Kenya National Highways Authority

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中国路桥工程有限责任公司
CHINA ROAD AND BRIDGE CORPORATION

PROJECT MODEL: BUILD OPERATE TRANSFER (BOT)

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED NAIROBI EXPRESSWAY PROJECT

VOLUME I

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ACRONYMS

AADT	Annual average daily traffic
ADP	Annual Development Plan
ALARP	As Low as Reasonably Possible
BID	Background Information Document
CIDP	County Integrated Development Plan
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Co-ordination Act 1999 and 2015
EPZA	Export Processing Zone Authority
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Management and Monitoring Plan
GHG	Greenhouse Gas
GoK	Government of Kenya
IDA	International Development Association
I&Aps	Interested & Affected Parties
KeNHA	Kenya National Highways Authority
KFS	Kenya Forest Services
KTSSP	Kenya Transport Sector Support Project
MAVWASCO	Mavoko Water and Sewarage Company

NEMA	National Environment Management Authority
NCWSC	Nairobi City Water and Sewarage Company
NIUPLAN	Nairobi Integrated Urban Development Master Plan
O&M	Operations and Maintenance
OP	Operational Policies
RAP	Resettlement Action Plan
ToR	Terms of Reference

ABBREVIATIONS

%	Percent
Cm	Centimetres
CO_2	Carbon Dioxide
Kg	Kilograms
Km	Kilometres
km^2	Square kilometres
M	Metres
m^2	Square meters

1 EXECUTIVE SUMMARY

1.1 OVERVIEW

The Government of Kenya (GoK), through the Kenya National Highways Authority ("KeNHA"), in its ambition to mobilize private sector capital and expertise in the infrastructure space has partnered with China Roads and Bridges Corporation to implement the first build operate transfer(BOT) Nairobi expressway project which will be the first BOT model project in Kenya. The Project's significance and objectives include:

- The investor takes the revenue risk;
- The concession period is 30 years;
- The project will alleviate traffic congestion significantly by shortening commuter time to 20mins; and
- The project will significantly reduce the commuting time between James Gichuru, Nairobi downtown, JKIA and Athi River, reducing accrued economic losses due to traffic congestion, lost time, delayed flights and emissions.

Kenya National Highways Authority (KeNHA) is mandated to manage, develop, rehabilitate and maintain the international trunk roads linking centres of international importance, crossing international boundaries and terminating at international ports (Class A), national trunk roads linking nationally important centres (Class B) and the primary roads which link the provincially important centres to each other or to other higher class roads (Class C roads) in Kenya. 33. KeNHA is mandated through the Kenya Roads Act to charge tolls, to establish or acquire subsidiary corporations and enter into agreements with any state-owned or other entities to promote its business of delivering road infrastructure and services.

China Roads and Bridge Corporation Kenya (CRBC) undertakes contracting, investment, development and operation of road, bridge, port, railway, airport, tunnel, real estate and industrial park projects. The project will have a 30 year concession and CRBC will guarantee all revenue risk. Tolling will be implemented once the road is put into service. The concession is to be granted after execution of the Project with an agreement between CRBC & KeNHA

CRBC have appointed Centric Africa Limited (Centric), a firm of experts registered with the National Environment Management Authority (NEMA) (registration number 7112) to undertake an Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for the Project.

1.2 BACKGROUND TO THE PROJECT

Nairobi-Mombasa Road (A8), as the main road between Nairobi (the capital and the largest city of Kenya) and Mombasa (the largest port city of Kenya), is approximately 482km long. Meanwhile, A8 Road (previously A104) also leads northwest to Uganda, forming a large traffic artery in the western and northern part of Kenya. It is also an important part of the Trans Africa Highway 8 (Lagos-Mombasa Highway) and the main channel between West Africa and East Africa. It goes through Burundi, the eastern area of the Democratic Republic of the Congo, Rwanda, Uganda, South Sudan and other landlocked countries and links them all with Mombasa which is an Indian Ocean port in Kenya.

A8 Road passes through the downtown of Nairobi, where serious traffic congestion often occurs, especially in the morning and afternoon rush hours. There is a heavy traffic congestion in the section between Mlolongo and James Gichuru Road, in which has caused serious delays. To establish a rapid transit from the downtown of Nairobi to Mlolongo and divert the downtown traffic, an expressway is proposed along the median strip of A8 National Road, starting from Mlolongo and ending at James Gichuru Road.

The travel demand in and out of the CBD has increased beyond current capacity of the existing highways, therefore there is need for further augmentation of the highway's capacity.

The perennial congestion contributes to significant loss of productivity and high vehicle operating costs, negatively impacts business operations, impacting negatively on the attractiveness of and the ranking of Nairobi as a destination of choice for business and investment.

The Government has developed an integrated plan for this corridor to ensure adequate and effective transport which includes development of:

- Improvement of the Road Network
- Improvement of Public Transport Systems = BRT Line 1
- Improvement of Logistics network at Embakasi linking on:
- Standard Gauge Railway (SGR)
- Metre Gauge Railway (MGR)
- ICD and the Industrial Area
- Improvement highway capacity junctions to cater for traffic demands

1.3 PROPOSED EXPRESSWAY DESIGN

The Nairobi Expressway is designed as an access controlled dual carriageway to run along the central reserve of the A8 road starting from Mlolongo all the way to James Gichuru. A four-lane dual carriageway with class A standard and a design speed of 80 KPH along the medial strip of the A8 National Trunk Road. The total length of the Project is approximately 27Km, including 15.7Km at grade and 11Km elevated with 10 Interchanges/Entry or Exists/Toll Plazas.

This project is proposed to be developed in Public Private Partnership ("PPP") mode with 30-year concession period, including 3-year construction period and 27-year operation period.

Early Works have commenced with the Contractor having initiated works on a 260m trial section JKIA - Cabanas

1.4 ESIA PROCESS OR METHODOLOGY

The ESIA is being undertaken in fulfilment of the Environmental Management Coordination Act of 1999 and 2015 (EMCA) Schedule II that identifies projects that require an Environmental Impact Assessment (EIA) to be conducted prior to the commissioning/operation in order to identify the potential adverse impacts of a project and thereby devise appropriate mitigation measures.

Various data collection methods were used as follows:

1.4.1 Document Review

A literature review was undertaken based on the findings of the scoping process, which involved reviewing legislation, policies, County Development Plans and previous studies carried out in the area to determine the baseline conditions and establish the legal, institutional and biophysical and socio-economic environmental setting of the proposed project.

The desk based study also included the development of fieldwork tools, fieldwork schedules as well as the approach to stakeholder engagement as outlined in the Stakeholder Engagement Plan.

1.4.2 Site Visits

Detailed site investigations were then undertaken in October and November 2019 during which further stakeholder engagement was undertaken and primary environmental and social data was collected through:

- a number of stakeholder meetings (including public meetings/baraza);
- Key Informant Interviews (KII);
- Focus Group Discussions (FGD)

Photography and Global Positioning Systems (GPS) were used to record the salient features and baseline conditions in the Project site and its surroundings. The photos were used to define existing features in the Project Area and identify soils and floral species. Photography was combined with transect walks and used to identify possible impacts of the proposed Project. All the relevant images were stored and are attached to this Report.

1.4.3 Impact Assessment Methodology

The purpose of impact assessment and mitigation is to identify the significant potential impacts on identified receptors and resources according to defined assessment criteria and to develop and describe measures that will be taken to avoid or minimise any potential adverse effects and to enhance potential benefits.

1.4.4 ESIA Project Report Objectives

The objectives of this ESIA Study Report are to:

- Identify all potentially significant adverse environmental and social impacts of the project and recommend measures for mitigation.
- Gather baseline data to inform the assessment of impacts and to monitor changes to the environment as a result of the Project as well as evaluate the success of the mitigation measures implemented.
- Recommend measures to be used to avoid or reduce the anticipated negative impacts and enhance the positive impacts.
- Prepare an ESIA Study Report compliant to EMCA and the Environmental (Impact Assessment and Audit) Regulations (2003/2016), detailing findings and recommendations for review by NEMA.

1.4.4.1 Stakeholder Engagement

Stakeholder Engagement ensures that the views and concerns of stakeholders (including the community) are incorporated as early as possible into the project development, i.e., at the planning, implementation and operations phase, to minimise any potential unexpected opposition to the proposed development, and potential adverse effects to the environment. Incorporating the views of the stakeholders into the design process is also very beneficial for adopting the best workable models and systems.

- The main objective of the Stakeholder Engagement is to inform stakeholders and the public about the proposed project and its likely effects, and in turn incorporate their inputs, views and concerns into project planning. The following engagements were held as part of the ESIA process;
- six (6) public consultation meetings along the project road corridor in order to collect the views of the local community members and obtain their input on the sustainable implementation of the project. Key Informant Interviews (KII); This public meetings were held in Mlolongo, Katani road (Syokimau), Imara Daima Cabanas, South C, South B, and Westlands.
- Focus Group Discussions (FGD) with Bodaboda and Tuktuk operators, small business traders, PSVs, and residents association along the project alignment and their interaction with the project in future; and site walkovers.
- Engagements with professional associations and inistitations such as University of Nairobi, AAK and EIK
- two high level meetings were organized to deliberate with primary stakeholders who have businesses or properties fronting the Nairobi Expressway Project. The meetings were held at College of Insurance in South C on 10 December 2019 and at Kenya Agriculture and Livestock

Researh Organization (KALRO) along waiyaki way on 11 December 2019 respectively.

Key environmental and social concerns are;

- Accessibility to employment opportunities
- Business Continuity with minimal disruption during construction
- Destruction of the landscaped areas within the existing median
- Traffic congestion during the construction period
- Disruption of services (power/water/internet)owing to relocation of utilities
- Safety of Road Users during Construction
- Land Uptake

A sumaary of key issues and responses during the stakeholder engegament exercise as presented below in thematic areas

Aspect	**Concern**	**Response given**
Project design	access to businesses would be affected in regards to the number of lanes customers would have to cross to access their premises	Crossing points will be established along the expressway at designated points and the older footbridges will be reinstated
	What are the anticipated/estimated rates per KM that the proposed express way will be charging motorists? • Will the toll roads be used by private vehicles and trucks only or it will be open to public transport vehicles as well?	The National Transport Funding Policy (study undertaken in 2015) stipulated a toll tariff of KES 6/pcu/km which would be subject to adjustment due to inflation. The project has adopted an adjusted tariff of KES 11.24/pcu/km. The toll payable would be a fraction of savings realized from vehicle operations cost and not an additional cost Yes, this Project will be open to public transport vehicles except those trucks carrying dangerous goods/chemicals and motorcycles
	Why will the road be fenced?	This Project is a true toll road and it is a fully access controlled expressway. The road will be fenced to ensure smooth movement of vehicles and good driving experience
	Why isn't the existing road being upgraded?	The construction of this project is actually an upgrade of the A8 road. However, we have used the central reserve of A8 to build new roads and formed two road systems, the Expressway and the existing A8 road, which are more conducive to the rapid traffic of the whole corridor
	How does the technical team plan to manage traffic during construction? traffic congestion during operation at toll station? .	Temporary access roads will be provided during construction period to ensure smooth movement of the existing A8 and instructions of diverging routes will be established as well. All toll stations have been carefully designed to ensure the delay of vehicles

Aspect	Concern	Response given
		is under control and the smooth movement is guaranteed
	storm water drainage was catered for in the design to avert adverse occurrence such as witnessed on Thika Road	Careful studies are being done to address the issue and come up with effective designs.
	As the road will utilize medium section how will the U turns for existing A8 be kept functional for the A8 to operate normally	Several U-turns will be re-built during the construction of this Project to keep functional for the existing A8.
	The project will pose accessibility challenges to pedestrians using the footbridges, motorbikes and motorists using the various turning points around the road which will either be re-routed or completely be eliminated. How will this be managed? How many crossing points is planned for the expressway?	All existing footbridges will be retained or rebuilt near the original location. The existing U-turns and intersections of A8 form southern bypass interchange to James Gichuru road will be retained. Form Mlolongo to southern bypass interchange, pedestrians can do U-turn or cross by using the road under Nairobi Expressway viaduct.
	current drainage systems can be improved to facilitate proper drainage as part of the project scope because the current drainage systems are not working	Proper design work and levels will be taken to inform effective storm water drainage
	design of the expressway will take into consideration accesses to various premises to avoid interfering with flow of customers	Studies on traffic flow have been done so as to identify the traffic flows at various sections and this can help minimize interference on access to premises.
	Can the detailed design be shared with stakeholders?	The detailed designs is still under preparation, what is currently available is the preliminary design
Project affected persons	Is a land lessee a primary or secondary affected person?	The affected persons are categorized according to impact the project will have on them. Land owners are primary affected persons and those leasing from the land owners are secondary affected persons.
	When will the setting out of the road be done for project affected persons to know early enough if affected and the extent, so they plan on a course of action in time	Once the detailed design is ready, it will be possible to know who is affected and how. When that time comes, a separate meeting for PAPs will be convened
	details be shared with the actual project affected persons and in good time so that business owners can plan accordingly and in good time on the way forward for their businesses	The designs haven't been fine-tuned yet but once they are, the specific people who will be affected will be contacted again and engaged separately and in depth to come up with effective and timely solutions

1.4.5 Potential Impacts and Mitigation Measures

1.4.5.1 Positive Impacts

- The four-lane dual carriageway once completed will run over 27km, linking Mlolongo and Jomo Kenyatta International Airport (JKIA) to the Nairobi-Nakuru highway and it is expected to ease the flow of traffic in the city
- The operational stage of the Project is expected to improve connectivity for the transport of goods, services and people between in Nairobi and the entire northern corridor for a better economic growth potential of the region (indirect). This would include better accessibility for businesses in the region to expand their geographical markets and resources to other areas and countries.
- The project is also expected to enhance Competitiveness of the Kenya within East Africa Region and entrench Kenya's position as a business hub of choice, through enhanced Logistics efficiency at SGR Terminus, JKIA, ICD and Industrial Area.
- The project is also ecpected to significantly reduce response time to emergencies as the expressway will have dedicated emergency lanes on either side and reduced journey times for motorists and passengers travelling beyond Nairobi;
- There will also be expected benefits existing A8 users (Mombasa Road, Uhuru highway, Waiyaki Way) due to less congested created by expressway.
- Benefits will also be accrued to the country and business opportunities for local supply chain through enhancement of attractiveness of vast areas around Mlolongo and beyond for major real estate and industrial development through significant reduction in travel times to the CBD and international visibility for Kenya as destination for Foreign Direct Investment especially in Road infrastructure;
- The Project impact on connectivity and accessibility is therefore considered as Positive.
- The Project will generate tax revenue for the Kenyan government, which will contribute to the national budget. Tax revenues will be generated through income taxes and corporate taxes on expenditures, operational and corporate revenues and incomes of employees. Operational revenues will be generated primarily through toll fees on the expressway and Corporate Tax is estimated at USD371M.
- Project is expected to decongest traffic significantly and save hundred millions of shillings per year. (Kshs 50 million shillings lost daily from the delays and fuel wastage caused by traffic jams, and accidents especially in urban areas).
- Realisation of Vision 2030 & Big 4 Agenda (Mlolongo, Athi River, Kitengela, Konza City, Machakos will be further enabled to develop as industrial and business hubs including locations for affordable housing)

1.4.6 Analysis of impacts

The bio-physical and socio-economic impacts during the construction phase that have been identified and assessed in the ESIA include the following;

Impact	Significance (pre-mitigation)	Residual Impact
Impacts on Water Quality	MAJOR NEGATIVE	MODERATE NEGATIVE
Reduction in Water Availability	MAJOR NEGATIVE	MINOR NEGATIVE
Impacts on Soils	MAJOR NEGATIVE	MINOR NEGATIVE
Impacts on Local Air Quality	MAJOR NEGATIVE	MINOR NEGATIVE

Impact	Significance (pre-mitigation)	Residual Impact
Impacts on the Noise Environment (including vibration)	MODERATE NEGATIVE	MINOR NEGATIVE
Wastes and Effluents	MAJOR NEGATIVE	MINOR NEGATIVE
Impacts Flora	MODERATE NEGATIVE	NEGLIGIBLE NEGATIVE
Impacts on Fauna	MODERATE NEGATIVE	MINOR NEGATIVE
Impacts of material sites and borrow pits	MODERATE NEGATIVE	MINOR NEGATIVE
Impacts on Employment, Procurement and the Economy	POSITIVE	POSITIVE
Land Acquisition and Resettlement	MAJOR NEGATIVE	MODERATE NEGATIVE
Impact on Disease Transmission	MODERATE NEGATIVE	MINOR NEGATIVE
Traffic Impacts	MAJOR NEGATIVE	MINOR NEGATIVE
Insecurity	MODERATE NEGATIVE	MINOR NEGATIVE
Labour and Working Conditions	MODERATE NEGATIVE	MINOR NEGATIVE
Impact on Cultural Heritage	MODERATE NEGATIVE	NEGLIGIBLE NEGATIVE

The major mitigation/enhancement measures to address the more significant impacts for the construction phase include the following (for a comprehensive list of mitigation measures please refer to the ESIA report and Environmental and Social Management and Monitoring Plan, ESMMP):

- Regularly maintain the Project equipment as per the manufacturer's instruction to avoid the possibility of any leaks and spills.
- Do not undertake any maintenance near a water source.
- Minimise Project activities at river crossing points, only carryout the earth work that is necessary for the proposed Project.
- Select the preferred water abstraction points based on a hydrology study.
- Obtain water abstraction permits from WRMA prior to the commencement of the water abstraction activities.
- Integrate drainage system in the overall road planning and construction to align it to the natural drainage system as much as possible.
- Harmonize drainage with all point sources of surface runoff such as valleys and rivers, and the pavement surface structure.
- The design of all the culverts should be informed by hydrological studies to be able to manage peak runoff.
- Drainage outfalls should not be directed into private land or premises.
- Ensure protection of soil adjacent to the side drains and the constructed drainage.
- Dust suppression measures including a watering programme should be implemented during the construction phase. This would include ensuring constant watering of construction surfaces and dry materials to keep dust low throughout the project areas and the deviation routes.
- Traffic management measures for construction vehicles.
- The Contractor should develop a rehabilitation/reinstatement plan for the borrow pits.
- Contracts with the landowners for material sites should be signed before excavation begins which include terms and conditions for payment, the area of land to be excavated, and the rehabilitation measures to be carried out on the gravel sites, if required. The contract documents should instruct the contractor to construct and maintain fences and rehabilitate after use.
- The material sites areas must be excavated should be cordoned off, as these areas tend to be deep and pose a danger to children and livestock.
- A resettlement action plan (RAP) will be conducted to minimise the adverse social impacts of the proposed project road. The RAP will identify those persons within the project area who may be displaced as a result of the proposed road. It will provide a socio-economic profile

on the Project Affected Persons (PAPs) and give the cost of resettlement. From the preliminary designs the land uptake for this Project is approximately 35 acres, comprising 60% of public land and 40% private land. Efforts have been made to minimize the land acquisition of the Project, including placing the toll plazas on the bridge/grade separated sections, limiting the radius of ramps and the spacing between the ramps and the main lines

- KeNHA and CRBC must develop and implement a HIV/AIDS/Malaria as well as TB policy and an information document for all workers directly related to the Project. The Contractor must implement this policy. The information document will address factual health issues as well as behaviour change issues around the transmission and infection of HIV/AIDS as well as malaria.
- Employment should also be equal throught the projects 27km corridor.
- The Project should develop and implement an Occupational Health and Safety Management System in line with good industry practice. This systems should include consideration of hazard identification, risk assessment and control, use of Personal Protection Equipment (PPE), incident investigation and reporting, reporting and tracking of near misses, incidents etc. The management system should also include emergency response plans. Roles and responsibilities should be clearly defined.
- In order to minimize the potential for impact to sub-surface cultural resources, KeNHA should establish a Chance Find Programme staffed with on-call Kenyan archaeologists to address the discovery of Chance Finds during the construction phase.

1.5 RECOMMENDATIONS

Centric is confident that every effort will be made by KeNHA and CRBC to accommodate the mitigation measures recommended during the ESIA process to the extent that is practically possible, without compromising the economic viability of the Project. The implementation of the mitigation measures detailed in Chapters 10 and listed in the ESMMP will provide a basis for ensuring that the potential positive and negative impacts associated with the establishment of the development are enhanced and mitigated to a level which is deemed adequate for the development to proceed.

2 INTRODUCTION & CONTEXT

2.1 INTRODUCTION TO THE PROJECT

The Nairobi Expressway Project ("The Project") is proposed to be built along the median of A8 National Road, starting from Mlolongo and ending at James Gichuru Road. The total length of the main line is 26.764km, including 15.739 km of at grade sections and 11.025 km elevated sections. It is a standard Class A dual-carriageway road.

This project is proposed to be developed in Public Private Partnership ("PPP") biuld operate transfer (BOT) model with 30-year concession period, including 3-year construction period and 27-year operation period.

2.2 PURPOSE OF THE REPORT

The information contained in this ESIA Study Report, along with comments and inputs received from stakeholders and commenting authorities will assist the competent authority, the National Environment Management Authority (NEMA), in deciding whether or not to grant environmental authorisation for the proposed Project, and to inform the conditions associated with such authorisation.

The ESIA process involves the identification, prediction and evaluation of actual and potential environmental and social impacts of a Project and outlines the proposed mitigation measures for negative impacts and enhancement measures for positive impacts which CRBC and KeNHA will implement.

The objectives of this document are to:

- Communicate the results of the ESIA process for the proposed Project and alternatives considered;
- Ensure that the impacts identified during the ESIA process are assessed;
- Present the mitigation and enhancement measures which will be implemented by CRBC and KeNHA in managing the impacts identified;
- Provide a record of comments and responses received from Stakeholders during the ESIA process; and
- Facilitate an informed decision-making process by the relevant authorities.

2.3 PREVIOUS ESIA STUDIES ON THE CORRIDOR:

In 2013 KeNHA undertook Nutrip project ESIA for construction of additional lanes on JKIA-Likoni - James Gichuru-Rironi road (A4) (approximately 42 km), dualling of Airport South Road (approximately 3km), creating of an access to JKIA widening (approximately 2km), construction of a bitumen road to the proposed Barabara Plaza (approximately 2km) and construction of an access road to container depot (approximately 2km) . NEMA license (0016896) was issued on 26th June 2013. The license was initially varied on 18th April 2017 (NEMA/EIA/VC/567) and again varied on 12th October 2018 (NEMA/EIA/VC/977).

Another study that dealt with Consultancy Services of Feasibility, Preliminary and Detailed Engineering Design, Environmental and Social Impact Assessment Study for the capacity enhancement of part of the A104 road from JKIA Turnoff to Likoni road junction was undertaken by KeNHA in 2015. As part of the assignment the study included upgrading of the Airport South, Access to JKIA (B10), Barabara Plaza, Container Deport and East Gate roads. This study was submitted to NEMA and License issued (NEMA/EIA/PSL/4435) issued on 23rd March 2017. The license was later returned to NEMA for amendments due to a typological error on the objective section.

On October 2019 NEMA approved another variation (See Annex 5 volume II of this report) of the NEMA license (0016896) for a go ahead of the Nairobi Expressway works for the section between JKIA to James Gichuru covered under the project construction of additional lanes on JKIA-Likoni - James Gichuru-Rironi road (A4) (approximately 42 km), dualling of Airport South Road (approximately 3km), creating of an access to JKIA widening (approximately 2km), construction of a bitumen road to

the proposed Barabara Plaza (approximately 2km) and construction of an access road to container depot (approximately 2km).

However a guidance was issued by NEMA for the section between Mlolongo to JKIA (not covered under license number 0016896) not to commence until ESIA for the redesign expressway is undertaken processed by by NEMA and record of NEMA decision is issued.

It is against this background this ESIA report for Nairobi Expressway is presented to NEMA for review and decision

2.4 PROJECT PROPONENT

China Roads and Bridge Corporation Kenya (CRBC) undertakes contracting, investment, development and operation of road, bridge, port, railway, airport, tunnel, real estate and industrial park projects. The project will have a 30 year concession and CRBC will guarantee all revenue risk. Tolling will be implemented once the road is put into service. The concession is to be granted after execution of the Project with an agreement between CRBC & KeNHA.

1.5.2 PROJECTS ENVIRONMENTAL AND SOCIAL CONSULTANTS

Centric Africa Limited (Centric) was appointed by the Proponent to undertake the ESIA for the proposed Project. Centric (and specialists appointed by Centric during the course of this ESIA) has no financial ties to, nor are they a subsidiary, legally or financially, of the Proponent.

Centric is an Engineering and Environmental Management Consultants with extensive experience in environmental engineering management consultancy in the Kenya and East African region.

Centric Africa Limited is also registered with the National Environment Management Authority (NEMA) as a 'Firm of Experts' Reg. No. 7112. Ref Annex 1 for Centric's Registration Certificate and Practicing Licence from NEMA.

The ESIA team is presented in Table 1

Table 1: Centric Expressway ESIA Project Team

Position	Name	Qualifications
Project Manager	Haroub Ahmed	○ M.Sc. Energy tech, ○ B.Sc. (Hons) Environmental Science, ○ NEMA Kenya Lead EIA/Audit Expert
Lead Environmental Expert	Eunice Opondo	○ Post Graduate Diploma in Occupational Health and Safety (OHS), ○ Master of Arts in Development Studies, University of Nairobi ○ Bachelor of Environmental Studies, Kenyatta University ○ NEMA Kenya Lead EIA/Audit Expert
Social Safeguards Expert/RAP Expert	Allan Owino	○ Master of Art Degree in Sociology, Nairobi University ○ Bachelor of Science (Environmental Science) with Information Technology, Maseno University ○ NEMA Kenya Lead EIA/Audit Expert
Environmental Expert	Michael Waweru	○ Master Degree in Environmental Planning and Management, University of Nairobi- Kenya (Specialization on Environmental Concern and Pro- Environmental Behaviour); ○ NEBOSH International General Certificate in Occupational Health and Safety (IGC- OSH), Course Provider- SMTS UK; ○ Bachelor Degree in Environmental Studies

		(Science), Kenyatta University o NEMA Kenya Associate EIA/Audit Expert
Social Safeguards/Field Technician	Joyce Owino	o Masters of Arts (Sociology) University of Nairobi-On going o Bachelor of Science: (Community Resource Management)
Linus Origa	Ecologist	o University of Nairobi MSc. /Land and Water Management o BSc. Agriculture (Soil Science Major)
Daniel Chumo	Environmental Engineer	o BSc in Environmental Engineering o NEMA Associate EIA/EA Expert

2.5 REPORT STRUCTURE

The structure of this ESIA Report is outlined in Table 2.

Table 2: Report Structure

Section	Contents
Executive Summary	Contains a summary of the ESIA
Chapter 1 Introduction	Contains a brief description of the proposed activities, Project proponent, Project consultants and an outline of the report structure.
Chapter 2 Project Description	Includes a detailed description of the proposed Project activities.
Chapter 3 Legal and Institutional Framework	Outlines the legislative, policy and administrative requirements applicable to the proposed Project.
Chapter 4 Project Alternatives	Describes the alternatives that have been considered and the reasons for the selection of the preferred alternative
Chapter 5 Stakeholder Engagement	Describes the approach to and outcomes of the stakeholder engagement and public participation process.
Chapter 6 Biophysical Baseline	Describes the receiving biophysical baseline environment.
Chapter 7 Socio-economic Baseline	Describes the receiving socio-economic baseline environment.
Chapter 8 Approach and Methodology	Outlines the approach to the ESIA and summarises the process undertaken by the Project to date.
Chapter 9 Impacts and Mitigation Measures	Describes and assesses the potential environmental and social impacts of the proposed Project. Mitigation measures are also presented.
Chapter 10 Environmental and Social Management and Monitoring Plan (ESMMP)	Specifies the mitigation and management measures to be undertakes and shows how the Project will mobilise organisational capacity and resources to implement these measures.
Chapter 11. Handling Of Project Grievances And Complaints	This section describes the overall approach to Project's grievance mechanism, including the role and responsibility of both KeNHA and CRBC.
Chapter 12 Conclusions and Recommendations	Summarises the key findings of the EIA and provides recommendations for the mitigation of potential impacts and the management of the proposed Project.

In addition the Report includes the following annexures:

- Centric nema license and experts licenses
- Project layout and technical brief
- Biodversity assessmsnet Data on flora and fauna along the expressway
- Minutes of public meetings
- Sign in sheets of public meetings

- Photos of public minutes
- Minutes of high level meetings
- Sign in sheets of high level meetings
- Photos of high level minutes
- Meeting with professional bodies
- Media coverage of the project
- NEMA correspondence letters on the project

2.6 LIMITATIONS OF THIS REPORT

The report is based on the information available at the time of preparation of this report, which included:

- Preliminary Project Design Documentation developed at the CRBC
- Information provided by the CRBC personnel during interviews, weekly meetings and site visits

At the time of issuing this version of the ESIA report it is evident that the Project's technical design is being improved by the CRBC design team and KeNHA's project team and some of the design solutions will be amended especially around optimization to minimise land take, re-configuration of junctions, and configuration of linear utilities (e.g. existing pipelines, power transmission lines etc.).

3 PROJECT DESCRIPTION

3.1 PAST INITIATIVES ON THE SECTION JKIA - RIRONI

The section of the highway (A8) between Machakos Turnoff – JKIA- Nairobi CBD – Rironi has remained a priority for expansion in line with strategic objectives of the Ministry.

The section forms part of the Northern corridor which is a key economic route and gateway to Kenya, which serves as a critical link to the Port of Mombasa, Jomo Kenyatta International Airport, SGR Nairobi Terminal and the Inland Container Depot at Embakasi.

Previous studies have shown that the entire section of this highway is viable for development through PPP, and a number of initiatives have been tried over the years to upgrade it:

- The Nairobi Urban Toll Concession Project, NUTC (2007);
- National Urban Transport Improvement Project (NUTRIP)2013; and
- AfDB Development Support, 2014.

3.2 SUBSTANTIATION OF THE PROJECT

Nairobi-Mombasa Road (A8), as the main road between Nairobi (the capital and the largest city of Kenya) and Mombasa (the largest port city of Kenya), is approximately 482km long. Meanwhile, A8 Road (previously A104) also leads northwest to Uganda, forming a large traffic artery in the western and northern part of Kenya. It is also an important part of the Trans Africa Highway 8 (Lagos-Mombasa Highway) and the main channel between West Africa and East Africa. It goes through Burundi, the eastern area of the Democratic Republic of the Congo, Rwanda, Uganda, South Sudan and other landlocked countries and links them all with Mombasa which is an Indian Ocean port in Kenya.

A8 Road passes through the downtown of Nairobi, where serious traffic congestion often occurs, especially in the morning and afternoon rush hours. There is a heavy traffic congestion in the section between Mlolongo and James Gichuru Road, which has caused serious delays. To establish a rapid transit from the downtown of Nairobi to Mlolongo and divert the downtown traffic, an expressway is proposed along the median strip of A8 National Road, starting from Mlolongo and ending at James Gichuru Road. The total length of the main line is 26.764km, including 15.739 km at grade sections and 11.025 km elevated sections. It is a standard Class A dual-carriageway road.

Due to the increasing traffic volume, the current traffic capacity of A8 National Road cannot meet the demand of the development of the economy and society. It is urgent to upgrade and reconstruct the road. For the purpose of the Project, a new expressway will be built between Mlolongo and James Gichuru Road, which densifies the highway network and enhances the internal connectivity of the road system, resulting in a more convenient transportation and service level.

Traffic Conditions of the Sections Within the Scope of Project

The Project will be one of the most important roads in Nairobi, which passes many significant landmarks, including Nairobi National Museum, Nairobi CBD, Parliament of Kenya, Nyayo National

Stadium, Jomo Kenyatta International Airport ("JKIA"), the SGR and Mlolongo. It will significantly reduce the commuting time between Nairobi downtown to JKIA and Athi River. Furthermore, it will strengthen the economic relationship between Nairobi and other regions.

Jomo Kenyatta International Airport is the busiest airport in East Africa. The expansion of the Terminal 2 is coming in the near future, which will increase the handling capacity from 9 million person-times per year to 20 million person-times per year. A8 National Road is the only access to JKIA, which cannot match the future expansion need of the airport and the fast development of the surrounding highway network. A large number of passengers miss their flights on account of the frequent traffic congestions of A8 National Road. The Project, by constructing an expressway connecting the downtown and the airport, will greatly reduce the commuting time and be essential for coping with the increasing capacity of JKIA. It will also relieve the traffic pressure of the current road network and enhance the traffic capacity of the collecting and distributing channels of the airport.

3.3 KEY DESIGN SOLUTIONS

3.3.1 General Information

3.3.1.1 Starting point, ending point and main control points of the alignment

- Staring point: East of Mlolongo
- Ending point: James Gichuru Road (Westlands Redhill Road Link)
- Main control points: JKIA, Eastern Bypass End Interchange, Southern Bypass Start Interchange, Kiganjo Avenue flyover, Thika Road Interchange, 2 railway bridges, 8 pedestrian overpasses, 5 roundabouts and other existing structures.

3.4 ALIGNMENT SCHEME

In order to reduce land acquisition and demolition, the alignment is designed from the southeast to the northwest and along the median strip of the A8 Road, except the Haile Selassie section and the National Museum Interchange section is designed along the west side of A8 Road, with the route length of 26.764km.

- For the K0+000-K18+900 section, the alignment is laid out on the wide median strip (5-29m) of the A8 Road.
- For the K18+900-K19+300 Haile Selassie section, the alignment is laid out on the west side of A8 Road, occupying part of the land belonging to the railway bureau, without additional demolition.
- For the K19+300-K21+800 section, the alignment is designed along the wide median strip (5-10m) of the A8 Road.
- For the K21+800-K22+400 museum interchange section, the alignment is laid out on the west side of A8 Road due to the narrow medial strip (2.3-5.4m in width), complicated junction, great topographic relief and difficult pier setting of existing A8 road.
- For the K22+400-K23+600 section, since the east part of A8 line is higher than the west part, in order to reduce the height of the main line, the alignment is located on the west side of median strip of A8 Road (3.1-29.5m in width).
- For the K23+600-K24+600 section, due to the poor index of A8 Road, the alignment is laid out between the main line of A8 Road on the west side and service road.
- For the K24+600-K26+300 section, the alignment is laid out on the wide median strip (4.1-19.6m in width) of A8 road.
- For the K26+300-K26+764 section, in order to relieve the traffic pressure at terminal intersection and to achieve the interconnection of all roads at this area, the alignment is supposed to be digged down, below existing junction which should be transformed into an interchange.

According to the width of medial strip of A8 Road and the clearance of interchange overpass (the clear height of Eastern Bypass overpass is 22.8m and the clear height of Southern Bypass overpass is 22m), the total length of alignment is 26.764km including about 15.739 km of the embankment on ground and 11.025 km elevated.

The typical cross section between K10+800 and K14+100 is a six-lane cross section with the width of 28.6m, other sections adopt four-lane cross section with the width of 21.6m.

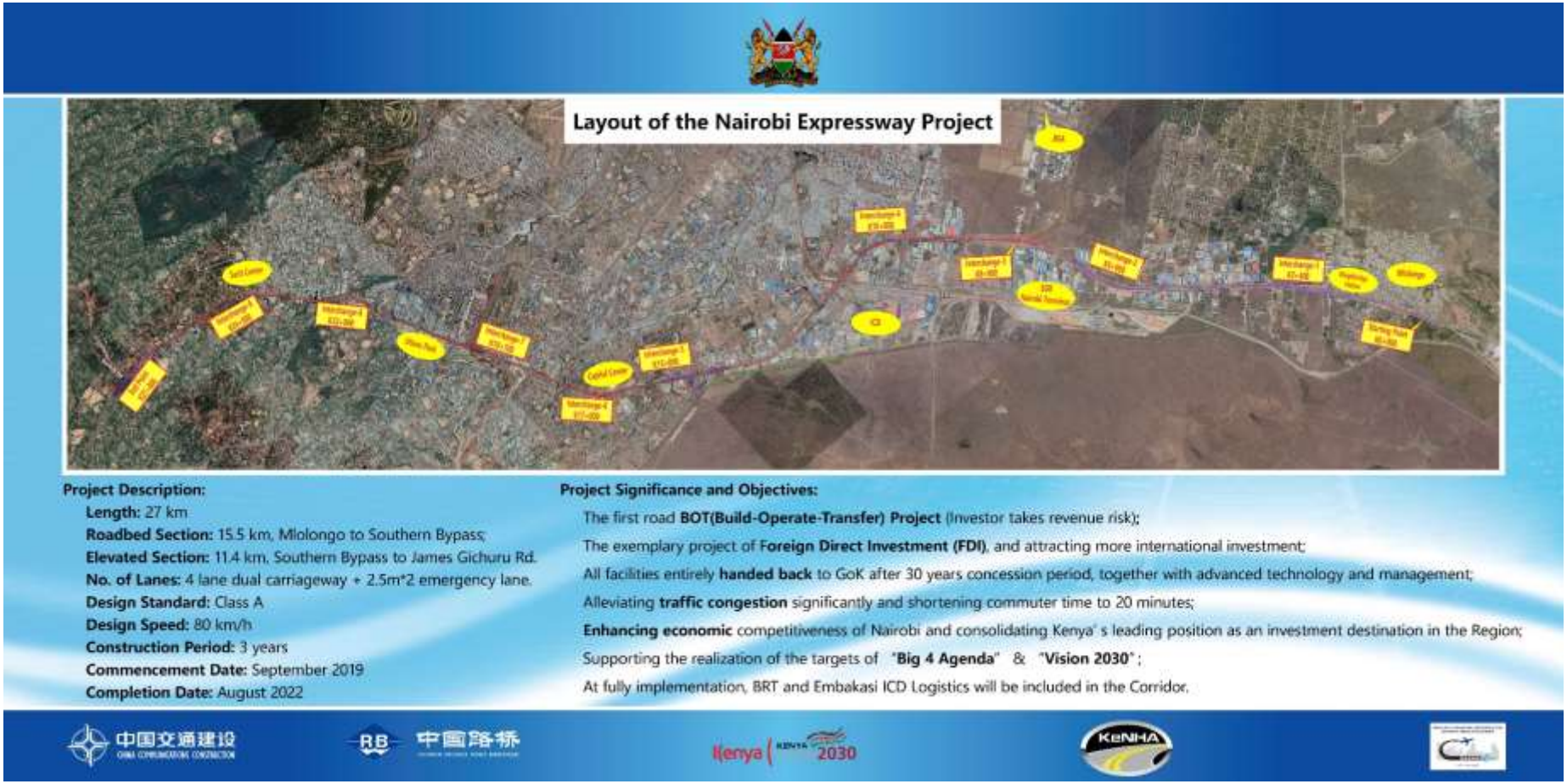


Figure 1: layout of Nairobi Expressway Project

3.4.1 Key Technical Data

The key technical indicators of road are presented in Table below.

Table 3: Expressway Key Technical Data

ITEM	UNIT	Technical parameters	Remarks
Highway Class	-	Class A	
Design speed	km/h	80	
Standard Subgrade Width	m	typical cross section - 21.6mEastern Bypass to Southern Bypass-28.6m	
carriageway width	m	3.5	Main road
Minimum radius of horizontal curve	m	350	Main road
Minimum radius of horizontal curve without superelevation	m	4000	Main road
Maximum longitudinal grade	%	4%	Main road
Minimum radius of convex type vertical curve	m	3500	Main road
Minimum radius of concave type vertical curve	m	2400	Main road
Category of design load for bridge and culvert	-	Highway -Class I	China Standard

3.4.2 RoW Earthworks, Drainage and Diversion Activites

3.4.2.1 Earthworks

The Class A standards for road is used for the roadbed design of the main line hereof, with a design speed of 80km/h. It is a dual carriageway road, with a typical cross section of 21.6m in width. For the section from K10+000 to K15+564 (Eastern Bypass to Southern Bypass), the cross section shall be locally increased to 28.6m.

For the typical cross section, the roadbed width is 21.6m and the cross section consists of 2.5m paved shoulder+3.5m×2 carriageways+0.5m marginal strip+0.6m guardrill+0.5m marginal strip+3.5m×2 carriageways+2.5m paved shoulder, as shown in the figure below:

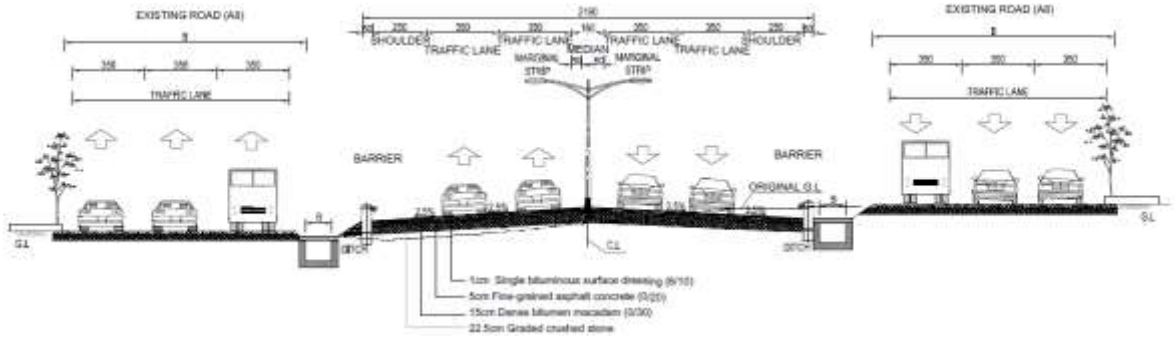


Figure 2: Standard Cross Section (21.6m) of Roadbed of General Section

For the section, with limited width of medium divider, where the retaining wall is required to contract the slope toe, the roadbed width is 21.6m=0.5m guardrail+2.5m paved shoulder+3.5m×2 carriageways+0.5m marginal strip+0.6m guardrill+0.5m marginal strip+3.5m×2 carriageways+2.5m paved shoulder+0.5m guardrail, as shown in the figure below:

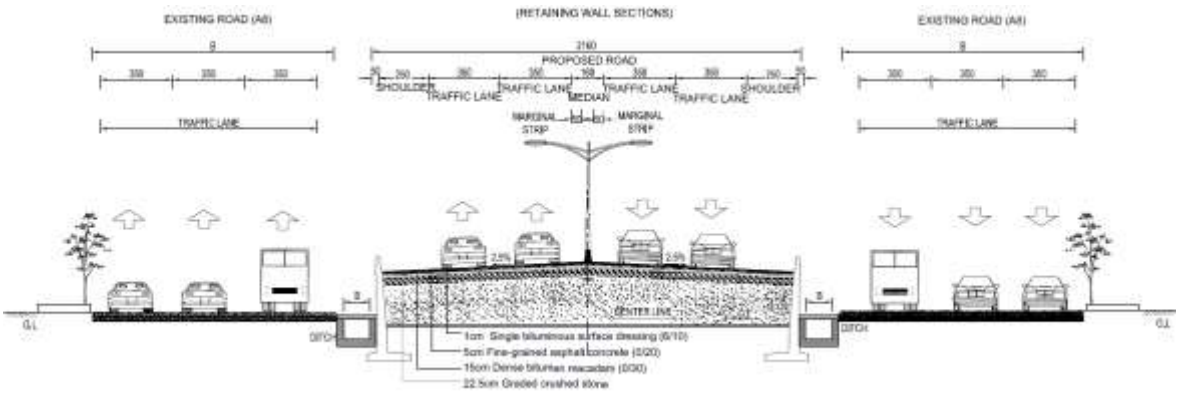


Figure 3: Standard Cross Section (21.6m) of Roadbed of Section with Retaining Wall

Due to the latest traffic projection, the traffic volume between Eastern Bypass and Southern Bypass would be constrained if we propose 4-lane dual carriageways. Therefore, it is considered to widen the roadbed cross section by adding 2 extra carriageways and the roadbed cross section is 28.6m = 0.5m guardrail+2.5m paved shoulder+3.5m×3 carriageways+0.5m marginal strip+0.6m guardrill+0.5m marginal strip+3.5m×3 carriageways+2.5m paved shoulder+0.5m guardrail, as shown in the figure below:

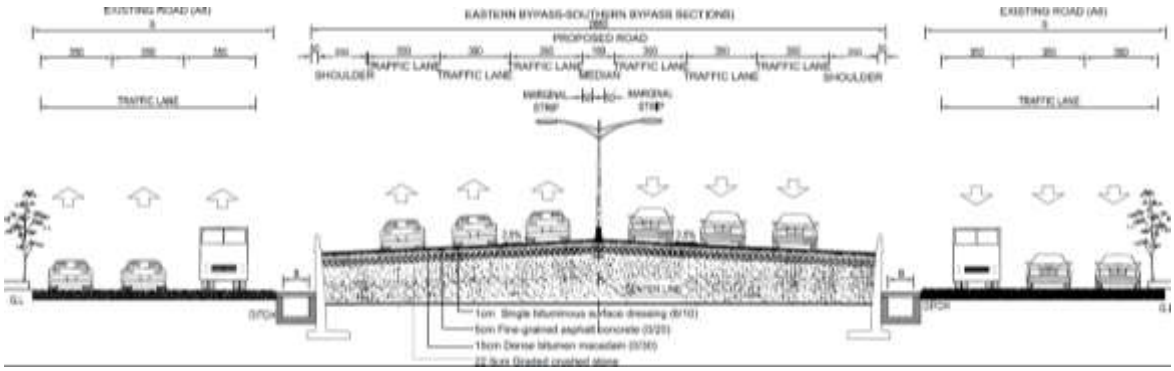


Figure 4: Typical Cross Section (28.6m) of Roadbed between K10+800-K15+564 Section

The expressway scheme is used for the K15+564-end point, with the bridge cross section of 21.6m, as shown in the figure below:

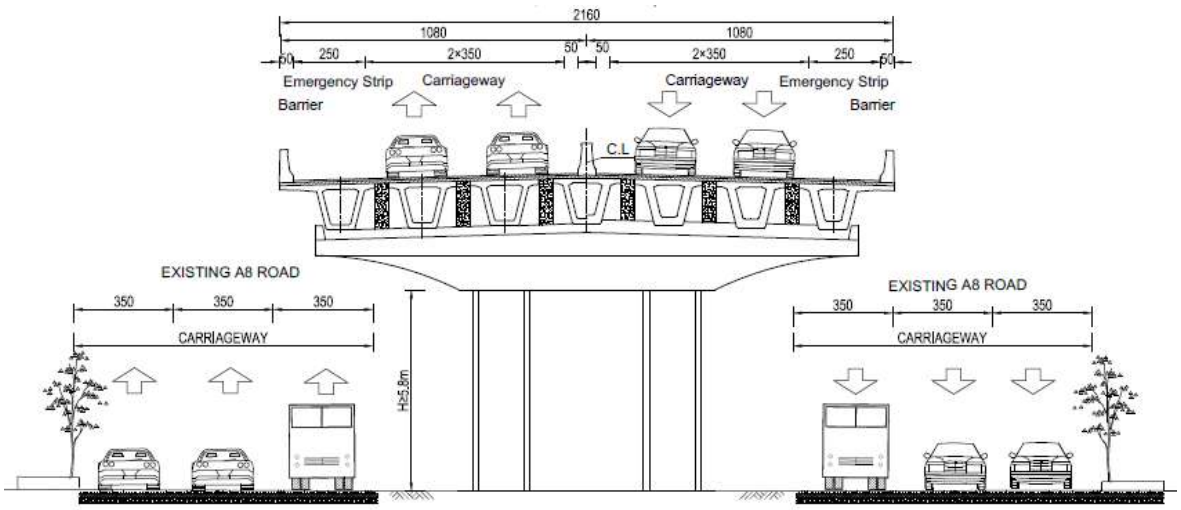


Figure 5: Typical Cross Section of Bridge of K15+564-End Point

Three typical cross sections are adopted in the interchange ramps of this project which shown in below figures. The typical cross section with a width of 10m only adopted in C and E ramps of Southern Bypass interchange.

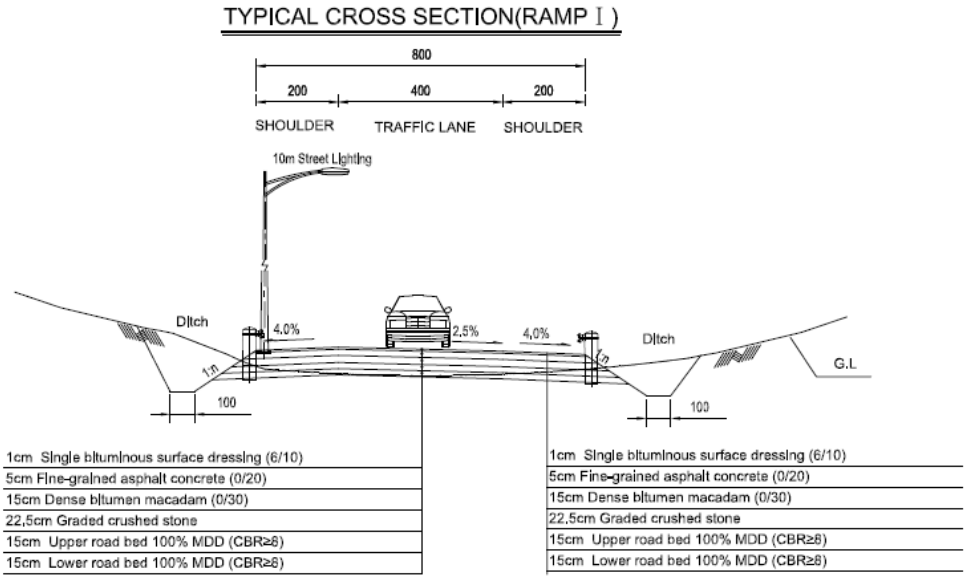


Figure 6:Typical Cross Section of Interchange Ramp(9m)

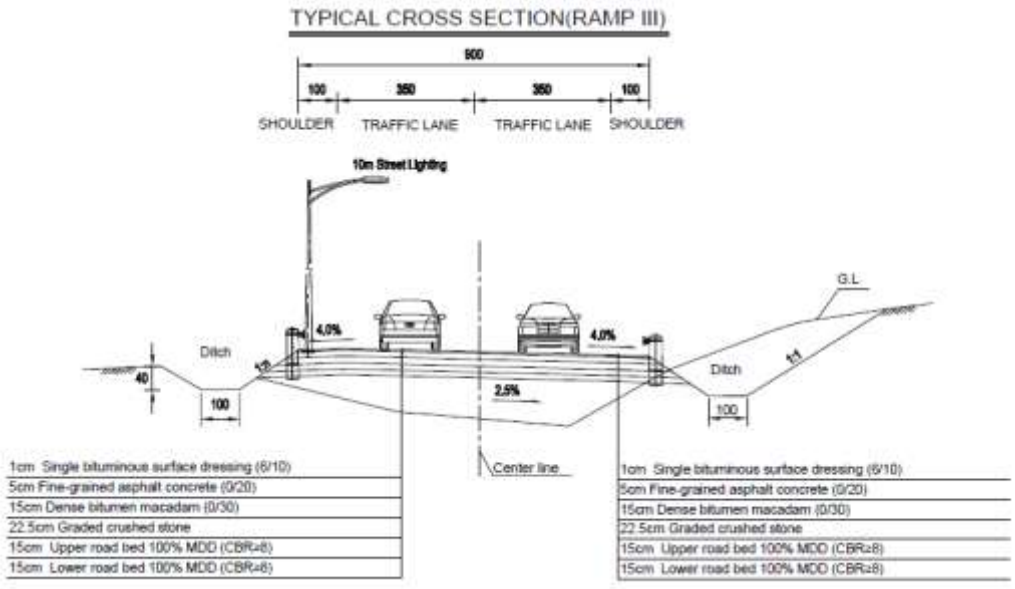


Figure 7: Typical Cross Section of Interchange Ramp(10m)

The cross slopes of the carriageway and paved shoulder are 2.5%.

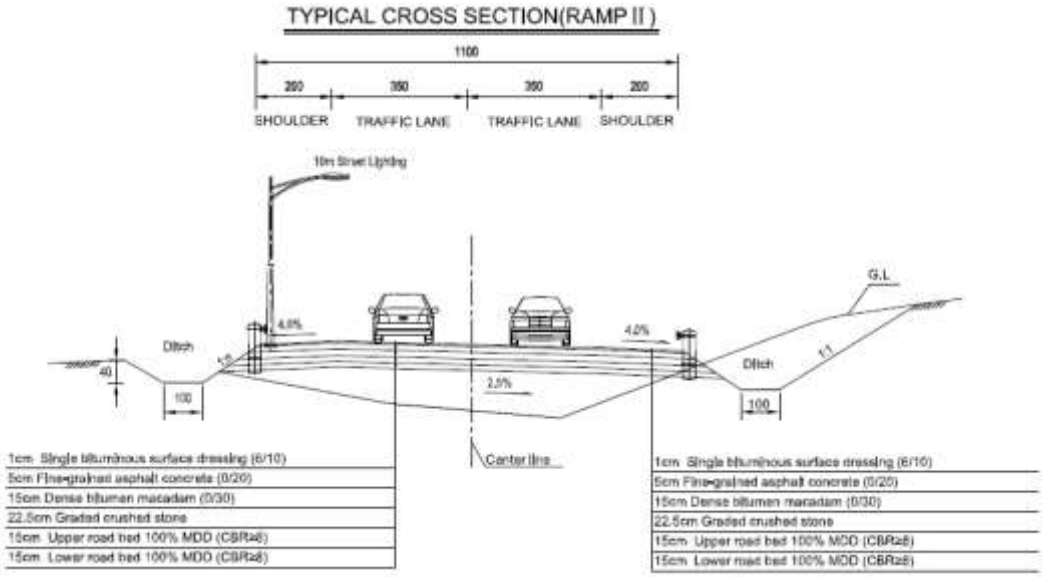


Figure 8:Typical Cross Section of Interchange Ramp(12m).

The alignment of the project is designed within the A8 central reserve with little terrain fluctuation. Due to the limited width of the median strip, the high slope will encroach on the space of the existing A8 road. Therefore, sections with enough width will be normally sloped, while for the width-limited sections, the cantilever or MSE retaining wall is used to restrain the toe of slope. The slope of roadbed of the project is as below:

3.4.2.2 Embankment slope:

For the sections with a sufficient width of central reserve, the slope is 1:1.5;

For the sections where the slope setting will encroach on the area of existing A8 road, the retaining wall is built to restrain the slope. If the wall height is <1m, the cantilever reinforced retaining wall is used; if the wall height is⩾4m, the MSE retaining wall is used.

3.4.2.3 Cutting slope:

For the sections with a sufficient width of central reserve, the slope is 1:1;

For the sections where the slope setting will violate the ROW of the existing A8 road, the retaining wall is built for restraining the slope. The cantilever reinforced retaining wall is used due to that the height of cutting is generally low.

Before the roadbed filling, the original vegetation and humus of the soil surface shall be cleared (generally 20cm for surface soil stripping) within the project area. After the surface clearance, the compaction works are conducted before the filling works. The roadbed is filled upon that base compaction degree is ⩾95% (standard compaction).

For certain sections, the A8 median strip is too narrow to construct the entire cross section of roadbed. Therefore, it is required to modify and relocate part of A8, resulting in the issues on the connection of new and existing roadbeds.

To avoid any cracking of roadbed/pavement due to the differential settlement of new and existing roadbeds, the following measures are taken:

- 1)For the black cotton soil sections, the underlying soil shall be replaced before the roadbed filling; for the sections with defective existing roadbed, the defects shall be removed to improve the compactness and stability before linking the roadbeds.
- 2) Before filling the connected roadbed, the surface soil of the existing slope shall be striped for 50cm. Upon the cleaning works, the benches are made on

the clean slope from the bottom to the top. The excavated bench shall be filled without delay;

- 3) The geogrid shall be installed between the new and existing roadbeds;
- 4)The qualified high-class filling materials shall be preferred for roadbed filling to improve the compactness of the connected roadbed;
- 5) The connection of the pavement structures shall be subject to the overlap joint.

There is black cotton soil along the alignment whose poor strength after soaking cannot satisfy the features of roadbed filling. According to the geological report, the depth of the black cotton soil within the project site is generally less than 1.5m. Therefore, it is required to replace the black cotton soil with the qualified roadbed filling materials.

3.4.2.4 Requirements of roadbed filling materials

The following materials are forbidden for roadbed filling:

- The materials with an organic content more than 5% (e.g. surface soil, materials from marsh and mud, stump and humus);
- The materials with an expansion rate more than 3% (e.g. black cotton soil);
- The cohesive soil with a plasticity index more than 50; and
- All materials with a water content that is 105% of its optimal water content (under standard compaction).

3.4.2.5 Requirements of filling and compactness

Before the construction, the waste soil and organic soil must be removed and back-filled to the original ground level. The compactness shall be at least 95% (standard compaction).

When filling with soft materials, fill by layer is recommended, with the thickness of each layer no more than 150mm (compacted). While filling with hard materials, the maximum particle diameter shall not exceed 250mm, with the thickness of each layer no more than 400mm (loose state).

In general, the dry density of the filling materials of each layer shall be compacted to no less than 95% MDD (standard compaction). Where, the upper 350mm part of the roadbed shall be compacted to no less than 100% MDD (standard compaction). The embankment shall be completed as soon as possible to ensure the adequate time for preventing the pavement from cracking. When compacting, the water content shall not be higher than 105% of its optimal water content (standard compaction).

For the soft filling materials, the CBR shall be more than 8% and the expansion rate shall be no more than 1% upon being soaked for 4 days.

Upon being soaked for 4 days, the CBR of the layer which is 350mm beneath the pavement shall be no less than 15%, the expansion rate shall be no more than 1%, the compactness shall be 100% (AASHTO T99) and the particle diameter shall be no more than 25mm.

3.4.2.6 Surface soil cleaning and compaction before soil replacement

Any black cotton soil and surface soil shall be removed. In case of any cultivated land, the top 20cm of surface soil shall be removed, with the grass planting for the embankments as well. The compactness of this kind of soil shall be 95%.

The weather conditions in Kenya is favorable for plant growth. The embankment/cutting is mainly protected by turfing. For the sections where the slopes will violate the ROW of the existing A8 road, retaining walls are necessary. If the wall height is $<$1m, a cantilever reinforced retaining wall is used; if the embankment height is $\geqslant$1m, a MSE wall is used.

3.5 DRAINAGE DESIGN

With respect to the drainage design in the project, it needs to take into overall consideration the relationship between different drainage facilities and structures, and form a complete drainage system according to the width of A8 central reserve, landform, geology and hydrometeorology as well as the distribution and dimensions of existing drain ditches, culverts and other drainage facilities. Moreover,

it is also of great importance to match with the urban sewerage system in the region, and avoid water and soil loss and water pollution.

Due to limited space of A8 central reserve, it is unable to design large-size drain ditch, store the water of the whole roadbed in the drain ditch, and discharge the water through natural evaporation or infiltration at present. Therefore, rainwater in the roadbed shall be collected in the water outlets with certain spacing. The following three schemes are considered for the water outlet:

3.5.1 Scheme 1: introduce the roadbed water into the drain ditches on both sides of A8 road;

Disadvantages:

At some segments of the existing road, the drain ditch is of relatively shallow depth, and controlled by water head difference. If crossing A8 via culvert, it needs to use a water pump. If crossing A8 via open trench, however, it will cause great impacts on traffic. The drainage scheme is comparatively complex.

Due to plenty of water discharge, it may be undersized for the drain ditches on both sides of the original road (A8) and the drain ditches along the entire discharge route downstream. Therefore, it needs to expand and reconstruct all drain ditches on both sides of A8 and the whole section downstream the road.

The drain ditches on both sides of A8 and its downstream undertake highway drainage and urban drainage at the same time. A wide range will be involved, if it is reconstructed. Besides, it is also difficult to define the maintenance rights and obligations in the future.

Advantages:

A complete drainage system has already formed for the A8 Road. It only needs to reconstruct some segments instead of the whole section.

3.5.2 Scheme 2: build new outside drain ditches (canals) on both sides of A8, and finally divert into natural rivers

- Disadvantages: It is necessary for this scheme to make a survey on the water outlets and the drainage water flow direction within a range of approximately 3km on both sides of A8, and study the drainage planning of the whole region. It is a complicated comprehensive drainage system. The range is limited for the topographic map of the project. Moreover, it is also of poor enforcement and high construction costs in this stage.
- Advantages: New drain ditch (canal) on both sides can solve the issue of water head difference. For diversion from the medium divider, culvert can be used for connection. The sump shall be newly built. The drainage system in the project is completely independent from A8 and the local urban sewerage system, with high reliability.

3.5.3 Scheme 3: All water outlets are connected via concealed water pipes and finally lead to Nairobi River.

Disadvantages: It is necessary for this scheme to arrange long-distance concealed pipes (diameter: approximately 0.8-1.2m). As the pipes need to be dredged and overhauled, manhole shall be arranged every 50-90m. Furthermore, two water outlets shall be provided, so as to lead into the urban drainage pipe network or natural rivers, with high construction costs, inconvenient for maintenance and repair after damage.

Advantages: the least water outlets, completely new, the drainage system of the Project is completely independent from A8 and the local urban sewerage system, with high reliability and fewer uncontrollable factors.

Upon a comprehensive consideration of the advantages and disadvantages of all schemes above as well as the overall urban drainage layout in the project area, the road segments with existing drain ditches (deep enough) on both sides that can be conditionally connected via culvert shall be linked up with existing drain ditches (after detail survey and design in the next stage, it may include 1/2 open trenches due to the control over water head difference) through sump and horizontal culvert. The

drained water shall be diverted through the existing drainage system. However, drainage channel shall be built for the road segments with no drain ditch on both sides, the road segments inapplicable to culvert crossing due to shallow depth of drain ditch, or those obviously undersized road segments, so as to divert the roadbed water into the drainage channel and finally into natural rivers.

The medium divider has relatively large space at Section K0+000-9+500. Construction of roadbed will not occupy existing drain ditch. Drain ditch shall be arranged on both sides of the new roadbed, which shall be connected with existing drain ditch in the original medium divider.

At Section K9+500-K10+120, drain ditch shall be built on both sides of the roadbed. The roadbed water shall be longitudinally diverted into K8+960. A8 shall be locally reconstructed or moved in case of insufficient width of the medium divider.

At Section K10+120-K10+500, drain ditch shall be built on both sides of the roadbed. Sump shall be arranged at the depression (around K10+300). The roadbed water shall be connected toward the alignment left into the drain ditch of Eastern Bypass Interchange through horizontal culvert, and finally discharged through the drainage system of Eastern Bypass Interchange.

At Section K10+500-K11+560, drain ditch shall be built on both sides of the roadbed. Drop well shall be arranged on both sides of K10+980 and K11+200. The roadbed water shall be connected toward the alignment right into the existing drain ditch of A8 through horizontal culvert. At last, the water drained at this place will be connected into the urban sewerage system at K11+040.

At Section K12+100-K14+250, the existing drain ditches at some segments are of relatively shallow depth. It is very difficult for culvert crossing. Because of small size, new water may exceed its capacity. The segments with soil drain ditch are seriously blocked. Therefore, drainage channel shall be built along the right of A8. At last, the water shall be discharged into Nairobi River through 2km pipeline along Enterprise Rd.

Sump and horizontal culvert shall be arranged at K12+100, K12+500, K13+040, K13+420 and K14+250 to connect the roadbed water to the drainage channel.

At Section K14+780- K15+564, drain ditch shall be built on both sides of the roadbed, and connected with existing horizontal culvert around K15+150. The roadbed water will be collected into the drainage system at Southern Bypass through the drainage channel downstream this culvert.

The said drainage channel shall be arranged as an open trench (if possible), and as concealed conduit when it needs to overcome the landform altitude difference and in case of lots of excavation, difficult construction or poor economic efficiency.

3.6 DIVERSION ACTIVITIES

3.6.1 Guiding ideology and basic principle of traffic organization

During the construction period of the Project, due to the long construction period and large project scale, it is necessary to fully mobilize and integrate the potential capacity of other trunk road networks to divert and transfer some traffic flow.

The "guiding from the source" and the "diverting through road network" scheme: By taking full advantage of the resources of the regional road network and the main traffic channels, the traffic management measures are taken to guide and divert the traffic flow in the construction area and reduce the traffic pressure on the Nairobi-Mombasa highway (A8).

3.6.1.1 Current situation of regional road network

The whole length for the Project scope of viaduct is 26.764 km, among which the first 15 km of the current road is a six-lane dual carriageway, and the last 11km is a four-lane dual carriageway.

3.6.1.2 Vehicle access assurance scheme

During construction, the access assurance scheme is adopted based on the available width of central reserve, the structural type of bridge and roadbed, and the cross-sections, and whether it is feasible to construct auxiliary roads. For some key sections, speed limitation and other necessary methods are proposed to ensure the smooth traffic flow and construction safety of A8 roads.

3.6.2 Diversion scheme

Long-distance traffic is diverted through the Southern Bypass and the Eastern Bypass while short-distance traffic adopts two kinds of diversion schemes, namely regional road network diversion and A8 auxiliary roads diversion.

The diversion route is shown as follows:

Table 4: List of the Diversion Route

No.	Chainage	Diversion direction	Diversion plan and route	The number of occupied lanes in the construction section	Smooth passing plan during construction
1	K8+000-K9+150	To Northwest Nairobi	Drive along existing road A8	No existing lane occupied	Dual 6-lane vehicle access
		To Athi River	Drive along existing road A8	No existing lane occupied	Dual 6-lane vehicle access
2	K9+150-K15+564	To Northwest Nairobi	Drive along existing road A8	One lane temporarily occupied each side	Dual 4-lane vehicle access
		To Athi River	Drive along existing road A8	One lane temporarily occupied each side	Dual 4-lane vehicle access
3	K15+564-K17+500	To Northwest Nairobi	Popo Rd	One lane temporarily occupied each side	Dual 4-lane traffic is kept smooth for passing
		To Athi River	Lusaka Rd	One lane temporarily occupied each side	Dual four-lane traffic is kept smooth for passing
4	K17+500~K21+800	To Northwest Nairobi	Langata Rd；Haile Selassie Ave; Kenyatta Ave; Southern Bypass	One or two lane(s) temporarily occupied each side	Dual two-lane, Dual four-lane
		To Athi River	Forest Rd; Kenyatta Ave; Haile Selassie Ave;	One or two lane(s) temporarily occupied each side	Dual two-lane, Dual four-lane
5	K21+800~K23+000	To Northwest Nairobi	Driving along existing A8 road	Do not occupy the existing lanes	Dual six-lane traffic is kept smooth for passing
		To Athi River	Ring Rd Parklands→Parklands Rd	Do not occupy the existing lanes	Dual six-lane traffic is kept smooth for passing
6	K23+000~K26+674	To Northwest Nairobi	Diversion to the Southern Bypass	Temporary access roads are constructed outside the existing roads	Dual four-lane traffic is kept smooth for passing
		To Athi River	Diversion to the Southern Bypass	Temporary access roads are constructed outside the existing roads	Dual four-lane traffic is kept smooth for passing

3.6.2.1 Section K8+000-K9+150

The Project shall be built in the median strip (width >30m) of the existing A8. In this section, tapered casing shall be provided as temporary safety facility on both sides of the existing road, making sure the driving safety and the construction safety. The existing traffic flow will not be intervened.

3.6.2.2 Section K9+150-K15+564

One lane will be temporarily occupied for construction each side. The rest four lanes are of normal access. During construction, it needs to provide temporary isolation and anti-collision facilities and

warning signs. Besides, water (sand) injection isolation pier shall be used for driving safety. In this section, it is a 4-lane dual carriageway vehicle access scheme.

3.6.2.3 K15+564~K17+500:

One lane will be temporarily occupied for construction each side, and the remaining four lanes will be of normal access. During the construction of the Project, remove the anti-collision guardrails and traffic safety facilities and signs along the existing A8. During this period, for sections where the median strip is 10m to 15m wide, one lane will be temporarily occupied for construction each side, and can be reopened for traffic after the construction. During construction, it needs to provide temporary isolation and anti-collision facilities and warning signs. Besides, water (sand) injection isolation pier shall be used for driving safety. In this section, it is a 4-lane dual carriageway vehicle access scheme.

3.6.2.4 K17+500~K21+800:

The number of occupied lanes will be determined according to the specific conditions (the width of the central reserve and the clearance requirements of the construction surface) in this section and the remaining dual carriageways will normally operate. In this section, the width of the central reserve is generally less than 10m, so it needs to occupy at least one lane each side, and some sections may occupy two lanes for closed construction. Due to the narrow width of the central reserve, in order to ensure the driving and construction safety, the road shall be closed 150 meters in front of and behind the bridge construction area. The traffic flow is diverted to the outer lanes of the existing A8. In this section, it is a 4-lane (2-lane in some sections) dual carriageway vehicle access scheme.

3.6.2.5 K21+800~K23+000:

In this section, tapered liners will be installed at the edges of hard shoulders on both sides of the existing road as temporary safety facilities to ensure the safety of driving and construction. The traffic will not be interfered, and it is a dual 6-lane access scheme.

3.6.2.6 K23+000~K26+764:

In this section, the width of the central reserve is generally less than 10m and the existing road is four-lane carriageway, so it is not suitable to occupy the existing lanes as the construction area. Considering that there is some vacant land on both sides of the road in this construction section, temporary access roads are proposed on both sides of the existing road for bridge construction. During construction, it needs to provide temporary isolation and anti-collision facilities and warning signs. Besides, water (sand) injection isolation pier shall be used for driving safety.

3.6.3 Road Surfacing

3.6.3.1 Design principle

Based on local conditions, reasonable material selection, convenient construction, favorable curing and investment saving, the pavement structure shall be designed according to the service function of the project and natural conditions (e.g. weather, hydrology and soil texture) along the corridor and in combination with successful project experience of Kenya. The scheme recommended for pavement structure shall be characterized with, economic rationality, safety and reliability, and favorable for mechanization and industrialized construction.

3.6.3.2 Design basis

To determine by looking up relevant tables according to the ROAD DESIGN MANUAL: PART III MATERIALS AND PAVEMENT DESIGN FOR NEW ROADS (hereinafter referred to as the "Pavement Design Manual of Kenya") issued by the road sector of the Ministry of Transport & Communications of Kenya in August 1987. The design life is 20 years and the standard axle load is 80kN.

- Roadbed filling and strength

Black cotton soils are widely distributed within the roadbed range of the whole corridor of the project. The roadbed shall be filled after the black cotton soil is replaced. In combination with the road building materials in the project area, it plans to construct the roadbed with gravel in the project. After water soaking for four (4) days, its CBR is usually 10% - 18%. Besides, 100% compactness shall

be adopted for the roadbed improvement layer (namely 30cm above the roadbed). The roadbed bearing capacity level shall be S4.

- Traffic classification

Based on the traffic projection and the vehicle proportions in Chapter 3, the accumulative ESAL of the project is determined as 25 million to 60 million times, and the traffic grade as T1 from 2023 to 2037.

- Pavement structure scheme

The traffic grade is T1, and the roadbed strength level is S4. After looking up to the table of Type 11 pavement structure in the Pavement Design Manual of Kenya, the pavement structure scheme for the main line and slip roads in the Project is determined as follows:

- 10mm asphalt surface treatment (6/10)
- 50mm asphalt concrete (0/20)
- 150mm dense graded asphalt macadam (0/30)
- 175mm cement stabilized GCS
- 300mm 100% MDD roadbed
- Total thickness 685mm

The toll station is of a cement concrete pavement. The structure scheme is shown as follows:

- 280mm cement concrete slab
- 175mm cement stabilized GCS
- 300mm 100% MDD roadbed
- Total thickness 755mm

3.6.4 Junctions and Crossings

3.6.4.1 Interchange scheme

The total length of the alignment is 26.764km. The number and position of interchanges are considered based on the distribution of build-up areas, current situation of traffic volume, current situation of existing road network and junctions, land expropriation and demolition and other comprehensive factors along the alignment.

The whole corridor will be installed with 10 interchanges, which basically could meet the demands of turning traffic volume along the alignment. The position and spacing of interchanges are shown in Table below.

Table 5: List of interchanges and intersections

SN	Center chainage.	Model	Spacing (km)
1	K2+500	Semi rhombic interchange	0
2	K6+200	Semi rhombic interchange	3.7
3	K8+000	Y-shaped interchange	1.8
4	K10+000	Hybrid interchange	2
5	K15+000	Hybrid interchange	5
6	K17+000	Variant rhombic interchange	2
7	K19+700	Variant rhombic interchange	2.7
8	K22+000	Compound rhombic interchange	2.3
9	K24+000	Semi rhombic interchange	2
10	K26+700	Rhombic interchange	2.7

3.6.5 Bridges and Culverts

Table 6: Bridge Schedule (For Mainline)

No.	Start Chainage	End Chainage	Number-Span(m)	Length (m)	Superstructure	Substructure	Foundation
1	K6+156	K6+246	3×30m	90	Precast box girder	Double-colume pier/Abutment	Spread foundation
2	K7+541	K7+631	3×30m	90	Precast box girder	Double-colume pier/Abutment	Spread foundation

No.	Start Chainage	End Chainage	Number-Span(m)	Length (m)	Superstructure	Substructure	Foundation
3	K11+648	K11+708	2×30m	60	Precast box girder	Double-colume pier/Abutment	Spread foundation
4	K12+145	K12+235	3×30m	90	Precast box girder	Double-colume pier/Abutment	Spread foundation
5	K15+552	K16+152	20×30m	600	Precast box girder	Double-colume pier/Double-column portal pier/Abutment	Spread/ Pile foundation
6	K16+152	K16+227	3×25m	75	Precast box girder	Double-colume pier	Spread foundation
7	K16+227	K16+467	8×30m	240	Precast box girder	Double-colume pier	Spread foundation
8	K16+467	K16+557	3×30m	90	Cast-in-place box girder	Double-colume pier/ Double-column portal pier	Spread/ Pile foundation
9	K16+557	K16+797	8×30m	240	Precast box girder	Double-column portal pier/ Double-colume pier/ Single-column pier	Spread/ Pile foundation
10	K16+797	K16+897	4×25m	100	Precast box girder	Double-colume pier	Spread foundation
11	K16+897	K17+097	8×25m	200	Cast-in-place box girder	Double-column portal pier/ Single-column pier	Pile foundation
12	K17+097	K17+197	4×25m	100	Precast box girder	Single-column pier/ Double-colume pier	Spread/ Pile foundation
13	K17+197	K17+347	5×30m	150	Precast box girder	Single-column pier/ Double-column portal pier	Pile foundation
14	K17+347	K17+432	2×30m+25m	85	Cast-in-place box girder	Double-column portal pier / Double-colume pier	Spread/ Pile foundation
15	K17+432	K17+512	25m+30m+25m	80	Precast box girder	Double-colume pier /Single-column pier	Spread/ Pile foundation
16	K17+512	K18+232	24×30m	720	Precast box girder	Single-column pier/ Double-colume pier	Spread/ Pile foundation
17	K18+232	K18+332	2×50m	100	Steel-concrete composite bridge	Single-column pier/ Double-colume pier	Pile foundation
18	K18+332	K18+432	4×25m	100	Precast box girder	Double-colume pier	Pile foundation
19	K18+432	K18+852	14×30m	420	Precast box girder	Double-colume pier/ Double-column portal pier/ Single-column pier	Pile foundation
20	K18+852	K18+952	2×50m	100	Steel-concrete composite bridge	Single-column pier/ Double-colume pier	Pile foundation
21	K18+952	K19+342	13×30m	390	Precast box girder	Double-column portal pier/ Single-column pier/ Triple-column portal pier	Pile foundation

No.	Start Chainage	End Chainage	Number-Span(m)	Length (m)	Superstructure	Substructure	Foundation
22	K19+342	K19+432	3×30m	90	Cast-in-place box girder	Double-column portal pier/ Triple-column portal pier	Pile foundation
23	K19+432	K19+502	2×35m	70	Cast-in-place box girder	Double-column portal pier	Pile foundation
24	K19+502	K19+602	4×25m	100	Precast box girder	Double-column portal pier	Pile foundation
25	K19+602	K19+752	5×30m	150	Precast box girder	Single-column pier/ Double-colume pier/ Double-column portal pier	Pile foundation
26	K19+752	K19+852	2×50m	100	Steel-concrete composite bridge	Single-column pier/ Double-column portal pier	Pile foundation
27	K19+852	K20+242	13×30m	390	Precast box girder	Single-column pier/ Triple-column portal pier	Pile foundation
28	K20+242	K20+332	3×30m	90	Cast-in-place box girder	Triple-column portal pier	Pile foundation
29	K20+332	K20+392	2×30m	60	Precast box girder	Triple-column portal pier	Pile foundation
30	K20+392	K20+442	2×25m	50	Precast box girder	Triple-column portal pier	Pile foundation
31	K20+442	K20+502	2×30m	60	Precast box girder	Triple-column portal pier	Pile foundation
32	K20+502	K20+602	2×50m	100	Steel-concrete composite bridge	Single-column pier/ Double-colume pier	Pile foundation
33	K20+602	K21+112	17×30m	510	Precast box girder	Single-column pier/ Triple-column portal pier	Pile foundation
34	K21+112	K21+222	2×40m+30m	110	Steel-concrete composite bridge	Triple-column portal pier/ Double-colume pier	Pile foundation
35	K21+222	K21+302	30m+2×25m	80	Precast box girder	Triple-column portal pier/ Single-column pier	Pile foundation
36	K21+302	K21+752	15×30m	450	Precast box girder	Single-column pier/ Triple-column portal pier	Pile foundation
37	K21+752	K21+842	3×30m	90	Cast-in-place box girder	Triple-column portal pier	Pile foundation
38	K21+842	K21+992	5×30m	150	Precast box girder	Double-column portal pier	Pile foundation
39	K21+992	K22+042	1×50m	50	Steel-concrete composite bridge	Single-column pier	Pile foundation
40	K22+042	K22+122	30m+2×25m	80	Precast box girder	Single-column pier	Pile foundation

No.	Start Chainage	End Chainage	Number-Span(m)	Length (m)	Superstructure	Substructure	Foundation
41	K22+122	K22+512	13×30m	390	Precast box girder	Single-column pier/ Double-colume pier/ Double-column portal pier	Spread/ Pile foundation
42	K22+512	K22+612	4×25m	100	Precast box girder	Double-colume pier	Spread foundation
43	K22+612	K22+702	3×30m	90	Cast-in-place box girder	Double-colume pier	Pile foundation
44	K22+702	K23+032	11×30m	330	Precast box girder	Single-column pier/ Double-colume pier/ Double-column portal pier	Spread/ Pile foundation
45	K23+032	K23+132	4×25m	100	Precast box girder	Double-column portal pier	Pile foundation
46	K23+132	K23+222	3×30m	90	Cast-in-place box girder	Double-colume pier/ Double-column portal pier	Pile foundation
47	K23+222	K23+552	11×30m	330	Precast box girder	Single-column pier/ Double-column portal pier	Pile foundation
48	K23+552	K23+652	2×50m	100	Steel-concrete composite bridge	Single-column pier/ Double-colume pier	Spread/ Pile foundation
49	K23+652	K23+752	4×25m	100	Precast box girder	Double-colume pier/ Double-column portal pier	Spread/ Pile foundation
50	K23+752	K24+652	30×30m	900	Precast box girder	Double-column portal pier/ Single-column pier/ Double-colume pier	Spread/ Pile foundation
51	K24+652	K24+742	3×30m	90	Cast-in-place box girder	Double-column portal pier	Pile foundation
52	K24+742	K24+817	3×25m	75	Precast box girder	Double-column portal pier/ Single-column pier/ Triple-column portal pier	Pile foundation
53	K24+817	K25+897	36×30m	1080	Precast box girder	Single-column pier/ Double-colume pier/Portal pier/ Abutment	Pile foundation
54	K25+897	K25+947	2×25m	50	Precast box girder	Single-column pier/ Double-colume pier	Pile foundation
55	K25+947	K26+247	10×30m	300	Precast box girder	Single-column pier/ Double-colume pier/ Double-column portal pier/ Triple-column portal pier /Abutment	Pile foundation
56	K11+648	K11+708	2×30m	60	Precast box girder	Single-column pier/ Abutment	Spread foundation

Table 7:Bridge Schedule (For Ramp)

No.	interchange Name	Start Chainage	End Chainage	Number-Span(m)	Length (m)	Superstructure	Substructure	Foundation	Remark
1	JKIA Interchange	K0+435	K0+525	3×30m	90	Precast box girder	Single-column pier/Abutment	Spread foundation	Ramp A
2	Eastern Bypass	K0+220	K0+270	2×25m	50	Cast-in-place box	Vase-shaped pier/Abutme	Spread foundation	Ramp A

No.	interchange Name	Start Chainage	End Chainage	Number-Span(m)	Length (m)	Superstructure	Substructure	Foundation	Remark
						girder	nt		
3		K0+270	K0+310	1×40m	40	Steel-concrete composite bridge	Single-column pier	Spread foundation	
4		K0+310	K0+460	6×25m	150	Cast-in-place box girder	Vase-shaped pier	Spread foundation	
5		K0+460	K0+510	1×50m	50	Steel-concrete composite bridge	Single-column pier	Spread foundation	
6		K0+510	K0+600	3×30m	90	Cast-in-place box girder	Vase-shaped pier	Spread foundation	
7		K0+600	K0+700	2×50m	100	Steel-concrete composite bridge	Double-column portal pier	Spread foundation	
8		K0+700	K0+875	7×25m	175	Cast-in-place box girder	Vase-shaped pier/Abutment	Spread foundation	
9	Southern Bypass	K0+171	K0+271	4×25m	100	Precast box girder	Vase-shaped pier/Abutment	Spread foundation	Ramp D
10		K0+271	K0+446	7×25m	175	Precast box girder	Single-column pier/Abutment	Spread foundation	
11		K0+446	K0+606	2×30m+2×50m	160	Steel-concrete composite bridge	Single-column pier	Spread foundation	Ramp E
12		K0+606	K0+981	15×25m	375	Precast box girder	Single/Double-column portal pier/Abutment	Spread/ Pile foundation	
13	Capital Center	K0+124	K0+349	9×25m	225	Precast box girder	Single/Double-column portal pier/Abutment	Spread/ Pile foundation	Ramp A
14		K0+229	K0+479	10×25m	250	Cast-in-place box girder	Vase-shaped pier/Portal pier/Abutment	Spread/ Pile foundation	Ramp B
15		K0+089	K0+364	11×25m	275	Precast box girder	Single-column pier/Abutment	Spread foundation	Ramp C
16		K0+109	K0+334	9×25m	225	Precast box girder	Single-column pier/Abutment	Spread foundation	Ramp D
17	Haile Selassie	K0+198	K0+443	9×25m+20m	245	Cast-in-place box girder	Double-column pier	Pile foundation	Ramp A
18		K0+443	K0+743	10×30m	300	Precast box girder	Single-column pier	Pile foundation	
19		K0+743	K0+793	2×25m	50	Precast box girder	Single-column pier	Pile foundation	
20		K0+102	K0+162	2×30m	60	Precast box	Single-	Pile	Ram

No.	interchange Name	Start Chainage	End Chainage	Number-Span(m)	Length (m)	Superstructure	Substructure	Foundation	Remark
						girder	column pier	foundation	p B
21		K0+162	K0+237	3×25m	75	Precast box girder	Single-column pier	Pile foundation	
22		K0+237	K0+387	6×25m	150	Cast-in-place box girder	Vase-shaped pier/ Double-column pier	Pile foundation	
23		K0+060	K0+260	8×25m	200	Precast box girder	Single-column pier/Abutment	Pile foundation	Ramp C
24		K0+100	K0+350	10×25m	250	Cast-in-place box girder	Vase-shaped pier/Abutment	Pile foundation	Ramp F
25		K0+089	K0+464	15×25m	375	Cast-in-place box girder	Vase-shaped pier	Pile foundation	Ramp H
26		K0+200	K0+290	3×30m	90	Cast-in-place box girder	Double-column pier/Abutment	Pile foundation	Ramp M
27		K0+290	K0+365	3×25m	75	Precast box girder	Single-column pier/Abutment	Pile foundation	
28		K0+130	K0+220	3×30m	90	Precast box girder	Single-column pier/Abutment	Pile foundation	Ramp N
29		K0+220	K0+295	3×25m	75	Precast box girder	Single-column pier/Abutment	Pile foundation	
30	Thika Interchange	K0+125	K0+300	7×25m	175	Precast box girder	Single-column pier/Abutment	Pile foundation	Ramp A
31		K0+047	K0+372	13×25m	325	Cast-in-place box girder	Vase-shaped pier/Abutment	Pile foundation	Ramp B
32		K0+164	K0+389	9×25m	225	Precast box girder	Single-column pier/Abutment	Pile foundation	Ramp C
33		K0+706	K0+736	1×30m	30	Precast box girder	Abutment	Pile foundation	
34	Westlands Roundabout	K0+071	K0+171	20m+30m +2×25m	100	Precast box girder	Single/Double-column portal pier/Abutment	Spread/ Pile foundation	Ramp A
35		K0+088	K0+338	10×25m	250	Precast box girder	Single-column pier/Abutment	Spread foundation	Ramp B

Table 8:Culverts Schedule

No.	CHAINAGE	TYPES	ANGLE (°)	DIMENSION	LENGTH(m)	TYPES	
						ENTRANCE	EXIT
Culverts Arrangement Will be along Mainline							
1	K0+100.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
2	K0+500.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
3	K0+800.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
4	K1+250.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
5	K1+445.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
6	K1+800.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
7	K2+100.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
8	K2+500.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
9	K2+700.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
10	K3+200.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
11	K3+700.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
12	K3+850.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
13	K4+100.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
14	K4+250.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
15	K4+800.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
16	K5+125.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
17	K5+500.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
18	K5+850.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
19	K6+500.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
20	K6+880.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
21	K7+160.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
22	K7+450.000	Pipe Culvert	90	2-φ900mm	50	Flared Wing Wall	Flared Wing Wall
23	K7+850.000	Pipe Culvert	90	2-φ900mm	40	Flared Wing Wall	Flared Wing Wall
24	K7+160.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
25	K7+450.000	Pipe Culvert	90	2-φ900mm	50	Flared Wing Wall	Flared Wing Wall
26	K7+850.000	Pipe Culvert	90	2-φ900mm	40	Flared Wing Wall	Flared Wing Wall
27	K8+487.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
28	K8+505.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall

No.	CHAINAGE	TYPES	ANGLE (°)	DIMENSION	LENGTH(m)	TYPES	
						ENTRANCE	EXIT
29	K8+548.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
30	K8+857.000	Pipe Culvert	90	2-φ900mm	35	Flared Wing Wall	Flared Wing Wall
31	K10+290.000	Pipe Culvert	90	2-φ900mm	18		
32	K10+290.000	Pipe Culvert	90	2-φ900mm	18		
33	K10+970.000	Pipe Culvert	90	2-φ900mm	18		
34	K10+970.000	Pipe Culvert	90	2-φ900mm	18		
35	K11+190.000	Pipe Culvert	90	2-φ900mm	18		
36	K11+190.000	Pipe Culvert	90	2-φ900mm	18		
37	K12+090.000	Pipe Culvert	90	2-φ900mm	50		
38	K12+490.000	Pipe Culvert	90	2-φ900mm	50		
39	K13+030.000	Pipe Culvert	90	2-φ900mm	50		
40	K13+410.000	Pipe Culvert	90	2-φ900mm	50		
41	K14+240.000	Pipe Culvert	90	2-φ900mm	50		
Culverts Arrangement Will be along the Ramps							
42	K2A0+200.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
43	K2B0+100.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
44	K2C0+200.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
45	K2D0+100.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
46	K8A0+800.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
47	K8B0+660.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
48	K8C0+720.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
49	K8D1+260.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
50	K10A0+100.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
51	K10A1+160.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
52	K10B0+550.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
53	K10C0+700.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
54	K10D0+300.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
55	K15A0+250.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
56	K15B0+200.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
57	K15C0+220.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall

No.	CHAINAGE	TYPES	ANGLE (°)	DIMENSION	LENGTH(m)	TYPES	
						ENTRANCE	EXIT
58	K15D0+150.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
59	K15E0+150.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
60	K17A0+400.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
61	K17B0+100.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
62	K17C0+520.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
63	K17D0+050.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
64	K19A0+800.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
65	K19C0+300.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
66	K19F0+050.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
67	K19M0+450.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
68	K19N0+050.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
69	K22A0+400.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
70	K22B0+040.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
71	K22C0+600.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
72	K24A0+400.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
73	K24B0+050.000	Pipe Culvert	90	2-φ900mm	15	Flared Wing Wall	Flared Wing Wall
Culverts Arrangement Will be along JKIA to James Gichuru Rd Express Highway(U-Turn)							
74	K8+490.000	Box Culvert	90	1-10000*6000mm	30	Flared Wing Wall	Flared Wing Wall
Culverts Arrangement Will be at the End							
75	K26+690.000	Box Culvert	90	2-10000*6000mm	100	Flared Wing Wall	Flared Wing Wall
Culverts Arrangement Will be along Drainage Channel							
76		Box Culvert		29-2000*2000mm	29*10	Flared Wing Wall	Flared Wing Wall

3.6.6 Road Facilities

3.6.6.1 Road Maintenance Facility

Main purpose of the Road Maintenance Facility (RMF) is the repair and maintenance of roads, bridges, highway interchanges and overpasses, and implementation of measures to ensure safety on the road. There will be adequate members of staff at RMF working one shift.The RMF will be repairing and maintaining the road, bridges, overpasses and junctions, and will be responsible for ensuring traffic safety.

3.6.6.2 Traffic and Toll System

Based on the negotiation with the KeNHA, a closed toll-collection system shall be used in the Project, and tolls shall be collected by vehicle types.

A two-level management system is proposed, i.e. the central and local toll stations.

Only necessary servers, workstations, ethernet switches, etc. shall be provided in the toll booths of the Project; meanwhile, a centralized monitoring mode shall be adopted, with no monitoring equipment set up in the toll booth. The data and images of each toll lane shall be uploaded to the toll-collection monitoring center for unified management by the center.

The toll sites shall be arranged as follows:

Table 9: Toll booth specifications

Toll Booth		Number of Lanes (2037)		
		ETC	MTC	Total
Mainline station at ending point	Entrance	1	1	2
	Exit	1	5	6
Westlands	1-entrance	1	2	3
	2-exit	1	1	2
Thika Rd	1-exit	1	3	4
	2-entrance	1	2	3
	3-exit	1	4	5
Halle Selassie	1-exit	1	1	2
	2-entrance	1	1	2
	3-exit	1	3	4
	4-entrance	1	1	2
Capital center inter	1-entrance	1	1	2
	2-exit	1	4	5
	3-exit	1	2	3
	4-entrance	1	1	2
Southern Bypass	1-entrance	2	2	4
	2-exit	3	2	5
	3-exit	1	4	5
	4-entrance	1	2	3
Eastern Bypass	1-entrance	1	1	2
	2-exit	1	2	3
	3-entrance	1	2	3
	4-exit	2	4	6
	5-entrance	1	1	2
JIKA	1-exit	1	2	3
	2-entrance	1	1	2
	3-exit	1	3	4
	4-entrance	1	2	3
	5-exit	1	1	2
Mlolongo	1-exit	1	1	2
	2-entrance	1	1	2
Mainline station at starting point	Entrance	1	1	2
	Exit	1	3	4

Since the vacant land at the site is limited and the scales of some toll plazas are too large to meet the ROW, ETC lanes are set up in each toll plaza of the Project to improve the traffic capacity and meet the traffic demand.

3.6.6.3 Noise Barriers and Landscaping

As part of the Project, noise screens will be proposed at CBD and sections where dwellers live. Main purpose of these noise screens is to mitigate the impact of noise and reduce the noise level along the alignment. Landscaping measures will also be adopted to achieve aesthetic of bridges and structures.

3.6.6.4 Fencing and Road Signs

1) Traffic sign

In general, the speed limit sign, warning sign, ban sign, auxiliary sign etc., shall be set. Exit sign, speed limit sign, entrance sign, and direction location sign etc., shall be set in the interchange interchanges.

2) Traffic lines

The traffic lines are divided into the center line of the road, the lane dividing line, the lane edge line, the entrance and exit marking, the guide arrow and etc., In order to meet the visual effect of night driving and improve the safety of night driving, the Project adopts hot-melt reflective marking, and the carriageway edge line and road center line thickness is 1.8±0.2mm.

It shall setup the speed reducer before and after the toll station to ensure that the vehicle reduces the speed for safety.

3) Safety guardrail

The sides of road sections with roadbed and the medial strip of the Project shall be installed with concrete barriers, the measurement and design of which will be included in the design works. Corrugated beam barriers will be installed for the ramps of the interchange. The center of the bridge section and both sides of the road will be installed with concrete barriers, the measurement and design of which will be included in the bridge design works.

3.6.6.5 Power Supply and Illumination

1. Power supply facilities

In the Project, a power supply mode of the housed substation + diesel generator shall be adopted for the management center, and a mode of box substation + diesel generator for toll booths and the mode of box substation for road lighting.

2. Lighting facilities

The whole-alignment lighting shall be provided for the Project to ensure safe driving and good driving sight.

The mainline shall be provided with 12m double-arm street lamps arranged in the center at a spacing of 35m. Ramps shall be equipped with 10m single-arm street lamps arranged on one side at a spacing of 30m. 12m single-arm street lamps shall be provided at the toll plaza for lighting. The lamps shall be arranged on one side or symmetrically on both sides according to the width of different plazas. The plaza lighting and the road lighting shall be well connected. The lighting sources shall be LED lights.

3.7 CONSTRUCTION STAGE

3.7.1 Section 1 Mlolongo To Southern Bypass Interchange

Project scope of section 1 of BOT project of Nairobi airport viaduct, Kenya (hereinafter referred to as the project) includes: The total length of the line is 15.564km, that is, from Mlolongo to Southern Bypass Interchange. Except K6+ 156-k6 +246, K7+ 541-k7 +631, K11+ 648-k11 +708, and K12+ 145-k12 +235 which are bridge sections, all the other sections are roadbed sections. The Middle East ring Interchange to south ring Interchange section adopts two-way six-lane roadbed standard width of 28.6m, while the rest sections adopt two-way four-lane roadbed standard of 21.6m wide grade A road.

This project contains 5 interchanges, respectively: K2+500 Mlolongo interchanges, K6+200 SGR interchanges, K8+000 JKIA interchanges, K10+000 Eastern Bypass interchanges and K15+000 Southern Bypass interchanges.A total of 18 toll gates were set up at the 5 interchanges.

The total length of the main bridge in this project is 390m, including the 60m reconstruction of existing A8 Bridges in sections K11+ 648-k11 +708. The superstructure of the main bridge is prefabricated box girder, the substructure is double-column pier, and the foundation is extended.The ramp bridge has a total length of 1,555m, including 190m precast box girder, 1015m cast-in-place box girder and 350m steel-concrete composite beam. The substructure is divided into single column pier, double column pier and vase pier, and the foundation is extended.Main culvert, 38, 1408 m, with vertical line direction, there are two box culvert, 85 m long, the rest are 2 - Φ 900 mm pipe culvert;Ramp culvert 18, a total of 270 m, with vertical ramp line direction, and 2 - Φ 900 mm pipe culvert.

This project borrows about 1.7 million square meters of land filling, borrows about 200,000 square meters of road bed gravel soil, and replaces about 702,000 square meters of black cotton soil;About 116,000 cubic meters of structural concrete;About 144,400 cubic meters of asphalt concrete;Cement stabilized gravel about 146,000 cubic meters;Section 2 Southern Bypass To James Gichuru

The start station of second section is K15+550,and the end in K26+764,the route is about 11.2 km,the most of the road are bridge sections except 500m subgrade.

The bridge deck is 21.6 m wide and 7 pieces of precast box girder are used. The superstructure of the main line bridge adopts 25m or 30m small box girder, the special structure adopts 50m I-shaped composite beam, and the 30m cast-in-place box girder is used at the connection between the main line and the ramp. The lower structure of the main bridge adopts single column or double column cantilever pier, and the special structure adopts double or three column frame pier.Pile foundation or expanded foundation is used in bridge foundation. There are five interworking in this section.

3.7.2 Water Abstraction and Wastewater Management

3.7.3 Section 1 Mlolongo To Southern Bypass Interchange

Two Wells are planned to supply water supply for this section for production and domestic use respectively.The plan is to drain the sewage into a sedimentation tank, sink it and use it elsewhere.Domestic sewage will serve the mixing plant, the sewage after the sink of the watewill be used for road dust.

3.7.4 Section 2 Southern Bypass To James Gichuru

For this section the proposal for water extraction is use underground water extracted by well drilling, the estimated consumption rate will be about 900m3/d; for domestic water for employees NWSC supply will be utilized, with consumption estimated to be 100L / person (the number of employees is 300, with the daily domestic water consumption of 30 m3/d, and the total water consumption of the project is about 930m3 / d)

The waste water of the project will include mud, concrete mixing and concrete truck cleaning waste water and workers' domestic sewage generated from pile construction. The mud will be recycled in the construction process to avoid outward transportation and discharge as much as possible; the waste water generated from the mixing station and tank truck cleaning will be about 20 m3/D, and this will be pumped into a reservoir for recycling after being treated by the fourth level sedimentation tank. The amount of domestic sewage produced by employees is expected to be 15m ³ / D, this will be collected by sewage pipe network and discharged into local municipal sewage pipeline after pretreatment.

3.7.5 Demand for Construction Personnel

Table 10: Maximum Number of Personnel during the Construction Stage 1 (Mlolongo To Southern Bypass Interchange)

Personnel category	Foreign	Local	Total
Administrative	7	0	7
Direct	48	0	48
Indirect	89	1000	1089

Subcontractor	5	2	7
Total	149	1002	1151

Table 11: Maximum Number of Personnel during the Construction Stage 2 (Southern Bypass To James Gichuru)

Personnel category	Foreign	Local	Total
Administrative	10	10	20
Direct	74	60	134
Indirect	30	30	60
Subcontractor	200	2000	2200
Total	314	2100	2414

3.7.6 Demand for Materials

The demand for construction materials for section 1 and 2 is presented below in Table tables below

Table 12: Material Demand for section 1 (Mlolongo To Southern Bypass Interchange)

Material	**Quantity**
Bitumen-coated	1931t
Natural sand	30000t
Sand and gravel mix	200000m3
Gravel	150000m3
Heavy-weight concrete	116000m3
Bitumen	14000t
Soil	1900000m3
Vegetable soil	700000m3

Table 13: Material Demand for section 2 (Southern Bypass To James Gichuru)

Material	**Quantity**
Bitumen-coated	94,400 ㎡
Natural sand	258 kiloton
Sand and gravel mix	126 kiloton
Gravel	504 kiloton
Heavy-weight concrete	483 kilostere
Heavy-weight premixed brick mortar	2137 m³
Bitumen	39 kilostere
Soil	310 kilostere
Vegetable soil	30 kilostere
Water	486 kilostere

3.7.7 Temporary Facilities

3.7.7.1 section 1 (Mlolongo To Southern Bypass Interchange)

During the period of construction several temporary stockyards will be installed along the route in order to store building materials, road construction equipment, bridge structures and culverts, etc.

The following temporary facilities will be placed in main construction camp at km 7+100:

- Shift camp for staff, designed for accommodation of 200 people;
- Parking for vehicles and construction equipment, warehouses;
- Concrete batch plant with a capacity of 40 m3/h and aggregatexstock area;
- Asphalt plant with a capacity of 80 t/h and aggregate stock area;
- Premix plant with a capacity of 240 t/h.

3.7.7.2 Section 2 Southern Bypass To James Gichuru

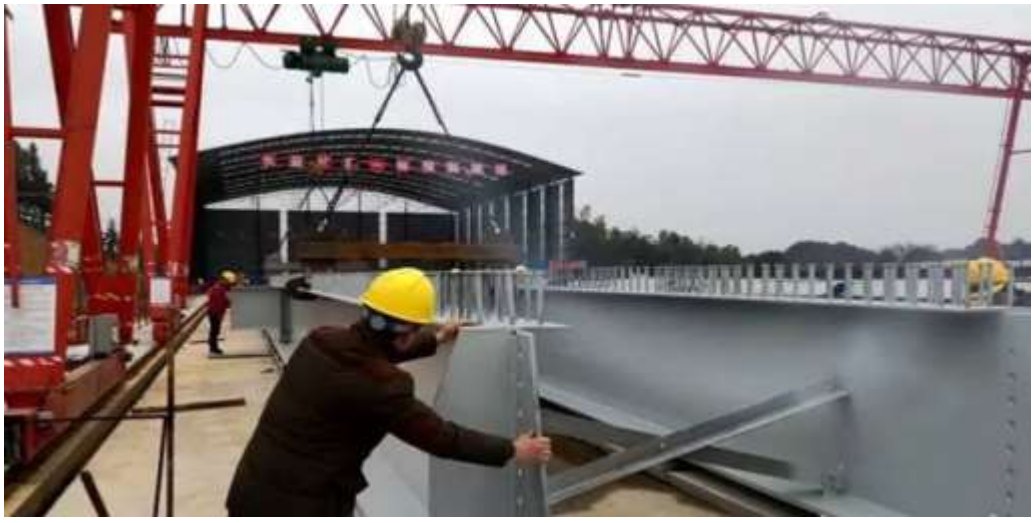
For section 2 a shift to accommodate about 300 people will be designed. The project manager department will be placed in the start of the bridge nearby K15+500,it will cover an area of about

5000 m²,and another 3000m² for the workers. At the end of the bridge a division of workers'living quarters,with an area is 1400 m² will be constructed.

Figure 9: Location of proposed project office and camp

3.7.8 Steel structure, material and machine storage yard

Steel structure, material and machine storage yard covering an area of about 15000 m2.will be set up the central separator of JKIA interworking in K7. This facility will servethe whole line of temporary steel structure support processing, material storage,steel-concrete composite plate beam steel beam processing and component storage, construction equipment storage.



caption 1: Example of Steel structure, material and machine storage yard

3.7.9 concrete mixing station

Two concrete mixing station will be set up near the start and the end of the main line bridge,locacted at K7+400 and K26+764,the station will cover an area of about 37,000 square meters.Each mixing station will have a production capacity of 120 cubic meters.

caption 2: Example of Concrete mixing station

3.7.10 Asphalt plant and cement stabilized mixing plant

Asphalt plant and cement stabilized mixing plant will be set near on the central separator of JKIA interworking in K7,the area of the plant will approximately be 16000 ㎡ and 12300 ㎡

Figure 10: Impression of Asphalt plant

3.7.11 beam field

Two equal-scale beam field will be set near K7 and K26, single precast beam field covers 25000 ㎡ area ,the size is about 564×44.3 m, and a reinforcement processing field will be build for each beam field.Each beam factory prefabricates 3 pieces of box girder every day and considers the storage capacity of the beam for 2 months, and plans a reserve space for the beam storage.

Figure 11: Impression of Box beam prefabricated factory

3.7.12 Delivery of Construction Materials

For section 1, the location of the site has not yet been determined, and temporary access roads are planned in the construction area.

For section 2, construction materials will be delivered along the A8 public roads.The existing roads will be used for most of the construction with the daily enhancing maintenance and traffic guidance.

Stone material yard No.1: will be located on the road at K2 + 400, with a distance of 13.4 km, basalt, the covering layer is about 1 m, the reserve is about 3 million square meters, the exposed type is convenient for mining.

Picture of proposed Material sites

3.7.13 Waste Management

Construction activities will generate construction waste and solid domestic waste; also subsoil and topsoil will be removed.

The following construction waste will be generated during the construction and operation of the road:

- Inert materials like padding soil, sand and gravel mix, concrete,– which will be processed and used as a construction material in backfilling, shaping and landscaping operations;
- Potentially harmful and hazardous substances such as construction camp waste, crushed stone from crushing, empty containers used to store fuel, lubricants and

chemicals, ferrous scrap, electrode stubs – these waste have to be properly disposed of as per national regulations;

• Timber waste from tree felling and other organic substances from site clearing – these should be stockpiled at designated areas outside construction sites and removed during the period of felling and grubbing. A possible solution is to sell these materials as fire wood to local residents.

For section 1 the generation of construction waste is estimated at 10000 m³; of solid domestic waste – at 3650 m³ .

For section 2, the amount of solid domestic waste from personnel for the construction stage was estimated based on national standards and was taken at 0.4 tpa per worker.

Generation of construction waste is estimated at 1.2 tpa; of solid domestic waste – at 2.4 tpa The construction waste and excavated soil will be transported subject to prior consent of local authorities.

All waste generated will be removed by specialised contractors for further processing or disposal at NEMA designated sites.

For section 1, the amount of topsoil to be removed and stockpiled is estimated at 700000 m3. This material will then be used in land reclamation after liquidation of temporary roads and in landscaping activities.

For section 2, the amount of topsoil to be removed and stockpiled is estimated at 13500 m3. This material will then be used in land reclamation after liquidation of temporary roads and in landscaping activities.

The Project also envisages construction of temporary waste storage areas.

The design documentation prohibits burning of any waste without special permits. All waste generated is to be timely removed for disposal or processing.

3.8 MEASURES ENVISAGED IN THE DESIGN TO PREVENT AND/OR MINIMISE POTENTIAL ENVIRONMENTAL IMPACTS

The proponent CRBC will complete the investigation of the surrounding environment prior to construction, including the relevant departments of road transportation, environmental protection related departments and relevant police departments. Advance communication of possible problems during construction to ensure that pressure from the surrounding area is reduced.

- Multiple measures will also be taken to minimize potential environmental impacts including:Dredging the existing drainage system along the corridor of this Project and collecting surface water by side ditches.
- Grassing embankments and necessary landscaping.
- Noise screens provided at CBD and dwelling houses sections.

3.8.1 Noise Control Measures

Construction activites will be stopped at noon (12:00 to 14:00) and at night (23:00 to 6: 00 a.m.). Due to uninterrupted construction and other special circumstances for technical reasons, it is indeed necessary to apply to the competent administrative department of construction and the environmental protection department for construction work at noon or at night.

- Strengthen the maintenance of mechanical equipment, ensure the mechanical operation is normal, and reduce the noise.
- The walls of the generator room are decorated with sound absorption boards to reduce noise pollution.
- All machinery and equipment, vehicles shall not ring loudly;
- Workers use walkie-talkies to communicate with each other during construction and prohibit shouting.
- Air Protection
- It is prohibited to burn toxic, harmful and smelly substances at the construction site.

- Toilet septic tank equipped with cover plate, size urinal should be flushing equipment. By the special person several times a day regular cleaning, to ensure that there is no odour.
- Using the advanced asphalt mixing equipment to avoid the air pollution caused by asphalt in the heating process.
- In order to prevent dust from being generated by the concrete mixer and the sand and stone material, a closed stirring shed is set in the concrete mixing area.
- Use professional powder material transport vehicle to cement, fly ash and other fine granular bulk materials transport, storage, gravel and other materials transport attention to cover, seal, reduce dust, control air dust pollution.

3.8.2 Traffic Noise Prevent Measures

A total of 17000m sound barriers will be set up along the outside of the bridge to prevent the impact of vehicle noise on the surrounding residents. The maintenance work of the road is strengthened, the subgrade is stable, the road surface is flat, and various protection and drainage facilities are complete, so that the running safety is stable, the running noise of the vehicle is reduced, and the pollution to the air and the water body is prevented.

3.9 MEASURES PROPOSED IN THE DESIGN TO PREVENT AND/OR MINIMISE POTENTIAL SOCIAL IMPACTS

Existing footbridges, at-grade pedestrian crossings, U-turns and other planned footbridges will be retained as far as possible. The details are as follows:

- South C overpass (Kiganjo Avenue) will be intact and the Expressway will go above this overpass. U-turns near Syokimau Railway Station, JKIA, Enterprise Rd, Nextgen Mall and Capital Center will be retained. Other U-turns which are from Museum Hill interchange to James Gichuru Junction will be retained.
- Existing street lightings will be dismantled and rebuilt. While the existing services will be relocated to the outer sides of A8.
- Existing drainage system of this corridor which is dismantled due to the implementation of the Expressway needs to be rebuilt and improved.
- It is suggested that the ongoing performance-based maintenance contracts be suspended. As there will be some conflicts between the construction of Expressway and these maintenance works.
- Existing footbridges and at-grade pedestrian crossings will be retained and rebuilt at original locations (grade-separated pedestrian crossings will be proposed at embankment sections if needed). Other planned footbridges will be subject to the designs of the Expressway.

The construction of this project is mainly flat land, foundation pit excavation, bridge engineering and so on. During the construction, the original auxiliary materials will interfere with the urban traffic, which may make the A8 highway and other surrounding residents inconvenient for vehicles to travel.

3.9.1 Design Measures to Prevent and/or Minimise Potential Social Impacts during the Construction Stage

- The earthwork must transport within the prescribed time and operate in accordance with the transport route approved by the transportation department. The project has the responsibility to supervise the route of the transport vehicle.
- The construction road shall be hardened, and the equipment for removing the wheel earth shall be set at the exit of the construction site, so as to ensure that the vehicle is out of the construction site without soil; and the loading and unloading of the slag soil is strictly prohibited.
- When vehicles transport bulk materials and waste, transport vehicles must be properly loaded, must be closed, covered, and must not be leaked along the way.
- Reasonable speed control, and as far as possible to avoid rush hour transport, along the way residential areas are prohibited to whistle.

3.9.2 Design Measures to Prevent and/or Minimise Potential Social Impacts during the Operation Stage

The pollution to the environment during the operation period of the proposed road is mainly caused by the transportation of automobile exhaust emissions, road dripping oil, tire friction particles, dust and so on, which enter the water body with the runoff of the road surface, uncivilized transportation behavior (such as abandoning waste, garbage, etc.) and dangerous goods (such as acid, alkali and toxic and harmful commodities, etc.).

During the operation period, drivers and residents along the road are prohibited from discarding beverage bags and cans on the roads through publicity and regulations to keep the roads clean;

Solid waste along the route collected and disposed in a timely manner by dividing the road sections to the responsible persons

Regularly cleaning the bridge deck, the road surface, keeping the bridge, and the road surface clean and dry.

4 LEGAL FRAMEWORK

4.1 INTRODUCTION

This Chapter details the legislative and international good practice environmental and social requirements for the proposed Expressway. National (Kenyan) laws deemed relevant for the successful implementation of all environmental and social components of the Project are presented in this Chapter. Furthermore, the applicable standards of international lending organisations are provided and their applicability discussed.

Please Note: Whilst this Chapter has been prepared with all due care by Centric, it does not constitute legal advice and should not be construed as such. Furthermore, the Kenyan regulatory environment may be subject to changes to both regulatory instruments and authorities during the projected Project life-cycle. It is therefore recommended that the regulatory framework is reviewed and assessed periodically.

The sourcing of legislation was limited to a desktop survey and reliance on in-country contacts.

4.2 INSTITUTIONAL FRAMEWORK

The overall authority for implementation of environmental and social commitments will be the Environmental Division of KeNHA. The key responsible implementing organisation for the construction phase of the proposed Expressway will be for CRBC, due to their physical presence and direct involvement in the proposed Project, during the construction phase.

A summary of other authorities with the mandate to implement aspects of Kenyan legislation over aspects relating to the proposed Expressway are provided in Table below

Table 14: Institutional Framework

Organization	**Responsibilities/ Relevance**
Ministry of Transport and Infrastructure	Provide policy guidance on national transportation infrastructure.
National Environmental Management Authority (NEMA)	General supervision and, co-ordination of all matters relating to the environment. The NEMA is the principal instrument in Government in the implementation of all policies relating to the environment. NEMA is also responsible for monitoring compliance with all the environmental regulations.
Water Resource Management Authority (WRMA)	WRMA is responsible for regulation of water resources such as water allocation, source protection and conservation, water quality management and pollution control and international waters. Its roles and responsibilities are as follows: Planning, management, protection and conservation of water resources; Planning, allocation, apportionment, assessment and monitoring of water resources; Issuance of water permits; Water rights and enforcement of permit conditions; Regulation of conservation and abstraction structures; Catchment and water quality management; Regulation and control of water use; and Coordination of the Integrated Water Resource Management (IWRM) Plan.
Kenya Wildlife Service (KWS)	The KWS is a Kenyan state corporation established in 1989 to conserve and manage Kenya's wildlife, with the mandate to conserve and manage wildlife in Kenya, and to enforce related laws and regulations. KWS manages the biodiversity of the country, protecting and conserving the flora and fauna. KWS manages most of the National Parks and Reserves in Kenya (the Maasai Mara National Reserve is managed by local authorities). The money collected as entrance fees in the parks is used to help the conservation of habitats and wildlife within the parks.
Kenya Forest Service (KFS)	The KFS is an agency of the Government of Kenya designated by the Forest Act of 2005. Among the responsibilities of the Kenya Forest Service are to:Own, manage and protect all state forests;Promote forestry education and training and operate the Kenya Forestry College;Enforce the conditions and regulations pertaining to logging, charcoal making and other forest utilisation

	activities;Apprehend and prosecute violators of forest law and regulations; and Collect revenues from exploitation of forest products.
Department of Occupational Health and Safety	Monitor the implementation of health and safety plans for construction workers and members of public coming into contact with construction activities.
Ministry of Health	Surveillance of public health with respect to workers and affected communities, especially in regard to HIV/AIDS and other communicable diseases. Identify suitable linkages between the road and health facilities including emergency access.
Lands, Housing and Urban Development/National Land Commission	Facilitate land acquisition when required.Protection of the road reserve after the construction. Initiating the process of land use zoning along the road corridor.
County Governments	Provide land for social facilities including markets, parking areas, drainage and access roads.Collaborate on physical planning of relevance to the project road. Review master plans for compatibility with the improved roads.

4.3 NATIONAL REGULATORY FRAMEWORK

4.3.1 Law and Policy Related to Environmental Consideration

The Environmental Management and Co-ordination Act (EMCA), formulated in 1999, amended in 2015, serves as the environmental law related to environmental and social considerations in Kenya. Pursuant to the Act, the National Environment Council (NEC) as the administrative authority and the National Environment Management Authority (NEMA) as the executive authority were established. Formulation of detailed regulations for EMCA followed, including Environmental Impact Assessment and Audit Regulations, regulations related with prevention of air and water pollution, waste management, and noise control. In addition, the amendment to the Act accompanied regulations for Strategic Environment Assessment (SEA). Other regulations pertaining to the environment include wildlife conservation, management of forest resources, control of water resources, and safety, health, and welfare of workers. With EMCA being enforced, it demands that EIA prepared according to EMCA be submitted to the relevant agency along with a permit application for resource utilization or development as required for the use of natural resources, implementation of construction, and construction of facility.

The laws and policies related to environmental considerations are as follows

The laws that place legal obligations upon the Project Proponent are outlined in Table 17

Table 15: Law and Policy (Environmental Consideration) in Kenya

Name	Abstract	Responsible Org.
1. Environmental Consideration Related Law		
The Environmental Management and Co-ordination Act, 1999 Amendment Act, 2015	Pollution prevention Environmental conservation	MEWNR NEC NEMA
1.1 EIA/SEA		
The Environmental (Impact, Audit and Strategic Assessment) Regulation 2009	Environmental Impact Assessment, Strategic Environmental Assessment, Procedures for Environmental Audit, Requirement for applying EIA, SEA License	NEMA
County Government Act 2012	It mandates provisions of opportunities for citizen participation to SEA・EIA via ICT, town hall meetings, notice boards, etc.	NCCG
1.2 Pollution Prevention		
The Environmental Management and Coordination	Management of air pollution	NEMA

Name	Abstract	Responsible Org.
(Air Quality) Regulations, 2008, Revised 2012		
The Environmental Management and Coordination, (Water Quality) Regulations 2006, Revised 2012	Quality standards for domestic water Monitoring discharge	NEMA
The Environmental Management and Coordination, (Waste Management) Regulations 2006, Revised	Regulation and management of waste	NEMA
The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control)	Noise and vibration control	NEMA
The EnvironmentalManagement and Co-Ordination (Controlled Substances) Regulations, 2007	Conservation of Ozone Layer	NEMA
The Environmental Management and Co-Ordination (Conservation of Biological Diversity and Resources,	Conservation of biological diversity and management of genetic resources	NEMA
The Environmental Management and Co-Ordination (Wetlands, River Banks, Lake Shores and Sea	Wetlands, riverbanks, lake shores, and sea shore conservation	NEMA
The Environmental (Prevention of Pollution in Coastal and Other Segments of the Environment)	Management of harbour (ship) drainage	NEMA
2. Natural Environment, Cultural Heritage		
The Wildlife (Conservation and Management) Act (Cap 376) (1985) Revised Edition 2009	Conservation and management of wildlife	MEWNR KWS
The Forests Act, 2005, Revised 2012	Management and conservation of forest	MEWNR KFS
The Water Act, 2002, Revised 2012	Conservation of water resources	MEWNR WRMA
The Water Resources Management Rules, 2007	Regulation of water use including groundwater, prevention of water pollution	WRMA
The National Museums and Heritage Act (Cap 216) (2006) Revised Edition 2009	Establishment of national museums and preservation of cultural heritage	MEAC NMK
3. Laws and Regulations related with Environment during Construction		
The Occupational Safety and Health Act, 2007, Revised 2010	Securing safety, health, and welfare of all worker	MLSSS
The Public Health Act (Cap. 242) 1986, Revised 2012	Securing safety and health during the land use (development)	MoH
The Physical Planning Act (Cap. 286) Revised Edition 2010 (1996)	Development permits from local authority	MoLH&UD Central/District Development Committees

Name	Abstract	Responsible Org.
The Energy Act, 2006, Revised 2012	Development permit for construction of facility for the energy sector	MOEP
The Wayleaves Act (Cap. 292) Revised Edition 2010 (1989)	Procedures for laying utility lines in private land	The Government of Kenya

Source: JICA Study Team

4.3.2 Law and Policy Related to Social Consideration

The basis for the laws and policies related to the Social Consideration in Kenya lies in securing human rights and property rights. As such, the constitutional Bill of Rights enacted in 2010 governs the related laws and policies. The Bill of Rights, Chapter Four of the Constitution of Kenya, recognises the need to address the needs of marginalised communities, which include "traditional communities with unique culture and identity", "indigenous communities maintaining traditional lifeways and livelihood", and "pastoralists and their communities". Through taking legislative and other measures, it also prohibits direct or indirect discrimination against marginalised group of individuals who are suffering or have suffered from disadvantage on any ground including race, sex, pregnancy, marital status, health status,ethnic or social origin, colour, age, disability, religion, conscience, belief, culture, dress,language or birth. Notably, it states that the State shall take legislative measures to implementthe principle that women, persons with disabilities, youth, ethnic groups, and other minoritygroups shall be represented in the congress. In addition, Chapter Five of the Constitution ofKenya, 2010, recognises a new form of land ownership, namely, community land that is vestedin and held by communities. This will be of importance from the perspective of landacquisition. Law and Policy related to Social Consideration are as follows.

Table 16: Law and Policy related to Social Consideration

Name	Abstract	Responsible Org.
1. Constitution		
The Constitution of Kenya, 2010	Chapter 4: recognizes rights to marginalized groups or communities Chapter 5: recognizes community land	All State organs
2. Land		
Land Acquisition Act (Cap. 295) Revised Edition 2010 (1983)	Provides for procedures for acquiring land for public use.	MoLH&UD
Government Lands Act (Cap. 280) Revised Edition 2012 (1984)	Provides for procedures for government land.	MoLH&UD NLC
Trust Land Act (Cap. 288) Revised Edition 2012 (1970)	Provides for procedures for Trust Land owned by local administrative body.	MoLH&UD Council Divisional Land Board
Registration of Titles Act (Cap. 281) Revised Edition 2010 (1982)	Provides for procedures for registering land and transferring title.	MoLH&UD NLC
Registered Land Act (Cap. 300) Revised Edition 2012 (1989)	Provides for record of registered land.	MoLH&UD
National Land Commission Act 2012	Provides for conditions to prepare RAP. Provides for land acquisition for public use.	MoLH&UD NLC
Land (Group Representatives) Act (Cap 287) Revised Edition 2012 (1970)	Provides for procedures to incorporate group representatives as owners of land (procedures to elect legal owners of customary land).	MoLH&UD Council
Land Adjudication Act (Cap 284) Revised Edition 2012 (1977)	Provides for procedures to adjudicate on ownership of trust land.	Council
Land Consolidation Act (Cap 283) Revised Edition 2012 (1977)	Provides for the ascertainment of ownership for the consolidation of trust land (other than land to which the Land Adjudication Act applies).	Council

Name	Abstract	Responsible Org.
Land Titles Act (Cap. 282) Revised Edition 2010 (1982)	Provides for establishment of a Land Registration Court and its jurisdiction.	MoLH&UD Recorder of Titles appointed by the President
Land Disputes Tribunals Act (Cap303A) Revised Edition 2010 (1990)	Provides for establishment of a Land Disputes Tribunals and its jurisdiction	MoLH&UD
Landlord and Tenant (Shops, Hotels and Catering Establishments) Act (Cap 301) Revised Edition 2012 (1984)	Provides for the protection of tenants	MoLH&UD
Land Control Act (Cap. 302) Revised edition 2012 (1989)	Provides for controlling transactions in agricultural land	MoLH&UD
Valuers Act (Cap.532) Revised Edition 2012 (1985)	Provides for the registration of valuers and the certification requirements	MoLH&UD
3. Human Rights		
The Kenya National Commission on Human Rights Act, 2002, Revised 2012	Protection and enhancement of human rights	KNCHR
4. Labour Security		
The Employment Act, 2007, Revised 2012	Protection of employee rights, prohibition of child labor	MLSSS
The Labour Relations Act, 2007, Revised 2012	Right to form a trade union	MLSSS
The Work Injury Benefits Act, 2007, Revised 2012	Compensation to employees for work related injuries and diseases	MLSSS

Table 17: National Regulatory Framework

Governing Documents	Description	Applicability
KENYAN POLICY PROVISIONS		
Session Paper No. 5 on the Development and Management of the Road Sub-sector for Sustainable Economic Growth, 2006 (	The goal of the policies outlined in this Sessional Paper is to attain an efficient road sector that supports and promotes economic growth through the cost effective provision and maintenance of infrastructure that is necessary for safe and reliable road transport. This Session Paper presents various policy statements on: • Providing an appropriate road network; • Road Maintenance; • Technical Standards; • Non-Motorised Transport (NMT); • Traffic Management; • Road Safety; • Roads and Land-Use Planning; and • Axle Load Compliance. Specifically, Section 5.1.1 of this policy statement states that "*road development will be focused on improving accessibility, increasing the variety and quality of affordable urban and rural transport and improving accessibility for the development of key economic sectors.*" Furthermore, Section 5.1.5 states that "*measures will be taken by the Government to provide bypasses, missing road links, improved junctions, dedicated bus lanes/corridors, public service vehicle terminals, parking spaces, carriageway capacity improvement, service roads and improved traffic information in order to reduce traffic congestion in urban areas and along highways, and improve the quality of the travelling environment for all road users including non-motorised transport.*"	The purpose of the proposed Expressway is to improve transportation along the Nairobi to Mombasa route, which will ultimately improve connectivity of Kenya's interior to the coast. In developing the proposed Expressway, KeNHA should ensure that the design is aligned to the specifications in the policy statements to ensure effective implementation of this Session Paper.
Session Paper No.10 of 2014 on the National Environment Policy, 2014	The overall goal of this Session Paper is to ensure better quality of life for present and future generations through sustainable management and use of the environment and natural resources. In particular, Section 5.6 of this Session Paper focusses on	In line with the policy statements of this Session Paper, this ESIA study includes an assessment of impacts to the physical, biological and socio-economical environments related with the different phases of the proposed Expressway. Moreover, this ESIA includes mitigation measures and an associated Environmental

Governing Documents	Description	Applicability
	infrastructure development and environment and makes explicit policy statements to ensure sustainable management and use of the environment and natural resources during the construction and operation of infrastructure developments including roads. These policy statements require the commitment of the Government to: • Ensure Strategic Environmental Assessment (SEA), Environmental Impact Assessment, Social Impact Assessment and Public Participation in the planning and approval of infrastructural projects; • Develop and implement environmentally-friendly national infrastructural development strategy and action plan; and • Ensure that periodic Environmental Audits are carried out for all infrastructural projects.	and Social Management and Monitoring Plan (ESMMP) that aim to avoid /minimise/manage the severity of identified impacts. Once the ESIA is approved by the NEMA, the KeNHA must conduct annual Environmental Audits to ensure continuous conformity with the overall goal of this Session Paper.
Vision 2030	Kenya Vision 2030 is the country's development blueprint covering the period 2008-2030. It aims to transform Kenya into a newly industrialised, '*middle income country providing a high quality life to all its citizens by the year 2030*'. Vision 2030 is based on 3 key pillars namely: Economic, Social, and Political. These pillars are anchored on the foundations of infrastructure, and public sector reforms, among others. Vision 2030 aspires for a country firmly interconnected through, among others, a network of roads and recognises that in order to achieve this, investment in the nation's infrastructure will be given the highest priority.	Implementation of the proposed Expressway will contribute towards improvement of the road network within the country, which is in line with the objectives of Vision 2030.
National Policy on Water Resources Management and Development, 1999	The National Policy on Water Resources Management and Development promotes the systematic development of water facilities in all sectors while recognising wastewater as a by-product of this process. The Policy therefore calls for development of appropriate sanitation systems to protect people's health and water resources from institutional pollution. This implies that industrial and business development activities should be accompanied by corresponding waste management systems to handle the wastewater and other waste emanating there from.	The proposed Expressway crosses a number of rivers and streams. Therefore, in line with this policy, the integrity of these water systems will need to be protected throughout the implementation of the proposed Expressway. This includes ensuring proper waste management to prevent water pollution during both the construction and operation phases.
Ministry Of Transport And Infrastructure Policy Statement On National Surface	The primary objective of tolling is to raise additional funds directly from road users in a cost-effective and equitable manner in order to	The project will have a 30 year concession and CBRC will guarantee all revenue risk. Tolling will be

Governing Documents	Description	Applicability
Transport Infrastructure Funding (2016-25) Annex A – National Road Tolling Policy April 2016	contribute to the sustainable development, rehabilitation and maintenance of Kenya's National Road network. This Tolling Policy is consistent with the objectives of the Integrated National Transport Policy and the National Surface Transport Sector Funding Policy. The approach to tolling individual roads will also have regard to the implications for: • road traffic management and congestion; • wider transport network objectives through the relative price of different modes of transport; and • a road's economic and social impacts. Tolling will be applied only where it is economically and financially beneficial, and where all relevant socio-economic implications have been fully taken into consideration. The decision on whether and how to toll a road will be independent of decisions on how to finance, build, operate and maintain that road.	implemented once the road is put into service. The concession agreement is between CRBC & KeNHA
KENYAN LEGAL REQUIREMENTS		
The Constitution of Kenya, 2010	Part II (I) of the Constitution of Kenya, 2010 commits the State to: • Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits; • Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya; • Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities; • Encourage public participation in the management, protection and conservation of the environment; • Protect genetic resources and biological diversity; • Establish systems of environmental impact assessment, environmental audit and monitoring of the environment; • Eliminate processes and activities that are likely to endanger the environment; and • Utilise the environment and natural resources for the benefit of the people of Kenya.	The proposed Expressway should observe the stated conditions in as far as environmental protection is concerned. Moreover, the Constitution has been considered as part of resettlement planning for the proposed Expressway.

Governing Documents	Description	Applicability
	Part II (II) states that "*Every person has a duty to cooperate with state organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.*" Moreover, the Constitution includes aspects around land acquisition and compensation. It also mandates the development of a national land policy to implement the principles and establishes the National Land Commission	
The Kenya Roads Act, 2007 (revised in 2012)	This Act provides for the establishment of the KeNHA, the Kenya Urban Roads Authority (KURA) and the Kenya Rural Roads Authority (KeRRA), and provides for the powers and functions of the authorities and for connected purposes. Section 4 of this Act specifies the function of KeNHA, specifically; Section 4(1) states that "*The Highways Authority shall be responsible for the management, development, rehabilitation and maintenance of national roads.*" Section 29 of this Act further indicates that in exercising the powers, an Authority shall do as little damage as possible, and, where any person suffers damage, no action or suit shall lie against the Authority, but he shall be entitled to such compensation thereof as may be agreed between him and the concerned Authority, or, in default of agreement, as may be determined by an arbitrator appointed by the Chief Justice.	In implementing the proposed Expressway, KeNHA and CRBC will need to ensure that minimum damage, if any, is caused and all affected persons are appropriately compensated.
Traffic Act (Chapter 403, revised in 2012)	This Act consolidates the law relating to traffic on the roads. Section 69 of this Act makes it the duty of the police to: • Regulate all traffic and to keep order and prevent obstruction in all roads, parking places and other places of public resort; and • Divert traffic temporarily, or to restrict or close and deny public access to any road, parking place or other place of public resort, where any emergency or any assembly or other event appear to render advisable such a course. Section 70 of this Act further makes it a requirement for the Authority	In line with the requirements of this Act, CRBC will need to install and properly maintain all the necessary road signs along the proposed Expressway, and liaise with Kenya police in regulating traffic along this road during the operational phase. Moreover, aspects of preventing traffic obstruction on roads impacted by construction of the proposed Expressway will need to be considered during the construction phase.

Governing Documents	Description	Applicability
	to install road signs on or near a road including road traffic signs prescribing speed limits on the road.	
Urban Areas and Cities Act, 2011	This Act provide for the classification, governance and management of urban areas and cities, among others. Part V of this Act focusses on integrated development planning which shall give effect to the development of urban areas and cities as required by this Act and any other written law, among others.	The proposed Expressway is within the Nairobi City environs and a section of Machakos County, and activities within such centres will need to align with respective county integrated development plans as required by this Act.
The National Transport and Road Safety Act, 2012	This Act provides for the establishment of the National Transport and Safety Authority (NTSA), the powers and functions of the authority, and for connected purposes. Section 22 of this Act provides for the establishment of county transport and safety committees in each county whose roles are to: • Oversee the management and regulation of the road transport system by the Authority at the county level; • Prepare and submit to the Authority such audit reports as the Authority may require on the safety, reliability and efficiency of the road transport system within the county; • Advise the Authority on matters affecting the road transport system within the county; and • Perform such other functions as may be assigned to it by the Authority.	KeNHA will need to disclose the proposed Expressway activities with the respective county transport and safety committees in the two counties traversed by the proposed Expressway.
The Public Finance Management (Road Tolls And National Toll Fund) Regulations, 2018	The objects and purposes of these regulations are to - • Provide a mechanism for mobilizing resources for the financing of road development and modernization investments to support economic development and regional trade; • Impose a toll and related charges to be paid by designated classes of road users for purposes of mobilizing resources for the objectives in (a); • Establish a centralized and [ring-fenced?] fund into which all revenues collected pursuant to these regulations shall be paid and administered; • Provide for the oversight and administration of the Fund; • Prescribe the processes by which money is paid into and out of the Fund; • Provide investors and development partners visibility and structure in participation processes under the Fund;	The project will have a 30 year concession and CBRC will guarantee all revenue risk. Tolling will be implemented once the road is put into service. The concession agreement is between CRBC & KeNHA

Governing Documents	Description	Applicability
	and • Make provision for purposes connected with and incidental to the foregoing objects and purposes.	
The State Corporations Act (NaMATA Order)	It is an Act of Parliament to consolidate and reform the laws related to the incorporation,registration, operation, management and regulation of companies; to provide for theappointment and functions of auditors; to make other provision relating to companies; and to provide for related matters. This is the order to establish Nairobi Metropolitan Area Transport Authority (NaMATA), issued in 17th February 2017 as a special issue under the state corporations act (Cap. 446). The authority is established after record of discussion of The project on detailed planning of integrated transport system and loop line in the Nairobi Urban Core signed in 26th December 2016. However, it should be noted that the bill is yet to pass the parliament as of August 2017. The authority covers five counties i.e., Nairobi City, Kianbu, Machakos, Kajiado and Murang'a as the Metropolitan Area in Nairobi. The board of Directors of the authority consists of twelve (12) members as follows; The authority covers five counties i.e., Nairobi City, Kianbu, Machakos, Kajiado and Murang'a as the Metropolitan Area in Nairobi. The board of Directors of the authority consists of twelve (12) members as follows; • The chairperson of the Board, appointed by the President; • Two Principal Secretaries responsible for transport and finance, respectively; • The County Executive Committee Member responsible for transport in each of the said five counties of the Metropolitan Area; • The Director General; and • Three independent person who shall be appointed by virtue of their knowledge and experienced, transport and economic relevant field. NaMATA is on duty to develop a sustainable integrated public transport strategy and urban mobility plan then formulate the Integrated Mass Rapid Transit System including BRT and Commuter	Expressway project falls within NAMATA jurisdiction area

Governing Documents	Description	Applicability
	Rail within the Metropolitan Area. NaMATA also to ensure the connectivity between modes such as air, road, rail and non-motorized transport. The regulation of parking and coordination between roads and public mode is responsible for the authority. Therefore, various functions in public transport sector from strategy planning to project formulation including coordination with other government agencies are given to NaMATA according to the act.	
The Environmental Management and Coordination Act, 1999 (and amendments made in 2015)	The Environment Management and Coordination Act (EMCA), 1999 is implemented by the guiding principle that every person has a right to a clean and healthy environment and can seek redress through the high court if this right has been, is likely to be or is being contravened. Section 58 of the Act makes it a mandatory requirement for an ESIA to be carried out by proponents intending to implement projects specified in the second schedule of the Act (1). Such projects have a potential of causing significant impacts on the environment. Similarly, section 68 of the same Act requires operators of existing projects or undertakings to carry out environmental audits in order to determine the level of conformance with statements made during the ESIA.	The proposed Expressway falls within the category of high risk projects (more specifically, construction and rehabilitation of roads), for which an ESIA is required. Accordingly, an ESIA study is currently being carried out in line with the requirements of this Act, and KeNHA and CRBC shall be required to commit to implementing the Environmental and Social Management and Monitoring Plan (ESMMP) laid out in this ESIA Report and any other conditions as laid out by NEMA, should an ESIA licence be issued for the proposed Expressway.
The Environmental (Impact Assessment and Audit) Regulations, 2003 (and amendments made in 2016)	The Environmental (Impact Assessment and Audit) Regulations state in Regulation 3 that "*the Regulations should apply to all policies, plans, programmes, projects and activities specified in Part IV, Part V and the Second Schedule of the Act*". Part III of the Regulations outlines the procedures to be taken during preparation, submission and approval of the ESIA Report. The Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2016 contains an updated copy of the Third Schedule, which applies to medium risk projects for which an ESIA is required.	The proposed Expressway falls within the category of high risk projects, and therefore requires that an ESIA be undertaken. This ESIA has been undertaken to comply with the requirements of these Regulations. KeNHA and CRBC shall be required to commit to implementing the ESMMP laid out in this ESIA and any other conditions stipulated by NEMA.
The Environmental Management and Coordination (Water Quality) Regulations, 2006	The Regulations provide for sustainable management of water quality including prevention of water pollution and protection of water sources from situations involving effluent discharge and wastewater use for agriculture. It is an offence under Regulation No. 4 (2), for any	The proposed Expressway will be associated with waste generation, more specifically solid waste, which should be disposed of in an environmentally friendly manner to avoid any form of pollution, including water pollution.

Figure 1:

(1) The Second Schedule of the EMCA was updated in the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2016.

Governing Documents	Description	Applicability
	person to throw or cause to throw into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution. Regulation No. 11 further makes it an offence for any person to discharge or apply any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit the dumping or discharge of such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards for effluent discharge into the environment.	Of special interest are the sections of the Expressway that crosses rivers and streams. The Third Schedule of the regulations include standards for effluent discharge into the environment. The ESMMP has considered these regulations and includes (amongst others) a section on the management of both non-hazardous and hazardous wastes.
The Environmental Management and Coordination (Waste Management) Regulations, 2006	The regulations provide details on management (handling, storage, transportation, treatment and disposal) of various waste streams including: • Domestic waste; • Industrial waste; • Hazardous and toxic waste; • Pesticides and toxic substances; • Biomedical wastes; and • Radioactive waste. Regulation 4 (1) makes it an offence for any person to dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle. Regulation 5 (1) provides categories of cleaner production methods that should be adopted by waste generators in order to minimize the amount of waste generated. Regulation 6 requires waste generators to segregate waste by separating hazardous waste from non-hazardous waste for appropriate disposal. Regulation 15 prohibits any industry from discharging or disposing of any untreated waste in any state into the environment. Regulation 17 (1) makes it an offence for any person to engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license issued by NEMA.	The proposed Expressway, during the construction and operational phases, will generate wastes, which will need to be disposed of as per the guidelines in the Regulations. The ESMMP has considered these regulations and includes a section on the management of both non-hazardous and hazardous wastes.
The Environmental Management and	The regulations provide for the prevention, control and abatement for	The First Schedule of the Kenyan Air Quality

Governing Documents	Description	Applicability
Coordination Act (Air Quality), Regulations, 20014	air pollution, and to ensure for clean and healthy ambient air. The regulations apply to (amongst others) all internal combustion engines.	Regulations set out standards for the land types along the alignment of the proposed Expressway - i.e. industrial area, residential area and protected area. The applicability of these regulations are discussed in more detail in *Section 4.3.5*.
The Environmental Management and Coordination Act (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009	The regulations provide information on the following: • Prohibition of excessive noise and vibration; • Provisions relating to noise from certain sources; • Provisions relating to licensing procedures for certain activities with a potential of emitting excessive noise and/or vibrations; and • Noise and excessive vibrations mapping. Regulation 3 (1) states that no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Regulation 12 (1) makes it an offence for any person to operate a motor vehicle which- (a) produces any loud and unusual sound; and (b) exceeds 84 dB(A) when accelerating. According to sub-regulation 2 of this regulation, no person shall at any time sound the horn or other warning device of a vehicle except when necessary to prevent an accident or an incident. Regulation 13 (1) provides that except for the purposes specified in sub-Regulation (2) there under, no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations.	CRBC will be required to ensure compliance with these regulations in order to promote a healthy and safe working environment throughout the construction phase. This shall include regular inspection and maintenance of equipment to reduce noise and vibration, and prohibition of unnecessary noise emitted from construction equipment and Project heavy and light vehicles.
The Forest Conservation and Management Act, 2016	The Act recognises the establishment of Kenya Forest Service (KFS) which, among other functions, is charged with conservation, management and protection of all public forests in accordance with the provisions of this Act. Part IX of this Act lists the offences in a public or provisional forest which include among others construction of	

Governing Documents	Description	Applicability
	any road or path except under a licence or permit or a management agreement issued or entered into under this Act.	
Forest Conservation and Management Act (Act 34 of 2016)	An act of Parliament regarding forest resources; to provide for the development and sustainable management, including conservation and rational utilization of all forest resources for socio-economic development and related issues.	Compensation for loss of important trees may be payable to KFS.
The Wildlife Conservation and Management Act, 2013	This is the main law that governs the management of wildlife including their habitats such as national parks, national reserves and local sanctuaries. The Act defines the functions of the Kenya Wildlife Service to include: • Formulate policies regarding the conservation of all types of non-domestic fauna and flora; • Manage National Parks and National Reserves, prepare management plans and advise on establishment thereof; • Provide wildlife conservation education and extension; • Conduct and co-ordinate wildlife research; • Maintain the required manpower for wildlife conservation; • Advise the Government, local authorities and landowners on wildlife conservation and management. Serve as the principal Government agent for ecological controls outside urban areas; • Administer and co-ordinate international protocols, conventions and treaties regarding wildlife; and • Render ecological services to farming and ranching communities for protection of agriculture and livestock against risks by wildlife. Part XI of this Act lists the offenses in national parks which includes among others pollution of wildlife habitats and ecosystems; and damage of any object of geological, prehistoric, archaeological, historic, and marine or other scientific interest within a National Park.	.
Wildlife Conservation and Management (Activities in Protected Areas) Regulations, 2015 (DRAFT) *These regulations are compiled by KWS*	These regulations provide guidance on the conduct of any activities within a protected area. Regulation 5(d) of these regulations indicate that in management of the activities in protected areas, the Service or the owner in case of a	

Governing Documents	Description	Applicability
to guide implementation of the above Wildlife Conservation and Management Act, and are applicable even in Draft state.	conservancy or sanctuary, shall regulate the acceptable mode of transport in each protected area and post any restriction at all entry points. Regulation 7(1)(s) indicates that, except with the special permission of the Kenya Wildlife Service (KWS), no person shall, in the case of a state-protected area, clear any bushes, make road works, paths in the protected area.	
Wildlife Conservation and Management (Protection of Endangered and Threatened Ecosystems, Habitats and Species) Regulations, 2016 (DRAFT) *These regulations are compiled by KWS to guide implementation of the above Wildlife Conservation and Management Act, and are applicable even in Draft state.*	The overall objective of these regulations is to ensure protection of endangered and threatened ecosystems, habitats and species which are published in the national Gazette in accordance with section 46 of the Wildlife Act. Regulation 9(1) outlines restricted activities with regard to the listed species, which include among others conveying, moving or otherwise trans locating any specimen of a listed species. Any regulated activities can only be carried out pursuant to permit issued in accordance with the Wildlife Act and these regulations.	A biodiversity characterisation has been conducted. Moreover, the ESMMP includes measures for biodiversity management. These measures are in accordance with the requirements of these Regulations.
Wildlife Conservation and Management (Protected Wetlands) Regulations, 2016 (DRAFT) *These regulations are compiled by KWS to guide implementation of the above Wildlife Conservation and Management Act, and are applicable even in Draft state.*	The aim of these regulations is to ensure appropriate management of protected wetlands in Kenya whether in public, community or private land. Regulation 6(2) states that "*Neither the national government, county governments or communities shall lease or otherwise alienate any protected wetland." Regulation 6(3) further states that "The Polluter Pays Principle shall be strictly applied in regards to payment of compensation for pollution of protected wetland areas*." Regulation 9 lists the activities restricted in wetlands, which include among others any form of alteration, interference or modification of wetlands. The conduct of such activities requires a permit. Regulation 10 lists prohibited activities in protected wetlands which include among others dredging, unless the wetland is only impacted by siltation.	These regulations have been considered in the biodiversity study for the ESIA.
The Climate Change Act, 2016	This Act provides for a regulatory framework for enhanced response to climate change; to provide for a mechanism and measures to	In line with the requirements of this Act, this ESIA has considered the climate change adaptation requirements

Governing Documents	Description	Applicability
	achieve low carbon climate development, and for connected purposes. The Act shall be applied in all sectors of the economy by the national and county governments to (amongst others) – mainstream climate change responses into development planning, decision making and implementation; and promote low carbon technologies, improve efficiency and reduce emissions intensity by facilitating approaches and uptake of technologies that support low carbon, and climate resilient development.	for the proposed Expressway and management options relating to GHG emissions during the construction phase.
The Land Act, 2012	This Act of Parliament intended to give effect to Article 68 of the Constitution, to revise, consolidate and rationalise land laws, to provide for the sustainable administration and management of land and land based resources, and for connected purposes. Article 5 of this Act, lists forms of land tenure: Freehold; leasehold; such forms of partial interest as may be defined under this Act and other law, including but not limited to easements; and customary land rights, where consistent with the Constitution. Section 7 of this Act focusses on the methods of acquiring a land title as: • Allocation; • Land adjudication process; • Compulsory acquisition; • Prescription; • Settlement programs; • Transmissions; • Transfers; • Long term leases exceeding twenty one years created out of Private land; or • Any other manner prescribed in an Act of Parliament. The Act is the primary legislation on public land, governing its management (including leasing) as well as acquisition. Part VIII provides the procedures for compulsory acquisition. Article 111 requires NLC to make rules to regulate the assessment of just compensation	All the land required for the proposed Expressway will need to be acquired in line with the provisions of this Act. The provisions included in this Act have been considered as part of resettlement planning for the proposed Expressway.
The National Land Commissions Act,	This is an Act of Parliament to make further provision as to the	All the land required for the proposed Expressway will

Governing Documents	Description	Applicability
2012	functions and powers of the National Land Commission (NLC), qualifications and procedures for appointments to the commission, to give effect to the objects and principles of devolved government in land management and administration, and for connected purposes. In particular, this Act mandates the Land Commission to manage public land on behalf of the national and county governments. Moreover, the Act assigns functions and responsibilities to the NLC in furtherance of the principles set out in the Constitution. The NLC's functions and roles are set out in the Act.	need to be acquired in line with the provisions of this Act. Moreover, the functions and roles of the NLC is a key considerations as part of resettlement planning.
The Environment and Land Court Act, 2011	This is an Act of Parliament to give effect to Article 162 (2) (b) of the Constitution; to establish a superior court to hear and determine disputes relating to the environment and the use and occupation of, and title to, land, and to make provision for its jurisdiction functions and powers, and for connected purposes. The principal objective of this Act is to enable the Court to facilitate the just, expeditious, proportionate and accessible resolution of disputes governed by this Act. The Environment and Land Court has jurisdiction over all disputes having to do with land, including compulsory acquisition. In a matter before it the Court may adopt and implement alternative dispute resolution mechanisms including traditional ones.	In the event that any disputes relating to land and environmental protection arise, such as any land use planning, title, tenure and boundary issues within the Area of Interest (AoI) that are not solved at the Project level, these can be forwarded to the Land and Environment Court, for resolution. The provisions included in this Act have will be considered as part of resettlement planning for the proposed Expressway.
The Valuers Act, 1984	Article 21 of this Act states that no person can carry on the business as a practising valuer of movable or immovable property unless the person is registered with the Valuers Registration Board	The provisions included in these Acts will be considered as part of resettlement planning for the proposed Expressway.
The Survey Act, 1961	Article 35 of this Act states that only a surveyor licensed by the Land Surveyors Board under the Survey Act can survey land for the purpose of preparing a plan that is referenced in a title document or for delimiting boundaries.	
The Land Registration Act, 2012	This is an Act of Parliament intended to revise, consolidate and rationalise the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes.	KeNHA is required to acquire a certificate of title for the land to be occupied by the proposed Expressway, in line with the provisions of this Act. Moreover, the provisions included in these Acts will be considered as

Governing Documents	Description	Applicability
	Section 26(1) states that the certificate of title issued by the Registrar upon registration, or to a purchaser of land upon a transfer or transmission by the proprietor shall be taken by all courts as *prima facie* evidence that the person named as proprietor of the land is the absolute and indefeasible owner.	part of resettlement planning for the proposed Expressway.
The Water Act, 2016	This Act provides for the regulation, management and development of water resources, water and sewerage services; and for other connected purposes. As stated in Section 63, every person in Kenya has the right to clean and safe water in adequate quantities and to reasonable standards of sanitation as stipulated in Article 43 of the Constitution. Section 21(2) that follow mandates the Water Resources Management Authority (WRMA) to demand from any person, within a reasonable time or on a regular basis, to provide it with specified information, documents, samples or materials in relation to the system referred to in Section 21(1). Under these rules, specific records may require to be kept by a site operator and the information thereof furnished to the authority. Section 36 makes it a requirement to obtain a permit for any of the following purposes: • Any use of water from a water resource, except as provided by Section 37. Section 37 lists water use practices that are exempted from the acquisition of a water use permit. These include: • for the abstraction or use of water, without the employment of works, from any water resource for domestic purposes by any person having lawful access to the water resource; • for the abstraction of water in a spring which is situated wholly within the boundaries of the land owned by any one landholder and does not naturally discharge into a watercourse abutting on or extending beyond the boundaries of that land; or • for the storage of water in, or the abstraction of water from a reservoir constructed for the purpose of such storage and	The proposed Expressway crosses a number of rivers and streams. In line with the requirements of this Act, these water resources will need to be safeguarded against pollution, and will need to be appropriately managed throughout the Project lifecycle (construction and operational phases). Moreover, the proposed Expressway will have water resource requirements during the construction phase. A permit will be required for any abstraction of water resources needed for construction.

Governing Documents	Description	Applicability
	which does not constitute a water course for the purposes of this Act. • The drainage of any swamp or other land; • The discharge of a pollutant into any water resource; and • Any other purpose, to be carried out in or in relation to a water resource, which is prescribed by Regulations made under this Act to be a purpose for which a permit is required. In line with Section 5(1) of the Second Schedule of this Act, the permit holder shall submit a completion certificate in the prescribed form upon the expiration of the time limited by a permit for construction of works authorised by the permit, or where the construction is completed before the expiration of that time.	
The Water Quality Regulation, 2006	Part II, Section 4 of these regulations states that "*Every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution.*" Part V, Section 24 states that "*No person shall discharge or apply any poison, toxic, noxious or obstructing matter, radioactive wastes, or other pollutants or permit any person to dump or discharge any such matter into water meant for fisheries, wildlife, recreational purposes of any other uses.*"	The proposed Expressway passes through a number of rivers and streams. In line with the requirements of these Regulations, the quality of these water resources will need to be maintained throughout the Project lifecycle (construction and operational phases); water pollution attributable to the proposed Expressway should be completely avoided.
Water Resources Management Rules (2007)	The rules set out the procedures for obtaining water use permits and the conditions placed on permit holders.	CRBC will obtain the necessary water use permit(s), and observe the conditions therein, in line with these rules.
The Public Health Act (Cap 242)	This is an Act of Parliament to make provision for securing and maintaining health. Section 115 of this act prohibits causing nuisance or other condition liable to be injurious or dangerous to health. Section 118 provides a list of nuisances which includes any noxious matter, or waste water, flowing or discharged from any premises, wherever situated, into any public street, or into the gutter or side channel of any watercourse, irrigation channel or bed thereof not approved for the reception of such discharge.	Implementation of the proposed Expressway will need to be carried out in a manner that does not compromise public health and safety. In particular, all the waste and emissions generated during Project implementation will need to be managed in an appropriate manner so as to prevent any associated public health risks.
The Physical Planning Act, 1996	This is the main Act that governs land planning and all proposed developments must be approved by the respective local authority and certificate of compliance issued accordingly. This Act provides for the preparation and implementation of physical	KeNHA shall secure all mandatory approvals and permits as required by the law. Moreover, an ESIA process for the proposed Expressway will be undertaken.

Governing Documents	Description	Applicability
	development plans for connected purposes. It establishes the responsibility for the physical planning at various levels of Government in order to remove uncertainty regarding the responsibility for regional planning. A key provision of the Act is the requirement for an ESIA to be undertaken. Moreover, the Act will apply to the planning and implementation of resettlement sites,	The provisions included in these Acts will be considered as part of resettlement planning for the proposed Expressway.
The Prevention, Protection and Assistance to Internally Displaced Persons and Affected Communities Act, 2012	Article 21 and 22 of this Act states that displacement and relocation of Internally Displaced Persons (IDPs) and communities by development projects must be unavoidable. A public hearing must take place at project planning stage. Free and informed consent must be sought from affected persons, although it is ultimately not required. The protection of community land and "the special needs of women, children and persons with special needs" must be observed. Full information must be provided and affected persons must be afforded effective participation in planning and management of the displacement. Safe and habitable sites must be provided.	The provisions included in these Acts will be considered as part of resettlement planning for the proposed Expressway.
The Community Land Act, 2016	The Act provides for the recognition and registration of community land and its management and administration. Registered communities may be granted ownership of community land, with certificate of title issued by the Registrar. Article 22 of the Act states that community land may be converted to public land by compulsory acquisition.	The provisions included in these Acts will be considered as part of resettlement planning for the proposed Expressway.
The Matrimonial Property Act, 2013	Article 6 and 7 of this Act states that matrimonial property is owned by the spouses according to their contribution towards its acquisition, regardless of who is the registered owner. Matrimonial property includes the home or homes.	
The County Governments Act, 2012	Article 114 of this Act provides that development of nationally significant development projects must be preceded by public hearings in each affected county.	The provisions included in these Acts will be considered as part of stakeholder engagement process for the ESIA and resettlement planning for the proposed Expressway.
The Occupational Safety and Health Act, 2007	This is an Act of Parliament to provide for the safety, health and welfare of all workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes.	The safety, health and welfare of all the workers associated with the proposed Expressway will need to be assured in line with all the provisions of this Act throughout the Project lifecycle (construction and operational phases).

Governing Documents	Description	Applicability
The Employment Act No 11, 2007	The Act is enacted to consolidate the law relating to trade unions and trade disputes, to provide for the registration, regulation, management and democratisation of trade unions and employers organisations and federations. Its purpose is to promote sound labour relations through freedom of association, the encouragement of effective collective bargaining and promotion of orderly and expeditious dispute the protection and promotion of settlement conducive to social justice and economic development for connected purposes. This Act is important since it provides for employer – employee relationship that is important for the activities that would promote management of the environment at a workplace.	CRBC being primary employers during the construction and operational phases of the proposed Expressway, they are bound by this law to abide to its stipulations on employee management and relations. CRBC must respect workers' rights to join (or not join) unions of their choice and to engage with those unions which workers are members of in relation to collective bargaining, disciplinary proceedings and retrenchment of workers.

4.3.3 The EMCA (Water Quality) Regulations, 2006

Section 11 (*Discharge into Aquatic Environment*) of the regulations states that no person shall discharge or apply any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit any person to dump or discharge such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards set out in the Third Schedule of the Regulations.

The Third Schedule includes the standards for effluent discharge into the natural environment.

Table 18:The EMCA Water Quality Standards for Effluent Discharge into the Environment

Parameter	**Max Allowable(Limits)**
1,1,1-trichloroethane (mg/l)	3
1,1,2-trichloethane (mg/l)	0.06
1,1-dichloroethylene	0.2
1,2-dichloroethane	0.04
1,3-dichloropropene (mg/l)	0.02
Alkyl Mercury compounds	Nd
Ammonia, ammonium compounds, NO_3 compounds and NO_2 compounds (Sum total of ammonia-N times 4 plus nitrate-N and Nitrite-N) (mg/l)	100
Arsenic (mg/l)	0.02
Arsenic and its compounds (mg/l)	0.1
Benzene (mg/l)	0.1
Biochemical Oxygen Demand (BOD 5days at 20 oC) (mg/l)	30
Boron (mg/l)	1.0
Boron and its compounds – non marine (mg/l)	10
Boron and its compounds –marine (mg/l)	30
Cadmium (mg/l)	0.01
Cadmium and its compounds (mg/l)	0.1
Carbon tetrachloride	0.02
Chemical Oxygen Demand (COD (mg/l)	50
Chromium VI (mg/l)	0.05
Chloride (mg/l)	250
Chlorine free residue	0.10
Chromium total	2
cis –1,2- dichloro ethylene	0.4
Copper (mg/l)	1.0
Dichloromethane (mg/l)	0.2
Dissolved iron (mg/l)	10
Dissolved Manganese(mg/l)	10
E.coli (Counts / 100 ml)	Nil
Fluoride (mg/l)	1.5
Fluoride and its compounds (marine and non-marine) (mg/l)	8
Lead (mg/l)	0.01
Lead and its compounds (mg/l)	0.1
n-Hexane extracts (animal and vegetable fats) (mg/l)	30
n-Hexane extracts (mineral oil) (mg/l)	5
Oil and grease	Nil
Organo-Phosphorus compounds (parathion,methyl parathion,methyl demeton and Ethyl parantrophenyl phenylphosphorothroate, EPN only) (mg/l)	1.0
Polychlorinated biphenyls, PCBs (mg/l)	0.003
pH (Hydrogen ion activity----marine)	5.0 – 9.0
pH (Hydrogen ion activity--non marine)	6.5 – 8.5
Phenols (mg/l)	0.001
Selenium (mg/l)	0.01

Parameter	Max Allowable(Limits)
Selenium and its compounds (mg/l)	0.1
Hexavalent Chromium VI compounds (mg/l)	0.5
Sulphide (mg/l)	0.1
Simazine (mg/l)	0.03
Total Suspended Solids, (mg/l)	30
Tetrachloroethylene (mg/l)	0.1
Thiobencarb (mg/l)	0.1
Temperature (in degrees celious) based on ambient temperature	± 3
Thiram (mg/l)	0.06
Total coliforms (counts /100 ml)	30
Total Cyanogen (mg/l)	Nd
Total Nickel (mg/l)	0.3
Total Dissolved solids (mg/l)	1,200
Colour in Hazen Units (H.U)	15
Detergents (mg/l)	Nil
Total mercury (mg/l)	0.005
Trichloroethylene (mg/l)	0.3
Zinc (mg/l)	0.5
Whole effluent toxicity	
Total Phosphorus (mg/l)	2
Total Nitrogen (mg/l)	2

4.3.4 The EMCA (Noise and Excessive Vibration Pollution Control) Regulations, 2009

Part II of the regulation states "*No person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. In determining whether noise is loud, unreasonable, unnecessary or unusual, factors such as time of the day, proximity to residential area, whether the noise is recurrent, intermittent or constant, level and intensity of the noise, electronic or mechanical means etc. may be considered.*"

The following sections of the regulations are relevant to the proposed Expressway:

- **Rule 4** – the regulation relates noise to vibration effects, which can be harmful to people or the environment. Harmful vibrations are defined as exceeding 0.5 centimetres per second beyond any source property boundary or 30 metres from any moving source.
- **Rule 11** – requires any person wishing to operate or repair any machinery, motor vehicle, or construction equipment that is likely to emit noise or excessive vibrations to carry out the activity or activities within the relevant levels, provided in the First Schedule to these Regulations (**Error! Reference source not found.**).
- **Rule 14** – requires that where construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose on how the work be carried out. This includes the type of machinery used, and the permitted levels of noise (as stipulated in the Second and Third Schedules to these Regulations. In addition, the relevant lead agency shall ensure that mines and quarries where explosives are used are located in designated areas, and not less than two kilometres away from human settlements.

Error! Reference source not found. presents the maximum permissible L_{Aeq} levels in Kenya (First Schedule). The Kenya noise regulations define daytime period as 06:01 to 20:00 hours and night-time period from 20:01 to 06:00 hours.

Table 19: Maximum Permissible Noise Levels in Kenya

Zone	Description of Noise Receptor	Permissible Noise Level in dB(A)	
		Day (06:01 – 20:00, LAeq, 14 hour)	Night (20:01 – 06:00, LAeq 10 hour)
A	Silent zone1	40	35
B	Places of worship	40	35
C	Residential: Indoor Residential: Outdoor	45 50	35 35
D	Mixed residential (with some commercial and places of entertainment)	55	35
E	Predominantly heavy industrial areas	60	35

Table 20 presents the maximum permissible LAeq levels for construction sites in Kenya (Second Schedule). The Kenya noise regulations define daytime period as 06:01 to 18:00 hours and night-time period from 16:01 to 06:00 hours.

Table 20: Kenya Permissible Noise Level in dB(A)

	Facility	Maximum Permissible Noise Level in dB(A)	
		Day (06:01 – 18:00, LAeq, 12 hour)	**Night (16:01 – 06:00, LAeq 12 hour)**
(i)	Health facilities, educational institutions, homes for disable etc.	60	35
(ii)	Residential	60	35
(iii)	Areas other than those prescribed in (i) and (ii)	75	65

Kenya also has permissible noise levels (in maximum C-weighted decibels or dBCmax) for mines and quarries (Third Schedule); however, the dBCmax limits refer to noise overpressure due to blasting (i.e. airblast overpressure).

Compliance with this limit can be met through appropriate consideration of the blasting design. In addition, the Kenyan EMCA regulations state "*The relevant lead agency shall ensure that mines and quarries, where explosives and machinery are used, are located in designated areas, and not less than two kilometres away from human settlements.*"

As such, no modelling of airblast noise has been carried out; rather the dB max limits and the buffer distance of quarries from human settlements are prescribed in the ESMMP.

4.3.5 The EMCA (Air Quality), Regulations, 2014

The draft Kenyan Air Quality Standards as part of *The Environmental Management and Co-ordination Act 1999*, were transposed into Kenyan legislation through *The Environmental Management and Co-ordination (Air Quality) Regulations, 2014*[2]. As previously mentioned, these standards include a consideration of the type of area within which the proposed Expressway is located – i.e. industrial area, residential area and controlled area. For the purposes of the air quality assessment for the proposed Expressway, it is assumed that the residential and/or controlled area standards will apply along the whole alignment of the proposed Expressway, whichever are most stringent. Controlled areas are stated to include, but are not limited to, residential areas, hospitals, National Parks, Reserves and Sanctuaries and therefore this approach is considered to be appropriate for the Expressway assessment. This assumption is reasonable, as the large majority of receptors identified along the route are residential properties, with two National Parks and reserves on the route. In the

Figure 1:

[2] Available on-line at <<http://kenyalaw.org/kl/fileadmin/pdfdownloads/LegalNotices/34-EnvironmentalManagementandCo-ordination(AirQuality)Regulations2014.pdf>>

case of truck stops, these appear to have dwellings on or adjacent to the stops, and therefore the residential standard is applicable.

Note - where Kenyan standards are set out in terms of parts per million, these have been converted to µg/m^3 for ease of comparison. The Kenyan air quality standards for SO_2, PM_{10} and $PM_{2.5}$ are similar to other international standards. For NO_2, the Kenyan air quality standard is somewhat less stringent than the standards set by these bodies, but are comparable to some other African countries (for example Egypt, Benin, Tunisia). The air quality standards for SO_2, PM_{10} and $PM_{2.5}$ are considered suitable for purpose and suitable for purpose in the protection of human health.

Table 21: Kenyan air quality standard

Kenyan Standards		
Pollutant	**Averaging period**	**Criterion (µg/m^3)**
NO_2	annual average	96
NO_2	monthly average	153
NO_2	24 hour maximum	100
NO_2	one hour maximum	383
NO_2	Instant peak maximum	957
PM_{10}	annual average	50
PM_{10}	24 hour 98 percentile	70
$PM_{2.5}$	annual average	35
$PM_{2.5}$	24 hour maximum	75

4.3.6 International Conventions, Protocols and Agreements

Kenya is signatory to a number of international conventions and agreements relating to environmental and social matters (refer to Table 22). In certain cases these have influenced the promulgation of domestic policy, guidelines and regulations.

Although not all treaties/ conventions listed below have been enacted into domestic legislation; good practice would require that the ethos of each treaty be taken into consideration during the planning, construction and operations phases of the Project.

Table 22: Summary of International Conventions

International Convention	**Objective**	**Relevancy to the project road**
United Nations Convention on Biological Diversity (CBD)	The three goals of the CBD are to promote the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources.	Measures need to be put in place to conserve biodiversity along the proposed Expressway, particularly to maintain the wilderness integrity of the protected areas through avoiding sensitive areas, retaining wildlife dispersal and avoiding the loss of the threatened species in these areas.
United Nations Framework for Convention on Climate Change (UNFCCC)	Its main objective is to achieve the stabilisation of greenhouse gas concentrations in the atmosphere at a level that prevents dangerous anthropogenic interference with climate systems and within a specific timeframe which will allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.	The emission of greenhouse gases during the implementation of the proposed Expressway should be controlled to avoid compromising the objective of this convention.
Bamako Convention, 1991	This convention focusses on the ban of the import of hazardous wastes into Africa and the control of	All Project associated hazardous wastes will need to be appropriately managed to avoid contravention of this convention. Moreover,

International Convention	Objective	Relevancy to the project road
	transboundary movement and management within Africa.	Project Procurement will need to screen all Project goods and products exported from the Country. Appropriate and authorised destinations for the export of hazardous waste will need to be identified.
Basel Convention, 1989	Transboundary transportation and disposal of hazardous wastes. Its objective is to protect human health and the environment against the adverse effects of hazardous wastes.	All Project waste will need to be correctly classified to identify what qualifies as hazardous waste according to this convention. Appropriate and authorised destinations for the export of hazardous waste will need to be identified.
Bonn Convention, 1979	This convention focusses on the conservation of migratory species of wild animals. Its aim is to conserve terrestrial, marine and avian migratory species throughout their range.	The implementation of the proposed Expressway should ensure that there are minimal impacts on green spaces. No important migratory fauna are expected to be impacted,
World Heritage Convention, 1972	This convention requires each State Party to recognise the duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage.	The social study associated with the ESIA has considered cultural and natural heritage and has located such sites along the proposed Expressway. Moreover, the ESMMP includes management measures for Cultural Heritage.
Convention for the safeguarding of the intangible cultural heritage, 2003	The objectives of this convention include to: safeguard the intangible cultural heritage; ensure respect for the intangible cultural heritage of the communities, groups and individuals concerned and raise awareness at the local, national and international levels of the importance of the intangible cultural heritage, and of ensuring mutual appreciation thereof.	As part of the social study associated with the ESIA, cultural and natural heritage (including intangible cultural heritage) have been considered and appropriate measures for their preservation have been included in the ESMMP.

4.1 PERMITTING STATUS

4.1.1 Previous ESIA for the the Corridor:

In 2013 KeNHA undertook Nutrip project ESIA for construction of additional lanes on JKIA-Likoni - James Gichuru-Rironi road (A4) (approximately 42 km), dualling of Airport South Road (approximately 3km), creating of an access to JKIA widening (approximately 2km), construction of a bitumen road to the proposed Barabara Plaza (approximately 2km) and construction an access road to container depot (approximately 2km) . NEMA license (0016896) was issued on 26th June 2013. The license was initially varied on 18th April 2017 (NEMA/EIA/VC/567) and again varied on 12th October 2018 (NEMA/EIA/VC/977).

Another study that dealt with Consultancy Services of Feasibility, Preliminary and Detailed Engineering Design, Environmental and Social Impact Assessment Study for the capacity enhancement of part of the A104 road from JKIA Turnoff to Likoni road junction was undertaken by KeNHA in 2015. As part of the assignment the study included upgrading of the Airport South, Access to JKIA (B10), Barabara Plaza, Container Deport and East Gate roads. This study was submitted to NEMA and License issued

(NEMA/EIA/PSL/4435) issued on 23rd March 2017. The license was later returned to NEMA for amendments due to a typological error on the objective section.

On October 2019 NEMA approved another variation (See Annex 5 volume II of this report) of the NEMA license (0016896) for a go ahead of the Nairobi Expressway works for the section between JKIA to James Gichuru covered under the project construction of additional lanes on JKIA-Likoni - James Gichuru-Rironi road (A4) (approximately 42 km), dualling of Airport South Road (approximately 3km), creating of an access to JKIA widening (approximately 2km), construction of a bitumen road to the proposed Barabara Plaza (approximately 2km) and construction of an access road to container depot (approximately 2km).

However a guidance was issued by NEMA for the section between Mlolongo to JKIA (not covered under license number 0016896) not to commence until ESIA for the redesign expressway is undertaken processed by by NEMA and record of NEMA decision is issued.

It is against this background this ESIA report for Nairobi Expressway is presented to NEMA for review and decision. The Project must comply with the requirements of national legislation. Certain permits that CRBC will need to put in place. Some permits may be obtained during construction since they will be determined as need arises. Table below lists the environment-related permits required for this project.

Table 23: Permitting table

No.	Relevant activity	Statute	Requirement	Competent Authority	Responsible Agency for Obtaining Clearance	Date of Acquisition	Duration
Pre-Construction Stage							
1	Construction and operation of the road	Environmental Management and Coordination Act (EMCA) Cap 387, Rev 2018	Need to submit ESIA report to obtain EIA license	NEMA	KeNHA	Upon approval of ESIA report	Max 90 Days from date of submission of ESIA Study Report
2	Cutting of trees	Forest Management and Conservation Act, 2016	Need to obtain permission to cut down trees	Kenya Forest Service (KFS)	KeNHA	Before road clearance works	Indefinite
3	Construction activities	Occupational Safety and Health Act (OSHA), 2007	Need to apply registration of premises	Directorate of Occupational Safety and Health Services (DOSHS)	CRBC	Before commencement of construction works	1 – 4 weeks
4	Setting up of construction camp sites	Environmental Management and Coordination Act (EMCA) Cap 387, Rev 2018	Need to submit Project report for the Camp Sites to obtain EIA License	NEMA	CRBC	Before commencement of construction	1 – 1.5 months
5	Water abstraction from Surfacewater sources in the area (Rivers etc.)	Water Act, 2012	Need to obtain permission to abstract water	Water Resources Authority (WRA)	CRBC	Before commencement of construction	1 – 1.5 months
6	Drilling of boreholes to supply water to the contractor	Environmental Management and Coordination Act (EMCA) Cap 387, Rev 2018	Need to submit Project report to obtain EIA license	NEMA	CRBC	Before commencement of construction	1 – 1.5 months
		Water Act 2012	Need to obtain permission to abstract water	Water Resources Authority (WRA)	CRBC	Before commencement of construction	1 – 1.5 months
7	Storage, transport and disposal of ordinary domestic and office waste	Environmental Management and Coordination Act (EMCA) Cap 387, Rev 2018	Need to obtain waste license through submission of Waste Management Plan	NEMA	CRBC	Before commencement of construction	1 – 1.5 months
8	Storage, transport and disposal of hazardous waste	Environmental Management and Coordination Act (EMCA) Cap 387, Rev 2018	Need to obtain hazardous waste license through submission of Waste Management Plan	NEMA	CRBC	Before commencement of construction	1 – 1.5 months
Construction Stage							
1	Extraction of rock aggregates and murram from quarry	Environmental Management and Coordination Act (EMCA) Cap 387, Rev 2018	Need to obtain material extraction permit	NEMA	CRBC	Before extraction works	Max 1 month
		-	Need to purchase material extraction rights	Local Authority on behalf of community	CRBC	Before extraction works	Max 1 month
2	Blasting of construction site bedrocks (if required)	Explosives Act, 2016	Need to obtain to blasting permit	Mines and Geology Department in Ministry of Environment and	CRBC	Before blasting works	Max 1 month

No.	Relevant activity	Statute	Requirement	Competent Authority	Responsible Agency for Obtaining Clearance	Date of Acquisition	Duration
				Forestry			
3	Emission of excessive noise/vibration (if required)	Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009	Need to obtain permit to emit excess noise/vibration	NEMA	CRBC	Before excessive noise/vibration works	2 days

5 REVIEW OF ALTERNATIVES

5.1 GENERAL

The consideration of alternatives is one of the more proactive sides of environmental assessment - enhancing the project design through examining options instead of only focusing on the more defensive task of reducing the adverse impacts associated with a single design.

The analysis of alternatives should yield a well-informed decision on the optimal project design, based on consultations with stakeholders and experts. This calls for the comparison of feasible alternatives for the proposed project site, technology, and/or operational alternatives. Alternatives may been compared in terms of their potential environmental impacts, capital and recurrent costs, suitability under local conditions, acceptability by neighbouring land users, among other pertinent factors.

5.2 NO- GO ALTERNATIVE

Under the 'No Action' alternative, the Proponent would not carry out the intended works and the anticipated impacts resulting from commissioning and operation of the Project Road as proposed would not occur. Additionally, the resultant socio-cultural/economic benefits that would be created by the proposed development would also be foregone. The no-intervention project scenario means that the Project Area will continue to utilise the existing A8 corridor.

Under this option, there will only be defined intermittent road repairs undertaken from time to time and that the maintenance strategy will be to ensure that the road remains passable.

The no project alternative is expensive in the long term. Leaving the corridor in the current condition is not a viable option, especially as the desired objective of construction of the Project Road has not been achieved. The congestion problem along the main road artery through Nairobi will remain and the travel demand in and out of the CBD will increase beyond current capacity of the existing highways.

This is therefore not a desirable alternative.

5.3 PROJECT AS DESIGNED

This option is the basis of this ESIA and it includes the main objectives of constructing the proposed Expressway are as follows:

- **Road Safety** – the proposed Expressway will improve safety of vehicular traffic in transit between Mlolongo and James Gichuru junction. The current Mombasa Road (A8) has high traffic volumes, and a high concentration of heavy-duty vehicles (within the Mlolongo-Southern By-pass interchange), and is therefore prone to accidents that account for a number of fatalities and injuries in the country. According to the National Transport Safety Authority (NTSA) safety statistics, Nairobi has the leading contributing number of fatalities at 337 between January- October, 2019 with the leading cause of crashes being 'hit & run' at 925 reported cases in the country within the same period[3].
- **Economic Development** – the proposed Expressway will become a toll road and will provide a faster solution for transit between Mlolongo and James Gichuru Junction, which in turn will support economic growth for those countries reliant on this network for export and import of goods and materials, not to mention the passenger traffic within the A8 as people move from one region to the other within and outside the Kenya. The proposed Expressway is intended to serve as a central part of the national and regional transport system, helping

Figure 1:

[3] Source: NTSA website http://www.ntsa.go.ke/index.php - Road Crash Data as at 14th October, 2018/2019

promote trade and development in Kenya and neighbouring countries Uganda, Rwanda and the Democratic Republic of the Congo, Burundi and South Sudan. Currently, the existing A8 Road moves more than 50 percent of all goods traded in the East African Community.

- Lost Productivity – frequent disruptions of traffic occur resulting in lost productivity. For example, during a recent traffic incident between Athi River and the Chumvi junction on Mombasa Road (A109) (March 2018), a traffic jam lasted 20 hours (4). Another example was in November 2015, where a traffic jam on the Mombasa Road in the vicinity of Taru stretched for 48km and lasted 3 days, due to road works combined with heavy rains (5). This particular incident was also reported BBC news. According to this same article, in 2015, traffic jams costs the City of Nairobi roughly $578,000 a day due to lost productivity.
- Moreover, the proposed Expressway will provide opportunities for employment in the two counties that the proposed Expressway traverses- i.e. Machakos and Nairobi as well as overall employment opportunities to Kenyans across the country during the construction phase.
- The current situation on the Mombasa Road (A8) results in poor road safety, and high traffic volumes, resulting in high levels of congestion, long travel times, and lost productivity. The proposed Expressway will contribute significantly to local, regional, national and international economic development, serving as a central part of the national and regional transport system, helping to promote trade and development in Kenya and its neighbouring countries, which is a key objective of Kenya's 2030 Vision. As such, the "no-go" alternative is not considered reasonable, and will not be considered any further in this report.

Most of the rehabilitation will be restricted within the median of the A8 as described in Chapter 3 of this Report. However, to improve motorability on the road, some sections of the Project Road will be realigned to improve the geometry and safety suitability but without compromising the environmental and social requirements.

5.3.1 Comparison of Alternative

Table 24 below presents an assessment of all the alternatives mentioned above and makes comparison between their merits and demerits.

Table 24: Comparison of Alternatives

Alternatives	Merits	Demerits
No-Go Alternative	There will be no road project implementation and its associated impacts on the biophysical and socio-cultural/economic environment	The objectives of the project and the expected socio-economic benefits that would be achieved by the project implementation would be foregone.
Proposed Alternative	Nairobi-Mombasa Road (A8), as the main road between Nairobi (the capital and the largest city of Kenya) and Mombasa (the largest port city of Kenya), improving the proposed section will improve trade and development. A8 Road (previously A104) also leads northwest to Uganda, forming a large traffic artery in the western and northern part of Kenya, thus the proposed project will enhance development beyond Kenya's borders. It is also an important part of the Trans Africa Highway 8 (Lagos-Mombasa Highway) and the main channel between	The proposed option has the potential to create undesirable environmental and social impacts as described in Chapter 7 of this report. The Proponent shall be required to incorporate various mitigation measures (Chapter 10) in order to minimize/prevent these impacts and ensure sustainable development.

Figure 1:

(4) https://www.nation.co.ke/news/Mombasa-Road-traffic-jam/1056-4328006-m56ikbz/index.html

(5) https://www.citylab.com/transportation/2015/11/a-3-day-30-mile-traffic-jam-stalls-kenya/417060/

	West Africa and East Africa. A8 Road passes through the downtown of Nairobi, where serious traffic congestion often occurs, especially in the morning and afternoon rush hours. There is a heavy traffic congestion in the section between Mlolongo and James Gichuru Road, which has caused serious delays Due to the increasing traffic volume, the current traffic capacity of A8 National Road cannot meet the demand of the development of the economy and society. An expressway is proposed along the median strip of A8 National Road, starting from Mlolongo and ending at James Gichuru Road which densifies the highway network and enhances the internal connectivity of the road system, resulting in a more convenient transportation and service level..	

5.3.2 Mitigation for the Proposed Alternative

In view of the fact that this study identifies environmental and social impacts associated with the project as proposed, mitigation measures, including best environmental management practices have been recommended in this Report. When diligently implemented will help to protect the environment of the affected project area. Commitments included in this Report, as well as the EIA license and other authorizations that would be issued, are designed to avoid environmental damage in accordance with the Environmental Management and Co-ordination Act, 1999 (Revised 2015).

6 STAKEHOLDER ENGAGEMENT

6.1 Introduction

EIA process is largely determined by effective Consultation and Public Participation (CPP) which basically provides a cornerstone for project planning and successful implementation. In addition, CPP helps to ensures a sense of responsibility and commitment towards implementing the proposed Environmental and Construction Management Plan.

Public consultation and stakeholder engagement is a process through which stakeholder's influence and share concerns over development initiatives, the decisions and resources which affect them. It is a vital process that provides an avenue to involve project-affected groups and other stakeholders in the disclosure of information concerning a project, to deliberate at an early stage on issues that will need to be addressed both environmentally and socially and the course of action most suited to achieve mitigation of the negative impacts emanating from the development and implementation of the proposed project as well as enhancing project benefits to the stakeholders.

The objective of consultation, disclosure and engagement during present and forthcoming phases of the proposed Nairobi Expressway Project is to establish broad community support and employ the principles of free (free of intimidation or coercion), prior (timely disclosure of information) and informed (relevant, understandable and accessible information) consultation.

This section provides detailed information regarding the consultation process and documents the consultations to date. It also describes information disclosure at different stages. The process established for the project has employed a range of formal and informal consultative methods including issuance of Public Consultation forms to all primary stakeholders fronting the project, public meetings (barazas), focus group discussions, in-depth interviews with key informants and high level workshops.

6.2 Kenyas Regulations And Requirements For Public Consultation

With the promulgation of the Constitution in 2010, public participation is now an integral requirement in all policy and statutory functions of the executive and legislature. It is, also, an inherent requirement in the planning and execution of projects which have an impact on the social or economic life of communities. It is a specific necessity in all projects with an impact on the environment. Under the ESIA process, Public participation is indispensable from the point of the study, through the review of the reports and all the way to the final decision on whether or not the project can proceed.

Article 35 of the Constitution of Kenya, provides that 'every citizen has the right of access to information held by the state; and information held by another person and required for the exercise or protection of any right or fundamental freedom'.

Article 42 of the Constitution of Kenya enshrines people's right to a clean and healthy environment.

Since the enactment of the Environmental Management and Co-ordination Act (EMCA) 1999 and the Environmental (Impact Assessment and Audit) Regulations in 2003, the National Environment Management Authority (NEMA) started conducting stakeholder engagement for projects that were deemed to have significant impacts requiring detailed environmental studies and a wider reach in stakeholder engagement. In such cases, a summary of the project impacts is disclosed in a newspaper of national circulation and the Kenya Gazette for two consecutive weeks, whereby the public is sensitised to review the report at the nearest office of the DCC. The public is then given thirty days to give feedback to NEMA. In some cases, when significant issues are raised from this activity, NEMA may call for a public hearing at a venue within the affected project area. The

outcomes of this hearing are expected to inform the final decision on the approval of the project.

6.3 Identification Of Stakeholders

The stakeholders identified for the Project ESIA process include but are not limited to those organisations presented in Table 25. As the proposed Expressway Project progresses, ongoing stakeholder identification, mapping and analysis will be conducted. Table 25 presents the findings of the analysis for this project. This is a live matrix that will be updated prior to commencement of and during every phase of the project.

6.4 Stakeholder Engagement History

KeNHA has undertaken past initiatives on the corridor to promote private sector participation in financing and managing road infrastructure, by offering a section of the Northern Corridor road passing through Nairobi for tolling. An ESIA study comprising of construction of additional lanes on JKIA-Leoni-James Gichuru-Rironi road (A4) (approximately 42 km), dualling of Airport South Road (approximately 3km), creating of an access to JKIA widening (approximately 2km), construction of a bitumen road to the proposed Barabara Plaza (approximately 2km) and construct an access road to container depot (approximately 2km) was undertaken in 2012.During the studies KeNHAundertook three consultative meetings which were held at the chief's offices, at Zambezi, Kangemi and Westlands respectively. They also held a consultative meeting at the Kenyatta International Conference Centre, to which they had sent invitation letters to Stakeholders from JKIA to Uthiru.The range of stakeholders included property and business owners found between Uthiru and Rironi, small businesses operating between Kangemi and Kabete Police Station, small businesses operating in Westlands, and medium to large property and businesses owners between JKIA and Uthiru.

In addition, KeNHA undertook another study that dealt with Consultancy Services of Feasibility, Preliminary and Detailed Engineering Design, Environmental and Social Impact Assessment Study for the capacity enhancement of part of the A104 road from JKIA Turnoff to Likoni road junction in 2015.During the study three (3) workshops were held as part of stakeholder engagement exercise at the project's inception, Draft Study Report and Final Study Report phases respectively. In addition over forty (40) stakeholders who have properties along the project road were consulted.

6.5 Stakeholder Engagement During the Current ESIA Preparation For The Proposed Nairobi Expressway

Stakeholder engagement was undertaken in accordance with the Kenyan legislative requirements, specifically the Environmental (Impact Assessment and Audit) Regulations, 2003.Specific objectives of the Stakeholder Engagement for the proposed Nairobi Expressway Project were as follows:

- To identify the best methods for project developers to provide stakeholders with balanced and objective information on the proposed project and to obtain their feedback;
- To develop a model for the project developers to use for enhanced community participation and collaboration through the project lifecycle, including environmental mitigation and management;
- Develop strategies for the proponent to use to build strong and effective relationships with stakeholders including the communities, regulatory officials, local government officials and national government officials;
- Develop minimum standards/best practices for the proposed project in social and environmental engagement; and

- To provide tools for effective resolution of community issues during project implementation.

The methods applied to engage the stakeholders included key stakeholder interviews, Questionnaire administration, Focus Group Discussions (FGDs) and Public Consultation meetings (PCMs). The FGDs and PCMs were carried along the project alignment from Mlolongo (KM 0) to Westlands (KM 27) and convened between 19th to 27th November 2019.

Prior to the consultations, courtesy call visits were paid to the County Commissioners in Machakos and Nairobi respectively. The aim of these meetings was to introduce the Project, receive feedback and to observe protocols in ensuring that the Commissioners were aware of the proposed Expressway and the baseline data collection activities that would be undertaken in their respective counties.

Following on from the two above meetings, Centric visited the respective Deputy County Commissioners offices along the proposed Expressway alignment that is: Athi River, Embakasi, Langata, Starehe and Westlands to introduce the Project and to organize for the public barazas/ meetings.

The main points raised during the meetings with the local administration were concerns on traffic congestion along the current existing A8 road, drainage issues during heavy rains, employment and compensation of all those properties that would be acquired as a result of the project.

In general, the Interior and Coordination Administration were supportive of the proposed Expressway, and are committed to assist the Project Implementation Team to ensure overall success of the Project.

Also as part of planning general invitation letters was shared with respective DCCs to formerly invite members of churches along their administrative boundaries to the public meetings

Posters was also used to invite the general public along the project road alignment to the Barazas and stakeholder engagement forums.

The project also had good media coverage organised by KeNHA project team and coverage by media based on the high interest on the project from the public.

Public awareness is limited to general knowledge about the Project.

- All respondents were interested in receiving information about the Project, including technical characteristics of the route, activities and plans of the CRBC.
- Preferred channels of information for the public (descending preferences) are: television, placing ads on the company's website, in social networks, in public places.
- The Project is positively evaluated by the majority of the population

Table 25: Stakeholder Mapping And Analysis Matrix

Stakeholder Category	Stakeholder Group	Stakeholders	Connection to the Project	Their concerns/risks	Mode of Engagement
Government	• National Regulatory Bodies	• National Environmental Management Authority (NEMA) • National Transport and Safety Authority (NTSA) • Traffic Police	Important in terms of establishing policy, granting permits or other approvals for the proposed Expressway, and monitoring and enforcing compliance with Kenyan Law throughout all stages of the Project life-cycle.	• Safety concerns in project • Granting permits or other approvals for the proposed Expressway • Sharing of information • Coordination in project Implementation	• One on One meetings/Key Informant Interviews (KIIs)
	• Other Government Transport Agencies	• Kenya Urban Roads • Kenya Rural Roads • Kenya Roads Board • NAMATA • KRC	Parastatals may have: • Other projects intersecting with the proposed expressway; or and • Land or other assets, which could be affected by the proposed Expressway	• Traffic Management • Disruptions, diversions • Sharing of information • Integration and harmonization of interesting projects • Coordination in project Implementation	• One on One meetings/Key Informant Interviews (KIIs)
	• Government funded private enterprises in charge of managing specific activities. •	• Athi Water Services Board • Kenya pipeline • Kenya Power • Communications Authority • Kenya Forest Service (KFS) • Kenya Transmission Company (KETRACO) • National Museums of Kenya (NMK)	Important in terms of relocation of services/utilities	• Disruptions of sevices • Relocation of their facilities prior to construction	• One on One meetings/Key Informant Interviews (KIIs)
	•	• National Lands	-Manage Public land on	• Land acquisition	• One on One

Stakeholder Category	Stakeholder Group	Stakeholders	Connection to the Project	Their concerns/risks	Mode of Engagement
		• Commission • Environmental Tribunal	behalf of the national and county governments -Initiate investigations, on its own initiative or on a complaint, into present or historical land injustices, and recommend appropriate redress Encourage the application of traditional dispute resolution mecha-nisms in land conflicts,	• -Asset valuation and payment of the project components that will require land take for the project.	meetings/Key Informant Interviews (KIIs)
	• Ministry of Interior and Coordination	• County Commissioners • Deputy County Commissioners • Assistant County Commissioners • Area Chiefs for the relevant Locations • Sub-Chief for the relevant Sub-Locations • Elders from various villages within the relevant Locations	Local community leaders acting as representatives of their local community. Meetings with traditional authorities follow local practices and are held prior to any wider communication in local communities in order to respect the political and social structures.	• play a role in convening and facilitating discussions • between the project and stakeholder representativesWork together with the project proponents in Mobilizing the public for project information disclosure at different phases of the project.	• One on One meetings/Key Informant Interviews (KIIs)
	County Government of: • Nairobi; and • Machakos	• Office of County Governors • Office of Deputy Governors • Office of Members of County Assembly	County Government are also of primary importance as they are responsible for implementation of legislation, and	• Access to information • Liaison between two levels of Govts on project delivery • Safety concerns during implementation	• One on One meetings/Key Informant Interviews (KIIs

Stakeholder Category	Stakeholder Group	Stakeholders	Connection to the Project	Their concerns/risks	Mode of Engagement
		• Office of County Administrators • Office of Sub-County Administrators • Office of Ward Administrators • County Executives-Lands • County Executives-Environment • County Executives - Physical Planning • County Executives - Energy • County Executives - Legal • County Executives - Education & ICT • County Executives - Social Development • County Executives - Public Health • County Executives - Infrastructure • County Executives - Agriculture • County Executives-Water County Executives – Labour	development plans and policies at the County level. The County Government will also have a role in issuing permits and processing applications associated with the proposed Expressway (such as Change of Landuse certificate). In addition, Counties impacted by the proposed Expressway will need to be kept informed of progress and plans in their area, to consider the proposed Expressway activities in their policy-making, regulatory and other duties and activities. Finally, the County Government has a role in ensuring the views of the communities they represent are presented to the Project.	• Revenue collection/sharing	
Proffessional Bodies	• Built Environment	IEK, ISK, AAK, IEK,EBK	.	•	• Public forums, stakeholder engagement meetings, KII Public consultation feedback forms

Stakeholder Category	Stakeholder Group	Stakeholders	Connection to the Project	Their concerns/risks	Mode of Engagement
	• Motorists Associations	• SACCOs along the route, Matatu Owners Association, Motorists Association of Kenya, KTA		•	• Public forums, stakeholder engagement meetings, KII Public consultation feedback forms
	• Private Sector	• KEPSA • KAM		•	• KII and high level engagement
Business Community	All the Indivuduals conducting businesses along the project alignment corridor	--	-Information sharing on detailed timelines for planning purposes	• Relocation of services/utilities • Environmental concerns (Noise, dust) • Disruption or blockage of access to premises/businesses	• Face-to-face meetings • .Stakeholders Engagement • .Establish feedback mechanisms with the business community
Communities/Stakeholders	Project affected communities including: • Registered and customary land owners; • Residents and occupiers of land; and • Members who use or access land and resources in the AoI.	Residents along project route (Athi River, Syokimau, Mlolongo, Imara Daima, South B, South C, Westlands) The general public	Households and communities that may be directly or indirectly affected by the proposed Expressway and its activities. This includes people living on land affected by the proposed Expressway, through direct land take or by social and environmental impacts	• Interruptions of utility services • Traffic congestion and delays due to construction • Dust and noise pollution • Road safety concerns during implementation • Project Financing, project feasibility • General information on road usage • Assurance on project implementation • Lack of access to information on the project	• Notices, Posters,Public meetings, focus group discussions
Civil Society and/ Non-Governmental Organisations	Community Based Organisations	• Churches • Schools • Health Centres • Cooperatives (SACCOs, Circles, Roundabouts etc.)	Organisations with direct interest in the proposed Expressway, and its social and environmental aspects and that are able to influence the proposed Expressway directly or	• Environmental concerns • Public Participation in project planning and Implementation • Human Rights during project delivery	• One on one meetngs • Public Forum • KII • FGD

Stakeholder Category	Stakeholder Group	Stakeholders	Connection to the Project	Their concerns/risks	Mode of Engagement
			through public opinion. Such organisations may also have useful data and insight and may be able to become partners to the Project in areas of common interest.		
	NGOs at the national, county or local level.	• Greenbelt Movement	NGOs with direct interest in the proposed Expressway, and its social and environmental aspects and that are able to influence the proposed Expressway directly or through public opinion.	• Matters touching on the rights of people – social, economic, environmental, justice, etc.	
Business organisations	Companies - potential suppliers and contractors	• Matatu Owners Association (MOA) • Kenya Tourism Federation • Kenya Transporters Association Ltd Community level SACCOs	Individuals or organisations with direct economic interest in the proposed Expressway. This may be through gaining contracts with the proposed Expressway or due to economic impacts caused by the Project.	• Detailed timelines for planning purposes • Compensation for loss of business and damage	•

6.6 PUBLIC CONSULTATION

Prior to the public barrza meetings meetings were held with County Commissioners to organize for public meetings. The agenda was to discuss logistics of organizing a public meeting to inform the public about the proposed Nairobi Expressway Project and document their views for ESIA and RAP studies

The schedule of meetings with respective County commissioners and their respective Deputies is provided below:

Meeting	Location	Date	Time
Meeting with County Commissioner Machakos	CC's Office Westlands	11/11/2019	9:00-11:00am
Meeting with Deputy County Commissioner incharge of Mlolongo and Syokimau	DCC office Athi River	12/11/2019	900-11:00am
Meeting with County Commissioner Nairobi	CC's Office Nairobi	13/11/2019	9:00-10:00am
Meeting with Deputy County Commissioner incharge of Langata	DCC'S Office Langata	13/11/2019	12:00-1:00pm
Meeting with Deputy County Commissioner incharge of Starehe (incharge of South B)	DCC'S Office Starehe	13/11/2019	2:00-4:00pm
Meeting with County Commissioner Embakasi incharge of Imara Daima	DCC Office Embakasi	14/11/2019	9:00-11:00am
Meeting with County Commissioner incharge of Westlands	DCC Office Westlands	15/11/2019	9:00-11:00am

Prior to the meetings, posters were placed in public areas to inform the Public of the dates and venues for the meeting. Below are examples of posters shared.

An example of the Project Poster used to compliment the Interior Administration in Informing the Public about the Public meeting

A poster,along a public road in South C

Centric conducted six (6) public consultation meetings along the project road corridor in order to collect the views of the local community members and obtain their input on the sustainable implementation of the project.

The meetings were conducted following written and verbal communication with the local administration. The table below lists details of public consultation meetings held during the ESIA exercise.

Table 26; Details of public consultation meetings

Administrative Location	Date	Time	Venue	Actual No. of Participants
Mlolongo	19th November 2019	10:00am	Bus Park	143
Syokimau/Katani	20th November 2019	10:00am	Matatu Terminus	135
Nairobi West (South C & Nairobi West)	21st November 2019	10:00am	CID Training Centre	61
Mukuru Nyayo (South B & Landi Mawe)	22nd November 2019	10:00am	St. Veronica Church, next to South B Shopping Centre	265
Imara Daima (Hazina to JKIA)	26th November 2019	02:00pm	A8 Median section at the Embakasi turning towards CBD	196
Westlands (U.O.N to James Gichuru)	27th November 2019	10:00am	Sarit Centre Parking lot near the Triangle Market	86

The meetings included presentation by KeNHA on the proposed design and proposed works, as well as presentation by the Consultant regarding the ESIA process and various environmental and social impacts that may arise from the project including resettlement along the road corridor. The consultant however pointed out that the Designers had tried their very best to minimize resettlement and that the proposed works would be located within the road reserves.

In order to be able to interact with the community to get their views regarding the proposed project, a question and answer session after conducting a presentation during the baraza. The participants were given a chance to exhaustively ask any questions regarding the project, its positive and negative impacts and the proposed mitigation measures.

At the end of each Baraza the study team administered ESIA feedback form/questionnaire to all participants to obtain their views regarding the project. The feedback forms were administered after conducting presentation on the proposed project to ensure that participants are well informed about all aspects of the proposed project including positive impacts, potential negative impacts and proposed mitigation measures.

Being that these were public consultation meetings, feedback from the stakeholders was obtained the analysis indicates that the stakeholders do not have issues with the project, as long as their concerns are addressed and the anticipated negative impacts are properly mitigated. The table below provides a summary of the issues raised during the meetings and the responses.

Photo 1: Public Baraza Meeting at St Veronicah,ACK Church, South B

Photo 2: Public Baraza Meeting at Imara Daima

Photo 3: Public Baraza Meeting at Mlolongo Bus Station

Photo 4: Public Baraza Meeting at Sarit Centre,Westlands

Photo 5: Public Baraza Meeting at CID Training Centre, South C

Photo 6: Public Baraza Meeting at Syokimua

Table 27: Summary of issues raised and responses for the public consultation meeting

No	Issue	Concerns/Comments	Response as Addressed during the Meeting	Recommendation
1.	Project Design	Enquired on the route the expressway will take	The expressway starts right before the footbridge at mlolongo area up till JKIA proceeds to eastern bypass then to southern bypass and ends at James Gichuru road near ABC.	Providing relevant information to targeted stakeholders concerning the Final Design explaining the next steps while being clear about which project elements are fixed and which can be changed or improved upon, based on consultation and participatory inputs will go along way in sowing transparency and accountability as a means of promoting understanding about the project and engendering public trust.
		Enquired on the design of the road	The expressway will be built between the present highway with 2lanes on each side,each also having emergency lanes from Mlolongo till Eastern bypass which will be 15km long. There will be 3lanes from Eastern bypass to Next Gen Mall from where the expressway will start rising. There will be 4lanes from Next Gen up until James Gichuru road at ABC.	
		Enquired on whether the service way can be extended into an interchange	The expressway won't have a service lane as it beats its purpose as a fast moving highway. The expressway is designed to help reduce congestion of the service lanes in the existing highway	
		Stated that the design maintains the joke that people living beyond JKIA are not important	The design`s route ensures it facilitates the people living and working nearby and tries to avoid any interference with existing structures	
		Requested that the community be notified of any changes made on the final design	Communities will be inform in adequate time of any changes to be made on the design.	
		Enquired on how he could get a detailed design	The final design is not yet out as more information is still being gathered such as particulars of the footbridges and also recommendations from the ESIA report	
		Enquired on how soon the final designs will be out for public viewing	The final design will be put out to the public for viewing as well as the ESIA report will be published in the newspapers and will be available on the NEMA website.	
		There were concerns on the design acquiring land that would result in demolition of buildings	The expressway will not result in demolition of buildings as it runs in between the existing A8 road. However there may be minimal demolition of affected perimeter walls	

No	Issue	Concerns/Comments	Response as Addressed during the Meeting	Recommendation
		Is acquisition of a section of Uhuru park still included in the project design.	The expressway will be constructed between the existing roads hence it will not include acquisition of Uhuru park in its design.	
		Indicated that the project design document had not been availed which inhibited their ability to make informed contributions. He enquired on more project details	The project is still at conceptualization stage what is available if the preliminary design which lacks finer details. The detailed design is currently under preparation and will be availed to the public once it is ready	
		Enquired on how the design of the expressway will avoid causing distractions to businesses and people as the construction is on-going	The expressway is designed to be constructed at the median of the road meaning that all other operations will still be on going on the existing road. Additionally the contractors supplies will be transported at night when there is less activity on going on the existing road	
		Enquired on whether the design had considered people who were blind or had disability as well as people who needed to move their livestock from one place to another	The design will factor in the needs of people living with disability and provide appropriate utilities such as ramps to aid in their transportation. Livestock keepers will also be factored in in the design stage.	
		Enquired on whether there was an exit route to town	There will be 10 exits to enter into cities and towns	
		Enquired on the design around the wetlands roundabout as it was closed	Kenha is aware of the issue and relevant departments are working on it	
		Enquired on a previous letter that she had sent to Kenha over the issue of the roundabout which had since not been responded to		
		Enquired on the accessibility of the final detailed design	There is a disclosure framework for all projects whereby all project details are made public.	
		Enquired on whether there would be a lane for breakdown services	The contractor is mandated to also take care of breakdowns on the expressway. He will sign a contract with a breakdown company to offer their services.	
2	Project Phase	Enquired on whether the project was a proposed project or it was on its implementation stage	Previous studies had been done from JKIA to James Gichuru.The ESIA was done and a license given but due to the tweaks in the design,another ESIA had to be done to capture the views of the people in regards to Tolling	For future engagements, CRBC should disclose in a form that is understandable and meaningful to the affected communities about the purpose, nature, and scale of the project; the duration of proposed project activities; any risks to and potential impacts

No	Issue	Concerns/Comments	Response as Addressed during the Meeting	Recommendation
			and addition of Mlolongo Area which was not in the original design.	on such communities and relevant mitigation measures; the envisaged stakeholder engagement process moving forward and the grievance mechanism.
3.	Foot bridges and crossing points	Enquired on whether footbridges will be built past JKIA or not	The project will accommodate footbridges needed for pedestrian crossing especially in dense areas with social amenities	The project should provide adequate and safe pedestrian crossing points as per consultation with the stakholders based on their need where humanly possible in refereene to the Project's Final Design.
		Enquired on where the footbridges will be and urged the contractor to consider places with social amenities such as churches and schools.		
		Requested that a flyover be constructed at the junction.	Flyovers will be put up in areas of dense population and depending on access to social amenities such as churches and schools.	
4.	Project costs	Enquired on the total cost of the project implementation	The project will cost approximately 60 Billion Kenyan shillings.	
		Enquired on how long it will take for the project to have paid up	The payment period will take 30years but the investor's decision to invest on the project as opposed to other profit benefiting means so as to uplift the economy and lives is a beneficial risk.	
		Enquired on why the total cost of the project was higher than Thika road	The expressway provides value for money and has a different design from the Thika super highway.	
		Enquired on what would be of the project if the intended positive impact wasn't met, would the investor stop charging and cancel the project	The investor is taking he's own risk on the project and hence will bear all losses and profits	
5.	Employment	Enquired on whether the locals would be given jobs	Youths in the locality and women will be prioritized when it comes to job allocation and local; leaders will be consulted on the same.	CRBC, its' Contractors, Sub Contractors and third-party suppliers should ensure that they base their employment relationship on the principle of equal opportunity and fair treatment and should avoid discrimination with respect to hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement and disciplinary practices;
		Enquired on whether there would be any jobs for the youth		
		Raised concerns that women are looked down upon when they seek employment in construction sites	This issue will be looked into and the contractor will ensure there is gender balance and that women are prioritized when it comes to allocation of jobs	

No	Issue	Concerns/Comments	Response as Addressed during the Meeting	Recommendation
		Enquired on whether women would be allowed to sell their foodstuffs to the people working on the construction sites	This issue will be looked into and the contractor advised on the same.	CRBC and its Sub Contractors and third-party suppliers should provide a grievance mechanism for its 'workers to raise work place concerns and workers will be informed of the mechanism at the time of recruitment and how to access it; The grievance mechanism put in place by CRBC, its Sub Contractors and third-party suppliers should involve level of management and aim to address concerns promptly using understandable and transparent processes that provide timely feedback to those concerned without any retribution and should therefore allow anonymity of complaints to be raised.
		Requested that women be considered for jobs		
		Enquired on whether the contractor would have a side office where people would apply and be accepted for jobs	There will be a labor engagement liason officer who will ensure that employment opportunities will be prioritised to the locals.	
		Enquired on how the project seeks to create employment	3000 people will be employed for both direct and indirect jobs during the construction phase of the project and 500 people during the operation period of the expressway.	
		Enquired on whether there would be transparency in issues of job employment	The project will employ 3000 people for the construction period of 3 years and 500 people during the operation period of 27years. A mechanism will be devised to ensure full transparency in job allocation.	
		Enquired on what measures would be taken to ensure that employers don't come with their own labour, making the residents lose out on job opportunities	The project will maintain the virtue of transparency especially when it comes to job allocation and will be vigilant to ensure ensure gender equality and inclusivity	
		Enquired on the contact of the person who will be issued with a list of names of those seeking employment opportunities in this project at all levels	This details will be availed upon further discussions with the local leadership	
		Enquired on what criteria would be used to announce for job opportunities in the project	All this will be ascertained following various discussions with our team of experts	
		Enquired on how many jobs will be available for the youths in Westland.		
6.	Sexual Exploitation and Abuse SEA/GBV	Enquired on how issues of paternity would be handled in the case of irresponsible sexual behaviour between the Chinese and the locals	Every contractor signs a code of conduct which holds them accountable for any action that they involve themselves in and in this case the law of the land would still stand on issues of child support and DNA tests.	CRBC, its Sub Contractors and third-party suppliers should set up grievance mechanisms under the supervision of CRBC and KeNHA management to document and resolve issues by both the communities and the local labour force;

No	Issue	Concerns/Comments	Response as Addressed during the Meeting	Recommendation
				CRBC, its 'sub-contractors and third-party suppliers should demonstrate respect for peoples, languages, cultures and customs. With that respect comes an obligation to protect human rights and to speak out against acts that are contrary to human dignity. There should be a code of conduct that prohibits employees from engaging in discrimination, or abusing the authority of their position
7	STI arising as a result of interaction with Project	Enquired on what measure will be carried out to inhibit the spread of sexually transmitted diseases in the community during this project duration	Trainings on sexual health and reproduction would be carried out in the community to enlighten the locals on this matter.	
8	Noise Levels	Enquired on what will be done regarding the noise levels to avoid affecting the church	Baseline noise level measurements are being taken to enable monitoring of noise level during the construction phase to monitor the contractors work and ensure it is within the acceptable limits. Further, the road will have in-built sound barriers to mitigate noise impact.	Share the construction schedule with all the affected stakeholders indicating period when un-usual construction activities with extraordinary noise levels will be conducted including time, expected duration and any safety precautions. Refer to the mitigation/management measures as outlined in the ESMP
		Enquired on how the project would impact other investments. What will be the project impact on noise, lighting and shadow effect?	For noise, reference was made to earlier response above. Expressway project will likely have minimal impact on lighting and shadow effect as it is isolated in the median. Nonetheless, this concern will be looked into and if need be remedied	
		Enquired on how the noise levels would be reduced since they would cause miscarriages for expectant women or the birth of children with abnormalities due to the loud noise.	Air survey and noise survey studies are being undertaken to determine the existing air quality and noise levels before and during construction and mitigation strategies will be put in place to improve on the air quality level as well as the noise level	
		Enquired on what sound barriers will be put in place to limit the noise in that area.	Sound metres have been put in place to measure the noise levels before and during the construction phase and recommendations will be given on the same.	
9.	Air Quality	Enquired on how dust control would be done during the construction.	Environmental experts will ensure the contractors comply with environmental laws	Where possible the projects should avoid, minimize, and control adverse impacts to human

No	Issue	Concerns/Comments	Response as Addressed during the Meeting	Recommendation
			and ensure that quarries that serve the construction phase are monitored so as to be maintained according to the environmental standards. Environmental experts will gauge and monitor the contractor to ensure they maintain local Environmental standards.	health, safety, and the environment from emissions to air. Where this is not possible, the generation and release of emissions of any type should be managed through a combination of: Energy use efficiency Process modification Application of emissions control techniques
		Enquired on the air quality during operation	Experts have been engaged to measure various air parameters including particulates and gases before and during construction and operation, so that appropriate measures can be put in place to reduce and monitor levels. Studies indicate that vehicular emissions are lower when vehicles move fast as compared to when they move slowly.	
10	Health and Sanitation	Enquired on how the contractor would ensure high sanitation standards especially from the dust emanating from the quarries.	Depending on the effects of the project,the ESIA report will include mitigation measures in regard to the air quality,sanitation and biodiversity so as to reduce the negative effects of the project.	WASH services for the Contractor's workers should be catered for and adequate mitigation measures to avert adverse impacts
11	Drainage	Enquired on the drainage system that would be used during the construction And mostly to be able to control rain water	Drainage will be carefully considered in the design to avoid overflows to neighbouring residential and business premises.	The drainage facilities that exist have insufficient capacity to contain the storm water. Some of the existing culverts are blocked and dysfunctional and therefore cannot handle the existing demand. The final design of the road has to take into consideration the potential risk of flooding on the new road and factor the appropriate adaptation measures. Also to take into consideration is the increase of surface runoff as a result of additional lanes.
		Enquired on where the drainage channels are leading to	All this details will be included in the detailed project design.	
		Enquired on the drainage system that would be used during the construction bearing in mind that Thika Super Highway had a drainage issue	Issues of drainage will be factored in the detailed design and that the importance of holding public participation meetings is that the public gets to inform the project parties of specific areas of such concern.	
		Enquired on where the convergence of the storm water would be on the road		
		Enquired on how storm water would be managed	The final design will accommodate for a better drainage system for storm water.	
12	Blasting	Enquired on whether the contractor would use blasting.	Monitoring will be done to ensure that the contractor complies with blasting regulations during construction.	CRBC should establish procedures to monitor ongoing construction and to ensure the contractors are adhering to their contractual obligations and

No	Issue	Concerns/Comments	Response as Addressed during the Meeting	Recommendation
		Enquired on how vibrations caused by blasting would be controlled		regulatory requirements
13	Road Safety	Enquired on the measures that would be put in place during the road excavation	Environmental experts will monitor to ensure compliance with the local environmental laws during the construction phase.	Warn the road user clearly and sufficiently in advance Provide safe and clearly marked lanes for guiding users. Provide safe and clearly marked buffer and work zones.
14	Relocation impacts	Enquired on what will be done to damaged houses, social amenities and basic infrastructure.	The expressway has been designed to minimise any destruction of existing structure, social amenities and infrastructure within its route as best as possible.	CRBC should adopt the measures to minimize impacts on the adjascent community and where avoidance is not possible measures to restore such areas should be implemented as proposed in the ESMP
15	CSR	Enquired on which CSR the contractor hoped to do.He further suggested the construction of other linking roads so as to be able to beat traffic. The suggested roads were Mwananchi, Kiungani and Katani road.	The project will look into a CSR Project to benefit the communities nearby.	CRBC should comply with their CSR policy to establish goals for community benefit sharing initiatives. This will enable documentation, monitoring and evaluation of the impacts arising from the investment on Community development initiatives. The initiative should be aligned with a Stakeholder Engagement Plan (SEP) to promote ownership of the development activities/proposals by the community.
		Enquired on which CSR project the contractor would do. He further suggested the construction of footpaths and pedestrian crossing in places like Bellevue.	Footpaths, foot bridges and other acceses will be provided in areas with social amenities as well as to ease movement of people from one place to another.	
		Requested for the tarmacking of their link roads	This will be looked at.	
		Enquired on which C.S.R would be carried out in the area	The contractor will be advised in regards to C.S.R but it is based on their own discretion since this is a private project.	
16	ESIA Process	Enquired on why most ESIA`s are usually done but it is not properly disseminated to the public in a consumable way	This is a project which has generated a lot of public interest and other than legal requirement; there is a need to disseminate information to as many people as possible. When NEMA receives the ESIA report, it will be published in the newspapers and comments will be invited. The public will be able to download the entire report from the NEMA website and they can also peruse hard copies	While CRBC has demonstrated initiation of stakeholder engagement at the preliminary phase, demonstrating to communities and other local stakeholders that their views and well-being are considered important by continuous engagements will go along way into fostering the relationship with the community especially because expectations are already raised and speculation about the project and the company has been

No	Issue	Concerns/Comments	Response as Addressed during the Meeting	Recommendation
			from relevant state departments.	circulating. Continuous future engagements will provide a valuable opportunity to influence public perception and set a positive tone moving forward
		Enquired on whether the public participation meetings were an exercise in futility since the project had already been launched by the President	The public participation meetings are not in futility. They are an important exercise that will inform the design of the project and ensure that concerns are taken up and mitigation measures put in place before construction begins.	
		Requested for access to the previous ESIA reports that were done in 2013	The document is a public document that can be found on the NEMA website and online	
17	Toll Fees	Enquired on the toll charges	The toll charges will be 300ksh on small vehicles for one way and 1800ksh for lorries, one way.	The Public Road Toll Act should form a basis for the Toll fees imposed.
		Enquired on whether the toll fees would be three hundred for one way or two ways	The toll fees will be 300 for one way for small cars and will vary depending on where you exited from or joined the expressway from.	
		Enquired on whether the toll fees would vary depending on the size of the car Maintained that toll charges were not viable for the local mwananchi.	The toll charges might not be affordable for everyone or not everyone will want to pay but the existing road will still be free to be able to serve those who opt not to use the expressway.	
		Enquired on whether the toll charges and fuel charges would go down as that would be double taxation.		
		Enquired on whether the toll fees would reduce over the years		
		Enquired on how the toll stations will work in order to avoid cars queuing on the expressway when paying	There have been considerations of using automatic systems by NTSA.All this is in the process of assessment so as to eliminate queues in the toll stations.	
		Enquired on how paying of toll fees would work		
		Enquired on where the toll fees would go to	The toll fees would be collected by the private investor since he invested his own money to construct the expressway	
		Enquired on whether ambulances will be charged	Ambulances, Fire extinguishers, security cars, the police will use the expressway for free to be able to cater better for their citizens.	
		Enquired on how people ferrying the	There is no clear answer to this question for	

No	Issue	Concerns/Comments	Response as Addressed during the Meeting	Recommendation
		sick with personal cars will be charged.	now though KENHA was going to look into it because issues of honesty and transparency might come up.	
		Enquired on the number of Toll stations from Halle Selassie to James Gichuru road.	There will be 10 entry points and exits from Mlolongo to JKIA. At Westland there is an entry point from ring road.	
18	Public Participation	Enquired on how public participation works	Public participation is necessary according to the law as it is meant to keep the public in the loop of any new developments happening in the area.	CRBC should ensure that the Contractors, Sub Contractors and third-party suppliers working directly with the community engage with communities at their arrival and seek to understand their social, cultural, environmental and implications of their activities with the aim of reducing negative impacts and optimise benefits for the local community.
19	Source of Materials for Construction	Enquired on the source of project materials	from people living within and working in the vicinity of the project.	This will be an opportunity for the suppliers of construction materials and other utility suppliers to create market and sell their goods to the project. The spill over effect as a result of tax remittance will contribute towards economic development of the area and the nation For new borrow pits the Contrator will be required to undertake detailed EIA for NEMA approval in addition to other authorisation before extraction of materials For commercial sites the Contractor will be required to ensure that the sites are duly approved annually by NEMA and other authrities like Mines and Geology Departments and relevant County Government
20	Type of Motor Vehicles that will access the expressway	Enquired on whether both small cars and huge tracks would use the expressway.	Both small cars and lorries will use the expressway but the lorries will enter the expressway once they've gone through the weighbridge.	
		Enquired on whether boda boda ridder's would be allowed to use the expressway and how much they would be charged if so.	There was no clear answer to this question, though KENHA was going to look into it. There will be automatic detectors that will read number plates so as to know how many	

No	Issue	Concerns/Comments	Response as Addressed during the Meeting	Recommendation
			kilometers one has travelled and the cost calculated. At the same time there will also be manual detectors to help in the same exercise for older cars whose number plates cannot be automatically detected.	
21	Speed Limit for Expressway	Requested for the review of the speed limits for the existing road stating that the limit is too low	The purpose of the expressway is to ensure that it serves fast moving cars hence should serve vehicles that want to avoid speed limits that are too low at the existing roads.	--
22	Disruption of utility services	Enquired on how the contractor intends to work around a solution on how their water and electricity supply will not be affected.	The design will factor in the sewer lines and electric poles.	CRBC should take grievances raised by the community seriously and deal with them in a reliable and timely manner. The Senior Managers should stay involved with stakeholder activities and be updated on a regular basis
		Enquired on whether their Syokimau water project would overlap with this proposed project	The construction will integrate with other projects to ensure that they continue with minimal distractions even as the construction of the expressway commences.	
		Enquired on the issue of access of utilities such as water and electricity once the project starts	The design will consider utilities and will accommodate them in the final detailed design.	
		Enquired on why the sewerage system being interfered with has not been mentioned.	Sewerage lines will be relocated before the project starts. This is being done so as to ensure that there are no interruptions.There is a tender already in circulation for the relocation of these utilities.	
23	Traffic Management	Enquired on how traffic will be controlled as the project will be ongoing	Diversions will be provided by the traffic management to control traffic nonetheless the elevated section will not cause any interference.	The Contractor has prepared a detailed traffic management plan attached to this Report see annex 10 which he will adhere to.
		Enquired whether the diversion routes had been identified		
		Enquired on how many and which roads in syokimau would be closed to allow for construction.	The expressway will not interfere with any roads especially the syokimau roads as they are not within the route of the expressway.	
		Enquired whether City cabanas jam would be addressed in this project	The interchange at City Cabanas was being looked at by KURA and there had been delays due to issues of land,all which have been ironed out and construction will begin soon	
		Enquired on what would be done to	The road is being constructed in the Midian of	

No	Issue	Concerns/Comments	Response as Addressed during the Meeting	Recommendation
		ease congestion during construction.	the existing road hence there will be minimal distractions to the existing road. Dumping of construction materials will also be done at night.	
		Enquired on whether the movement of diplomats and expatriates during the construction period will be affected.	There will be no distractions caused during the construction of the expressway in wetlands since the road will be constructed in the median and will be elevated in wetlands causing no confusion to children as well.	
24	Compensation	Enquired on whether there would be any compensation	The design of the expressway is at the Midian of the existing highway so as to ensure minimal disruption and destruction of property.	CRBC/KeNHA should focus on lasting relationships when negotiating on the compensation packages and ensure that such negotiations do not jeopardize their broader social license to operate in the area. CRBC/KeNHA should ensure that compensation activities are implemented through appropriate disclosure of information, consultation and the informed participation of those affected. CRBC/KeNHA should ensure that the valuation method for determining replacement cost is documented and included in the livelihood restoration plan for the project
		Enquired on whether there would be any compensation for the affected roadside traders. .	Compensation will be done for all project affected people.	
		Enquired on whether there would be compensation for disturbance		
25	Road Project Benefits	Reiterated that Machakos has not benefited from any road development projects	It is a misplaced statement to say that the government has not done anything for the residents of Syokimau as the Mombasa road used to be a single carriage and was later expanded to a dual carriageway.	The anticipated benefits of the construction of the expressway include a) Reduced traffic congestion b) Reduced transit time c) Easier transportation of people and goods hence promoting local economy d) Provision of job opportunities e) Direct transfer of technology f) Largest FDI to attract more private investment g) Realisation of vision 2030 and the Big four agenda h) Enhanced competitiveness i) Savings on motorists since it is estimated that fifty million shillings is lost in Kenya daily in traffic jam j) Reduction of vehicular emissions hence improved air quality k) Reduction in response time for emergencies l) Attraction of international investors m) Business opportunities for local supply chain n) Attractiveness of areas around Mlolongo to both foreign and local investors
		Enquired on how the project would benefit the locals	The ESIA report will look at matters affecting the community and highlight them so as to ensure that project report guarantees that lives are benefitted through jobs and opportunities availed to the community.	
		Enquired on whether their link roads would be upgraded	Link roads are under KURA and the information would be passed on to them	
27	Project Justification	Enquired on how much research had gone into the project	Intensive research has been carried out that has determined the expressway will significantly reduce traffic as 30% of the population might choose to use the expressway,leaving 70% on the currently	

No	Issue	Concerns/Comments	Response as Addressed during the Meeting	Recommendation
			existing road hence reducing traffic	
		Reiterated that those who don't have cars need the expressway as much as those without cars	There will be a bus rapid system available for mass transport of people who don't own cars from place to place.	
28	Contractor's Camp Site	Enquired on the exact location of the contractors campsite	Since the contractor had an existing camp where he has worked on other projects, he will still use that camp which is on the Southern bypass.	The contractor will be required to carry out EIA for any new sites that he may acquire in the course of the project duration
29	Project timelines	Enquired on how long the construction would take	The construction of the expressway will take 3 years while the operation period will take 27 years totalling 30years for the concession period.	Proper planning calls for recognition that road projects can lead to modifications in the community environment surrounding the road, influencing various aspects of lifestyles, travel patterns, and social as well as economic activities.Therefore, it will be imperative that the project construction timelines are adhered to to avoid individual economic losses and the project being expensive overall.
		Enquired on why the government was going to be handed back the project after a concession period of thirty years.	For 30 years the project would be in the hands of a private investor who used his money to invest in the project and after 30 years the project would be handed back to the government and the road would be free.	
30	Shadowing of adjacent properties/businesses	Enquired on what will be done for businesses and churches that will have been shadowed by the construction of the expressway	Since the road will be in the median, the shadow effect is not expected to be significant. Nonetheless, this concern will be looked into and if need be, appropriate measures put in place to remedy this.	Visual intrusion caused by elevated section of the road should be considered. It maybe necessary to provide some form of screen to avoid loss of privacy.Where possible the elevated sections should blend into the City's landscape
31	Access of facilities fronting the road	Enquired on accessibility of the church	Appropriate accesses including footbridges, will be provided in places with social amenities such as churches and schools to enable people to access such facilities.	The Contractor will be required to inform the property owners prior to commencement of works in places where entrance may be blocked. In consultation with property owners the Contractor will provide temporary entrance to the affected properties. A draft traffic relief plan has been provided by CRBC see annex 10
32	CRBC's Credibility	Enquired on why CRBC is the contractors for this project yet they had been blacklisted by World Bank back in 2009	CRBC is a subsidiary to a parent company which possibly could be the one blacklisted by the World Bank but it is not verified whether the parent company has been blacklisted. Nevertheless, CRBC being the proponent for the project means that they are the ones providing the funding and bearing the investment risk.	Having a good overall community engagement process in place and providing access to information on a regular basis can substantially help to prevent grievances from arising concerning the Contractor, or from escalating to a level that can potentially undermine business performance. Thus, from a basic risk-management perspective, spending the time and effort up front to develop a well-functioning process is a
		Enquired on why the contractor CRBC was not present at the	The consultant nominated by CRBC was present to represent the contractor in the	

No	Issue	Concerns/Comments	Response as Addressed during the Meeting	Recommendation
		stakeholder consultation meetings.	stakeholder consultation meeting	good investment.
33	Biodiversity Management	Enquired on how compensation of affected biodiversity will be done	Centric Ecologist is undertaking the biodiversity assessment to determine the species, age and types of the flora and fauna that may be affected. The Ecologist will give appropriate recommendations.	CRBC should avoid adverse impacts on ecosystem services of relevance to the community and in the event where the impacts are unavoidable CRBC in conjuction with KeNHA should minimize such impacts and implement mitigation measures that aim to maintain the value and functionality of flora and fauna as proposed in the ESMP and biodiversity management plans
		Enquired on what would be done for the affected trees and flowers	An ecologist has been engaged to carry out studies on the species,age and types of the biodiversity affected and recommendations will be given to the contractor on how better to improve the environment once the studies are concluded.	
34	Integration of Expressway with other Projects	Enquired on how other projects will interact with the expressway project.	The expressway project is designed to avoid interference with other projects as its route is isolated to one section between the existing roads. Further, the Authority has out effort to ensure all developments in the corridor are harmonized to the best extent	--
		Pointed out that there were three projects ongoing at James Gichuru	The construction of the expressway will not disrupt existing projects	
35	Project Website	Enquired on whether KENHA would create a formal memorandum.	A special website is being created to host all project documents and will soon be made accessible to the general public.	--
36	Social Divide	Enquired on whether the project will widen the gap between the rich and the poor.		--
		Raised a concern that the project was for the rich and was not viable to the poor	A survey was done that showed that 30% of the people might opt to use the expressway, and 70% will opt to use the existing highway, decongesting the highway by 30%,hence the expressway is a win situation for everyone.	
37	Land take	Enquired on how land grabbing issues along Mombasa road will be dealt away with	This will be dealt with adequately.	Grievance procedures should be in place from the and exist throughout construction and operations through to the end of project life to carter to any grievances that will arise due to landtake and other project impats..

6.7 HIGH LEVEL STAKEHOLDER ENGAGEMENT

During the ESIA studies, two high level meetings were organized to deliberate with primary stakeholders who have businesses or properties fronting the Nairobi Expressway Project. The meetings were held at College of Insurance in South C on 10 December 2019 and at Kenya Agriculture and Livestock Researh Organization (KALRO) along waiyaki way on 11 December 2019 respectively. Below is a table with summary of issues raised and responses.

For planning Centric carried out door to door mapping of the stakeholders fronting the expressway project to get their information. Introduction letter, project Background Information and a preliminary consultation form sent to each business 14 days prior to the high level stakeholder engagement meeting

	
Photo 1:One of the stakeholders airing his Concerns during the meeting at COI South C	Photo 2: KeNHA representative responding to,the stakeholders' questions-COI Meeting
	
Photo 3: High Level Stakeholder Meeting at KALRO Westlands.	ESIA Process presentaton by Centric, during the KALRO meeting

Table 28: Summary of issues and response for high level meeting at South C college of insurance and Karlo Waiyaki way

Topic	Participant	Issue Raised	Responses
Crossing point	Daniel Baaru - L'oreal	Enquired how the access to their business would be affected in regard to the number of lanes their customers would have to cross to access their premises. and wanted to find out	The section between Mlolongo to JKIA, there will be construction of new foot bridges; The section between JKIA to Southern Bypass the current foot bridges will be retained; In the section between Southern Bypass to James Gichuru the Contractor will rehabilitate the pedestrian crossings and U-turns.
	John Mwangi – Sameer Business Park	Requested to have a footbridge put closer to their establishment because the current one is too far so people opt to just cross the road and this results in accidents	
		Enquired how people would move from one side of the road to the other	
Billboards	Wendy Makena– Panesar Centre	Asked if the people with adverts and signages on the existing highway would be compensated because they cost a lot of money to put up	For billboards that will be relocated the Contractor will discuss with KeNHA to move them and further discuss with Nairobi City County if advert companies can put up advert after construction of the expressway; The Contractor and the KeNHA will look into other alternative for managing billboards within the RoW is to compensate owners to relocate them elsewhere The agreement signed when putting up the signages will be referred and adhered to.
	Daniel Baaru - L'oreal	What will happen to the current advertisements they have on the current highway.	
Storm Water Drainage		According to the Kenya National Disaster Policy of 1979 – Central Park and City Park are among destinations that flood waters collect; hence when express way is constructed the Railways Golf City is concerned of waterways being interfered with flooding their grounds.	Proper design work and topography studies will be done to cater for effective drainage systems.
		Enquired if storm water drainage was catered for in the design	
	Job Mwangi – Imara Daima Estate Association (IDEA)	Enquired if making improvements on the section that will be on the road bed so as to facilitate proper drainage are part of the project scope because the current drainage systems are not working	

Topic	Participant	Issue Raised	Responses
Access to businesses and properties along the existing A8		MUA residents wanted to know how they will access their properties; utilities interruptions and landscaping after interfering with existing landscaping	Careful studies are being done to address the issue of U-turns and come up with effective designs that will ensure access to businesses along the road are not blocked The design of the expressway will not affect the existing westlands roundabout. Ramps are staggered away from the buildings and will not affect frontage of One Africa.
		Enquired if the design of the expressway is taking into consideration the traffic flow that the existing service stations along the highway maximize their profits on.	
		Asked if there would be a service charge for independent contractors who may want to improve accessibility to their business	
U-Turns, Interchanges and Ramps on the Expressway:		Enquired if the U-turns that provide access to their business will be maintained.	
	Mohan - One Africa	Enquired potential impact on the small roads joining Waiyaki way and towards Kileleshwa (for lack of detailed design that's being fine-tuned.) asked if the ramps affect the frontage of the building.	Studies on traffic flow have been done so as to identify the traffic flows at various sections and this can help minimize interference on access to premises
Stakeholder Involvement	Sanjil - stakeholder	Also wanted to find out when the project affected persons will be informed for the setting out of the project so that they can plan on a course of action in time	Once the detailed design is ready, it will be possible to know who is affected and how. When that time comes, a separate meeting for PAPs will be convened
		suggested that as the project is being implemented, the stakeholders will be as involved as they have been so far	
		Requested that more details be shared with the actual project affected persons and in good time so that business owners can plan accordingly and in good time on the way forward for their businesses	
		Requested to have a similar meeting once the detailed design drawings are ready	
		Enquired if the service providers of power, internet and water who will be affected have been consulted	Yes, they've been actively engaged and have even already shared detailed location plans and maps with GPS co ordinates and there's a clear plan on how to go about it

Topic	Participant	Issue Raised	Responses
		why involve stakeholders after project was launched?	Stakeholder engagements is for feedback mechanisms and finalize a design that is optimal for everyone.
Project design		Wanted to find out if the current design could be shared with the stakeholders to enable them to make necessary adjustments	The designs haven't been fine-tuned yet but once they are, the specific people who will be affected will be contacted again and engaged separately and in depth to come up with effective and timely solutions
		Will detailed design be shared?	Participants were requested to visit KeNHA offices to discuss the final design as soon as it is ready in February 2020.in depth discussions to commence in January.
	John Kimura and Mohan	Tentative timelines when the final project design is released	The contractor promised that the final design will be out by February 2020
Waste Management		Enquired the exact point of K0 and suggested the design to put into consideration proper waste management and cover the projected population growth because the current waste management system is inefficient.	A propoer waste management plan ha to be implemented to avoid Sewerage system interference which impacts negatively on businesses along the road where interference with sewer systems and not mitigated swiftly. There has been a lot of back and forth between KeNHA, contractors and the business owners in the past;
Traffic Management	Makena- MUA residents Association	KeNHA was requested to construct other bypasses to divert heavy vehicles from entering the CBD and interfering with traffic. Suggested that the existing roads such as enterprise and Likoni roads to be properly done to alleviate traffic during construction of the proposed project	KeNHA will discuss final traffic management plan with the contractor. Dumping of materials will be done at night. . Suggestion well noted
			The suggestion was noted The contractor will share detailed traffic management plan. MUA residents will be able to plan their movements during construction. Traffic department will also be notified and public notices will be issued for any closures or diversions.

Topic	Participant	Issue Raised	Responses
PAP Category		Wanted to find out if he was a primary or secondary affected person.	The affected persons are categorized according to impact the project will have on them. Land owners are primary affected persons and those leasing from the land owners are secondary affected persons
Relocation of utilities		Enquired about relocation of utilities owned by independent private contractors	ICT Authority been involved from the launch of the project; funds have been allocated for relocation of cables; there will be sleeves that will be provided for all cabling. Disruptions of services have been noted as well, funds have been allocated for swift restoration.
	Crispin Odongo Communications Authority of Kenya	Communication facilities will be adversely affected, there needs to be provisions of channels for communications ducts and also other alternatives besides burying the cables	
Compensation	Daniel Mutuku Mbevi - M	Enquired if the compensation plan factors in land owners who have only sale agreements and not title deeds	The National Land Commission will address this
Tolling	Daniel - Stakeholder	Was concerned that the tolling charges would impact the social life of those using the road. He also enquired if discounts would be offered.	The company involved is a a private once, hence maintain that discretion. However, there may be promotional strategies to attract users. Where the users are unable to afford the tolling rates, there is another viable option (the existing road) that is free of charge.
	-S K Mwaura – (Secretary Kenya Railways Golf Club)	Complained that tolling is double taxation to Kenyans using the road considering that fuel levy is charged by the government for all roads used.	Toll fee is for maintaining the road and operations and also for the investor to recoup his investment. Kenya government does not contribute financially. Additionally, toll fees is in line with Toll act of Kenya Laws
Air Quality	George - Stakeholder	If there will be compensation for the stakeholders who are affected by dust during construction	Concerns have been heard and will be addressed effectively.
Project Effects	Daniel Mutuku Mbevi – MCA	Enquired if the project will affect the existing services such as water services	The services that will be affected are already being addressed and being relocated.
Corporate Social Responsibility	Daniel Mutuku Mbevi - MCA	Enquired if the corporate social responsibility to the people in Mlolongo had been put into consideration. He also asked if the process of recruiting workers will consider the youth in Mlolongo	The project is being done by a private company, hence they are not obligate to do so but the suggestion was forwarded and is being considered.

Topic	Participant	Issue Raised	Responses
Land Take	S K Mwaura – (Secretary Kenya Railways Golf Club)	Expressway may encroach on Railway city land between Bunyala Rd and Haileselasie Avenue : final design to be presented Kenya Railways; Secretary requested to have a separate one on one meeting with KeNHA/NEMA	By the time the Final Design is being crystallized, NLC will already know which land take will be required and where will it will be acquired. A schedule has will have been sent to NLC and they will reach out to landowners soonest and they will initiate communication with affected persons.
		Enquired on timelines for uptake of land to be taken away by the project	
	Petronila Westlands Association	Requested land acquisition and scope of work be shared with stakeholders;	The road does not touch Uhuru Park; the ramps are shifted backwards. The military building may be interfered with but the discussions are ongoing though at preliminary stage. The military members present requested and FGD with KeNHA/Centric to discuss this further
General	Daniel Mutuku Mbevi	Requested assurance that use of the road will remain optional throughout the 30 years Enquired the reason behind the stalling of the already existing projects such as interchange to the Makutano junction	The assurance is in the agreement signed by the parties involved The projects stalled because of financial constraints. However, acquisition of a bond is underway that is expected to restart the stalled road projects.
Access to the ESIA Report		Clarity on when proposal on ESIA is completed.	THE ESIA report will be submitted by the end of December 2019. NEMA will publish the report and give a link for public to comment within 30 days.
Corporate Social Responsibility	Petronilla – CEO Westlands Associations	- Complained that construction lorries spoil existing feeder roads during construction and asked if the contractor can fix the damaged roads as CSR	The contractor will be informed accordingly
Access Plan for adjascent properties		Access to their property on chiromo road	There shall be an interchange near the property Contractor to ensure that during construction there is access for all types of cars as per previous road use - Contractor to give out a hotline number for communication incase of any issues that may arise -Chinese surveyors to share final data

Topic	Participant	Issue Raised	Responses
	Sylvia – Dunhill Towers		The ramp is staggered, it will not affect Dunhill towers
Noise Pollution		Experiencing high level noise pollution; how will interchange affect the building?	
Security and Privacy Infringement		Elevated road will impact security of the building	the road is expressway, it is fenced hence no stopping and looking and no impact on security
Project Contract		Secrecy of the Expressway Contract	Project contract not a secret much as it was signed
Harmonizaton with other Proposed Projects Interacting with the expressway			-KeNHA has received letters from Kenya Railways Golf Club and forwarded to CRBC on how the railway city and other developments will be handled.
Project Impacts during construction	Petronella- Chair Westlands Association	How will construction impact on school children's calendar	For school children's crossings is being considered by the contractor
	Gregory- OLA energy	Questioned about business assets that are on KeNHA reserve, what reliever is KeNHA offering for payments are done yearly	George was requested to contact KeNHA and he will be engaged.
		Sewerage systems; there is back and forth between contractor and Nairobi waters whenever there is interference with sewer system.	KeNHA apologized for run around of stakeholders and promised to take up the issue as soon as it arises during construction
Employment		Youth employment	There will be 3000 jobs for youths during construction of NEP and 500 post construction for maintenance and operations

6.8 ENGAGEMENT WITH PROFESSIONAL BODIES

6.8.1 Architects Association Kenya (AAK)

A meeting organised through the architectural socierty of Kenya and KENHA was held on 06 November 2019 at Ngong Hills Hotel. The meeting was attended by approximately 80-100 participants and tabulated below are some of the issues that were raised. Notes arising from the forum are under annex 4 of this Report. Highlights of the meetings are as presented below:

- Impact on Green spaces: The rationale to opt for the road and it cutting across the green spaces in Nairobi was questioned. This was clarified by KeNHA that the project was redesigned and the impact on Uhuru Park is minimal.
- How much greening will be lost? Can the NEP consider greening the junctions while on grade? The response was that the proposed project design is under review to reduce the loss of green spaces; green spaces are important for our city and we appreciate that. Further, the meeting was informed that Landscape Architects will design the green spaces within the junctions.
- Emergency lanes: There is need to have emergency lanes on the proposed road that is easily accessible. This was clarified that the road will have emergency lanes on both sides (two by two lanes).
- CO2 emissions: Did KeNHA carry out a study to check on the corelationship between engaging higher gears / speeds and reduced carbon emissions? This was answered, in the affirmative. The meeting was informed that a number of studies have been done as well as benchmarked to confirm this. The higher gears reduce consumption and thus emission of CO2, so in essence we (as a country) are reducing the amount of CO2 caused in traffic jams (lower gears).
- Coordination with other proposed/ existing projects: Is the proposed project part of the NAMATA/ Railway City/BRT/NUTRANS/NMT projects, how are you as government looking into the Non-Motorized transport (that accounts for more than 70% of users in Nairobi)? This was clarified, that the proposed NEP is not part of the NAMATA or other projects mentioned, however the projects are being coordinated by the Ministry of Transport and Infrastructure who gives the mandate to the various agencies and authorities to look in to developing the specific areas in their jurisdiction, and that KeNHA have the mandate for highways.
- Stakeholder Engagement: Concerns were brought out regarding the engagement process by the government in relation to the pricing of the toll-road, concerns around when was it done, what was the population target, at what point was their s/h engagement? KeNHA clarified that indeed s/h engagement was done and the study was conducted within the corridor- the figures were crunched and the lowest amount that could make financial sense to both the Kenyanuser as well as the investor was appx 15KES/pcu/km which amounts to approximately KES 300 for the entire stretch of 27kms. KeNHA has various competent economists who looked at this keenly.
- There were concerns about the stakeholder engagement being done after the launch of the proposed project, what is the validity of the engagement in this case. This was clarified; various engagements were done prior to the launch- this project has been in existence since the 90's. The initial late- proposal was to have a super express way- with no exits from JKIA to James Gichuru; this was highlighted during the engagement process and the project was put on pause to redesign it and have the exits incorporated.

- Disaster Risk preparedness: Concerns about the design of the road were raised especially looking at the impact the other road projects have on flooding and drainage menace in the city. What design plans are there to reduce the impact of floods and blocked drainage, have the design team done enough studies on the same? KenHA responded that various studies have been done and still being done regarding the proposed project- the final design will highlight the drainage issue. Currently the developer is carrying out detailed geo-technical survey to incorporate such issues.
- Spaces under and next to the highway (overhead sections): These spaces are known to be opportune areas for street families to reside, how will the design consider this? How will the design consider the buildings that are next to the NEP at the elevated sections? The detailed design will highlight these issues, with further consultations with the County Governments Authorities who are in-charge of such issues.
- Traffic management during construction: What will be the plan especially with the heavy traffic on Mombasa Road? The design will consider this. There will be multiple lanes, paved at some sections to ensure continuous flow of traffic, such as done on the Waiyaki way.
- There is an increasing need to explain that the existing A8 will be in existence at free of charge even with the toll road being in construction and operation. There was/ and still is a misconception that the existing A8 would be removed. This was clarified by KENHA that the existing road will still be there, and the motorist will be given the option. Further clarification and sensitization will be done during the continuous stakeholder meetings being held.
- There was a mention about a proposed project (larger by-pass) from Kipevu in Malindi to Kinangop in the Rift Valley, as part of the LAPSET corridor, to decongest the existing A8 corridor. Has the proposed NEP considered these plans- will the investor still make his money, what if there are no cars to toll? The investor has also done his studies before deciding to invest, and he is fully aware of the financial risks.
- There was a concern regarding the balance between the Social equity verses the Infrastructure Equity: - who is this road being built for? – this will be a large physical separator of the east and west of the city. Has the design considered the social fabric of the city? Cities are developing towards a more inclusive and not segregated trajectory.
- There was a question regarding the solution beyond the Mlolongo- JKIA section, wont proposal to dual the road from Mombasa to Nairobi, but this was put on pause to have more feasibility done.
- The ESIA report and concerns being brought out during the s/h engagement should be made accessible to the public.

Table 29: Notes from AAK/KeNHA meeting

Sticking Points	Responses
Need for a framework that guides the coordination of different projects being undertaken by the various road agencies in Kenya	CRBC presented their financial models which KeNHA reviewed & can guarantee that the value for money in the project will be realized
"Did KeNHA carry out the Traffic & Social Impact Assessments? When was this done?" How will the traffic on Mombasa road be managed during the construction of the Expressway?"	The project contractor-CRBC will be taking a demand risk & as such there are very minimal chances that the project costs will vary during the project implementation phase. Further the project will be based on a government-government arrangement
KeNHA should focus more on investing in the mass public transport as Urban design principles do not support the construction of elevated highways owing to their negative effects on the urban fabric,	The Public-Private Partnerships Act 2013 allows for non-disclosure of detailed figures in PIIP arrangements & thus KeNHA may not make public detailed information relating to the project owing to the confidentiality clause in the agreement"
Need for data on studies undertaken to establish whether the users of the Expressway would be willing to pay for using the highway	The procurement for the construction of the Nairobi Expressway was undertaken through a comprehensive process that adhered to all legal provisions that touch on Public-Private Partnerships & Procurement
Concern greenery will be lost if the road is to be constructed?" hoseaomole Landscape Architect.	The project is set to cost approx. Kshs. 59.9 B with the construction period taking 3 years & commercial operations being undertaken by CRBC for 27 years. A BRT & a Light Rail System to facilitate commuter movements will be built in subsequent phases
Concerns about the prioritization of the project stating that it fails to meet viability standards & as such focus should be directed on more viable alternatives such as the provision of NMT & mass public transportation	In order to ensure that the project is viable & bankable, the contract-China Road & Bridge Corporation (CRBC) will enjoy several waivers including but not limited to VAT, Import Duties, Local Government taxes among others
Concern KeNHA was granting outrageous incentives to the contractor at the expense of Kenyan taxpayers. Why engagement of professionals is done after the project was launched	According to KeNHA the value for money with respect to the Nairobi Expressway project is guaranteed especially since the first 15.7 km roadbed section will cost 36.2% less than some recent tendered projects across the country
KeNHA requested to be more deliberate on how the project will impact on other planned infrastructure projects as well as existing roads like the Haile Selassie & Ngong Road Concern on the cost & implications the project would have on the environment, existing land uses of Nairobi City. Plan for stakeholder analysis & engagement	The Expressway will be undertaken through a Privately Initiative Investment Proposal as provided for under the Public-Private Partnerships Act 2013

6.8.2 Meeting with EIK

The EIK President's dinner was held on 30 November 2019 at KICC and the focus of discussion was the Nairobi Expressway. Eng Peter Mundinia, Director General KeNHA made a presentations after which there was an interactive session. The table below highlights the views, concerns and comments that were raised.

Table 30: Summary notes of EIK meeting

Issue	Response
Engineer M. Hamisi-in terms of local content what clauses has KeNHA as the implementors put in place in the contract to safeguard local contracts of the engineers, consultants and any other services that will be required who will be engaged in the project Emergency lane entry and Exits how will this be incoporated How will the implementors ensure there is smooth flow of traffic during construction and smart way of payment to avoid snarl up during payment	The Procurement Act has clauses that provide for local content and local labor upto a certain %. The labour includes various categories of employment. There will be opportunities for local sub contracting at consulting level. On both sides of the expressway there is going to be 2.5m emergency lanes which will be available for all emergencies; fire, ambulance and security purposes.The detail design is ongoing but on the expressway itself there will be fire hydrants to deal with such situations.The contract provides for the contractor to maintain all emergency readiness including simple things like towing stalled vehicles. All emergencies that may arise have been cartred for The tolling system has been looked at and at the tolling stations there will be electronic systems that will be incorporated and in addition to that there will be manual systems because the electronic system envisages having some cards put on the vehicles that will be read as you pass through and amounts billed accordingly
Esther Sagero, (Registered Graduate Engineer)-Is there a way that the project can maximize potential for profit for both the infrastructure and the financial aspect of it. The Contractor will make an interest of about 30B. Is there a way a % of the project could be funded by Kenyans so that they can make some profit	In concessions like this, there are clauses on agreed returns by the concessionaire to the economy where we say if you invest in the economy there is a a revenue share that goes to improvement of junctions, some of the profits are input in other project to subsidize and improve other capacities which is to the benefit of the Country.If the project generates super profits and there is enough reserve from the tolling fees then he minister can deny tolling fees subsequently as a benefit to the users All the toll collected will be put in a fund where there will be prosubsidy for various other projects. However NEP is the first pure PPP Project where the developer is going to take 100% demand risk, when there is a downside he has to take the risk, when there is an upside, he takes that risk. However the way the agreement is structured nuch as there are various tax subsidies that have been included both during the construction period that goes into the company and during the operaton period that goes to the users to make the bankability on the implementation side and affordability on the users during the operation side. For the coporate taxes, there is no exemption what that means is that when there is an upside, revenue from the tax go up and when there is a downside the investor is alone.So ccording to our tax law when there is an upside we celebrate together.
O Wycliff (Registered Graduate Eng)-Regarding local content,a lot of locally registered engineers are currently unemployed and the Chinese are notorious for bringing in their own Engineers and giving Kenyans the menial jobs When the project was launched, It was heard that the Government of Kenya cannot implement any other project that endangers the profitability of this project. Could we be	Employment is mandatory. The NCA Act requires that there be a certain subcontracted 30%. The procurement Act also requires that there be a provision for local content. This local Content has been factored in the Contract in terms of provision of materials such as cement, steel and various inputs. Non compete clauses are standard in PPP agreements. If an investor commits their finances towards a project, they usually require assuarance that the Govt of the day will not put up another facility that will threaten the investors operations. However, the Government can still put up BRT or improve any other road eg jogoo road. Overall the provisions are not restrictive or binding.They do not prevent other projects to be done in the vicinity.

Issue	Response
enlightened as to what exactly that means	The non compete clause talks about not bringing in another person to implement a parallel road or facility that competes with the expressway. However, with time there may be a need to enhance capacity along the same corridor and priority is normally given to the concessionaire.
Eng Collins Juma,The President EIK-The way people conceive the project is that it is supposed to decongest Nairobi. How does this project decongest Nairobi? Who are this people moving from Mlolongo to Rironi and not coming to the City Centre? How will it help the challenge that we have in the City everyday of trying to get out of town or trying to get in town? There is some arrangement made on what is called guanteered payment for the concessionaire so that he will have the comfort that he will collect return on his investment cause maybe they have taken a loan from a bank that requires guranteered payment. But assuming that chances are 1/1000000 the road may not pay itself what happens in such a scenario?	Deongestion is going to happen in two ways: 1.The expresswy is actually increasing the capacity of the road. Currently we have 6 lanes and it is adding another 4,that will reduce 30% of current congestion on A8 2. BRT willalso decongest the road by removing some personal cars and matatus since a bus will be able to carry 80-100 passengers as opposed to one person per vehicle. The expressway is sering other ares as it has 10 inter changes where we have entry and exit points so it not just going through from km0 to 27 As far as this project is concerned the Government is not guaranteeing payment because the contractr is taking revenue risk if hecollects less that is his risk if he collects more that is his advantage but KRA will be there to acertain received revenue to carter for coporate tax which is our benefit KeNHA interrogated the Contractor's financial model and the proposal of tolling to ensure it will work.
Eng….from EIK commented on the worry on behaviour of Chinese contractor reiterated earlier, will be addressed by the EIK, Which has recognition from the world of Engineering Federation from China who are key in ensuring their citizens out of China behave,therefore KeNHA should know that EIK has a direct contact with the highest level of the chinese Government in the event that the Contractor misbehaves.	
Proffesor Mweya- The expressway cuts the UON into two at the junction between UON and St. Pauls. It takesaround 20 minutes for Police men to stop the cars fro the comrades to pass. It also takes another 20 mins for someone going to Chiromo to collect examinations, to cross the road is there anything that will be done to cater for the crossing issue of the University as stakeholders? There is silence about NMT and how people will cross the elevated section	Regarding the separation, the section abating the university, the expressway will be elevated, what that means is that stakeholders will be able to make use of the existing A8 as is. However plans are in gear to do the BRT which menas there wil also be BRT running and some of the stations will just be right under the elevated area. What is going to happen is that arising from that we are going to have specific points where pedestrians will be able to access or go under the expressway or in some situations elevated so that they are able to cross over.Studies are being done, a lot of detiled design is still ongoing both for the expressway itself and BRT which is still at the early conceptual stages and will be implemented by NAMATA For NMT,once BRT comes,……..the Expressway Project itself will not be include the NMT. However when the corridor is being improved in totality especially the existing A8 plus the BRT there will be areas reserved for peope to walk and also for NMT. It has bbeen put into consideration and is being addressed.
Mukhoya George-The Project is quite wonderful and commends KeNHA for the good work.Rironi towards Chiromo/waiyki way. What is the mandate of KeNHA with regard to those people who have travelled outside Kenya,	Regarding mandate of KeNHA and the delays on this section, KeNHA intends to achieve in that 26km stretch to put in 6 lanes instead of the current 4,while leaving space for BRT between James Gichuru and Uthiru, KeNHA intends to include separate bicycle lanes under NMT, 2.5M pedestrian lane and between Gitaru going forward where the southern bypass joins in, there will be a concrete pavement on the left as your climbing.

Issue	Response
you have seen how road improvement is handled, you have seen how what the diverts are made motorable. The diverts from James Gichuru to Rironi on the ongoing construction are terrible. What authority does KeNHA have to make the contractor make the diverts motorable/passable. The diverts are too narrow, muddy, with lots of portholes.Can KeNHA manage the mess	Doing this in a constrained space is a challenge. Sometimes the Contractor is able to work but frequently he s having to remove existing structures and this is done using the slip roads as diversions which sometimes flood. They have solutions that they have been trying to implement. The diversions are all supposed to be paved and the sections that have not been paved the servie provider has been asked to address that way thet will not deteriorate when it rains. KeNHA has also asked the service provider to take a maximum of 100 days to build the structures to minimize disruption. In regards to safety, they have asked for better signage as a last resort they encourage motists to use alternative roads
Eng. J. Mutai-Regarding the environment- in the presentation the participant would have loved to hear about the EIA. What is the baseline now particularly on air quality and what will be the impact when the expressway is working. Nairobi is No. 61 in the World pollution Index and No. 8 in Africa City Pollution Index. What will be the impact on this road. Out there people are thinking engineers are only focused on designing for cars. The road does not have a cycling lane,pedestrian walk ways.What is the EIA of this road? What will be the impact on air quality? What is the policy on transition to Electronic Vehicles (EVs)? It would be a good thing to hear that this road which will be constructed in 3 years will in 5 years only accept EVs so that the pollution experienced can be minimized. As KeNHA builds it roads does it ever care about the trees?...Work with KFS to put trees along all KeNHA roads. Cars produce noxious fumes that trees will remove. What is the policy of KeNHA on air pollution.	With regard to air quality, if you look at the smog around Nairobi in the morning,there is a lot of gey smog which goes to show we are a careless industrious Country. This is due to motor fuel and not manufacturing. This isbecause we import a lot of vehicles which already have too high emissions than what would ordinarily be allowed for the environment we want to perceive.KeNHA has carried out someair quality studies at the busy junctions and the findings are that the Northern Corridor through Nairobi and the major arterial roads coming to the city like Ngong road, Jogoo road, Highway towards westlands and Ongata Rongai where traffic is at a near standstill. Where you have near stand still traffic situations emissions tend to be very high as that is the efficiency of engines. If we carry about 100,000 vehicles per day by increasing the speed by making transit quicker, we will gain and benefit on air quality around the city. The policy on use of EV that is an overall state wide policy thst encourages use of EV. In terns of just allowing EVs to use the expressway, there is a bigger macro situation that we have to look at inorder to answer from a transport point of view on whether to penalize non EVs. If we don't have a foot print in pollution, then we can have a rebate in toll tariffs but that can be as we move forward in terms of toll tariffs for the road.We cannot actually outlaw non EVs from the road because of the situation where we are. KeNHA already have an agreement with KFS to ensure they replant and their environmental safeguards include planting trees along their roads in areas not occupied by carriage ways and permanent structures with a strong component of monitoring it. In KeNHA there is a motto called "EYESIGHT" Innovativeness, customer fous and Environmental Stewardship for every project that it does. Every KeNHA Projet has got very strong environmental safeguards components that include regreenery and reinstatement of the environment
Eng Timothy M-Thaned DG for the presentation which has made him more informed. Why is the expressway designed for 80/kph? Experience form other Countries where PPP have been implemented are the issue of durability, Quality control during construction just to make sure that when the concession term ends the contractor does not hand over something substandard and this has been a concern especially in China in the housing sector where there have	This highway was initially not designed to be an expressway and it is being retrofitted to be of high capacity. With a speed of 80kph you would do km0-27 in 20 minutes with the junctions being shared by other facilities. The Contract has clause on condition of the asset at the time the concessionaire hands over the project back to KeNHA. There will be an inspection and it will be rehabilitated and if there is need for an over lay that will done. Monitoring of the pavement strength, ondition of the asset and ensure before handing over that is reinstated to a new condition with new life to take us several years before there is need to rehabilitate.That is the contractual commitment from the concessionaire.

Issue	Response
been many problems in such projects. Bridges are impotant structured designed to last 120 years but the Contractor is only intrested in it for the next 30 years	
Eng Christine-Thanked the DG for the elaborate presentation. When Thika Super Highway was Constructed, there were very many fatalities. What lessons have KeNHA learnt from Thika Super Highway that will be brought on board on the expressway. How safe is the express road? What are the safety considerations cause as much as we have the expressway, there is the existing A8 and pedestrians are being killed on some section of the road	On the issue of accidents there is EHS, there is the aspect of safety separating this highway from the existing facilities with controlled access, good traffic control facilities to make sure that safety is improved. Safety is actually inbuilt in all KeNHA's designs pre and post construction.

6.8.3 Nairobi University/ Uhuru Park discussions

A public forum was organized by CASELAP on 05 December 2019, To Provide an avenue to discuss the Proposed Nairobi Expressway Project and it interaction with Uhuru Park. The following issues arose as tabulated in the table below. Minutes of this meeting is provided in annex 4

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Table 31:Summary note Nairobi University organized by CASELAP

Issue	Response	Comments/Recommendation
Is Public Participation in EIA adequate? as EIA Is just a tool	-EIA is a process, it is not a one stop shop; -It identifies impacts of a project and proposes mitigation measures and once that is done the project is conducted; -EIA is a sustainable development management tool; -EIA is basically doing what it is supposed to do which is to identify and propose mitigation measures; and -It fits the environment into the project	Holistic evaluation of projects through SEA should be done more often
Why is EIA done? Is it to balance the environmental? Social and economic concerns?		--
If EIA is not working what is going to work?	-Strategic Environmental Assessment (SEA) which fits the project into the environment. This usually starts with what the environment has and what projects can fit into the environment -SEA subjects project plans into the environment -If SEA had been done prior that would have addressed the issue of the Project in relation to the Park. -EIA has its limitation, despite KeNHA doing variations on the design, it will be difficult to assess impacts on the park	--
Did the University of Nairobi participate in the public participation? If they did what are their concern?	During mapping of stakeholders fronting the expressway, the University was mapped and a letter of invitation to attend the meeting at KALRO was sent to the VC	Continous engagement to follow up on the appointed person to represent the university when it come to project information and activities during construction and implementation
What is the role of intellectuals in ensuring the experts release relevant information to the public	There is a need for all experts in the Built environment to sit and integrate their views concerning the project	--
What are the timelines for BRT-40% of Kenyans use public transport, another 40% walk while only 10% use private cars. Therefore, the project will only serve 10%. What about the 80%?	The free alternative of using the existing A8 road will ensure those who are not able to pay move efficiently since the expressway will reduce traffic on A8 by at least 30%. There will also be the option of using BRT which will equally reduce congestion by at least 50%	--
How does the expressway intend to reduce green gas emission of its users considering the biggest opportunity to reduce green gas emission lies in the transport sector	The expressway will indeed reduce green gas emissions which are usually caused by vehicles idling on the road, by ensuring cars are moving without stoping unnecesarrily.	--
The 30 years concession period that the project will give to CRBC –what happens during this period will Kenyans just sit it out? How can they benefit in this period?		The Contractor to implement CSR plans to capacity build loals on the gap on skills to be able to take over after the concession perid.

Issue	Response	Comments/Recommendation
Are we designing roads for people or are we designing for cars? Where is the human dimension	--	
Public Participation should start at concept stage otherwise it is just imposing the conceptualized design on people	With regards to the mechanics of public consultation and at what point the public participation commences-Public participation can only commence once preliminary designs have been conceptualized. You subject the designs to the public and their views inform the detailed designs and project implementation	Public participation under EIA is done at different levels, during the studies and once the reports have been submitted to incorporate comments emanating from the report. NEMA also sends copies of the Reports to relevant government authorities for comments It advertises on media both on the radio and the daily papers to receive comments within a 30 day period. After this, they may advise KeNHA to do at least an additional 3 public consultation meeting based on the comments that have been submitted. Last but not least NEMA can organize for a public hearing, based on comments received for the project as it is no practical to hold a public hearing for each and every project.
What is the nature and trend of freeways? Currently Chile is having a lot of issues as a result of it and developed Countries are pulling down free ways	Freeways are being pulled down in some Countries but at the same time they are being constructed in others. The reasons for pulling down the ones being pulled down have nothing to do with their efficiency or use. The reasons are due to: -The fact that some of them are very old having served over 50 years, they no longer appeal aesthetically and the cost of rehabilitating them would be very expensive. Also these Countries have other forms of very good transport network such as the underground rail systems that are working well in diverting traffic; and -Seismic movements, which poses a risk of destroying the freeways.	--
The Governor (Sonko) has just raised parking fees, what options are we giving car users that will encourage them to use public transport?	--	BRT will complement the expressway and further reduce congestion by wncouraging private car owners to use buses instead.
1. Is there a EIA license for the project?	-KeNHA did ESIA studies back in 2012, comprising of construction of additional lanes on JKIA-Leoni-James Gichuru-Rironi road (A4) (approximately 42 km), dualling of Airport South Road (approximately 3km), creating of an access to JKIA widening (approximately 2km), construction of a bitumen road to the proposed Barabara Plaza (approximately 2km) and construct an access road to container depot (approximately 2km). This report was finalised, submitted to NEMA and license (0016896) issued on 26th June 2013. The license was	--

Issue	Response	Comments/Recommendation
	initially varied on 18th April 2017 (NEMA/EIA/VC/567) and again varied on 12th October 2018 (NEMA/EIA/VC/977). -KeNHA later asked if the license could be varied to include renaming the road under a PPP plan and include user charges but 'regulation 25' only applies when there are no major changes therefore the request was denied -KeNHA asked for SPR (Summary Project Report) which was not granted. NEMA advised KeNHA to undertake an ESIA pursuant to section 64 of EMCA	
Is the EIA process ongoing	Nairobi Expressway Project had previously done EIA Studies but due to redesign a firm of experts registered by NEMA has been engaged and they are currently conducting the ESIA studies	--
Our Government is also a signatory to international rights. How will the expressway integrate with the SDGs? How will it reduce poverty and relate to all the 17 SDGs		--
Discussions should be based on our fundamental rights		--
Areas of impacts will go beyond the road- shadows being cast towards the park and the noise will not provide a relaxing environment at Uhuru Park		--
What impacts will the project have on Uhuru Park?-	--	KeNHA should provide a portal where everyone can access the project information and interrogate
How are we going to address the bio diversity impacts?		--

6.9 FOCUS GROUP DISCUSSION

In addition to public meetings, separate focus group discussions should were arranged with specific groups or individuals. These meetings were an opportunity to improve communications and understand in detail specific groups such as Bodaboda and Tuktuk operators, small business traders, PSVs, and residents association along the project alignment and their interaction with the project in future.

Table 32: Summary of focused group discussion

Group	Concern/Comment	Response/Recommendation
Motorcycle (Bodaboda and Tuktuk)	The road will not be beneficial to them as it risks disenfranchising them due to the fact that .the group highly rely and capitalize on Mombasa road traffic jams to get most of their customers from Syokimau and Mlolongo area. They are able to transport both passengers and goods in good time as traffic jam builds up, hence the project may impact negatively on their source of income if it eases the traffic jam both on the existing roads and the upcoming Nairobi expressway.	The client should hence consider them for various employment opportunities during the project construction phase.
	The project will negatively impact on their livelihood hence most of them will have to relocate during the operation phase of the project.	
	Hillum Mthiga one of the operators, suggested that shades should be built for motorcycle operators and also to have a dedicated boda boda lane to minimize or avoid accidents.	
	Road to have drop and picking points	
	Create alternative roads / route during construction	
	Provide WASH facilities after construction for operators	
Public Service Vehicles (PSVs)	Creation of Bus parks	Ensure the toll cost charges for PSVs are affordable for their use to ensure afford ability of their users
	proposed that the toll cost should be subsidized. This will enable them set affordable fares for the public use. The public may prefer using the old Mombasa road and avoid PSVs using the Nairobi Expressway due to increased amounts of money while using the Expressway	
	proposed that the benefits to PSVs can be maximized by sensitization of the community/capacity building. This will enable them understand the operational technicalities of the road. Consequently, the passengers will not demand that PSV makes several stops along the Expressway.	sensitization of the community/capacity building on use of expressway
	the contractor should ensure that there is very minimal interference with the operation of the existing road during the construction phase of the project	
	drainage is currently a major concern along Mombasa road. This should be factored in the designs to ensure that there is normal flow of storm water to keep the road passable and to reduce road maintenance cost.	
	He stated that the PSV will be willing to use to the proposed Nairobi Expressway due to numerous reasons including the following reasons: Reduced traffic jam. Improved income The expressway will enable them wake up past 0600Hrs in the morning and get customers contrary to the current situation where the PSV operators have to start work as early as 0400hrs as customers try to avoid the traffic jam. The proposed road will reduce the vehicle operation cost in the long term The proposed project will reduce traffic police in the roads who constantly get money from them unfairly. The proposed project will create employment The proposed project will promote economic growth in the country largely	

Group	Concern/Comment	Response/Recommendation
Road side Traders	They anticipate increase in sales during construction from the road workers employed leading to high purchasing power	Contractor to mitigate against dust by watering the road Mitigate against sound vibrations from the machines
	Dust and noise pollution from the construction activities will have a negative effect on their businesses	
	During implementation the road will be fenced off hence customers will not be able to divert to the traders along the road to buy from them (reduced purchasing power)The contractor should Increase foot bridges, underground tunnels to allow easy access of the customers to each side of the road where traders	
	They anticipate reduced traffic which will make delivery of goods faster to and from the source	
	Interruption of business due to construction equipment and spoils being kept where we usually trade.	
	KENHA to provide a WASH facility at Cabanas flyover	
	Provide technical training to the locals	
	Employment. The project will employ their children some of whom are graduates and are unable to get employment. Only the local residents should be considered for employment.	
	The project may displace the roadside traders. KeNHA in consultation with Machakos County government should give the roadside traders an alternative trading space	
	Blocking access routes and interrupting the use of the existing Mombasa road. Alternative/diversion routes must be provided in the event that the access routes are blocked. The routes should directly lead to roadside businesses	
	The trader's business is maintained by various estates along Katani road, Katani residents and estates along Beijing road. Displacing them will not only affect them but their entire family.	
	They were all in agreement that the project should introduce livelihood restoration programme to support them. The proponent should consider providing public toilets for the roadside traders	
Residents Association	Employment creation. Ensure all the employment opportunities are given to the local residents with consideration of the youths, women and Persons living with disability.	
	Transfer of skill to the local young professionals. The Contractor should introduce CSR programmes where local Technical and Vocational Education and Training (TVET) are empowered to train students on new skills. The contractors should also take in graduates from these institutions.	
	Market for local raw materials. KeNHA should put punitive measures to ensure the contractors sources all the materials locally. Only materials which are not available can be sourced from elsewhere.	
	The project may expose the residents to dust and toxic fumes due to excavations activities, earthmovers among others operation. The contractor should sprinkle water on dusty area, machines should all be maintained	

Group	Concern/Comment	Response/Recommendation
	Contractor camps should not be located close to residential estates, schools or churches to avoid social vices brought the construction workforce.	
	The contractor should appoint a local CLO who will listen to the community concerns and address them appropriately	
	The contractor should also set up a Grievance Redress committee which Is made up of the community members. The GRC will assist address concerns arising during the project implementation	
	Circulation of money during the construction will lead to increased prevalence of HIV/AIDS, Drug use and other social vices. KeNHA should ensure the contractor and his employees sign a code of conduct. Educational programmes should be introduced to empower both the employees and the community on HIV/AIDs and drug use concerns	Health education Community sensitization on communicable and infectious diseases Ensuring occupational health and safety Prevention of HIV transmission hrough provision of condoms at work sites and engaging an expert to have awareness sessions with both workers and community Quarterly
	Accident. The high speed can lead to accidents both to pedestrians and vehicles as well. Ensure the proposed expressway is fenced off and footbridges introduced at various sections of the road where pedestrians pass including Belle Vue. Cameras should be installed to monitor faulty cars and careless drivers.	
	Vibration which may compromise building structural integrity/cracks. Modern machines to be used to minimize vibration	
	KeNHA should supervise contractors to ensure concerns raised during meetings are factored/implemented	
	The contractor should continuously engage the stakeholders during the project construction phase.	

6.10 QUESTIONNAIRE

See annex 9 volume II of this report

6.11 LIMITATIONS TO STAKEHOLDER ENGAGEMENT

A lack of interest or apathy in public consultation is a challenge in the country. People who understand project impacts may not attend public hearings and meetings for various reasons. This may include the belief that their participation or input may not make a difference in the decision making process. There is also a belief that it is difficult to influence government decisions based on occurrences prior to the 2010 Constitution.

While this gap is sometimes met by civil society participation starting petitions on certain issues, some individuals prefer to play a "hands-off" approach to participation by expressing their opinion through social media without actually taking steps to contribute to decision making.

There is also a perception that driving change through participation is a role to be played by "activists" and not the "common mwananchi". The implications of community apathy hampers on expectations on adequate and meaningful consultation. There is ned to mitigate apathy to participation.

Time keeping was a concern. Some participants got the venue on time but a majority came later hence the consultant had to delay just to ensure everyone is represented.

In some locations the consultant had to mobilize participants again since the local chief were new in the area hencehence, they had mobilization challenges.

Misconception of the project prior to the meeting could be felt as some stakeholders came very irritated. This was well managed by detailed project description which was made by KeNHA and Centric.

7 ENVIRONMENTAL BASELINE

7.1 INTRODUCTION

It is important to gain an understanding of the physical, biological and social attributes of the area in which the Expressway is proposed and its surroundings. The description of the baseline environment is essential in that it represents the conditions before the construction of the proposed Expressway. The description of the baseline environment therefore provides a description of the current or *status quo* environment against which social and environmental impacts of the proposed Expressway are assessed and future changes monitored.

The information presented in *Chapters* 7, *8* and *9* has been collected from desktop studies and supplemented with site visits along the alignment of the proposed Expressway.

7.2 Land Cover And Land Use Classification

About 80% of the lands in Nairobi City are owned by the government, but those lands are held by several types of users. About 41% of government lands (33% of total land) are alienated to private and other parties

Table 33: Land Use by Land Hold in Nairobi City

Category	Subcategory	Area(sq.km)	%
Government land	1) Forest reserve	21	3.1
	2) Other government reserve	77	11.3
	3) Township	93	13.6
	4) Alienated land	225	32.9
	5) Un-alienated land	16	2.3
	6) National parks	117	17.1
	7) Open water	-	-
	Subtotal	549	80.3
Freehold land	8) Smallholder schemes	-	-
	9) Other	135	19.7
	Subtotal	135	19.7
Grand Total		684	100.0

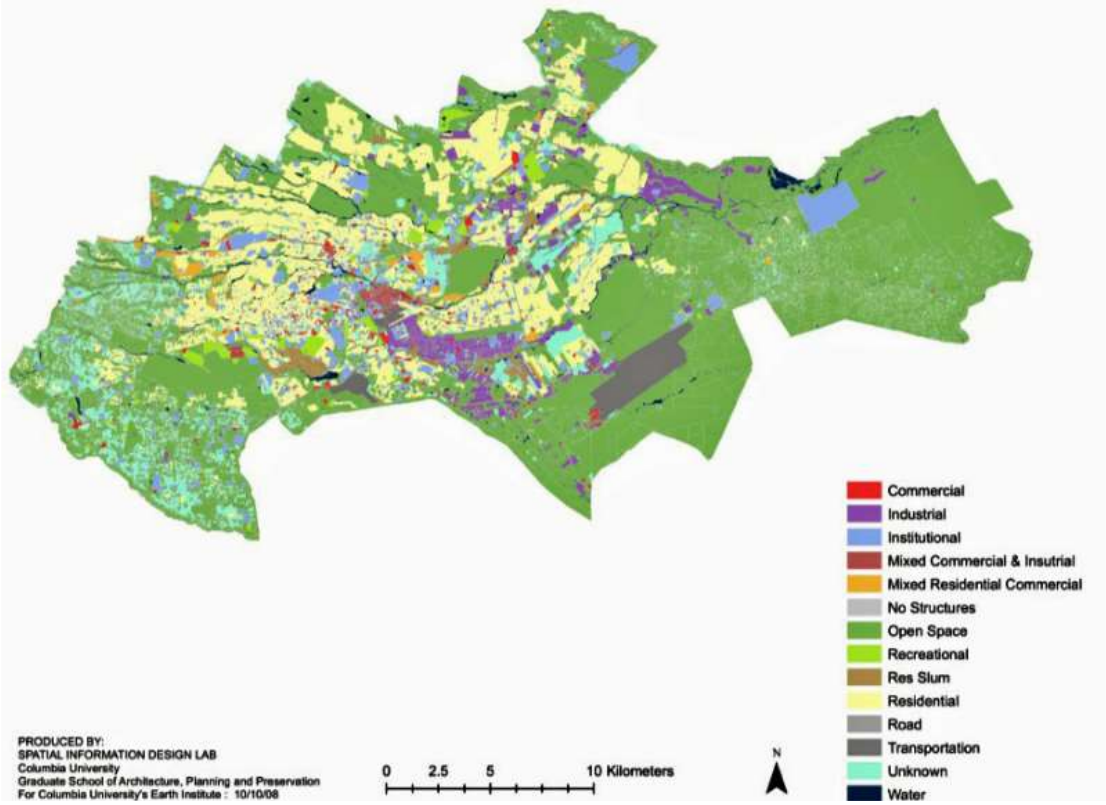
Source: Statistics Abstract 2005

Land use surveys for the whole area of Nairobi City were conducted by the Centre of Sustainable Urban Development (CSUD) of Colombia University in collaboration with Nairobi University in 2005 and 2010. The land use map was developed from a combination of analysis o satellite images and ground surveys. The composition of land use is summarised as shown below.

Table 34: Land Use Composition

Land Use	Area (sq. km)	
Residential	105.2	15.1%
Commercial	5.9	0.8%
Industrial	22.2	3.2%
Mixed commercial and industry	3.6	0.5%
Mixed residential and commercial	4.2	0.6%
Institutional	39.8	5.7%
No structures	0.3	0.0%
Open space	332.0	47.8%
Recreational	8.7	1.3%
Res slum	7.8	1.1%
Transportation	15.5	2.2%
Unknown	42.3	6.1%
Water	10.9	1.6%
Total	598.2	86.1%
National Park	96.9	13.9%
Grand Total	695.1	100.0%

Source: NIUPLAN 2015



Source: NIUPLAN 2015

Figure 12: Land Use Map Done by Columbia University and Nairobi University

Nairobi has experienced Land use change during the last decade. The northern and eastern parts of Nairobi City have rich red soil being utilised for tea/coffee plantation or other agricultural activities. These plantations have been recently developed into residential areas. Highlands in the western area of Nairobi City were developed as estates for European settlers before the independence. Recently, low-rise detached houses for single families are converting into high-rise apartments or offices. Informal settlements on the river banks are still spreading rapidly. A research paper indicated that half of increased population during the last decade settled in so-called slum areas.

7.3 GEOGRAPHY

Nairobi City with its administrative area of approximately 700 km2 is the capital of the Republic of Kenya and also the centre of administration, politics, economy, and culture. The city is bounded by Kajiado County in the south and south west, Kiambu County in the north and north west and Machakos County in the east and south east. Such adjacent areas are now absorbing increasing population and economic activities

7.4 TOPOGRAPHY

The Nairobi City is characterised by undulating hilly topography with an elevation ranging from 1,460 m to 1,920 m. Lowest elevation occurs in the Athi River at the eastern boundary of the city while its highest is at the western rim of the city. It is unique that it has the Nairobi National Park with an area of 117 km2 within its administrative area, extending along the western boundary and attracting a large number of international and domestic tourists annually.

The project area is mainly characterized by a structured plateau with the highest point being James Gichuru road next to ABC Place at approximately 1788m above sea level while the lowest point is Mlolongo 0km at approximately 1603m above sea level. This represents a gentle gradient to Mlolongo with a drop of about 185m. The Nairobi Express Way covers an approximate distance of 26.5km with

a maximum slope of 10.1% and an average slope of 1.9% which is relatively flat according to Food and Agriculture Organization (FAO) slope categories.

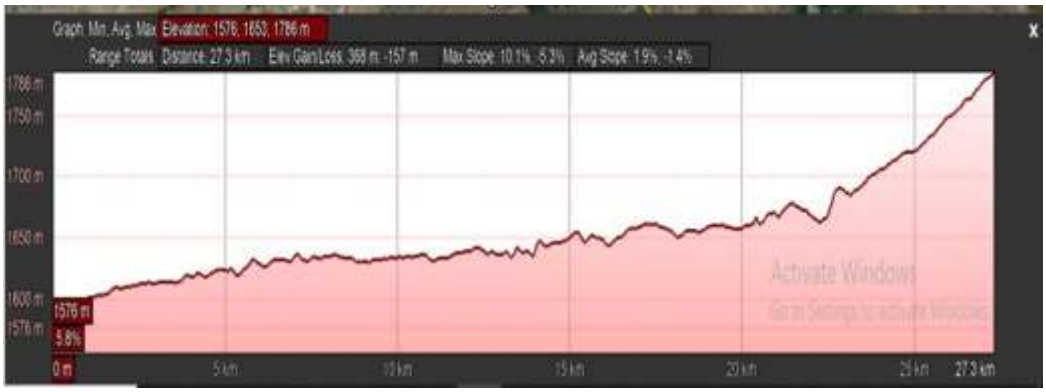


Figure 13: Road gradient: from Mlolongo 0km to James Gichuru 27.3 km (Source; Centric 2019)

Elevation along the proposed Nairobi express way has a gentle gradient ranging between 1600m to 1788m asl. Lowest elevation at 0+00 Km at Mlolongo at 1603m asl and coodirnate 37 M 0271491 m E, 9844614 m while highest elevation at James Gichuru 1788m asl 37M 0252382 m E, 9860663 m S

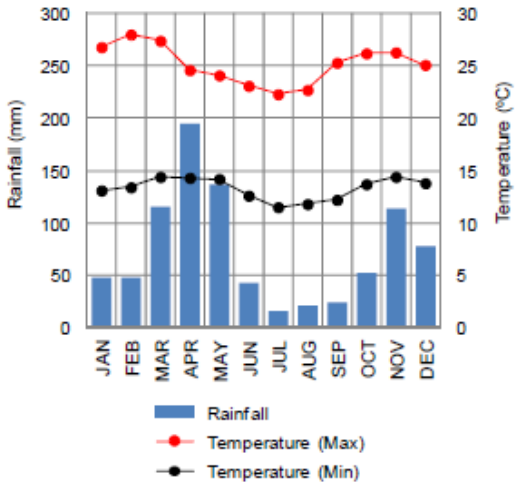
7.5 Climate

7.5.1 Climate overview

The climate in Nairobi City is usually dry and cool between July and August but hot and dry between January and February. The average annual rainfall in Nairobi City is about 900mm. The first peak of monthly rainfall occurs in April and the second peak takes place in November. The mean daily maximum temperature by month ranges from 28 oC to 22oC and the minimum ranges from 14 oC to 12 oC.

The proposed Naiorbi Expressway Project traverses the following two distinct climatic zones based primarily on topography (altitude):

- Central Highlands and Rift Valley- which includes the Nairobi County's JKIA-James Gichuru Section; and
- Eastern Kenya - which includes the Machakos County's Mlolongo – JKIA Section of the Nairobi Expressway Project



Source: KMD

Figure 14: Rainfall and Temperature in Nairobi City

7.5.2 Wind

Prevailing wind direction in Nairobi is almost exclusively from the northeast, air quality impacts from the Project will therefore be expected to predominantly be experienced to the southwest of the Project site, for both short-term and annual average concentrations. The wind roses presented in Figure 15 and shows the variation in the prevailing wind patterns

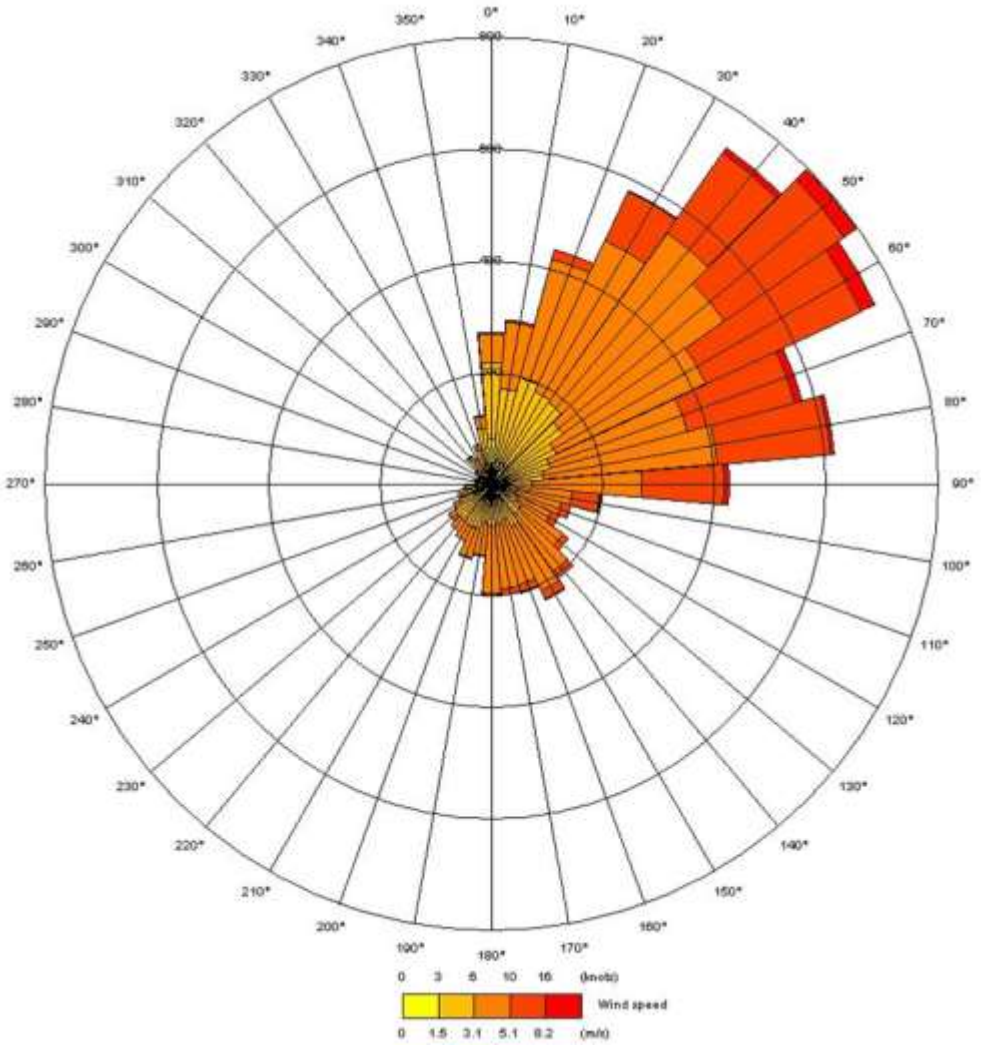


Figure 15: Wind Rose for Nairobi, 2017

7.6 Air Quality

7.6.1 Ambient Air Quality

The Kenyan Air Quality Standards as part of The Environmental Management and Co-ordination Act 1999, were transposed into Kenyan legislation through The Environmental Management and Co-ordination (Air Quality) Regulations, 2014. . WHO Standards do not consider the economic factors affecting guideline attainment.

Within the assessment, both the relevant Kenyan and guidelines have been used.

…Emissions [should] not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards, or in their absence, the current WHO Air Quality Guidelines, or other internationally recognized sources.

In addition:

Emissions [should] not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards. As a general rule, this Guideline suggests 25 percent of the applicable air quality standards to allow additional, future sustainable development in the same airshed.

Kenyan air quality standards include a consideration of the type of area within which a project is located i.e. an industrial area, residential area or protected area. Table 35. presents Kenyan and WHO reference standards and guidelines for NOx PM, Sox.

Table 35: Kenyan and WHO reference standards and guidelines for NOx PM, Sox.

Parameter	WHO Air Quality Guidelines	NEMA Air Quality Regulations	Averaging period
Sulphur Dioxide, SO2	20 µg/m3	80 µg/m3	24hr
Nitrogen Oxides, NOx as NO2	200 µg/m3 (1hr)	80 µg/m3 (24hr)	
Suspended Particulate Matter	200 µg/m3	-	24hr
PM10	100 µg/m3	50 µg/m3	24hr
PM2.5	25 µg/m3	75 µg/m3	24hr
Ozone	100 µg/m3	120 µg/m3	8hr

Baseline Air Quality for the corridor has not been carried out and the proponent (CRBC) will undertake a baseline survey and air quality modelling in order to develop Air Quality Management Plan befor during the detailed design.

Nairobi does not regularly monitor its urban air quality, even as the levels of air pollution worsen to the point where a brown haze regularly develops over the central business district.

While Kenya has gazetted laws such as the Air Quality Regulations passed in 2014 to limit air pollution and protect the air that we breathe, there is limited information on the level of particulate air pollutants in Nairobi, and this lack of data makes it difficult to assess the potential impact of air pollution in order to adequately respond to the threats posed by poor air quality.

Several air quality surveys were conducted around the CBD of Nairobi City in the past, and it was found that there is a strong correlation between the recent urban air quality degradation and the vehicular emission therein. Also, recent citywide health statistics report a rapid increase of acute and chronic respiratory diseases such as asthma.

No long-term, continuous, citywide air quality monitoring has been implemented such that reliable quantitative evaluation of urban air quality.

Air quality measurements was conducted in 2017, October 24 to 28 during the occasion of the repeat presidential election. Three sensors (See location on Figure 16) have been deployed in Nairobi, one on Ngong Road, another at Muthurwa Primary School, and one at Lenana.

The results showed (see Figure 16 a sharp decline in the level of particulate matter on election day, with levels going back up as normal traffic resumed. The dip started from 2pm on the 25th, lasting until noon on the 26th. There was a spike in particulate matter detected on the days leading up to election day, presumably as people traveled out of Nairobi, but it is clear that on the day of the election, the levels of particulate matter detected were much lower than normal.

This results extrapolates potential peak and off peak traffic air quality on the planned expressway. However the need to undertake a comprehensive air quality impact assessment in Nairobi County and Mavoko Sub County, to assess the overall net effect of the proposed Expressway is evident. The proposed Expressway will change traffic flows through the main arterial routes in Southern Nairobi, including the Southern Bypass, Mombasa Road, Langata Road, Waiyaki Way amongst others. On some roads traffic flows will increase, and on others will decrease. This will depend upon a number of factors including trip origin and destination, congestion patterns and existing and future bottlenecks. As a result, a detailed traffic assessment would be required to identify changes in traffic flows, incorporating these factors, and on the basis of this, inform a detailed air quality impact assessment for southern Nairobi. Of particular importance will be those locations where there may be a worsening

which are already subject to poor air quality. CRBC intends to carry out air quality measurement along the the expressway to establish baseline before construction.

On the positive side however the development of the proposed Expressway is predicted to reduce traffic on the Mombasa Road in this location, thus improving the air quality in the area.

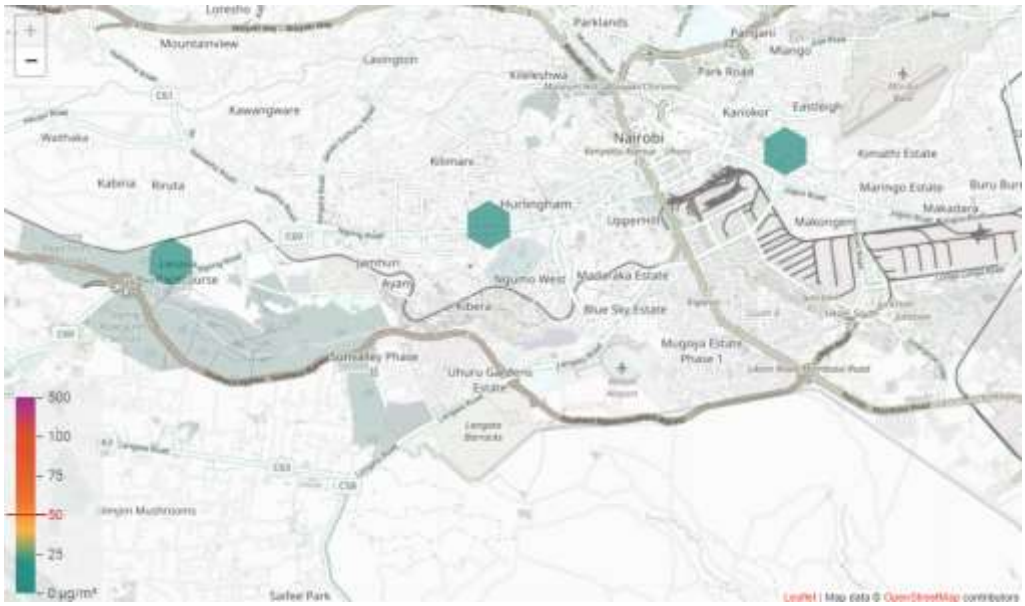


Figure 16: Sensor locations at Ngong Road, Muthurwa Primary School, and Lenana.

Source: https://sensors.africa/

Figure 17: Air quality Data in Nairobi Oct 24 t0 28 2017

7.7 Noise

Baseline Noise measurement for the corridor has not been carried out and the proponent (CRBC) will undertake a baseline survey during the detailed design.

A noise measurement exercise was conducted in Nairobi CBD by Enock Abe Wawa, Galcano Canny Mulaku of Department of Geospatial and Space Technology, University of Nairobi, Nairobi, Kenya. This study was done over a short period of time and specifically during the day due to constraints of time, security and cost to show a GIS-based approach for 2D noise modeling. Coupled with other constraints, the sampling duration was less than 1 minute at every sampling point. The temporal dimension was not considered as measurements were not taken concurrently but individually and momentarily.

The results of this exercise showed that the eastern parts of Nairobi's CBD have the highest levels of noise. This can be attributed to a high concentration of matatu (public service vans) stops and open air vendors in that part of the CBD. The highest sound recorded, at 78 db, shows that in some parts, especially the hotspots, the noise levels approach the healthy hearing limit of about 85 db.

Most noise guidelines are receptor-specific, depend on local conditions, and are more appropriately set at national or regional level.

Construction noise criteria is defined in the Kenyan noise regulations. Project construction activities have therefore been assessed using the Kenyan Regulations related to construction. The Kenya noise regulations for construction sites (Second Schedule), as summarised in Chapter 4 have been used to establish a suitable set of construction noise criteria for the Project. For the activities during the construction phase to create a significant noise impact, the noise generated must be above the noise impact threshold levels.

Unlike the construction and vibration activities, the Kenyan noise limits (particularly the nighttime noise limits) for industrial facilities are too stringent and almost unachievable for linear sources, such as roadways and railways.

Another noise measurement exercise carried out as part ESIA for the Nairobi Mombasa Expressway by ERM show that night-time and daytime levels are above those operational criteria, as defined in Chapter 5. It is also observed that all baseline night-time levels were higher than the Kenyan night-time limit of 35 dB(A). Data on this measurement on the corridor showed baseline noise levels along the proposed Expressway currently exceed the Kenyan night-time noise limit of 35 dB(A). For most areas, the baseline night-time levels ranged from 50 to over 60 dB(A) due to the existing traffic noise from the Mombasa Road (A109). Consequently, in deriving noise impact assessment criteria for the operation of the proposed Expressway.

Table 36: Daytime/Nighttime noise measurement results Nairobi Section of NRB _MSA Expressway

Receptor Type	Period	Measured Sound Levels, LAeq (dB(A))		Representative Ambient Sound Levels Based on Land Use Type, LAeq (dB(A))(1)
Receptors nearby main roads/highways	Daytime	61		60
	Night-time	57		55
High-density residential area	Daytime	55		55
	Night-time	48		50
Low-density residential areas	Daytime	45		45
	Night-time	40		40
Receptors nearby main roads/highways	Daytime	64		65
	Night-time	60		60

Along the project route, sensitive receptors are located around the highway and include schools, hospitals, government buildings and residential estates as shown in table below.

Table 37: Sensitive noise receptors

Receptor Type	Name	LOCATION	Distance to Existing Road
Hospitals	Nairobi West	Nairobi West	102m
	Mariakani Nursing & Rehabilitation	South C	54m
	Chiromo Funeral Parlour	Chiromo	56m
	Bliss Hospital	Nairobi West	110m
Schools	University of Nairobi	Chiromo	Along road
	State House Girls	Westlands	603m
	Consolata School	Westlands	247m
	Technical University of Kenya	CBD	366m
	Kenya Institutte of Mass Communication	South B	167m
	Westlands Primary	Westlands	155m
	Nairobi South Primary	South B	247m
	Maguga Green Primary	Westlands	60m
	Khalsa Primary	South C	98m
	CID Police Training	South C	121m
	St. Mary's School Nairobi	Muthangari	250m
	Highway Secondary	South B	Along road
	Highway educational Centre	South B	Along road
	Agha Khan High	Westlands	Along road
	Mlolongo AIC Primary	Mlolongo	100m
Government Building	Parliament	CBD	Along road
Residential Estates	Westlands		Along road
	Muthangari		Along road

	Muguga		Along road
	Soutb C		Along road
	South B		Along road
	Syokimau		Along road
	Mlolongo		Along road
	Imara Daima		Along road
	Nairobi West		Along road

For the proposed Expressway to create a significant noise impact, the absolute noise it generates must be above the impact threshold levels. Whether or not the operation of the new Expressway will create a noise impact in a given location will depend not only on absolute noise levels from the proposed Expressway, but also the extent to which the predicted Project noise LAeq levels exceed the existing baseline levels.

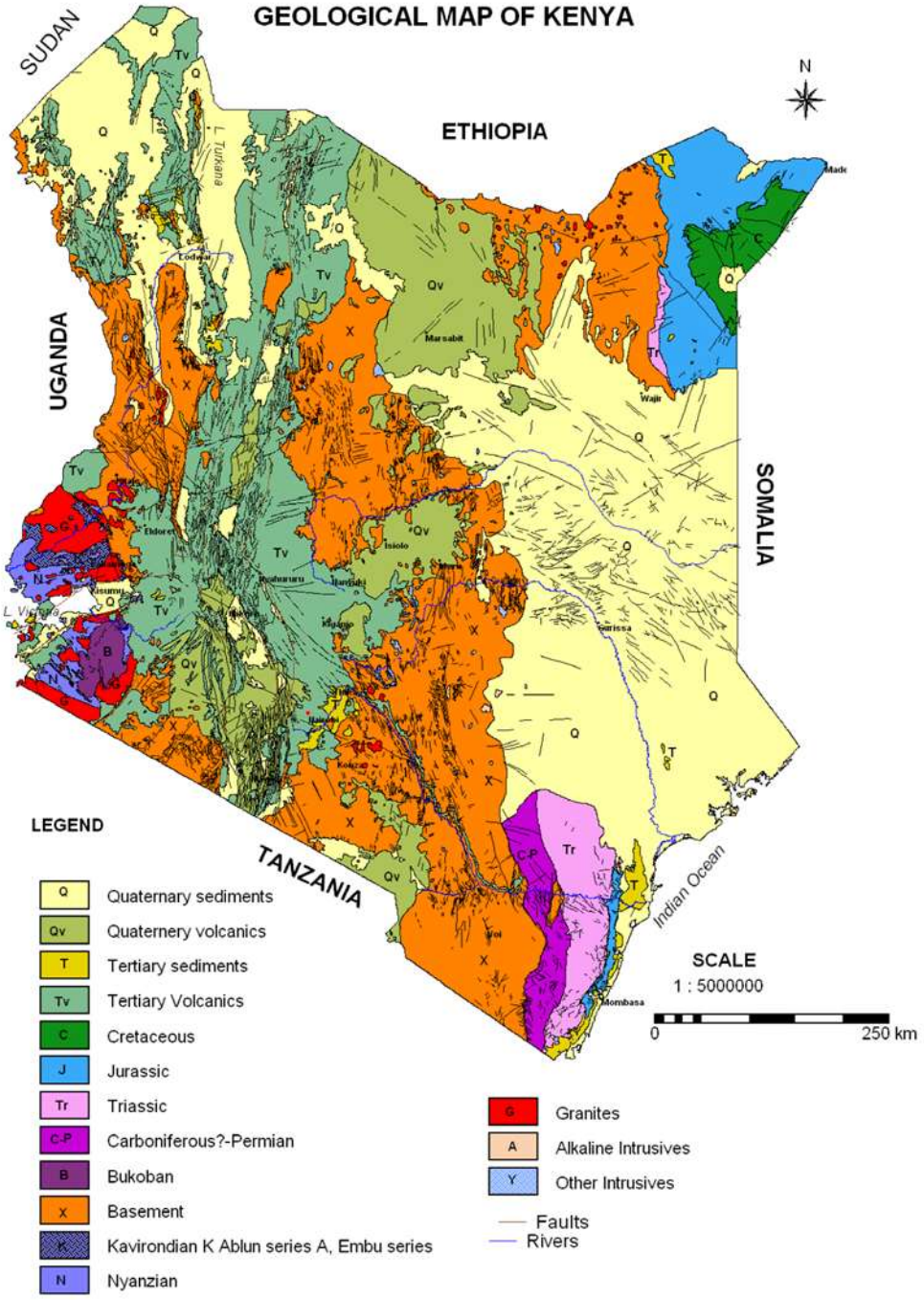
National Environment Management Authority (NEMA) noise levels, maximum permissible noise levels for construction sites (Measurement taken within the facility) are shown below.

Table 38: NEMA Noise Level Guidelines

Site	Day	Night
Health facilities, educational institutions, homes for disabled	60dBA	35dBA
Residential	60dBA	35dBA
Other areas	75dBA	65dBA

7.8 Soils

Nairobi is characterised by nitisols and andosols (Kenya Soil Survey, 1980). Nitisols occur mainly in the tropics and subtropics, as well as in areas with a Mediterranean type of climate and are associated with basic rocks (e.g. basalts). Andosols occur throughout the world where volcanic activity is common. Soils in the Machakos (where the proposed project starts) counties typically include the vertisols, gleysols and phaeozems. They are characterized by having pockets of sodicity and salinity, are typically of low fertility and vulnerability to erosion.



7.8.1 Project Ares Soil type

The proposed area is within high-level structured plains with three soil types namely clay soils (vertisols), loam soils and nitisols. At the start of the project area the soils are mainly clay, which are imperfectly drained, deep, dark grey to black, cracking clay soils. Moderately deep, well drained, brown loam soils characterized the project area that traverses the central business district of Nairobi (CBD). At the tail end of the express way, deep, well drained, red nitisols are dominant.

Table 39: Soil type along the project area

Sections along the road	Co-ordinates	Soil Type	Characteristics

Mlolongo to Nyayo Stadium	37 M 0271491 m E, 9844614 S to 37 M 0257727 m E 9856610 m S	Clay Soils	Poorly drained deep black soils
Nyayo Stadium to Thika Interchange	37 M 0257727 m E 9856610 m S to 37 M 0256610 m E, 9858993 m S	Loam soils	Moderately deep brown soils
Thika Interchange to ABC/James Gichuru	37 M 0256610 m E, 9858993 m S to 37M 0252350 m E,9860662 m S	Nitisols soils	Deep well drained red soils

Picture 1: Clay soils

Picture 2: Poorly drained clay soils

Picture 3: Loam soils

Picture 4: Modified soils along Waiyaki way

7.9 Water Resources

The project area is part of the upper Athi basin which drains into the Nairobi, Ngong, Athi rivers and several small streams.

Picture 5: River Nairobi between capital center and Nyayo

Picture 6: Nairobi river at Thika interchange

Prominent drainage feature is the Nairobi River and its tributaries which are permanent rivers that cross the proposed express way.

Picture 7: Thika interchange

Picture 8: Nairobi river tributary before capital center

Groundwater aquifers in the project area occur mainly between the principal lava flows that have old land surfaces and in the fractured and weathered volcanic rocks. Near-surface aquifers occur in ferricrete deposits and weathered soil on former land surfaces and in addition to faults, fissures and joints may carry water in the proposed project area.

Table 40: Major surface water bodies along the road

Name of River	Co-ordinates	Location
River Nairobi tributary	37 M 0258416 m E, 9855149 m S	Between Capital Centre and Nyayo stadium
River Nairobi	37 M 0257727 m E, 9856610 m S	Between Nyayo Stadium and Golf Club
River Nairobi	37 M 0256591 m E. 9859016 m S	Museum Hill interchange

7.9.1 Nairobi Aquifer System (NAS)

NAS is a series of multi-layered aquifers in the volcanic flows rising from the southern Aberdares, the Kikuyu Escarpment and the Ngong Hills, which dips gently eastwards into the pre-Tertiary Athi Lake Basin. The groundwater basin extends from the zone of north south rift faulting west of the city towards the Athi river floodplain (Gulf Power Ltd., 2010; Stephen et al., 2005; and WRMA, 2010). The NAS intersects and provides water to the cities and towns of Nairobi, Kiambu, Machakos and Kajiado. The NAS features the only Groundwater Conservation Area (GCA) in Kenya, which was established primarily to protect its sustainability; however, this GCA is poorly enforced as the NAS is the most abstracted aquifer amongst all aquifers in the country, and is also very prone to pollution.

The NAS covers an area of ~6,500 km2 under Nairobi, Kiambu, Machakos and Kajiado. It is a volcanic-hosted multilayered aquifer, the principal unit of which is the confined Upper Athi Series which is typically found between 120 and 300 m below ground level (Mumma, 2011). The mean annual recharge is estimated at between 8 and 9.2 %, mostly in the western and northwestern parts of the aquifer (Irungu, 1997; WRMA, 2010).

The NAS is extensively used as a source of water for domestic use, both public and communal uses, and for commercial, industrial and agricultural purposes (Mumma, 2011). It is estimated that 4,856 boreholes are used to abstract water from the NAS, although the registration of boreholes and the management of water abstraction from these is a challenge for the Water Resource Management Authority (WRMA) (Mumma, 2011).

The NAS is under significant pressure due to increasing water abstraction, predominantly in urban areas. Locally this has led to a significant decline in groundwater levels, changes in water quality, as well as conflict between water users (Mumma, 2011). Much of the groundwater in the NAS is naturally high in dissolved fluoride, at concentrations which exceed Kenya's drinking water standards, and has elevated electrical conductivity (KEBS, 2007).

7.10 BIODIVERSITY ASSESSMENT

7.10.1 Overview

The area traversed by the proposed road construction project has been modified for settlement and other related activities. However, the remaining vegetation stands in this project area still offers habitats for a diverse array of species in addition to other ecological significance. Therefore, this report gives comprehensive data on ecological baseline conditions of the entire corridor for the proposed project area.

While the study encompassed assessing the site soil types and conditions, water resources, flora and fauna of the entire area, specific attention was given to the floral species. To ensure complete coverage and good representation, the area was divided into three sections; Left-hand side (LHS), Median section (MS) and Right-hand side (RHS). On both LHS and RHS, the study covered a 20m offset from the existing A8 road. The MS was taken as a whole for assessment purposes. The 20m stretch was maintained from beginning to end of the road allignment.

The biodiversity assessment entailed area exploration to identify the entire native and exotic plant species present in the proposed project area. This involved recording the (i) number of plant species according to the girth (less than 30 cm, between 30cm to 60 cm and above 60 cm) and (ii) taking photos of the available species and the general ground cover of left, middle and right side of the road.

7.10.2 Fauna

The proposed road mainly runs through a built environment with minimal fauna. However, some birds such as common bulbul, crows and marabou stocks are common along the road at Nyayo stadium and Westlands round about. A few wild animals that stray from the Nairobi National Park such as zebras, gazelle have been spotted in the project area especially on the right side of JKIA-Imara Daima section of the proposed road. None of such wild animal were cited during the study period.

The undisturbed and vegetated sections of the project road are naturally rich in soil and terrestrial macrofauna. Soil macrofaunal is indicated by the many anthills along the sections. Diverse insect and other invertebrate species are expected in those places. The presense of reptiles is also highly likely.

Picture 9: Nests and Marabou stock on *Acacia* tree at Nyayo Stadium

Picture 10: Anthills along the middle section between Syokimau and JKIA

7.10.3 Flora

The road corridor is characterized by varying degree of tree cover. Vegetation is mainly comprised of exotic variety. Generally, the project area has a combined population of approximately 5,000 trees, with the mid section of the highway having the highest number of trees, approximately 2,600. The left and the right side of the road corridor have fairly equal numbers of trees.

The road section between Mlolongo to Syokimau has the least vegetation cover while the sections between Nyayo Stadium and Haile Selasie where the road project boarders a Golf Club and Uhuru Park, both on the LHS and the section between Nairobi University and James Gichuru have the highest tree density cover.

The vegetation along the proposed road constitute some of the main green spaces with the Nairobi county. Further, the vegetation cover is not only aesthetic but also provides residence with shady recreation areas. For good representation of the site vegetation, the proposed project area was divided into sections and the (i) dominant plant species, (ii) canopy cover, (iii) ecological importance quoted of each section. Division of the area into sections was quided by vegetation changes and ecologically sensitive areas.

Picture 11: General vegetation at JKIA interchange middle section

Picture 12: The dense and mature trees along Uhuru park

7.10.3.1 Section 1: Mlolongo, Syokimau and SGR Terminus

In this section, a total of 871 tree species in 39 genera and 21 families were recorded. The section is mostly dominated by natural stands of yellow-back Acacia (Acacia xanthophloea) both on the left and right sides of the road; Casuaina equisetifolia in the median section from Syokimau and Terminalia sericea (Annex 1). The canopy cover is about 10%, of which 38% were trees with diameter less than 30cm, 39% had a diameter of between 30cm and 60cm and 23% were mature trees with diameter greater than 60cm. The median section is covered with grass where basal cover is about 40%. The mid-lane, however, from Syokimau to SGR terminus is dominated by planted whistling pine tree (Casuarina equisetifolia) with ground covered by grass. The importance of trees at this section is provision of shades and beautification of the area.

Picture 14: Natural acacia species along the road reserve

Picture 13: Grass cover at 0+00km middle section

Picture 15: Planted Casuarina equisetifolia between Syokimau and SGR teminus

Picture 16: General view of trees in close proximity of settlement areas of the site.

7.10.3.2 Section 2: JKIA to Eastern Bypass.

The dominant tree species are Grevilea robusta, Casuarina equisetifolia, Senna siamae and Markhamia lutea (Annex 2). Most of tree species in this area are planted and, if natural, are maintained by the local people. A total of 656 trees were recorded, of which 46% had a dimeter less than 30cm, 49% were between 30cm and 60cm in girth and only 5% were mature trees with girth greater than 60cm. A good number of planted Vitex keniensis and many saplings of Acacia drepanolobium were also observed in this section. A lot of planted trees in this section are for landscaping and aesthetic purposes. Some indigenous trees like Vitex keniensis and

Picture 18: Mature trees of *Casuarina equisetifolia,*

Spathodea nilotica were recorded and serve to enhance species richness of the area.  Picture 17: JKIA Interchange middle section	*Acacia* and *Terminalia spp*

Picture 19: General view of tree abundance and distribution in the section

Picture 20: Planted *Grevillea* between JKIA and Cabanas

7.10.3.3 Section 3: Eastern Bypass to Southern Bypass.

It is dominated by Terminalia sericea, Schinus molle and Terminalia mantale (Annex 3). This area has mature planted tree species and a lot of ornamental plants along the road. A total of 525 trees were noted such that 26% were less than 30cm, 28% were between 30cm and 60cm and 46% were greater than 60cm in diameter.

Picture 21: Middle lane trees of the section

Picture 22: Mature trees with diameter > 60cm

Picture 23: Mature *Acacia* spp with bird nests

Picture 24: *Schinus molle* and *Senna siamae* in the MS

7.10.3.4 Southern Bypass to Nyayo Stadium.

The middle part of this section has dense number of planted trees as compared to the left and right sides. The most dominant trees are Terminalia sericea, Zanthoxylum gilleti and Phoenix reclinata (Annex 4). Trees in this section are used for landscaping, providing shades and income generation as indicated by presence of tree nursery.

Picture 25: Planted *Vitex keniensis* immediately after Southern Bypass

Picture 26: Trees in the MS of the road from Southern Bypass to Nyayo Stadium.

Picture 27: Commercial tree nursery in the section

Picture 28: Planted *Grevillea* close to Nyayo Flyover

7.10.3.5 Section 5: Nyayo stadium to Thika Road Interchange

It is dominated by Jacaranda mimosifolia, Terminalia sericea, Senna siamae, Filicium decipiens and Phoenix reclinata. The middle part starting at the first roundabout from Nyayo stadium is dominated by planted Olea capensis, Filicium decipiens and Phoenix reclinata (Annex 5). This section consists of mature Jacaranda, Acacia, Terminalia, Senna and Zanthoxylum species. The big trees act as habitats for different species of avifauna such as marabou stocks and crows.

Picture 29: *Jacaranda mimosifolia* at Nyayo Stadium acting as habitat for avifauna

Picture 30: Trees species and sizes at the Golf between Nyayo stadium and Haile Selassie.

Picture 31: Tree species along Uhuru park

Picture 32: *Zanthoxylum gilleti* and mature *Grevillea* along Uhuru park

7.10.3.6 Section 6: Thika Road Interchange

The area is small but has diverse tree species some of which are threatened such as Prunus africana. It is dominated by Eucalyptus species, Meru oak and Markamia lutea (Annex 6). Most of the trees are still young with diameter less than 30cm.

Picture 33: Planted *Eucalyptus* at the middle section of Chiromo/ Thika Interchange

Picture 34: *Olea europaea* at the site

Picture 35: Planted *Vitex keniensis* and *Cordia spp* at the site

Picture 36: *Prunus africana* at the site

7.10.3.7 Section 7: Thika Road Interchange to Westlands Roundabout.

This is the area where the median section has higher tree density as compared to other median sections. It is dominated by Grevilea robusta, Casuarina equisetifolia, Croton megalocarpus and Vitex keniensis (Annex 7). The ecological significance of trees in this section is for aesthetic purposes. A total of 548 trees were recorded in this section, of which 15% were less than 30cm, 49% lies between 30cm and 60cm and 35% were greater than 60cm in diameter. This indicates that most of trees in this section are big in size and of good ecological importance like carbon sequestration.

Picture 37: Trees at the beginning of the section

Picture 38: Tree cover by canopy and size of the area

Picture 39: *Grevilea* dominating the site

Picture 40: General vegetation type of the section

7.10.4 Ecologically Sensitive (Import) Areas (ESA)

The proposed road alignment will cross areas that are considered of environmental importance due to their ecological functions and because they act as local biodiversity hotspots with regard to bird species, green cover and recreation. These areas include Railway Golf Club, Uhuru Park, Trees at Nyayo Stadium roundabout, Nairobi River, Thika road interchange and Trees at Westlands roundabout. The Table below explains reason as to why each of these areas has been identified as of ecological importance.

Table 41: Sections along the road considered ecologically sensitive

ESA	Features
River Crossings	• Rivers • Mature riparian trees
Nyayo Stadium	• The Acacia spp adjacent to the highway (A8) at Nyayo roundabout are home to Marabou Stork birds
Railway Golf Club	• River crossing • High tree density and diversity on LHS • Manure trees
Uhuru Park	• High tree density and diversity on LHS • Mature trees
Thika road interchange (Museum Hill)	• River crossing • High vegetation density • Significant species
Westlands	• Indigenous tree- Mugumo tree at 37 M 0255581 m E, 9859968 m S • Westlands roundabout home to Marabou Stork

Significant species include Prunus africana; Olea capensis and Olea europaea. Non-threatened significant species include Vitex keniensis and Spathodea nilotica.

8 SOCIAL BASELINE

8.1 Introduction

The purpose of this Chapter is to describe the social, cultural and socio-economic environment along the proposed Expressway alignment. The baseline provides a contextual component for identifying and assessing any potential social impacts of the Project.

A description of the socio-economic environment is provided for the Counties that will be traversed by the proposed Expressway to put the Project into context, with further detail provided for the Area of Influence, which forms the key focus of the social baseline.

8.2 Definition Of Key Terminologies

- Project Footprint – defined as the corridor where the proposed Expressway will be constructed including the locations for temporary or permanent associated infrastructure, such as the construction camps.

- Area of Influence (AoI) – the Area of Influence (AoI) is defined as the area likely to be affected by the Project activities during the pre-construction, construction and operational phase of the Project. The AoI includes:

- The Project Footprint and related facilities that the Project Proponent develops or controls;

- Additional areas in which aspects of the environment could conceivably experience significant impacts;

- Areas potentially affected by cumulative impacts resulting from other potential or known developments at the time of the ESIA, further planned phases of the Project or any other existing circumstances; and

- Areas potentially affected by impacts from predictable (but unplanned) developments as a result of the Project (i.e., induced activities), occurring at a later stage or at a different location. From a social perspective, this could relate to influx of opportunistic and migrant workers.

For purposes of this study, the AoI was defined to include all the Locations that will be traversed by the proposed Expressway as well as nearby settlements and towns/ trading centres, identified through baseline data collection, where applicable.

8.3 Geographical Area

The proposed Expressway alignment will traverse two counties from west to east. Within these counties, the 8 administrative areas outlined in Table 42 have been identified as potentially being affected.

Table 42: Summary of Locations in the Project Area of Influence (AoI)

County	Administrative areas
Nairobi	Embakasi
	Langata
	Makadara
	Dagoretti
	Kamukunji
	Starehe
	Westlands
Machakos	Mavoko

Figure 18: Administrative areas on the expressway

8.4 POPULATION

According to the Kenya Population and Housing Census conducted in 2019, 47,564,296 Of which 23,548,056 were Males, 24,014,716, and that of Nairobi City was approximately 4,397,073.

According to the 2019 census, in the administrative area of Nairobi, 4,397,073 inhabitants lived within 696 km2 (269 sq mi).

The capital city's population has grown 40 per cent in the last 10 years from 3,138,369 in 2009, the 2019 census data reveals. This now means Nairobi accounts for 9.2 per cent of the country's total population.

In 2009, there were 1,605,230 females in Nairobi compared to 1,533,139 males. In 2019, the number has risen to 2,192,452 females and 2,204,376 males.

Embakasi Sub-county recorded the highest population in Nairobi with 988,808 people. It is followed closely by Kasarani at 780,656.

Njiru is third with 626,482, Dagoretti fourth with 434,208, Westlands (308,854), Kamukunji (268,276), Starehe (210,423), Mathare (206,564), Langata (197,489), Makadara (189,536) and Kibra being last with 185,777.

The city is growing at a rate of over four per cent annually, primarily because of the high birth rate and as people migrate from rural areas in search of employment.

KNBS projects Nairobi will have a population of five million in 2025. Nairobi's landmass is 703.9 square kilometres. This shows about 6,247 people occupy a square kilometre.

There are about 1.5 million households in Nairobi, according to the 2019 census. This again shows there are 2.9 people per household.

An average household size in Kamukunji stands at 3.1, Njiru (3), Westlands (2.9), while Dagoretti, Embakasi, Kasarani and Starehe tie at 2.8.

According to the Kenya Population and Housing Census conducted in 2019, the population of Machakos County was projected to be 1,421,932 comprising of 710,707 males and 711,191 females. The 2009 National Population and Housing Census estimated that the population of Mavoko Sub County would be 191,920 by 2020, it also placed the population of Syokimau/Mlolongo ward at 42,154

8.5 SETTLEMENT AREAS

Nairobi is a densely populated city with most of the structures made of stone and concrete Central district is the most densely populated area of Nairobi with 22 ,164 persons per square km.

Slum areas such as Kibera slum have extremely high population densities. Slum areas are heavily congested hence increasing pressure on the available resources such as land, water and energy. Most of the Nairobi residents are tenants as opposed to home owners.

With the dense population in Nairobi, housing within the city is a challenge. Settlement patterns have shifted in the recent years with many housing units having coming up in the past few years as more people are opting to settle in the outskirts of the city. The population has therefore increased in the areas within the county of Machakos bordering Nairobi ie Syokimau , Mlolongo and Athi river.

Residential estates within the project area are westlands, estates around Safaricom HQ area, lmara Daima and Embakasi Pipeline estate. There are slums as well including; Mukuru kwa Njenga, Mukuru Kayaba and Mukuru village Along the A 108, beyond the Likoni road junction towards the CBD there are a number of residential estates as well that are found between Southern bypass and Langata road. These include; Bellevue, Plainsview, Akiba, KMA, South B, South C and Miller Estate.

Mavoko sub county where the project road starts can be said to be an industrial town and real estate ventures due to its proximity to Nairobi.

Residential estates within the project area are estates within Syokimau area and Mlololongo

8.6 Land Tenure

The land tenure system along the proposed Expressway falls into the following broad categories:

- Private/ individual, where land rights are assigned to a private party who may be an individual, a married couple, a group of people, or a corporate body such as a commercial entity or non-profit organisation.
- Public/ Government, where property rights are assigned to some authority in the public sector. For example, open spaces fall under the mandate of the state and all members of the state can use them freely.

Along the proposed Expressway, land is owned on either a lease or freehold. In many rural areas land is owned as freehold, this gives the holder absolute ownership of the land. A freehold title deed has no restrictions as to the use or occupation.

In urban areas, land is mostly owned on leasehold where the interest in land is for a specific period, subject to payment of a fee or rent to the grantor. The maximum term of government leases is 999 years for agricultural land and 99 years for urban plots. It is also common to find 33 year leases in respect to urban trust land.

Land use in Machakos County urban centres including the project area in Mavoko subcounty is generally mixed development. There are no clearcut zones for specific land uses in the county. This is because all the existing physical development plans except Machakos New Town Local Physical Development Plan are outdated hence not in force. There is no well-defined zoning policy in the county that guides land use development in all its urban centres sometimes leading to overlaps and mixing of incompatible land uses.

Further details on the land tenure by County are provided in Table 43. It should be noted that this is based on secondary data and that land ownership and land rights in Kenya are complex with a variety of players and sometimes competing ownership rights. As such, this may not represent a complete picture. Similarly, the primary data presented below is also likely to be subject to the views and perceptions of those living on the land as such communities may assert that they have land rights, which are not upheld in law.

Table 43: Summary of Land Tenure by County

Nairobi	• Shortage of land is a major issue and land is overstretched. • Illegal land grabbing is common especially of government land, reserves and land allocated for development. • Informal settlements are present around Nairobi

Machakos	• Shortage of land is a major issue and land is overstretched. • Illegal land grabbing is common especially of government land, reserves and land allocated for development. • Informal settlements are present in small towns thereby straining resources and infrastructure

8.7 WATER AND SANITATION

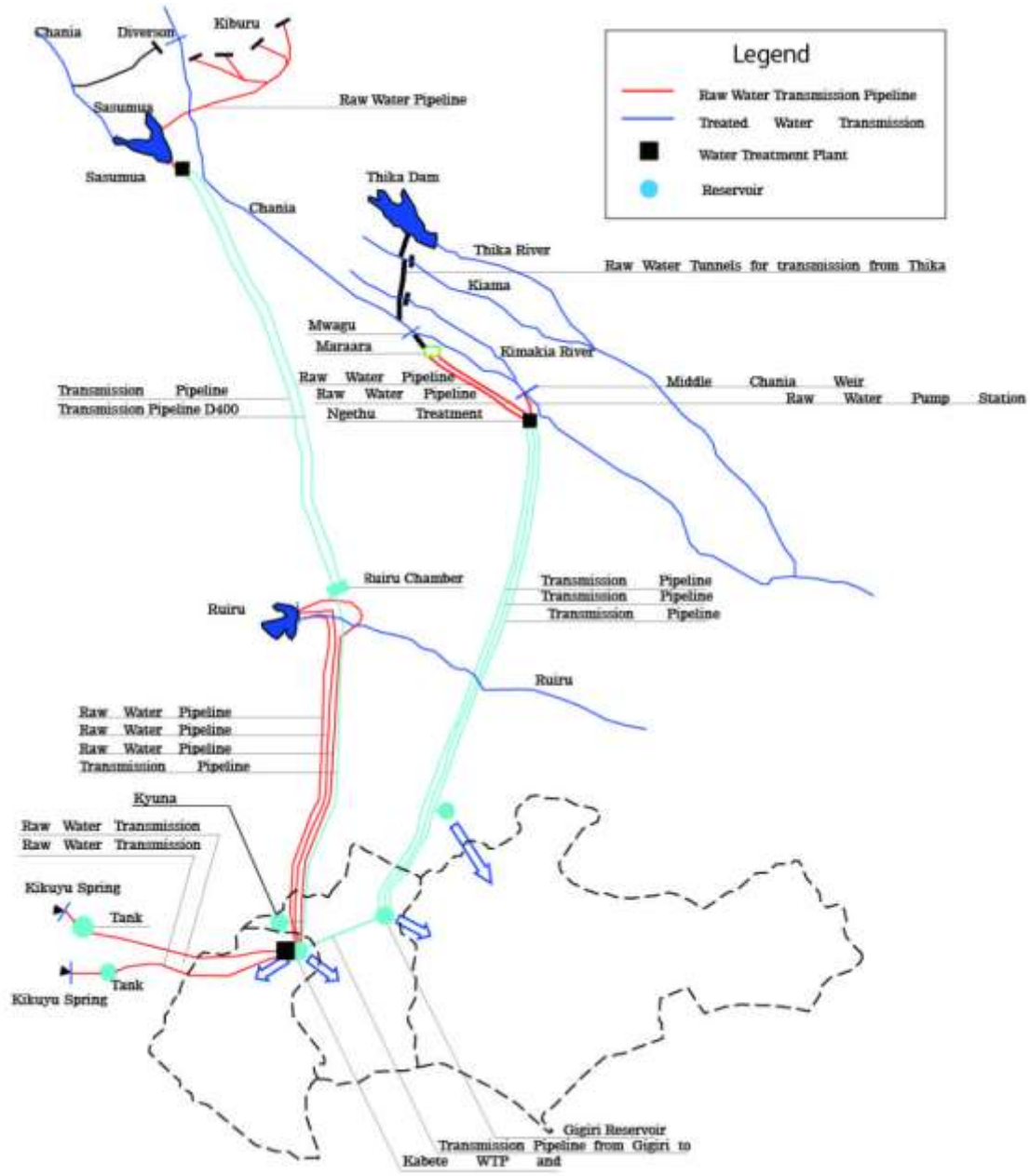
8.7.1 Water Resources

The existing water resources for the water supply system of Nairobi City were from Sasumua Dam, Thika Dam, Ruiru Dam, and Mwagu Intake on the Chania River, Kikuyu Springs, and boreholes for groundwater. The capacity for the water supply is summarised in Table 44. The outline map for the water supply of Nairobi City is presented in Figure 19

Table 44: capacity for the water supply

Name	Water Supply Capacity (m3/day)		Remark
Sasumua Dam	63,000	549,500	Chania River
Thika Dam -Mwagu Intake	460,000		Thika River
Ruiru Dam	21,700		Ruiru River
Kikuyu Springs	4,800		Two springs mainly supply raw water to Nairobi City.
Groundwater	45,000		Due to the shortage of water, private boreholes were developed in Nairobi City. Nairobi City Water Supply and Sewerage Company (NCWSC) owns 30 boreholes and 13 of those are in operation. Figure 4.2.17 shows total as expected by NCWSC in 2010.

Source: NIUPLAN 2015



Source: NIUPLAN 2015

Figure 19: outline map for the water supply of Nairobi

The existing water resources for the water supply system of Mavoko Sub County are from Boreholes, Nairobi City Water and Sewarage Company and Mavoko Water and Sewerage Company (MAVWASCO)

Table 45: Capacity of the water supply system

Name	Water Supply Capacity
Nairobi City Water and Sewarage Company	90,000 m3 per month
Mavoko Water and Sewerage Company	48,000m3 per month
Boreholes	7,000m3 per month

8.7.2 Existing Water Supply Facilities

There are four water supply systems in Nairobi City based on its water resource, namely the Sasumua system, Ruiru system, Mwagu system, and Kikuyu system. Some of the facilities of the systems, such as raw/treated water transmission pipelines of Sasumua Water Treatment Plant (WTP) and Ngethu WTP exist outside of Nairobi City. Thus, countermeasure for complaints from the users in the area needs to be considered in the rehabilitation/expansion of facilities, some of which may be located outside of Nairobi City. In fact, Nairobi City Water Supply and Sewerage Company (NCWSC) supplies bulk water from the systems to the WSP of the area.

The distribution network of Nairobi City receives treated water from four reservoirs, namely: Kabete, Kyuna, Kiambu, and Gigiri reservoirs and the distribution area is segmented into 13 zones based on the reservoir supplying the water to the zone. The distribution network is installed with high density in the western area of Nairobi City and low in the eastern area.

There are three water supply systems in Mavoko Sub County based on the water resource, namely; NCWSC System, MAVWASCO system borehole system. In addition to this individuals have also dug their own boreholes.

8.7.3 Sewerage systems

8.7.3.1 Sewerage Treatment Plants

There are 24 existing sewerage treatment plants (STPs) in Nairobi City, but most of them are localised STPs with a small capacity of less than 2,000 m3/day. The major STPs are Dandora STP (120,000 m3/day) and Kariobangi STP (32,000 m3/day). A report by the NCWSC indicates that these STPs are not well functioning in terms of actual sewerage treatment volume and water quality of treated outflow as shown in Table below. In particular, the Kariobangi STP suffers from deterioration and mechanical troubles; hence, it is not operational substantially.

Table 46: Sewerage Treatment Plants

STP	Type	Capacityyy (m3/day)	Sewerage Inflow (m3/day)	Treated Outflow (m3/day)
Dandora	Lagoon	120,000	90,870	69,941
Kariobangi	Conventional biological aerated filter	32,000	11,933	(N/A)

STP	Item	Water Quality (mg/L)		
		Sewerage Inflow	Treated Outflow	Effluent Standard
Dandora	BOD	375	66	30
	COD	924	245	50
	TSS	500	113	30
Kariobangi	BOD	340	194.8	30
	COD	774.7	373.1	50
	TSS	306.5	77.3	30

Source: NCWSC Quarterly Report, July-September 2011

In Mavoko Sub County; the sewerage treatment plant is located at Export Processing Zone Authority(EPZA) Athi River town.The design capacity of the existing plant is 6500m^3/day

8.7.3.2 Sewers

The majority of existing sewers in Nairobi are combined sewers, collecting both stormwater and wastewater, and are developed in the CBD and in other recent development areas. The total length of the existing trunk sewers is about 162 km that collect wastewaters from the sewerage service areas totaling about 208 km2, which accounts for approximately 40% of

the total area covered by the water supply service. But some of the sewerage service areas still need some reticulation lines (secondary sewers) locally and an actual percentage of service coverage is not clear yet accordingly.

Wastewater collected from the sewerage service areas are conveyed to STPs located in the east of Nairobi City through the trunk sewers constructed along the rivers running west to east.

Existing sewerage coverage is limited to the areas of Export Processing Zone Authority (EPZA), Athi River Town, a bit of lukenya area and the lower part of daystar university and part of Mlolongo, west of Mombasa Rd. There is no existing sewer network in most parts of Mlolongo/Syokimau. Some industries and estate developers in the area had to construct the sewer to connect to the trunk sewers. It is estimated that the sewerage system covers about 15% of the existing developed area.

8.7.3.3 Sanitation

"Nairobi Sanitation Status" on the website of IWA Water Wiki5 summarises the existing situation of sanitation in Nairobi City as described below.

(i) About 10% of the population is served by sewers while 20% has septic tanks and the remainder uses latrine, although these appear to be very crude data (UN-HABITAT, 2003).

(ii) Business/institutional centre and wealthy/middle-income residential districts mostly are served by sewerage system or septic tanks.

(iii) About 60% of the population live in informal settlements. Of this population, 24% is estimated to have a latrine (improved or unimproved) or a flush toilet, while 68% use public toilets (mostly overcrowded, low-quality latrines), and 6% resort to open defecation or in plastic bags that they call "flying toilets" (NCWSC/AWSB 2009).

According to the 2009 Population and Housing Cencus A total of 61% of residents in Machakos County use improved sanitation, while 39% use unimproved sanitation. Improved sanitation includes use of main sewer, septic tank, cess pool, VIP latrine and pit latrine for human waste disposal. Unimproved sanitation includes use of uncovered pit latrines, bucket, bush or other means for human waste disposal. Use of improved sanitation is slightly higher in male headed households at 62% compared with female headed households at 52%. In the project area, 74% of the residents use improved means of sanitation while 26% use unimproved means of sanitation

8.8 EDUCATION

Illiteracy rate in Nairobi for the 15-54 group is 7.8 per cent for women and 5.8 per cent for men. Illiteracy levels are lowest in Nairobi, compared to the rest of the country: 21 per cent for women and 12 per cent for males. In Nairobi, 56.4 per cent of women and 67.3 of men have attended secondary school and above.

Along the project area. there are various education facilities for all levels of education including, primary schools, secondary schools and colleges. These are: Nuru Kindergarten and Pre School along Likoni Road, Diamond Junior School, Our Lady of Mercy Primary, Nairobi School at James Gichuru round about, Agakhan high school, consolata school, grrengate primary, Bora primary school, westalnds primary school, highway school Highway Secondary School, St Bakhita Kindergarten, Jabali Christian School, Riara Springs Girls High school, Riara Springs Academy, Bellevue School, College of Insurance and University of Nairobi.

8.9 HIV/AIDS PREVALENCE RATES AND RELATED SERVICES

The HIV prevalence in the County stands at 4.50% with females being the most affected at 6.10%. Percentage of those who have never been tested for HIV is high among males at

27% compared to 13% among females. The estimated new annual infections are 1,872 and are more prevalent among young women. The estimated population of adults and children living with HIV according to the 2016 data is 30,529 and 2,082 respectively. The County has put in efforts to promote use of ARVs among the infected. Currently, the proportion of PLHIV on ARV treatment is 83% and 82.6% for those on treatment and are immuno suppressed. (Machakos County Integrated Development Plan 2018 – 2022).

Table 47: HIV/AIDS Prevalence Rates and Related Service

Indicator		Indicator	
HIV Prevalence	4.50%	Estimated annual new infections	1,872
HIV Prevalence(Males)	2.70%	Est. Pop Living with HIV(adults)	30,529
HIV Prevalence(Females)	6.10%	Est. Pop Living with HIV(Children)	2,082
% of females who have never been tested for HIV	13%	Proportion of people living with HIV on ARV treatment	83%
% of males who have never been tested for HIV	27%	% of people living with HIOV who are on treatment and Immuno suppressed	82.6

(*Source Machakos County Integrated Development Plan 2018 – 2022*)

The HIV prevalence rate in Nairobi County stands at 6.1 percent. There are 116,513 eligible HIV clients on ARVs. Currently the number of people living with HIV in Nairobi are 171,510 while as the new infections are 4,981 (Nairobi County Integrated Development Plan 2018 – 2022).

8.10 EMPLOYMENT

8.10.1 Nairobi

- Wage Earners - Nairobi commands the largest share of formal sector wage employment in Kenya with a total of 453,000 people. The manufacturing industry accounts for the highest wage employment followed by trade, restaurants and hotels. The construction, transport and communications industry also play key role in generation of wage employment. Other important sectors include finance, real estate and business services. The main formal employment zones in Nairobi are the Central Business District (CBD), Industrial area, along Mombasa Road, along Thika Road and Dandora (2009 Population and Housing Census).
- Self-Employed - A large segment of the labor force in Nairobi is self-employed largely in the informal sector with 1,548,100 being employed in this sector. This is about 3.5 times those in wage employment. The informal sector covers small scale activities that are semi-organized, unregulated and uses low and simple technologies while employing few people per establishment. (2009 Population and Housing Census).
- Labor force - According to the Kenya National Population and Housing Census 2009, Nairobi had a labor force of 2,148,605 comprising of 1,034,009 females and 1,114,596 males. Out of the 2,148,605 persons in the labor force, 1,832,751 were classified as employed while 315,844 were seeking for employment. The youthful proportion of the labor force consists of 561,457 males and 648,756 females.
- Unemployment Levels -The level of unemployment in Nairobi stands at 14.70 per cent with the female unemployment rate standing at 18.99 per cent while that of males is 11.55 per cent.

In Nairobi County, 34% of the residents with no formal education; 45% of those with a primary level of education and 49% for those with a secondary level of education or above are working for pay.

8.10.2 Machakos County

Wage earners -According to the 2009 Kenya Population and Housing Cencus. There are few formal employment opportunities within the County. Majority of employees in the County are casual labourers working in the farms, construction, manufacturing and textile industries.

Table 48: Overall Employment by Education Levels in Machakos County

Education Level	Work for Pay	Family Business	Family Agricultural Holding	Intern/Volunteer	Retired/Homemaker	Fulltime Student	Incapacitated	No Work	Number of Individuals
Total	*29.1*	*11.3*	*22.9*	*1.0*	*14.5*	*13.8*	*0.7*	*6.8*	*603.316*
None	*22.9*	*10.1*	*28.5*	*2.7*	*23.2*	*1.6*	*4.6*	*6.4*	*25.604*
Primary	*26.7*	*10.7*	*26.6*	*0.8*	*16.7*	*11.1*	*0.6*	*6.8*	*318.7-1*
Secondary	*32.7*	*12.0*	*17.8*	*1.1*	*10.9*	*18.2*	*0.3*	*7.0*	*259.001*

(*Source: KNBS and SID, 2013*)

In Machakos County, 23% of the residents with no formal education 27% of those with a primary level of education and 33% of those with secondary level of education or above are working for pay. Work for pay is highest in Nairobi at 49% and this is 16 percentage points above the level in Machakos for those with secondary level of education or above.

Self-Employed - Most residents in the County are self-employed. Those living in the rural areas engage in agricultural activities while those in the urban areas engage in small scale businesses as their sources of livelihood.

Labor Force - The County has a high number of skilled and unskilled labour which is steadily increasing. This poses a major challenge in matching employment opportunities with the surplus labour.

Unemployment Levels - According to the 2009 Kenya Population and Housing Cencus.The unemployment rate in the County is high due to increasing level of labour force with unmatched slowly growing commercial sectors. In addition, land use change from agricultural to real estate development and other uses has shrunk employment opportunities in agriculture sector.

8.11 MARKETS

The population of market traders in Nairobi and Machakos County are mostly low income earners, who venture into micro-enterprises activities. In Nairobi County; this economic sector plays an important role in the city economy in terms of employment generation and delivery of urban services, accounting for about 60% of working population and 20% of GDP. The markets also serve as alternative trading spaces for hawkers, offering a wide variety of choices of goods effectively by lowering the prices of common goods, and are often more conveniently located to traders and buyers than formal stores.

However, a number of the NCC markets were constructed during the colonial era and the market conditions have deteriorated over time. Further, the number of traders and buyers has increased considerably, putting pressure on the infrastructure and capacity of existing facilities. These facilities require upgrading and expansion to remain viable.

8.12 TRANSPORT

The Kenyan road network consists of 114,500 km of unclassified roads. About 14% of theclassified road network (i.e 9,273km) is paved, the rest being of gravel or earth surface. Roadtransport is the predominant mode of transport in Kenya, accounting for about 85% of the total domestic transportation transport in Kenya, Roads constitute a major transportation link in Kenya, moving large numbers of passengers and high volumes of domestic freight throughout the country. To satisfy road demand, a substantial portion of Kenya's annual budget is expended on building, expanding and maintaining roads that have underpinned economic development.

The existing A8 Road forms a part of the Northern Corridor that runs from Mombasa through Nairobi to Malaba (Border with Uganda). Key Trade Route that connects landlocked countries in Eastern and Central Africa Region to the Port of Mombasa. Past Public Transport studies have identified the section of the A8 highway as a critical Transport corridor for movement of people and goods.

A8 facilitates transportation to and from Kenya's Jomo Kenyatta International Airport which is a regional air transportation hub recently upgraded to CAT 1

In spite of the development initiatives made, sections of the highway are still too limited to cope with future demands from:

In Machakos County; Major roads include the Mombasa Highway, Machakos – Kitui, Machakos – Wote, Garissa and Kangundo roads, among others. The County has successfully constructed the following roads among others, the Mwala – Kithimani road, Kathiani – Kangundo road and Athi river road. Paved roads in Machakos County comprise of 6.9% of total roads in the county while good and fair roads make up 26.9% of total roads. 17% of the households in the County have access to electricity while 58.1% have access to clean water The proposed project will be part of the Mombasa highway in the county

The major road in Syokimau/Mulolongo is the Mombasa road, there exists some other roads such as Katani, Kiungani, Beijing, Wananchi and Community roads.

8.12.1 Public transportation

Public transportation 1n Nairobi Area is dominated by conventional bus service and mini bus services (commonly known as Matatus). More than 80% of public transport consists of matatus, which is not an efficient use of limited urban infrastructure and causes traffic congestion and traffic accidents.

Some commuters prefer the use of motorcycle taxis commonly referred to as bodaboda.These are mostly used to travel to nearby destinations along Enterprise, Likoni and Mombasa Roads or from the neighbouring residential estates to the nearest public bus-stops.

The commuter rail plays a limited role as the existing railway corridors provide commuter rail services between Nairobi Railway Station and the following destinations: Ruiru, Syokimau

Jomo Kenyatta International Airport, Kikuyu, and Embakasi Village. The commuter railway system in the project area starts at the new Syokimau Railway Station before connecting to the railway network that serves lmara Daima, Industrial Area and the Eastlands area and terminating at the main Nairobi Railway Station. The system mainly serves commuters from the outskirts of Nairobi including those from Machakos County (Syokimau and Athi river areas) and Kajiado County (Kitengela) through a park and ride system commencing at Syokimau Station.

Majority of the persons accessing the affected properties therefore travel through public or private modes of transport, through the existing road network.

8.12.2 Road Safety along the Existing Mombasa Road (A8)

Available information from Kenya's National Transport and Safety Authority (NTSA) indicate that in 2015:

- The Mombasa Road is ranked as the deadliest road in Kenya followed by Thika Super Highway and Waiyaki Way.
- Most road accidents occur between 7:00 pm and 9:00 pm.
- In 2015, 300 fatalities (55.5% of the fatalities along the Mombasa – Busia highway) occurred along the Mombasa Road.
- The majority of the fatal accidents (123) occurred within the Nairobi County, (41% of the total fatalities along the road section from Mombasa to Kiambu).
- Weekends contributed the highest number of fatalities with a combined figure at average 38% in both 2014 and 2015.
- According to NTSA Press Statement, 28th September 2017, 91% of the road traffic crashes are attributed to human related factors such as speeding, reckless driving, dangerous overtaking, drink driving, drink walking, drink riding, motorists using unfamiliar roads during weekends and failure to use helmets on boda bodas.

8.12.3 Gender and transport in Nairobi City and Its Environs

The Kenyan Government has institutionalised its commitment of addressing gender inequalities. This has been achieved by creating a National Commission on Gender and Development and, a Ministry of Public Service, Youth and Gender Affairs as well as initiating gender desks in all ministries. According to AfDB Kenya Country Gender Profile of 2007, Nairobi Province (Now Nairobi City County) had the lowest incidence of female headed households (19.2%). This indicates that most men can access skilled and uns killed labour This project is meant to address such gaps and offer an opportunity to women to also access the workplace and hence can be able to support themselves besides being dependant to men.On road development, 60% of residents walked, 35% travelled by public transport and only 5% used private cars. With reference to this project, the BRT system meant to offer public transport should be well implemented since it will carry most of the passengers on transit along A 108. The study also indicates that most of the population walk and therefore pedestrian facilities/NMTs along A 108 should be given much attention for the project to be a success.

This project aims to address the various challenges being experienced currently on the A 108 road including traffic congestion, lack of pedestrian walkways at strategic locations which forces pedestrians to risk their lives (by running across the road) wh ile using the road. Most of the vulnerable pedestrians are composed of Children at 24%, Aged at 7% and Disabled at 7%. *(GIBB Africa Traffic Report, 2012).* The project is therefore necessary in order to address these challenges through the proposed capacity enhancement parameters. In particular, the following challenges are being experienced.

(a) Exposure of private vehicle owners to insecurities along the road

Users of private vehicles are normally exposed to robbery and sometimes gun violence whereby armed thieves demand for valuables through open windows at intersections and roundabouts. In the recent past, these attacks have been witnessed to occur in broad daylight Drivers are also susceptible to criminals who attempt to open the car doors or steal side mirrors. vehicle lights and wheel caps. Since female drivers are viewed as non-threatening, there is a perception that some sections of roads in the city are not safe due to these security threats, and the issue of vandalising of car parts in traffic is one of the key causes of this perception. With regard to the A 108 road however, most of these events are perceived to occur in the sections between Nyayo Stadium roundabout and Museum Hill interchange. Criminals sometimes enlist the use of street children to beg for food or money from drivers as a measure of distracting the drivers in order for them to make way with their car parts. The assumption is that children are perceived by drivers as non-threatening hence the drivers are caught off-guard. Commuters in public service vehicles stuck in traffic jams tend to be exposed to mugging whereby phones, bags and jewellery are snatched by petty thieves who then disappear into foot traffic.

(b) Pedestrians safety risks while using the road

A 108 currently lacks adequate facilities for use by pedestrians. In some areas zebra crossings have been erected but the drivers along the road ignore such road safety signs hence endangering the lives of other road users. Plate 4-1 below shows some of the challenges being experienced currently by pedestrians when trying to cross the road.

8.12.4 Railway

SGR – Line 1: Mombasa - Nairobi and Line 2a: Nairobi – Suswa ; Movement of freight and passengers

Improvement of the Commuter Rail Network from Syokimau Station to Nairobi Station - Movement of Passengers

8.12.5 Airports

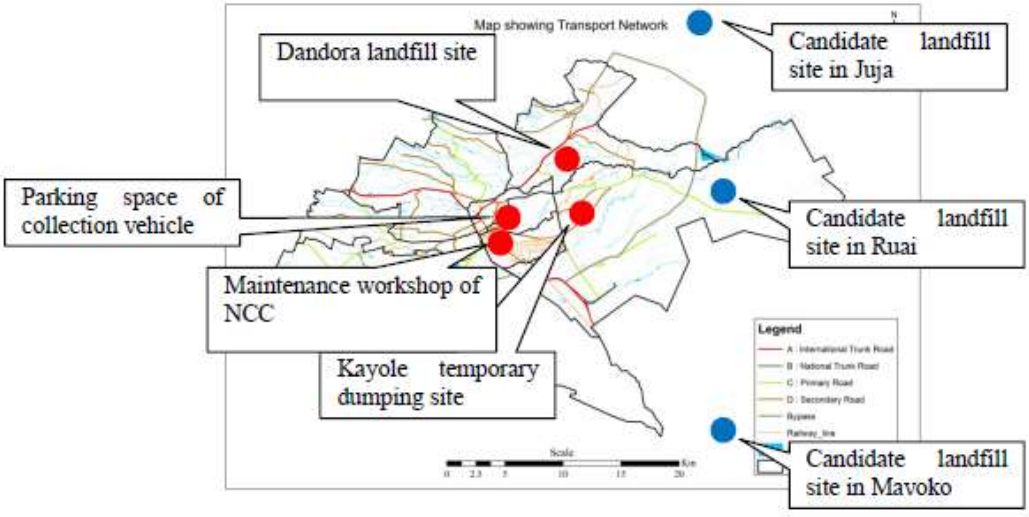
The airports located close to the proposed Expressway include:

- Jomo Kenyatta International Airport (JIKA) in Nairobi;
- Wilson Airport, Nairobi.

8.13 WASTE MANAGEMENT IN NAIROBI CITY COUNTY

The Nairobi City County (NCC) has the responsibility of SWM in Nairobi City. The Department of Environment (DOE) in NCC collects the solid waste by themselves or subcontract it to private companies. On the other hand, private companies collect the solid waste through the contract with households, public, or private enterprises. The collected waste is transported into the Dandora landfill site or other dumping sites. Some of the collected waste is illegally dumped. There are some areas that cannot be collected by NCC or private companies due to the lack of access roads. In this area, CBO collects the waste.

The facilities related to SWM and management situation are shown in Figure 20



Source: NIUPLAN 2015

Figure 20: Facilities Related to Solid Waste Management

The collection and transportation of solid waste are implemented by DOE, private companies contracted by DOE, private service providers (PSPs), and community based organisations (CBOs).

As for the collection service provided by CCN, the operation method is basically a station type collection. The operation team composed of one supervisor, three collectors and one driver collect the waste. The maintenance activity to repair the collection vehicle is carried out in the CCN transport depot. Regarding the service provided by the private companies contracted by CCN, most of the companies have three to five collection vehicles and half of the vehicles have a tipping function and they collect the waste from the station including the collection points transported by CBO, which collects by hand cart as its primary collection. Regarding the service provided by PSPs, the operation scale is different with each PSP. Some PSPs are only small companies that have only one Waste picking activity during unloading of waste from collection vehicle

collection vehicle but other PSPs are large companies which have more than 20 collection vehicles. Some of the collection vehicles of PSPs do not have a tipping function, and this causes inefficient unloading activity.

The collection time is 24 hours for CCN, and from 6 a.m. to 6 p.m. for private contractors of CCN and PSPs to prevent their illegal dumping activities. Therefore, they have to transport solid waste during daytime when the roads are congested.

The overall collection system in Nairobi City for each organisation is envisaged in Table 49.

Table 49: Nairobi city waste collection categorization

Organisation	Service Area	Collection Method	Equipment
CCN	CBD; Districts	Station type: common Door to door: very rare	Trucks with tipping function
Private company contracted with CCN	Districts	Station type	Trucks with/without tipping function
Private service provider	Middle and high income residential area	Door to door	Trucks without tipping function
CBOs and local youth group	Slum and low income areas	Door to door	Handcart

The main treatment and disposal method in Nairobi City is final disposal. There is an official landfill site in Dandora currently. However, there are many illegal dumping sites where the private contractored contracted by CCN and PSPs sometimes dispose their collected waste. The information on the current official landfill site and temporary dump sites are shown in Table 50

Table 50: Nairobi landfill site and temporary dump sites

Name	Zone	Area [ha]	Planned Service	Present Condition
Dandora landfill site	Embakasi	46	1981-	Open dumping and no supervision of waste
Kayole temporary Dumpsite	Embakasi	4	2009-	Area is historically a quarry area. Currently, there is open dumping and there are some

The Dandora dumping site is currently the only official landfill site in Nairobi City. However, the operation of disposal in Dandora dumping site is open dumping, which means that there is no soil covering. This is located 7.5 km away from the northeast side of the city centre. The operation of the landfill site began in 1981 and the total area is approximately 46 ha. The total amount of disposed waste is estimated to be 3,550,000 t/day, according to DOE. There are many waste pickers who carry out waste picking activities during unloading operations of the collection vehicles and spreading activities by the landfill equipment as shown in the pictures below.. The access road is muddy and in bad condition, especially during the rainy season. Therefore, the unloading area is different based on the climate condition, and collection vehicles are pulled by bulldozers when they get stuck in the muddy areas of the access road during the rainy season.

8.14 Health Profile

According to the Ministry of Health (2013), Kenya currently has a total of 9,694 health facilities that are government, private, NGO and religious owned. The majority of Kenya's population within the broader AoI receive healthcare services from the public sector. Health care services are provided at the following levels by the government. Curative services only are provided at Level 4-6 facilities, while health promotion and prevention are also implemented through Level 1-3 facilities.

- Level 1: Community Health Services, which are community-based services.
- Level 2: Dispensaries for both public and private health services providers. These are usually run and managed by enrolled and registered nurses who are supervised by the nursing officer at the respective health center. They provide basic first aid and care as well as some preventative care.
- Level 3: Health Centres, provided by county governments. Health centers have a clinical officer in-charge and provide comprehensive primary care. They also focus on preventive care such as childhood vaccination programs, maternal health and HIV/AIDS prevention.
- Level 4: Sub County Referral Hospitals, which are managed by the respective County Governments and provide basic curative care often related to maternal and early childhood health and care for minor accidents and injuries.
- Level 5: County Referral Hospital, which are managed by the National Government and provide more complex curative care including surgeries, treatment for diseases such as cancer etc. They are also able to provide intensive care and life support. As the name suggests there is one such hospital per County.
- Level 6: National Referral Hospitals, which comprise of facilities that provide highly specialised services and include all tertiary referral facilities.

Health issues that affect the residents of Nairobi include Communicable diseases including HIV /AIDS and TB, Malaria, Road traffic injuries. Non-communicable diseases, skin diseases, diarrhoea, pneumonia, arthritis and joint pains, Urinary Tract Infections and respi ratory diseases. According to the Kenya Stepwise Survey for Non-Communicable Diseases risk factors 2015 report, non-communicable diseases account for 27% of the total deaths and over 50% of total hospital admissions in Kenya. The major NCDs are cardiovascular conditions, cancers, diabetes, and chronic obstructive pulmonary diseases with their sequelae and their shared risk factors. Equally contributing to the huge burden of NCDs are violence and injuries, haemoglobinopathies, epilepsy, mental disorders, oral, eye and dental diseases Nairobi, being the largest population centre in Kenya, recorded the most outpatient visits for the largest range of diseases. For example, for children under five years old, Nairobi recorded the most hospital visits for 23 out of the 44 diseases recorded, including all respiratory diseases, road traffic injuries, burns, chicken pox and dental disorders.

The health facilities found along and within the project area are: Bliss GVS Healthcare Panari Clinic, Mukuru Health Centre, Gertrudes Children's Hospital, south B Hospital, Mariakani Cottage, Avenue Healthcare South C Clinic.

Along the corridor, most of the health facilities are within walking distance for minor ailments and emergency cases except referral cases where the services are only available at the main hospitals of Kenyatta, Aga Khan, M.P. Shah and Mater Hospitals. The principal mode of transport to health facility is walking where the distances are less than 1km and public transport where the distances are greater.

The farthest distance to hospital is 10km, being the distance to Kenyatta National Hospital. Most of the facilities are less than 1km. from the residences

The hospitals and medical facilities in Mulolongo and Syokimau Syokimau ward include: Health Centre, Vantage Health Care, Aga Khan University Hospital Medical Center, Baspen syokimau cottage hospital, Medicross Clinic, Maayan Medical Centre - Gateway Mall, Gertrude's Children's Hospital, st. Paul's community hospital, Mlolongo Medical Centre, St. Michael Medical Services, Airport Medical Center, Maria Goretti Health Services, Bless Kenya People Organisation Hospital

The most prevalent diseases are of respiratory system which account for the highest number of diseases reported, followed by diseases of the skin

8.15 Places of worship and heritage areas

Located very close to the project in the heart of Nairobi City next to Nyayo House is the Nairobi Gallery. Buit in 1913, this Old PC's office building was fondly referred to by the settler community as 'Hatches, Matches and Dispatches' name because of the births, marriages and deaths that were recorded here. This museum holds temporary exhibitions that continuously rotate to give it spice and life. The project will not affect this museum.

The university way roundabout is bordered by St Paul's Catholic Church, the Lutheran Church, St Andrew's Church and the Nairobi Synagogue. This houses of worship will not be affected by the project.

Nairobi British And Indian Memorial cemetery is situated in Nairobi South Cemetery which is located 3 kilometres south-east of the city centre on Uhuru Highway, leading from the airport to Nairobi town centre. Coming from the airport, the cemetery is found directly beside the road on the left, adjacent to the Banyala roundabout. This is the first roundabout after the Nyayo National Station. The Memorial is built into one of the walls of the cemetery. The project will not affect the cemetary.

In Mavoko subcounty most of the churches are located in Mulolongo ward. The churches located less than 500 meters from the main Mombasa road include Full Gospel Churches of Kenya Mlolongo, CIAT Ministry church Mulolongo, African Inland Church Mulolongo, World Breakthrough Center Mulolongo, Catholic church Mulolongo. The project will not not directly affect these religious inittittions. They are however mapped as sensitive receptors which the contractor should implement the ESMP to ensure they are sustained.

9 ESIA Methodology

9.1 INTRODUCTION

CRBC has committed to complying with both the Kenyan EIA process. This Chapter describes the ESIA methodology that has been followed for the Project.

The ESIA process for the proposed Expressway has been undertaken in compliance with the Kenyan legislative requirements of the Environmental Management and Co-ordination Act of 1999 (and amendments made in 2015) and Environmental (Impact Assessment and Audit) Regulations, June 2003.

The purpose of the ESIA is to examine how the proposed Expressway will lead to a measurable difference in the quality of the environment and the quality of life of impacted individuals and communities. Over the past decades, environmental impact assessments have expanded to include social impact assessments as well as public consultation/stakeholder engagement in the planning and decision-making process to avoid, reduce, or mitigate adverse impacts and to maximise the benefits of the project proposed. More recently, the emphasis has moved to the ESIA producing robust social and environmental management plans, which can effectively implement the recommended mitigation measures (developed in partnership with the proponent) identified in the ESIA during the life of the project. A detailed Environmental and Social Management and Monitoring Plan (ESMMP) has been developed for the proposed Expressway and is included in section 11 of this report .

The main stages of the ESIA and the basic steps carried out at each stage are presented in Figure 21

The key stages for this ESIA are:

- Scoping;
- Baseline data collection;
- Assessment of impacts and mitigation;
- Support during the ESIA approval process;
- Interaction with design and decision-making processes;
- Management system integration; and
- Change management.

It must be noted that these key stages do not follow a linear process, but several stages are carried out in parallel. Many assumptions are revisited and modified as data becomes available and as the Project and ESIA progresses.

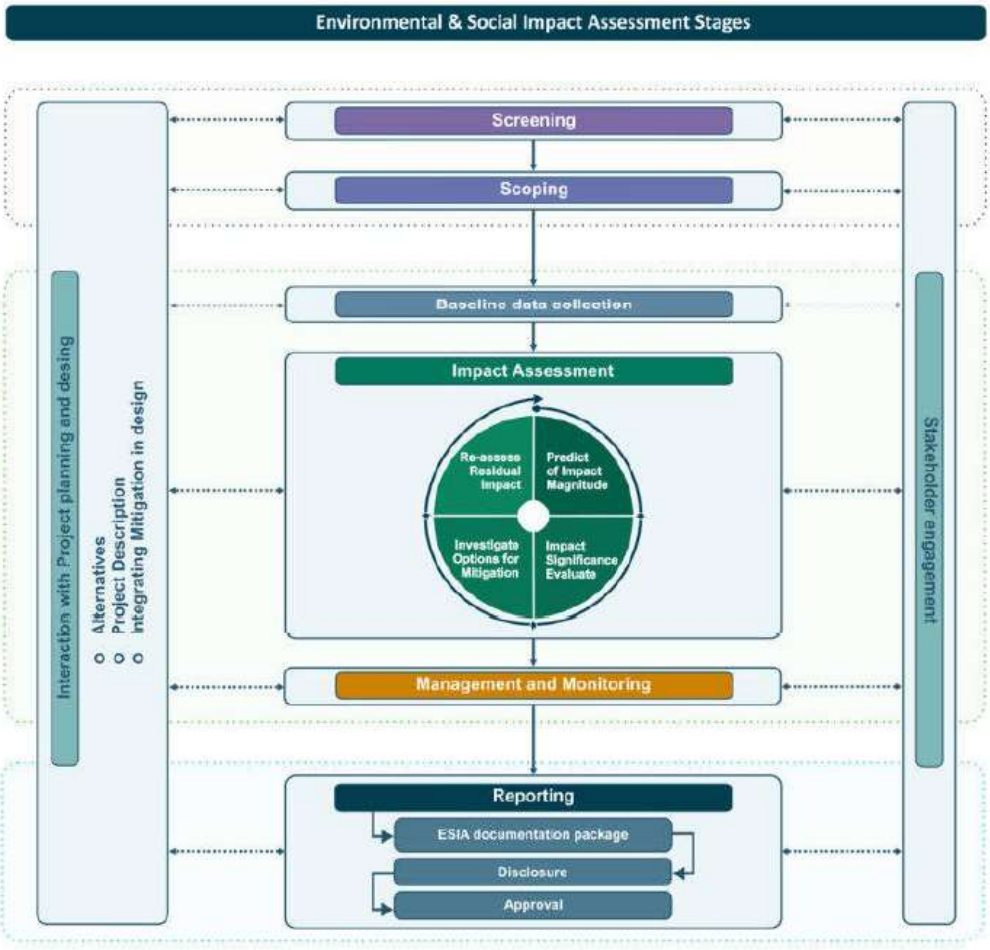


Figure 21: Overall ESIA Approach

9.2 Scoping

9.2.1 Approach

The purpose of the scoping stage was to identify key sensitivities and those activities with the potential to contribute to, or cause, potentially significant impacts to environmental and socio-economic receptors and resources, and to evaluate siting, layout and alternatives for the proposed Expressway. The key objectives of scoping were to:

- Identify the potentially most significant impacts;
- Obtain stakeholder views through consultation; and
- Develop the ToR for the ESIA through consultation to ensure that the ESIA process and associated reporting output are focused on the key issues.

The ESIA process focuses on these key issues through the collection of information on existing environmental and social conditions; engagement with stakeholders; understanding the impacts to the physical, biophysical and social environment; and developing the measures to avoid/control and monitor these impacts.

The ToR (the ToR Report), formed the basis for this ESIA. The ToR Report was submitted to and approved by the NEMA (Reference number: NEMA/EIA/TOR/06) on 11TH October 2019 (refer to *Annex 6*).

9.3 Scoping Site Visit

9.3.1 Introduction

As part of the scoping stage, a preliminary site visit was undertaken along the alignment of the proposed Expressway. The objective of this preliminary site visit was to validate sensitivities identified during an initial review of secondary data and map these along the proposed Expressway alignment. This was undertaken by driving the length of the proposed Expressway, and investigating potential areas of environmental and/or social sensitivity.

9.3.2 Social

During the preliminary site visit, direct observations were undertaken to identify land use, the presence of settlements, livelihoods activities and other potentially sensitive sites along the proposed Expressway. A limited number of interviews with stakeholders were also undertaken.

In addition, geo-spatial information (in the form of GPS waypoints and geo-tagged photographs) was also gathered to allow for more accurate mapping of communities, important livelihood areas and key infrastructure.

9.3.3 Stakeholder Engagement

It is a legislative requirement in Kenya that the ToR report needs to be approved by the NEMA prior to disclosure of the report to stakeholders. Accordingly, following approval of the ToR Report by the NEMA, two phases of engagement were undertaken; initial engagement with County officials (to ensure they are informed about the Project and activities that will be undertaken in their County, and solicit their key interests and concerns), and scoping disclosure, which involved a range of stakeholders including affected communities. This is discussed in more detail in *Chapter 6*. Stakeholders identified and engaged with during the initial engagement and scoping disclosure activities included:

- Meetings with County Commissioners (CCs) in Machakos and Nairobi Counties respectively for Courtesy calls regarding the Project and to be introduced formerly to the respective Deputy County Commissioners (DCCs), Assistant County Commissioners (ACCs), the Chiefs and Assistant Chiefs administering along the Nairobi Express Way Project Corridor;
- Meetings with the DCCs, ACCs and their Chiefs to organize for public meetings spread out along the road alignment:
- Drafting of a general invitation letter which has been shared with DCC Mavoko and Westlands Sub County respectively, to put on their letter heads and formerly invite members of churches along their administrative boundaries to the public meetings set for the week beginning 18 November 2019;and
- Drafting of posters to invite the general public along the project road alignment to the Barazas and stakeholder engagement forums.
- Key informant interviews were carried out with the local administration including Chiefs and Assistant Chiefs and other local leaders to obtain information regarding the local community, their candid views of the local community's perception on the project.
-

9.3.4 Baseline Data Collection

One of the main objectives of the ESIA process was to collect suitable data on the physical, biophysical and social environment, to understand what receptors and resources have the potential to be *significantly* affected by the proposed Expressway. *Chapters 7* and *8* describe

the baseline conditions that have been used to make the assessment of physical, biological and social impacts (impact assessments are presented in *Chapters 10 and 11*). The description of baseline aims at providing sufficient detail to meet the following objectives:

Identify the key conditions and sensitivities in areas potentially affected by the proposed Expressway;

- Provide a basis for extrapolation of the current situation, and development of future scenarios without the proposed Expressway;
- Provide data to aid in the prediction and evaluation of possible impacts of the proposed Expressway;
- Identify data collected by others to aid in the prediction and evaluation of possible impacts of the proposed Expressway;
- Understand stakeholder concerns, perceptions and expectations regarding the proposed Expressway;
- Allow the proposed Expressway to develop appropriate mitigation measures as part of the ESIA process; and
- Provide a benchmark to assess future changes and to assess the effectiveness of mitigation measures.

9.4 Project Description, Alternatives And Interaction With Project Planning And Design

The Project description is provided in order to identify the impacts of design and technological features, as well as all alternative design solutions are analyzed in an effort to select the optimal Project implementation option based on the sustainable development concept.

The ESIA process requires continuous interactions with Project designers at all stages of the Project design lifecycle in order to take into consideration the ESIA findings when making design solutions

9.5 Impacts Assessment And Mitigation Methodology

9.5.1 Introduction

The impact assessment stage comprises a number of steps that collectively assess the manner in which the proposed Expressway will interact with elements of the physical, biological, cultural or human environment to produce impacts to resources/receptors. The steps involved in the impact assessment stage are described in detail below.

NOTE:

The environmental and social impact assessment detailed below is an approach that combines *Impact Magnitude* and *Receptor Sensitivity* to determine **Impact Significance**.

For determination of air quality and noise impacts however, one can usually predict emission levels quantitatively and compare them against Impact Assessment Standards that take into account Receptor Sensitivity and/ or the source of noise or air contaminants to develop suitable criteria. Other standards can be more prescriptive, offering numerical guidance to determine criteria and assessment of impacts, and can also be source specific. For example, industrial noise is different to road traffic noise, as is, rail traffic and aircraft noise.

9.5.2 Impact Prediction

The impact assessment process predicts and describes impacts that are expected to occur for different phases of the Project. Where possible, impacts are quantified to the extent practicable, which may include hectares of land affected; increase in noise or air pollution levels above acceptable standards; volume of waste or water discharged, number of graves affected, etc.

For each impact, its significance is evaluated by defining and evaluating two key aspects:

- The magnitude of the impact, and

- The sensitivity of the feature or receptor that will be impacted.

9.5.2.1 Impact Magnitude

Magnitude essentially describes the intensity of the change that is predicted to occur in the resource/receptor as a result of the impact. A magnitude rating tends to reflect a combination of the size of an area that may be affected, the duration over which the aspect may be altered, and the size, degree or scale of that change. In essence, magnitude is a descriptor for the degree of change that is predicted to occur in the resource or receptor.

For positive impacts (which are mostly socio-economic impacts) magnitude is generally categorised as 'Positive' unless sufficient information is available to support a more robust characterisation and to assign the degree of magnitude as Small, Medium or Large. For instance, if the number of jobs to be assigned to local community members is confirmed or if the size or value of the contribution to the national, regional or district economy is known then a magnitude rating can be assigned. If not, then the significance rating is assigned based on the sensitivity of the feature impacted by a specific activity or change.

The term '***magnitude'*** therefore encompasses all the characteristics of the predicted impact including:

- Extent;
- Duration;
- Scale;
- Frequency; and
- Likelihood (only used for unplanned events).

The definitions for characteristics of magnitude used during the impact assessment are summarised in Table 51.

Table 51: Impact Characteristic Terminology

Characteristic	Definition	Designations
Type	A descriptor indicating the relationship of the impact to the Project (in terms of cause and effect).	Direct Indirect Induced
Extent	The "reach" of the impact (e.g., confined to a small area around the Project Footprint, projected for several kilometres, etc.).	Local Regional International
Duration	The period over which a resource / receptor is affected.	Temporary Short-term Long-term Permanent
Scale	The size of the impact (e.g., the size of the area damaged or impacted, the fraction of a resource that is lost or affected, etc.).	[no fixed designations; intended to be a numerical value]
Frequency	A measure of the constancy or periodicity of the impact.	[no fixed designations; intended to be a numerical value]

The evaluation of pre-mitigation impact significance takes into account control measures that are already part of, or embedded within, the Project design. This avoids the situation where an impact is assigned a magnitude based on a hypothetical version of the Project that considers none of the embedded controls that are defined as part of the Project description. Examples of embedded controls could include acoustic reduction measures around noisy equipment or servitude and buffer requirements the development is obliged to implement and is part of the layout. Additional mitigation measures aimed at further reducing the significance of impacts are proposed where necessary or appropriate and are assessed as part of the 'residual' impact significance rating.

In the case of ***type***, the designations are defined universally (i.e., the same definitions apply to all resources/receptors and associated impacts). For these universally defined designations, the definitions are provided in Table 52.

Table 52: Designation Definitions

Designation	Definition
Type	
Direct	Impacts that result from a direct interaction between the Project and a resource/receptor (e.g., between occupation of a plot of land and the habitats which are affected).
Indirect	Impacts that follow on from the direct interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g., viability of a species population resulting from loss of part of a habitat as a result of the Project occupying a plot of land).
Induced	Impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project (e.g., influx of camp followers resulting from the importation of a large Project workforce).
Extent	
Local	Impacts that affect an area in proximity to the development area within an area defined on a resource/receptor-specific basis.
Regional	Impacts occurring at a regional scale as determined by administrative boundaries or which affect regionally important resources or ecosystems.
International	Impacts that extend across international boundaries or affect resources such as features, resources or areas protected by international conventions.
Duration	
Temporary	Impacts are predicted to be of short duration (in the order of days) and/or intermittent/occasional.
Short-term	Impacts that are predicted to last only for the duration of the construction period (i.e. – 8 years).
Medium-term	Impacts that will continue for a period of 5 to 10 years following the completion of the construction phase e.g., where the impact may reverse or affected resources or receptors recover within this period of time.
Long-term	Impacts that will continue for the life of the Project, but will either cease when the Project stops operating or is decommissioned, or where the impact may reverse or the affected resource / receptor recovers or reverts to a near-natural state after 10 or within 20 years following the completion of the construction phase.
Permanent	Impacts that cause a permanent change in the affected receptor or resource (e.g., removal or destruction of ecological habitat) that endures substantially beyond 20 years following the completion of the construction phase.

In the case of ***scale*** and ***frequency***, these characteristics are not assigned fixed designations, as they are typically numerical measurements (e.g., number of acres affected, number of times per day, etc.).

The terminology and designations are provided to ensure consistency when these characteristics are described in an impact assessment deliverable. However, it is not a requirement that each of these characteristics be discussed for every impact identified.

For unplanned events (e.g., accidental release of hazardous materials) the ***likelihood*** of the impact occurring is taken into consideration in deriving the magnitude rating. The likelihood of an impact occurring as a result of an unplanned event is expressed as a probability and is designated using a qualitative scale (or semi-quantitative, where appropriate data are available), according to the attributes described in Table 53

Table 53: Definitions for Likelihood Designations (only used for unplanned events)

Likelihood	Definition
Unlikely	The event is unlikely but may occur at some time during normal operating conditions.
Possible	The event is likely to occur at some time during normal operating conditions.

Likely	The event will occur during normal operating conditions (i.e., it is essentially inevitable).

Likelihood is estimated on the basis of experience and/or evidence that such an outcome has previously occurred.

It is important to note that likelihood is a measure of the degree to which the unplanned event is expected to occur, *not* the degree to which an impact or effect is expected to occur as a result of the unplanned event. The latter concept is referred to as *uncertainty*, and this is typically dealt with in a contextual discussion in the impact assessment deliverable, rather than in the impact significance assignment process.

In the case of impacts resulting from unplanned events, the same resource/receptor-specific approach to concluding a magnitude designation is utilised, but the 'likelihood' factor is considered, together with the other impact characteristics, when assigning a magnitude designation. There is an inherent challenge in discussing impacts resulting from (planned) Project activities and those resulting from unplanned events. To avoid the need to fully elaborate on an impact resulting from an unplanned event prior to discussing what could be a very low likelihood of occurrence for the unplanned event, this methodology incorporates likelihood into the magnitude designation (i.e., in parallel with consideration of the other impact characteristics), so that the "likelihood-factored" magnitude can then be considered with the resource/receptor sensitivity/vulnerability/importance in order to assign impact significance. Rather than taking a prescriptive (e.g., matrix) approach to factoring likelihood into the magnitude designation process, it is recommended that this be done based on professional judgment, and assisted by quantitative data (e.g., modelling, frequency charts) where available.

Once the impact characteristics are understood, these characteristics are used (in a manner specific to the resource/receptor in question) to assign each impact a *magnitude*. In summary, magnitude is a function of the following impact characteristics:

- Extent;
- Duration;
- Scale;
- Frequency; and
- Likelihood.

Magnitude essentially describes the degree of change that the impact is likely to impart upon the resource/receptor. As in the case of extent and duration, the magnitude designations themselves (i.e., negligible, small, medium, large) are universally used and across resources/receptors, but the definitions for these designations will vary on a resource/receptor basis, as is discussed further below. The universal magnitude designations are:

- Positive;
- Negligible;
- Small;
- Medium; and
- Large.

The magnitude of impacts takes into account all the various dimensions of a particular impact in order to make a determination as to where the impact falls on the spectrum (in the case of adverse impacts) from *negligible* to *large*. Some impacts will result in changes to the environment that may be immeasurable, undetectable or within the range of normal natural variation. Such changes can be regarded as essentially having no impact, and should be characterised as having a *negligible* magnitude.

9.5.2.2 Sensitivity

In addition to characterising the magnitude of impact, the other principal step necessary to assign significance for a given impact is to define the sensitivity/vulnerability/importance of

the impacted resource/receptor to the type of activity proposed (e.g., habitat clearance, topsoil removal, etc.) or the consequences of a Project activity (e.g., dust, noise, water pollution, or induced population influx). This requires a range of physical, biological, cultural or human factors to be taken into account and may need to include other factors such as legal protection, government policy, stakeholder views and economic value.

Characterisation of sensitivity for a physical or biological resource or receptor (e.g., a water feature or parameter, cliff, vegetation type) will take into account its conservation status and importance (on a local, national and international scale), its vulnerability to disturbance, and its resilience to recover or withstand a specific impact or type of impact. Where the receptor is human or cultural, the value of that social and cultural heritage receptor/s and its vulnerability to the impact is considered, taking into account the receptor's resilience, including ability to adapt to change or use alternatives where available.

As in the case of magnitude, the sensitivity/vulnerability/importance designations themselves are universally consistent, but the definitions for these designations will vary on a resource/receptor basis. The universal sensitivity/vulnerability/importance designations are:

- Low;
- Medium; and
- High.

9.5.2.3 Evaluating Significance

Once magnitude of impact and sensitivity/vulnerability/importance of resource/receptor have been characterised, the significance of the impact is assigned using the impact significance matrix shown in Table 54

For impacts resulting from unplanned events (typically accidents, such as a major oil spill or other event that cannot be reasonably foreseen), the above methodology is applied but likelihood is also considered when assigning the magnitude designation, as classified in Table 54

Table 54: Impact Significance

Evaluation of Significance		Sensitivity/Vulnerability/Importance of Resource/Receptor		
		Low	Medium	High
Magnitude of Impact	Negative Impacts			
	Negligible	Negligible	Negligible	Minor
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Critical
	Positive Impacts			
	Positive	Minor	Moderate	High

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor- or impact-specific considerations are factored into the assignment of magnitude and sensitivity designations that enter into the matrix.

Section below provides a context for what the various impact significance ratings signify.

An impact of Negligible significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

An impact of Minor significance is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.

An impact of Moderate significance has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.

An impact of Major significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of IA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

An impact of Critical significance after all feasible mitigation measures have been identified and assessed warrants the highest level of attention and concern. As with residual impacts of major significance, the regulators and stakeholders will need to closely evaluate whether the positive impacts of the project outweigh residual negative impacts of critical significance. In many cases, residual critical impacts can be considered as a potential fatal flaw of the project.

9.5.3 Mitigation of Impacts

Once the significance of a given impact has been characterised using the above mentioned methodologies, the next step is to evaluate what mitigation measures are warranted. In keeping with the Mitigation Hierarchy, the priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

It is important to have a solid basis for recommending mitigation measures. The role of any given ESIA is to help develop a consentable project, and to help clients meet their business objectives in a responsible manner. Impact assessment is about identifying the aspects of a project that need to be managed, and demonstrating how these should be appropriately dealt with through implementation of the project ESMMP. As key influencers in the decision making process, the role of the impact assessment is not to stop development or propose every possible mitigation or compensatory measure imaginable, but rather to make balanced judgements as to what is warranted, informed by a high quality evidence base.

Additional mitigation measures should not be declared for impacts rated as not significant, unless the associated activity is related to conformance with an applicable requirement. Further, it is important to note that it is not an absolute necessity that all impacts be mitigated to a not significant level; rather the objective is to mitigate impacts to an as low as reasonably practicable (ALARP) level.

As previously mentioned, embedded controls (i.e., physical or procedural controls that are planned as part of the project design and are not added in response to an impact significance assignment), are considered as part of the project (prior to entering the impact assessment stage of the impact assessment process).

9.5.3.1 Residual Impact Assessment

Once mitigation measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact assessment

steps discussed above, considering the assumed implementation of the additional declared mitigation measures.

9.6 Reporting

9.6.1 ESIA Reporting

Using data gathered on the physical, biological and social environment, Centric has assessed impacts by using the impact assessment methodology described above (refer to respective impact assessments in *Chapters 10, 11* and *12*). The process of predicting and evaluating impacts and development of mitigation measures is iterative, and informs and runs in parallel with the design of the proposed Expressway. The process also links in with consultation and stakeholder input regarding the significance of impacts and the suitability of proposed mitigation measures. As part of the impact assessment phase a broad description of the Project activities was provided by the KeNHA and CRBC (refer to *Chapter 2*).

The detailed impact assessments to each social and environmental resource / receptor is presented in in three stages: (i) the potential impact is described and assigned a significance level (pre-mitigation); (ii) the mitigation committed to by KeNHA is outlined; and (iii) the residual impact (that remaining after mitigation) is described and assigned a significance level.

This ESIA report presents a broad description of the proposed Expressway and relevant alternatives; the ESIA process and a description of legislation, guidelines and strategies (both national and international) pertinent to the proposed Expressway and associated ESIA; the outcomes associated with stakeholder engagement activities carried out to date; a detailed baseline review; an assessment of environmental and social impacts related to different phases of the proposed Expressway; mitigation measures that aim to avoid /minimise/manage the severity of identified impacts; and an assessment of cumulative impacts associated with other planned, existing or project-related developments in the broader AoI.

9.6.2 ESMMP

The ESIA Report culminated in the development of a Project ESMMP. The ESMMP ensures that environmental and social impacts are avoided, minimised or reduced to acceptable levels and ensures that positive impacts are enhanced and realised. Moreover, the ESMMP is reasonable and achievable in the local context (i.e. – it does not commit the Project to measures that are not achievable / possible in Kenya). The ESMMP consists of the set of management, mitigation, and monitoring measures to be taken during implementation of Project activities, to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The ESMMP details the specific actions that are required to implement the agreed controls and mitigation measures as set out in the ESIA. The ESMMP also includes responsibilities, timings, monitoring measures and clearly set out an audit and review program. A main aim of the audit and review program is to ensure compliance (e.g. by contractors) with the agreed commitments and any permit conditions.

9.6.3 Support during the ESIA Approval Process

It must be noted that there is a statutory period for NEMA to give its decision after receiving the ESIA report. Reference is made to the Environmental (Impact Assessment and Audit) Regulations (2003):

- ***Part III Section 23 (1)*** states that: "*The Authority shall give its decision on an environmental impact assessment study report within **90 days** of receiving an environmental impact assessment study report*".
- ***Part III Section 23(4)*** states that: "*The decision of the Authority under this Regulation shall be communicated to the Proponent within fourteen days from the date of the decision and a copy thereof shall be made available for inspection at the Authority's offices*."

Centric will assist the Project in coordinating the environmental permitting process, and will through regular contact with the NEMA, attempt to obtain NEMA's decision well within the statutory period prescribed in the Regulations. Centric will maintain regular contact with the NEMA, and will ensure that the NEMA has ongoing support, should there be any queries / concerns / comments during their review.

9.6.4 Interaction with Design and Planning Process

The interaction between the ESIA team and the design and planning process is one of the key areas in which an ESIA can influence how a project develops. It includes involvement in defining the Project and identifying those activities with the potential to cause environmental and social impacts (e.g. physical presence, noise, workforce, traffic, local employment, procurement). Project planning, decision-making and refinement of the project description continue throughout the ESIA process as a result of the development of the proposed Expressway, and in response to the identified impacts, and stakeholder concerns.

As indicated in *Chapter 3*, although the current Rev. E Alignment has been used as the basis for this ESIA study as stated in the ToR, the KeNHA and CRBC acknowledge that the ESIA is a key influencer on design (primarily alignment) of the proposed Expressway. Accordingly, key decision-making and refinement of Project design will continue post-ESIA, in response to identified environmental and social impacts and in response to suggestions for realignment opportunities from various stakeholders. Realignment suggestions resulting from key environmental and social impacts are provided in *Chapter 11* and *Chapter 12,* as some of the key mitigation measures.

9.6.5 Management System Integration

Stakeholders and external decision-makers for the proposed Expressway will rely on the findings of the ESIA (e.g. the significance of residual impacts) in formulating their ultimate views to the proposed Expressway. As this ESIA is based on predictions made in advance of the various Project activities taking place, it effectively makes assumptions that the proposed Expressway will implement certain controls and mitigation measures. If the controls do not happen, then the ESIA is undermined as a tool for stakeholders and external decision-makers. It is important, therefore, that these 'assumptions' (i.e. the mitigation / management measure recommendations included in *Chapters 10, 11* and *12*) are translated into commitments that will be implemented through the ESMMP for the Project.

It is also important that, over the life of the proposed Expressway, the vehicle by which the commitments as set out in the ESMMP are turned into specific actions, and implemented through an Environmental and Social Management System (ESMS). The ESMS will be initiated through the development of the ESMMP and will continue to be developed as the proposed Expressway proceeds. The implementation of such a system should ensure that any unforeseen impact or issues that may arise will be dealt with in an effective manner in accordance with the relevant laws and regulations of Kenya.. In this way, stakeholders and external decision-makers should have confidence in the ESIA as a tool, to aid both in decision-making, and in ensuring mitigation measures proposed are applicable and sufficient for implementation.

9.6.6 Change Management

As mentioned in *Chapter 2*, the siting of certain Project infrastructure / activities (*viz.* Construction Camps & Plant; and Quarries & Borrow Pits) are not yet confirmed. Moreover, even with a final design and an unchanging environment, impacts are difficult to predict with certainty. Uncertainty stemming from on-going development of the Project design is inevitable, and the social and biophysical environment is typically variable from season to season and year to year. Similarly, the organisational structure and roles and responsibilities may also change as the Project progresses. Where such uncertainties are material to ESIA findings, they will be clearly stated and conservatively approached ('the precautionary approach') in order to identify the broadest range of likely residual impacts and necessary mitigation measures.

The ESIA process does not stop with the submission of the Final ESIA report. Therefore, the ESMMP will require a mechanism to manage change. Changes will be assessed in terms of the severity to potentially alter the ESIA findings; i.e. those that result in adverse changes to the predicted significance of environmental and social impacts. Some changes may not result in a material change to the ESIA findings; however, in other instances, these changes may be material, potentially influencing the original findings of the ESIA, and hence, the basis for its approval. Such a mechanism to manage change, or a change management system, must ensure that changes to the scope of the proposed Expressway are subjected to a robust social and environmental assessment process.

Any changes to Project scope or new substantive environmental and social findings through ongoing monitoring will be evaluated for their degree of significance, and will be incorporated into the appropriate Project documentation as follows:

- Minor changes will be reflected in updates to the applicable Management Plans included in the overall ESMMP; and
- Substantive design changes that might potentially alter the ESIA findings will be subject to re-assessment, further stakeholder consultation, supplementary reporting and revision of the Project's ESMMP. Typically, such substantive changes will be submitted as an addendum to this ESIA.

10 ANTICIPATED IMPACT AND MITIGATION MEASURES

In the time of the preparation of this draft ESIA report information on the specifics regarding borrow pits and waste management was not available. Therefore, a site-specific impact assessment could not be conducted. Borrow pits that will be used will be either determined later by the CRBC or KeNHA. The assessment of these topics will then be handled in accordance with the Design Change Management Plan and the applicable Management Plans under the ESMP.

10.1 INTRODUCTION

This Chapter provides a summary of the environmental impacts which were identified during the ESIA study. The methodology used to identify and assess impacts is described in detail in Section 9 of this ESIA.

The following Project activities will be performed during he construction phase:

- Construction and operation of concrete and asphalt plants, worker camps, access roads (emissions, noise and etc.);
- Employment of personnel and procurement of goods and services (from local market);
- Physical presence of construction workers;
- Construction traffic (transportation of workers and materials);
- Pile driving of the foundations;
- Operation of construction machinery, equipment and generators, hazardous materials;
- Borrow pits development;
- Quarry mining;
- Wastes/ wastewater handling and disposal.
- Relevant activity for the operation phase is the maintenance of the road, bridges and other associated facilities.

10.2 Construction and Operation Geology and Soil Impacts and their Mitigation

10.2.1 Impact on geological processes

potential adverse geological processes can be caused by site preparation (removal of topsoil), excavation work (replacement of soil, filling canvases). Most vulnerable areas are confined to the interchange construction sites, bridge crossings over watercourses and relocation of river channels.

Construction of interchanges is associated with the need to fill the road bed and reinforce slopes/ ramps using both mechanical means (geowebs) and biological methods, e.g. sowing of perennial grasses over road slopes.

Given the expressway length and the number of interchanges and bridges that need to be constructed, potential impact may be assessed as 'moderate to major'. The most sensitive areas within the expressway route interchange sections and bridge sections: Permanent residual impacts due to the physical excavation of the soils and other existing surface structures along the Right of Way and the required cuts and fills of the existing topography. Despite the planned mitigation measures for the construction stages, runoff from stockpiles and cut and fill areas may result in soil erosion, especially in the vicinity of the construction areas, access roads and quarry and borrow pit operation areas.

10.2.1.1 Embedded Controls

Construction stage:

- To prevent the development of unfavorable geological processes, the Project provides for the strengthening of the roadbed, depending on the height of the mound and the angle of slope, followed by sowing of herbs.
- To prevent waterlogging of the roadbed by surface water and possible water erosion, the Project provides for a system of surface drainage, including water drainage from the sole of the embankment with ditches.
- Culverts for streams with slopes exceeding 2% are designed according to the off-the-shelf solution: construction of gullies and dampers to prevent erosion on the inlet and outlet pipe sections.
- The Project provides for grass seeding.
- The Project design will consider the relevant national regulatory requirements related to seismic design and risk assessment and also the findings of the site specific geological/ geotechnical investigation study.

10.2.1.2 Mitigation Measures:

No additional measures are required

10.2.2 Soil degradation due to removal of soil-vegetation layer

Section 1 of the expressway route will contructed in the median vegetated section of the A8, general degration of land within the median implementation area will occur due primarily to the acquisition/ withdrawal and fragmentation of land. Local losses of topsoil will also occur in areas that will be affected by temporary disturbance during construction.

In the course of preparatory work on the expressway, it is planned to remove the topsoil to a different depth of 0.20-0.60 m (depending on the physical and chemical characteristics and the power of the topsoil).

The impact is assessed as Minor to Moderate with negligible Residual Impact:

10.2.2.1 Embedded Control

Construction stage:

- Minimisation, where possible, of land withdrawal during the design stage; adherence to allocated land boundaries during construction;
- It is proposed a layer-by-layer removal of topsoil, avoiding of mixing with underlying infertile horizons and construction waste.
- Land restoration is carried out in two stages: technical (land planning and application of topsoil) and biological (complex of agrotechnical measures and sowing of perennial grasses).

10.2.2.2 Mitigation Measures:

Construction stage:

Control of land rehabilitation/ reinstatement activities as detailed in the ESMP.

10.2.3 Change of water regime of soils

As a result of excavation and construction of the roadway embankment, it is expected that the water regime (mainly towards waterlogging) of the soil on the sections adjacent to the A8 will change. The changes will be due to the overlap of the natural flow of groundwater, which within the construction site is close enough to the surface.

It is proposed to construct 167 culverts. The impact is assessed as Minor to Moderate with negligible Residual Impact:

The sensitive areas are provided on Table 40

10.2.3.1 Embedded Control

Construction stage:

- Construction of culverts and bridges crossing permanent watercourses;
- Land restoration.

10.2.3.2 Mitigation Measures:

Operation stage

- Control of the serviceable condition of culverts/drainage ditches, etc.

10.2.4 Soil degradation as result of pollution

During construction, potential soil pollution in adjacent areas will be caused by emissions from construction equipment and production/ transportation of building materials. Other potential impacts include spills of pollutants/ fuels and oils, littering of construction sites and surrounding areas including construction camps.

During operation, potential soil pollution in adjacent areas will be predominantly caused by emissions from vehicles. Most emissions/ pollutants will be dispersed via air (gases) or will be quickly transformed in soil (organic substances). Long-term accumulation in soil during the entire operation period may be characteristics mainly of heavy metals (due to the wear of tyres, metal parts, etc.).

This impact is assessed as Moderate to Major with minor Residual Impact. Along the expressway in the immediate vicinity of the road there are various receptors (Business, parks, residential areas, schools). Such areas, are the most vulnerable to pollution. The magnitude of the impacts on the soil media of spills and runoff arising during the construction and operation activities ranges from small to large depending on the concentrations of pollutants.

10.2.4.1 Embedded Control

Construction stage:

- Use of serviceable construction equipment:
- Construction of water-resistant coatings on equipment maintenance sites
- Temporary storage of waste from vehicle and machinery maintenance operations at designated
- areas with subsequent removal of waste to solid domestic and industrial waste landfills or transfer to specialised organisations for disposal / recycling;
- Collection of wastewater from vehicle washing into a settlement pond to trap suspended particles and petroleum products.
- Collection of sludge from the settlement pond into a container followed by its offsite removal and reuse in road construction;
- Temporary storage of all wastes generated at the construction site at designated areas followed by their timely removal to NEMA designated disposal site or transfer to specialised organisations for disposal / recycling.
- Fuels, oils and chemicals will be stored on an impervious base protected by a bund, and drip trays will be used for fuelling mobile equipment. No USTs will be used during construction stage.
- The soil contaminated due to spillages during handling fuel and other hazardous liquids will be removed from the site for suitable treatment and/or disposal.

Operation stage

- The O&M facility and toll stations must include appropriate treatment of liquid and solid wastes to avoid contamination of local soils/ecology near these facilities;
- Store appropriately by following good hazardous materials storage and handling management practices.

10.2.4.2 Mitigation Measures:

Operation stage

- Measures for the case of lorry spills,fire, etc. involving hazardous/polluting substances along the expressway to prevent and clean up any significant impacts from drainage of contaminated liquids and fire-fighting water.

10.2.5 Soil Erosion Risk

Soils along this stretch of the road will be subjected to earthworks and later compacted thus reducing their susceptibility to erosion.

The areas in the proposed road project that are expected to be most susceptible to erosion include borrow pits, quarries, storm water drainages, embankments, especially during the rainy season. In addition, movement by project vehicles and equipment both on the road and off-road will heighten the incidence of soil erosion. Soil erosion is however expected to be moderate outside this particular road alignment due to the already paved surface of the A8 road.

Side drains, especially outfalls/mitre drains and in areas with cross culverts, may increase incidence of soil erosion of exposed surface through with runoff from the expressway will drain. The concentration of flows at both inlets and outlets of culverts may cause scouring at drains. Increases in flow volume within a narrow channel and enhanced speed may cause the storm flow to scour and cause soil erosion.

Soil erosion may silt water bodies and increase flood risk due to rapid and higher volumes of surface runoff since a larger surface of the road corridor will now have impermeable surface. The impacts of soil erosion will be negative, temporary and major, but this can be minimized if only the areas necessary for construction to occur are cleared of vegetation, and if soils are appropriately compacted and stabilized.

Residual Impact: Negligible

10.2.5.1 Embedded Control

Construction stage:

- The road design is optimized to limit the gradient of the access roads to reduce runoff-induced erosion, and provide adequate road drainage based on road width, surface material, compaction and maintenance.
- The Project provides for grass seeding.
- The Project provides for the strengthening of the roadbed, depending on the height of the mound and the angle of slope, followed by sowing of herbs.
- To prevent waterlogging of the roadbed by surface water and possible water erosion, the Project provides for a system of surface drainage, including water drainage from the sole of the embankment with ditches.

10.2.5.2 Mitigation Measures:

construction

- Integrate drainage system in the overall road design and construction to align it to the natural drainage system as much as possible.
- Harmonize drainage with all point sources of surface runoff such as existing A8 road, and the neighboring properties.
- The design of all the culverts should be informed by hydrological studies to be able to manage peak runoff.
- Drainage outfalls should not be directed into adjacent land or premises.
- Ensure protection of soil adjacent to the side drains and the constructed drainage.
- Construct appropriate drainage trenches along the entire section of the Project Road.
- Identify appropriate areas away from water courses for the dumping of spoil material
- Plant trees especially of indigenous origin along the Road corridor.
- Spoil arising from the excavations should be assessed to determine if it is contaminated. In the event that the soil is contaminated it should be handled as hazardous materials and disposed-off under supervision and into controlled dumping areas.
- The drainage outfalls should follow proper levels for construction to reduce the erosion from surface runoff and storm water

Operation stage

- Erosion, sediment and pollution control, management of upper soil, as well as storm water run-off.

10.3 Construction And Operation Hydrogeology And Ground Water Impacts And Mitigation

10.3.1 Change in level and ground water conditions

Change in level and ground water conditions can be caused by carrying out preparatory, earth and construction works. A slight change in groundwater level is expected due to disturbance and local reduction in the area of natural infiltration of precipitation and linear overlap of gravity flow down the terrain.

The processes of intensification of waterlogging/desiccation associated with the construction work will be local depending on the hydrological conditions of the territory. If necessary, in such areas it is recommended to use drainage systems with temporary drainage. The impact assessment is **Minor to Moderate with minor residual impact**

10.3.1.1 Embedded Control

Construction stage:

- To prevent the development of unfavorable geological processes, the Project provides for the strengthening of the roadbed, depending on the height of the mound and the angle of slope, followed by sowing of herbs.
- To prevent waterlogging of the roadbed by surface water and possible water erosion, the Project provides for a system of surface drainage, including water drainage from the sole of the embankment with ditches.
- The subsequent monitoring of water quality at the construction stage
- Conduct quality control of remediation;
- Carry out monitoring of environmental mitigation measures implementation especially in shift camping area, and the sites with most volume of time and work and quantity of involved equipment;

- Construction of culverts in some road-adjacent areas;
- Land restoration.

10.3.2 Mitigation Measures:

Construction stage

In case of underground water supply for the construction camp and concrete plant it's necessary to equip a well in order to prevent potential aquifer contamination

10.3.3 Deterioration of groundwater quality during construction stage

Impact on groundwater quality is a result of pollution caused by emissions and leaks from construction equipment, maintenance of vehicles, operation of construction camp. However, the ingress of pollutants into the ground water can not be completely excluded due to the length of the construction site and the lack of a complete waterproof coating on the construction sites

Large construction sites, if not properly managed and operated, can lead to significant impacts on groundwater quality. The main risk of contamination is intentional discharges or accidental leaks and spills of liquid cement, fuel oils and lubricants from construction.

The following identifies the main potential issues that have been considered in the assessment on groundwater quality and quantity which can arise in the absence of appropriate mitigation and controls:

- There is a possibility of contamination of aquifers in the event of intentional or accidental discharges of hazardous materials to the ground during construction, particularly in shallow overburden areas.
- The bedrock aquifers may be impacted by various activities involving site clearance / earthworks, and spillages / leakages from construction plant and at refuelling and storage depots located on site.
- Construction accommodation compounds along the route will be developed to house construction workers. All wastewater from these compounds poses a risk to the water environment if not treated prior to discharge (either by on-site treatment or removal for disposal via the local sewage network, if available).

Despite the fact that fuel leackages cannot be avoided, the impact assessement and residual impact will be minor due to significant depth and size of the acquifer

10.3.3.1 Embedded Control

Construction stage:

- Minimisation, where possible, of land withdrawal during the design stage; adherence to allocated land boundaries during construction;
- No fuelling of vehicles or equipment will take place within excavated areas.
- If heavy equipment cannot be moved to appropriate fuelling points, an impervious surface (such as a drip-tray) will be used for refuelling this equipment to prevent accidental releases to groundwater aquifers.
- Use of serviceable construction equipment.
- Construction of water-resistant coatings on equipment maintenance sites
- Temporary storage of waste from vehicle and machinery maintenance operations at designated areas with subsequent removal of waste to solid domestic and industrial waste landfills or transfer to specialised organisations for disposal / recycling;

- Collection of wastewater from vehicle washing into a settlement pond to trap suspended particles and petroleum products.
- Collection of sludge from the settlement pond into a container followed by its offsite removal and reuse in road construction;
- Temporary storage of all wastes generated at the construction site at designated areas followed by their timely removal to landfills or transfer to specialised organisations for disposal / recycling.
- Fuels, oils and chemicals will be stored on an impervious base protected by a bund, and drip trays will be used for fuelling mobile equipment. No USTs will be used during construction stage.
- The soil contaminated due to spillages during handling fuel and other hazardous liquids will be removed from the site for suitable treatment and/or disposal.

10.3.3.2 Mitigation Measures

Construction stage:

- Quality control of land rehabilitation/ reinstatement work.
- The periodic monitoring of the groundwater resources should be conducted.
- Identification of existing extraction wells (domestic and public use) within the zone of influence
- Periodic monitoring of ground water use quantity during construction period
- Periodic monitoring of ground water quality during construction period and operation period Periodic monitoring of groundwater discharge locations (rivers) and operation period
- The size and duration of exposure of areas of open ground will be kept to the minimum.

10.3.4 Deterioration of groundwater quality during operation stage

There may be a reduction in the quality of groundwater locally as a result of contaminated operational road runoff infiltration entering the groundwater environment via proposed filter drains. Runoff from the road pavement is likely to contain some degree of silt/dust and pollutants from atmospheric deposition, vehicle emission, litter and general road maintenance, as well as from possible accidental road spillage incidents.Fill sections may also have an impact, in particular from potentially contaminated material. Any surface water runoff has the potential to infiltrate the subsoil and migrate into the groundwater. The impact is assessed to minor and residual impact to be negligible

10.3.4.1 Mitigation Measure

construction

- Regularly maintain the Project equipment as per the manufacturer's instruction to avoid the possibility of any leaks and spills.
- Do not undertake any maintenance near a water source.
- Minimise Project activities at river crossing points, only carry out the earth work that is necessary for the proposed Project.
- Do not dump any earth material in a river course.
- Minimize construction activity near rivers to allow regeneration of vegetation on affected rivers and streams.
- Do not discharge any waste material into the rivers or streams.
- Camp sites, waste disposal and spoil dumping areas should be located away from the surface water sources.

Operation stage:

- The road facilities (O&M centre toll stations etc) road must include appropriate treatment of liquid and solid wastes to avoid contamination of local soils/ecology near these facilities;
- Store appropriately by following good hazardous materials storage and handling management practices.
- Measures for the case of lorry spills, fire, etc. involving hazardous/polluting substances along the expressway to prevent and clean up any significant impacts from drainage of contaminated liquids and fire- fighting water.
- Control of the serviceable condition of culverts/drainage ditches, etc.
- Identification of existing extraction wells (irrigation, domestic and public use) within the zone of influence
- Periodic monitoring of ground water quality during operation period

10.4 Construction And Operation Surface Water Impacts And Mitigation

10.4.1 Change in regime of rivers

The Project Road will intersect the Nairobi River at three points: Capital Centre-Nyayo Stadium; Nyayo stadium-Railway Golf Club and at the Museum Hill interchange.

The Project envisages the construction of 56 bridges across the watercourses providing a maximum discharge of 1% water security in free-flow mode and 167 culverts across the river/stream network. Culverts and pipes can be used to provide ways for the migration of animals.Construction of the bridge on a single-span scheme on small rivers and streams will exclude a direct negative impact on the hydrological regimes of watercourses.The most significant impact on water regime is related to the reconstruction of sections of riverbeds.

During the construction of the bridge and strengthening the river beds with concrete slab there is a possibility of activation of channel processes and sedimentation in the bed of the watercourse. Relocation of channels may affect (reduce) the natural water flow due to construction of artificial structures and barriers. This may result in siltation of river bed, flowage during the high-water period or heavy rains, etc. The impact is assessed as Moderate to Major while residual impact will be minor.

10.4.1.1 Embedded Controls

Construction stage:

- Minimization of the areas of temporary alienation of the territory of water protection zones and water areas of water bodies in the course of work;
- To prevent the development of unfavorable geological processes, the Project provides for the strengthening of the roadbed, depending on the height of the mound and the angle of slope, followed by sowing of herbs.
- To prevent waterlogging of the roadbed by surface water and possible water erosion, the Project provides for a system of surface drainage, including water drainage from the sole of the embankment with ditches.
- The subsequent monitoring of water quality at the construction stage;
- Conduct quality control of remediation.
- Protection measures to prevent soil erosion after the finalisation of the earth work will be implemented where required such as: use of grass turf to cover the soil surface;

10.4.1.2 Mitigation Measures:

Construction stage:

- Culverts will be designed to maintain the natural riverbed width and the natural riverbed level.
- Foundation works for the bridges, viaducts, retaining walls and other structures at or close to particularly sensitive surface water bodies should not take place during the high- water season;
- Work on river crossings should be carried out, where technically feasible, from the banks above the channel and avoiding direct intervention in the watercourse, unless the existing bank reinforcement needs to be replaced.
- Sensitive areas of rivers and drains should be protected from impacts of vehicles and other construction activities via fencing or other appropriate means.
- Driving within rivers, or on their banks should be forbidden except if unavoidable to construct a particular structure.
-

10.4.2 Surface water quality degradation during

The city's wastewater management has not kept up with the increasing demands of the growing population and is inadequate to treat the amount of industrial and municipal effluent entering the Nairobi River and other surface waters. Nairobi Rivers is no longer potable or fit for many other useful purposes. A number of factories in Nairobi City's industrial area discharge waste directly into the Ngong River, making it the most polluted river in Kenya. Industrial waste effluents include petrochemicals and metals from micro-enterprises and "Jua-kali", as well as, oil and grease from busy roads which run off into adjacent waters

The Nairobi River also receives improperly treated effluents from Dandora Sewage Treatment Plant and several drainage channels that gather stormwater from Nairobi City. Domestic garbage from informal settlements that have no public waste collection services also finds itself into the river similarly does sewage from pit latrines and other on-site sewerage-disposal methods. Sanitation facilities are very basic in many informal settlements, consisting of earth drains, communal water points, pit latrines shared by many people, and no systematic solid-waste disposal.

The Project Road will intersect the Nairobi River at three points: Capital Centre-Nyayo Stadium; Nyayo stadium-Railway Golf Club and at the Museum Hill interchange. Hence it is not expected the project will siginificantly impact the surface water along the corridor. The Impact is assessed as minor and the residual impact negligible.

10.4.2.1 construction stage Impact

During the construction stage impacts on surface water quality and quantity are considered to be temporary and include the following:

- Silty/soiled water from excavations (e.g. cut and fill), exposed ground, stockpiles of soil, quarries, topsoil placing and excess material, plant and wheel washings, construction roads, washing of finished road surfaces to remove accumulated soil and disturbance of drains and streambeds (i.e. in-stream construction of culverts and channel diversions/improvement works), and landscaping e.g. of road embankments.
- Other sources of contamination during the construction phase arise from the use of bitumen compounds in the wearing course of the road and materials used for waterproofing of concrete surfaces.
- Waste from construction activities and wastewater generation from construction accommodations may impact the surface water quality. All wastewater from these compounds poses a risk to the water environment if not treated prior to discharge (either by on-

site treatment or removal for disposal via the local sewage network, if available).
- Use of surface water supply sources to obtain water supply needs for the construction process

10.4.2.2 Mitigation Measures

Construction stage:

- Water containing such pollutants as bitumen, cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site where applicable
- The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to Rivers Nairobi and Ngong;
- Site compounds and stockpiles will be located away from the river crossings
- Any work across River Nairobi and Ngong will be isolated to prevent silt propagating downstream;
- Discharges to River Nairobi and Ngong will only be carried out under consent of the relevant governing bodies such as Water Resource Authority (WRA)
- Site compounds and stockpiles will be located away from these rivers
- Use of serviceable construction equipment:
- Construction of water-resistant coatings on equipment maintenance sites
- Temporary storage of waste from vehicle and machinery maintenance operations at designated areas with subsequent removal of waste to solid domestic and industrial waste landfills or transfer to specialised organisations for disposal / recycling;
- Collection of wastewater from vehicle washing into a settlement pond to trap suspended particles and petroleum products.
- Collection of sludge from the settlement pond into a container followed by its offsite removal and reuse in road construction;
- Temporary storage of all wastes generated at the construction site at designated areas followed by their timely removal to disposal site or transfer to specialised organisations for disposal / recycling.
- Fuels, oils and chemicals will be stored on an impervious base protected by a bund, and drip trays will be used for fuelling mobile equipment. No USTs will be used during construction stage.
- The soil contaminated due to spillages during handling of fuel and other hazardous liquids will be removed from the site for suitable treatment and/or disposal.
- Hazardous materials will not be stored in excavated areas
- To prevent contaminated surface runoff, the Project provides for the placement of construction equipment and temporary buildings outside water protection zones, the use of serviceable equipment and pallets for mechanisms and other activities).
- Shift camps are equipped with bio-toilets and domestic waste water storage tanks to prevent the discharge of untreated wastewater into surface water bodies and on the terrain.
- Mud generated from the concrete batch plant operation operations and washing of cement trucks will be tested for hazardous characteristics and will be disposed of in line with waste regulations.
- Monitoring of surface water quality, drainage infrastructure assessment as well as ground water. quality procedures.

- Treated wastewater should be reused where possible (eg. for local watering of vegetation, dust control or as fire-fighting reserve).
- An Emergency Response Plan (ERP) should be developed

10.4.3 Surface water quality degradation during operation stage

Surface water can be affected during operation by routine deposits from vehicles (e.g. tyre and brake deposits, hydrocarbons from engines, liquid exhaust emissions etc.) being deposited on the road surface and carried into the road drainage system. The road induced sources are leakage of the road body itself (tar oils) and road marking materials. Local receiving streams may be negatively affected in case the wastewater discharge from the the facilities Service Areas (including O&M centre toll stations, etc) is not adequately treated in line with national standards/guidelines. The Impact is assessed as minor and the residual impact negligible.

10.4.3.1 Mitigation Measures

- The facility areas of the expressway must include appropriate treatment of liquid and solid wastes (in accordance with the regaulation on waste) to avoid contamination of local soils/ecology near these facilities;
- Store appropriately by following good hazardous materials storage and handling management practices (IFC Industry Sector Guideline Toll Roads).
- Measures in the case of lorry spills, fire, etc. involving hazardous/polluting substances along the expressway to prevent and clean up any significant impacts from drainage of contaminated liquids and fire-fighting water.
- Permanent erosion and runoff control features will be regularly inspected and maintained during operation.

10.5 Biodiversity

Biodiversity baseline has been discussed on page 129 of this report section on receiveing environment.

Biodiversity is the variety of different lifeforms and the habitat that they live in. Threats to the biodiversity along the A8 are many and varied. Along the highway, these threats have been as a result of a combination of gradual processes that have led to slow, steady population decline and sudden events that have led to rapid change. This proposed project falls into the later category of the threat to biodiversity. Clearing of the remnant vegetation along the highway has the potential to cause sudden change in numbers and diversity of the biological organisms along the road.

This section has therefore been prepared to help the KeNHA and CRBC prioritize biodiversity management along the highway. It has spatial and descriptive guideline.

Potential impacts associated with vegetation loss are closely linked to potential impacts on fauna, since key determinant of faunal disturbance is generally habitat quality. The study identified 8 potential impacts on flora and fauna, namely. Threats have been identified as:

- Loss of habitat
- Modification of habitat
- Loss of individuals / population
- Loss of genetic integrity
- Weeds
- Anthropogenic climate change

The location and perceived severity of the threats have been identified as environmental sensitive areas along the road.

Table 55: Summary of impacts associated with project

Impact	Project phase	Pre-mitigation	Post mitigation
Clearing of vegetation	Construction Operation	Moderate Low	Low Low
Faunal habitat loss and disturbance	Construction Operation	Moderate Moderate	Moderate Low

Weed spread	Construction Operation	Low Low	Low Low
Disturbance of sensitive plant communities	Construction Operation	Moderate Low	Low Low
Loss of genetic integrity	Construction Operation	Moderate Low	Low low

Table 56: Location and likelihood of mitigation of impacts

Threat Category	Impact Ranking and Location	Likelihood of Mitigation
Clearing of vegetation	• Moderate threat across the entire project area. • The project footprint will require, along the road alignment especially the midsection, clearance of vegetation. This will lead to loss of ground cover and possible loss of biodiversity. • The process may also cause loss of mature tree species as well as interference with CBD green cover areas such as Golf Club, Chiromo and Uhuru Park	• Clearance of vegetation can be partially mitigated • Compensatory planting elsewhere can be done
Loss of plant richness/ diversity	• This is a moderate impact intermittent on sections of the road. • This impact is most relevant from Nyayo Stadium to Westlnds (next to Delta house), as it is extremely rich in plant species and is an important centre for plant endemism	• This can be partially mitigated. • Some of the vegetation along the road are planted ornamental species which can be replanted
Modification of habitat	• Clearance of vegetation to give room for construction of the express will lead to loss of existing vegetation • Most of the vegetation along A80 will be cleared to give room for construction activities. Generally substantial part of the proposed area will be converted from green spaces to roads and paved areas • Significant threat across the alignment, particularly along Golf Club, Uhuru Park, Nyayo Stadium, Chiromo and Thika Interchange	• Modification of habitat along the alignment is irreversible and requires offsite mitigation
Loss of species of special concern	• Species of special concern in this area are mainly the endemics, rare and the threatened species. • Some of these have been recorded in the project area particularly at Thika road/ Chiromo Flyover/ Interchange, where Prunus africana and Olea africana were observed	• The impact can be reduced if restricted clearing of vegetation is practiced • Compensatory planting using same species is recommended
Loss and fragmentation of habitat	• Project will involve significant loss of bird habitat associated with vegetation clearance of mature trees at Nyayo stadium and Westlands roundabout • The construction phase of this project will be associated with vegetation clearing. Some of the trees along the right of way (RoW) such as acacia spp and Jacaranda mimosifolia are seen to serve as habitats for avifauna (Marabou stork) in the project area. Clearing these tree species will result to loss or fragmentation of habitat for these species	• Disturbance can be avoided • Impacts can be reversed with proper mitigation measures
Weed spread	• Currently, the area has some invasive species like Lantana camara, Parthenium hysterophorus and Solanum incunum. Through vegetation clearance and disturbance of plant communities, alien species have the potential to invade these disturbed areas • Emerging threat involves potential colonisation of newly cleared or excavated sites within the project area by weeds especially Tagetes minuta, Senna floribunda, Argemone mexicana, Datura stramonium and Cyperus rotundus which were evident encroaching most disturbed project area.	• Total elimination of the weed may not be possible, however spread can be mitigated and impacts reversed
Loss of plant community	• The loss of plant communities in the project sensitive areas like Nyayo Stadium, Golf club, Uhuru Park, Thika road Interchange (Museum) and Westlands is a concern.	• The cumulative magnitude of impact is considered low

Threat Category	Impact Ranking and Location	Likelihood of Mitigation
	• Most of these areas are of great conservation value as they contain species of special concern, or have other conservation features such as water storage and providing habitats to animals. • Loss of plant communities occur directly as a result of road construction or indirectly in the longer term due to ecological changes caused by the presence of the road. In effect, those species that are specialist and growing in confined habitats will be restricted in their distribution and generalists species will be dispersed easily and tend to flourish in the newly rehabilitated communities	• However at Nyayo Stadium and Westlands, loss of habitat for Marobou stock will be significant
Loss of genetic integrity	• Removal of plant species without replacement in the project area may result to gene dilution. • This may decrease the potential of surrounding plant species and communities to persist in the face of biotic and abiotic environmental changes as well as alter the ability of these species to cope with short term challenges such as pathogens.	• The impact is partially irreversible
Anthropogenic climate change	• Improvement of road infrastructure may contribute to significant climate change. This could lead to increase in temperature and either an increase or decrease in annual rainfall, change in humidity, wind and pressure cycles. • These changes are accumulative, and may lead to critical extreme weather events that signify climate change. • This consist of alteration of microclimate and isolation of ecosystem patches. Microclimate alterations include changes in solar radiation, interruption of biogeochemical cycle, wind regime in each area, water flux and effect on nutrient availability. This may result in changes in composition and function role of these ecosystems	• Road Designs should be climate change adaptive

10.5.1 Mitigation Measures to Project Impacts

Table 57: Impact and mitigation measures for Flora and Fauna

Element	• Potential Impact	• Mitigation measures
Vegetation	• The project footprint will require, along the existing highway, clearance of vegetation to create a new alignment and road corridor that covers a significant area, clearance of vegetation along 26Km of A104 highway. This will lead to loss of ground cover and possible loss of biodiversity. The process will also cause loss of mature tree species • Invasive species	• The clearance of the site for construction purposes shall be kept to a minimum. • The use of existing cleared or disturbed areas for the Contractor's Camp, stockpiling of materials etc shall be encouraged; • Areas to be cleared should be agreed and demarcated before the start of the clearing operations to minimize exposure • A post-clearance checklist to be developed for checking whether the number of trees removed are according to the documented data in Annex 2 • Stage vegetation clearance to prevent the colonization of invasive species that thrive in distrubed areas
Fauna	• Impacts relate to disturbance of birds' habitats are likely to occur at JKIA, Nyayo Stadium, Golf club and Uhuru Park.	• A buffer strip of existing vegetation will be maintained alongside Nyayo stadium. Where this buffer zone is necessarily breached by the road design, the construction of structures will be environmentally sympathetic; • In the identified areas of habitat to birds such as the Marabou stork in Nyayo stadium, if tree clearance is unavoidable, it should be done in two-stage process; clearance of non-habitat trees clearing habitat trees. • Trees cleared during two-stage process should not be stockpiled on site as it may provide temporary habitat for the displaced Birds. • Felled habitat trees should be left overnight to allow any undetected bird further opportunity to escape. • Installation of noise barriers • A safety barrier will be installed on both sides of the road and along the median strip.

10.5.1.1 1. Vegetation and sensitive plant community loss

Vegetation clearance is defined as the removal of all vegetation (both living and dead). A vegetation clearance procedure as set by site supervisor to be strictly followed. This is to ensure that all vegetation clearing and grubbing are done in accordance with the project approvals, is minimized within the approved areas and minimizes ecological impacts and the surrounding environment.

A procedure for weed removal, location of habitat trees or threatened flora and a procedure for staged habitat removal as set by environmental advisor/ecologist to be obeyed. A post-clearance checklist to be developed for checking whether the number of trees removed are according to the documented data in Annex 2 of this report.

10.5.1.2 2. Landscaping and habitat rehabilitation

Revegation will play an important role in mitigating the impact of the project on flora and fauna values. This will incorporate both landscaping and habitat rehabilitation measures. Habitat rehabilitation aims to maintain/ increase fauna habitat values in the project area and to compensate for the loss of habitat from clearing. Plant species to be used in landscaping to be local endemic species and no species which display charactersitics of environmental weeds will be used.

The aim of habitat rehabilitation will be to restore or recreate the vegetation same as originally occurring in the project area with the following considerations:

- In cleared areas, strips of vegetation along road corridors can facilitate the movement of fauna through the landscape.
- Placecement of tall screening vegetation is recommended as a means to raise flight paths of birds crossing the road and thus reduce road kill.
- The need to control erosion and sedimentation processes
- Disturbed edges create opportunities for weed and alien plant species establishment and expansion.
- Plantings should use locally sourced plants to maintain and enhance genetic integrity of local populations.

Locally endemic species and species regularly used for landscaping in the locality include: *Grevillea robusta, Filicium decipiens, Jacaranda mimosifolia, Vitex keniensis, Terminalia mantale, Cassia siamae, Harisonia decapetala, Eucalyptus spp, Phoenix reclinata, Zanthoxylum gilleti* and *Markamia lutea*. It is recommended that these tree species be sourced from Kenya Forest Service (KFS) tree nurseries and re-planted in the project area after completion.

10.5.1.3 Fauna recovery

In the identified areas of habitat to fauna like *Jacaranda mimosifolia* and *Acacia spp* in Nyayo stadium used as habitat for marabou stork, tree clearance can be undertaken in two-stage process. Stage one clearance undertaken to clear non-habitat trees and stage two clearing of the remaining habitat trees. Trees cleared during two-stage process should not be stockpiled on site as it may provide temporary habitat for the displaced fauna. Felled habitat trees will be left overnight to allow any undetected fauna further opportunity to escape.

10.5.1.4 Other measures

keNHA and CRBC should consider doing the following as a way of mitigating the identified biodiversity impacts of the project:

- Ex-situ propagation and reintroduction of threatened flora
- As much as possible, retain mature trees along the highway
- Minimize damage to identified ESA and habitat i.e. at Nyayo Stadium, Chiromo / Thika Interchange
- Support NGO and government agencies to protect and improve condition of important habitats i.e. Uhuru and City parks / Aboretum etc.
- Identify key deserving or priority areas offsite for improvement and development
- Develop, fund and implement monitoring program to measure the success of the management actions
- Control the spread of invasive weeds

10.5.1.5 Potential Complementary Projects

There are two potential areas that require implementation of complementary projects. These are as follows:

- Afforestation: The other activity the proponent can support is compensatory tree planting to offset the ground cover that will be

permanently lost to Nairobi Expressway. It is proposed that tree cover double the acreage should be planted on Nairobi National Park, Uhuru and City parks / Aboretum, public schools and other government land. The tree nurseries support proposed could also be used in this regard. To achieve this it is recommended that the proponent supports the establishment of tree nurseries in the areas that are traversed by the road.

- River cleanup:The rivers Nairobi and Ngong crossing the proposed Nairobi Expressway are heavily polluted with domestic, industrial and solid waste.The proponent can take the inciative to help clean up the rivers with organized collaboration with Nairobi County

10.5.2 Biodiversity Management Plan / Matrix

10.5.2.1 Introduction

Biodiversity management plan (BMP) describes how the identified flora and fauna in the site will be managed and protected during the construction and operation of the project. The management measures identified in this plan will be incorporated into management of envieonmental impacts, through a variety of measures including, but not limited to, the relevant construction area plan, site environmental plans or training and awareness activities. The main objective of BMP is to ensure that the impacts to flora and fauna are minimized and are within the scope permitted by the infrastructure approval.

The study assessed potential impacts on flora and fauna resulting from the activities of the proposed project during preconstruction, construction and operational phase. Vegetation within and adjacent to the construction footprint comprises of planted trees, landscaped vegetation, natural tree patches, grassland with scattered trees and private gardens. The study determined that sensitive areas within the construction footprint include River Nairobi, Nyayo stadium, Railway Golf club, Uhuru Park and Thika road interchange (Museum Hill).

No threatened flora species which occur in their natural range have been recorded within or surrounding the project footprint. Further, the study determined that one threatened fauna species, Marabou stork (*Leptoptilos crumeniferus*) was recorded at Nyayo Stadium and Westlands roundabout.

10.5.2.2 Environmental Cost

Vegetation

The proposed road bed section of 11 to 15 km will require removal of 1,706 mature indigenous, exotic and fruit trees. This include; *Grevillea robusta, Filicium decipiens, Jacaranda mimosifolia, Vitex keniensis, Terminalia mantale, Cassia siamae, Harisonia decapetala, Eucalyptus spp, Phoenix reclinata, Zanthoxylum gilleti* and *Markamia lutea.* Below is the tabulation of costs relating to loss of trees and their compensation costs.

Table 58: Approximated cost per tree for compensatory planting

Item /service	Cost
Seedling	200
Digging the seedling a hole	100
Protection(stakes, Chain-link, nails, labour)	620
Manure	50
Transportation	50
Purchase of water and watering of the seedling	600
Contractor's margin (30%)	400
Total	2,020 per tree

Compensatory tree planting

Compensatory tree planting along the 26.7 km stretch at 8m spacing on both sides and within Nairobi National park, public schools and other government land will require double the number of trees cleared to pave way for construction.

Total number of trees lost = 4,690	Total cost per tree 2,020.	Total cost: (4,690 * 2) * 2,020 = 18,947,600.00

10.6 Air Quality

The entire Project Road traverses an urban setting including Mlolongo town and Syokimau, before cutting across the capital city, Nairobi. The A8 road alignment which forms part of the Northern corridor has one of the highest traffic volumes in the country. Whereas the existing A8 is already paved from Mlolongo all the way to James Gichuru roundabout and may only cause negligible dust impact, the traffic volumes in the alignment is very high with uncountable incidence of stalled traffic, causing considerable gaseous emissions. Ambient air quality is also influenced by emissions from industrial establishments along the corridor and active commercial quarries in Katani area. During the construction phase, gaseous and dust emissions will mainly be associated with excavations and earth moving activities, haulage of fill material, operation of diesel-powered machinery and ignited vehicle engines. The main components of gaseous and dust emissions will be hydrocarbons, CO2, NOx, SOx and Particulate Matter. The main sensitive receptors are the residential areas, businesses and other establishments along the Project Road, as well as the construction workers. Human exposure to gaseous and dust emissions is associated with airborne disease such as respiratory infections.

10.6.1 Construction dust

The unpaved road network used across the Project Site prior to works completion, is likely to be constructed from a mixture of rocks, stone, gravel, sand and silt, and can be particularly dusty when disturbed by vehicle movements. The elevated wind speeds occurring in the region together with the absence of natural barriers at the Project Site further increase the high potential for dust generation.

Total construction volume >100,000m3, on-site concrete batching and use of dusty construction materials will cause increase in PM concentrations at sensitive receptors.

10.6.2 Construction Air Emission Risks and Impacts

The main sources of air emissions from construction works on the Project and hence risks will be:

- Dust emitted from excavation, earth moving, loading, handling and transportation of excavated material. Dust deposition from road traffic is not likely to be a more significant issue than exhaust emissions, as many of the roads used by construction vehicles will be paved specifically the existing road which will be used. Traffic may need to pass through settlements especially access roads for material sites, camp sites etc. with the potential to affect people living near the road and nearby vegetation. Receptors up to 200 m from the roadside may be affected, with major impacts for people living within 50 m of roads which are heavily trafficked, moderate impacts for receptors up to 100 away, and minor impacts for receptors up to 200 m away. As the details of access roads to be used for construction have yet to be determined, it is not possible to specify where these effects will occur at this time, but in the absence of mitigation, construction traffic is predicted to have an overall moderate or major adverse impact due to soiling caused by dust deposition and locally elevated levels of

PM10 and PM2.5 where the roads to be used during construction pass through towns and villages.

- Emissions of combustion gases from construction machinery and the vehicles. Construction vehicles are generally fueled with diesel, and thus, SO2, PM, NOX, VOC and CO emissions are expected to occur along the route of the highway and access road construction. In addition to these mobile source emissions, there will be also stationary emissions from the activities in the camp sites, and at the concrete and asphalt plants. These emissions will be mostly due to heating and power generations in diesel generators. For heating, it is most likely that fuel-oil will be used at the camps. Thus, SO2, PM, NOX, VOC and CO emissions are expected to occur at camp sites. At the asphalt plants and concrete sites, there will be VOC, SO2 and PM emissions. Construction machinery and vehicles use mainly diesel engines that can lead to emissions of nitrogen oxides and particulates. Most site equipment (bulldozers, diggers, etc.) can be considered as similar to medium or heavy duty trucks. Vehicles are used for the transport of materials and equipment on and off site as well as carriage of personnel to and from site using minibuses and cars. Offsite transport will include spoil, concrete, road aggregates, asphalt, and prefabricated concrete tunnel segments. Since the project construction phase duration will be 3 years long, consisting of different construction activities, air quality impact generated from these activities will not be static. Although the general terms of the construction of phases are similar, their application locations will follow each other. For these reasons CRBC will be required to undertake and calculate air quality for the whole project route including the construction camp area locations and all the associated facility locations. The quantities of motorized equipment (trucks, excavators) etc. remains unknown and will be determined by the CRBC
- Workers accommodation camps and associated facilities are also significant sources of air emissions. The locations of the camp sites, construction facilities, concrete and asphalt plants and crushing units are not known at this point in time and will only be determined by CRBC after which associated risks and mitigation measures will be determined prior to construction works.
- In addition, quantities of material to be loaded and unloaded, number and type of construction equipment and machinery all which are contributors to air emissions are also unknown and will be determined at a later stage by the private concessionaire.
- The construction of the expressway has the potential to cause emissions of dust Total Suspended Particles (TSP) from land clearing, earthworks, movement of vehicles over unpaved surfaces and roads, handling of friable materials, laying of ballast, and construction of structures such as interchanges, bridges etc. These sources have the potential to increase ambient concentrations of particulate matter, resulting in nuisance at nearby settlements and to affect crops and natural vegetation through dust deposition. Experience from construction sites around the world suggests that dust deposition levels can be sufficient to adversely affect people and vegetation at distances up to a few hundred metres from construction activity. Typically, critical impacts can occur up to 20 m from construction sites, major impacts up to 50 m, moderate impacts up to 100 m, and minor impacts up to 200 m. In view of the fact that there are a number of receptors near the construction corridor around the current alignment that could be affected by nuisance levels of dust deposition CRBC will undertake a baseline survey and air quality modelling in order to develop Air Quality Management Plan.

The impact associated with construction is assessed as moderate while residual impact minor.

10.6.2.1 Mitigation Measures

The control and mitigation of dust is identified to be of primary consideration within the assessment and will be achieved by implementing following embedded mitigation measures:

- a speed limit of 30kph on unpaved surfaces should be used;
- vehicles should be kept clean to avoid tracking dirt around and off the site;
- vehicles transporting friable materials should be covered;
- where feasible, surface binding agents should be used on exposed open earthworks;
- exposed ground and earthworks areas should be covered as much as possible, for example with sheeting or boarding, or the use of chemical binders should be investigated;
- where ground and earthworks are covered or surface binders are used, the smallest possible area for working should be exposed;
- use of localised dampening and activity specific dampening should be used to reduce localised emissions of dust;
- stockpiling of material, for example, rocks, sand and soils should be minimised;
- stockpiles should be enclosed or sheeted as much as possible;
- stockpiles should be located as far away from receptors as possible
- the design of stockpiles should be optimised to retain a low profile with no sharp changes in shape; and wind breaks should be erected around the key construction activities and, if possible, in the vicinity of potentially dusty works, to minimise impacts at nearby residential receptors.

10.6.3 Ambient air quality in the areas fronting the A8 and expressway during the operation stage

Exhaust emissions from the road traffic will affect the ambient air quality along the expressway and A8.Intensive vehicular traffic moving along expressway and adjacent roads will generate (CO, NOx, hydrocarbons, SO2 and PM). However it is expected the reduction in congestion due to the expressway on the A8 will reduce emissions. The expressway operation will lead to a decreasing of traffic jams increasing in the average speed of motor transport in the city. As a consequence, there will be a decrease in average fuel consumption, which will lead to a general reduction in greenhouse gas emissions. Since the growth in the number of vehicles in the future is inevitable, even a slight decrease in greenhouse gases in general through the implementation of the Project is a positive impact.

This impact is assessed as minor to moderate while residual impact to moderate. Baseline air quality along the existing A8 will be carried before the construction to set benchmark for frequent monitoring of emission during operations phase of the expressway.

10.6.3.1 Mitigation measure at Operation stage:

- Excluding transport stops at intersections and junctions of roads, improved visibility, increased radius for high speed driving and reducing toxic emissions;
- Longitudinal slopes on road surface not exceeding 10% of radius curves, providing highly functional operating conditions;
- Road signs, markings, guard rails to ensure free traffic flow and reduce the emission of harmful exhaust of vehicles.
- One of the most simple methods to reduce toxic exhaust gas (EG) is converting vehicles for liquefied gas, whereby NOx concentration in emissions is reduced by 4-10 times;

10.7 Noise And Vibration

There will be risks and impact of traffic noise and vibration resulting from the construction and of the proposed Project on people and property. Potential sources of noise and vibration during construction will include clearing and grubbing of the highway corridor, earthmoving, erection of bridges, construction traffic and blasting in quarries.

The main sensitive receptors to the noise impact will be the residential areas, commercial entities institutions including places of worship, schools and hospitals along the Project Road.

The equipment used in construction will generate noise during construction of the expressway will affect communities and fauna. Further impacts and risks associated with noise and vibration will emanate from quarry and other material sites due to blasting. The locations of proposed material sites have not been identified and will be determined by the CRBC who will then develop specific plan (s) informed by further noise studies to mitigate such risks.

This risk is considered moderate in significance, short term in nature (with respect to construction risks), more intense in areas with sensitive receptors, localized in scope and highly likely to occur but mitigatable based on the noise environmental and social program to be developed by private concessionaire.

Noise and vibration risks associated with material sites (quarries) etc. are unknown at this point due to non-identification of sites and will be determined by the private concessionaire.

Construction of the expressway will result in a noise impact on a short-term basis as the construction approaches and moves past each receptor.Noise resulting from general construction work to build structures, such as bridges and viaducts, is covered by the road construction site assessments. It has been assumed that driven piling will not be used. Instead, hydraulic pile driving "silent piling" or bored piling will be used, which has lower noise levels than the percussive piling methods.

10.7.1.1 Mitigation/Management Measures

- Limit noisy construction activities to day time hours only.
- Share the construction schedule with all the affected stakeholders indicating period when un-usual construction activities with extraordinary noise levels will be conducted including time, expected duration and any safety precautions.
- Provide construction workers with necessary Personal Protective Equipment
- Undertake structural integrity assessment of existing structures along the Project Road as control for damages from vibrations during construction.
- Utilise low noise machinery for the construction to the extent possible (Noise levels be below 35dBA to the nearest receptors by day).
- Regularly maintain Project equipment and machinery during the construction to avoid unnecessary noise generation.
- Provide all construction workers with relevant PPE at all times while at work and enforce application.
- Undertake noise survey pre-construction and carry out periodic monitoring during construction
- Avoid idling of Project vehicles and equipment when not in use.
- Avoid unnecessary hooting of vehicles.
- Avoid unnecessary noise from the construction crew.
- Limited blasting for hard stone from quarries shall only be done after approval by the relevant authorities following effective public notification
- install noise barriers along sensitive receptor areas like schools, public parks and the national assembly.

10.8 Waste And Effluent

Waste management is a growing problem in Nairobi City. Increasing urbanisation, rural-urban migration,rising standards of living, and rapid development associated with population growth have resulted in increased solid waste generation by industrial, domestic, and other activities. This increase has not been accompanied by equivalent growth in capacity to address the problem. Proper management of waste has thus become one of most pressing and challenging environmental problems in the city.

The Project Road traverses the Counties of Nairobi and Machakos, both of which have a number of designated waste management sites. The project is however expected to generate an assortment of wastes with some being clearly hazardous such as bitumen, oils, paints, and requiring specialized handling and treatment. The baseline information indicates that poor waste management is already a challenge in both Machakos and Nairobi County, where the Project Road will be located.

Construction activities for the Project Road are expected to generate wastes including overburden material especially those that will be generated from the site clearance and top soil stripping and domestic waste that will be generated within site camps and offices. In addition, effluent waste will be generated in form of both grey and black water at the same site camps and offices.

If the generated waste is not well managed, it can cause a menace to the communit along the Project Road as it can jeopardise the sanitation within the Project area.

The local community members, commercial areas and institutions along the Project Road are the sensitive receptors and will be directly impacted if proper waste management measures are not put in place.

Based on the analysis provided above, impact of effluent and waste management during the construction phase will be "Major Negative Impact" pre-mitigation and Based on the implementation of the proposed mitigation measures, the significance of the impact of waste and effluent management will be a "Minor Negative Impact" post mitigation.

Improper waste management procedures or lack of mitigation measures during construction, phase of the Project may result in adverse environmental and social impacts on: -

- Storm water quality and thus water quality in the water bodies in project areas;
- Soil quality;
- Surface water quality;
- Ground water quality; and
- Ecological receptors or human health.

10.8.1 Mitigation/Management Measures

- Spoil generated should be disposed of on pre-identified and approved locations
- A site-specific Waste Management Plan (WMP) will be produced for the construction phase:following the principles of reduce, reuse, recycle; With detailed measures stipulated such as:
    - using waste minimisation techniques such as buying in bulk;
    - Segregating waste at source
    - allocating responsibilities for waste management;
    - identifying all sources of waste;
    - ensuring wastes are handled by personnel licensed to do so in all cases, especially in the case of hazardous waste;
    - making suitable facilities available for the collection, segregation and safe disposal of the waste, also ensuring wastes are not strewn by wind

  - creating waste collection areas with clearly marked facilities such as colour coded bins and equipment for handling the various waste types; and
  - The collection of wastes that cannot be reused or recycled to be collected by approved waste contractors and transferred to an appropriately (NEMA licensed) waste management facility for treatment and ultimate disposal.
- Trucks and construction vehicles will be serviced off site at designated and approved servicing locations.
- The use, storage, transport and disposal of hazardous materials used for the project will be carried out in accordance with all applicable Kenyan regulations, and Material Safety Data Sheets (MSDS).
- CRBC will supply the required temporary ablution facilities and be responsible for the treatment and/or removal of sewage wastes off site. CRBC will also be required to ensure that the contracting company is accredited and has the necessary permits to remove sewage waste.
- The sewage will be treated in accordance with the applicable laws like the Environmental Management and Coordination (Waste Management) Regulations, 2006.
- Spoil generated be disposed-off on pre-identified and approved locations
- Construction Camp sites shall be provided with appropriate solid waste holding receptacles to be regularly emptied for disposal.
- Construction camp management to provide an inventory of waste and an acceptable chain of custody.

10.9 SOCIO-ECONOMIC IMPACTS

This section assesses the potential socio-economic impacts of the expressway Project. The following impact areas were identified for the Project:

- Community Demographics;
- Local and National Economy and Employment;
- Transport Infrastructure.

These above impact areas may entail both positive and negative impacts.

10.9.1 Assessment of Impacts on Local and National Economy and Employment

10.9.1.1 Construction Phase

The key construction activities which have been identified to have a potential effect on local and national economy are listed below:

- employment of personnel and procurement of goods and services (from local market);
- the physical presence of construction workers
- construction and operation of worker camps, access roads and quarries; and construction traffic (transportation of workers and materials.

Employment opportunities and procurement of services

The construction of the expressway will result in temporary employment for the duration of the construction programme at the local and national levels. This includes people employed by the Project as well as contractors and subcontractors for pre-construction and construction works (direct). The maximum number of employees involved in the construction of the expressway will be 1151 people for section 1, of which foreign labor will be 149 people and local workers 1002 people. For section 2 the maximum number of employees involved be 2414 people, of which foreign labor will be 314 people and local workers 2100 people

Employment opportunities also include jobs supplying the goods and services needed to support the construction process, including food and transport services and support staff in the construction camp (indirect). In addition, the increased income of the employees will lead to an increase in general spending on goods and services as well as potentially related job creations (induced).

The extent to which lower income, less educated population will benefit from employment opportunities created by the Project will depend, partially, on the skill-level of the positions to be filled.

Therefore it is considered that the impacts related to employment opportunities during the construction phase prior to the implementation of mitigation measures will be Positive.

The construction of the Project will result in temporary economic impacts from procurement of goods and services by the Project in construction and related industries (construction vehicles and machinery, construction materials, etc.) and goods and other services such as transport, catering, laundry, food supply, security services, etc. (direct). Procurement of goods and services for the project is expected to contribute to the economy to the extent that these outputs are purchased locally, regionally, or nationally. Considering that the construction industry is a relatively important sector in the region, this seems possible.

Temporary economic impacts will also stem from induced economic effects of spending on goods and services by construction workers who will have increased disposable income and the ability to spend more money in the local economy (indirect). The magnitude of worker spending will depend on the percentage of local or regional (resident) vs. national vs. foreign workers and the duration of their contracts. This impact is therefore considered as Positive.

Capacity Enhancement of Workforce

The Project will result in long-term capacity enhancement for the local workforce during the construction period. Specifically, this includes long-term benefits from on-the-job and formal training opportunities for individual workers (direct), and the possibility for capacity enhancements for local and national companies who would have won tenders for work on components of thexpressway. These companies would also reap reputational benefits from working on a major Project with specialised technology (direct).

In turn, capacity enhancement of local and national workforce and companies will also contribute to creating long-term employment opportunities for individuals and businesses, independent of the project (indirect).

The Project impact on capacity enhancement during construction is therefore considered Positive.

10.9.1.2 Operation Phase

The key operarion phase activities, to have a potential effect on local and national economy are listed below:

- employment of personnel and procurement of goods and services (from local market);
- road traffic (taxes revenue);
- operation of the expressway, tolls; and maintenance of road.

Employment opportunities

Under Project operation, employment for the operation and maintenance activities of the expressway and tolls will be required, resulting in long-term employment opportunities for the local and national workforce. However, employment opportunities will be limited to personnel required for Road Maintenance Facility (RMF).

The Project impact on employment opportunities during operation is therefore considered as *Positive.*

Improved connectivity and accessibility

The four-lane dual carriageway once completed will run over 27km, linking Mlolongo and Jomo Kenyatta International Airport (JKIA) to the Nairobi-Nakuru highway and it is expected to ease the flow of traffic in the city

The operational stage of the Project is expected to improve connectivity for the transport of goods, services and people between in Nairobi and the entire northern corridor for a better economic growth potential of the region (indirect). This would include better accessibility for businesses in the region to expand their geographical markets and resources to other areas and countries.

The project is also expected to enhance Competitiveness of the Kenya within East Africa Region and entrench Kenya's position as a business hub of choice, through enhanced Logistics efficiency at SGR Terminus, JKIA, ICD and Industrial Area.

The project is also ecpected to significantly reduce response time to emergencies as the expressway will have dedicated emergency lanes on either side and reduced journey times for motorists and passengers travelling beyond Nairobi;

There will also be expected benefits existing A8 users (Mombasa Road, Uhuru highway, Waiyaki Way) due to less congested created by expressway.

Benefits will also be accrued to the country and business opportunities for local supply chain through enhancement of attractiveness of vast areas around Mlolongo and beyond for major real estate and industrial development through significant reduction in travel times to the CBD and international visibility for Kenya as destination for Foreign Direct Investment especially in Road infrastructure;

The Project impact on connectivity and accessibility is therefore considered as *Positive.*

Taxes revenue

The Project will generate tax revenue for the Kenyan government, which will contribute to the national budget. Tax revenues will be generated through income taxes and corporate taxes on expenditures, operational and corporate revenues and incomes of employees. Operational revenues will be generated primarily through toll fees on the expressway and Corporate Tax is estimated at USD371M.

Project is expected to decongest traffic significantly and save hundred millions of shillings per year. (Kshs 50 million shillings lost daily from the delays and fuel wastage caused by traffic jams, and accidents especially in urban areas).

Realisation of Vision 2030 & Big 4 Agenda (Mlolongo, Athi River, Kitengela, Konza City, Machakos will be further enabled to develop as industrial and business hubs including locations for affordable housing)

Project impact on taxes revenue is therefore considered as *Positive.*

10.9.2 Enhancement/Mitigation of Potential Impacts related to Project Construction and Operation

As described above, most of the potential economic impacts of Project construction and operation are likely to be positive with one minor expected negative impact on economic inflation and income inequalities. A number of measures have been identified to enhance the positive impacts of the projects.

In order to enhance local employment and procurement opportunities, CRBC shall develop and agree an Employment Policy, which to include provisions on local content and employment strategy and subsequent plans and procedures (e.g. Labor Management Plan) with primary contractors. Specific measures will include the following measures:

- Conduct a comprehensive demand-and-supply-side analysis to identify and quantify local content potential, identify potential employees, Contractors and suppliers.
- Recruitment procedures will aim to provide opportunities for employment of local workforce to the extent possible considering unskilled, semi-skilled and skilled workforce, and giving priority to vulnerable persons. Priority will be placed on hiring skilled, semi- skilled and unskilled labour from within the expre, then greater Nairobi and the country
- Seek to maximise the benefits from the expressway to local communities in terms of direct and indirect employment, and purchasing of local good and services during construction. This will include measures such as adopting local employment and purchasing policies, establishing tenders for procurement of subcontracted goods and services at a scale that local businesses can respond to, ensuring opportunities are advertised locally, and providing training for local people to allow them to obtain jobs with the Project as much as possible.
- Outline and require a fair and transparent, gender neutral recruitment process for all openings.

- Seek to employ local personnel residing in project-affected communities on different sections of the expressway. Subcontractors will be encouraged to employ local personnel.
- Provide advance information on tendering opportunities to local businesses
- Break tendering opportunities into smaller components to increase the likelihood of granting individual pieces of work to Kenyan companies.
- In order to enhance Project impacts on long-term employment and procurement during operations, the Project proponent will implement the Employment Policy and subsequent plans and procedures (e.g. Labor MP), which will outline and require a fair and transparent recruitment process for all openings.
- CRBC will also seek to promote local employment (including job training) and purchase local goods and services during the operation of the expressway to the extent possible. Measures will include the facilitation of access to alternative employment for people affected by the loss of jobs through the Project, for people directly affected by past and future land acquisition impacts causing loss of access to employment. Specific resettlement and livelihood restoration measures will be developed as a part of Livelihood Restoration Action Plan.

10.9.3 Assessment of Impacts on Transport Infrastructure

This section assesses the potential impacts on transport infrastructure associated with the construction and operation of the Project. The assessment is divided into construction and operations and specific mitigation measures are identified followed by an analysis of residual impacts, which takes into account the application of the mitigation.

Affected population

Potentially impacted receptors are primarily the users of the road and the settlements located along the expressway and near the construction, shift camps and quarries.

Construction

The key construction activities which have been identified to have a potential effect on transport infrastructure are listed below:

- construction traffic (transportation of workers and materials);
- construction of temporary access roads.

10.9.3.1 Damage and disruption to road transport and infrastructure

The main potential impacts on the local road network as a result of project construction activities (transport of personnel, material and equipment, waste disposal, etc.) are disruption to traffic and transportation due to road crossings, and damage to local roads from heavy truck movement to and from construction sites, worker camps, landfill areas, etc. Disruption to road infrastructure and reduced access due to road cuttings could result in impacts to livelihood or quality of life and if unmanaged properly and in time, could result in health impacts (e.g. inability to pass roads in an emergency etc.).

The Project will use existing A8 road. Given the ongoing frequency and temporary time frame of construction activities, and the regional extent of the works, the impact

magnitude may be assumed as *Medium.* Considering the importance of the road network to ensure mobility sensitivity of receptors is considered as *Medium*. Potential impacts on road traffic and infrastructure are therefore rated as *Moderate* prior to mitigation.

Operation

Sustained road traffic may also result in damage to the road, which is addressed through maintenance works as an embedded measure in Project design.

Specifically, regarding road traffic, the Project operation is expected to result in improved traffic and better connectivity and accessibility along Mombasa road.

10.9.3.2 Hindrance of access and utility disruption

The operation of the expressway has the risk of reducing access to and operation of the exisiting A8 if appropriate u turns are not put in place. Stakeholder consultations during the field survey have also raised the potential of reduced access to by the expressway during construction operation in both section 1 and section 2 especially mlolongo Syolimau section. In particular, the perception is common among residents that the water and electricity supply will be affected. Syokimau water project would overlap with this proposed project access of utilities such as water and electricity once the project starts interference with the sewerage system. They were also suspicious about the solution for providing U turns. The common concern is that only a few U turns will be built and that they may not be located close enough to the existing U turns, leading to increased costs as more money spent on fuel. This being said, the construction of U turn is an embedded measure in Project design, with the aim to mitigate such potential impacts.

This impact if it were to occur would therefore be local, small in scale, but permanent which leads to a *Major* magnitude. The sensitivity of the receptor is considered *High.* The significance of the impact before mitigation is therefore *Major* before mitigation.

10.9.3.3 Enhancement/Mitigation of Potential Impacts related to Project Construction and

Operation

The following measures have been identified to mitigate impacts on road traffic and infrastructure:

- Provision of annual repaire works at damaged sections of local road used for transportation (if agreed with KeNHA);
- Installation of additional road signs (if applicable and agreed with KeNHA);
- Engagement with KeNHA County government traffic police and other stakeholders on the issue of traffic movement during construction and development of additional measures if required.

The following measures have been identified to mitigate impacts related to reduced access to agricultural fields:

- Installation of U turns in accordance with operation of the existing A8;

A Project specific Grievance Mechanism will be used to record and solve the relevant incidents results.

10.10 Community Health And Safety

This section assesses how the Project may change the community exposure to risks and impacts arising from traffic flows, equipment accidents, structural failures, exposure to diseases and the activities of workers. It also defines relevant mitigation measures so that the respective risks are prevented or minimised.

The impacts identified in relation to community H&S are the following:

- Traffic accidents,
- Community health and nuisance related to air and noise emissions,
- Injury from unsafe equipment use,
- Community exposure to disease and anti-social behaviour,
- Conflict with security personnel.

Source of potential impacts on community H&S that have been identified are the following Project activities:

- Construction activities (e.g. dust, noise, use of hazardous materials, machinery operations and truck traffic);
- Expressway operation during operation (e.g. dust, noise);
- Traffic movements during construction and operation resulting in accidents;
- Presence of construction personnel in the area during construction;
- Security personnel.

10.10.1 Assessment of Impact on Traffic Accidents

10.10.1.1 Construction

This section assesses the potential impacts on traffic accidents with the following construction activities:

- Transportation of materials, personnel, wastes etc.
- The physical presence of construction equipment and machinery.

Health and safety risks involving the public associated with construction could include impacts from construction traffic and accidents involving construction equipment and machinery movements.

The following types of transportation will be relevant for the Project:

- Transportation of sand and gravel mix from quarries to construction camps
- Transportation of soil for embankment from quarries to construction camps (soil quarries and their locations have not been determined at the time of the report),
- Transportation of other construction materials and cargoes (including concrete steel, noise barriers, fencing materials, parts of bridge structures, cables and other constructions and materials) from suppliers to construction camps (suppliers and their location have not been determined at the time of the report).
- Transportation of wastes from construction sites to waste disposal sites and their locations have not been determined at the time of the report
- Transportation of personnel between settlements (local workers), camps (shift workers), construction sites, etc. (settlements, those population will be involved in employment, have not been determined at the time of the report);
- Transportation and operation of construction equipment and machinery (transportation routes have not been determined at the time of the report).

The construction phase of the Project is likely to affect adversely the current traffic situation, causing congestions in some areas and increasing the risk of traffic accidents.

The magnitude of the construction traffic impact may be Major at certain locations due to long-term duration (earth works and pavement works for different sections will last for 15-22 months) and the large amount of material and waste transport trucking that will use existing roads.

A8 road users, boda boda riders, Syokimau Mlolongo and business fronting the A8 are amongst those vulnerable to the physical hazards associated with construction traffic, for example, especially because of proximity to roadways.

The receptors using the A8 can be considered have High sensitivity with respect of potential traffic related impacts and the high level of existing traffic. As the impacts of traffic accidents are frequent the duration of the risks will persist during the construction period the significance of the impact is considered as Moderate to High.

10.10.1.2 Operation

During the operation stage risks of traffic accidents will be associated with the following factors:

- Technical characteristics of the expressway;
- Repair and maintenance activities;
- Traffic accidents due to accidental access to the expressway.

Due to the anticipated higher average vehicle speed on the corridor (on both A8 and expressway), there is a potential that there may be more frequent high-speed accidents and correspondingly more severe injury implications. As the expressway will be fenced and will not be accessible to boda boda riders, the impacts on traffic safety will likely be Positive for the overall scope of the expressway.

The impact significance of traffic accidents induced from repair and maintenance activities of the expressay is considered as Moderate because the impacts is expected to be occasional, seasonal (short duration) and limited to construction sites. Repair activities may include road resurfacing waste (e.g. removal of the old road surface material) which would physically reduce the expressway lanes and have physical presence of personnel and equipment on the expressway.

Accidental access to the expressway is another potential risk that may be present during the operation phase on the road bed section. Embedded design includes the presence of permanent obstacles (including wire fence) along the expressway. Also, the Project envisaged u Turns(intersections with A8) and foot bridges used by pedestrian.

The presence of these obstacles will limit the significance impact to moderate.

10.10.1.3 Measures to Avoid and Minimise Potential Risks and Impacts and Promote Benefits

In order to minimize risks of traffic accidents, the Traffic Management Plan will be developed as a part of the ESIA process. Traffic Management Plan will be agreed and implemented by the and will be applied CRBC. Specific measures will include the following measures:

Placement of fencing or other barricades around dangerous construction installations with warning signs of the hazards;

Temporary traffic control planning for the continuity of the movement of vehicles and transit operations will be developed when the normal function of the A8 is suspended. The traffic control planning will have the objective to provide for safe and efficient movement of road users through

and around temporary traffic control zones protecting workers, responder to traffic incidents and equipment.

- The stakeholder engagement activities will serve to inform the local communities regarding potential health and safety issues during the construction period. Community health and safety information will be disclosed to the communities. The stakeholder engagement activities will include:
- community meetings with residents associations (including visits to schools) and local postings or through social media to inform the public regarding the relevant hazards for their particular locations.
- Monitor driver behaviour, especially for routes that are subject to frequent accidents, and implement corrective action to prevent recurrence.
- Coordinate with emergency responders to ensure that appropriate first aid is provided in the event of accidents;
- Project design will provide for sufficient passages (vehicle and pedestrian) crossing the expressway
- Liaise with utility companies to identify affected sections of alignment that affect utilities. Relocation plans shall include adequate notification of affected customers

A traffic relief program is provided in annex 10 of this report

10.10.2Assessment of Impact on Community Exposure to Disease and Anti-Social Behaviour

10.10.2.1 Construction

As with other large construction projects, the potential exists that the social/recreational activities of construction workers might lead to anti-social behaviour (such as noise/rowdiness, drinking, brawls, socially inappropriate relationships/ prostitution etc.) between each other and/or with local residents.

The local communities can be vulnerable to the potential increase of communicable diseases, such as tuberculosis and influenza, for example. In addition, in general, workers may cause the spread of HIV/AIDS and other sexually-transmitted diseases (STDs) amongst the population.

The receptors of the impact are primarily the residents of settlements located near construction camps as interactions between workers and residents will be more likely during worker's visits to settlements and social facilities in their off-work time. Secondary, the receptors of the impact will be the residents of settlements located near expressway RoW, where the main construction works will be carried out.

The risk of community exposure to disease and anti-social behaviour will be limited to construction period. This impact will affect receptors and will be related to occasional visits of workers to social facilities. The magnitude of the impact is therefore considered to be *Moderate to High.* As the life and health of human is considered as the highest priority, the receptor sensitivity is assessed to be *High*. The significance of the impact before mitigation is considered to be *Major*.

10.10.2.2 Measures to Avoid and Minimise Potential Risks and Impacts

The construction workforce is planned to be recruited locally as much as possible, and measures and actions in order to enhance local employment opportunities

The risks of antisocial incidents by Workers can be minimised through the provision of training with appropriate discipline measures in place, and to ensure that they are understood. The issue will also be addressed during the community engagement process, which will entail consultation with the local representatives, including women's groups and local authorities, to address their concerns

regarding any critical aspects of the Project that may be encountered during the construction phase.

In addition to cooperation with the local government and stakeholder groups (e.g. local NGOs, resident associations and schools), health awareness trainings amongst the workers, training of health workers in disease treatment, the provision of health services and performing immunisation programmes for workers will also be undertaken to minimise the risks of the spread of STDs and other communicable diseases in the local communities.

CRBC and its subcontractors is also required to develop and implement a code of conduct for the workers, which will include appropriate behavior amongst workers and with communities. This code of conduct should be attached to the contracts with workers.

The construction contractors will be required to provide orientation training to their workforces that underline the potential risks/impacts that exist with respect to the relations with the local communities, and the appropriate preventive measures.

Complaints by the public (or other workers) with respect to behaviour of the workforce can be made via the Grievance Procedures for public and workers.

Prior to commencement of operations, the *Community Health & Safety & Security MP* will be developed and implemented on the topic of potential impacts from communicable diseases and other impacts of the expressway operations (similar to the above-described aspects during construction).

10.10.3 Assesment of potential impact of street children using the viaduct as habitual abode

It is a common in Nairobi to street kids sleeping on pavements, bridges, abandoned buildings and parks among other sheltered spots. This results in a two-way impact; The street children themselves are exposed to increased dangers due to accidents while on the other hand the road infrastructure's integrity and durability is lessened and road users risk being robbed or mugged. This is often not taken into account during the design phase of road projects. For this reason, most underpasses, overpasses, footbridges, bus parks among others are often unsafe at certain hours. Section 2 of the proposed Nairobi Expressway will be elevated and therefore possesses this challenge during its operational phase. A feature was done on this phenomenon footnote link[6]

In addition to this area with efficient roads normally attract large numbers of people some of who decides to settle or conduct business underneath the elevated sections of a roads, inside road side culverts, inside the upper open sections of the elevated road section/ overpasses, and inside large drains or on-ground the road reserve, especially within urban areas. This is normally done with a conscious mind on the assumption that it is "no one's land" and/or that the road authority shall not develop the road in the near foreseeable future. To mitigate against this it is proposed that;

- Design aspect to take this into account and minimize unnecessary dark sheltered spots along the proposed road as would occur under bridges, underpasses, culverts etc. and adequate lighting.
- During the construction phase the contractor should aim at ensuring smooth surfaces and removing any unnecessary spaces that may be used as shelters. The spaces left should be guarded off using appropriate engineering controls

Figure 1:

[6] https://www.youtube.com/watch?v=YmgJr22vruk

- Road agencies (KeNHA. KURA, KeRRA, County Government) should develop a multi-agency in liaison with Kenya Police aimed at monitoring and ensuring no such shelters develop.
- Collaboration with the County Government of Nairobi, security teams, local administration, and the National Youth Service (mandated to rehabilitate street children in the country) in preventing and managing any encroachments.

10.10.4Assesment of impact due to enchoraochment by Road Side Traders/vendors

Upon construction of Nairobi Express way road project and operational, there is the possibility of encroachment of various informal business along the expressway being attracted by the increased traffic from the expressway. The encroachment increases the possibility of road side accidents and makes road maintenance difficult and future expansion expensive activity due to the compensation demands from destruction of properties and disruption of livelihoods for the encroachers. Such settlements in most cases are normally unplanned with no basic services such as water sewer and solid waste management, which lead to the use of the road, drains and neighboring area as dumping grounds which affects the performance of the road.

Existence of these informal settlements can pose the following risks:

- Security risks as seen in cases of mugging along the Haile Selassie round-about -to- Nyayo Stadium round-about,
- Blocked drains can cause flooding during heavy rains.
- Human health risk of the persons living inside the elevated road culverts

Mitigation measures:

- KeNHA should work in conjunction with NLC and the County Government in management of public land.
- KeNHA in consultation with the county governments of Nairobi City and Machakos should collaboratively enforce development control and not allow for any approvals along the way leaves of the Expressway to ward off potential encroachers and to allow for easy implementation of future road expansion plans.
- KeNHA should provide and maintain road-reserve boundary posts at appropriated distances; and
- KeNHA should conduct periodic awareness talks and presentations about the road reserve.
- The Nairobi Expressway will be fenced off to mitigate encroachments into the road

10.11 Labor And Working Conditions For Employees

The construction of the Espressway Project associated with a considerable workforce of whom a large proportion are subcontractor employees working with the CRBC. This section presents a preliminary assessment of potential concerns relating to labor and working conditions which may arise during the construction and operation of the expressway project.

Following list have been identified as potential risks and issues for the Project:

- safe and acceptable physical working conditions including construction and operational H&S and training;
- acceptable standards and management of workers accommodation; and
- arrangements for dealing with worker's grievances.

This preliminary assessment is based on a review of Kenyan labour Laws and Regulations.

Labour laws in Kenya are in line with international labour laws and Kenya has ratified seven of the eight core (7) ILO conventions:

- Right to Organise and Collective Bargaining Convention, 1949 (No. 98);
- Forced Labour Convention, 1930 (No 29);
- Abolition of Forced Labour Convention, 1957 (Mo 105);
- Minimum Age Convention, 1973 (No 138);
- Worst Forms of Child Labour Convention, 1999 (No 182); and
- Equal Remuneration Convention, 1951 (No 100); and Discrimination (Employment and Occupation) Convention, 1958 (No 111).

It is important to note that while the labour laws exist, there are issues with regards to implementation. Also due to the lack of employment in Kenya, workers are willing to sacrifice their rights in order to secure employment. There is therefore the risk that the Contractor and sub-contractors will not operate in line with international best practice if measures to manage such risks are not enforced (8).

While forced labour, child labour and discrimination is known to occur in many sectors of the economy, it is unlikely that the Project or Contractor and suppliers will be doing so.

With regards to on-site worker welfare, the Contractor will be required to adhere to:

- Kenyan Labour Law, and
- ratified ILO conventions.

Sensitive receptors may include employees who have a poor understanding of the requirements of OHS standards and their labour rights as enshrined by law.

Labour and working conditions, including occupational health and safety, will need to be considered to avoid any incidents and/or injuries. Issues that need to be considered include: fair treatment of workers, non-discrimination, equal opportunities, as well as the provision of a safe and healthy working and living conditions.

These issues should be considered not only for those employed directly by the Proponent, but also employees of the Contractor and any other sub-contractors during construction and operation.

Without careful management the workforce employed may be exposed to occupational health and safety risks as a result of insufficient health and safety standards, potentially resulting in injury or death.

This section will focus on both **construction** and **operational** phases of the Project due to the applicability of the labour conditions throughout the Project cycle.

Based on the analysis provided above, impacts to exposure of the workforce to poor labour and working conditions will be a "Moderate Negative Impact" pre-mitigation

10.11.1 Mitigation/Management Measures

10.11.1.1 Management System

- The Project should develop and implement an Occupational Health and Safety Management System in line with good industry practice. This systems should include consideration of hazard identification, risk assessment and control, use of Personal Protection Equipment (PPE), incident investigation and reporting, reporting and tracking of

Figure 1:

(7) Kenya has not ratified the 'Freedom of Association and Protection of the Right to Organise Convention', 1948 (no 87)

(8) Refer to comments on Labour and Employment in *Chapter* 8 of this report- where fairness in labour and employment conditions was raised severally.

near misses, incidents etc. The management system should also include emergency response plans. Roles and responsibilities should be clearly defined.

10.11.1.2 Contractor Management

- In contractor contracts, KeNHA should make explicit reference to the need to abide by Kenyan law, and the ratified ILO conventions and KeNHA's policies in relation to health and safety, labour and welfare standards.
- As part of the contractor and supplier selection process the Proponent should take into consideration performance with regard to worker management, worker rights, health and safety as outlined in Kenyan law and international standards.
- Regular checks by KeNHA should be undertaken to ensure the relevant labour laws and occupational health and safety plans are adhered to at all times.
- All workers (including those of contractors and subcontractors) should, as part of their induction, receive training on health and safety and should receive update training annually as well as when undertaking new tasks such as working at heights or in confined spaces.

10.11.1.3 Workers' Rights

- CRBC will put in place hiring mechanism to ensure no employee or job applicant is discriminated against on the basis of his or her gender, marital status, nationality, ethnicity, age, religion or sexual orientation.
- All workers (including those of contractors and subcontractors) will, as part of their induction, receive training on worker rights in line with Kenyan legislation to ensure that positive benefits around understanding labour rights are enhanced. This process will be formalised within the Code of Conduct that will be provided by the CRBC.
- All workers (including those of contractors and subcontractors) will have contracts which clearly state the terms and conditions of their employment and their legal rights. Contracts will be verbally explained to all workers where this is necessary to ensure that workers understand their rights. Contracts must be in place prior to workers leaving their home location if applicable.
- CRBC will put in place a worker grievance mechanism that will be accessible to all workers, whether permanent or temporary, directly or indirectly employed. worker grievance mechanism shall be open to all Contractor and subcontractor workforce in the event that their grievance is not adequately resolved by their direct employer. KeNHA will then have the authority to act to resolve this grievance.
- All workers (including those of the contractor and subcontractor) will have access to training on communicable diseases and STDs and community interactions in general. This training will be developed in collaboration with local health institutions.
- Implement international guidelines regarding the construction and management of worker accommodation.
- Surveillance and assurance that no children or forced labour is employed directly, by the Contractor, and to the extent possible by third parties related to the project and primary suppliers where such risk may exist

10.12 LAND ACQUISITION AND RESETTLEMENT

The sections below summarise the initial findings of land acquisition process. Resettlement action plan has not been prepared as the final alignment has not been finalized by the time of drafting this report. This will be presented separately as RAP upon completion of detailed design.

In order to assess the degree of bisected and fragmentated landplots, the following information is required:

- The configuration of the land plot before the expropriation;
- The configuration of the land plot(s) after the expropriation. Both are unavailable to the time of reporting.

Land take requirement is expected to be mainly at interchange and toll station section where A8 may need to shifted outwards.The land take equirement and locations provided in the table below is on the basis of preliminary analysis prepared by CRBC for presentation to KeNHA and other stakeholders. From the preliminary designs the land uptake for this Project is approximately 35 acres, comprising 60% of public land and 40% private land

Efforts have been made to minimize the land acquisition of the Project, including placing the toll plazas on the bridge/grade separated sections, limiting the radius of ramps and the spacing between the ramps and the main lines

There was perception within the public that the interchange at Uhuru highway and Haile Selasie and the section to Kenyatta Avenue will result in hiving of section of Uhuru Park but the government through the Principal Secretary of infrastructure clarified that the road's design will minimise damage on iconic facilities and lessen compensation payouts.[9]

Table 59: Preliminary Land take requirement

Chainage	Location	Area (m²)	Building (m²)	Remark
K10+000	Eastern bypass	22,166	0	Public land (KURA); Private land (CCFC, Saj Ceramics)
K11+700	Railway Bridge	2,385	0	Public Land (Kenya Railways)
K15+000	Southern bypass	32,311	1,500	Private land to be acquired (Kangtels Motors, Nextgen Mall, etc.)
K17+000	Capital Center	20,486	2750	Public land (CID Police Training School), Private land (Khalsa Primary School)
		16,000		Private land to be acquired for the O&M Center
K19+800	Haile Selessie	26,650	1,000	Public land: Kenya Railways; Private land (Railway Golf Members Club)
K22+000	Thika Road	7,000	500	Public land: University of Nairobi & Catholic Chapel; Private land (Boulevard Hotel).
K26+700	End Point Interchange	10,000	1,140	Public land (Military Camp); Public land (National Council for Persons with Disabilities)
Public land to be acquired		81,381		60% of total, 20.0 acres

Figure 1:

[9] https://www.standardmedia.co.ke/article/2001347608/uhuru-park-will-not-be-touched-by-new-expressway

Chainage	Location	Area (m²)	Building (m²)	Remark
Private land to be acquired		55,617		40% of total, 13.7 acres
Buildings (found within public land & private land combined)			6,890	The buildings are mainly single storey industrial warehouses
Total		136,998		33.7 acres

For campsite CRBC is looking at option of leasing 40acre piece of land from KAA CRBC near the airport for 5years leasing period. The location of access roads, some of the quarries and some of the construction grounds (additional plots along the route that will be used for the temporal storageof soils and construction materials) was not known at the time of writing and, therefore, the scope of this assessment does not cover these in detail.

On utilities there is 85km of water lines and 20km of sewer along the road section (Mlolongo to James Gichuru). AWSB will require to procure a contractor to conduct the relocation works so as to ensure a free wayleave for the road works. The NWSC and AWSB have maps of the pipes along the road section; however, they may be outdated or inaccurate (with some sections having a variation of 5m). This is critical to the relocation works- timing and scope of works. CRBC will liaise with utility companies to assist them to create the scope of works for the relocation- noting the critical path of that element of the project. Private sector ICT companies will require more engagements with regards to their utility relocations plan.

10.13 National Heritage Sites, houses of worship and Memorial Cemetery

Located very close to the project in the heart of Nairobi City next to Nyayo House is the Nairobi Gallery. Buit in 1913, this Old PC's office building was fondly referred to by the settler community as 'Hatches, Matches and Dispatches' name because of the births, marriages and deaths that were recorded here. This museum holds temporary exhibitions that continuously rotate to give it spice and life. The project will not affect this museum.

The university way roundabout is bordered by St Paul's Catholic Church, the Lutheran Church, St Andrew's Church and the Nairobi Synagogue. This houses of worship will not be affected by the project.

Nairobi British And Indian Memorial cemetery is situated in Nairobi South Cemetery which is located 3 kilometres south-east of the city centre on Uhuru Highway, leading from the airport to Nairobi town centre. Coming from the airport, the cemetery is found directly beside the road on the left, adjacent to the Banyala roundabout. This is the first roundabout after the Nyayo National Station. The Memorial is built into one of the walls of the cemetery. The project will not affect the cemetary.

In case of find of cultural heritage the following mitigation measure is proposed.

10.13.1 Mitigation/Management Measures

10.13.1.1 Execution of a Chance Finds Programme:

In order to minimize the potential for impact to sub-surface cultural resources, KeNHA should establish a Chance Find Programme staffed with on-call Kenyan archaeologists and overseen by experienced cultural heritage management specialists (Research and Conservation of Cultural Heritage (ARCCH) specialist) to address the discovery of Chance Finds during the construction phase.

A Chance Finds Program includes the following provisions:

A cultural heritage specialist (ARCCH) archaeological specialist should remain on-call and will provide oversight of the Chance Finds Program. The on-call international specialist should be used on an as-needed-basis and will monitor the Chance Finds Program from his/her desktop. The local ARCCH

specialist will be responsible for initial field response to chance finds. The on-call international specialist should only conduct field monitoring in the case of unusual or highly sensitive and importance chance finds.

A chance find can be reported by any member of the Project. Accordingly, it is necessary to provide cultural heritage training to all Project staff and sub-contractors. A separate section detailing cultural heritage training is provided in the next section. If a chance find is encountered the first course of action is to stop work in the vicinity of the find. Then the following steps will be undertaken:

- Inform site supervisor/foreman.
- Install temporary site protection measures (warning tape and stakes, avoidance signs).
- Inform all personnel of the Chance Find if access to any part of the work area is restricted.
- Establish a localized no-go area needed to protect the Chance Find.
- The internationally qualified and Local ARCCH archaeological specialists will confer and perform a preliminary evaluation to determine whether the Chance Find is cultural heritage and if so, whether it is an isolate or part of a larger site or feature.
- Artefacts will be left in place when possible; if materials are collected they will be placed in bags and labelled by an archaeologist and handed over to the ARCCH; no Project personnel are permitted to take or keep artefacts as personal possessions.
- Document find through photography, notes, GPS coordinates, and maps (collect spatial data) as appropriate.
- If the Chance Find proves to be an isolated find or not cultural heritage, the local ARCCH specialist, in consultation with the internationally qualified specialist, will authorize the removal of site protection measures and activity in the vicinity of the site can resume.
- If the archaeological specialists confirm the Chance Find is a cultural heritage site they will inform the ARCCH and initiate discussions with the latter about treatment.
- Prepare and retain archaeological monitoring records including all initial reports whether they are later confirmed or not. The record will include coordinates of all observations to be retained within the project's GIS system (*viz.* ArcGIS).
- Develop and implement treatment plans for confirmed finds using the services of qualified cultural heritage experts.
- If a Chance Find is a verified cultural heritage site, prepare a final Chance Finds report once treatment has been completed.
- While investigation is ongoing, co-ordinate with on-site personnel keeping them informed as to status and schedule of investigations, and informing them when the construction may resume.

If mitigation is required, then expedient rescue excavations will be undertaken by the ARCCH archaeological specialist, except in the case that the chance find is of international importance (i.e. Critical Cultural Heritage). If an archaeological site of international importance is encountered special care will be taken and archaeologists with the appropriate expertise in addressing the find will be appointed

11 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP)

11.1 INTRODUCTION

This chapter identifies the Environmental and Social Management Programs (ESMPs) that need to be prepared by CRBC and Kenya National Highways Authority (KeNHA) during different project phases. The Environmental and Social Management Programs will describe mitigation and performance improvement measures and actions that address the identified environmental and social risks and impacts of the Project.

More specifically, the management programs will:

- comprise a documented combination of operational procedures, practices, plans, and related supporting documents (including legal agreements) that are managed in a systematic way
- apply broadly across the Projects' design (KeNHA, CRBC and primary suppliers over which the CRBC has control or influence, or to specific sites, facilities, or activities)
- use the mitigation hierarchy to address identified risks and impacts, i.e. avoidance of impacts over minimization, and, where residual impacts remain, compensation/offset, wherever technically and financially feasible
- establish specific measures and plans – with clear timelines and main assigned responsibility as above - which will define desired outcomes and actions to address the issues raised in the risks and impacts identification process, as measurable events to the extent possible, with elements such as performance indicators, targets, or acceptance criteria that can be tracked over defined time periods, and with estimates of the resources for implementation
- describe feasible, cost efficient and sufficient measures to mitigate and monitor the impacts identified in the ESIA, during pre-construction, construction, and operation of the toll-road, in accordance to the requirements of the laws and regulations of the GoK
- provide technical details for each mitigation measure, including the type of impact to which it relates, the conditions under which it is required (e.g., continuously or in the event of contingencies), as well as preliminary design, equipment descriptions, and operating procedures, as appropriate
- assign institutional responsibilities for implementing and monitoring these risk mitigation measures/plans/actions, and estimate the resources required for their implementation, distinguishing the roles and responsibilities of KeNHA from the responsibilities that KeNHA will include in the concession agreement; the latter will translate into the ESAP
- take into account the Project RAP, as necessary.

11.2 ENVIRONMENTAL AND SOCIAL MANAGEMENT PROGRAMS

As part of its management program to cover environmental and social issues, the list of the plans that the CRBC will develop and implement include: -

- Contractor management plan
- Construction management, including contractors, sub-contractors, and primary supply chains
- Traffic Management Plan
- Labour Management Plan
- Occupational Health and Safety Plan
- Waste Management Plan
- Water Quality Management Plan
- Emergency and Spill Response Plan
- Air Quality Management Plan
- Noise Quality Management Plan
- Stakeholder Engagement Plan
- Grievance Redress Mechanism and Plan
- Community Health and Safety Plan
- Site closure and restoration
- Staffing to monitor the plans, including roles and responsibilities

- Monitoring, reporting and control of the plans
- Code of conduct for workers (with relevant requirements and sanctions)

11.3 SOCIAL MANAGEMENT PLANS

11.3.1 Land Acquisition and Involuntary Resettlement

11.3.1.1 Objectives

The objectives for management of physical and / or economic displacement are:

- Avoid and minimize physical and economic displacement by exploring alternative project designs.
- Mitigate and compensate adverse impacts from land acquisition or restrictions.
- Improve, or at least restore pre-Project livelihoods and standards of living for all Project-affected persons (PAPs).
- Establish standards of compensation that are transparent, consistent, and reflect the full replacement value of all impacted assets eligible for compensation.
- Guide the design of the resettlement process through free, open, transparent and informed engagement with Project-Affected persons.
- Establish grievance and conflict resolution mechanisms to address any grievances raised by PAPs or other stakeholders.

11.3.1.2 Project Activities Resulting in Land Acquisition and Involuntary Resettlement

Physical and / or economic displacement will result from the following activities:

- Temporary land acquisition during construction;
- Permanent land acquisition during construction;
- Noise impacts during operation; and
- Severance impacts during operation.

11.3.1.3 Responsibility

CRBC will lead on the resettlement activities but will require input from KeNHA and the National Lands Commission (NLC) and affected people amongst others.

The National Land commission (NLC) will address the resettlement activities and livelihood restoration programmes in coordination with KeNHA. CRBC on the other hand has commissioned a Resettlement Action Plan to be undertaken by Centric Africa limited. Detailed RAP report will be submmited to CRBC for submion to KeNHA.

11.3.1.4 Management Measures

The management measures outlined in Table 60 should be implemented to manage impacts associated with physical and / or economic resettlement.

Table 60: Management of Land Acquisition and Involuntary Resettlement

Aspect Activity	Management Measure	Timing and Frequency	Target / Performance Indicator
Physical and Economic Displacement.	A Resettlement Action Plan (RAP) or series of plans in line Kenyan legislation will be developed for the proposed Expressway to address issues associated with physical and economic displacement, loss of community infrastructure and other assets.	Prior to construction	Consistency between RAPs.
	The Project will adequately engage with affected persons based on the principles of informed consultation and participation as part of the development and implementation of the RAP process and content.	Prior to and throughout construction (RAP development and implementation)	Number of meetings helds Meeting Minutes
	A Grievance Mechanism will be developed, whereby affected people can raise issues and concerns associated with displacement and the RAP/ processes.	Prior to and throughout construction (RAP development and implementation)	Number of grievances received Grievance log Number of grievances resolved.
	RAP implementation will be monitored. As necessary corrective action will be put in place through implementation to achieve this outcome.	Prior to and throughout construction (RAP development and implementation)	KPIs will be developed as part of the RAPs for monitoring implementation.

11.3.2 Community Health Safety and Security Management Plan

11.3.2.1 Objectives

The Project is committed to ensuring the health, safety and security of all stakeholders who are affected by its activities including local communities and the broader public. Specifically, this plan aims to:

- Continuously identify, evaluate and prioritise the risks and impacts of proposed activities on the health, safety and security of local communities.
- Proactively prevent and avoid impacts to community health safety and security, and enhance any positive impacts related to community health and safety.
- Identify strategies that provide adequate health related information and prevention measures through which communities can manage their own health and safety.
- Implement security that protects Project employees, assets and business continuity in a manner that adheres to Kenyan legislation, and is consistent with the Voluntary Principles on Security and Human Rights (VPs).
- Avoid, minimise or compensate for the potential for community exposure to communicable and vector-borne diseases as well as accidents and injuries associated with site trespass and road traffic movements.

11.3.2.2 Project Activities Resulting in Impacts to Community Health Safety and Security

Project activities that could result in impacts to Community Health, Safety and Security include:

- Interaction between the workforce (particularly none-local workers) and communities.
- Presence of opportunistic job seekers in communities.
- Management of worker camps and work site notably hygiene, sanitation, waste management, environmental changes etc. that could lead to the creation of breeding grounds etc.
- Presence of work sites with large machinery and other equipment/ supplies that could result in accidents and injuries in case members of the public access the site.
- Movement of Project related traffic during construction.

These activities have the potential to create new breeding grounds for vectors and increase the circulating pool of diseases thereby facilitating transmission of diseases in the local community.

11.3.2.3 Responsibility

During construction, CRBC will be responsible for the implementation of the mitigation measures and development of any corrective actions.

11.3.2.4 Performance Criteria

- No increase in cases of communicable and vector borne diseases above baseline levels.
- No change in the peak season for vector borne diseases notably malaria.
- No increase in the number of cases of sexually transmitted diseases.
- No outbreaks of diseases associated with construction activities.
- Zero road traffic or site based accidents during construction involving community members or assets.
- Zero incidents of use of excessive force by security personnel.
- No change in access to health care facilities for communities.

11.3.2.5 Management Measures

The management measures included in Table 61 will be implemented to reduce community health safety and security related impacts from the Project

Table 61: Community Health Safety and Security

Aspect Activity	Management Measure	Timing and Frequency	Target / Performance Indicator
Vector Borne and Communicable Diseases			
Prevention of Transmission of Vector Borne and Communicable Diseases	Workers will receive training as part of their induction and then at least every 6 months on potential high risk communicable and vector borne diseases, symptoms, preventative measures and transmission routes as well as treatment options. This will be particularly important for diseases with which non-local workers are unfamiliar and in case of any emerging disease outbreaks.	Throughout construction	100% of workers receiving training
	In the event of a new disease, increased transmission or outbreak compared to the baseline, the Project will interact with local health care facilities and workers to ensure there is an appropriate response in place. This may involve community education and awareness, training of health care workers etc.	Throughout construction	Response plans in place to address disease outbreaks.
	A Worker Code of Conduct will be developed providing a camp code of behaviour including worker-worker interactions, worker-community interactions and development of personal relationships with members of the local communities. This would apply to all Project workers and visitors to any Construction Camps.	Throughout construction	100% of workers received training. 6 monthly audit of camp showing 100% compliance with required measures.
	Accommodation will be provided to workers in accordance with international good practice on workers' accommodation, to prevent transmission of diseases associated with poor living conditions.	Prior to and throughout construction	6 monthly audit of camp showing 100% compliance with required measures.
	At worker accommodation and sites the following will be implemented at a minimum in order to minimise disease transmission: • Providing workers with appropriate sanitary facilities, which are appropriately designed to prevent contamination. • Developing a robust waste handling system to avoid the creation of new vector breeding grounds or attracting rodents to the area. • Implementing measures to reduce the presence of standing water onsite through environmental controls and source reduction to avoid the creation of new breeding grounds. • Ensuring the worker camp is kept clean and free from any accumulation of wastes as well as supplied with clean potable water. • Ensuring appropriate food preparation and monitoring measures are in place. • Providing insecticide-impregnated bed nets as a physical barrier to repel and kill mosquitos for workers that have been provided accommodation. • Monitoring to ensure that all standards are being met by the relevant departments.	Throughout construction	6 monthly audit of camp showing 100% compliance with required measures.
	The workforce will be provided with access to treatment at health facilities on site/ at Construction camps. The requirements for these health facilities will be based on a risk	Prior to and throughout	6 monthly audit of health facilities showing 100%

Aspect Activity	Management Measure	Timing and Frequency	Target / Performance Indicator
	assessment taking into account access to existing health facilities and travel time to facilities that offer international standards of care. Access to health care will include direct employees, sub-contractors and employees of the supply chain working on based on site.	construction	compliance with required measures.
	Pre-employment screening protocols will be put in place. This will include pre-employment medicals and follow up medicals as appropriate. The screening protocols will consider heath conditions related to the nature of the work undertaken, employees country of origin and legal requirements. Workers will not be denied employment on the basis of the outcomes of the screening but will be provided treatment or alternative roles as appropriate.	Prior to and throughout construction	100% of workers having received pre-employment screening.
	The Project will prepare and implement a vector borne disease management plan focussing on malaria, which includes vector control, avoidance, diagnosis, treatment and training.	Prior to and throughout construction	100% compliance with measures in plan.
	The Project will implement TB prevention measures including testing and referral for treatment for all personnel working on the Project. This approach will be explained clearly to the workforce along with making it clear that there are no consequences for their employment.	Prior to and throughout construction	100% compliance with measures in plan.
	The Project will monitor the emergence of major pandemics through World Health Organisation (WHO) alerts and in the event of a pandemic review mobilisation and demobilisation of ex-patriate Project personnel and / or implement appropriate control measures and Emergency Response Plans.	Throughout construction	ERP in place and implemented as needed.
Sexually Transmitted Diseases			
Prevention of Transmission of Sexually Transmitted Diseases	Provisions in Contract To Be Included		
	The Project will develop an STD Management Plan designed to minimise the spread of HIV infection and other STDs. The plan will be prepared with the assistance of a specialist in sexually transmitted diseases. A typical plan would include, among other things, the following measures: • An HIV/AIDS training course and on-going education on transmission of HIV/AIDS and STDs, to employees, through workshops, posters and informal information sessions; • Encouragement of employees to determine their HIV status; • Supply of condoms/ femidoms at the construction site(s)/ Construction Camps; and • Development of a comprehensive Construction Camp Management Plan, including rules for on-site behaviour, entrance and exit policies and prohibition of sex workers on site.	Prior to and throughout construction	100% compliance with measures in plan.
	As part of STD Management Plan, information will be provided to workers on STD prevalence rates in Kenya and/ or the relevant Counties as well as the expectations of local communities if a women is made pregnant by a worker (e.g. marriage, financial implications etc.).	Prior to and throughout construction	100% of workers receiving training

Aspect Activity	Management Measure	Timing and Frequency	Target / Performance Indicator
	Workers will have access to confidential health care for the treatment of STDs through medical facilities/ health care at Project sites.	Throughout construction	100% of workers with knowledge about access to treatment.
	The Project will partner with other NGOs and CBOs to support the provision of information, education and communication campaigns around safe sexual practices and transmission of STDs. These activities will be focussed in Locations where construction camps are located or where drivers rest.	Throughout construction	Partnerships in place at high risk locations.
	The Project will consult with local leaders such as Area Chiefs, village elders and Nyumba Kumi leaders among others. The consultations will be aimed at finding ways of ensuring social vices such as prostitution are minimised either through punitive or rehabilitative measures for the CSWs and their clients.	Prior to and throughout construction	No reported increased in numbers of CSWs. No reported increases in other social vices.
	A Grievance Mechanism will be developed, whereby affected people can raise issues and concerns associated with social vices, prostitution and the behaviour of workers and drivers.	Throughout construction	Number of grievances received about social vices. Number of grievances resolved.
Construction Traffic Movements			
Prevention of construction traffic accidents	CRBC to provide: Contractual commitments about road safety during operation – likely to be mainly linked to design, signage etc. >>		
	A Traffic Management Plan (in line with international best practice for vehicle movements, likely routes and associated risk assessment) will be developed and implemented including consideration of: • Safe worksite layouts; • Vehicle safety equipment standards (e.g. seat belts and first aid kits); • Driving rules (e.g. speed limits, hours of driving, required breaks, carrying passengers and use of mobile phones/ radios); • Driver qualifications and selection (e.g. defensive driving courses, accident history and 'practical' interviews to test skills); • Driver education and training (awareness raising, information on required standards and review of incidents); • Vehicle inspection and maintenance (in line with international standards for vehicle roadworthiness); • Accident/ incident reporting and investigation; and • Disciplinary procedures.	Prior to and throughout construction	100% compliance with measures in plan.
	The Project will ensure that all driver candidates meet specific requirements, including but not limited to: • Possessing a valid licence to drive each type/class of vehicle required; • Minimum 2 years driving experience; • An accident-free driving record;	Prior to and throughout construction	100% of drivers employed meeting requirements.

Aspect Activity	Management Measure	Timing and Frequency	Target / Performance Indicator
	• Pass an eye chart exam; and • Attend and complete driver safety education and training course.		
	During the construction phase, arrangements and routes for unusual/ wide loads (if required) will be agreed in advanced with the relevant authorities such as the Kenya National Transport Safety Authority (NTSA) and the appropriate permit will be obtained for the use of public roads.	Prior to and throughout construction	Agreements with NTSA in place.
	The Project will conduct an ongoing traffic safety awareness campaign during the construction period, particularly in those communities where construction vehicles will be most active. The awareness training will be repeated in villages as construction moves into their areas.	Prior to and throughout construction	Records of stakeholder engagement meetings.
	The Project will undertake mass transport of workers in the safest way possible; this will include movement of workers to construction areas as part of mobilisation and daily movements from camps to worksites.	Throughout construction	Zero road traffic accidents
	In the event of an accident in which a community member is harmed, CRBC will assume the responsibility for transporting the injured person to an appropriate health facility capable of dealing with the injuries, and will cover the cost of the person's medical treatment.	Throughout construction	Number of people assisted with treatment. Zero road traffic accidents
	Accident reporting and investigation procedures will be developed to determine root causes and identify corrective measures to reduce the risk of the accident happening again.	Throughout construction	100% incident and accident investigation closed out in 60 days. Zero road traffic accidents
	A Grievance Mechanism will be developed, whereby affected people can raise issues and concerns associated with vehicle movements, driver behaviours and report accidents or damage to property they feel are caused by CRBC vehicles.	Throughout construction	Number of grievances received about traffic movements. Number of grievances resolved.
Community Safety and Security			
Protection of Community Safety and Security	Project security will comply with Kenyan laws and regulations as well as the requirements of the Voluntary Principles for Security and Human Rights. The security will include, among other things, selection or personnel based on a careful background screening, training with regards to human rights requirements, and monitoring of performance.	Throughout construction	100% of security personnel recruited in line with the requirements of the Voluntary Principles. Zero incidents of use of excessive force by security personnel. Zero grievances related to the behaviour of security

Aspect Activity	Management Measure	Timing and Frequency	Target / Performance Indicator
			personnel.
	The Project will implement a Security Management Plan containing measures to protect the Project facilities and personnel against potential violent protest or social unrest and to train security personnel in safeguarding of community human rights.	Prior to and throughout construction	100% compliance with measures in plan. Zero incidents of use of excessive force by security personnel. Zero grievances related to the behaviour of security personnel.
	High-risk or value elements of construction sites will be fenced to minimise the risk of trespass and robbery. In addition, clear and visible signage will be put in place where appropriate to advise community members of the risk of site trespass.	Throughout construction	Fencing and signage in place Zero incidents of site trespass Zero incidents of robbery
	Sensitise local community members prior to the commencement of the construction phase so that they are aware of presence and role of security guards, the risk of site trespass and how to interact with the Project in the event of any concerns or issues.	Prior to and throughout construction	Records of stakeholder engagement meetings.
	The Project will consult with local leaders such as resident associations, Area Chiefs, village elders and Nyumba Kumi leaders among others. The consultations will be aimed at finding ways of ensuring trespass and attempted robbery are minimised either through punitive or rehabilitative measures.	Prior to and throughout construction	Zero incidents of site trespass Zero incidents of robbery
	The Project will develop and implement a grievance mechanism to address any security related grievances.	Throughout construction	Number of grievances received about security issues. Number of grievances resolved.

11.3.3 Employment and Procurement Management

11.3.3.1 Objectives

The Project is committed to ensuring the rights and health and safety of all workers are respected and protected including those who are employed by subcontractors and within the supply chain. This Management Plan has been developed taking into account the requirements of Kenyan law and seeks to:

- Promote fair and transparent employment and procurement practices.
- Promote reasonable working conditions including health and safety at work, working hours, contracts etc.
- Ensure the fair treatment, none-discrimination and equal opportunities of all workers.
- Protect Project workers including vulnerable workers from labour abuses.
- Prevent the use of all forms of forced and child labour.
- Support the principles of freedom of association and collective bargaining.
- Provide workers with a means to raise workplace concerns.
- Ensure that worker accommodation is provided in line with international best practice.
- Manage retrenchment of workers.

11.3.3.2 Project Activities Associated with Employment and Procurement

Regardless of if people they are direct employees, subcontractors or within the supply chain, workers can be affected either by exposure to insufficient health and safety standards or exposure to insufficient labour and working standards. Exposure to insufficient standards increases the risks of accidents, injuries or of workers not receiving fair treatment.

11.3.3.3 Responsibility

CRBC is responsible for ensuring the labour and working conditions of all Project employees (direct employees, sub-contractors and workers in the supply chain) are in line with the requirements of Kenyan law.

11.3.3.4 Performance Criteria

- Fair and Transparent recruitment and procurement procedures are in place.
- Workforce is diverse (men/women) and reflects the project corridor residents
- Zero incidents of use of any form of forced or child labour (direct employees, subcontractors or in the supply chain).
- All workers have a contract in line with Kenyan Law outlining the terms and conditions of employment.
- Accommodation for workers (direct employees, subcontractors or in the supply chain) is provided in line with international best practice.
- Zero incidents of discrimination of workers reported this should include equal pay should be provided for equal work.
- All workers have the right to associate and collectively bargain.
- Normal working hours do not regularly exceed 48 hours per week and none-rotational workers receive a minimum of one day off following every 6 days of working.
- All overtime is voluntary and does not regularly exceed 12 hours per week.
- Wages for all workers are aligned with minimum wages and minimum industry standards.
- Policies in place related to discrimination, worker rights, freedom of association, use of forced and child labour etc.
- Worker Grievance Mechanism should be in place and implemented.
- Retrenchment planning should be in place and implemented.

11.3.3.5 Management Measures

The management measures outlined in Table 62 should be implemented to manage impacts associated with employment and procurement

Table 62: Management of Employment and Procurement

Aspect Activity	Management Measure	Timing and Frequency	Target / Performance Indicator
Recruitment and Procurement			
Recruitment of Workers and Procurement of Goods and Services	CRBC will prioritise the recruitment of workers and procurement of goods and services from within the Counties then to national companies. This will not apply to the provision of highly technical equipment.	Prior to and throughout construction	Percentage of workers employed from the affected counties by skills level. Percentage of suppliers based in the affected counties by value of contract.
	The Project will develop a fair and transparent employment and procurement policy and processes to avoid any potential for nepotism or favouritism. The policy will be shared with the local community members and leadership.	Prior to and throughout construction	Percentage of workers employed from the affected counties by skills level. Percentage of suppliers based in the affected counties by value of contract. Percentage of employees or suppliers related to local Chiefs/ village elders etc.
	A Local Recruitment Procedure will be developed by CRBC, which outlines the percentage of skilled, semi-skilled and unskilled employment that should be sourced from the Locations and Counties along route. For unskilled workers this target will be set as high as possible i.e. at least 90%. The procedure will also include requirements for recruitment of vulnerable groups (women, indigenous people and disabled workers) to ensure equal opportunities, involvement of local Chiefs in ensuring local employment is achieved, no hiring of workers at the gate etc. The requirements of this procedure will form part of the Conditions of Contract with subcontractors.	Prior to and throughout construction	90% of unskilled workers from County being constructed in. Percentage of workforce who are women or from other vulnerable groups. Percentage of workforce who were employed following Chiefs input. Zero workers hired at the gate. Any additional measures included in the plan.
	CRBC will notify identified representatives of the County Government and Local Administration (i.e. the Location Chiefs) of the specific jobs and the skills required for the Project, prior to the commencement of construction phase. This will give the local population time to prepare and apply for the available job opportunities on time. This is mainly applicable to unskilled and semi-skilled workers who will be locally sourced.	Prior to and throughout construction	Meeting minutes. Percentage of workers employed from the affected counties by skills level. Percentage of suppliers based in the affected counties by value of contract.
	Employment and procurement opportunities will be publically advertised in appropriate newspapers, public libraries, County Offices and Chiefs Offices and in all relevant languages in a timely manner, to allow fair competition.	Prior to and throughout construction	Evidence of such advertisements.
	There will be no requirement for applicants to make payments for applying for, or securing, employment on the Project.	Prior to and throughout	Zero workers / community members reporting making such

Aspect Activity	Management Measure	Timing and Frequency	Target / Performance Indicator
		construction	payments or submitting grievances about requests for payments.
	The Project will ensure that recruitment procedures are transparent and monitored to ensure that those recruited present their actual experience, geographical location, health status, and age and that requirements for local employment are being met.	Prior to and throughout construction	90% of unskilled workers from County being constructed in. Percentage of workforce who are women or from other vulnerable groups. Percentage of workforce who were employed following Chiefs input. Zero workers hired at the gate.
	The Project will develop and implement a program of up-skilling, training and development for workers to assist them in accessing opportunities associated with the Project and in finding work following completion of their contracts.	Prior to and throughout construction	Number of workers or companies who have received training
	The Project will provide training on health and safety and quality standards required by the Project for provision of goods and services to the Project to ensure that local businesses have the opportunity to benefit.	Prior to and throughout construction	Number of workers or companies who have received training
	The Project will ensure that contracts are unbundled to allow a number of small businesses to provide goods and services rather than the supply being monopolised by one larger subcontractor.	Prior to and throughout construction	Number and value of contracts.
Management System			
Management of Labour and Working Conditions	The Project will develop a Human Resources Policy and Plans. This will include a Labour and Employment Plan and Worker Grievance Mechanism. These requirements will also be passed on to any subcontractors. Key issues with the Human Resource (HR) management will include, but not be limited to the following: • Provision of clear and understandable information regarding rights under national labour and employment law, and any applicable collective agreements, including those related to hours of work, wages, overtime, compensation, etc. • Provision of reasonable working conditions and terms of employment. • Provision of adequate accommodation (where relevant). • Provision of employment, compensation/remuneration and working conditions, including working hours, based on equal opportunity and fair treatment, avoiding discrimination on any aspects. • Provision of adequate welfare facilities on site. • Implementation of a grievance mechanism for the Project workers. • Adoption and implementation of a sexual harassment policy. • Adoption of open attitude towards freedom of association.	Prior to and throughout construction	Zero grievances related to labour and working conditions, which breach law. Contracts in place for all workers in line with Kenyan Law Monitoring and audit of implementation of contracts. Workers reporting fair and equitable working conditions. Evidence of freedom of association and right to collective bargaining.
	The Project will develop a H&S programme which will include risk assessments (such as working at heights, confined space machine guarding), work permit systems and a H&S management system, in line with industry best practice, including worker performance	Prior to and throughout construction	Zero grievances related to labour and working conditions, which breach law.

Aspect Activity	Management Measure	Timing and Frequency	Target / Performance Indicator
	safety tracking (safety observations) to assure worker safety. All workers will receive induction and continuous training regarding this system.		Zero fatalities involving workers on site. Zero Lost Time Incidents involving workers on site. 100% of workers receiving induction and training related to their position.
	The Project will develop a Retrenchment Plan to assist workers in finding alternative work following completion of the construction activities relevant to each Section of the proposed Expressway alignment.	Prior to and throughout construction	Percentage of workers who find alternative work after being retrenched by skills level. raining received.
Subcontractor and Supplier Management			
Management of Suppliers and Subcontractors	Subcontractor and Supplier Contracts will make explicit reference to the need to abide by Kenyan law and the ratified ILO conventions and the Project Proponent's policies relating to health and safety, labour and welfare standards.	Prior to and throughout construction	100% of contracts with suppliers and subcontractors including these requirements. Ongoing monitoring to ensure implementation.
	As part of the subcontractor and supplier selection process, CRBC will take into consideration performance with regard to worker management, worker rights, health and safety as outlined in Kenyan law and the CRBC policies.	Prior to and throughout construction	Due diligence reports for all subcontractors and suppliers. Subcontractorsand suppliers with poor findings not contracted.
	CRBC will provide support to subcontractors and suppliers to ensure that labour and working conditions are in line with Kenyan legislation through gap analysis, awareness raising and information provision, as necessary.	Prior to and throughout construction	Training provided to subcontractors and suppliers on these issues.
	Regular checks / audits by CRBC will be undertaken to ensure the relevant labour laws are adhered to at all times.	Prior to and throughout construction	Audit reports of all subcontractors and suppliers. Corrective actions identified and closed out in the time required.
Workers' Rights			
Protection of Workers Rights	CRBC will ensure no employee or job applicant is discriminated against on the basis of his or her gender, marital status, nationality, ethnicity, age, religion or sexual orientation.	Prior to and throughout construction	Percentage of workforce who are women or from other vulnerable groups. Zero grievances from workers or job seekers related to discrimination.
	All workers (including those of subcontractors) will, as part of their induction, receive training on worker rights in line with Kenyan legislation to ensure that positive benefits around understanding labour rights are enhanced. This process will be formalised within the Code of Conduct that would be provided by CRBC.	Prior to and throughout construction	100% of workers having received training on their rights. Workers being able to describe their rights as part of ongoing

Aspect Activity	Management Measure	Timing and Frequency	Target / Performance Indicator
			monitoring.
	All workers (including those of subcontractors and suppliers) will have contracts, which clearly state the terms and conditions of their employment and their legal rights. These contracts will be aligned with Kenyan labour law, the ILO core conventions . Contracts will be verbally explained to all workers where this is necessary to ensure that workers understand their rights. Contracts will be in place prior to workers leaving their home location if applicable.	Prior to and throughout construction	100% of workers having contracts in line with Kenyan Law. 100% of workers having received training on their rights. Workers being able to describe their rights as part of ongoing monitoring. Zero grievances related to contractual conditions not being implemented.
	The Project will put in place a worker grievance mechanism that will be accessible to all workers, whether permanent or temporary, directly or indirectly employed. The worker grievance mechanism will be open to CRBC and the subcontractor workforce in the event that their grievance is not adequately resolved by their direct employer. CRBC would then have the authority to act to resolve this grievance.	Throughout construction	Number of grievances received by direct employees, subcontractors and suppliers. Number of grievances resolved within 60 days. Number of grievances received on a theme.
	All workers (including those of CRBC and the subcontractor) will have access to training on communicable diseases and STDs and community interactions in general.	Prior to andthroughout construction	100% of workers having received induction training. Percentage of workers having received regular training.
	Accommodation will be provided to workers in accordance with international good practice on workers' accommodation to prevent transmission of diseases associated with poor living conditions.	Prior to and throughout construction	Monthly inspections showing no breaches of requirements. Grievances or issues related to camps/ accommodation raised by workers to be closed out in 14 days (or less).
	CRBC will undertake surveillance and assurance that no children or forced labour is employed directly, and to the extent possible by third parties related to the Project and primary suppliers where such risk may exist.	Prior to and throughout construction	Zero cases of forced or child labour found in direct employees, sub-contractors or suppliers.

11.3.4 Social Cohesion and Connectivity Management

11.3.4.1 Objectives

The objectives for social cohesion and connectivity management are to:

- Avoid impacts associated with severance of communities due to the presence of the proposed Expressway.
- Avoid changes in social networks and therefore social cohesion, which will negatively impact on the lives of people along the proposed Expressway.

11.3.4.2 Project Activities Associated with Impacts to Social Cohesion and Connectivity

The construction of the proposed Expressway will restrict access between communities, towns and livelihood activities section 1.

The construction sites and then fencing along the road will result in severance of communities from other neighbouring communities (and associated support networks), social and health infrastructure and services and markets.

The construction of the proposed Expressway will also result in societal change associated with the presence of the Project workforce and potential for opportunistic immigration.

11.3.4.3 Responsibility

During construction, CRBC are responsible for the implementation of the mitigation measures and development of any corrective actions.

11.3.4.4 Performance Criteria

- A8 operation in terms of U turns and other crosses linked in expressway design, which will allow people to access social networks, infrastructure and services.
- No increase in travel times for communities along the route.

- *Management Measures*

The management measures outlined in Table 63 should be implemented to manage impacts associated with Social Cohesion and Connectivity

Table 63: Management of Social Cohesion and Connectivity

Aspect Activity	Management Measure	Timing and Frequency	Target / Performance Indicator
Severance			
Maintain junction, crossings and u turns	During construction, temporary crossing points will be provided for communities. The distance between the crossing points may vary depending on the Section and existing land uses but should not require people to walk more than an additional 2km in total to access services etc.	Prior to and throughout construction	Crossing points provided for all existing roads and tracks.
	The Project will adequately engage with affected persons based on the principles of informed consultation and participation regarding severance impacts and mitigation.	Prior to and throughout construction	Stakeholder meetings minutes.
	A Grievance Mechanism will be developed, whereby affected people can raise issues and concerns associated with severance during construction and operation, including any unforeseen impacts.	Throughout construction	Number of grievances received regarding severance. Number of grievances closed out within 60 days.
Social Cohesion			
Maintain social cohesion	Sensitise local community members prior to the commencement of the construction phase so that they are aware of presence and role of security guards, the risk of site trespass and how to interact with the Project in the event of any concerns or issues.	Prior to construction	Stakeholder meetings minutes.
	The Project will consult with local leaders such as residents association, Area Chiefs, village elders and Nyumba Kumi leaders among others. The consultations will be aimed at finding ways of ensuring social cohesion is maintained and that people have equal access to development benefits.	Prior to and throughout construction	Stakeholder meetings minutes.
	The Project will develop and implement a grievance mechanism to address any grievances related to social cohesion and equitable sharing of benefits including recruitment of employees.	Throughout construction	Number of grievances received regarding social cohesion issues. Number of grievances closed out within 60 days.
	The Project will communicate its recruitment strategy early and broadly to minimise opportunistic migration this will include: • No hiring of job seekers on site or at the gate; • No procurement on site or at the gate; • Employment selection should involve local leadership to verify people are from the area; and • Maximising local content in procurement i.e. from local people and towns, whenever possible, and whenever Project requirements are met.	Prior to and throughout construction	Stakeholder meetings minutes.
	Information meetings will be held with County and Local Government, explaining the negative impacts of population influx, the company's recruitment policy and verification process for appointing only local people for unskilled work, harnessing their support to reduce influx of work and opportunity seekers.		

Aspect Activity	Management Measure	Timing and Frequency	Target / Performance Indicator
	All unskilled employment will be from affected Counties. Fair and transparent selection processes will be developed and communicated.		
	Community leaders and residents may have expectations that the proposed Expressway will play a supporting and developmental role within the area and that the Project will have other positive economic benefits. In order to encourage realistic expectations, close communication should be maintained between local communities and the Project to manage such expectations.		

Table 64: Pre-construction and Construction Monitoring Measures (CRBC Responsibility)

Monitoring Measure	Responsibility	Timing and Frequency	Target / Performance Indicator
Community Health, Safety and Security			
Health Surveillance and Monitoring System*:* To record health details, identifying actions or follow-up where necessary, and the type of healthcare that is being sought. This information will be used to identify the emergence of any health concerns or trends, which need to be proactively managed. Records will be kept strictly confidential.	Contractor (Construction Camp Health Facility Manager) Contractor (HSSE Manager)	Throughout construction Data should be reviewed quarterly	• Number of cases of communicable diseases in total and by disease. • Number of cases of vector borne diseases in total and by disease. • Number of cases of STDs in total and by disease. • Number of cases of Diarrhoeal diseases. • Number of cases referred for treatment at other health facilities. • Number of cases of any new or novel diseases in the area. • Percentage of workers that have received pre-employment health screening
Health Education and Training Database*:* To record details of the health education and training provided to Project workers and other stakeholders. This information will be used to determine the success of the training and the need to amend training and information in light of diseases that occurring.	Contractor (HSSE Manager)	Quarterly throughout construction	• Records of training topics delivered. • Records of attendees by grade and location with aim of 100% of workers receiving training • Results of tests undertaken as part of the training to determine level of understanding of participants – 'pass rate' should be over 75%.
Traffic Database: This will log all vehicles entering or leaving the site, registration number, drivers and passengers' names, date and time of arrival and departure etc., accidents or non-compliance related to traffic and training provided to workers and community related to road traffic.	Contractor (HSSE Manager) Contractor (Traffic Manager)	Quarterly throughout construction	• Number of drivers trained. • Number of community members/ stakeholders training on road safety. • Number of RTAs involving Project vehicles. • Number of incidences of speed exceedances. • Number of vehicles that fail inspections for roadworthiness.
Grievance Mechanism*:* Will log all grievances, issues and concerns raised. The system will also include areas to record information on actions required to address issues, timeframes, personnel responsible and any subsequent feedback that is required.	Contractor (public Relations Manager)	Quarterly throughout construction	• Number of grievances received related to disease transmission, access to health care facilities and road traffic accidents. • Percentage of grievances resolved within 60 days.
Stakeholder Engagement Database*:* Will be used to track and record the dates, minutes and attendance at engagement activities. In addition the database will be used to log relevant stakeholders and contact details. Actions agreed along with timeframes will also	Contractor (Community Relations Manager)	Quarterly throughout construction	• Number of stakeholder engagement meetings held with stakeholders related to community health, safety and security. • Number of actions from stakeholder meetings

Monitoring Measure	Responsibility	Timing and Frequency	Target / Performance Indicator
be logged and tracked.			closed with 60 days.
Employment and Procurement			
Recruitment and Procurement: The Project needs to demonstrate it is meeting commitments to maximise local employment and procurement across all the Sections of the proposed Expressway and for skilled, semi-skilled and unskilled workers using a fair and transparent procedures.	Contractor (HR Manager)	Quarterly throughout construction	• Percentage of the skilled, semi-skilled and unskilled workforce hired from within the relevant affected Location and County. • Percentage of skilled, semi-skilled and unskilled workforce hired from within Kenya. • Percentage of procurement of goods and services from affected Locations, Counties and Kenya respectively. • Percentage of employees or suppliers related to local Chiefs/ village elders etc. • Zero hiring / procurement at the gate.
Occupational Health and Safety (OHS)*:* The OHS system will include a variety of plans and procedures depending on the activities being undertaken and associated risks. Staff will also receive training on this and incidents and accidents recorded and investigated. Implementation of the OHS system will be monitored to ensure that it is being implemented appropriately and that risks are being managed. This will include regular (daily) site walk overs to observe behaviours and more detailed weekly checks of performance. Accident and incident data will be reviewed monthly to spot trends where further H&S measures or training may need to be implemented.	Contractor (HSSE Manager) Contractor (Site Managers(s))	Monthly throughout construction	• Percentage of workers (direct employees, subcontractors and suppliers) that have received OHS induction prior to working on site. • Percentage of workers (direct employees, subcontractors and suppliers) that have received task specific training. • Percentage of workers attending toolbox talks. • Number of stop work notices issued by activity. • Number and type of non-compliances observed during daily and weekly site walkovers. • Percentage of workers that receive PPE (without payment). • Zero fatalities involving workers on site. • Zero Lost Time Incidents involving workers on site. • Number of minor accidents and injuries. • Number of incidents investigated, corrective actions identified and closed out/ not closed out within month.
Retrenchment Plan: The aim of the plan is to assist workers to find alternative incomes following construction such that their livelihoods are improved.	Contractor (HR Manager)	Six months after significant retrenchment of workers	• Percentage of workers who find alternative formal work after being retrenched by skills level. • Percentage of workers that receive training or other support identified in the plan.
Supplier and Subcontractor Manager: The Project needs to monitor the performance of suppliers and subcontractors in relation to labour and working conditions to ensure workers rights are being	Contractor (Procurement Manager)	Bi-annually throughout construction	• Due diligence performed on all suppliers and subcontractors related to labour and working conditions prior to being contracted.

Monitoring Measure	Responsibility	Timing and Frequency	Target / Performance Indicator
protected. Where issues are identified the Project needs to work with the supplier or subcontractor to develop remedial action	Contractor (HSSE Manager)	(depending on size of the contract)	• Percentage of suppliers and subcontractors hired without due diligence being undertaken. • Percentage of suppliers and subcontractors hired where due diligence has identified issues. • 100% of contracts including clauses on labour and working conditions in line with Kenyan Law • 100% of suppliers and subcontractors audited once contracted. • Number of non-conformities identified by supplier/contractor and theme (e.g. discrimination, working hours, remuneration, H&S). • Number of non-conformities not closed out in the agreed timelines. • Number of suppliers/ contractors removed from the Project due to failure to address non-conformities. • Number of grievances raised relating to labour and working conditions by supplier/contractor.
Workers' Rights: The Project needs to monitor that workers rights are being respected in line with the requirements of Kenyan Law related to: working conditions, discrimination, equal remuneration, freedom of association, forced labour, child labour, grievance mechanism and worker accommodation (where provided).	Contractor (HSSE Manager) Contractor (HR Manager) Contractor (Site Managers(s))	Quarterly throughout construction	• Percentage of workforce who receive training/ induction on HR policies, plans and procedures. • Percentage of workforce who are women or from other vulnerable groups. • 100% of workers having contracts in line with Kenyan Law. • 100% of workers having received training on their rights as enshrined in law. • Results of 'tests' undertaken as part of the training to determine level of understanding of participants – 'pass rate' should be over 75%. Where this level of understanding has not been achieved further training on specific topics should be provided within a three month period. • Average number of hours worked per week. • Average number of days worked without a rest day (excluding rotational workers) • Average number of overtime hours worked per week. • Number of casual or day workers hired. • Percentage of workers that have joined a union or workers forum to raise issues. • Number of meetings of workers forums per

Monitoring Measure	Responsibility	Timing and Frequency	Target / Performance Indicator
			quarter. • Percentage of workers who are covered by a collective bargaining agreement. • Target of zero incidences of forced or child labour within direct employees, subcontractors and suppliers. • Monthly inspections of all accommodation provided completed. • Number of non-compliances identified related to accommodation • Number of non-compliances not closed out within 14 days. • Number of workers (direct employees and subcontractors) trained on the worker grievance mechanism. • Number of grievances resolved within 60 days. • Number of grievances received by theme. • Target of zero grievances from workers or job seekers related to discrimination, abuse of labour rights, sexual harassment.
Social Cohesion and Connectivity			
Severance Management: Community satisfaction with alternative routes around Construction Camps should be determined to avoid impacts.	Contractor (CR Manager)	After 2 weeks of new route being provided	• Number of grievances raised related to severance due to construction sites. • Number of stakeholder engagement activities undertaken regarding alternative routes. • Number of actions raised in stakeholder meetings and percentage closed out in agreed timeframe.

12 HANDLING OF PROJECT GRIEVANCES AND COMPLAINTS

12.1 INTRODUCTION

This section describes the overall approach to Project's grievance mechanism, including the role and responsibility of both KeNHA and CRBC.

The overall objective of the grievance redress mechanism is to establish an effective communication channel among the stakeholders for providing a timely and efficient two-way feedback mechanism to address any complaints made about the project, including those from members of the communities, local businesses and other stakeholders, as well as raising public awareness on the projects and on the availability of a grievance redress mechanism. The grievance redress procedure suggests resolution of grievances in the spirit of mediation between the parties, and will comply with the spirit of Kenya standards and practices.

KeNHA has put in place and implement a grievance redress mechanism for this project that will build on the Grievance Redress Mechanisms that it has already set up in the context of other projects, which they have worked thus far. This GRM will be harmonized with the GRM to be put in place as part of the Project Resettlement Action Plan (RAP) as well as the GRM to be established by the CBRC.

KeNHA GRM will detail the procedures that communities and individuals who believe they are adversely affected by the Project can use to submit their complaints, as well as the procedures that will be put in place to systematically register, track, investigate and promptly resolve complaints.

KeNHA, and CRBC, will each set up a focal point to handle Project activity-related complaints. Multiple access points (telephone, complaint box, website, email, text message, etc.) should be provided and advertised at subproject level so that beneficiaries have different ways to voice their concerns.

KeNHA will have the overall responsibility to address concerns brought to the attention of the focal points regarding any environmental and/or social impacts due to Project activities. Copies of complaints shall be recorded in the activity files and the progress reports, including the number and type of complaints and the results of their resolution.

12.2 GRIEVANCE REDRESS STEPS

12.2.1 Where to Report Complaints and Grievances

Several government and non-government agencies are mandated to receive complaints and grievances from the public and they include among others:

- The Office of the Ombudsman-This office is mandated to investigate the actions of public authorities including State Government departments, prisons, hospitals, schools and technical colleges, local governments, and public universities.
- Kenya National Human Rights Commission -The mandate of the KNCHR is to enhance the promotion and protection of human rights in Kenya.
- Ethics and Anti-Corruption Commission (EACC) of Kenya -Ethics and Anti-Corruption Commission gathers information on corruption occurring in Government and the public Sector from a variety of sources which include members of the public, heads of government departments and agencies, officials working in both the public and private sectors and the media
- County and Sub-County Offices -These offices promote and facilitate community participation in the development of policies and plans, and delivery of services in the county.
- Ministry of Interior and Coordination of National Government -This Ministry was created through the executive order No. 2/2013. It is charged with mandates, including; National government coordination at counties; Internal State functions; National Cohesion and Reconciliation Management; Chief Officers within the auspices of the Ministry include:

- the County Commissioners (CCs) and Deputy County Commissioners (DCCs),
- sub-county officers,
- chiefs/assistant chiefs

• Village Elders, Local Leaders and Politicians -These leaders represent community interests and disseminate them by providing leadership, identification of community concerns and fears and mobilization of the community for individual and community development.

• Kenya National Highways Authority -KeNHA has customer desk at projects office and at the Headquarters in Nairobi. Complains, comments, suggestions and concerns are received here by trained officers. The officers sort what is received and forward it to relevant officers. This is guided its service charter.

• National Land Commission -This is the body mandated by law to acquire land for public use. The commission addresses all land acquisition and valuations grievance.

• Kenya's Dispute Resolution Centre (DRC) -KeNHA could also use the Kenya's Dispute Resolution Centre (DRC), which is an independent, not-for-profit organization that promotes the prompt, effective and economic resolution of disputes through arbitration.

12.3 PROPOSED GRIEVANCE REDRESS MECHANISM

The following action lines will be considered:

- Identifying and engaging key stakeholders both in the community and the project
- Understanding the current environment
- Defining the scope of grievances and
- Determining the purpose and goals of a grievance mechanism.

KeNHA and CRBC will facilitate the community in forming Grievances Redress Mechanism Committees (GRMC) in the project area and within the locations that are traversed by the road project;

1. Identifying and engaging key actors in the community and the project -When establishing the grievances redress mechanism, KeNHA and CRBC will identify key stakeholders in the project area and seek for their support in the formation and operationalization of the mechanism. Effective stakeholder assessment will be necessary in order to identify leaders within the community who are trusted by the community. Therefore, people of decision making authority will be identified and approached for such cooperation. It will also be important to ensure that there is proper representation from different community segments, such as women, youth and people living with disability among others. Such diversity will help in making the GRM be easily understood, assist with communication and educating others on the need and importance of the mechanism. The process of identifying key stakeholders ensures that different players are committed to the process and that main decision makers are committed to the process and that they will respond to complaints quickly. Identification of key actors also build trust between the CRBC and the community and allows the parties to engage each other in a constructive manner.

2. Understanding the Current Environment -To understand the type of grievances and complaints existing in the project area, KeNHA and its CRBC will undertake an assessment of the grievances that are likely to arise and any existing local methods, procedures, or capacity to handle them. Understanding the current environment involves visiting the project area and the community frequently to determine what kind of concerns the community have on the project. This step will help in understanding the types of complaints and grievances that are likely to be arise and be addressed.

3. Definition of the Scope of Grievances -To describe the range of the grievances within the project area, it means visiting the community frequently and finding out how people are

affected by the daily operations of the project. The interaction of the project and the community forms the basis of scope of grievances and complaints.

4. Determine the on how to respond to grievances and complaints -To address complaints and grievances raised, KeNHA and CRBC will develop a plan or blueprint broken down into the following primary components.

5. Formation of a GRM Committee -The local committee (preferably location) with membership drawn from the identified stakeholders serves best. The core mandate of the committee is to receive complaints and submit them to the CRBC and KeNHA for resolution.

Local people need a trusted way to voice and resolve concerns linked to a development project, and companies need an effective way to address community concerns. A locally based grievance resolution mechanism provides a promising avenue by offering a reliable structure and set of approaches where local people and the company can find effective solutions together.

Development of Complaint and Grievances tools -To document people's grievances there is need to develop documents that will accommodate grievances raised. Such documents include:

- Complaint Form to be filled and filed by the complainant
- Complainants Register that contains all persons who have raised some grievances.
- Establishment of complaints collecting point or centre where aggrieved persons can walk and register their complaints or grievances.

Receive and register a complaint - When complaints and grievances are raised they will be:

- Received and acknowledged,
- Registered and filed for action
- Complaints is resolved and finalized
- Complaint is not resolved and finalized

Screen and Assess the Complaints.

- KeNHA receives and acknowledges receipt of grievances from CRBC
- Screens, assesses and resolves the complaints and grievances
- Screened and assessed grievances are not resolved and are referred to the GRM Committee for resolution.

Resolution by the Location GRM Committee -On receipt of the grievances from CRBC, the GRM Committee will:

- Receive and Acknowledge the receipt of the grievances
- Resolve and finalize the complaints
- Complaints and grievances not resolved and finalized but referred to Sub – County GRM Committee for resolution.

Resolution by the Sub -County GRM Committee

- Receive and acknowledge receipt of the grievance
- Resolves the grievance
- Does not resolve but refers it to KeNHA for resolution

Resolution by KeNHA - KeNHA arbitrates and resolves the grievance.

Standard prescribed forms including grievance registration form, grievance disclosure form, grievance log and grievance redress monitoring form will be used. Clearly indicate the focal persons (this will be Social and Environmental specialist for social and environmental grievances accordingly). The GM will clearly indicate how a complaint can be submitted. This

can be by a letter, verbally, email, telephone, SMS, WhatsAPP message, SMS etc. All grievances, suggestions/comments will be recorded in a Grievance Register by the Focal Person(s) / Complaint Handling Officer within specified working days of the receiving of the grievances. A unique number will be assigned to each grievance, suggestions, and comment

12.4 PROCEDURE FOR GRIEVANCES

The steps taken by the company for receiving and handling any such concerns are outlined below

1. STEP 1: Submitting a grievance to CRBC/Resident engineer

- A grievance can be submitted in a number of ways:
- During regular meetings held between communities and CRBC;
- Through the Local Consultative Forums established in the affected villages;
- During informal meetings with CRBC; Through communication directly with management – for example a letter addressed to site management, or other operational offices
- Directly by e-mail to RE/CRBC
- Placing a comment in the community suggestion boxes by dedicated fellows; and
- Through the Community Liaison Officer (CLO).
- For grievances that have been submitted informally, the CLO will arrange for a meeting where the grievance can be explained in full, written down, and agreed upon. For all grievances the CLO will be the main point of contact, responsible for updating the complainant about the process.

2. STEP 2: Logging the grievance

- Once a grievance has been received, it must first be logged in the grievance database register and the CLO will be informed. This register is a live document.

3. STEP 3: Providing the initial response

- The person/community/stakeholder that lodged the initial grievance will then be contacted within 3 days to acknowledge that CRBC has logged the complaint. This response will either accept or refute possible responsibility for the grievance.
- This notification will include details of the next steps for investigation of the grievance, including the person/department responsible for the case.

4. STEP 4: Investigating the grievance

- KeNHA will aim to complete investigation within two weeks of the grievance first being logged. Depending on the nature of the grievance, the approach and personnel involved in the investigation will vary. A complex problem may involve external experts for example. A simpler case may be easier, and quicker to investigate. CRBC will involve the aggrieved in this investigation, where possible, to ensure participation.
- KeNHA, through the CLO, will continually update the aggrieved on the progress of the investigation and the timeline for conclusion.

5. STEP 5: Concluding/resolving the grievance

- CRBC will outline the steps taken to ensure that the grievance does not re-occur. Consultation with aggrieved parties and views sought about company recommendations. If complainant is satisfied, then sociologist/CLO should seek their sign off from Resident Engineer and Project Manager.

6. STEP 6: Taking further steps if the grievance remains open

- If, however the grievance still stands then the CLO will initiate further investigation and determine the steps for future action. This will be referred to the Resident Engineer who will

constitute a team to determine a team to address the grievance and determine if the client must be notified.

12.5 RECORD KEEPING

All comment responses and, grievances are to be logged using the Comment Response, and Grievance logging forms and registers. This includes details of the comments/grievance, the commenter/aggrieved, and ultimately the steps taken to resolve the grievance. Hard copies of the form are to be kept at the project sites, whilst soft copies will be saved on the CRBC server. Any accompanying documentation e.g. written statements, photographic evidence, or investigation reports are to be filed along with the grievance log both in hard and soft copies. A master database will be maintained by the CLO to record and track management of all comments and grievances and audited by the CLSO. This will serve to help monitor and improve performance of the Comment Response and, Grievance Mechanism.

12.6 COMMENT RESPONSE AND, GRIEVANCE MECHANISM LOG

A sample format for logging summary details of each comment response and, grievance must be provided. As noted above hard and soft copies should be kept on file.

Note:

- If it is a comment, the commented will receive a copy if he/she requests one
- If it is a Grievance, the aggrieved shall always receive a copy once complete for their own records.

12.7 INITIAL RESPONSE TEMPLATE

The template is necessary for providing the initial response to the aggrieved only in the case of Grievances. This should be written on headed paper. This response must be sent within 3 days of the grievance being entered into the logbook.

It is vitally important to monitor the effectiveness of the comment response and, grievance mechanism. Appropriate measures/KPIs for this include monthly reporting on the number of grievances received, resolved and outstanding. This will be undertaken by the sociologist and reported to the resident engineer. As part of the annual review/report, analysing the trends and time taken for grievance resolution will help to evaluate the efficacy of the comment response and, grievance mechanism.

12.8 MONITORING AND REVIEW

As part of stakeholder engagement and consultation, involving the views of the stakeholders for whom the Comment Response and, Grievance Mechanism is designed in this monitoring and review will help to improve effectiveness and stakeholder buy-in.

13 CONCLUSION AND RECOMMENDATION

The aim of the ESIA for the Project is to provide information to inform decision-making that will contribute to sustainable development. This Report is submitted to the National Environment Management Authority (NEMA), to provide information and an independent assessment, thus enabling NEMA to make an informed decision regarding whether or not to grant an EIA licence for the Project to proceed, in accordance with the Environmental Management and Coordination Act (EMCA), 1999.

If granted, this Report will also assist NEMA to define under what conditions the development should go ahead. In considering the development of infrastructure projects such as roads, it is inevitable that there will be some negative environmental impacts. In addition, following a rigorous stakeholder engagement exercise, there is support for the Project.

Through the ESIA process, which included various stakeholder input, Centric has identified and assessed a number of potential impacts relating to the development. This Chapter therefore provides an overview of the ESIA findings and makes recommendations regarding key mitigation measures for the final Project Footprint.

The potential impacts associated with the development are summarised below and should be considered in the context of the Project rationale.

Key environmental and social concerns are;

- Accessibility to employment opportunities
- Business Continuity with minimal disruption during construction
- Destruction of the landscaped areas within the existing median
- Traffic congestion during the construction period
- Disruption of services (power/water/internet)owing to relocation of utilities
- Safety of Road Users during Construction
- Land Uptake

A sumaary of key issues and responses during the stakeholder engegament exercise as presented below in thematic areas

Aspect	**Concern**	**Response given**
Project design	access to businesses would be affected in regards to the number of lanes customers would have to cross to access their premises	Crossing points will be established along the expressway at designated points and the older footbridges will be reinstated
	What are the anticipated/estimated rates per KM that the proposed express way will be charging motorists? • Will the toll roads be used by private vehicles and trucks only or it will be open to public transport vehicles as well?	The National Transport Funding Policy (study undertaken in 2015) stipulated a toll tariff of KES 6/pcu/km which would be subject to adjustment due to inflation. The project has adopted an adjusted tariff of KES 11.24/pcu/km. The toll payable would be a fraction of savings realized from vehicle operations cost and not an additional cost Yes, this Project will be open to public transport vehicles except those trucks carrying dangerous goods/chemicals and motorcycles
	Why will the road be fenced?	This Project is a true toll road and it is a fully access controlled expressway. The road will be fenced to ensure smooth movement of vehicles and good driving

Aspect	Concern	Response given
		experience
	Why isn't the existing road being upgraded?	The construction of this project is actually an upgrade of the A8 road. However, we have used the central reserve of A8 to build new roads and formed two road systems, the Expressway and the existing A8 road, which are more conducive to the rapid traffic of the whole corridor
	How does the technical team plan to manage traffic during construction? traffic congestion during operation at toll station? .	Temporary access roads will be provided during construction period to ensure smooth movement of the existing A8 and instructions of diverging routes will be established as well. All toll stations have been carefully designed to ensure the delay of vehicles is under control and the smooth movement is guaranteed
	storm water drainage was catered for in the design to avert adverse occurrence such as witnessed on Thika Road	Careful studies are being done to address the issue and come up with effective designs.
	As the road will utilize medium section how will the U turns for existing A8 be kept functional for the A8 to operate normally	Several U-turns will be re-built during the construction of this Project to keep functional for the existing A8.
	The project will pose accessibility challenges to pedestrians using the footbridges, motorbikes and motorists using the various turning points around the road which will either be re-routed or completely be eliminated. How will this be managed? How many crossing points is planned for the expressway?	All existing footbridges will be retained or rebuilt near the original location. The existing U-turns and intersections of A8 form southern bypass interchange to James Gichuru road will be retained. Form Mlolongo to southern bypass interchange, pedestrians can do U-turn or cross by using the road under Nairobi Expressway viaduct.
	current drainage systems can be improved to facilitate proper drainage as part of the project scope because the current drainage systems are not working	Proper design work and levels will be taken to inform effective storm water drainage
	design of the expressway will take into consideration accesses to various premises to avoid interfering with flow of customers	Studies on traffic flow have been done so as to identify the traffic flows at various sections and this can help minimize interference on access to premises.
	Can the detailed design be shared with stakeholders?	The detailed designs is still under preparation, what is currently available is the preliminary design
Project affected persons	Is a land lessee a primary or secondary affected person?	The affected persons are categorized according to impact the project will have on them. Land owners are primary affected persons and those leasing from the land owners are secondary affected persons.
	When will the setting out of the road be done for project affected persons to know early	Once the detailed design is ready, it will be possible to know who is affected and how.

Aspect	Concern	Response given
	enough if affected and the extent, so they plan on a course of action in time	When that time comes, a separate meeting for PAPs will be convened
	details be shared with the actual project affected persons and in good time so that business owners can plan accordingly and in good time on the way forward for their businesses	The designs haven't been fine-tuned yet but once they are, the specific people who will be affected will be contacted again and engaged separately and in depth to come up with effective and timely solutions

13.1.1 Potential Impacts and Mitigation Measures

13.1.1.1 Positive Impacts

- The four-lane dual carriageway once completed will run over 27km, linking Mlolongo and Jomo Kenyatta International Airport (JKIA) to the Nairobi-Nakuru highway and it is expected to ease the flow of traffic in the city
- The operational stage of the Project is expected to improve connectivity for the transport of goods, services and people between in Nairobi and the entire northern corridor for a better economic growth potential of the region (indirect). This would include better accessibility for businesses in the region to expand their geographical markets and resources to other areas and countries.
- The project is also expected to enhance Competitiveness of the Kenya within East Africa Region and entrench Kenya's position as a business hub of choice, through enhanced Logistics efficiency at SGR Terminus, JKIA, ICD and Industrial Area.
- The project is also ecpected to significantly reduce response time to emergencies as the expressway will have dedicated emergency lanes on either side and reduced journey times for motorists and passengers travelling beyond Nairobi;
- There will also be expected benefits existing A8 users (Mombasa Road, Uhuru highway, Waiyaki Way) due to less congested created by expressway.
- Benefits will also be accrued to the country and business opportunities for local supply chain through enhancement of attractiveness of vast areas around Mlolongo and beyond for major real estate and industrial development through significant reduction in travel times to the CBD and international visibility for Kenya as destination for Foreign Direct Investment especially in Road infrastructure;
- The Project impact on connectivity and accessibility is therefore considered as Positive.
- The Project will generate tax revenue for the Kenyan government, which will contribute to the national budget. Tax revenues will be generated through income taxes and corporate taxes on expenditures, operational and corporate revenues and incomes of employees. Operational revenues will be generated primarily through toll fees on the expressway and Corporate Tax is estimated at USD371M.
- Project is expected to decongest traffic significantly and save hundred millions of shillings per year. (Kshs 50 million shillings lost daily from the delays and fuel wastage caused by traffic jams, and accidents especially in urban areas).
- Realisation of Vision 2030 & Big 4 Agenda (Mlolongo, Athi River, Kitengela, Konza City, Machakos will be further enabled to develop as industrial and business hubs including locations for affordable housing)

13.1.2 Analysis of impacts

The bio-physical and socio-economic impacts during the construction phase that have been identified and assessed in the ESIA include the following;

Impact	Significance (pre-mitigation)	Residual Impact
Impacts on Water Quality	MAJOR NEGATIVE	MODERATE NEGATIVE
Reduction in Water Availability	MAJOR NEGATIVE	MINOR NEGATIVE
Impacts on Soils	MAJOR NEGATIVE	MINOR NEGATIVE
Impacts on Local Air Quality	MAJOR NEGATIVE	MINOR NEGATIVE
Impacts on the Noise Environment (including vibration)	MODERATE NEGATIVE	MINOR NEGATIVE
Wastes and Effluents	MAJOR NEGATIVE	MINOR NEGATIVE
Impacts Flora	MODERATE NEGATIVE	NEGLIGIBLE NEGATIVE
Impacts on Fauna	MODERATE NEGATIVE	MINOR NEGATIVE
Impacts of material sites and borrow pits	MODERATE NEGATIVE	MINOR NEGATIVE
Impacts on Employment, Procurement and the Economy	POSITIVE	POSITIVE
Land Acquisition and Resettlement	MAJOR NEGATIVE	MODERATE NEGATIVE
Impact on Disease Transmission	MODERATE NEGATIVE	MINOR NEGATIVE
Traffic Impacts	MAJOR NEGATIVE	MINOR NEGATIVE
Insecurity	MODERATE NEGATIVE	MINOR NEGATIVE
Labour and Working Conditions	MODERATE NEGATIVE	MINOR NEGATIVE
Impact on Cultural Heritage	MODERATE NEGATIVE	NEGLIGIBLE NEGATIVE

The major mitigation/enhancement measures to address the more significant impacts for the construction phase include the following (for a comprehensive list of mitigation measures please refer to the ESIA report and Environmental and Social Management and Monitoring Plan, ESMMP):

- Regularly maintain the Project equipment as per the manufacturer's instruction to avoid the possibility of any leaks and spills.
- Do not undertake any maintenance near a water source.
- Minimise Project activities at river crossing points, only carryout the earth work that is necessary for the proposed Project.
- Select the preferred water abstraction points based on a hydrology study.
- Obtain water abstraction permits from WRMA prior to the commencement of the water abstraction activities.
- Integrate drainage system in the overall road planning and construction to align it to the natural drainage system as much as possible.
- Harmonize drainage with all point sources of surface runoff such as valleys and rivers, and the pavement surface structure.
- The design of all the culverts should be informed by hydrological studies to be able to manage peak runoff.
- Drainage outfalls should not be directed into private land or premises.
- Ensure protection of soil adjacent to the side drains and the constructed drainage.
- Dust suppression measures including a watering programme should be implemented during the construction phase. This would include ensuring constant watering of construction surfaces and dry materials to keep dust low throughout the project areas and the deviation routes.
- Traffic management measures for construction vehicles.
- The Contractor should develop a rehabilitation/reinstatement plan for the borrow pits.
- Contracts with the landowners for material sites should be signed before excavation begins which include terms and conditions for payment, the area of land to be excavated, and the rehabilitation measures to be carried out on the gravel sites, if required. The contract documents should instruct the contractor to construct and maintain fences and rehabilitate after use.
- The material sites areas must be excavated should be cordoned off, as these areas tend to be deep and pose a danger to children and livestock.
- A resettlement action plan (RAP) will be conducted to minimise the adverse social impacts of the proposed project road. The RAP will identify those persons within the project area who may be

displaced as a result of the proposed road. It will provide a socio-economic profile on the Project Affected Persons (PAPs) and give the cost of resettlement. From the preliminary designs the land uptake for this Project is approximately 35 acres, comprising 60% of public land and 40% private land. Efforts have been made to minimize the land acquisition of the Project, including placing the toll plazas on the bridge/grade separated sections, limiting the radius of ramps and the spacing between the ramps and the main lines

- KeNHA and CRBC must develop and implement a HIV/AIDS/Malaria as well as TB policy and an information document for all workers directly related to the Project. The Contractor must implement this policy. The information document will address factual health issues as well as behaviour change issues around the transmission and infection of HIV/AIDS as well as malaria.
- Employment should also be equal throught the projects 27km corridor.
- The Project should develop and implement an Occupational Health and Safety Management System in line with good industry practice. This systems should include consideration of hazard identification, risk assessment and control, use of Personal Protection Equipment (PPE), incident investigation and reporting, reporting and tracking of near misses, incidents etc. The management system should also include emergency response plans. Roles and responsibilities should be clearly defined.
- In order to minimize the potential for impact to sub-surface cultural resources, KeNHA should establish a Chance Find Programme staffed with on-call Kenyan archaeologists to address the discovery of Chance Finds during the construction phase.

13.2 RECOMMENDATIONS

Centric is confident that every effort will be made by KeNHA and CRBC to accommodate the mitigation measures recommended during the ESIA process to the extent that is practically possible, without compromising the economic viability of the Project. The implementation of the mitigation measures detailed in Chapters 10 and listed in the ESMMP will provide a basis for ensuring that the potential positive and negative impacts associated with the establishment of the development are enhanced and mitigated to a level which is deemed adequate for the development to proceed.

14 REFERENCE

1. County Government of Nairobi County Integrated Development Plan 2018-2022
2. Machakos County Integrated Development Plan 2018-2022
3. Kenya National Bureau of Statistics (KNBS), (2012). 2009 Kenya population and housing census. Analytical report on household and family dynamics, volume IV. Available from https://www.knbs.or.ke/download/analytical-report-on-household-andfamily-dynamics-volume-iv-2/?wpdmdl=3755
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5. Kenya National Bureau of Statistics. (2009). Economic survey 2009. Nairobi, Kenya: Government Printer.
6. Kenya National Bureau of Statistics (2009) Population and Housing Census
7. Ministry of Nairobi Metropolitan Development (MNMD). (2012). Development of a spatial planning concept for Nairobi metropolitan region (Final plan, January 2012). Nairobi, Kenya: Ministry of Nairobi Metropolitan Development.
8. The Project on Integrated Urban Development Master Plan for the City of Nairobi in the Republic of Kenya December 2014

15 LIST OF ANNEXES (SEE SEPARATE VOLUME II)

15.1 ANNEX 1 CENTRIC NEMA LICENSE AND EXPERTS LICENSES

15.2 ANNEX 2: PROJECT LAYOUT AND TECHNICAL BRIEF

15.3 ANNEX 3: BIODVERSITY ASSESSMENT DATA ON FLORA AND FAUNA ALONG THE EXPRESSWAY

15.4 ANNEX 4: MINUTES, SIGN IN SHEETS, AND PHOTOS OF STAKEHOLDER ENGAGEMENT EXERCISES

15.5 ANNEX 5: NEMA CORRESPONDENCE LETTERS ON THE PROJECT

15.6 ANNEX 6: APPROVED NEMA TOR OF THE PROJECT

15.7 ANNEX 7: STAKEHOLDER ENGAGEMENT INVITATION LETTERS AND BID

15.8 ANNEX 8: LETTERS FROM FROM MEMBERS OF THE PUBLIC/ RESIDENT ASSOCIATION ETC

15.9 ANNEX 9: EMAIL CORRESPONDENCES ON THE PROJECT

15.10 ANNEX 10. TRAFFIC RELIEF PLAN

15.11 ANNEX 11: BOREHOLE LOGS

15.12 ANNEX 12: PROJECT WORK PLAN