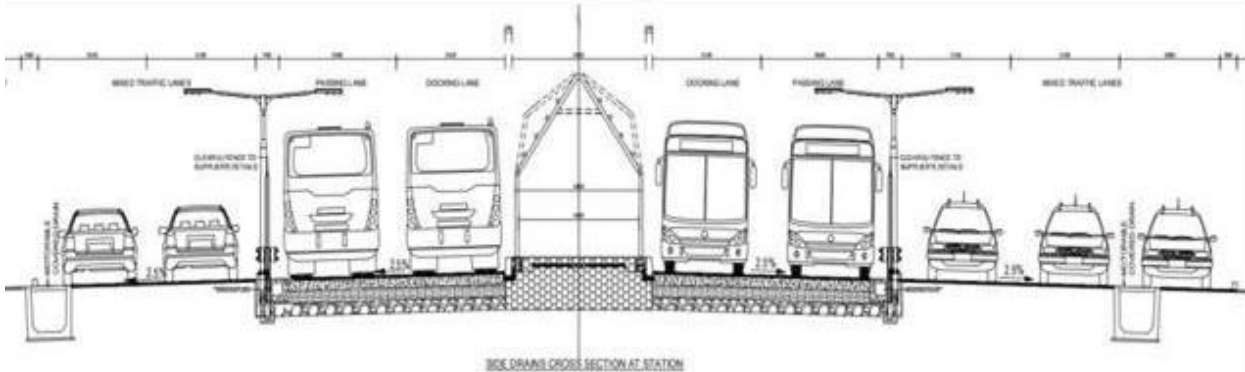




*Transforming Urban Mobility*

## ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY REPORT FOR THE PROPOSED ESTABLISHMENT OF BUS RAPID TRANSIT LINE 5 ON OUTER RING ROAD IN NAIROBI CITY COUNTY



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SEPTEMBER, 2024

**DECLARATION**

**ESIA STUDY TEAM LEADER**

I, **ELIJAH MUTHUSI** submit this Environmental and Social Impact Assessment (ESIA) Study Report for the proposed Establishment of Bus Rapid Transit (BRT) Line 5 on Outer Ring Road in Nairobi City County. The ESIA has been carried out in accordance with the Environmental Management and Coordination Act (EMCA) Cap 387, Environmental Management and Coordination (Amendment) Act [EMC(A)A] No. 5 of 2015 and Environmental Impact Assessment and Audit (EIAA) Regulations, 2003.

Signed at **NAIROBI** on this 30<sup>th</sup> day of September 2024.

Signature: 

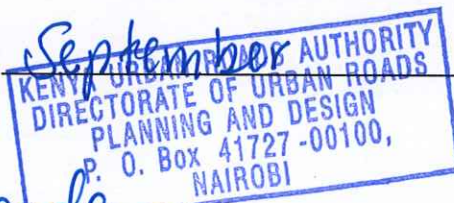
Designation: **EIA/EA LEAD EXPERT**  
**NEMA REG. NO. 0754**

**PROPONENT**

I, Eng. Benjamin ASIN on behalf of Kenya Urban Roads Authority (KURA) submit this ESIA Study Report for the proposed Establishment of BRT Line 5 on Outer Ring Road in Nairobi City County.

Signed at **NAIROBI** on this 30<sup>th</sup> day of September 2024.

Signature & Official Stamp 



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## ACRONYMS

---

|                 |   |
|-----------------|---|
| %               | : Percent   |
| °C              | : Degrees Celsius   |
| AADT            | : Annual Average Daily Traffic                              |
| AASHTO          | : American Association of States Highway and                |
| ABS             | : Acrylonitrile Butadiene Styrene                           |
| AIDS            | : Acquired Immunodeficiency Syndrome                        |
| ASAL            | : Arid and Semi Arid Land                                   |
| ASL             | : Above Sea Level   |
| ASTM            | : American Society for Testing and Materials                |
| BMS             | : Bus Management System                                     |
| BoQ             | : Bill of Quantities  |
| BRT             | : Bus Rapid Transit   |
| CBD             | : Central Business District                                 |
| CBOs            | : Community Based Organizations                             |
| CBR             | : California Bearing Ratio                                  |
| CCTV            | : Closed Circuit Television                                 |
| CEC             | : County Environment Committee                              |
| CMG             | : Compressed Natural Gas                                    |
| CNG             | : Compressed Natural Gas                                    |
| CO              | : Carbon Monoxide   |
| CO <sub>2</sub> | : Carbon Dioxide  |
| CO <sub>x</sub> | : Carbon Oxides   |
| COP             | : Conference of Parties                                     |
| CPR             | : Comprehensive Project Report                              |
| CS              | : Cabinet Secretary   |
| dB(A)           | : A-Weighted Decibels                                       |
| DD-ESS          | : Deputy Director-Environmental and Social Safeguards       |
| DOSHS           | : Directorate of Occupational Safety and Health Services    |
| DRR             | : Disaster Risk Reduction                                   |
| EA              | : Environmental Audit                                       |
| EAC             | : East African Community                                    |
| EACCCMP         | : East African Community Climate Change Master Plan         |
| ECD             | : Early Childhood Development                               |
| EHS             | : Environmental Health and Safety                           |
| EIA             | : Environmental Impact Assessment                           |
| EIAA            | : Environmental Impact Assessment and Audit                 |
| EMC             | : Environmental Management and Coordination                 |
| EMC(A)A         | : Environmental Management and Coordination (Amendment) Act |
| EMCA            | : Environmental Management and Coordination Act             |
| ESIA            | : Environmental and Social Impact Assessment                |
| ESMMP           | : Environmental and Social Management and Monitoring Plan   |
| EVSE            | : Electric Vehicle Service Equipment                        |

|                        |   |
|------------------------|---|
| <b>GBV</b>             | : Gender Based Violence                         |
| <b>GDP</b>             | : Gross Domestic Product                        |
| <b>GHG</b>             | : Greenhouse Gases                              |
| <b>GPS</b>             | : Global Positioning System                     |
| <b>GRM</b>             | : Grievance Redress Mechanism                   |
| <b>GSU</b>             | : General Service Unit                          |
| <b>GVA</b>             | : Gross Value Added                             |
| <b>HDPE</b>            | : High Density Poly Ethylene                    |
| <b>HIV</b>             | : Human Immunodeficiency Virus                  |
| <b>ICT</b>             | : Information and Communication Technology      |
| <b>IFC</b>             | : International Finance Corporation             |
| <b>ILO</b>             | : International Labour Organization             |
| <b>ITS</b>             | : Intelligent Transportation System             |
| <b>JKIA</b>            | : Jomo Kenyatta International Airport           |
| <b>JSA</b>             | : Job Safety Analysis                           |
| <b>CAA</b>             | : Kenya Airports Authority                      |
| <b>KFS</b>             | : Kenya Forest Service                          |
| <b>kg</b>              | : Kilograms                                     |
| <b>km</b>              | : Kilometres                                    |
| <b>km<sup>2</sup></b>  | : Square Kilometres                             |
| <b>KNBS</b>            | : Kenya National Bureau of Statistics           |
| <b>KPC</b>             | : Kenya Pipeline Company                        |
| <b>KPHC</b>            | : Kenya Population and Housing Census           |
| <b>KPLC</b>            | : Kenya Power and Lighting Company              |
| <b>KRB</b>             | : Kenya Roads Board                             |
| <b>Ksh</b>             | : Kenya Shillings                               |
| <b>KURA</b>            | : Kenya Urban Roads Authority                   |
| <b>l/m<sup>2</sup></b> | : litres per square metre                       |
| <b>LAPSSET</b>         | : Lamu Port South Sudan Ethiopia Transport      |
| <b>LCD</b>             | : Liquid Crystal Display                        |
| <b>LED</b>             | : Light-emitting Diode                          |
| <b>LPG</b>             | : Liquified Petroleum Gas                       |
| <b>m</b>               | : Metre   |
| <b>m<sup>3</sup></b>   | : Cubic Metres                                  |
| <b>MDD</b>             | : Maximum Dry Density                           |
| <b>MDGs</b>            | : Millennium Development Goals                  |
| <b>mm</b>              | : Millimetres                                   |
| <b>MRT</b>             | : Mass Rapid Transport                          |
| <b>MSDS</b>            | : Material Safety Data Sheet                    |
| <b>MTP</b>             | : Medium-Term Plan                              |
| <b>MuPVC</b>           | : Modified unplasticized Polyvinyl Chloride     |
| <b>NaMATA</b>          | : Nairobi Metropolitan Area Transport Authority |
| <b>NAP</b>             | : National Adaptation Plan                      |
| <b>NCCAP</b>           | : National Climate Change Action Plan           |
| <b>NCCG</b>            | : Nairobi City County Government                |
| <b>NCCIDP</b>          | : County Integrated Development Plan            |
| <b>NCCRS</b>           | : National Climate Change Response Strategy     |

|                       |   |
|-----------------------|---|
| <b>NCWSC</b>          | : Nairobi City Water and Sewerage Company               |
| <b>NDC</b>            | : Nationally Determined Contributions                   |
| <b>NEMA</b>           | : National Environment Management Authority             |
| <b>NGOs</b>           | : Non-Governmental Organizations                        |
| <b>NMA</b>            | : Nairobi Metropolitan Area                             |
| <b>NMR</b>            | : Nairobi Metropolitan Region                           |
| <b>NMT</b>            | : Non-Motorised Transport                               |
| <b>NO<sub>2</sub></b> | : Nitrogen Dioxide                                      |
| <b>NO<sub>x</sub></b> | : Nitrogen Oxides                                       |
| <b>NRC</b>            | : Nairobi Rivers Commission                             |
| <b>NSDCC</b>          | : National Syndemic Diseases Control Council            |
| <b>NTSA</b>           | : National Transport and Safety Authority               |
| <b>OSH</b>            | : Occupational Safety and Health                        |
| <b>OSHA</b>           | : Occupational Safety and Health Act                    |
| <b>PAPs</b>           | : Project Affected Persons                              |
| <b>PM</b>             | : Particulate Matter                                    |
| <b>PPE</b>            | : Personal Protective Equipment                         |
| <b>PRSP</b>           | : Poverty Reduction Strategy Paper                      |
| <b>PSVs</b>           | : Passenger Service Vehicles                            |
| <b>PTID</b>           | : Portable Tickets Issuance Devices                     |
| <b>PTW</b>            | : Permit to Work  |
| <b>PVC</b>            | : Polyvinyl Chloride                                    |
| <b>PWD</b>            | : Persons with Disabilities                             |
| <b>RA</b>             | : Risk Assessment                                       |
| <b>RE</b>             | : Resident Engineer                                     |
| <b>RFID</b>           | : Radio Frequency Identification                        |
| <b>RQD</b>            | : Rock Quality Designation                              |
| <b>SACCO</b>          | : Savings and Credit Cooperative                        |
| <b>SDGs</b>           | : Sustainable Development Goals                         |
| <b>SEA</b>            | : Sexual Exploitation and Abuse                         |
| <b>SEP</b>            | : Stakeholder Engagement Plan                           |
| <b>SO<sub>2</sub></b> | : Sulphur Dioxide                                       |
| <b>SPM</b>            | : Suspended Particulate Matter                          |
| <b>SPR</b>            | : Summary Project Report                                |
| <b>SPT</b>            | : Standard Penetration Test                             |
| <b>STDs</b>           | : Sexually Transmitted Diseases                         |
| <b>TCR</b>            | : Total Core Recovery                                   |
| <b>TOR</b>            | : Terms of Reference                                    |
| <b>TVOCs</b>          | : Total Volatile Organic Compounds                      |
| <b>UN</b>             | : United Nations  |
| <b>UNFCCC</b>         | : United Nations Framework Convention on Climate Change |
| <b>UPS</b>            | : Uninterruptible Power Supply                          |
| <b>uPVC</b>           | : Unplasticized Polyvinyl Chloride                      |
| <b>URPD</b>           | : Urban Roads Planning and Design                       |
| <b>VAC</b>            | : Violence Against Children                             |
| <b>VAT</b>            | : Value Added Tax                                       |
| <b>VES</b>            | : Vehicle Enforcement System                            |

|             |                                      |
|-------------|--------------------------------------|
| <b>VMS</b>  | : Viable Message Sign                |
| <b>WC</b>   | : Water Closet                       |
| <b>WHO</b>  | : World Health Organization          |
| <b>WIBA</b> | : Work Injury Benefits Act           |
| <b>WRA</b>  | : Water Resources Authority          |
| <b>WSSD</b> | : World Summit on Social Development |

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## **EXECUTIVE SUMMARY**

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### **Introduction**

KURA herein referred to as the Proponent in line with her Mandate, “*the Management, Development, Rehabilitation and Maintenance of all Public Roads in the Cities and Municipalities in Kenya except where those Roads are National Roads*” as provided in the Kenya Roads Act (2007), intends to establishment BRT Line 5 on the Outer Ring Road Corridor in Nairobi City County. BRT in a nutshell is a high-quality bus-based transit system that delivers fast, comfortable, and cost-effective services. The proposed BRT Line 5 branded as “Nyati” is among the five (5) gazetted BRT Corridors in Nairobi namely:

- Line 1 (Ndovu): Limuru-Kangemi-CBD-Imara Daima-Athi River-Kitengela;
- Line 2 (Simba): Rongai-Bomas (Langata Rd)-CBD-Ruiru-Thika-Kenol;
- Line 3 (Chui): Tala-Njiru-Dandora (Juja Road)-CBD>Show Ground (Ngong Road)-Ngong;
- Line 4 (Kifaruru): Mama Lucy-Donholm (Jogoo Road)-CBD-T-Mall-Bomas-Karen-Kikuyu; and
- Line 5 (Nyati): Balozi (Allsops)-Baba Dogo-Donholm-Pipeline-Taj Mall.

The Nairobi BRT System is founded on the concept that when fully implemented, the BRT corridors combined with more convenient bus routes will be critical tools for encouraging more residents to choose public transport over private vehicles. The logic is that, well-managed and quality public transport networks are essential to moving masses across a major city like Nairobi and can ultimately lead to increased efficiency, less pollution, and a reduction in transport costs for everyone. BRT is highly ranked among the sustainable solutions to the grossly unreliable public transport system in Nairobi City from socio-economic and environmental perspective.

Under Part VI Section 58 of EMCA Cap 387, notwithstanding any approval, permit or license granted under the Act or any other law in force in Kenya, any person being a proponent of a Project is required to apply for an Environmental Impact Assessment (EIA) license from National Environment Management Authority (NEMA) before financing, commencing, proceeding with, carrying out, executing or conducting or causing to be financed, commenced, proceeded with, carried out, executed or conducted by another person any undertaking specified in the Second Schedule to the Act.

Functionally, the BRT Line 5 as proposed is a metro transportation facility. In light of the Second Schedule of EMCA Cap 387 under the category of High Risk Projects in (4)(g), “*Transportation and related infrastructure projects including metro transport facilities*” need to be subjected to the EIA process in accordance with the Act. The Proponent well aware of the latter therefore, undertook this ESIA Study to comply with the requirement of Part VI Section 58 of the Act. The output from the ESIA Study was this comprehensive ESIA Study Report for decision making and legal compliance.

EIAA Regulations (2003), EIAA (Amendment) Regulations, 2016 and EIAA (Amendment) Regulations, 2019 provide the basis for procedures for carrying out EIA and Environmental Audit (EA).

The scope of this ESIA covered:

- The baseline environmental conditions of the Project area;
- Description of the proposed Project;
- Provisions of the relevant environmental laws;
- Public consultation through administration of a Structured Questionnaire and holding of Stakeholders' Consultation Meetings;
- Analysis of project alternatives;
- Climate and vulnerability assessment;
- Identification and discussion of the adverse impacts to the environment anticipated from the proposed Project;
- Provision of appropriate mitigation measures for the identified adverse impacts from the proposed Project; and
- Provision of an ESMMP outline.

The ESIA Study Methodology entailed the following eight (8) key steps:

- **Desktop Study:** Desktop Studies were undertaken with a view of understanding the Project Concept;
- **Screening:** Screening was undertaken to determine whether the proposed Project required an ESIA or not, and if an ESIA was required at what level. The verdict was that the proposed Project required to be subject to a full ESIA Study on the basis of the provision of the Second Schedule of EMCA Cap 387 corroborated with the cumulative impacts' significance;
- **Scoping:** Scoping helped in narrowing down into the most critical issues requiring attention during the assessment and development of the study Terms of Reference (TOR). The study TOR were developed and approved by NEMA under reference NEMA/TOR/5/2/782 as evident in **Appendix 6** of this Report;
- **Data Collection:** Actualized through a predesigned checklist, a predesigned public participation questionnaire, observation, photography, site visits, noise measurements, air quality measurements and desktop environmental studies, where necessary in the manner specified in the EIAA Regulations, 2003;
- **Field Surveys:** Sought to collect site-specific information on the biophysical and socio-economic environment and to cross-check the secondary data that had been compiled during the desktop studies;
- **Public Participation:** Actualized through administration of a Structured Questionnaire and holding Stakeholders' Consultation Meetings;
- **Impact Assessment and Analysis:** Both qualitative and quantitative methods were used to evaluate impact significance; and

- **Reporting:** A comprehensive ESIA Study report was prepared as provided in EMCA Cap 387.

## **Project Description**

The BRT Line 5 herein referred to as the proposed Project will be implemented along Outer Ring Road which is at a trunk road and is approximately 10.435 kilometres (km) in total length. Outer Ring Road is an arterial road that connects Thika Road (A2), Airport North Road and Mombasa Road (A109) and it starts at Global Positioning System (GPS) Coordinates 1° 14' 43.79" S, 36° 52' 2.82" E and ends at GPS Coordinate 1° 19' 35.99" S 36° 54' 6.69" E. The Establishment of BRT Line 5 transport system will include construction of 13 bus stations at Allsops, Baba Dogo, Kamunde, Huruma, Juja Road, Mutindwa, Tena, Manyanja, Donholm, Tassia, Fedha, Pipeline, and Taj Mall.

The BRT Line 5's proposed Depot site is located along Mombasa Road just after City Cabanas Interchange. The proposed Depot site is on Plot L.R. NO. 209/14694/1 & 2 which is approximately 5 acres in size. The GPS Coordinates of the proposed site is 1° 19' 59.76" S, 36° 53' 17.66" E.

The proposed BRT Line 5 is to be implemented on the median of Outer Ring Road which has sections that are at grade with the existing carriageway and sections that are separate grade. Currently there are a total of ten (10 No.) pedestrian footbridges along Outer Ring Road. The median along Outer Ring Road is characterized by various utility infrastructure installed which include stormwater drainage system, streetlights, flood lights, electrical circuit boxes, and support system for road signage. Drainage along Outer Ring Road is facilitated by the three Nairobi Rivers (Mathare River, Nairobi River and Ngong River) that traverse it. There are mixed land use activities within the Project area. The main uses include; public, residential, commercial and industrial land use. The Flora along the median consists mostly of grasses, a few trees and riverine vegetation close to the rivers. The fauna in the area consists mostly of avifauna and some domestic animals.

The proposed Depot site consists of an empty lot and a developed section. The developed section consists of two rows of go-downs, a power house (generator room), a water tower, a borehole, and a guardhouse. Both sections are enclosed by a perimeter fence and two steel gates. Vegetation at the proposed Depot site is minimal and mainly derived from acacia trees, pawpaw trees, casuarina trees and duranta hedges. The main utilities infrastructures observed within the proposed site are Kenya Power and Lighting Company (KPLC) Plc electricity lines/poles and Nairobi City Water and Sewerage Company (NCWSC) sewer infrastructure. Commercial land use is the predominant land use within the proposed Depot site.

The major works to be executed under the proposed Project shall comprise mainly of but are not limited to the following:

- All Works along the BRT Line 5:
  - Construction of a 2 Lane BRT Line, along the entire length of the Outer Ring



Road;

- Construction of the 3 No. River Bridges and 2 No. Highway Bridges;
  - Construction of 13 No. BRT Stations;
  - Installation of all electro-mechanical works;
  - Construction of drains along Outer Ring Road;
  - Construction of a barrier on the outer extents of the BRT Lane; and
  - Street lighting along Outer Ring Road.
- 
- All works on the BRT Depot:
    - Construction of a three-floor administration building;
    - Civil works within the BRT Depot; Parking Spaces and Access Roads, Drains, Septic Tank; and
    - Installation of all Electro-mechanical Works.
  
  - Intelligent Transport System (ITS) Basic Infrastructural Components Installation.
  - All other ancillary works as specified in the contract and as instructed by the Engineer.

The BRT Line 5 Civil Works will entail but not be limited to:

- Site clearance and topsoil stripping;
- Earthworks;
- Pavement Construction;
- Concrete Pavement;
- Drainage Works;
- Road Furniture Components;
- Maintenance of Traffic through the Works;
- Structures (Bridge, Pedestrian Footbridges, Stations Structural Works); and
- Landscape Architecture.

The proposed Project will be undertaken at a total cost of approximately **Eight Billion Seven Hundred and Thirty-Seven Million One Hundred and Seventy-Six Thousand Twenty-Six Kenya Shillings and Ninety-Nine Cents (Ksh. 8,737,176,026.99)** only inclusive of value added tax (VAT). A summary of the Bill of Quantities (BoQ) is attached as **Appendix 2**.

The Fifth Schedule of EIAA Regulations, 2003 as reviewed vide Gazette Notice No. 13211 of 2013 provide for EIA processing and monitoring fee. As per Gazette Notice No. 13211 of 2013, pursuant to Regulation 48 of the EIAA Regulations (2003) as read with schedule 4 of the fifth schedule thereof, the EIA fees payable shall be 0.1 percent (%) of the total cost of the project to a minimum of Ksh. 10,000.00 with no upper capping. The Proponent shall fully abide by the latter provisions together with the Regulator's (NEMA) administrative guidelines pertaining payment of EIA Processing and Monitoring Fee.

## **Environmental Setting of the Project Area**

Outer Ring Road is entirely located in Nairobi City County and it traverses Embakasi South, Embakasi North, Embakasi West-Starehe, Kamukunji, Mathare, Makadara and Ruaraka Constituencies.

According to Nairobi City County Integrated Development Plan (NCCIDP) 2023-2027, Nairobi City County lies adjacent to the eastern edge of the Rift Valley and is situated 1661 metres (m) Above Sea Level (ASL). It is characterized by gently rolling terrain on the eastern side but divided by steep valleys towards the City's boundaries. Nairobi City County is close to the eastern border of the Rift Valley and is on a large depression filled with volcanic rocks and sediments of Cainozoic times, which lie on basement complex rocks.

Nairobi City County has a tropical climate with temperatures ranging between 10 degrees Celsius (°C) and 28°C during cold and hot seasons respectively. The hottest period extends between November and February (25°C–31°C) while the coldest period occurs between May and August (8°C–18°C). Nairobi has two major rainfall regions. One is unimodal (December–April) and the other is bimodal (October–December and March–May).

The Baseline Ambient Air Quality Measurement, and Noise Measurement was conducted along Outer Ring Road on September 11, 2024. The assessment focused on measuring concentrations of several pollutants including, Particulate Matter (PM<sub>2.5</sub> and PM<sub>10</sub>), Sulfur Oxides (SO<sub>x</sub>), Nitrogen Oxides (NO<sub>x</sub>), Carbon Dioxide (CO<sub>2</sub>), Carbon Monoxide (CO), and Total Volatile Organic Compounds (TVOCs). The assessment aimed to establish the current air quality conditions before the implementation of the proposed Project.

The results from the assessment indicated that the levels of both PM<sub>10</sub> and PM<sub>2.5</sub> at all the nine (9) sampling points were within the permissible limits set by the EMC (Air Quality) Regulations, 2014 and the World Health Organization (WHO) Air Quality Guidelines. Additionally, the concentrations of Sulfur Dioxide (SO<sub>2</sub>) and Nitrogen Dioxide (NO<sub>2</sub>) were also within the allowable limits prescribed by EMC (Air Quality) Regulations, 2014. TVOCs levels were found to be well below the maximum limits defined by both EMC (Air Quality) Regulations, 2014 and WHO Air Quality Guidelines. Further, the concentrations of CO<sub>2</sub> and CO at all sampling locations complied with the standards set in EMC (Air Quality) Regulations, 2014. In overall, the air quality in the Project area was deemed to be within acceptable levels for all measured pollutants. The Noise Measurements indicated that the noise levels at all monitoring points exceeded both the International Finance Corporation's (IFC's) guideline of 70 dB(A) and the EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 daytime limit of 60 dB(A).

NCWSC is the main water and sanitation service provider for the City and a company fully owned by Nairobi City County Government (NCCG). Its mandate is to offer water and sanitation services to Nairobi residents on behalf of the NCCG. Major challenges facing Nairobi City County with respect to solid waste management include management of waste collection and disposal.

The geotechnical site investigations (such as soil sampling and testing), assessing the properties of the soil, and designing foundations, slopes, embankments, or other earth-related structures were carried out along Outer Ring Road. Based on these investigations, the geotechnical team provided specific recommendations for foundation types in different areas. These recommendations were tailored to the unique soil conditions encountered along the alignment.

The common flora in Nairobi includes indigenous trees such as the *Newtonia buchananii* (Mukoi) and *Trichilia-roke* (Mutuati) trees. In some areas, the vegetation is primarily dry savannah, open grass plains with scattered Acacia bushes. Permanent rivers with riverine vegetation are also evident. Nairobi City County is endowed with various game species, wild birds and domesticated animals such as cow, goats, sheep, pigs etc.

According to the results of the Kenya Population and Housing Census (KPHC) 2019, which was conducted by Kenya National Bureau of Statistics (KNBS), Nairobi City County has a population of 4,397,073 comprising of 2,192,452 males, 2,204,376 females and 245 intersex persons.

Nairobi City County has a total of 555 Early Childhood Development (ECD) centres, 2205 primary schools and 152 secondary schools. The County also has various tertiary institutions including universities and technical colleges.

According to KPHC 2019 Vol IV economically active population was 22.3 million, comprising the working (19.7 million) and those seeking work (2.6 million). Females accounted for 50.2 per cent of the total working population.

Nairobi City County has a total area of 696.3 km<sup>2</sup>. Land use within the County is divided into categories namely residential, industrial/commercial, infrastructural, recreational, water bodies and riverine, urban agriculture, open lands, others (including protected areas) (NCCIDP 2023-2027).

Nairobi Metropolitan Region (NMR) has a combined transport network comprising of Roads, Railways, Airways and Pipelines. The Outer Ring Road was upgraded between 2014 to 2018 and is mainly composed of main roads with four (4) lanes and service roads with more two (2) lanes by each direction. The Outer Ring Road connects to main transportation facilities such as the airport, railway, and road A2 & A104 in the City.

The traffic count data for BRT Line 5 provides a detailed analysis of traffic volumes along key sections of Outer Ring Road in Nairobi. Traffic volumes were measured over a 7-day period, with counts taken for 12 to 24 hours. The peak traffic hours were identified as 7:00 am to 8:00 am in the morning and 5:00 pm to 6:00 pm in the evening, with pm peak hour volumes generally higher than those in the morning.

The main sources of energy in Nairobi City County are electricity, solar, liquefied petroleum gas (LPG), biogas, paraffin, charcoal and firewood. Lack of access to clean sources of energy is a major impediment to development due to health-related complications such as

increased respiratory infections and air pollution. The type of cooking fuel used by households is related to their socio-economic status.

Nairobi City County hosts 16 Sub-County hospitals, 9 mission hospitals, 32 private hospitals, 15 nursing homes, 38 public health centres as well as 45 private health centres, 30 public dispensaries, 84 private clinics and 22 public clinics.

### **Policy, Legal and Administrative Framework**

Relevant legislative, regulatory framework and international convention have been reviewed. The EIA process in Kenya has also been described in form of a schematic presentation. The following are the relevant Policy, Legal and Regulatory framework reviewed:

- Constitution of Kenya, 2010;
- National Environmental Policy, 2014;
- Sectoral Policies and Legislation;
- Integrated National Transport Policy, 2009;
- Bus Rapid Transit Design Framework, 2018;
- Sessional Paper No. 3 of 2009 on National Land Policy;
- Session Paper No. 1 of 2017 on National Land Use Policy;
- Sessional Paper No. 5 on the Development and Management of the Road Sub-sector for Sustainable Economic Growth, 2006;
- Policy Paper on Environment and Development (Sessional Paper No. 6 of 1999);
- Policy Statements and Guidelines on Mainstreaming Cross-cutting Issues, 2013;
- East African Community Climate Change Policy;
- National Water Policy No. 1 of 1999;
- Environmental Management and Coordination Act Cap 387;
- Water Act, 2016;
- Public Health Act (Cap 242);
- Penal Code Act (Cap 63);
- The Lands Act, 2012;
- The Physical and Land Use Planning Act, 2019;
- Protection and Assistance to Internally Displaced Persons (IDPs) and Affected Communities Act, 2012;
- HIV/AIDS Prevention and Control Act (Act No.14 of 2006);
- Mainstreaming HIV/AIDS Issues in the Roads Sub-Sector;
- Mainstreaming Child Rights and Protection in the Roads Sub-sector;
- Children's Act, 2001;
- Traffic Act Cap 403;
- Kenya Roads Act, 2007;
- Urban Areas and Cities (Amendment) Act, 2019;

- Occupational Safety and Health Act, 2007;
- National Occupational Safety and Health Policy, 2012;
- Work Injury Benefits Act; 2007;
- The County Government Act, 2012;
- Intergovernmental Relations Act No. 2 of 2012;
- National Transport and Road Safety Authority Act, 2012;
- Radiation Protection Act, 2012;
- Public Roads and Roads Access (Cap 399);
- Mainstreaming Community Participation in the Roads Sub-sector;
- Mainstreaming Disability Issues in the Roads Sub-Sector;
- The Water Resources Regulations, 2021;
- The Public Health (Drainage and Latrine) Rules, 1927;
- East African Community Climate Change Master Plan 2011-2031;
- National Adaptation Plan 2015-2030;
- National Climate Change Action Plan 2018-2022;
- National Climate Change Action Plan 2023-2027;
- National Climate Change Response Strategy 2010;
- Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2016;
- Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019;
- Environmental Management and Coordination (Water Quality) Regulations, 2006;
- Environmental Management and Coordination (Waste Management) Regulations, 2006;
- Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009;
- Environmental Management and Coordination (Conservation of Biodiversity Diversity and Resources Access to Genetic Resources and Benefit Sharing), Regulations, 2006;
- Environmental (Impact Assessment and Audit) Regulations, 2003;
- Environmental Management and Coordination (Controlled Substances) Regulation, 2007;
- Kenya Vision 2030;
- Environmental Guidelines for Roads and Bridges, 2010;
- Guidelines for Prevention and Control of Soil Erosion in Road Works, 2010;
- The National Biodiversity Strategy and Action Plan, 2007;
- The Sustainable Waste Management Act, 2022;
- Sustainable Development Goals (SDGs), 2015;
- The International Finance Corporation's Performance Standards on Environmental and Social Sustainability;
- The World Bank Environmental and Social Framework;
- United Nations Framework Convention on Climate Change (UNFCCC), 1994;

- Kyoto Protocol, 1997;
- 1985 Vienna Convention for the Protection of Ozone Layer;
- The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer;
- The Paris Agreement; and
- Convention on Biological Diversity, 1993.

## **Public Participation**

The Kenya Government has enshrined the need for human societies’ involvement in project development in the Constitution. This has been echoed in EMCA Cap 387 and EIAA Regulations, 2003 with regards to the EIA and EA process in Kenya. This was in recognition of the fact that they form a useful component for gathering, understanding and establishing likely impacts of projects, determining community and individual preferences and selecting alternatives. Furthermore, through public participation, it is possible to enhance project designs and ensure sustainability of the projects.

Public participation forms a useful component for gathering, understanding and establishing likely impacts of projects, determining community and individual preferences, and selecting alternatives.

Public participation with respect to the proposed Establishment of BRT Line 5 on Outer Ring Road in Nairobi City County was a collaborative process, actualized through administration of a Structured Questionnaire and holding Stakeholders’ Consultation Meetings.

The administration of the Structured Questionnaire was done along the Project Road from 26<sup>th</sup> to 29<sup>th</sup> August, 2024. Two Hundred and Five (205) copies of the Questionnaire were filled and returned to the Study team for analysis. Sample copies of the filled Questionnaire capturing the respondents’ views/opinions and suggestions are attached as **Appendix 3**.

From the Questionnaire analysis, one hundred and ninety-one (191) respondents, representing 93% of the total respondents welcomed the proposed Project while fourteen (14) respondent equivalent to 7% of the total respondents did not welcome the proposed Project. The Environmental Impacts anticipated by the respondents as a result of the proposed Project were as tabulated in **Table EX1** below.

**Table EX1: Environmental Impacts Anticipated by Respondents**

| <b>Environmental Impacts</b>                     | <b>No. of Respondents</b> | <b>Percentage of the Respondents (%)</b> |
|--|---------------------------|--|
| Positive Environmental Impacts Only              | 162                       | 79                                       |
| Negative Environmental Impacts Only              | 6                         | 3  |
| Both Positive and Negative Environmental Impacts | 37                        | 18                                       |

The Climate Change Impacts anticipated by the respondents as a result of the proposed Project were as tabulated in **Table EX2** below.

**Table EX2: Climate Change Impacts Anticipated by Respondents**

| Climate Change Impacts                            | No. of Respondents | Percentage of the Respondents (%) |
|---|--------------------|-----------------------------------|
| Positive Climate Change Impacts Only              | 147                | 72                                |
| Negative Climate Change Impacts Only              | 6                  | 3                                 |
| Both Positive and Negative Climate Change Impacts | 52                 | 25                                |

The Social Impacts anticipated by the respondents as a result of the proposed Project were as tabulated in **Table EX3** below.

**Table EX3: Social Impacts Anticipated by the Respondents**

| Social Impacts                            | No. of Respondents | Percentage of the Respondents (%) |
|---|--------------------|-----------------------------------|
| Positive Social Impacts Only              | 139                | 68                                |
| Negative Social Impacts Only              | 3                  | 2                                 |
| Both Positive and Negative Social Impacts | 63                 | 30                                |

The Labour Impacts anticipated by the respondents as a result of the proposed Project were as tabulated in **Table EX4** below.

**Table EX4: Labour Impacts Anticipated by the Respondents**

| Labour Impacts                            | No. of Respondents | Percentage of the Respondents (%) |
|---|--------------------|-----------------------------------|
| Positive Labour Impacts Only              | 142                | 69                                |
| Negative Labour Impacts Only              | 2                  | 1                                 |
| Both Positive and Negative Labour Impacts | 61                 | 30                                |

The Community Safety and Health Impacts anticipated by the respondents as a result of the proposed Project were as tabulated in **Table EX5** below.

**Table EX5: Community Safety and Health Impacts Anticipated by the Respondents**

| Community Safety and Health Impacts               | No. of Respondents | Percentage of the Respondents (%) |
|---|--------------------|-----------------------------------|
| Positive Community Safety and Health Impacts Only | 164                | 80                                |
| Negative Community Safety and Health Impacts Only | 2                  | 1                                 |
| Both Positive and Negative Community Safety and   | 39                 | 19                                |

| Community Safety and Health Impacts | No. of Respondents | Percentage of the Respondents (%) |
|-------------------------------------|--------------------|-----------------------------------|
| Health Impacts                      |                    |                                   |

A number of suggestions were recommended for KURA and the Contractor by the respondents to consider before, during and after implementation of the proposed Project. They were as listed below:

- KURA should ensure Persons with Disability (PWD) are considered in the design and implementation of the proposed Project;
- The Contractor should consider proper planning of construction activities in order to minimize disruptions;
- KURA should consider adding an extra lane along Outer Ring Road upon completion of the BRT Line 5;
- KURA should consider the use of only electric/hybrid buses for the proposed BRT Line 5 Project in order to reduce Greenhouse Gases (GHG) emission;
- KURA should ensure that the drainage system is properly designed and constructed to safely and efficiently drain storm water during rain season;
- KURA should improve on the drainage system of Outer Ring Road;
- The Contractor should prioritise local community for employment in the proposed Project;
- KURA should ensure that construction works are strictly undertaken during the day to avoid noise pollution and inconveniencing locals/residents at night;
- KURA should ensure that the proposed Project is implemented to completion within the stipulated Project period without delays;
- KURA should closely liaise with the relevant service providers during the construction phase to ensure seamless continuity of services in the event of disruption;
- KURA should consider replanting of all the lost native tree species where lost and also create new habitats as compensation;
- KURA should ensure the existing Passenger Service Vehicle (PSVs) are not locked out by BRT buses. The existing PSVs should be allowed to operate alongside the BRT buses;
- KURA should consider tree planting activities along Outer Ring Road;
- The Contractor should consider phasing out construction works for BRT Line 5 to mitigate against traffic disruptions;
- KURA and the Contractor should capitalize on night time hours for non-disruptive works;
- KURA should provide a periodic maintenance plan for Outer Ring Road;
- KURA should conduct sufficient public consultation forums to inform locals about the proposed BRT Line 5 Project;
- KURA together with the Contractor should ensure there is no destruction of Private property;
- KURA should ensure proper reinforcement of existing pedestrian footbridges along Outer Ring Road;



- KURA should ensure all construction materials are of high quality in order to enhance durability of the Proposed Project;
- KURA should consider construction of a pedestrian footbridge at Kamunde area;
- KURA should consider extension of the proposed BRT Project to Jogoo Road route;
- KURA should ensure that there is proper utilization of the Project funds; and
- KURA should ensure that the Contractor constructs all stations to the required and stipulated design standards.

Eight (8) Stakeholders' Consultative Meetings were held with the general public, local leaders, representatives from the relevant government institutions, as well as representatives from private institutions and other stakeholders as illustrated **Table EX6** below. The Attendance Registers and Minutes of the Stakeholders' Consultation Meetings are attached in **Appendix 4**.

**Table EX6: Stakeholders Consultation Meetings**

| SN | Date                            | Venue                          | Participants/<br>Constituencies            | No. of<br>Participants |
|----|---------------------------------|--------------------------------|--|------------------------|
| 1. | 5 <sup>th</sup> September 2024  | Barabara Plaza Auditorium      | Key Stakeholders                           | 120                    |
| 2. | 10 <sup>th</sup> September 2024 | CLS Hall, KAG University       | Makadara & Kamukunji                       | 91                     |
| 3. | 11 <sup>th</sup> September 2024 | Youth Empowerment Hall         | Embakasi West & Embakasi East              | 77                     |
| 4. | 12 <sup>th</sup> September 2024 | Redeemed Gospel Church, Kware  | Embakasi South                             | 84                     |
| 5. | 13 <sup>th</sup> September 2024 | Kenya Assemblies of God, Fedha | Embakasi East                              | 68                     |
| 6. | 17 <sup>th</sup> September 2024 | Royal Victory Hospital, Ruraka | Ruraka & Embakasi North                    | 68                     |
| 7. | 18 <sup>th</sup> September 2024 | Huruma CDF Hall, Huruma        | Mathare                                    | 128                    |
| 8. | 19 <sup>th</sup> September 2024 | Youth Empowerment Hall         | Matatu SACCOs plying Outer Ring Road Route | 80                     |

The following are the key issues that were discussed in the Stakeholders' Consultation Meetings:

- Proposed Project Maintenance Framework;
- Drainage Works;
- Implementation of the proposed Project;
- Traffic Management during Construction Phase;
- Occupational Safety and Health;
- Involvement of PSVs Service Providers; and
- Proposed Project Details.

The proposed Establishment of BRT Line 5 on Outer Ring Road in Nairobi City County has the potential to trigger disputes which will need to be addressed to ensure the

implementation of the proposed Project is not disrupted. Grievance Redress Mechanism (GRM) provides a general guideline through which dispute resolution is sought and provided. GRM provide an avenue for individuals and communities to submit complaints directly to the Proponent and the Contractor to enhance responsiveness and accountability to project-affected communities by ensuring that grievances are promptly reviewed and addressed.

### **Analysis of Project Alternatives**

The principal alternatives studied in the context of the proposed Project were:

- **Alternative 1:** The “No Action” alternative-the Project Site remains as it is;
- **Alternative 2:** Alternative Land Transport Modes;
- **Alternative 3:** Implementation o of the BRT Line at the proposed Route;
- **Alternative 4:** Analysis of Alternative Equipment, Technology and Materials; and
- **Alternative 5:** Analysis of the Depot Location; and
- **Alternative 6:** Implementation of the proposed Project with and without EIA License.

### **Climate Change Risks, Adaptation and Mitigation**

Globally transport sector accounts for approximately one-fifth of CO<sub>2</sub> emissions where 24% of the CO<sub>2</sub> emission is from energy sources. Global Transport Emissions 2018 shows that road travel accounts for three-quarters of transport emissions. Most of these emissions comes from passenger vehicles. BRT is a bus-based mass transit system with specialized design, service, and infrastructure to improve the system and remove typical causes of bus delays. BRT is a high-capacity transport system with its right of way. The use of public transportation is an efficient mode of transport since it emits minimal GHG compared to private car usage. Studies indicate that the use of buses in the transport sector reduces the emission of GHG by up to two-thirds per passenger, per kilometre as compared to private cars. BRTs are considered a cost-effective, flexible, inclusive, and sustainable means of transit when compared to other modes, however, they require careful planning, design, implementation, and management to achieve their full potential.

The proposed Establishment of BRT Line 5 on Outer Ring Road in Nairobi City County is likely to be vulnerable to climate change such as rising temperatures and changing rainfall patterns. Assessing the vulnerability of critical BRT road infrastructure is a critical step in ensuring the construction of high-quality road infrastructure, and ensuring the government invests scarce funding strategically in road improvement, and toward building climate resilience into the BRT Road network. KURA will prioritize climate change resilience measures for the proposed BRT Project since it is likely to be vulnerable to climate change hazards such as flooding, temperatures, damage to drainage, damage to bridges, soil erosion and sedimentation, fogs and mists, and traffic congestion.

The positive climate change impacts anticipated from the Establishment of BRT Line 5 on Outer Ring Road in Nairobi City County include: Reduction in GHG Emissions Impacts, Reduction in Local Air Pollutants, Increased Energy Efficiency, Improved Public Health and Air Quality, Increased Resilience to Climate Change Impacts.

The negative climate change impacts anticipated from the Establishment of BRT Line 5 on Outer Ring Road in Nairobi City County include: Increased Flooding Risks, Reduced Vegetation Cover, Increased Temperature Levels, Increases Occurrence of Fog and Mist, Damage of Drainage Infrastructure, Damage to Bridge Infrastructure, Increase in Soil Erosion and Sedimentation, and Traffic Congestion/Delay Impacts. Various enablers and/or adaptation and/or mitigation measure have been assessed and will be used to reduce/eliminate these negative impacts that are associated with the Establishment of BRT Line 5 on Outer Ring Road in Nairobi City County.

The Establishment of BRT Line 5 should be well planned and implemented it will provide an appropriate approach to reducing GHG emissions and improving urban mobility for sustainable development. When the system is effectively implemented, it becomes a key component strategy in combating climate change and building a more resilient and livable city. The system should be designed more efficiently compared to traditional buses. The BRT system is faster, reliable, and comfortable therefore attracting more passengers who will opt for public transportation rather than personal driving leading to reduced vehicle emissions.

### **Identification of Potential Impacts and Mitigation Measures for Negative Impacts**

On-site and off-site impacts can occur due to project location, and during construction, operation and decommissioning phases of the proposed Project. Identification and assessment of impacts depend on the nature and magnitude of the activity being undertaken and also on the type of pollution control measures that are envisaged as part of the Project proposal.

**Table EX7** below shows the positive and negative impacts identified as the likely impacts during the construction phase and the mitigation measures for the negative impacts.

**Table EX7: Impacts and Mitigation Measures during Construction Phase**

| Impacts                                       | Mitigation Measures   |
|---|---|
| <b>Construction Material Sourcing Impacts</b> | <ul style="list-style-type: none"> <li>▪ Purchase aggregates and rock from an established quarry within Nairobi City County instead of starting another quarry for the proposed Establishment of BRT Line 5 in Nairobi City County;</li> <li>▪ Purchase gravel and sub-grade soil-marram from an established quarry within Nairobi City County instead of starting another quarry for the proposed Project;</li> <li>▪ Carry out inspection of each of the site’s soil</li> </ul> |

| Impacts   | Mitigation Measures  |
|---|--|
|   | <p>stability before excavation;</p> <ul style="list-style-type: none"> <li>▪ The use of burrow pits for material spoil sites may be approved by the Resident Engineer (RE) (and/or with the appropriate consent of the “landowner”). Where this occurs, the materials spoiled in the burrow pit shall be profiled to fit into the surrounding landscape and covered with topsoil; and</li> <li>▪ The Contractor is expected to adhere to the National Sand Harvesting Guidelines published by NEMA in 2007.</li> </ul>   |
| <b>Occupational Safety and Health (OSH) Impacts</b> | <p>The Proponent shall ensure that the Contractor is committed to adherence to OSH Rules and Regulations as stipulated in the Occupational Safety and Health Act (OSHA), 2007. In this regard, the Proponent and the Contractor shall be committed to provision and maintenance of safe systems and procedures of work at the workplace that are safe and without risks to health as outlined in the ESMMP including Standard Operating Procedures (SOPs), Job Safety Analysis (JSA) for low-risk activities, Risk Assessment (RA) for medium and high-risk activities and the Permit to Work (PTW) system for high-risk non-routine activities. Provision of appropriate Personal Protective Equipment (PPE) and ensuring that workers while at work always use the provided PPE as the last line of defence in risk control at the workplace after the other levels namely Elimination, Substitution, Engineering Controls and Administrative Controls in the risk control hierarchy shall be ensured. Proactive risk management of safety at the workplace centred at identifying precursors that lead to risk, identifying threats before they become dangerous, and understanding what behaviours and attitudes are influencing safety performance e.g. fencing of all dangerous areas, placing warning signs, enforcing maximum traffic speeds through the road, safety education and training shall be ensured.</p> |
| <b>Noise and Vibration Pollution</b>                | <ul style="list-style-type: none"> <li>▪ On-site power gen-sets shall be covered with an acoustic enclosure and fitted with muffler and shall conform to EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and the Noise Prevention and Control Rules, 2005;</li> <li>▪ Prescribe noise reduction measures if appropriate</li> </ul>   |

| Impacts                              | Mitigation Measures   |
|--------------------------------------|---|
|                                      | <p>e.g. restricted working hours, transport hours and noise buffering;</p> <ul style="list-style-type: none"> <li>▪ Inform the surrounding community on the permissible noise levels and best working hours;</li> <li>▪ Use quiet equipment (i.e. equipment designed with noise control elements) and regular maintenance of machinery to ensure that noise produced from machinery is kept to a practicable minimum;</li> <li>▪ Co-ordinate with relevant agencies regarding all construction activities in the Project area;</li> <li>▪ Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible; and</li> <li>▪ Vehicles hired for bringing construction materials at site shall conform to the noise emission standards and shall be operated during non-peak hours.</li> </ul>   |
| <p><b>Impacts on Air Quality</b></p> | <ul style="list-style-type: none"> <li>▪ All dusty materials (where applicable) shall be sprinkled with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet;</li> <li>▪ Cover stockpiles of sand, soil and similar materials or surround them with wind breaks;</li> <li>▪ Watering all roads used for any vehicular traffic at when need arises and restrict vehicle speed to 15 miles per hour (mph);</li> <li>▪ Down wash of trucks (especially tyres) prior to departure from site;</li> <li>▪ Vehicles delivering loose and fine materials like sand and fine aggregates shall be covered to reduce spills on road;</li> <li>▪ The height from which excavated materials are dropped shall be controlled to a minimum practical height to limit fugitive dust generation from unloading;</li> <li>▪ Post signs that limit vehicle speeds onto unpaved roads and over disturbed soils;</li> <li>▪ Rapid onsite construction so as to reduce duration of traffic interference and therefore reduce emissions from traffic delays; and</li> <li>▪ PPE to be worn as appropriate.</li> </ul> |

| <b>Impacts</b>   | <b>Mitigation Measures</b>   |
|--|--|
| <b>Interruption of Existing Installations and Services</b> | <ul style="list-style-type: none"> <li>▪ Establish the various service providers whose installations are to be interrupted;</li> <li>▪ Identify key interests of each of the stakeholders;</li> <li>▪ The Proponent should formally liaise with the stakeholders and communicate the Project details to them with a view of developing a work plan. The work plan to be developed should have clear responsibilities for each of the affected parties;</li> <li>▪ The work plan should then be implemented to ensure smooth execution of the construction; and</li> <li>▪ On completion of works, each property owner should be contacted again to give views and if complains arise, the Contractor will be required to address the same.</li> </ul>  |
| <b>Clearance of Vegetation</b>                             | <ul style="list-style-type: none"> <li>▪ Ensure proper demarcation of the Project area to be affected by the construction works. This will be aimed at ensuring that any loss of vegetation is restricted to the actual Project area and avoid spill-over effect on the neighbouring areas;</li> <li>▪ Clearing of work sites and roadside vegetation will be done to an acceptable minimum; and</li> <li>▪ KURA will engage relevant stakeholders such as Kenya Forest Service (KFS) and other Community Based Organizations (CBOs) in growing trees along the Outer Ring Road and other selected areas to compensate for the cleared vegetation.</li> </ul>  |
| <b>Flooding</b>  | <ul style="list-style-type: none"> <li>▪ Design team has incorporated the impacts of flooding in the Project design by utilizing the flood risk assessment guide;</li> <li>▪ The BRT infrastructure will be elevated in areas where flooding is common;</li> <li>▪ The BRT Project System will have an option for collecting floodwater before it pools by placing rain barrels on the side of the BRT infrastructure;</li> <li>▪ The design will provide a concentrated location for water collection and contain rain that would otherwise pool on the street;</li> <li>▪ KURA will liaise with the NCCG government to ensure regular removal of solid wastes from the existing BRT drainage system;</li> <li>▪ Road shoulders and storm drains shall be kept free from debris to reduce the severity of flooding;</li> <li>▪ KURA shall grow trees along the Outer Ring Road corridor as a climate change adaptation strategy;</li> </ul> |

| Impacts  | Mitigation Measures  |
|--|--|
|  | <p>and</p> <ul style="list-style-type: none"> <li>▪ KURA to liaise with NCCG and Water Resources Authority (WRA) for development and implementation of an appropriate Storm Water Management Plan anchored on the watershed management concept.</li> </ul>   |
| <p><b>Increased Temperatures</b></p>                 | <ul style="list-style-type: none"> <li>▪ Planting of trees after construction of the BRT infrastructure to provide shade and help to reduce the impact of carbon emissions and restore natural ecosystems;</li> <li>▪ Increase investment in BRT System maintenance and repair programs, focusing on the use of heat-resistant road materials;</li> <li>▪ Greater usage of permeable materials in civic infrastructure to reduce the urban heat island effect;</li> <li>▪ The BRT buses will improve public transportation and reduce private vehicle usage thus helping in reducing extreme heat;</li> <li>▪ Adjustment of both bituminous mixture design and structural design of the pavement;</li> <li>▪ Change of the design for concrete pavement mixture to lower the amount of water needed;</li> <li>▪ Greater use of concrete due to its higher temperature resistance;</li> <li>▪ Increase the reflectance (albedo) of the BRT surface e.g. using bright, colored elements on the BRT or reflective coatings of BRT surfaces; and</li> <li>▪ Cooling the BRT pavements with water.</li> </ul> |
| <p><b>Generation and Disposal of Solid Waste</b></p> | <ul style="list-style-type: none"> <li>▪ Carefully budget to ensure that the amount of construction materials left on site after construction is kept to a minimal;</li> <li>▪ Consider the use of recycled or refurbished construction materials;</li> <li>▪ Purchase and use once-used or recovered construction materials. This will lead to financial savings and reduction of the amount of construction debris disposed of as waste;</li> <li>▪ Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time;</li> <li>▪ Provision of facilities for proper handling and storage of construction materials to reduce the</li> </ul>  |

| Impacts   | Mitigation Measures  |
|---|--|
|   | <p>amount of waste caused by damage or exposure to the elements;</p> <ul style="list-style-type: none"> <li>▪ Use of construction materials that have minimal packaging to avoid the generation of excessive packaging waste;</li> <li>▪ Use of construction materials containing recycled content when possible and in accordance with accepted standards;</li> <li>▪ Adequate collection and storage of waste on site and safe transportation to the disposal sites and disposal methods at designated area shall be provided; and</li> <li>▪ Ensure that the construction wastes generated are disposed to the approved dump site.</li> </ul>       |
| <b>Increased Water Demand</b>                                 | <ul style="list-style-type: none"> <li>▪ Ensure that water is used efficiently at the site by sensitizing construction workers to avoid irresponsible water use; and</li> <li>▪ An assessment and evaluation of the identified water sources should be done against the estimated water demand during construction. These details should be provided to WRA before a permit for abstraction is issued.</li> </ul>  |
| <b>Increased Storm Water Runoff from New Impervious Areas</b> | <p>Put in place appropriate measures aimed at minimizing soil erosion and associated sediment release from the proposed Project site during construction. These measures will include levelling the proposed Project site to reduce run-off velocity and increase infiltration of rain water into the soil. A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structures will be designed.</p>  |
| <b>Delays in Transportation</b>                               | <p>To avoid delays to road users, the Contractor will be required to plan itineraries for site traffic on a daily basis. In addition, the following mitigation measures will be taken into consideration:</p> <ul style="list-style-type: none"> <li>▪ Erect temporary road signs that are visible both during the day and at night indicating road works and restrictions;</li> <li>▪ Restrict construction activities at the median of Outer Ring Road as much as possible;</li> <li>▪ Set aside footpaths and parking areas; and</li> <li>▪ Areas where construction is taking place should have clearly marked speed reduction signage.</li> </ul> |



| <b>Impacts</b>                    | <b>Mitigation Measures</b>   |
|-----------------------------------|--|
| <b>Fuel and Oil Spills</b>        | <ul style="list-style-type: none"> <li>▪ Control dangers of oil and fuel spills by maintaining machinery in specific areas designated for this purpose;</li> <li>▪ Prompt cleaning of oil and fuel spills, and proper disposal of clothing and rags contaminated with oil;</li> <li>▪ Construct sealed areas for the storage of pollutants so as to avoid any accidental discharge that would pollute water resources; and</li> <li>▪ Oil and fuel shall be stored in storage tanks within a secure compound and shall be stored in accordance with manufacturer's instructions.</li> </ul>  |
| <b>Impact on Wastewater</b>       | <ul style="list-style-type: none"> <li>▪ No grey water runoff or uncontrolled discharges from the site/working areas (including wash-down areas) to watercourses and/or water bodies shall be permitted;</li> <li>▪ Water containing such pollutants as cements, concrete, chemicals and fuels shall be discharged as provided in EMC (Water Quality) Regulations, 2006. This particularly applies to water emanating from concrete swills;</li> <li>▪ The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to adjacent watercourses and/or water bodies;</li> <li>▪ Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained, and the water table not endangered;</li> <li>▪ Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas (including groundwater) are not polluted; and</li> <li>▪ The Contractor shall notify the RE of any pollution incidents on site.</li> </ul> |
| <b>Impacts on Local Resources</b> | <ol style="list-style-type: none"> <li>1. The Contractor will consult the community on partitioning of access to local resource for construction purposes.</li> <li>2. The Contractor shall adhere to EMC (Water Quality) Regulations, 2006. These Regulations describe the following: <ul style="list-style-type: none"> <li>▪ Water sources for domestic use;</li> <li>▪ Sewage treatment;</li> <li>▪ Ground water;</li> </ul> </li> </ol>   |

| Impacts  | Mitigation Measures   |
|--|---|
|  | <ul style="list-style-type: none"> <li>▪ Water for agricultural use;</li> <li>▪ Water for other uses; and</li> <li>▪ Schedules depicting standards.</li> </ul> <p>3. Abstractions from natural, County Government and/or private water resources (e.g. rivers, boreholes and springs) for potable water and construction water shall be approved by WRA. The Contractor shall arrange for the necessary approvals/permits from the water authorities under the direction of KURA for the abstraction of water.</p>  |
| <p><b>Public Health and Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS)</b></p> | <ul style="list-style-type: none"> <li>▪ A comprehensive health awareness campaign carried out in conjunction with the Proponent, Contractor and other stakeholders will be done to prevent outbreak of disease. This will include successful preventive measures such as immunizing the vulnerable population, and educating people about diseases and how they are contracted, and how to avoid them by using treated water and keeping living areas clean;</li> <li>▪ Treating affected local and migrant populations will also be used in controlling the movement of disease vectors (through contaminated water and between people);</li> <li>▪ The Contractor shall be responsible for the protection of the public and public property from any dangers associated with construction activities, and for the safe and easy passage of pedestrians and traffic in areas affected by the construction activities;</li> <li>▪ All works which may pose hazard to humans and domestic animals are to be protected, fenced, demarcated or cordoned off as instructed by the RE. If appropriate, symbolic warning signs must be erected;</li> <li>▪ The HIV/AIDS awareness campaigns should be conducted at the camps as well as in the town centre. The Contractor shall take an active role in civic and public health education to his employees and the community. The campaign shall include the training of facilitators within the workers, information posters in the workshop and public areas, availability of promotional material (T-shirts and caps), availability of condoms (free), and</li> </ul> |

| Impacts   | Mitigation Measures  |
|---|--|
|   | <p>theatre groups. The Contractor will co-ordinate with National Syndemic Diseases Control Council (NSDCC), Health Officers and Non-Governmental Organizations (NGOs) undertaking education and sensitisation programmes;</p> <ul style="list-style-type: none"> <li>▪ The Contractor will provide condoms at appropriate places in the work camps. The campaigns will be continuously done by the relevant Government organisation even during operation phase of the road;</li> <li>▪ The implementing agency for HIV/AIDS campaign shall monitor activities regularly to assess effectiveness and impact. This should include an initial, interim and final assessment of basic knowledge, attitude and practices taking account of existing data sources and recognising the limitations due to the short timeframe to show behaviour change. The assessment will be supported by qualitative information from focus group discussions;</li> <li>▪ Implementation of initiatives which target knowledge, attitude, behaviour, prevention, treatment and care in collaboration with NSDCC at regional and local levels, NGOs and CBOs; and</li> <li>▪ Interventions should give attention to high-risk groups, factors perpetuating risk behaviours, female headed households, child headed household, orphans, people living with AIDS, youth, school girls and boys.</li> </ul> |
| <p><b>Incidence of Soil Erosion and Sedimentation</b></p> | <ul style="list-style-type: none"> <li>▪ The Contractor should avoid working on very steep alignments;</li> <li>▪ Avoid cut-slope creation and embankments greater than the angle of response for the soil type;</li> <li>▪ Minimize the ground clearance area;</li> <li>▪ The Contractor should minimize ground clearance area by working only within the road reserve;</li> <li>▪ Balance the cut-and-fill requirements by rightly choosing the route in order to avoid creating excess spoil materials and borrow pits;</li> <li>▪ Store and re-use top soil during the initial excavation to be deposited on the slopes to form a</li> </ul>   |

| Impacts  | Mitigation Measures   |
|--|---|
|  | <p>superficial layer for seedling establishment;</p> <ul style="list-style-type: none"> <li>▪ Replant cleared areas and slopes with herbaceous plants such as vetiver grass according to the soil type and the desired engineering function so as to reduce erosion and stability problems;</li> <li>▪ Construct interception ditches at the top and bottom of the slopes by use of gutters and spill ways to control the flow of water down the slope;</li> <li>▪ Construction of riprap, gabions, cribs or other wooden barricades and grid work battered back against the slope; and</li> <li>▪ Construction of retaining walls as appropriate.</li> </ul>   |
| <p><b>Asphalt Mixing and Hazardous Materials</b></p> | <ul style="list-style-type: none"> <li>▪ All concrete and asphalt plants shall be operated and maintained in accordance with the manufacturers' specifications and manuals;</li> <li>▪ The plant should be located a distance from residential areas with a buffer zone in between;</li> <li>▪ Fitting the exhaust with appropriate acoustic design to arrest noise pollution;</li> <li>▪ The visual impacts to be controlled by ensuring the design camouflages with the surrounding and the trees are maintained to enhance aesthetics;</li> <li>▪ Sprinkle the loose materials with water and cover the same to suppress dust;</li> <li>▪ The plant should be fitted with dust collectors and operated on venturi principle;</li> <li>▪ Wastewater from the wet dust collector and cleaning of the equipment should be channelled to dedicated settling tanks and the effluent dried to from sludge which is recycled;</li> <li>▪ Install absorbent mineral aggregates such as limestone for the absorption of sulphur oxides from the combustion of fuels;</li> <li>▪ There should be regular maintenance of the burner and optimization of the combustion volume to reduce emission of hydrocarbons;</li> <li>▪ Allow for correct air-fuel mixture and appropriate retention time for complete combustion to limit production of carbon oxides;</li> <li>▪ Personnel to be provided with appropriate PPE such as ear muffs and face mask to protect their health due to exposure to noise and dust with expectation that the noise and dust levels will be within allowable limits;</li> </ul> |

| Impacts                  | Mitigation Measures  |
|--------------------------|--|
|                          | <ul style="list-style-type: none"> <li>▪ Safety signage should be placed within the site and marked clearly at the entrance and exit;</li> <li>▪ Material Safety Data Sheet (MSDS) for each chemical product should be made available on site and well displayed;</li> <li>▪ First Aid kit to be on site for the workers in case of an emergency; and</li> <li>▪ Workers should be subjected to medical examinations as provided in Factories and Other Places of Work (Medical Examination) Rules, 2005.</li> </ul>   |
| <p><b>Fire Risks</b></p> | <ul style="list-style-type: none"> <li>▪ The Contractor’s staff shall undergo fire safety training and must be instructed in the correct use of fire-fighting equipment;</li> <li>▪ The site shall have suitable emergency routes and exits, indicated by suitable signs, that must be kept clear and free from obstruction;</li> <li>▪ The Contractor shall ensure that fires, except for controlled fires for burning rubbish, do not start within the site or in the environs thereto as a result of the works or from the actions of his employees;</li> <li>▪ The Contractor shall have trained firefighting personnel armed with adequate fire-fighting equipment, including up-to date serviced and functional fire extinguishers, to deal with all fires;</li> <li>▪ The Contractor shall clear away rubbish and waste frequently to the designated burning area and shall not let waste build up around the burning area;</li> <li>▪ Electrical systems, comprising of short-term supplies, must only be installed by a qualified electrician and must be frequently maintained;</li> <li>▪ High-intensity lights should not be hidden or placed near flammable material;</li> <li>▪ The Contractor shall prohibit smoking in areas of high fire risk or and only allow it at designated smoking zones. The matches and cigarette butts to be disposed cautiously;</li> <li>▪ The Contractor shall ensure any welding activity is undertaken in areas free of flammable materials. Non-removable items must be well covered with heat proof blankets to protect against radiant heat and sparks; and</li> </ul> |

| Impacts   | Mitigation Measures  |
|---|--|
|   | <ul style="list-style-type: none"> <li>▪ The Contractor shall stop all welding activities at least 1 hour before closing the site for the day. Fire checks shall be made in intervals of 30 minutes and at least 1 hour to the end of shift.</li> </ul>  |
| <p><b>Impacts on Existing Water Sources</b></p> | <ul style="list-style-type: none"> <li>▪ Proper solid and liquid waste disposal from the construction camp and site offices will be done;</li> <li>▪ Where possible, water will be reused to reduce demand on ground water sources;</li> <li>▪ Oil water separators and grease traps will be installed and maintained as appropriate at fueling areas, workshops, parking areas, fuel storage and containment to reduce potential contamination risk to water sources;</li> <li>▪ Ensure measures are in place to quickly recover any spilled fuel, oils and lubricants for appropriate disposal;</li> <li>▪ All waste generated from the construction activities will be disposed-off to appropriate NEMA licensed facility;</li> <li>▪ Handling, storage, treatment and disposal of hazardous substance will be in line with appropriate standards to reduce contamination of water resources;</li> <li>▪ The procedures for all stages of hazardous waste handling, storage, use and disposal will be well defined; and</li> <li>▪ The Contractor to develop an Emergency Response Plan with procedures that include measures to protect water environment from contamination in the event emergencies such as spills and leaks.</li> </ul> |
| <p><b>Labour Influx</b></p>                     | <ul style="list-style-type: none"> <li>▪ Prepare a labour influx plan to manage labour influx;</li> <li>▪ Casuals and skilled labour will be sourced from the local population as far as possible to minimize on influx of foreigners into the community;</li> <li>▪ Use of manual labour where possible to ensure more employment of locals and hence ensure support of the Project throughout the construction process;</li> <li>▪ Sensitize workers on the different cultures and inculcate tolerance;</li> <li>▪ Monitor potential occurrence of annoyance and conflicts that may arise from differences in lifestyle and culture between community and in-</li> </ul>   |

| Impacts  | Mitigation Measures   |
|--|---|
|  | <p>migrants; and</p> <ul style="list-style-type: none"> <li>▪ The Contractor shall ensure that the GRM addresses issues related to labour influx.</li> </ul>  |
| <p><b>Gender Based Violence (GBV), Sexual Harassment (SH), and Sexual Exploitation and Abuse (SEA)</b></p> | <p>Implementation of a GBV strategy which will include:</p> <ul style="list-style-type: none"> <li>▪ Gender mainstreaming in the Project with opportunities provided for all gender (females, males and intersex) to work equally, in consonance with local laws and customs;</li> <li>▪ The Contractor shall liaise with KURA to ensure that NGOs concerned with GBV issues are engaged as early as possible before construction commences since GBV, sexual harassment and SEA will arise early in the Project;</li> <li>▪ GRM that incorporates non-retaliation and specific procedures for GBV shall be implemented during the Project cycle;</li> <li>▪ Prepare and enforce a No sexual harassment and Non-Discrimination Policy;</li> <li>▪ Prepare and enforce a code of conduct that will be signed by all Project workers prohibiting GBV, SEA and sexual harassment by workers and providing an accountability and response framework including non-retaliation against those who report;</li> <li>▪ Establish partnerships with relevant Government Agencies, GBV Service Providers and NGOs to ensure survivors of GBV and sexual offences access survivor centred services such as medical care, psychosocial support, legal redress, safety, etc. as and when necessary;</li> <li>▪ Provision of gender disaggregated facilities-separate bathing, changing, sanitation facilities for men and women;</li> <li>▪ GBV issues to be incorporated when developing GRM for the Project; and</li> <li>▪ Prepare GRM with specific procedures for GBV including confidential reporting with safe, and ethical documenting of GBV cases should be set up for the workers and community.</li> </ul> |
| <p><b>Pollution of Rivers</b></p>  | <ul style="list-style-type: none"> <li>▪ All construction activities at the river crossings shall be guided by EMCA Cap 387 laws of Kenya, EMC (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulation (2009), Water Act (2016), and the Water Resources Regulations,</li> </ul>   |

| Impacts  | Mitigation Measures  |
|--|--|
|  | <p>2021.</p> <ul style="list-style-type: none"> <li>▪ In addition, the Contractor shall be required to:               <ul style="list-style-type: none"> <li>i. Reduce on plastic consumption and reuse/recycle as much as possible;</li> <li>ii. Ensure properly disposal of chemical cleaners, oil, and nonbiodegradable materials to keep them from going into the rivers;</li> <li>iii. Maintain the machineries and vehicles so that they don't leak oil, antifreeze, or coolant on the ground; and</li> <li>iv. Remove all the solid waste that has been dumped into the stormwater drainage system of Outer Ring Road.</li> </ul> </li> </ul>   |
| <p><b>Impacts Associated with Demolition of Warehouses at the Depot Site</b></p> | <ul style="list-style-type: none"> <li>▪ The demolition to carried out in accordance with the standard procedures by ensuring that all plant and construction equipment are be fitted with noise control measures and shall strictly conform to the EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and Noise Prevention and Control Rules, 2005;</li> <li>▪ Ambient air quality measurements shall be undertaken and maintained in compliance with EMC (Air Quality) Regulation, 2014; and,</li> <li>▪ The provisions of EMC (Waste Management) Regulations, 2006 and Sustainable Solid Waste Management Act, 2022 will be the minimum guidelines in solid waste management.</li> </ul> |
| <p><b>Non-Compliance with ESMMP and EIA License Conditions</b></p>               | <ul style="list-style-type: none"> <li>▪ To ensure that the Contractor complies with ESMMP and EIA License Conditions so as to realize sustainable development, the Proponent shall ensure that:               <ul style="list-style-type: none"> <li>i. Provisions for ESMMP implementations are included in the Contract Documents;</li> <li>ii. Monthly Environmental and Social Monitoring is carried out to identify and described the environmental and social impacts, propose their respective mitigation measures and the scope of monitoring activities to the Contractor; and</li> <li>iii. The Contractor adheres to all the EIA license conditions.</li> </ul> </li> </ul>                            |



**Table EX8** below shows the positive and negative impacts identified as the likely impacts during the operation phase and the mitigation measures for the negative impacts.

**Table EX8: Impacts and Mitigation Measures during Operation Phase**

| Impacts                              | Mitigation Measures  |
|--------------------------------------|--|
| Travel Time                          | To be enhanced.  |
| Quality of Public Transport Services | To be enhanced.  |
| Environmental Conditions/Aesthetics  | To be enhanced.  |
| Public Health                        | To be enhanced.  |
| Land Value                           | To be enhanced.  |
| Employment Opportunities             | To be enhanced.  |
| Security                             | To be enhanced.  |
| Tax Revenue                          | To be enhanced.  |
| Non-Motorized Transport              | To be enhanced.  |
| Solid Waste Generation               | <ul style="list-style-type: none"> <li>▪ To ensure efficient solid waste management, the Proponent in liaison with NCCG will identify proper sites for solid waste disposal. Waste receptacles will not be installed along the Project Road as wastes will not only end up spilling on the road but also it will be tantamount to establishment of illegal dump sites along Outer Ring Road as is currently the case; and</li> <li>▪ The Proponent shall strictly adhere to the provisions of the EMC (Waste Management) Regulations, 2006 and Sustainable Solid Waste Management Act, 2022 with respect to solid waste management along the Project Road.</li> </ul>  |
| Increased Road Accidents             | <p>Proper design of road safety features is a very effective way to prevent accidents. The RE and the Contractor involved with the implementation of the design of the road should:</p> <ul style="list-style-type: none"> <li>▪ Examine road design standards, safety equipment specifications and training to ensure that design details take account of safety concerns and that specific safety features are correctly designed and installed;</li> <li>▪ Require that road design audits be done, at final design stages, by specialists in road safety and traffic operations;</li> <li>▪ Draft traffic management plans, including details of signs, markings, and intersection layouts, channelization of flows, access restrictions,</li> </ul> |

| <b>Impacts</b>                               | <b>Mitigation Measures</b>   |
|--|--|
|  | <p>footpaths, bus stops, and provisions for Non-Motorised Transport (NMT) facilities;</p> <ul style="list-style-type: none"> <li>▪ Painting of edge lines;</li> <li>▪ Provision of traffic signals;</li> <li>▪ Separation of motorised and NMT;</li> <li>▪ Improvement of visibility;</li> <li>▪ Provision of speed limit signs;</li> <li>▪ Regulations, educations and safety trainings; and</li> <li>▪ Enforcement of traffic rules.</li> </ul> <p>Road safety and accident prevention campaigns are recommended at the end of construction. To monitor the effectiveness of the road safety information and education campaigns, the following measures are recommended;</p> <ul style="list-style-type: none"> <li>▪ KURA shall monitor traffic accidents through records kept at the local police stations along the Project Road; and</li> <li>▪ A report will be required after two years of monitoring and the results used to recommend further mitigation measures, if necessary.</li> </ul> |
| <b>Noise Pollution</b>                       | <p>To mitigate noise pollution during operation phase:</p> <ul style="list-style-type: none"> <li>▪ Vehicles using the Road should adhere to the Traffic Act Cap 403 where they are supposed to keep the vehicles in roadworthy conditions; and</li> <li>▪ Road users to adhere to NEMA Regulations on noise pollution i.e. EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.</li> </ul>  |
| <b>Erosion and Water Quality Degradation</b> | <p>Erosion and water quality degradation shall be mitigated as follows:</p> <ul style="list-style-type: none"> <li>▪ Maintenance engineers from KURA shall inspect all culvert structures and outfalls; and</li> <li>▪ All the damaged culverts, wing walls and aprons shall be repaired and additional measures for velocity reduction and erosion protection shall be implemented in case of development of erosion.</li> </ul>  |

| Impacts   | Mitigation Measures   |
|---|---|
| <b>Air Pollution</b>                                    | <ul style="list-style-type: none"> <li>▪ Use of quality fuels and proper vehicle servicing and maintenance;</li> <li>▪ Use of alternative fuels including alternative vehicle powering technologies e.g. electric powered cars, solar powered cars, etc; and</li> <li>▪ Vehicles at parking areas and Depot should also not be left running.</li> </ul>   |
| <b>Generation of E-Waste</b>                            | <p>The Proponent shall ensure that e-waste is managed in accordance with EMC (Waste Management) Regulations, 2006. In addition, the Proponent shall take the following action:</p> <ul style="list-style-type: none"> <li>▪ Develop and implement e-waste management plan;</li> <li>▪ Incorporating health protection measures during Operation Phase of BRT Line 5;</li> <li>▪ Monitor e-waste sites and surrounding communities;</li> <li>▪ Implement and monitor interventions that improve informal e-waste recycling activities, protect public health and ensure vital sources of community revenue; and</li> <li>▪ Educating workers across all levels on e-waste management and related health issues.</li> </ul> |
| <b>Labour Impacts to the Matatu Industry Dependents</b> | <ul style="list-style-type: none"> <li>▪ The Operators of the BRT buses should maximize on the new opportunities created by the Establishment of BRT Line 5, to increase the number of people to benefit from it;</li> <li>▪ The Proponent to take appropriate measures to minimize job loss in the matatu industry or introduce new opportunities for job creation through reforms and integration of the matatu industry through serious engagement and inclusion of the matatu workforce in the BRT Line 5 planning process; and</li> <li>▪ The Proponent should consult and include all stakeholders in the matatu industry in the process of planning and implementation of BRT Line 5.</li> </ul>                   |

### **Environmental and Social Impacts Rating**

RA is used to assess the probabilities and consequences of risk events if they were to be realized. The RA output is intended to help determine risk response actions based on the level of risk posed by the threat and risk appetite. Risk Scores are created by multiplying the *Likelihood and Impact*. The scores are then rated using a *Risk Rating/Significance of Risk*

Scale. RA helps in determining the potential consequences of a threat exploiting a vulnerability.

By evaluating impact in various categories, we ensure a comprehensive assessment of the potential consequences of impacts. Rating impact in various categories provides decision-makers (NEMA, the Proponent and the Contractor) with a more nuanced understanding of the potential consequences.

Risks Rating/Significance of Risks for the proposed Establishment of BRT Line 5 on Outer Ring Road in Nairobi City Country's Operation Phase returned an overall score of 4 (low) and 3 (low) for the Operation Phase. The significance rating signals how much attention the risk event will require during project development and implementation and the extent of control actions to be put in place.

### **Environmental and Social Management and Monitoring Plan**

There are three broad categories of ESMMPs in the Project lifecycle: Construction Phase ESMMP, Operation Phase ESMMP, and Decommissioning Phase ESMMP. The objectives of the ESMMP are to:

- Place the proposed/existing activity in the context of the local and regional environment;
- Adequately describe all components of the proposed/existing activity, so that the Authority can consider approval of a well-defined project;
- Identify the environmental issues/risks associated with the proposed/existing activity;
- Provide the basis of the Proponent's environmental management programme, which shows that the environmental impacts resulting from the proposed/existing activity, including cumulative impact, can be acceptably managed, and
- Provide a document that clearly sets out the reasons why the proposed/existing activity should be judged by the Authority to be environmentally acceptable.

### **Conclusion and Recommendations**

The proposed Project is positive in the overall and hereby recommended for approval by means of an EIA licence and be allowed to proceed, on condition that strict adherence to the proposed ESMMP in this ESIA Study Report is observed. Further to this, the following specific recommendations are made with respect to the proposed Project:

- The Proponent and Contractor should ensure that all-natural resources including water, flora and fauna are protected and conserved during design, construction and operation and lost flora caused by the activities of the Project are replaced;
- The Contractor should ensure that construction of all components in the proposed Project is carried out in accordance with the Designs;
- The Contractor and the Proponent should ensure that the Stakeholders' views are fully incorporated and that any unforeseen impacts are immediately notified to

KURA's Deputy Director-Environmental and Social Safeguards (DD-ESS) to ensure that they are immediately addressed and mitigated;

- The Contractor and the Proponent should ensure that relocation of services is carried out in liaison with the various service providers to ensure minimal disruption;
- The Proponent should ensure that the relocation of Project Affected Persons (PAPs) is carried out in adherence to the mitigation measures herein proposed and in liaison with the relevant institutions;
- The Contractor should ensure that the proposed mitigation measures are put in place to ensure that noise, vibrations and dust are managed to acceptable levels;
- Noise mitigation measures will be necessary during the implementation of the BRT Line 5 project to address these elevated noise levels along Outer Ring Road;
- The Contractor should implement appropriate measures to enhance safety and health at the various sites in relation to the proposed Project;
- The Contractor should implement a traffic management plan acceptable to the Proponent;
- The Proponent to ensure that the BRT system is effectively implemented for it to be a key component strategy in combating climate change and building a more resilient and livable city;
- The Contractor should put in place appropriate measures to manage waste emanating from Project construction activities;
- The Contractor should ensure maintenance of road safety throughout construction of the proposed Project;
- Land contamination and erosion should be mitigated accordingly, and measures should be put in place by the Contractor to prevent the occurrence of such incidences;
- The Contractor will implement measures as proposed in this report and others in the field to ensure that fire incidents are prevented, minimised or managed;
- During construction and operations, the Contractor and Proponent should ensure that trainings and campaigns on key issues including HIV/AIDS, Sexually Transmitted Diseases (STDs), road safety awareness, capacity assistance to project monitoring units, tool box talks for site labour and livelihood change appraisals are undertaken;
- The Proponent should institute surveillance measures to control developments along the Project Road's corridor; and
- The Proponent and the Contractor should engage the Stakeholders in developing GRM for the proposed Project to ensure timely resolution of issues and problems that might be triggered by the proposed Project.

## 1. INTRODUCTION

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### 1.1 Background Information

The Mandate of KURA herein referred to as the Proponent, in accordance with the provisions of the Kenya Roads Act (2007) is “*the Management, Development, Rehabilitation and Maintenance of all Public Roads in the Cities and Municipalities in Kenya except where those Roads are National Roads*”. Whereas, the Authority’s Mission is “*to Provide & Manage, Quality, Safe, Adequate & Responsive Urban Mobility*”. Both the Authority’s Mandate and Mission synergistically drive the Authority towards the realization of her Vision, “*A leading Provider of Sustainable Urban Mobility*”. In order not to lose focus on the Authority’s Vision, KURA’s core business revolves around “*Transforming Urban Mobility*” for Sustainable Development as envisioned in EMCA Cap 387.

The Proponent true to her core business: *Transforming Urban Mobility*, propose to establish BRT Line 5; the section along Outer Ring Road, which is among the Gazetted BRT Corridors in Nairobi namely:

- Line 1 (Ndovu): Limuru-Kangemi-CBD-Imara Daima-Athi River-Kitengela;
- Line 2 (Simba): Rongai-Bomas (Langata Road)-CBD-Ruiru-Thika-Kenol;
- Line 3 (Chui): Tala-Njiru-Dandora (Juja Road)-CBD>Show Ground (Ngong Road)-Ngong;
- Line 4 (Kifaru): Mama Lucy-Donholm (Jogoo Road)-CBD-T-Mall-Bomas-Karen-Kikuyu; and
- Line 5 (Nyati): Balozi (Allsops)-Baba Dogo-Donholm-Pipeline-Taj Mall.

The site of the works shall be within the Road Reserve, the Depot site and any other places as may be designated in the Construction Contract. The proposed Project aims at establishing the BRT Line 5 Outer Ring Road Corridor to design, in this report referred to as BRT Line 5. The proposed BRT Line 5 will be constructed with advanced technology, providing an economically feasible BRT that is appropriate to Nairobi citizen’s income level and economic status, securing the citizen’s mobility, accessibility and safety, and reducing the environmental effects caused by traffic congestion.

### 1.2 Study Rationale

Under Part VI Section 58 of EMCA Cap 387, notwithstanding any approval, permit or license granted under the Act or any other law in force in Kenya, any person being a proponent of a Project is required to apply for an EIA license from NEMA before financing, commencing, proceeding with, carrying out, executing or conducting or causing to be financed, commenced, proceeded with, carried out, executed or conducted by another person any undertaking specified in the Second Schedule to the Act. BRT by definition is a high-quality bus-based transit system that delivers fast and efficient service that may include dedicated lanes, busways, traffic signal priority, off-board fare collection, elevated platforms and enhanced stations. The Second Schedule of EMCA Cap 387 under the category of High Risk Projects in (4)(g) lists, “*Transportation and related*

*infrastructure projects including metro transport facilities”* as among the project which must be subjected to the ESIA process prior to commencement.

Metro transport facilities refer to high-capacity public transportation systems designed to move large numbers of passengers within urban areas. BRT is a classic example of a metro transport facility.

Therefore, the purpose of the ESIA Study was to fulfil a legal requirement and also guide both the Regulator (NEMA) and the Proponent (KURA) in decision making on matters the proposed Project.

The output of the ESIA Study in light of the Principles of ESIA was this ESIA Study Report which includes an ESMMP as provided in the EIAA Regulations (2003), EIAA (Amendment) Regulations, 2016 and EIAA (Amendment) Regulations, 2019 which provide the basis for procedures for carrying out EIA and EA in Kenya.

### **1.3 Principles of Environmental and Social Impact Assessment**

The main principles of ESIA includes:

- Environmental concerns must be accounted for in all development activities;
- Public participation in the development of projects, policies, plans and programmes is important;
- Recognition of social and cultural principles traditionally used in the management of the environment and natural resources;
- International cooperation in the use and wise management of shared resources;
- Integration of socio-economic and environmental factors;
- Intra-generational and inter-generational equity;
- The protection and conservation of natural physical surroundings of scenic beauty and the protection and conservation of built environment of historic or cultural significance;
- Polluter-pays principle; and
- The precautionary principle.

### **1.4 Objective of the Environmental and Social Impact Assessment**

The main objective of the ESIA was to establish the baseline conditions of the Project site, evaluate the existing and the anticipated impacts, propose measures to enhance the positive impacts and proposed measures to mitigate the effects of the negative/adverse impacts. The main objective sought to ensure that environmental concerns are integrated in the proposed Project’s activities for sustainable development.

The specific objectives for the ESIA study were:

- To fulfil the legal requirements as outlined in Section 58 to 67 of EMCA Cap 387, Section 43 to 46 of EMC(A)A No. 5 of 2015, Part III and IV of the EIAA Regulations (2003), and the

EIAA (Amendment) Regulations, 2016;

- To obtain background biophysical information of the site and legal and regulatory issues associated with the proposed Project;
- To identify potential environmental and social impacts of the proposed Project; both positive and negative;
- To assess the significance of the above impacts to the environment and other stakeholders;
- To assess the relative importance of the impacts of alternative plans to the proposed Project;
- To propose mitigation measures for the significant negative impacts of the proposed Project on the environment and all involved stakeholders;
- To propose measures that will enhance the positive impacts of the proposed Project to the environment and all involved stakeholders;
- To generate baseline data for monitoring and evaluation of how well the mitigation measures are being implemented during the proposed project cycle;
- To present information on the impact of alternatives;
- To allow for public participation; and
- To prepare an ESMMP outline.

## **1.5 Study Methodology and Approach**

### **1.5.1 Desktop Study**

Desktop Studies were undertaken with a view of understanding the Project Concept. The Project Proponent provided the proposed Project details. Discussions involved an explanation of the proposed Project and soliciting the Proponent's views on environmental and social aspects that need to be considered during the design and implementation of the Project.

In order to compile relevant baseline biophysical and socio-economic information about the proposed Project and the Project area, the Project Design documents, available published and unpublished reports and relevant Kenya Government Legislations were reviewed.

The biophysical information was compiled on environmental aspects such as physiographic and natural conditions of the Project area, flora and fauna.

On the socio-economic environment, the Study compiled information on aspects such as settlement patterns, population, human and environmental health and economic activities.

### **1.5.2 Screening**

Screening involves determining whether or not an ESIA is required for a particular development activity and the level/category of the ESIA. This depends on the significance of the project's environmental and social impacts as well as the provisions of the Second Schedule of EMCA Cap 387. This is the initial phase in the ESIA process.



Impacts significance depends on such factors as: the sensitivity of the area likely to be affected; public health and safety; the possibility of uncertain, unique or unknown risks; the possibility of having individually insignificant but cumulatively significant impacts; whether the proposed activity affects protected areas, endangered or threatened species and habitats; size, working methods, project activities including their duration and proposals for waste disposal etc. Considering the impacts significance, the Study team established the possibility of having individually insignificant but cumulatively significant impacts synonymous with a High Risk Project.

From the legal perspective, the Study team identified the proposed Project as among the projects listed in the Second Schedule of the Act; Legal Notice No. 31 in the Kenya Gazette Supplement No. 62 (Legislative Supplement No. 16) dated 30<sup>th</sup> April 2019 under:

- *3. High Risk Projects -*
  - ✓ *(4) Transportation and related infrastructure projects, including—*
    - *(g) Metro transport facilities.*

The screening phase verdict was that, “the proposed Project was a high-risk project requiring a full ESIA study hence this comprehensive ESIA Study Report.

### **1.5.3 Scoping**

The scoping process helped narrow down into the most critical issues requiring attention during the assessment and development of TOR. Environmental issues were categorized into physical, natural/ecological and social, economic and cultural aspects.

With a verdict of a full ESIA study at the screening phase, the Study team developed the Study TOR as provided in Regulation 11 of EIAA Regulations, 2003. The TOR was submitted to NEMA under reference NEMA/TOR/5/2/782 and approved on 23<sup>rd</sup> August 2024 as per the provisions of EIAA Regulations, 2003. Evidence of approval of the ESIA Study TOR is herein attached as **Appendix 6**.

### **1.5.4 Data Collection Procedure**

Data collection was carried out through a predesigned checklist, a predesigned public participation questionnaire, observation, photography, site visits, noise measurements, air quality measurements and desktop environmental studies, where necessary in the manner specified in the EIAA Regulations, 2003.

### **1.5.5 Field Survey**

Field visits were conducted in the Project area in order to collect site-specific information on the biophysical and socio-economic environment and to cross-check the secondary data that had been compiled during the desktop studies.

While at the Site, environmental data was recorded, and potential impacts identified. In addition, environmental features relevant to the Study were noted and photographs taken as record of key features.

### **1.5.6 Public Participation**

Public participation with respect to the proposed Establishment of BRT Line 5 on Outer Ring Road in Nairobi City County was collaborative. Whereby, the Goal (Overall Objective) of the Public Participation and the Promise to the Public respectively were:

- To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution; and
- We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.

The public participation exercise was actualized through administration of a Structured Questionnaire and holding Stakeholders' Consultation Meetings.

The administration of the Structured Questionnaire was done along the Project Road from 26<sup>th</sup> to 29<sup>th</sup> August, 2024. Two Hundred and Five (205) copies of the Questionnaire were filled and returned to the Study team for analysis. Sample copies of the filled Questionnaire capturing the respondents' views/opinions and suggestions are attached as **Appendix 3**.

Eight (8) Stakeholders' Consultative Meetings were held with the general public, local leaders, representatives from the relevant government institutions, as well as representatives from private institutions and other stakeholders. The Attendance Registers and Minutes of the Stakeholders' Consultation Meetings are attached in **Appendix 4**.

The public consultations were meant to address the following:

- Inform the Project Road's neighbours of the proposed works;
- Establish if the neighbours of the Project Road foresee any positive or negative environmental effects from it; and
- Seek views, concerns and opinions of the residents likely to be affected by the proposed Project.

### **1.5.7 Impact Assessment and Analysis**

The assessment and analysis methodologies for ESIA studies are based on multi-disciplinary approaches and structured to allow for holistic study and assessment of the following key components of the environment in relation to the proposed Project:

- Physical/chemical component;
- Biological/ecological component;

- Sociological/cultural component; and
- Economic/operational component.

### **1.6 Impact Assessment Experts Compliance**

As provided in Regulation 13, 14 and 15 of the of the EIAA Regulations (2003) as read together with the Study's Approved TOR, **Elijah Muthusi, Lawrence Wachira** and **Kennedy Wafula** are Lead Experts qualified in accordance with the criteria of listing of experts specified in the Fourth Schedule to the Regulations. Therefore, they are qualified and authorized as per the Act to undertake the ESIA Study and submit a report to NEMA. **Appendix 1** of this ESIA Study Report contains a copy of the Lead Experts' Registration Certificate with NEMA and the current Practicing License.

### **1.7 Reporting and Documentation**

A comprehensive ESIA Study Report containing the findings has been compiled by the EIA Study Team in accordance with NEMA guidelines for consideration. In preparing the ESIA Study Report, the ESIA Study Team paid attention to the following issues as specified in the Second Schedule of the EIAA Regulations, 2003:

- Ecological considerations including: Biological diversity, sustainable use, and ecosystem maintenance;
- Social consideration including: Economic impacts, social cohesion or disruption, effect on human health, communication, and effects on culture;
- Landscaping including: Views opened or closed, visual impacts (features, removal of vegetation, etc.), compatibility with surrounding area, and amenity opened up or closed e.g. recreation possibilities;
- Land use including: Effects of proposal on current land uses and land use potentials in the Project area, possibility of multiple use, and effects of the proposal on surrounding land uses and land use potentials; and
- Water including: Water sources and drainage patterns/drainage systems.

#### **1.7.1 Structure of the ESIA Study Report**

The structure of this ESIA Study Report is as follows:

##### **Declaration**

In this Section, the ESIA Study Team Leader officially affirm to submit the ESIA Study Report to NEMA that has been carried out in accordance with EMCA Cap 387, EMC(A)A No. 5 of 2015, EIAA Regulations, 2003 and its amendment regulations. The Proponent also declares to officially submit the ESIA Study Report and approves its content.

### **ESIA Study Team Key Members**

This Section provides a list of the key ESIA Study Team Members and their relevant qualifications in relation to the exercise.

### **Acronyms**

This Section provides all the acronyms used in the report and have been arranged in alphabetical order.

### **Table of Contents**

This Section provides an organized list of the report's chapters with their respective sub chapters labelled by page number.

### **List of Tables**

This Section identifies the titles and page numbers of all the tables in the report.

### **List of Plates**

This Section provides description of all the photos used in the report and their respective page numbers.

### **List of Figures**

This Section provides the list of figures in the report and their respective page number.

### **Executive Summary**

This Section is a summary of the entire report. It is written in a way that readers can rapidly become acquainted with the contents of the whole report without having to read it. The summary of all the chapters is provided in the section.

**Chapter 1: Introduction.** This Chapter is on the background information, study rationale, principles of ESIA, objective of the ESIA, study methodology and approach, impact assessment experts compliance, and reporting and documentation.

**Chapter 2: Project Description.** This Chapter describes the Project location, the current conditions of the Project area, description of BRT Line 5 depot and access road, scope of works, and the estimated Project cost.

**Chapter 3: Environmental and Social Setting of the Project Area.** This Chapter provides a description of the existing environment and social status to achieve an understanding of the environmental and social setting.

**Chapter 4: Policy, Legal, Regulatory, Institutional and Administrative Framework and International Conventions.** This Chapter outlines Government Policy on the environment, the relevant legislation relating to the proposed Project and the administrative framework that deal with various aspects of environmental management.

- Chapter 5: Public Participation.** This Chapter describes the public participation that took place with the Project stakeholders through administration of a Structured Questionnaire and Stakeholders' Consultation Meetings. This Chapter also include a general GRM guideline through which dispute resolution is sought and provided. The GRM provide an avenue for individuals and communities to submit complaints directly to the Proponent and the Contractor to enhance responsiveness and accountability to project-affected communities by ensuring that grievances are promptly reviewed and addressed.
- Chapter 6: Analyses of Project Alternatives.** The Chapter describes the various alternatives that can be applicable to the proposed Project and the reasons for not using them. It also discusses the "No Action" alternative.
- Chapter 7: Climate Change Risks, Adaptation and Mitigation:** The Chapter identifies the climate change risks and proposed enablers, adaptation and mitigation measures to be implemented to reduce the negative impacts of climate change and build resilience to climate-related shocks and stresses for the BRT System.
- Chapter 8: Identification of Potential Impacts.** The Chapter identifies the potential impacts on the bio-physical and socio-economic environment during construction, operation and decommissioning phases.
- Chapter 9: Mitigation Measures for the Anticipated Negative Impacts.** The Chapter describes the mitigation measures for the anticipated negative impacts identified during construction, operation and decommissioning phases.
- Chapter 10: Environmental and Social Impacts Rating.** The Chapter presents both individual and cumulative Impact Rating/Significance of Risk for the construction and operation phase of the proposed Project.
- Chapter 11: Environmental and Social Management and Monitoring Plan.** The Chapter describes the measures to be taken and the monitoring requirements and responsibilities for mitigating the potential negative impacts. It also indicates the estimated costs for mitigating the impacts.
- Chapter 12: Conclusion and Recommendations.** The Chapter provides a brief non-technical summary of the report findings and recommendations.

## **References**

This Section provides a list of all earlier published materials and their respective authors that have been used to source for information used in the report.

## **List of Appendices**

The Section provides the list of all attached documents in the report.

## **2. PROJECT DESCRIPTION**

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### **2.1 Project Location**

#### **2.1.1 BRT Line 5 along Outer Ring Road**

The BRT Line 5 will be implemented along Outer Ring Road. Outer Ring Road is a trunk road and is approximately 10.435 km in length. Outer Ring Road is an arterial road that connects Thika Road (A2), Airport North Road and Mombasa Road (A109). Outer Ring Road is entirely located in Nairobi City County and traverses the following seven Constituencies: Ruaraka, Mathare, Kamukunji, Makadara, Embakasi North, Embakasi West, Embakasi East, and Embakasi South.

Outer Ring Road starts at GPS Coordinates 1° 14' 43.79" S, 36° 52' 2.82" E and ends at GPS Coordinate 1° 19' 35.99" S 36° 54' 6.69" E.

The location map of Outer Ring Road and nearby road networks is as shown in **Plate 1** overleaf.



**Plate 1: Outer Ring Road Mapped in Red Colour**

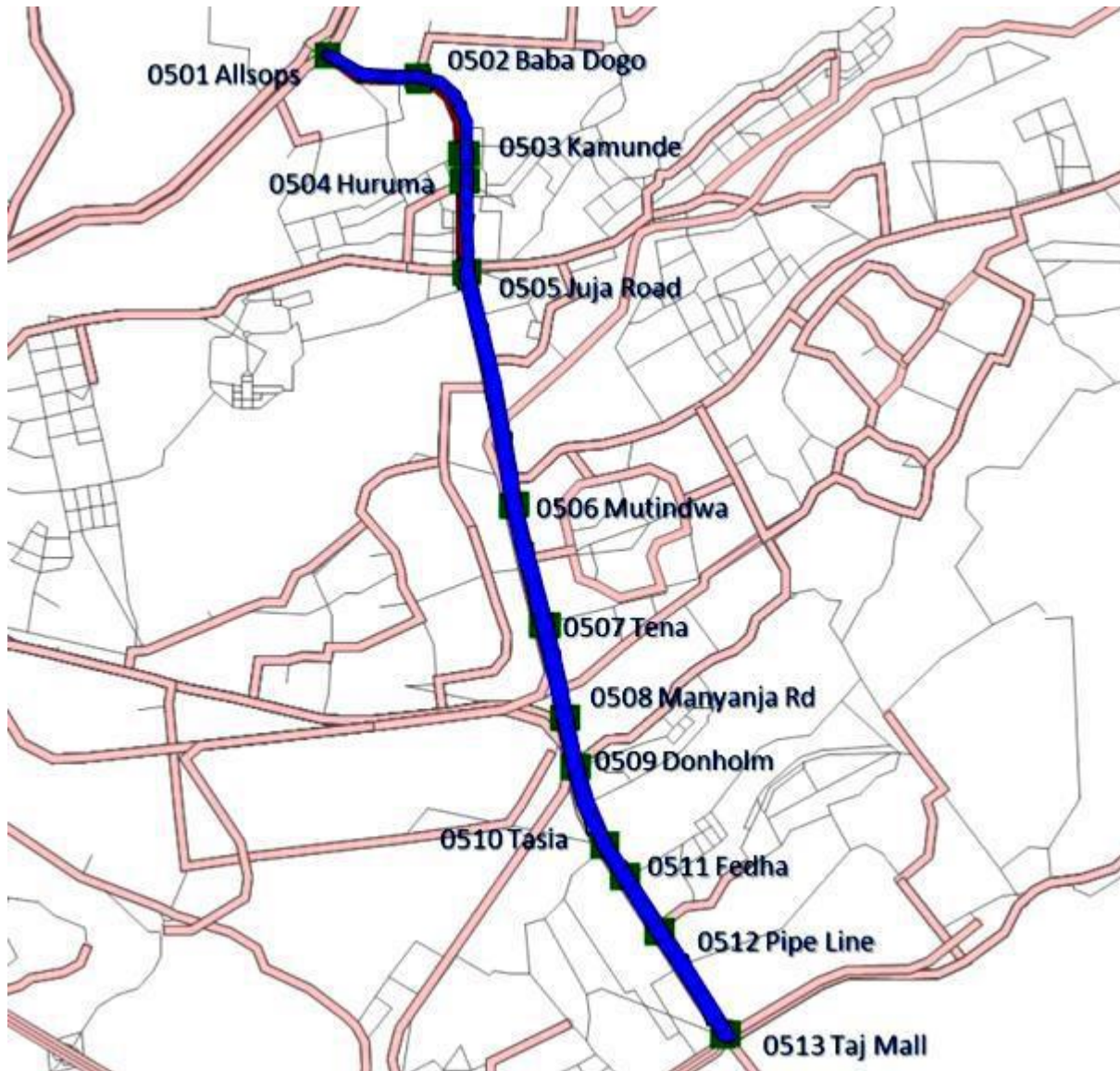
The Establishment of BRT Line 5 transport system will include the construction of 13 bus stations. The location of the stations is dependent on the junction and intersection locations, the distance between each station, and the regions of high boarding and alighting demand. The 13 stations were strategically placed at locations where passenger movement was high, transfer location at mixed traffic sections, and at locations with high potential for passenger movement. The station name, type and GPS coordinates is as shown in **Table 1** below.

**Table 1: Station Name, Type and GPS Coordinates**

| S/No. | Station Name | Station Type | Station Code | GPS Coordinates                   |
|-------|--------------|--------------|--------------|-----------------------------------|
| 1.    | Allsops      | Island       | 501          | 1° 14' 46.94" S, 36° 52' 8.26" E  |
| 2.    | Baba Dogo    | Island       | 502          | 1° 14' 50.33" S, 36° 52' 23.93" E |
| 3.    | Kamunde      | Island       | 503          | 1° 15' 13.14" S, 36° 52' 43.62" E |
| 4.    | Huruma       | Island       | 504          | 1° 15' 28.12" S, 36° 52' 44.10" E |
| 5.    | Juja Road    | Island       | 505          | 1° 15' 48.74" S, 36° 52' 45.30" E |
| 6.    | Mutindwa     | Staggered    | 506          | 1° 17' 1.82" S, 36° 53' 1.13" E   |
| 7.    | Tena         | Staggered    | 507          | 1° 17' 29.49" S, 36° 53' 7.78" E  |
| 8.    | Manyanja     | Staggered    | 508          | 1° 17' 40.93" S, 36° 53' 10.47" E |
| 9.    | Donholm      | Island       | 509          | 1° 18' 7.32" S, 36° 53' 15.50" E  |
| 10.   | Tassia       | Staggered    | 510          | 1° 18' 29.20" S, 36° 53' 24.80" E |
| 11.   | Fedha        | Staggered    | 511          | 1° 18' 48.29" S, 36° 53' 35.98" E |
| 12.   | Pipeline     | Staggered    | 512          | 1° 18' 57.33" S, 36° 53' 42.50" E |
| 13.   | Taj Mall     | Island       | 513          | 1° 19' 30.59" S, 36° 54' 2.41" E  |

The location map of the proposed BRT stations is as shown in **Plate 3** overleaf.





**Plate 2: Locations of the proposed BRT Stations**

### **2.1.2 BRT Line 5 Depot**

The general transit plan of the BRT 5 is based on the location of the Depot. BRT Line 5's proposed Depot location is along Mombasa Road just after City Cabanas Interchange. The proposed Depot site is on Plot L.R. No. 209/14694/1 & 2. The GPS Coordinates of the proposed site is 1° 19' 59.76" S, 36° 53' 17.66" E. The proposed site is approximately 5 acres in size.

The location map of the proposed BRT Line 5 Depot and its access road is as shown in **Plate 3** overleaf.



**Plate 3: The proposed Depot Location and Access Road Mapped in Red and Blue Respectively**

## **2.2 Current Conditions of the Project Area**

### **2.2.1 BRT Line 5 along Outer Ring Road**

#### **2.2.1.1 Current Road Condition**

The construction of BRT Line 5 will follow the configuration of Outer Ring Road corridor using the 9 m wide island/median on the mainline. The line will follow the lanes as they are super-elevated and lowered so as not to disrupt the flow of the background traffic after implementation.

The only sections within the corridor that will be affected are those with a reduced mainline median of about 3 m, and with 3 lanes in the mainline in each direction. An example of such is the Mutindwa area, where the BRT line will occupy the 2 inner lanes of the mainline, hence reducing the mainline carriageway to similar widths as the other sections of the corridor.

The pavement condition of Outer Ring Road is of bitumen standard as shown in **Plate 4** and **Plate 5** overleaf. The median along Outer Ring Road is of earth standard as shown in **Plate 6** overleaf. Outer Ring Road traverses other infrastructure such as under passes and railway lines, therefore, some sections of BRT Line 5 will be elevated in line with the alignment of the Road. **Plate 7** overleaf shows the elevated section where the road traverses the railway line at coordinate 1° 19' 20.7" S, 36° 53' 56.7" E.

|  |   |
|--|---|
|   |   |
| <p><b>Plate 4: Current Road Condition of Outer Ring Road</b></p>                   | <p><b>Plate 5: Project Road Pavement is of Bitumen Standard</b></p>                 |
|  |  |
| <p><b>Plate 6: Section of the Median that is of Earth Standard</b></p>             | <p><b>Plate 7: Elevated Sections of Outer Ring Road</b></p>                         |

### 2.2.1.2 Current Footbridge Conditions

Outer Ring Road has a total of ten (10 No.) pedestrian footbridges that are used for pedestrian crossing. These pedestrian footbridges will serve as accesses to the BRT Line 5 stations. The pedestrian footbridges have been designed in structural steel except for the deck which is a composite element made of concrete deck supported on steel platform. Pedestrian footbridges at the proposed Fedha Station at coordinate 1° 19' 2.8" S, 36° 53' 45.3" E and Allsops Station at coordinate 1° 14' 43.5" S, 36° 52' 2.7" E are as shown in **Plate 8** and **Plate 9** overleaf.

The pedestrian footbridges are characterised by encroachment from vendors and hawkers who use them for business activities, causing obstruction and nuisance to the pedestrians. This is as shown in **Plate 10** and **Plate 11** overleaf.



**Plate 8: Pedestrian Footbridge at the proposed Fedha Station**



**Plate 9: Pedestrian Footbridge at the proposed Allsops Station**



**Plate 10: Encroachment at a Pedestrian Footbridge hindering proper use**



**Plate 11: Encroachment on Pedestrian Footbridge hindering proper use**

### **2.2.1.3 Utility Infrastructure**

The median along Outer Ring Road is characterized by various utility infrastructure installed. Some of the utility infrastructure installed include stormwater drainage system, streetlights, flood lights, electrical circuit boxes, and support system for road name signage. These are shown in **Plate 12**, **Plate 13**, **Plate 14**, **Plate 15**, **Plate 16**, and **Plate 17** overleaf.



**Plate 12: Open Drain along the Median at the Taj Mall U-Turn section**



**Plate 13: Underground Drainage manhole along the Median**



**Plate 14: Lined Drains Installed along the Median**



**Plate 15: Street lighting Installed along the Median**



**Plate 16: Electrical Circuit Box Installed along the Median**



**Plate 17: Support System for Road Name Signage Installed along the Median**

#### **2.2.1.4 Drainage**

Outer Ring Road traverses the three Nairobi Rivers. Ngong River traverses the Road at GPS coordinates 1° 18' 23.7" S, 36° 53' 20.6" E, Nairobi River at GPS coordinates 1° 15' 51.9" S, 36° 52' 45.7" E and Mathare River at GPS coordinates 1° 14' 58.2" S, 36° 52' 41.2" E. Photos of the rivers are as shown in **Plate 18**, **Plate 19**, and **Plate 20** below. The rivers serve as outfalls along Outer Ring Road an example is at GPS coordinates 1° 14' 58.1" S, 36° 52' 42.0" E as shown in **Plate 21** below.

|   |  |
|---|--|
|    |    |
| <p><b>Plate 18: Ngong River Crossing along Outer Ring Road</b></p>                  | <p><b>Plate 19: Nairobi River Crossing along Outer Ring Road</b></p>                 |
|  |  |
| <p><b>Plate 20: Mathari River Crossing along Outer Ring Road</b></p>                | <p><b>Plate 21: Outfall at Mathari River along Outer Ring Road</b></p>               |

### 2.2.1.5 Land Use

There are mixed land use activities within the Project area. The main uses include; public, residential, commercial and industrial land use. Public land use along Outer Ring Road comprises of learning institutions, religious institutions, public transport facilities, and health facilities, as well as General Service Unit Head Quarters and other police services. Some of these are as shown in **Plate 22**, **Plate 23**, and **Plate 24** below.

Residential land use entails apartments, government housing and estates situated along the Outer Ring Road as shown in **Plate 25** below and **Plate 26** overleaf. Commercial land use is very common due to the high population in the area. Outer Ring Road is home to various business parks, markets, service stations, supermarkets, wholesale and retailers, as well as hawkers and open air stalls. Some of these are as shown in **Plate 27**, **Plate 28** and **Plate 29** overleaf.

Industrial land use is as shown by various industries situated along the Road such as Basco paints Kenya Limited, Bayer Pharmaceutical and Biotechnology Company, SC Johnson Limited and Zakhem Industries as shown in **Plate 30** and **Plate 31** overleaf.

|   |  |
|---|--|
|   |   |
| <p><b>Plate 22: Pipeline Railway Station along Outer Ring Road</b></p>              | <p><b>Plate 23: Religious Institution along the Outer Ring Road</b></p>              |
|  |  |
| <p><b>Plate 24: Taj Mall Bus Park at the end of Outer Ring Road</b></p>             | <p><b>Plate 25: Residential land use along the Road</b></p>                          |



**Plate 26: Residential land use along the Road**



**Plate 27: Business Park along Outer Ring Road**



**Plate 28: Service Station along Outer Ring Road**



**Plate 29: Commercial land Use along the Road**



**Plate 30: Industrial Land use along Outer Ring Road**



**Plate 31: Industrial Land use along Outer Ring Road**

### **2.2.1.6 Waste Management**



Outer Ring Road is characterized by poor solid and liquid waste management. There is open dumping of solid waste, with liquid waste flowing along the median. The rivers along the Project Road are also heavily polluted by both solid and liquid waste damaging the environment and the aesthetic value of the area. This is as illustrated in **Plate 32**, **Plate 33**, **Plate 34**, and **Plate 35** below:



**Plate 32: Open Dumping of Solid Waste along the Median of Outer Ring Road**



**Plate 33: Poor Liquid Waste Management along the Road**



**Plate 34: Heavy Pollution in Mathari River along the Road**



**Plate 35: Open Dumping and Defecation along the Median**

### **2.2.1.7 Biodiversity**

Due to heavy anthropogenic activities there is little flora and fauna in the area. The Flora along the median consists mostly of grasses, a few trees and riverine vegetation close to the rivers. The fauna in the area consists mostly of avifauna and some domestic animals such as cows and sheep kept the nomadic communities in the area. Some of the flora and fauna is as shown in **Plate 36**, **Plate 37**, **Plate 38** and **Plate 39** below.

|  |   |
|--|---|
|   |   |
| <p><b>Plate 36: Acacia Tree along the Median</b></p>                               | <p><b>Plate 37: Riverine Vegetation along Ngong River</b></p>                       |
|  |  |
| <p><b>Plate 38: Cows Sighted along the Median</b></p>                              | <p><b>Plate 39: Sheep Grazing along Outer Ring Road</b></p>                         |

## 2.3 Description of BRT Line 5 Depot and Access Road

### 2.3.1 The Current Physical Conditions and Characteristics of the Depot Site





The proposed Site is owned by KURA and is a suitable site for the Depot because of its close proximity to Outer Ring Road and it is at its extreme end (Taj Mall End). The proposed Project site was acquired by KURA, and consists of an empty lot and a developed section. The developed section consists of two rows of go downs, a power house (generator room), a water tower, a borehole, and a guardhouse. Both sections are enclosed by a perimeter fence and two steel gates. The developed section is currently rented out to a tenant. The proposed site conforms to the land use in the area since it sits next to Nairobi Express Way Offices in City Cabanas. The area is dominated with commercial and transportation activities.

The undeveloped section of the Project Site is characterized with vegetation overgrowth as shown in **Plate 40** below; while the developed section is occupied by warehouses as shown in **Plate 41** below. There is a perimeter wall around the Project Site at GPS coordinates 1° 20' 0.6" S, 36° 53' 18.0" E bordering the Nairobi Expressway Plaza to one side, as well as a wall dividing the Site between the developed and undeveloped sections. These are as shown in **Plate 42** and **Plate 43** below.

|  |  |
|--|--|
|             |    |
| <p><b>Plate 40: Vegetation Overgrowth at a Section of the Depot Site</b></p>                 | <p><b>Plate 41: Warehouses at a Section of the Depot Site</b></p>                    |
|           |  |
| <p><b>Plate 42: Perimeter Wall between the Project Site and Nairobi Expressway Plaza</b></p> | <p><b>Plate 43: Perimeter Wall Surrounding the Project Site</b></p>                  |

### 2.3.2 Biodiversity at the Project Site

Vegetation at the Project Site is minimal and mainly derived from Acacia trees, Pawpaw trees, Casuarina trees and Duranta hedges as shown in **Plate 44**, **Plate 45** and **Plate 46** overleaf. There is also a small marshy area within the Project Site (caused by stagnation of waste water resulting from the abutting properties) located at GPS coordinates 1° 20' 0.6" S, 36° 53' 16.7" E as shown in **Plate 47** below.

|  |   |
|--|---|
|   |   |
| <p><b>Plate 44: Acacia Tree at the Project Site</b></p>                            | <p><b>Plate 45: Young Pawpaw and Casuarina Trees at the Project Site</b></p>        |
|  |  |
| <p><b>Plate 46: Duranta Hedge at the Project Site</b></p>                          | <p><b>Plate 47: The Marshy Area within the Project Site</b></p>                     |

### 2.3.3 The Current Physical Conditions and Characteristics of the Access Road

The Project Road is paved to bitumen standards as shown in **Plate 48** overleaf, some sections such as at coordinate 1° 20' 2.12" S, 36° 53' 14.16" E are deteriorated as shown in **Plate 49** overleaf. There is provision of lined drains along the Project Road as shown in **Plate 50** overleaf as well as access culverts such as at coordinate 1° 20' 1.1" S, 36° 53' 13.4" E as shown in **Plate 51** overleaf. Additionally, there is provision of roadside kerbs for edge restraint as shown in **Plate 52** overleaf. The Project Road lacks footpaths which poses a safety risk to pedestrians as shown in **Plate 53** overleaf.



**Plate 48: The Project Road has a Bitumen Surface**



**Plate 49: Deteriorated Section of the Project Road**



**Plate 50: Drainage along the Project Road**



**Plate 51: Provision of an Access Culvert along the Project Road**



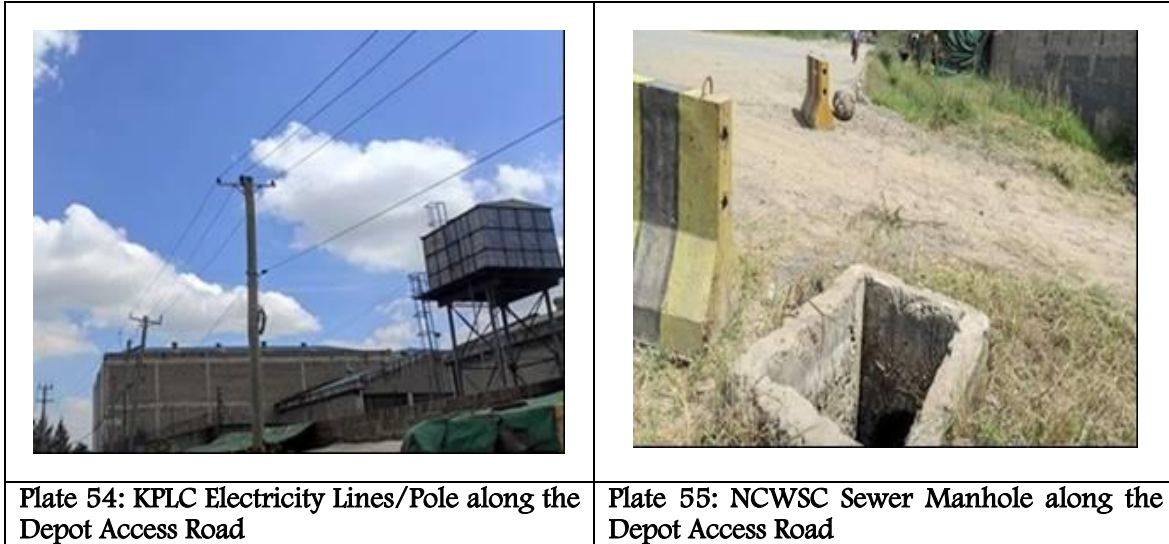
**Plate 52: Provision of Roadside Kerbs along the Project Road**



**Plate 53: No Provision of Pedestrian Footpaths along the Project Road**

### 2.3.4 Utility Services and Facilities along the Access Road

The main utilities infrastructures observed along the Project Road are KPLC Plc electricity lines/poles at GPS coordinates 1° 20' 0.4" S, 36° 53' 13.0" E, as well as NCWSC sewer infrastructure at GPS coordinates 1° 20' 1.2" S, 36° 53' 14.6" E as shown in **Plate 54**, and **Plate 55** below.



### 2.3.5 Land Use along the Access Road

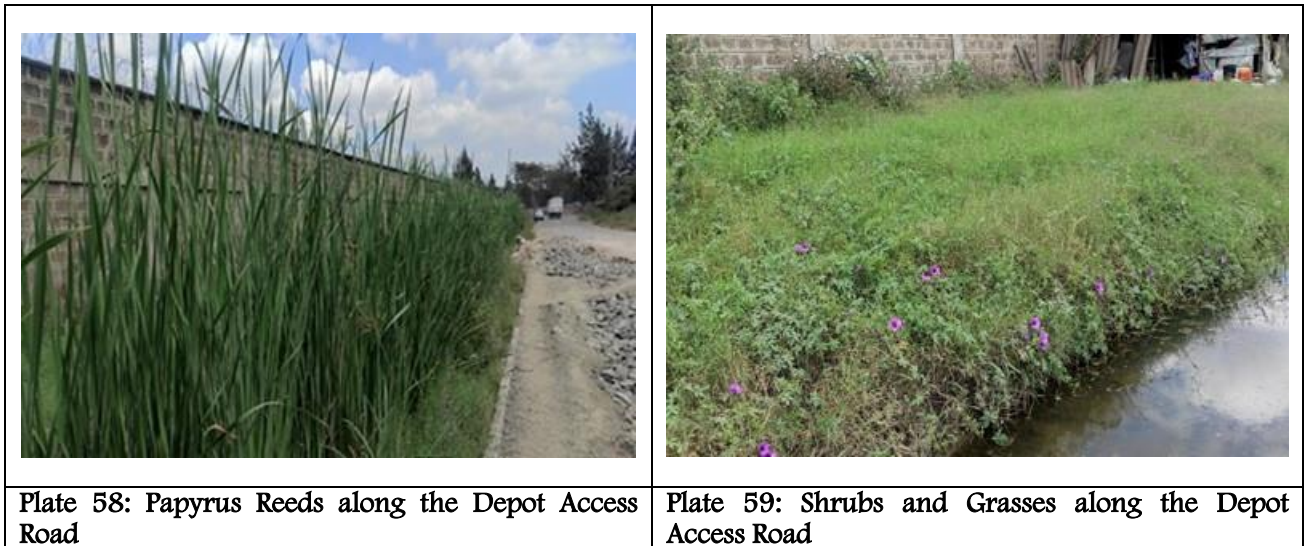
The predominant land use along the Project Road is commercial land use: This type of land use is designated for businesses, warehouses, shops and other infrastructure related to commerce. A few commercial properties are located along the Project Road such as Clinique Company Ltd at GPS coordinates 1° 20' 5.3" S, 36° 53' 13.3" E as shown in **Plate 56** below, and Basco Products Ltd at GPS coordinates 1° 20' 3.1" S, 36° 53' 14.1" E **Plate 57** below.



### 2.3.6 Biodiversity along the Access Road

Biodiversity can be defined as the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

Vegetation along the Depot Access Road is very little and mainly consists of Papyrus Reeds, shrubbery and grasses shown in **Plate 58** and **Plate 59** below.



### 2.4 Scope of Works

The major works to be executed under the proposed Project shall comprise mainly of but are not limited to the following:

- All Works along the BRT Line 5:
  - Construction of a 2 Lane BRT Line, along the entire length of the Outer Ring Road;
  - Construction of the 3 No. River Bridges and 2 No. Highway Bridges;
  - Construction of 13 No. BRT Stations;
  - Installation of all electro-mechanical works;
  - Construction of drains along Outer Ring Road;
  - Construction of a barrier on the outer extents of the BRT Lane; and
  - Street lighting along Outer Ring Road.
- All works on the BRT Depot:

- Construction of a three-floor administration building;
  - Civil works within the BRT Depot; Parking Spaces and Access Roads, Drains, Septic Tank; and
  - Installation of all Electro-mechanical Works.
- 
- ITS Basic Infrastructural Components Installation.
  - All other ancillary works as specified in the contract and as instructed by the Engineer.

The Scope of Works is described in this Chapter as follows:

1. BRT Line 5 Civil Works;
2. BRT Station Design;
3. BRT Stations Electrical and & Mechanical Works;
4. BRT Street Lighting Installation;
5. BRT Depot Works; and
6. BRT ITS Works.

#### **2.4.1 BRT Line 5 Civil Works**

The BRT Line 5 Civil Works will entail but not be limited to:

- Site clearance and topsoil stripping;
- Earthworks;
- Pavement Construction;
- Concrete Pavement;
- Drainage Works;
- Road Furniture Components;
- Maintenance of Traffic through the Works;
- Structures (Bridge, Pedestrian Footbridges, Stations Structural Works); and
- Landscape Architecture.

#### **2.4.2 Excavations and Earthworks**

##### **2.4.2.1 Site Clearance and Topsoil Stripping**

Site Clearance shall be carried out as directed by the Engineer. Topsoil shall include up to 200 millimetres (mm) depth. When instructed by the Engineer, the Contractor shall demolish or remove any structure.

Site clearance is not required over the paved width of the existing road and shoulders. The remaining area within the road reserve including the sides of the existing embankments and cutting should be cleared as instructed by the Engineer. This operation shall also include the removal of selected trees as directed by the Engineer. The



Contractor shall provide paint and all the assistance the Engineer may require to mark the trees, which should not be removed during site clearance.

#### **2.4.2.2 Preparation Prior to Forming Embankment**

Where benching is required to existing pavement to accommodate earthworks, subgrade or subbase for widening the road, the rate for compaction of existing ground shall be deemed to cover this activity. Excavation in the pavement of the existing road shall be kept dry. In the event of water penetrating the underlying layer, construction of the subsequent layers shall be postponed until the underlying layers are dry enough to accommodate the construction plant without deforming or otherwise showing distress.

Step construction shall be carried out per layer at the joint where excavating both vertically and perpendicular to the direction of the travel. The step shall be 500 mm perpendicular to the direction of the travel and 150 mm vertical unless otherwise instructed by the Engineer. Special care shall be taken when compacting the new material at the joint ensuring that specified density is achieved.

#### **2.4.2.3 Construction of Embankments**

Only material approved by the Engineer shall be used for fill in embankments. Material with high swelling characteristics or high organic matter content and any other undesirable material shall not be used, unless specifically directed by the Engineer. Unsuitable material shall include:

- All material containing more than 5% by weight or organic matter (such as topsoil, material from swamps, mud, logs, stumps and other perishable material);
- All material with a swell of more than 3% (such as black cotton soil);
- All clay of plasticity index exceeding 50; and
- All material having moisture content greater than 105% of optimum moisture content (Standard Compaction).

**Subgrade:** Shall mean upper 300 mm of earthworks either in situ or in fill and subgrade shall be provided for as part of earthworks operation. The material for subgrade shall have a California Bearing Ratio (CBR) of not less than 8% measured after a 4day soak in a laboratory mix compacted to a dry density of 100% Maximum Dry Density (MDD) American Association of States Highway and Transportation Officials (AASHTO) T99) and a swell of less than 1%.

**Subgrade repair:** Where directed by the Engineer, any localized failure in the subgrade shall be repaired by filling in selected soft, hard or natural of minimum CBR 30% and compacted in accordance with clauses in the specifications applying to normal subgrade.

**Embankment repair:** Where directed by the Engineer, any localized filling in soft, hard or natural; selected material requirements shall be executed in accordance with Clause 505.

#### **2.4.2.4      Compaction of Earthworks**

At pipe culverts, all fill above ground level around the culverts shall be compacted in layers not exceeding 150mm in thickness to a field density of 100% MDD (AASHTO T99) up to the level of the top of the pipes or top of surround. The compaction shall extend for a width equal to the internal diameter of the pipe on either side of the pipe (s) or surround (s).

At locations adjacent to structures, all fill above ground level up to the underside of the sub-grade shall be compacted in layers not exceeding 150mm in thickness to a field density of 100% MDD (AASHTO T99). In case of fill around box culverts, this shall be carried out for the full width of the fill and for a length bounded by the vertical plane passing through the ends of wing walls.

Where the formation in cut areas is formed of hard material, the Contractor shall remove the hard material to a depth of 200 mm or such other depth as may be directed by the Engineer. The void so formed shall be backfilled with sub-grade quality material and compacted to the same standard and tolerances as for sub-grade in fill.

Improved sub-grade, where required as part of the embankment construction shall be compacted and finished to the same standards and tolerances as those required for normal sub-grade.

#### **2.4.2.5      Quarries, Borrow Pits, Stockpiles and Spoil Areas**

The Contractor will be entirely responsible for locating and providing suitable sources of materials complying with the specifications and for procurement, winning, haulage to site of these materials, rehabilitating the borrow pits, quarries, stockpile and spoil areas, and all costs involved therein. Similarly, the Contractor will be responsible for provision of areas for stockpiling materials and disposal of spoil dumps or stockpiling within the road reserve. The Contractor may utilize them subject to the approval of the Engineer.

#### **2.4.2.6      Excavation and Filling for Structures**

Unless otherwise instructed by the Engineer, all excavated surfaces in material other than hard material, on which foundations for structures shall be placed, shall be compacted to 100% MDD (AASHTO T.99) immediately before structures are constructed.

All backfilling material shall be compacted to a minimum of 100% MDD (AASHTO T.99).

The bottom of foundations shall be levelled both longitudinally and transversely or stepped as directed by the Engineer. Where the material met with is other than rock, the same shall be compacted to at least 95% MDD. Where rock and soil are met with in part widths, the area in the soil portion shall be sub-excavated to a depth of 100 mm and backfilled with Class 15/20 concrete. All rock faces shall be freed of soft and loose material, cleared and cut to a firm surface, level, stepped or serrated as directed by the Engineer. All seams shall be cleared out and filled with cement mortar, to the satisfaction of the Engineer.

The work shall consist of provision of erosion protection works in the form of bed flooring and curtain or cut-off walls at the upstream and downstream ends of the new as well as the existing box/pipe culverts. The work shall be carried out to such designs and at such locations as indicated on the Drawings or as directed by the Engineer. The erosion protection works shall consist of dry rubble stone bed flooring and random rubble masonry curtain (cut-off) wall at the upstream and downstream ends of box/pipe culverts.

Stone pitching to drains, inlets and outlets of culverts to embankments and around structure shall consist of sound unweathered rock approved by the Engineer. The stone as dressed shall be roughly cubical in shape with minimum dimensions of 150 x 150mm for normal thickness of stone pitching.

All stone for pitching shall be capable of withstanding a crushing stress of 20 N/mm<sup>2</sup> when soaked. The source of stone shall be free from overburden, mudstone, cracks, sand holes, veins, laminations or other imperfections as may be identified by the Engineer during the approval process.

The surface to receive the pitching shall be compacted and trimmed to slope and the stone laid, interlocked and rammed into the material to give an even finished surface.

In areas where stone pitching has been damaged, the Contractor shall identify such areas and notify the Engineer for his agreement of the extent of the Works required and his approval and instructions to proceed with the Works. Stone pitching repair and reconstruction shall be carried out in accordance with Clause 710 of the Standard Specification. The Works shall involve removal of the damaged stone pitching and reconstruction of the said areas in accordance with Clause 710 of the Standard Specification by the use of the sound salvaged material together with any necessary additional material where all such materials shall comply with Section 7 of the Standard Specification.

Where instructed by the Engineer, the Contractor will install gabions as protection works to washout areas or bridge Piers and or Abutments. Gabions shall be constructed in accordance with Clause 711 of the Standard Specification.

In cases where existing gabions have been damaged, the Contractor shall identify them and notify the Engineer for his agreement of the extent of the Work required and his approval and instructions to proceed with the works.

Quarry waste or similar approved material shall be used to backfill scoured and eroded side, outfall and cut-off drain. The material shall be compacted to form a flat or curved surface preparatory to stone pitching of drainage channels, existing and new scour checks as directed by the Engineer. The surface to receive the pitching shall be compacted and trimmed to slope and the stone hand laid, interlocked and rammed into the material to give an even finished surface. The interstices of the Pitching shall be rammed with in-situ material. The in-situ material immediately behind the pitching shall be compacted to minimum density of 100% MDD compaction (AASHTO T.99).

#### **2.4.2.7 Culverts and Drainage Works**

Where instructed by the Engineer, the Contractor shall excavate and remove all existing blocked or collapsed culvert pipes of 450 mm, 600 mm and 900 mm diameter including concrete surround, bedding, in-let and outlet structure. The void left after removal of culvert pipes shall be widened as necessary to accommodate new concrete bedding, pipe and haunching. The void left by removal of these pipes shall be carefully preserved in order to accommodate replacement of 450 mm, 600 mm or 900mm diameter pipe culverts as shall be directed by the Engineer.

When instructed by the Engineer, the Contractor shall demolish or remove any other structure. The Contractor shall carry out all excavations for new culverts and drainage works to the lines, levels, inclinations, and dimensions shown on the drawings or as instructed by the Engineer.

Regarding bedding and laying of pipe culverts, where inflatable balloon method of casting culverts in-situ is used, it is essential that thorough pre-construction trials are carried out and necessary adjustments made to ensure that:

- Concrete pipes shall be laid on a 150 mm thick concrete bed of class 15/20 and the pipes shall be bedded on a 1:3 cement: sand mortar at least 50mm thick, 150 mm wide and extending the full length of the barrel.
- As for jointing concrete pipes: The concrete pipes for the culverts shall have ogee joints and will be joined by 1:2 cement: sand mortar and provided with fillets on the outside as described in clause 810 of the Standard Specification.

As for cleaning and repairing existing drains, in areas of existing side drains, mitre or outfall drains where such are blocked, the Engineer shall instruct the Contractor to clean and clear the drains to free-flowing condition. The work shall consist of but not limited to:

- Stripping and removal of any extraneous material to spoil including vegetation and roots in the drains to the satisfaction of the Engineer;
- Spreading of any spoil to the satisfaction of the Engineer;
- Shaping the drains to free flowing condition as directed by the Engineer; and
- Removing any broken side slabs for inverted block drains and replacing with a new one well jointed.

In the event of excavation for repairs exposing local seepage, springs or unacceptably high water table, the Engineer may instruct the provision of counter fort or French drains.

These drains shall consist of a trench excavated to the alignment, width, depth and gradient instructed by the Engineer, and backfilled with approved compacted clean hard crushed rock material as specified in standard specification. Where these drains lie within the carriageway the carriageway shall be reinstated with compacted stabilized gravel and surfaced with a surface dressing as instructed by the Engineer.

A filter fabric shall be placed under, around and over rock fill of the subsoil drains. The provisions and placing of the fabric shall be in accordance with manufacturer's instructions and complying with the Standard Specification.

The exposed surfaces of concrete lined drains shall be a class UF2 finish. Concrete lined drains shall be constructed to the same standard as the minor drainage structures.

Where instructed by the Engineer, the Contractor shall clean the existing hydraulic structures by removing all undesirable material in the structures to ensure they are clean and free flowing. The Contractor shall dispose of all the silt and other undesirable material to spoil. After the cleaning out of structures, the Contractor shall be responsible for maintaining the hydraulic structures in a clean condition for the duration of the Contract.

The Contractor shall remove existing concrete pipes as instructed by the Engineer including bedding, surround, and inlet and outlet structures. Concrete shall be disposed of as directed by the Engineer. Masonry structures, where in good condition, shall be preserved to reuse as may be directed by the Engineer. Additional material shall be added to the void left after removal of these pipes and structures and shall be carefully compacted to 100% MDD (T99). The void shall then be preserved for placement of any new pipes or construction of new structures.

The existing inlet and outlets structures-where in good condition, and reusable as beds to pipe extensions-shall not be removed.

#### **2.4.2.8 Passage of Traffic**

##### **2.4.2.8.1 Improvement of Existing Roads**

The employer shall hand over the entire road between the General Service Unit (GSU) premises at Allsops area and the Cul de Sac at Airport North Road for rehabilitation and reconstruction by the Contractor at the commencement of the contract.

Where instructed by the Engineer, Contractor shall improve the existing roads by providing material similar to those used for earthworks and pavement layers to repair any irregularities, or improve specified sections. The Contractor shall scarify the existing pavement, trim and compact the existing surface, and, where directed by the Engineer, bring in additional materials for pavement layers, spread and compact to required thicknesses and tolerances.

When a satisfactory standard of improvement has been achieved, the Contractor shall subsequently maintain the road to this standard.

##### **2.4.2.8.2 Passage of traffic Through the Works**

The Contractor shall so arrange his work to ensure the safe passage of the Traffic at all times and if necessary construct and maintain an adequate diversion for traffic complete with all the necessary road traffic signs.

The Contractor shall provide to the satisfaction of the Engineer adequate warning signs, temporary restriction signs, advance warning signs, barriers, temporary bumps and any other device and personnel equipped with two way radios to ensure the safe passage of traffic through the works.

- When carrying out the Works the Contractor shall have full regard for the safety of all road users.
- The Contractor shall also provide sign posts and maintain to the satisfaction of the Engineer all deviations necessary to complete the works.
- The Contractor will be deemed to have inspected the site and satisfied himself as to the adequacy of his bid for these works.
- The Contractor shall be responsible for safely maintaining and directing traffic through or around any part of the Works included in the Contract, with the maximum practical convenience, for the full twenty-four hours of each day.
- The Contractor shall render to the public all possible assistance when they are passing over roads maintained by him and over minor, private or temporary roads or bridges when used as deviation or when passing through the Works.
- Whenever the Contractor's operations create a condition hazardous to traffic or to the public, he shall furnish, erect and maintain such fences, barricades, lights,

signs and other services, as are necessary to prevent accidents or damage or injury to the public.

At the points where traffic is to deviate from its normal path (whether temporary diversion or part width of the carriageway) the channel for traffic shall be clearly marked with the aid of pavement markings, painted drums or a similar device to the directions of the Engineer. At night, the passage shall be delineated with lanterns or other suitable light source.

The Contractor shall ensure that the workforce and site supervisory staff at all times wear high visibility garments when work is carried out on or adjacent to a section of the road open to traffic. The Contractor shall ensure that the supervisor or person in charge of the work force is readily recognized from the rest of the work force. In addition, the Contractor shall provide a full-time traffic safety officer to coordinate aspects of road safety for the whole site.

#### **2.4.2.9 Natural Material Sub-base and Base**

The Contractor shall, as directed by the Engineer, bench and compact the subgrade to 100% MDD (AASHTO T99) provide lay and compact material for sub-base and base as directed by the Engineer and in accordance with Sections 5 and 12 of the Standard Specifications.

##### **2.4.2.9.1 Hand Packed Stones**

Where the use of hand packed stone is specified, the rock from which the stones and screenings are produced shall comply with the following:

- A.C.V. – Max. 25%;
- L.A.A. – Max. 30%;
- S.S.S. – Max. 12%;
- FI-Max 25%; and
- CR-Min 100%.

The stones shall be free from an excess of flat or elongated particles, soft and less durable rock, clays, loam, topsoil and other deleterious matter. The stones shall be of such grading and size that they pack firmly when laid by hand. The larger stones shall have a maximum dimension slightly greater than the thickness for the required compacted layer and be of a shape acceptable to the Engineer. The smaller stones shall have a reasonably uniform grading and be of a nominal size suitable, in the opinion of the Engineer, for filling the surface voids of the as placed larger stones in place. The nominal size of the smaller stones will be of the order of 50 mm.

#### **2.4.2.9.2 Screening**

The screenings shall consist of tough durable crushed rock, free from an excess of flat, elongated, soft or disintegrated pieces and harmful material, such as loam, clay, organic matter, or other deleterious substances and shall be to the Engineer's approval.

The grading of the screenings shall form a smooth curve and shall be within and approximately parallel to the following limits as shown in **Table 2** below:

**Table 2: Grading Screens**

| <b>B.S Sieve Size</b> | <b>Percentage by Weight Passing B.S. Sieve</b> |
|-----------------------|--|
| 10 mm                 | 100  |
| 5 mm                  | 85-100   |
| 0.425 mm              | 30-50  |
| 0.150 mm              | 10-30  |
| 0.075 mm              | 0-20   |

Sandy soil which may, with the approval of the Engineer, be added to the screenings or used in lieu of the screenings, shall comply with the following requirements:

- It shall consist mainly of sand sizes and have a reasonable smooth grading;
- The fraction passing 0.075 mm sieve shall be less than the weight passing 5mm sieve; and
- P.I. shall not be greater than 5.

#### **2.4.2.9.3 Construction**

On the prepared area, individual stones shall be positioned by hand with the greatest dimension vertical, and the largest and flattest end downwards. The greater number of stones shall be slightly higher than the thickness of the layer when laid. After placement of the stones in the specified manner, the material shall be initially compacted, preferably with a grid roller and a vibratory roller, which shall continue until the layer is thoroughly keyed, and until the compacted layer contains not more than 10% air voids. The irregularities that may show up during compaction shall be corrected by loosening the surface and removing or adding material as may be required and recompacting. Where necessary quarry fines of the same material shall be spread and broomed into the interstices and rolling shall continue until no more fines will go in to give a homogenous compacted layer of sub base.

#### **2.4.2.10 Reprocessing Existing Pavement Layers**

The existing surfacing and the base shall be reprocessed with additional material and the composite mixture shall be compacted to form the sub base layer. The existing surfacing and base course shall be broken up to specified depth and reprocessed in place, where



required. The underlying layers shall not be damaged, and material from one layer may normally not be mixed with that of another layer. Where unauthorized mixing occurs or where the material is contaminated in any way by the actions of the Contractor, and the contaminated material does not meet the specified requirements for the particular layer, he shall remove such material and replace it with other approved material.

Any mixture composition of the new layer must not contain more than 30% of the bituminous material by volume. The mixture must not contain pieces of bound bituminous material larger than 37.5mm, and any such material shall be removed. The requirements for imported material used in the respective pavement layers shall comply with the limitations, norms, sizes and strengths specified in the Standard Specifications. Material reworked in-situ or that obtained from existing pavement is not expected to comply with the material requirements but the reworking should achieve the specified requirements.

Where the thickness of any existing pavement layer requires to be supplemented within reprocessing and the thickness of the additional material after compaction will be less than 100 mm, the existing layer shall be scarified to a depth that will give a layer thickness of at least 100 mm after compacting the loosened existing and the additional material.

#### **2.4.2.10.1 Excavations in the Pavement**

Excavations in the pavement shall be kept dry. In the event of water penetrating the underlying layers, construction of the consecutive layers shall be postponed until the underlying layers are dry enough to accommodate the construction plant without deforming or otherwise showing distress. Step construction shall be carried out per layer at the joint when excavating, both longitudinally (if appropriate) and perpendicular to the direction of travel. The step width shall be 500 mm perpendicular to the direction of travel, and 150 mm long longitudinally, unless otherwise instructed by the Engineer. Special care shall be taken when compacting the new material at the joint, ensuring that the specified density is achieved.

#### **2.4.2.10.2 Bituminous Surface Treatments**

- **Materials for Prime Coat and Tack Coat**

For prime coat, the binder shall be a medium-curing cutback MC 30 unless otherwise directed by the Engineer. The rate of spray of bituminous prime coat refers to the gross volume of the cutback bitumen, that is to say the volume of the bitumen plus dilatants. Prime coat shall be applied to gravel areas that are to receive bituminous mixes as directed by the Engineer. The tack coat shall consist of bitumen emulsion K1-70 unless otherwise directed by the Engineer.

- **Spraying of Prime Coat and Tack Coat**

Application rates of the bituminous prime coat shall be designed by the Contractor to take into account surface condition of the surface to be primed, expected traffic conditions, blinding, and the time duration before the subsequent bituminous treatment is applied. The rate of spray of bituminous prime coat refers to the gross volume of the cut-back bitumen, that is to say the volume of the bitumen plus dilutant.

- The rate of application of prime coat shall be 0.8 litres per square metre (l/m<sup>2</sup>) to 1.2 l/m<sup>2</sup>. The exact quantity to be applied may be varied within these limits to suit field conditions and will be determined from trials by the Engineer.
- The rate of application of the tack coat on bituminous surfaces shall be 0.3 l/m<sup>2</sup> to 0.8 l/m<sup>2</sup>. The exact quantity to be applied may be varied within these limits to suit field conditions and will be determined from trials by the Contractor and approved by the Engineer.

#### **2.4.2.11 Bituminous Mix Bases, Binder Courses and Wearing Courses**

##### **2.4.2.11.1 Construction Plant**

- **Laying Plant**

The self-propelled spreader finisher shall be fitted with electronic level control devices, and level control shall be from tensioned wire supported at every 5 m intervals or levelling beam, as tried on site and subsequently approved by the Engineer.

- **Compaction Plant**

The Contractor shall provide sufficient rollers of adequate size and weight to achieve the specified compaction. Prior to commencing the laying of bituminous mixes in the permanent works, the Contractor shall carry out site trials to demonstrate the adequacy of his plant and to determine the optimum method of use and sequence of operation of the rollers. It is important to achieve as high a density as possible at the time of construction and it is expected that vibrating rollers will be required to produce the best results. That the optimum compaction temperatures are established which allow compaction without causing ripple effects or other distortions of the surfacing.

##### **2.4.2.11.2 Site Trials**

The trials shall be carried out to:

- Test materials, designed in the laboratory, so that a workable mix that satisfies the specification requirements can be selected; and
- To enable the Contractor to demonstrate the suitability of his mixing and

compaction equipment to provide and compact the material to the specified density and to confirm that the other specified requirements of the completed asphalt pavement layer can be achieved.

#### **2.4.2.11.3 Mixing of Aggregates and Bitumen**

The bitumen shall be heated so that it can be distributed uniformly and care shall be taken not to overheat it. The temperature shall never exceed 170°C for 80/100-penetration grade bitumen. The aggregates shall be dried and heated so that they are mixed at the following temperatures:

- 125-165°C when 80/100 bitumen is used

The dried aggregates shall be combined in the mixer in the amount of each fraction instructed by the Engineer and the bitumen shall then be introduced into the mixer in the amount specified. The materials shall then be mixed until a complete and uniform coating of the aggregate is obtained. The mixing time shall be the shortest required to obtain a uniform mix and thorough coating. The wet mixing time shall be determined by the Contractor and agreed by the Engineer for each plant and for each type of aggregate used. It shall normally not exceed 60 seconds.

#### **2.4.2.11.4 Transporting the Mixture**

The mix shall be transported from the mixing plant to the spreader in truck having tight, clean smooth beds, which have been treated to prevent adhesion of the mixture to the truck bodies. Gasoline, Kerosene, diesel fuel or other solvent shall not be used for this purpose. Loads shall be covered by waterproof canvas or metal sheets during wet weather. Vehicles shall be insulated when the air temperature and/or length of haul make this necessary to maintain the temperature between specified limits. Any loads wetted excessively by rain will be rejected. Hauling over freshly laid material will not be permitted.

#### **2.4.2.11.5 Laying the Mixture**

Immediately after the surface has been prepared and approved, the mixture shall be spread to line and level by the laying plant without segregation and dragging.

The mixture shall be placed in widths of one traffic lane at a time, unless otherwise agreed by the Engineer. The compacted thickness of any layer shall be at least 2.5 times the maximum size of the aggregate for wearing course and at least 2 times for binder course. The minimum thickness shall be 25mm.

Only on areas where irregularities or unavoidable obstacles make the use of mechanical laying impracticable, may the mixture be spread and compacted by hand.

#### **2.4.2.11.6 Finishing Joints and Edges**

Any mixture that becomes loose and broken, mixed with dirt or foreign matter or is in any way defective, shall be removed and replaced with fresh hot mixture, which shall be compacted to conform to the surrounding area.

Spreading of the mixture shall be as continuous as possible. Transverse joints shall be formed by cutting neatly in a straight line across the previous run to expose the full depth of the course. The vertical face so formed shall be painted lightly with hot 80/100 or 60/70 penetration grade bitumen just before the additional mixture is placed against it.

Longitudinal joints shall be rolled directly behind the paving operation. The first lane shall be placed true to line and level and have an approximately vertical face. The mixture placed in the abutting lane shall then be tightly crowded against the face of the previously placed lane. The paver shall be positioned to spread material overlapping the joint face by 20-30 mm. Before rolling, the excess mixture shall be raked off and discarded. When the abutting lane is not placed in the same day, or the joint is destroyed by traffic, the edge of the lane shall be cut back as necessary, trimmed to line and painted lightly with hot 80/100 or 60/70 penetration grade bitumen just before the abutting lane is placed.

Any fresh mixture spread accidentally on the existing work at a joint shall be carefully removed by brooming it back on to uncompacted work, so as to avoid formation of irregularities at the joint. The finish at joints shall comply with the surface requirements and shall present the same uniformity of finish, texture and density as other sections of the work. The edges of the course shall be rolled concurrently with or immediately after the longitudinal joint. In rolling the edges, roller wheels shall extend 50 to 100mm beyond the edge.

#### **2.4.2.12 Asphalt Concrete for Surfacing**

The asphalt concrete shall be SHRP Superpave. The design of the hot mixes shall be in accordance with the procedures detailed in overseas Road Note 19 (ORN19) “A guide to the design of hot mix asphalt in tropical and sub tropical countries”.

##### **2.4.2.12.1 Penetration Grade Bitumen**

Bitumen shall be 60/70 penetration grade specified in the special specifications or as instructed by the Engineer.

##### **2.4.2.12.2 Aggregate**

Fine and coarse aggregates must be clean, hard, strong and durable, and free from

absorbed chemicals, clay coating or materials in amounts that could affect hydration, bonding, strength and durability of concrete. Grading of aggregates shall conform to the requirements in the **Table 3** below.

**Table 3: Grading for Fine Aggregate**

| Sieve Size (mm) | Percentage by weight passing |
|-----------------|------------------------------|
| 10              | 100                          |
| 5               | 89-100                       |
| 2.5             | 60-100                       |
| 1.2             | 30-100                       |
| 0.6             | 15-54                        |
| 0.3             | 5-40                         |
| 0.15            | 0-15                         |

#### **2.4.2.12.3 Concrete Works**

This work shall consist of placing selected approved material of 250 mm minimum diameter on the foundation put after excavation to receive levelling concrete as required and in conformity with the lines, grades and cross sections as directed by the Engineer.

**Materials:** The selected rock builders to be placed for this work shall be hard, sound, durable quarry stones as approved by the Engineer. Samples of the stone to be used shall be submitted to and approved by the Engineer before any stone is placed. The maximum size of the stone boulders shall be 300mm.

**Construction method:** After completion of the structural excavation the surface of the loose soil shall be levelled and compacted. Then the stone of the above sizes shall be placed in one layer of 250mm over the compacted bed where the bottom slab will rest. Coarse sand shall be spread to fill up the voids in the stone boulders, and compaction with vibratory compactors should be performed to make this layer dense whereon a concrete of levelling course shall be placed.

#### **2.4.2.12.4 Concrete Class 15/20 of Culvert Walls and Slab**

Concrete Class 15/20 shall be used for culvert walls and slabs. The requirements of concrete Class 15/20 are provided as follows unless otherwise the Engineer will designate any alteration.

- Design compressive strength, 28 days: 15N/mm<sup>2</sup>;
- Maximum size of coarse aggregates: 20mm; and
- Maximum water/cement ratio of 45% with slump of 80mm.

#### **2.4.2.12.5 Concrete Works (Class 25/20) of In Situ Beams and Deck Slabs**

Concrete Class 25/20 shall be used for in situ beams and deck slabs. The requirements of concrete Class 25/20 are as detailed below unless otherwise the Engineer will designate any alteration.

- Design compressive strength, 28 days: 25 N/mm<sup>2</sup>;
- Maximum size of coarse aggregates: 20 mm;
- Minimum cement content: 300 kg/m<sup>3</sup>; and
- Maximum water/cement ratio of 45% with slump of 80 mm.

#### **2.4.2.12.6 Concrete Materials**

##### **▪ Cement**

Cement shall be of Portland type and shall conform to the requirements of BS 12 or equivalent. The Contractor shall select only one type of brand of cement or others. Changing of type or brand of cement will not be permitted without a new mix design approved by the Engineer. All cement is subject to the Engineer's approval; however, approval of cement by the Engineer shall not relieve the Contractor of the responsibility to furnish concrete of the specified compressive strength.

Conveyance of cement by jute bags shall not be permitted. Storage in the Contractor's silo or storehouse shall not exceed more than two (2) months, and age of cement after manufacture at mill shall not exceed more than four (4) months. The Contractor shall submit to the Engineer for his approval the result of quality certificate prepared by the manufacturer. Whenever it is found out that cement have been stored too long, moist, or caked, the cement shall be rejected and removed from the project.

##### **▪ Aggregate**

Fine and coarse aggregates must be clean, hard, strong and durable, and free from absorbed chemicals, clay coating, or materials in amounts that could affect hydration, bonding, strength and durability of concrete.

##### **▪ Water**

All sources of water to be used with cement shall be approved by the Engineer. Water shall be free from injurious quantities of oil, alkali, and vegetable matter and salt as determined by the Engineer.

##### **▪ Admixture**

Only admixture, which have been tested and approved in the site laboratory through trial mixing for design proportion shall be used. Before selection of admixture, the

Contractor shall submit to the Engineer the specific information or guarantees prepared by the admixture supplier. The Contractor shall not exclude the admixture from concrete proportions.

- **Proportioning Concrete**

The Contractor shall consult with the Engineer as to mix proportions at least thirty (30) days prior to beginning the concrete work. The actual mix proportions of cement, aggregates, water and admixture shall be determined by the Contractor under supervision of the Engineer in the site laboratory. The Contractor shall prepare the design proportions which has 120% of the strength requirement specified for the designated class of concrete. No class of concrete shall be prepared or placed until its job-mix proportions have been approved by the Engineer.

- **Concrete Work**

- **Batching**

Batching shall be done by weight with accuracy of:

- Cement: ½ percent;
    - Aggregate: ½ percent; and
    - Water and Admixture: 1 percent.

Equipment should be capable of measuring quantities within these tolerances for the smartest batch regularly used, as well as for larger batches. The accuracy of batching equipment should be checked every month in the presence of the Engineer and adjusted when necessary.

- **Mixing and Delivery**

Slump of mixed concrete shall be checked and approved at an accuracy of +25 mm against designated slump in these specifications.

- **Concrete in Hot Weather**

No concrete shall be placed when the ambient air temperature is expected to exceed thirty-three 33°C during placement operations.

- **Concreting at Night**

No concrete shall be mixed, placed or finished when natural light is insufficient unless an adequate approved artificial lighting system is operated, and such night work is subjected to approval by the Engineer.

- **Placing**

In preparation of the placing of concrete, the interior space of forms shall be cleaned and approved by the engineer prior to placing concrete. All temporary members except tie bars to support forms shall be removed entirely from the forms and not buried in the concrete. The use of open and vertical chute shall not be permitted unless otherwise directed by the Engineer.

#### **2.4.2.13 Structures; Bridges and Pedestrian Footbridges**

##### **2.4.2.13.1 Bridges and Pedestrian Footbridges**

This will involve the construction of the 3 No. River Bridges and 2 No. Highway Bridges. These are:

- Bridge 1 (Mathare River) at km 1+411;
- Bridge 2 (Nairobi River) at km 1+411;
- Bridge 3 (Kangundo Road Viaduct) at km 4+287;
- Bridge 4 (Ngong River) at km 7+850; and
- Bridge 5 over Embakasi Railway (Taj Mall) at km 9+880.

Design of highway bridges in the project has been carried out in accordance to Part 4 of the Road Design Manual of the Ministry of Roads, Transport & Public Works which mandated the application of British standard for this purpose. However, the relevant British Standards for design of bridges, i.e. BS5400 have since been superseded and withdrawn. This design has therefore applied Eurocodes, specifically EN 1990, EN 1991, EN 1992, EN 1997 and EN 1998. Because Kenya has no Annexes to these codes, the nationally determined parameters have been based, where applicable, on the UK National Annexes.

The bridges designed for the following load models:

- Load Model 1 comprising a representative tandem system made up of two axels each of 300kN concomitant with a uniformly distribute load of 9.0 kN/m<sup>2</sup> in the first notional lane with reduction factors applied to these loads when applied to the remaining lanes.
- Load Model 2 made up of a single axel of 400kN.
- Load Model 3 which caters for special heavy vehicles which could possibly gain access at one time to the project road.
- Load model 4 which would cater for pedestrian crowding is omitted as the bridges have no provision for pedestrian walkways.

The spans and overall lengths of river bridges are derived from hydraulic design based on hydrological studies carried out as a complementary part of the design process and



the skew angled at which the road alignment crosses the rivers. A free-board of at least 1m is provided over and above the design flood levels.

For bridges over lower roads, spans through which these roads pass have been dimensioned to accommodate their layouts. The clearance from the lower roads to the soffits of the bridge girders is set the minimum requirement of 5.5m.

For railway lines passing under the proposed bridges, the widths are based on lateral clearances required by the railway authorities and provision is made for future railway lines at the crossing points. The vertical clearance from the railway tracks to the bridge girder soffits is based on the minimum requirement of 7.01m.

The works to be executed on bridges and pedestrian footbridges will include:

- Supply, fit and fix in position true to line and level elastomeric bearings pads complete with all accessories;
- Strip Seal type of expansion joint with structural steel and anchorage assembly complete as per the drawings and specifications including acceptance testing as specified, to be installed under the supervision of a Specialist Manufacturer;
- Provide and fix in position 20 mm thick compressible fibre board in expansion joint complete as per the drawings and the Technical Specifications;
- Provide and fill joint sealing compound as per the drawings and Technical Specifications complete with coarse sand and bitumen;
- Drainage Spouts complete as per the drawings and Technical Specifications;
- Provide, place and compact concrete Class 30/20 to base of piers, Piers, abutments reinforced earth foundations and retaining walls. Rate inclusive of formwork as directed by the Engineer;
- Provide, place and vibrate pre-cast concrete Class 45/20 to deck girders. Rate inclusive of formwork;
- Reinforced concrete parapets - Class 40/20 - including cost of reinforcement, steel plates and pipes complete as per the Drawings and Specifications;
- Provide, place concrete Class 45/20 for bearing pedestals; and
- Supply of structural steel works including material bolts, nuts washers welding rods and all other fixings and erection, painting etc. complete as per drawing and Standard Specification for Road, Pedestrian Footbridges and Bridge Construction.

### **Pedestrian Footbridges**

- Excavate in soft material to depth up to 3 m, spoiling surplus/unsuitable material for and keeping the excavation free of water;
- Backfill and Compact excavated area to foundation level in accordance with the specifications;
- Provide, place and compact rock fill below structures, where necessary;
- Provide grade C25/20 reinforced for the substructure for pedestrian footbridge;

- Provide structural steel of characteristic strength 30 or 25 N/mm<sup>2</sup>;
- Provide blinding concrete equivalent to C15/20;
- Reconfigured the supports for the existing pedestrian footbridges to allow for access of the pedestrian footbridge platform from the staircase; and
- Introduce a Y configuration support from the deck downwards thereby eliminating the bracings above the deck and creating at least a 2.0 m access width to the platform.

#### **2.4.2.13.2 Demolitions**

The Contractor shall locate and protect any drains, cables, pipes etc. before commencing bulk excavations any damage or disturbance caused to any such services will be made good at the Contractor's expense.

The Contractor is to allow for all temporary protection required during the works including ordinary and special dust screens, boarding, barriers, warning signs etc. as directed by the Architect and as necessary for the protection of the existing structure and finishings, workmen employed upon the site and the public. All protective devices are to be removed on completion of the work and any necessary making good consequent upon this to be executed to the satisfaction of the Architect. The works shall be executed in such order and sequence as the Architect may direct and as little disruption and inconvenience as possible shall be caused to the normal functioning of the employer, staff and public. Debris shall be kept well watered during the work to avoid dust arising. No demolitions shall be commenced without the express instructions of the Architect.

All existing work shall be propped, strutted and supported as necessary for the protection and safety of the buildings while carrying out the works. Prices shall include for all necessary preparatory works to structure and finishings and all making good to finishings on completion whether or not specifically described (unless described as being stored on site, all resulting from the demolitions shall be carted away from the site and prices shall be deemed to include all credit allowances, unless an additional credit is offered by means of lump sum deduction on the collection page of this section).

Before commencing the demolition of any part of the structure, all Electrical, Plumbing and other services which come within the area to be demolished shall be disconnected and diverted so that they may be entirely self-contained within any portion of the premises which is to remain. All existing work shall be made good up to new surfaces and cleaned to the satisfaction of the Architect. The Contractor is to allow for all necessary means of access, hoisting etc. to existing floors and roofs at all heights above ground level.

Items described as being stored on site shall be carefully removed from the existing building and stored securely on site until required for re-use. Materials to be re-used shall be cleaned down, made good as necessary and re-fixed in position. The contractor

shall be entirely responsible for any breakages or damage which may occur during this process unless it is certified by the Architect that such breakage or damage was inevitable as a result of the conditions of the item concerned, or its method of fixing, in which case the cost of replacement will be borne by the Employer.

All items of cutting openings through walls and floors shall include for temporary propping, supporting the existing walls, floors and roofs, building up jambs, making good wall, floor or roof finish both sides to match existing.

#### **2.4.2.14 Road Furniture**

Road reserve boundary posts shall be provided as directed by the Engineer and in compliance with Standard Specification clause 2001. They shall be placed at 50m intervals along the boundary of the road reserve.

- **Edge Marker Edge**

Edge marker post shall be provided as directed by the Engineer and in compliance with Standard Specification Clause 2003.

- **Permanent Road Signs**

Permanent Road Signs shall be provided as directed by the Engineer and in compliance with the requirements of the "Manual for Traffic Signs in Kenya" Part II and standard Specification clause 2004.

- **Existing Road Signs**

Where directed by the Engineer, the Contractor shall take down road signs including all posts, nuts, bolts and fittings, and remove and dispose of the concrete foundation and backfill the potholes. The signs shall be stored as directed by the Engineer.

- **Road Marking**

Paint for road marking shall be internally reflectorized hot applied thermoplastic material in accordance with Clause 219 of the Standard Specification.

- **Raised Pavement Markers-Road Studs**

Road studs are moulded of acrylonitrile butadiene styrene (ABS) conforming to American Society for Testing and Materials (ASTM) Specification D1788 – 68, class 5-2-2 shell filled with inert, thermosetting compound and filler. The lens portion of the marker is of optical methyl meth acrylic.

The road studs shall be constructed of high impact ABS containing a multi-biconvex glass lens reflector system. It shall be of monolithic construction, and not less than 98.5 m<sup>2</sup>. The height of the marker shall not exceed 17mm and the underside shall contain a non-honeycomb base (flat).

- **Requirements**

The markers shall conform to the following requirements:

- **Colour:** Shall be white, yellow or red as specified and the Retro – reflectance values should conform to the testing procedures of ASTM E 809.
- **Impact Resistance:** The marker shall not crack or break when tested using a 1000-gram weight from a height of 1m (ASTM D 2444) or BS 3900 Part E3.
- **Resistance to Water Penetration:** Shall not have water penetration behind the lens after submerged in a water bath at 70 ± 50 for 10 minutes and it should still meet the reflectance Requirement BS 998.
- **Heat Resistance:** Shall comply with the initial brightness as per BS 873 Part IV of 1978.
- **Night Visibility:** The marker shall be bright as per BS 873 Part IV of 1978.
- **Compression Resistance:** There shall be no cracking sound at a pressure lower than 25 tones as per BS 873 Part IV of 1978.
- **Corrosion Resistance:** After immersing a sample of Road stud in a solution containing 30g/l of sodium chloride for 30 days, there shall not be any signs of corrosion- (BS998).

- **Guardrails**

Contrary to the Standard Specification, guardrail posts shall be concrete 200 mm diameter set vertically at least 1.2 m into the shoulder as directed by the Engineer. Spacer blocks shall also be made of concrete. Beams for guardrails shall be "Armco Flex beam" or similar obtained from a manufacturer approved by the Engineer.

- **Kerbs**

- i. Vertical Joints

Vertical joints between adjacent kerbs shall not be greater than 5 mm in width and shall be filled with a mortar consisting of 1:3 cement: sand by volume.

- ii. Transitional between Flush and Raised Kerbs

The transition between flush and raised kerbs (e.g. at bus bays) shall be termed as ramped kerbs. The transition between flush and raised kerbs shall occur within a length

of 2.0 m.

- **Kilometre Marker Post**

Kilometre marker posts shall be provided as directed by the Engineer and in compliance with Standard Specification clause 2008.

- **Rumble Strips**

Where directed by the Engineer, the Contractor shall provide, place, trim, shape and compact to line and level asphalt concrete rumble strips on the finished shoulders. This shall be done to the satisfaction of the Engineer.

- **Bollards**

Where shown on the Drawings or instructed by the Engineer, the Contractor shall construct permanent bollards. The bollards shall be gauge 16 steel pipe Bollards of diameter minimum 150mm and 1.0m above the ground, embedded to a depth of 0.5m at place. The bollards shall be filled using a minimum class (15/20) concrete and as shown on the Drawings.

- **Rumble Strips**

The Contractor shall provide, place, trim, shape and compact to line and level asphaltic concrete rumble strips on the finished shoulders as directed by the Engineer. Asphaltic concrete rumble strip sets to the full width of the carriageway and shoulders shall also be placed as warning strips to speed humps at the preselected locations to the satisfaction of the Engineer.

- **Service Ducts**

Service ducts shall be provided in locations as directed by the Engineer. Ducts shall be heavy duty Polyvinyl chloride (PVC) spigot and socket pipe of 3 mm minimum wall thickness. Minimum cover to the top of the pipe from formation level shall be 0.6 m. Pipes shall be bedded and surrounded by a 100 mm minimum thickness of compacted fine granular material of 10mm maximum size. The remainder of the trench shall be backfilled with selected backfill material of subbase quality up to the top of formation level.

- **Duct Marker Posts**

Duct markers shall be installed by the Contractor at each end of the services ducts provided. The duct marker shall be located immediately beyond the outer edge of the shoulder or footpath and as close to the line of the duct as physical constraints permit.

Where several ducts are laid side by side, only one duct marker post will be necessary. The duct marker posts shall be constructed as shown on the Drawings and shall be clearly and durably marked on the side facing away from the road. The marker post shall be inscribed ducts” where X is the number of ducts laid in the group marked by the marker post.

- **Road Humps**

Where shown on the drawings or directed by the Engineer, the Contractor shall provide, place, trim, shape and compact to line and level road humps. Road humps shall be constructed in asphaltic concrete or concrete class 20/10 to the dimensions shown on the drawings or as directed by the Engineer. Road humps should be painted with white thermoplastic paint of 45 ° diagonal strips.

- **Raised Zebra Crossing**

Where shown on the drawings or as directed by the Engineer, the Contractor shall provide, place, trim, shape and compact to line and level flat-topped zebra crossing.

- **Channel Blocks**

The Contractor shall provide, lay and joint 125mm x 125 and 125 mm x 250 mm channel blocks to roads, footpaths and shoulders as shown on the Drawings or as instructed by the Engineer.

#### **2.4.2.15 Landscape Architecture**

##### **2.4.2.15.1 Site Preparation**

**Site Clearance:** Site clearance shall include clearing the site of all debris, rubble, deleterious material, rubbish, unwanted bushes, undergrowth vegetation as well as grubbing up old roots and carting away from the site.

**Site Excavation:** Overall site excavations shall be executed by ploughing or hoeing, and are to be carried out to an overage depth of 300 mm. the Landscape architect may however order deeper excavations where site conditions dictate.

**Grading & Levelling:** Grading and levelling of planting areas shall involve both rough and fine grading.

**Soil Preparation:** This shall involve mixing of top/red soil and farmyard manure at specified ratios (3:1) ready for application on planting areas/beds and pits. In grass areas, the level of topsoil is to be 30 mm below all paved edges below the finished floor level of buildings where directly abutting the walls. All areas to be grassed are to be free of weeds and rubbish and brought up to fine tilth before grass cuttings are planted.

**Pits Excavation:** Pits for installation of plant materials (trees, shrubs, groundcovers) are to be excavated as described or outlined in the issued landscape drawings. Tree, shrub and trench positions must be clearly marked with wooden stakes before planting pits are excavated.

**Damage to Existing Fixtures:** The Contractor shall generally ensure that his work will not interfere with or damage any part of the existing site fixture e.g. Cables, pipes or other services, above or below ground level.

#### **2.4.2.15.2 Plant Materials**

**Delivery of Plants:** The Contractor shall ensure that adequate protection is given to all plants and their root systems to preclude failure due to lack of moisture or exposure during transportation to the Site. Where plants cannot be planted immediately upon arrival, they shall be tagged with labels when delivered to the Site with the botanical name clearly printed thereon.

**Grass Cuttings:** Fresh young growing roots/ tips of maadi river grass are to be used for all grass areas unless otherwise specified.

**Plant Materials (Including all Trees):** The Contractor shall provide all plant materials as indicated on the landscape drawings and in the plant list.

**Plant Condition and Size:** Plants shall be well branched and symmetrically shaped, of a normal habit for the particular species. The landscape architect shall be consulted to approve all plant samples before the buying of specified plants and any planting can commence.

**Existing Trees and Shrubs:** Existing trees on site shall be retained at Landscape Architect's discretion with client's approval. Thus the contractor shall NOT cut down or remove any shrubs and trees unless where directed by the Landscape Architect.

**Grass Maintenance:** The Contractor shall, during the period of the Contract, water, weed and tend well the whole grassed area till grass is well established or until they are handed over at the end of the defects liability period.

**Watering and Installed Plants:** Although the planting programmes for plants and grass to be coincident with rainy seasons, the contractor will be required to water all grassed areas as necessary.

### **2.4.2.15.3 Landscape Maintenance**

- **Maintenance period**

The Contractor shall maintain all planting, starting with the planting operations and continuing through to the maintenance period after all planting is complete and approved by the Landscape Architect. The maintenance period (Defects Liability Period) shall be six (6) months from the date of practical completion.

- **General Maintenance Practices**

The Contractor shall maintain the whole of the planted area, all trees, shrubs and other plants, also the grass areas within the contract period. General maintenance shall include; watering, weeding, mowing, cutting, cultivating, control of insects, fungus and other diseases by means of spraying with an approved insecticide or fungicide, pruning, adjustment and repair of tree ties, repair of minor washouts and other horticultural operations necessary for the proper growth of grass and plants and for keeping the landscape areas neat in appearance.

### **2.4.2.16 BRT Stations Design**

#### **2.4.2.16.1 Station Layout**

BRT line 5 system has been designed with 2 types of alignment models:

- Centrally located stations for both directions of travel (Island); and
- Centrally located stations for each direction of travel (Staggered).

The stations are of types:

- Island Station - Serving stations: 501,502,503,504,505,509,513; and
- Staggered Station - Serving stations: 506,507,508,510,511,512.

BRT line 5 stations contain three primary elements:

- Staircase: Designed in reinforced concrete. The staircase provides access and exit to and from the stations from the existing foot bridges which shall be used by BRT passengers to come to the stations at separate grade from the mixed traffic lanes;
- Lift: To be used by persons with disability and the vulnerable to access and exit the stations; and
- The station Structure: This has three primary areas:
  - Ticketing Area;
  - Checking in Area; and



- Waiting Area.

#### **2.4.2.16.2 Access Structures**

BRT Line 5 stations shall be served by the existing pedestrian footbridges. Passengers are expected to use the outer ramps or staircases that currently serve pedestrians crossing Outer Ring Road. Connecting staircases have been designed to facilitate access to the lower level stations from the foot bridge platform 6.0 m elevated. In addition, lifts have been designed for the persons with disabilities and the vulnerable.

The station design considered user friendly spaces that are both accessible and comfortable. The BRT Line 5 has provided an ablution block at the terminal stations, i.e., Station 1 and 13 at Allsops and Taj Mall respectively. There are staggered seats within the boarding areas for vulnerable users such as the elderly, mothers, children, and the less abled. Additional seats are also provided at the top of the stairs as well.

There will be sufficient lighting in all sections of the station for safety and security. The walls act as safety barriers preventing the users from climbing over or standing on the BRT line and only have access through the turnstile gates when the buses arrive.

#### **2.4.2.16.3 New Pedestrian Footbridges**

Four additional pedestrian footbridges have been designed to serve the stations at Allsops, Juja Road, Donholm and Tassia These are stations 501,505,509,510 respectively. These pedestrian footbridges have been designed in structural steel except for the deck which is a composite element made of concrete deck supported on steel platform.

Stations 501 and 510 (Allsops and Tassia) shall also serve as pedestrian crossing footbridges. The other pedestrian footbridges have been designed to serve the respective stations. All other stations shall be served using existing pedestrian footbridges which have been provided with connecting staircases from the respective stations.

#### **2.4.2.16.4 Connection of Station Staircases to Existing Footbridges**

The new bus station access staircases have been aligned with the central supports of the existing pedestrian footbridges. Consequently, the consultant has reconfigured these supports to allow for access of the footbridge platform from the staircase. We have proposed to introduce a Y configuration support from the deck downwards thereby eliminating the bracings above the deck and creating at least a 2.0m access width to the platform.

#### **2.4.2.16.5 Passenger Integration with BRT line 3 and 4**

Integration with BRT Line 3 requires both an access staircase and a suspended pedestrian side walk on the outside of the existing bridges. Since the existing side walk on the vehicular bridge is not sufficient to carry current pedestrian on Juja Road and BRT line five passengers, a suspended pedestrian footbridge has been designed to serve this purpose. For integration with line 4, only an access staircase and a lift is required for passenger's connection from line 5 to 4.

#### **2.4.2.16.6 BRT Station Electrical and Mechanical Works**

These will comprise of all electrical, mechanical and information and communication technology (ICT) components, including power back-up set-up, that will be undertaken on the stations.

#### **2.4.2.16.7 Station Electrical Works**

BRT stations require electricity for lighting, ticketing, fare collection, Closed Circuit Television (CCTV) surveillance, access control, pedestrian station access elevator and other related ITS elements. The stations ticketing booth and check-in area will be designed with illuminance levels of 300 Lux and 100 Lux for the circulation and boarding areas. The foot bridges will also be provided with lighting of minimum illuminance levels of 100 Lux.

The electrical load will be divided in to 3 categories namely:

1. The primary load which includes the fare collection system and the ticketing system which will have an extra accessory industrial Uninterruptible Power Supply (UPS) with an 8 hour back up power.
2. The secondary load which includes the turnstile gates, security doors, elevator power, CCTV power, raw power socket outlets and station lighting. The emergency version light fittings come complete with in-built battery backups. The primary and secondary loads will be provided with dual power supply to ensure power supply security at any given time. The dual power supply will be power from the KPLC utility grid and the backup batteries with an 8-hour backup power.
3. The tertiary load which includes station general lighting (foot bridge lighting, roof overhang lighting), advertising lighting, fans, air conditioning system.

#### **2.4.2.16.8 Light Fittings**

The proposed BRT stations interior lighting fittings are the 4 ft. twin recessed light fitting complete with 2No. 16W, T8 light-emitting diode (LED) tube light fittings, and prismatic diffuser.

The light fittings to be installed shall be for both the emergency version and the normal light fittings.

They will be controlled by a photocell which automatically switch on the lights when natural light levels are low darkness and automatically switches off when natural light sets in mostly during morning hours.

Motion sensor flood light fittings will be used to provide security lighting all-round the BRT stations. They will be controlled by a photocell which automatically switch on the lights when natural light levels are low darkness and automatically switches off when natural light sets in mostly during morning hours.

#### **2.4.2.16.9 Power Distribution**

Trunking systems shall be installed on the perforated steel walls, to contain both the low voltage supplies and the Information Technology/Communication cables to allow flexibility in use and distribution.

Three (3)-pin switched 13 Amperes socket power outlet points are provided next to the waiting area benches for phone and laptop charging for waiting passengers.

#### **2.4.2.16.10 Communications/Information Technology**

Data networking points are provided in the stations and fibre optic connection is recommended on site however this is dependent on the nearest backbone to site and internet service provider terms and conditions.

A dedicated server room will be provided to house the data cabinets, all data cabling will be routed from the communications cabinets within the server room via cable trays and conduits.

Twin data outlet will be installed next to each 13Amps. Socket outlet point and linked back to the respective communication cabinet.

#### **Uninterruptible Power Supply Works**

The design, supply, delivery, installation, testing and commissioning of a continuous duty 50Hz, 15KVA, 240V single phase (two wire + earth) uninterruptible power supply system complete with a maintenance-free sealed battery. The UPS system shall operate in conjunction with the existing power distribution system. In the event of an emergency it shall be able to supply independently at least 30 minutes of clean and regulated uninterruptible power for computer equipment and other critical loads. Only “True-on-line” technology, also called Voltage Frequency Independent Operation with By-pass (VFI according to IEC 62040-3), following the IEC 62040 standard, are accepted.

### **Lift Works**

- Price for all imported materials (give break-down on a separate sheet) for 1No. Machine room less panoramic Lift with a capacity of 4 passengers, 2No. stops and motor rated 400 kg;
- 240/415V, 3.0KW and a speed of 1.0m/s;
- Price for locally purchased materials, installation, testing and commissioning costs (give breakdown on separate sheet) for 1No. lift;
- Allow for any associated electrical works including provision of shaft lighting and for builders works;
- Provision of 5 No. keys for the lift, 4 sets of operation and maintenance manuals as described in the specifications, 2 sets of record drawing as described in the specifications, travelling cable for interfacing fire alarm system, CCTV and Audio system;
- High quality speakers connected to the cable and installed in the lift car to engineers; and
- Connection of a telephone extension from the premises with the telephone instrument in the lift car all wiring and accessories included.

#### **2.4.2.16.11 Station Mechanical Works**

The works to covered in mechanical installations shall include:

- Plumbing Services;
- Drainage Services; and
- Firefighting services

##### **2.4.2.16.11.1 Plumbing Services**

###### **A. Water Distribution System**

The water to the washroom is to be obtained from 12 m high sectional steel overhead tank of capacity 50 cubic metres (m<sup>3</sup>). All underground pipework for external water supply will be done using Polypropylene Random Copolymer (PPR-C) internal water pipework systems with fittings fixed and welding. The installations to have the various sizes of connectors, adaptors, sockets, reducers hold bats, clips etc. as required for satisfactory function.

###### **B. Internal Plumbing Services**

The domestic cold-water piping will be distributed to all lavatories (Wash Hand Basins) and water closet (WC) cisterns. The design for water supply pipes conform to BS 8558:2011: Guide to the design, installation, testing and maintenance of services

supplying water for domestic use within buildings and their curtilages. Complimentary guidance to BS EN 806.

#### **2.4.2.16.11.2 Drainage Services**

The scope of mechanical design entails draining each of the buildings to the last manhole connection and leaving the drainage site reticulation to the Civil Engineer given the various topography, layout design and interaction with other Civil works considerations.

- All bathroom groups will be connected to the sanitary waste and vent system per code requirements;
- Kitchen equipment waste will be routed through a grease interceptor if grease cooking is expected;
- Drainage from Fueling station, maintenance area and washing area are to be routed through an oil interceptor before joining storm water drainage; and
- Pipes material shall be Unplasticized Polyvinyl Chloride (uPVC) or Modified unplasticized polyvinyl chloride (MuPVC) pipes for sewage, High Density Poly Ethylene (HDPE) pressure pipes, joints and fittings for rising mains, where needed, shall be of mechanical.

The installations to have the various sizes of connectors, adaptors, sockets, reducers hold bats, clips etc. as required for satisfactory functions

#### **2.4.2.16.11.3 Firefighting Services**

##### **A. Fire Extinguishers**

These shall be 9-litre water filled or CO<sub>2</sub> cartridge operated portable fire extinguishers and shall comply with B.S. 401 or B.S. 1288. or KSIS O7165:1999 and to the requirements of B.S.1004.

The portable dry powder fire extinguishers shall comply with BS 1449 or KSISO7165:1999 and BS 1004. The body shall be constructed to steel not less than the requirements of BS 1449 or aluminium to BS 1470: 1972(EN3: 1996) and shall be suitably protected against corrosion The dry powder charge shall be not-toxic and retain its free flowing properties under normal storage conditions. Any pressurizing agent used as an expellant shall be in dry state; in particular, compressed air.

These shall be of 9 litres capacity complete Air Foam Extinguishers with refills cartridges and wall fixing brackets and complying with B.S. EN 3/BS 1449 and BS 1004 with the following specifications:

- Cylinder: to B.S. 1449 or KSISO7165:1999;
- Necking: to be 76 mm outside diameter steel EN 3A 23/4 X 8 TPI female thread;

- Head cap: to be plastic moulding acetyl resin;
- CO<sub>2</sub> Cylinder: to be 75 gm PVC coated;
- Internal Finish: to be polythene lining on phosphate coating; and
- External finish: to be phosphate - One coat primer paint and one coat stove enamel B.S. 381C.

## **B. Fire Blanket**

The fire blanket shall be made from cloth woven with pre-asbestos yarn or any other fire proof material and to measure 1800 x 1210 mm and shall be fitted with special tapes folded so as to offer instantaneous single action to release blanket from storing jacket to BS 1721.

## **C. Signage**

Appropriate signage on fire safety will be installed, this will include the Fire Exit Signs in red colour, and Fire Instruction Notice.

### **2.4.2.16.12 BRT Street Lighting Installation**

The lighting system to be installed shall withstand the maximum stresses under the most severe condition of normal service. Materials shall have a high resistance to change in their properties due to the passage of time, exposure to light, temperature and any other cause which may have a detrimental effect upon the performance or life of the Works.

The routes of cables and positions of transformers, feeders and equipment shall be part of the final design and must be agreed on site with the Engineer before any work is carried out. Lighting for pedestrians shall be on a comparable level to motorised vehicles.

#### **2.4.2.16.12.1 All in One Solar LED Street Lighting**

This section of the specification covers the supply, installation, connection, testing and commissioning of all-in-one solar street lighting installation.

Requirements for all-in-one solar LED street light shall be:

1. LED luminaire 150W - 240W LED power rating, luminous efficacy 210Lm/W, 3000K – 6500K.
2. PV monocrystalline solar module 10V, 39W, solar module efficiency > 17.8%; max. power current (Imp) 3.61 Amps.
3. Battery 30Ah / 6.4V, Lithium Ferro Phosphate LiFePO<sub>4</sub>.
4. Mounting height 10 m – 12 m high.
5. Waterproof IP66.
6. Lighting time after full charge 4 – 5 nights during rainy days.

7. Working temperature -25°C to 65°C.
8. Housing material to be Aluminum alloy + PMMA.
9. Three lighting modes: - remote control / PIR sensor (8M) / dim (30% when there is no movement of people or vehicles and 100% when motion is detected).

#### **A. Street Lighting Columns**

These shall be manufactured from Class B galvanized steel pipes as per the attached drawing and shall be complete with fitting brackets for single arm.

The columns shall be of 10m mounting height from ground level with 1.5m outreach arm and shall be installed at 1000 mm depth on a thick concrete foundation with protruding 16 mm thread diameter bolts.

#### **B. Lantern**

Lanterns shall be of all-in-one (integrated) solar streetlight with lithium Ferro phosphate (LiFePO4) battery, solar panel and charger built into the luminaire. Pressure die cast aluminium for sturdiness and long life, IP66. Specially designed pole mounting bracket allows different tilt angles, lateral and pole top mounting.

#### **C. Earthing**

All poles and lanterns shall be properly earthed. The earth lead should not be visible and be adequately protected. This is to be terminated onto an 1800 mm long x 15 mm diameter copper earth electrode with a driving tip and clamp in a 150 mm x150 mm x 200 mm precast concrete manhole to be covered and not to be seen after completion of surface.

All earthing lead shall be a green/yellow copper 6 mm<sup>2</sup> single core cable.

#### **2.4.2.16.12.2 Street Lighting Pole**

The civil works for the proposed Solar Street Lighting System shall include Solar Street Light pole design and installation at the site. The structure shall be facing southern direction tilted at 30-degree. Pole and Mounting structure shall be designed accordingly and shall be able to withstand wind loading of 180Km/hr and support the installed solar luminaires.

20m polygonal steel galvanised high mast column made from Class "B" steel galvanised polygon cross section column, complete with circular luminaire carriage for carrying 6No. luminaires, root mounted, continuous taper to meet 20m mounting height requirement with 6No. 300 W All in One Solar Lights mounted on the circular ring,

Lightning Arrester, Earthing and Solar Warning Light, pulleys, anchoring bolts and lowering steel ropes.

Civil works for reinforced concrete 2500 mm x 2500 mm x3000 mm high mast foundations of C30 concrete.

#### **2.4.2.16.12.3 High Mast for Flood Lighting**

The high masts for area lighting shall be the type incorporating a lantern carriage which can be raised and lowered by using a winch in the base of the mast. The columns of the high masts shall be continuously tapered with circular or polygonal cross section, to present an aesthetically good, slim visual appearance. Stainless steel shall have adequate corrosion resistance to chlorides in the atmosphere. Provision for earthing the masts shall be provided using a 12 mm diameter stainless steel or brass stud with nuts and washers fixed to the main body of the mast structure in the base compartment.

The luminaire carriage shall be of robust construction, keeping the number of individual components to a minimum. The frame of the carriage shall be capable of being fitted to and removed from the mast after erection of the mast. Each carriage shall be designed to carry luminaires required for the specified lighting including accessories, cable junction box, one obstacle light, and one access point unit for wireless data coverage. The access point will be approximately 0.3 x 0.2 x 0.2 m and have a maximum weight of 15 kg.

Luminaires (Lanterns) in this specification shall include All-in-One Solar LED Street Lighting, complete with their control gear. The luminaire shall include the reflector, the refractor, and the housing.

The floodlight luminaire shall be a low profile to minimize the structural load. The luminaire shall have a wind load lower than 0.1 m<sup>2</sup> at 00 tilting angle.

Allowance shall be provided for attendance and follow up by Kenya Power services comprising of application for permanent 3 phase service line installation and 3 phase energy meter connections.

#### **2.4.2.16.13 BRT Depot Works**

The BRT Line 5 Depot works will include but not be limited to:

- Building works:
  - Construction of a 3-floor administration block, of an approximately 1000 m<sup>2</sup>. Construction of an approximately 200 m<sup>2</sup> security and inspection block;
  - Building of the gate house, and an all-inclusive external perimeter wall. This works inclusive of a Mild Steel gate as specified;



- Provide, including provision of all mechanical, electrical and civil fittings, required for a 4-point fuelling Station;
  - Provide an approximately 100 m<sup>2</sup> washing bay;
  - Provide, including provision of all mechanical, electrical and civil fittings, required for an approximately 30 bus capacity Power Station;
  - Provide, including provision of all mechanical, electrical and civil fittings, required for an approximately 10 bus capacity Maintenance and Servicing Station; and
  - Provide a secure structure for the Electrical Power house, as instructed by the Engineer.
- 
- **Electro-Mechanical, and ICT Works:**
    - Provide all electrical installations, including buildings lighting, fire alarm system and power reticulation on all buildings within the Depot;
    - Provide all mechanical installations, including fittings, plumbing and drainage of the buildings and petrol station, Server room air conditioning and provisions of a compressed air system;
    - Provide, including lighting and power installation of the power house. Also, including provision, including connections of a 300KVA 3 phase, 415V, 50Hz diesel generating set with a continuous power factor of 0.8 lagging, and inclusive of a sound attenuated canopy with sound levels of 79 dB(A) at 7 m distance, complete with a Programmable logic controller;
    - Installation of high-capacity street lighting within the Bus Depot, as instructed by the Engineer;
    - Provision of CCTV cameras within the entire depot;
    - Provision of an Optic Fibre connection to all buildings within the Depot; and
    - Installation, inclusive of all components required for a fully operational access barrier at the entry point of the Depot.
- 
- **Civil Works, Drainage and Protection Works:**
    - Provision of an approximately 30,000 m<sup>2</sup> BRT Buses Parking Lot and access roads;
    - Provision of paved footpaths within the Depot;
    - Road Furniture as directed by the Engineer;
    - Provision of soil and storm water drainage on the Depot, by providing all fittings, inclusive of inspection chambers, to instructed finishings; and
    - Provision of a septic tank and soak pit, inclusive of all fittings.

- **Landscaping Works:**

- Provision, and maintenance during construction and defects liability period, approved variety of grass, specified ground covers, shrubs, small and avenue trees, and palm trees; and
- Supply and install approximately 10 No. wooden benches, as specified.

#### **2.4.2.16.13.1 Depot Structural Design**

BRT line 5 shall be served with a fully equipped Depot. The Depot has been designed to host an Administration block, fuelling station, Washing area, Maintenance area and a power station. The Depot building is a two-level building. administrative offices, drivers lounge, cafeteria with its kitchen for 100+ persons, lobby, washrooms, ITS offices. There is also a provision for parking of at least 100 cars and 10 BRT buses at any one given time.

The Structures have been designed in reinforced concrete frames with steel roof trusses. Design has taken care of general robustness and structural integrity with regard to fire due to the presence of a fuel station by incorporating a fire resistance time lag of at least 2 hours.

General drainage of the site has been taken into consideration by providing Closed drains and Shallow invert drains where necessary. All the storm water to be channelled to the nearest storm drain out of the site. There is a provision for a septic tank to receive both grey and black water for the Depot facilities.

Oil interceptors have been provided for purposes of ridding the site of oil spills that would otherwise cause slips and so accidents.

The Depot will also host a utility area which will include:

- A fueling station for 3 buses;
- Washing Stations for 2-18 m buses; and
- The maintenance area is for 4, 18 m buses. Also, the station has Storage for tires & tubes, maintenance tools and spare parts and bus maintenance products.

#### **2.4.2.16.13.2 Depot Mechanical Works**

Mechanical services include:

- Plumbing services;
- Drainage Services; and
- Firefighting and fire suppression services.

### **2.4.2.16.13.3 Plumbing Services**

#### **A. Site Water supply system**

The water supply system shall comprise the water treatment plant (to produce potable water for the entire site), water storage tanks, and the distribution network, including piping, manholes, valves and fittings.

#### **B. Water distribution system**

The system shall allow for multi-water source options, as borehole (internally drilled) and municipality grid and pumped to a 24 m<sup>3</sup> capacity underground plastic tank whereby a complete filtration system will be done. It is then pumped to a 12 m high sectional steel overhead tank of capacity 50 m<sup>3</sup> from where it is distributed by gravity to the various buildings' utilities.

Given the height of the overhead tank, the water has enough pressure to serve each of the buildings on site. The water supply system shall also function as a back-up provider to fire cistern.

#### **C. Water Sources**

**Borehole:** The Borehole shall be drilled inside the site, as a possible and reliable water supply system.

**Municipality Grid:** The contractor shall supply and install connection to the water treatment plant also from the municipality grids as back up water source.

**Water treatment plant:** The contractor shall supply, install and connect the water treatment plant. The water treatment plant will be able to treat water from wells/boreholes (internally drilled), storm water harvesting tanks and municipality grid. It shall comprise the basic water treatment module for the filtration producing safe drinking water for the entire site from the water source with TDS < 1000 ppm and in accordance with WHO water quality guidelines.

#### **D. Domestic cold-water services**

The domestic cold-water system will consist of:

- Domestic cold-water piping will be distributed to all drinking standpipes/ fountains (if required), lavatories (Wash Hand Basins), sinks, and kitchen equipment; and
- The treatment of the sewage waste will be investigated, and recommended so as to provide recycled water for use in the toilets for flushing as well and in all landscaping use.

#### **2.4.2.16.13.4 Drainage Services**

##### **A. External Drainage System**

The drainage system shall respect the following minimum requirements:

- The drainage system designs conform to BS EN 12056-2:2000, which covers wastewater drainage systems operating under gravity;
- The sewerage system shall serve the entire site;
- Pipes material shall be uPVC or MuPVC pipes for sewage, HDPE pressure pipes, joints and fittings for rising mains, where needed, shall be of mechanical joint type and of black colour;
- Piping network: minimum 100 mm diameter sewers; and
- Manholes:
  - Material: concrete or prefabricated from HDPE, Polypropylene or PVC, or similar;
  - Location: at each change of direction and at intersections;
  - Maximum straight distance: 20 m;
  - Fitted with water tight manholes lids, allowing for easy inspections; and
  - Allowing for vehicles passage.

##### **B. Internal Drainage System**

Sanitary waste and vent systems:

- The scope of mechanical design entails draining each of the buildings to the last manhole connection and leaving the drainage site reticulation to the Civil Engineer given the various topography, layout design and interaction with other Civil works considerations;
- All bathroom groups will be connected to the sanitary waste and vent system per code requirements;
- Kitchen equipment waste will be routed through a grease interceptor if grease cooking is expected;
- Drainage from fueling station, maintenance area and washing area are to be routed through an oil interceptor before joining storm water drainage;
- Pipes material shall be uPVC or MuPVC pipes for sewage, HDPE pressure pipes, joints and fittings for rising mains, where needed, shall be of mechanical joint type and of black colour; and
- Piping network: minimum 100 mm diameter.

### **C. Waste Water System**

The waste water system shall consist of a centralized Septic tank, a soakage pit, the sewage network, including piping, manholes and fittings.

The Waste water treatment process shall be based on the septic tank concept, with black and grey water separation and final discharge of the effluent into the soil, through the soakage pit. They shall be designed according to the site load, soil permeability and ground water table level.

#### **2.4.2.16.13.5 Fire Fighting and Fire Suppression Services**

##### **A. Fire Hose Reel System**

The site is posed to various fire risks hence the need for the External Fire hose reel throughout the site buildings. This system shall be of red painted colour to ensure high visibility.

##### **B. Fire Extinguishers**

Fire Extinguishers will be provided at various points inside the buildings for electric and other types of fire control.

This being a public place we would recommend to use a dry powder extinguisher A, B, C (which is all-purpose - it can be used for solids, liquids, gasses, electrics, and such like, however, there is an advantage of subsequent disposal).

Fire Extinguishers will be placed at visible and easily reachable places inside the buildings. In not clearly arranged or blind areas a particular fire symbol for marking placement of fire extinguisher is to be used and placed at a visible place.

#### **2.4.2.16.13.6 Depot Electrical Works**

The works involves carrying out a detailed electrical design for the following:

- Internal lighting layouts of various buildings;
- Power distribution;
- Structured Cabling/Data Networking;
- Fire detection and alarm system;
- Access control;
- CCTV surveillance system; and
- Electric Vehicle Service Equipment (EVSE).

#### **2.4.2.16.13.7 Lighting**

The lighting systems will look to compliment and highlight the architectural and design features of the building construction and finishes, achieving good quality colour appearance and colour rendering.

In addition to architectural and aesthetic function, the lighting installation shall assist in providing the appropriate environment for each space, to assist in differentiating spaces, illuminate signs and hazards, etc. as required and allow unimpeded access throughout, both under normal running conditions and emergency situations.

The lighting systems will be energy efficient, incorporating low energy lamp sources with LED luminaires within the site. Lamp colour temperatures will be in the region of 4000 K, with a colour rendering index (Ra) of above 80.

#### **2.4.2.16.13.8 Power Distribution**

Skirting trunking systems shall be installed to the perimeter of larger rooms and offices, to contain both the 13A socket outlets and the IT/Communication cables to allow flexibility in use and distribution.

3-pin switched socket power outlet points are provided next to the work station desks and to power all appliances that need electricity to operate. The power outlet points will be colour coded to indicated the raw power outlet points and clean power outlet points. Where floor boxes are provided, they shall be served by a network of screeded floor trunking system.

Wall mounted switches to power the indoor air conditioning units shall also be provided and labelled. Other recessed outlets such as fused connection unit for hand dryers shall be provided in the WC areas as required.

#### **2.4.2.16.13.9 Structured Cabling/Data Networking**

Data networking points are provided in the office and fibre optic connection is recommended on site however this is dependent on the nearest backbone to site and internet service provider terms and conditions.

A dedicated server room has been provided to house the data cabinets, all data cabling will be routed from the communications cabinets within the server room via cable trays and conduits installed throughout the risers and within the ceiling voids, ensuring that no run of cable exceeds 90 m.

Twin data outlet will be installed for each computer, printer, etc. and linked back to the respective communication cabinet.

#### **2.4.2.16.13.10 Fire Detection and Alarm System**

The detection system shall comprise of smoke and heat detectors, and manual break glass units with polycarbonate ‘flaps’ to prevent unintentional activation. The alarm system shall comprise electronic sounders and visual alarm devices as appropriate.

The main fire alarm panel will be located strategically in the open plan office, smoke/heat detection devices will be provided in all areas of the office buildings and break glass units will be provided at all final exits.

#### **2.4.2.16.13.11 Access Control**

The access control design shall be provided to the following areas:

- Server room; and
- All entrance doors.

The doors will be controlled by swipe card or number combination release. Door entry panels will be provided with push button to alert the reception desk. Internal access controlled doors will incorporate swipe card or proximity readers to allow entry/exit to each area. Each door will be complete with a magnetic lock with the provision of an emergency green break glass. Door controllers and power supply units will be installed adjacent each access door.

#### **2.4.2.16.13.12 Closed Circuit Television**

Cameras will be installed to provide 24-hour surveillance to both internal and external areas of the building covering main and rear access doors. Central monitoring equipment is provided in the manager’s office to oversee the site.

The cameras will be positioned so that the field of view is not obstructed by internal partitions; equipment and architectural features.

External cameras shall be suitable for low light conditions and located so as not to be affected by glare from the external lighting

#### **2.4.2.16.13.13 Electric Vehicle Service Equipment**

EVSE will be provided at the BRT Depot. Electrification of public bus fleets is a key priority for many cities around the world to tackle air pollution. The origin and destination depots or terminals are potential sites for setting up charging stations for an electric-bus fleet. Additionally, an en route charging or an intermediate charging setup may also be required for longer distances. Buses can be charged overnight when they are

not in operation, and during any available free time during operational hours. There are several ways of charging an electric bus using an EVSE. Buses are commonly charged with the help of wired connections, using AC or DC charging. A bus can be charged by an AC charging technology if it has an on-board charger.

#### **2.4.2.16.13.14 Pavement Design**

This pavement design outlines the proposed design for the BRT Line 5 Depot pavement design, utilizing the American Concrete Institute (ACI) 330R-08 manual: Guide for the Design and Construction of Concrete Parking Lots as a guide for designing for the Depot rigid pavement. Thickness design of pavement is intended to limit slab tensile stresses produced by vehicular loading.

#### **2.4.2.16.14 BRT and ITS Works**

The ITS basic infrastructural works will include but not be limited to:

- Provide, install, test and maintain for the entire duration of the contract Turnstile Gate and Access control in All BRT Stations;
- Provide, install, test and maintain for the entire duration of the contract Accessories, fiber, electrical, modules -Wi-Fi router-LS Per station, to all BRT Stations; and
- Provide, install, test and maintain for the entire duration of the contract Traffic signal system for single point pedestrian crossing including detection components.

#### **2.4.2.16.14.1 ITS Station Equipment and Design**

It is a system controlled by the Bus Management System (BMS). At the bus stop, one unit is installed at the back so that the gate and booth can be seen considering the flow of passengers, and one unit is installed at the front to prevent safety accidents for passengers inside the bus stop.

All stations shall have the following equipment and systems:

- Bus Information Terminal (BIT); this is the integrated display of Bus information location, arrival time, bus number and route- in BRT Line 5 Liquid Crystal Display (LCD) have been considered, please refer to chapter 2 for a brief description;
- BIT Kiosk; LCD display that provides more information to passengers. This shall include; Bus routes, bus location, transfer information, rout maps, other line integration information;
- Turnstile gate: an integrated access control hardware and software system, this will allow only paid up tickets to access the boarding area;
- Automatic Vending Machines (AVMs) shall be provided for tickets and card reloads at each station;



- Portable Tickets Issuance Devices (PTID); An integrated PTID equipment for cash buyers shall be provided at the onset; the tickets shall be scanned at the turnstile to allow access to the boarding area; and
- Automatic Radio Frequency Identification (RFID) Boarding Gates: all boarding swing gates has been designed with automatic door open and close components to be integrated with the Bus door to restrict passengers accessing the Bus drive way and ensure all passengers stay on the platform.

#### **2.4.2.16.14.2 ITS Components**

The Bus Information Centre arranges a console for operators for smooth control, and considers the characteristics of the bus information centre to suggest the optimal indoor space for 24-hour operation in a pleasant environment.

Robust Communications infrastructure linking the commuter stations, mobile buses and control centre amongst other operation centres is vital for the operation of the line. The services supported by the communication infrastructure consist of:

- Bus information & management system (BIMS);
- BRT station system Vehicle location tracking system;
- Vehicle enforcement system;
- Passenger information system;
- CCTV surveillance system;
- Viable Message Sign (VMS) Display panels for bus stations;
- Fare collection equipment; and
- Bus stop guide-BIT.

#### **2.4.2.16.14.3 Bus Management System**

The BMS collects, analyses bus operation information to make buses run on schedule, and adjusts intervals in case of incidents or accidents. It also performs the driver management, thereby improving the convenience and safety for bus passengers.

#### **2.4.2.16.14.4 Bus Information System**

The Bus Information System service collects, analyses and processes bus operation information, then provides the processed information to bus users. This system will allow the bus companies to track and manage their bus fleets and provides important information to riders. Bus companies will monitor in real-time the speed and location of each bus in their fleet and view live streaming video from video-enabled black boxes positioned in various locations within the buses.

#### **2.4.2.16.14.5 Vehicle Enforcement System**

BRT Line 5 shall have a Vehicle Enforcement System (VES) that detects a vehicle without user's manual control with automatized system (automated detection even on the spot, resolve frequent complaint on the field of detection, apply scan detection and video clip detection, overcome limits of human tracking on regular illegal parking zone and effect of saving time and cost VES has various models (Fixed type - 3 auto cameras, 1 semi-auto camera, speed dome type auto/semi-auto, etc.). VES can be interlocked with other company's system.

The Fixed VES consists of the vehicle detection device that detects illegally parked and stopping vehicles on the roadside, the vehicle filming device that films videos of violated vehicles, and the regional controller that identifies the vehicle's plate numbers. The centre has a system that handles data on the illegally parked and stopping vehicles.

#### **2.4.2.16.14.6 Passenger Information System**

Real-time traffic information system is an ITS that allows commuters to make their traveling plan better. This system keeps users updated with specific traffic information in given areas. Traffic information provided ranges from the route navigation to delay information caused by crashes, sever weather or road works.

The Traffic Information will be provided to the traveller by use of an application to be installed on smart devices, as well as a Highway Advisory Radio to be set up by the Authority, in conjunction with other relevant actors.

#### **2.4.2.16.14.7 Closed Circuit Television**

CCTV is divided into a photographing unit and a control unit, and the photographing unit consists of a camera, lens, housing, pan/tilt, etc., and considers stability, durability, and maintainability. The control unit receives the control signal and sets the lens, pan/tilt control function, and camera function. The proposal team proposes a Pan Tilt Zoom (PTZ) camera that not only supports pan/tilt/zoom and monitors a wide area, but also provides excellent detailed images when zoomed in, considering the safety of passengers in the shelter, ease of maintenance, and the climate of the city. In the case of the camera, it is located in the centre of the shelter and is in charge of monitoring 360 degrees in all directions.

#### **2.4.2.16.14.8 Variable Message Sign**

A VMS is an electronic traffic sign often used on roadways to give travellers information about special events. Such signs warn of traffic congestion, accidents, incidents such as terrorist attacks, roadwork zones, and/or speed limits on a specific highway segment.

VMS informs, warns or guides vehicles on specific roads in order to avoid traffic delays in advance and optimize the efficiency of traffic operations.

#### **2.4.2.16.14.9 Automatic Fare Collection System**

For BRT Line 5, the passengers shall use smart cards integrated with other payment media such as banks and M-Pesa at access control barriers inside the stations. The cards shall rely on RFID that activates a turnstile/flap gates when held in proximity to the reader. The fare collection system for BRT line 5 shall be station based system approach.

Off-board fare collection systems generally employ physical barriers to prevent passengers from entering the system without paying. An automatic barrier control at BRT stations reduce the amount of time needed to verify fare payments.

BRT Line recommends use of flap gates that fold back automatically once the fare reader completes a successful reading of an electronic smart card. Flap gates shall provide advanced detection systems that prevent the gates from closing when a stroller or suitcase is still passing through the gate. The flap gate can still stay open if another legal passage is detected. Further, the design of wing gates can allow for wider gates that permit the passage of wheelchairs. Flap gates are convenient for the disabled people and those with luggage.

BRT Line 5 shall have fare collection cabins where passengers may recharge their electronic fare-payment media or purchase single-ride media. These devices shall read the payment medium, determine if the medium has sufficient value, and then deduct the appropriate fare. The fare payment data are transmitted to the Central Control Centre (CCC) via the station server.

#### **2.4.2.16.14.10 Automated Traffic Data Collection System**

Strategic planning needs precise, extensive and prompt data collection with real-time observation. So the data here is collected via varied hardware devices that lay the base of further ITS functions. These devices are Automatic Vehicle Identifiers, GPS based automatic vehicle locators, sensors, camera etc. The hardware mainly records the data like traffic count, surveillance, travel speed and travel time, location, vehicle weight, and delays. These hardware devices are connected to the servers generally located at the depot for further analysis. The data is used for forecasting for future traffic planning and management.

#### **2.4.2.16.14.11 Bus Stop Guide-Bus Information Terminal**

In general, bus stop guides are classified into an LED type with excellent visibility and an LCD type that can display various information according to the display type, and are classified into a stationary type and an independent type according to the installation type. The bus stop guide is installed at the top of the screen door in both directions to

maximize user convenience. It provides information such as the location of buses passing through the bus stop, expected arrival information, route information, unexpected situation information and information on reasons for bus arrival delay in case of emergency.

## **2.5 Estimate Project Cost**

The proposed Project will be undertaken at a total cost of approximately **Eight Billion Seven Hundred and Thirty-Seven Million One Hundred and Seventy-Six Thousand Twenty-Six Kenya Shillings and Ninety-Nine Cents (Ksh. 8,737,176,026.99)** only inclusive of VAT. A summary of the BoQ is attached as **Appendix 2**.

### **2.5.1 EIA Processing and Monitoring Fee**

The Fifth Schedule of EIA Regulations, 2003 as reviewed vide Gazette Notice No. 13211 of 2013 provide for EIA processing and monitoring fee. As per Gazette Notice No. 13211 of 2013, pursuant to Regulation 48 of the EIA Regulations (2003) as read with schedule 4 of the fifth schedule thereof, the EIA fees payable shall be 0.1 percent (%) of the total cost of the project to a minimum of Ksh. 10,000.00 with no upper capping. The Proponent shall fully abide by the latter provisions together with the Regulator's (NEMA) administrative guidelines pertaining payment of EIA Processing and Monitoring Fee.

### **3. ENVIRONMENTAL AND SOCIAL SETTING OF THE PROJECT AREA**

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#### **3.1 Introduction**

Baseline conditions entail the sum-total of all biophysical and geo-physical condition of the project area. Gathering of baseline data is necessary to meet the following objectives:

- To understand key social, cultural, economic, and political conditions in areas potentially affected by the proposed project;
- To provide data to predict, explain and substantiate possible impacts;
- To understand the expectations and concerns of a range of stakeholders on the proposed development;
- To inform the development of mitigation measures; and
- To benchmark future socio-economic changes/impacts and assess the effectiveness of mitigation measures.

#### **3.2 Physiographic and Natural Environment**

##### **3.2.1 Project Location**

Outer Ring Road is a 10.435 km arterial road that connects Thika Road (A2) and Mombasa Road (A109) trunk roads. It starts at the junction of the GSU premises along Thika Road at Allsops area and ends at the Eastern Bypass Road (Taj Mall area). The Road traverses through an intense development of industrial establishments from the GSU premises to Mathare River Crossing, at Jogoo Road and Outer Ring Junction up to Ngong River and after Tassia Estate. Commercial Centers such as banks, retails outlets, fuel stations, market centers and residential estates are prominent along Outer Ring Road's mostly high-density area i.e. Huruma, Kariobangi, Dandora, Umoja and Donholm estates.

Outer Ring Road is entirely located in Nairobi City County and traverses seven constituencies namely Ruaraka, Mathare, Starehe, Kamukunji, Embakasi South, Embakasi North, and Embakasi West.

##### **3.2.2 Topography**

Nairobi City County lies adjacent to the eastern edge of the Rift Valley and is situated 1661 m ASL. It is characterized by gently rolling terrain on the eastern side but divided by steep valleys towards the City's boundaries. To the North of Nairobi City County, there is the Karura Forest which is characterized by steep sided valleys and to the western lies part of Sigiria Forest. Ngong Forest lies to the South, 6 km from the City Centre, close to Ngong Forest there is Oloolua Nature Trail and lastly there is the centrally located Arboretum Forest. The three forests have a total coverage of 23.19 square kilometres

(km<sup>2</sup>). Outer Ring Road section traverses predominantly flat terrain with a few rolling sections especially at bridge location.

### **3.2.3 Geology and Soils**

Nairobi City County is close to the eastern border of the Rift Valley and is on a large depression filled with volcanic rocks and sediments of Cainozoic times, which lie on basement complex rocks. In earlier times volcanic activities dominated Nairobi area. The volcanic rocks deposited by the solidification of flowing lavas (Nairobi phonolites) have gentle slope flowing eastwards from the Rift Valley. Below the phonolites are series of sediments (Upper Athi), which is underlain by Lower Athi series. Below the Lower Athi are the Kapiti Phonolites lying on the oldest rock in the Country the basement rocks, old metamorphic rocks of sedimentary origin.

The geology of the project area comprises of the Nairobi Trachytes extending from Dagoretti – Karen up to the east of Nairobi, and towards north of Kiambu and Githunguri; Nairobi Phonolites between the Nairobi National Park and Kiambu and resting directly on the Athi Series; and the Kapiti Phonolites which are also overlain by the Athi Series. The Upper Athi Series formations mainly consist of sandy sediments, gravel, or pebble beds, tuffs and pyroclastic sediments. The soils in the area are shallow, yellow-brown to yellow-red friable clays overlying a laterite horizon, nearer the Thika road axis and black cotton soils with calcareous and non-calcareous variants being dominant along the Outer Ring Road corridor.

The BRT Line 5 Project geotechnical investigations were carried out for 10.435 km at the median of the carriage way from the start point (GPS co-ordinates 1° 14' 43.79" S, 36° 52' 2.82" E) to the modified end point of the Airport South Road (GPS co-ordinates 1° 19' 35.99" S 36° 54' 6.69" E).

As outlined in the Road Design Manual Part III: Materials and Pavement Design for New Road. Section 14.4.1, at least one sample was taken per 500 m along the length of the proposed alignment. Alignment soil samples were collected from trial pits dug to depths up to an average depth of 1.0 m below existing alignment median levels.

The alignment median soils ranged from reddish to brownish gravelly material to clayey expansive soils clays with traces of tuff.

The potential borrow pit sites in the vicinity of the project road were identified during investigation. The locations of the material sites recorded using a hand-held GPS, and indicated in the location map indicated. The borrow pits tested were as follows:

- Kenya Builders borrow pit, Kayole. This is a commercial quarry and borrow pit located at the Barracks land in Kayole. Approximate gravel quantity was valued at 2.4 x 10<sup>6</sup> m<sup>3</sup>;

- Wanjigi H-Young Borrow pit, Ruiru. This is a recently opened up borrow pit located near Tatu City. Its approximated quantity was valued at 4.05 x 106 m<sup>3</sup>; and
- St. Joseph Ruai borrow pit, Ruai. This is a personally owned borrow pit, neighboring several commercial sites. The quantities are estimated at 355,700 m<sup>3</sup>.

**Table 4** below gives a summary of the Gravel sites.

**Table 4: Gravel Sites**

| S/No. |  |  | Name                 | Location                                     | Type of Material             | Remarks   |
|-------|--|--|----------------------|--|------------------------------|---|
| MS1   |  |  | Wanjigi H-Young Site | Ruiru Off Kiganjo Road                       | Whitish Grey to Brown Gravel | Currently in use by H-Young. There is substantial potential in the site itself and adjacent land. |
| MS2   |  |  | St. Joseph's Ruai    | Ruai Off the Eastern Bypass                  | Greyish Gravel               | Has a small level of overburden but navigation to the site is onerous.                            |
| MS3   |  |  | Mihango Site         | Kayole Near the Kenya Army Embakasi Barracks | Dark Grey Reddish gravel     | It is proximal to roads in Kayole and has substantial potential as well.                          |

Geotechnical conditions of foundation types for the BRT line 5 include:

Mathari River include: The cohesive soil layer is consisted in silty clay. The granular soil layer is consisted in silty sand, sandy gravel. The thicknesses of this layer are ranging from 2.5 m to 7.0 m. Bedrock (soft rock) This rock is appeared at the depth of 2.5 ~ 7.0 m from the ground surface. The weathering grade is classified as highly weathered to moderately weathered.

Nairobi River Bridge include: The granular soil layer is consisted in silty sand, clayey sand. The thicknesses of this layer are ranging from 1.5 m to 2.0 m. The Standard Penetration Test (SPT)(N)-values show 7/30 showing loose state in relative density. Bedrock (soft rock) This rock is appeared at the depth of 1.5 ~ 2.0 m from the ground surface. The weathering grade is classified as highly weathered to moderately weathered. The Total Core Recovery (TCR) ranges from 16.5% to 48.3% and Rock Quality Designation (RQD) ranges from 0 to 36%.

Kangundo Junction Viaduct include: The soil layer is consisted in silty sand, clayey sand with some gravel and silty clay. The thicknesses of this layer are ranging from 0.3 m to 5.5 m. The SPT(N)-values show wide range between 8/30 and 13/30. Bedrock (soft rock) This rock is appeared at the depth of 0.3 ~ 5.5 m from the ground surface. The

weathering grade is classified as highly weathered to moderately weathered. And TCR ranges from 6.9% to 100% and RQD ranges from 0 to 96%.

Ngong River Bridge include: The cohesive soil layer is consisted in clayey silt (MH). The thicknesses of this layer are ranging from 1.0 m to 5.5 m. The SPT(N)-values show range between 9/30 and 11/30 showing stiff state. Bedrock (soft rock) This rock is appeared at the depth of 1.0 ~ 5.5 m from the ground surface. The weathering grade is classified as highly weathered to moderately weathered. And TCR ranges from 13.3% to 100% and RQD ranges from 0 to 64.1%.

Taj mall Overpass include: The soil layer is consisted in silty clay, clayey silt. The thicknesses of this layer are ranging from 2.0 m to 3.5 m. The SPT(N)-values show wide range between 10/30 and 11/30 showing stiff state. Bedrock (soft rock) This rock is appeared at the depth of 2.0 ~ 3.5 m from the ground surface. The weathering grade is classified as highly weathered to moderately weathered. And TCR ranges from 10.0% to 100% and RQD ranges from 0 to 87.2%.

### **3.2.4 Climate**

The mean temperatures in Nairobi do not show wide variations throughout the year, although considerable seasonal spatial variations exist, these being largely attributed to altitude. Nairobi has a tropical climate with temperatures ranging between 10°C and 28°C during cold and hot seasons respectively. The hottest period extends between November and February (25°C–31°C) while the coldest period occurs between May and August (8°C–18°C).

Nairobi has two major rainfall regions. One is unimodal (December–April) and the other is bimodal (October–December and March–May). In the bimodal regime the March–May rains are referred to as the long rains, whereas the October–December rains are generally known as short rains. Various studies on climate variability and change indicate that impacts of global warming include increased temperature, severe droughts and similarly severe floods. The adoption of historical data whilst integrating current meteorological data is deemed suitable for the hydrological assessment especially where the actual data applicable to the respective project catchment is utilized. It was noted that although the data from the Wilson Airport Met station were of a shorter duration, the variation of rainfall pattern and peaks were of similar magnitude to those from Eastleigh Moi Air Base Met Station data. Therefore, the data from the Eastleigh Moi Air Base Met Station has been adopted for subsequent analysis in this report.

For the daily rainfall data, frequency analyses were undertaken and various rainfall intensities for respective return periods were calculated using statistical methods. A maximum 24-hour rainfall data in each year for the rainfall meteorological station at the above stations ranked according to the Cunane plotting positions, which is considered to be the most appropriate for general purpose statistical distribution. The figures also show



the fitted trendlines and formulas for the data and it can be seen that the rainfall data is best fitted with a logarithmic (Gumbel) trendline with a R2 coefficient values. These statistical analyses enable the projection of possible extreme rainfall events that may occur in the Project area.

The above maximum precipitation projections- design rainfall, were derived from the computed extreme events from the rainfall data. This precipitation projection data has been utilized in the subsequent flood estimations for sizing appropriate hydraulic structures along the project road sections where applicable. The Table below gives the summary of the rainfall projections for the project area through which the project road traverses

The **Table 5** below outline the return periods and rainfall intensities based on different durations and probabilities.

**Table 5: Probability of Recurrence of Annual Maximum Rainfall**

| <b>Probability of Recurrence of Annual Maximum Rainfall</b> |             |                     |             |             |                          |  |
|---|-------------|---------------------|-------------|-------------|--------------------------|--|
| <b>Year</b>   | <b>Rank</b> | <b>Rainfall (X)</b> | <b>P(X)</b> | <b>F(X)</b> | <b>X<sub>i</sub> - μ</b> | <b>(X<sub>i</sub> - μ)<sup>2</sup></b> |
| 1998  | 1           | 163.4               | 0.03        | 0.97        | 92.59                    | 8572.67                                |
| 2001  | 2           | 108.3               | 0.06        | 0.94        | 37.49                    | 1405.40                                |
| 2018  | 3           | 103.5               | 0.09        | 0.91        | 32.69                    | 1068.55                                |
| 1991  | 4           | 101.9               | 0.12        | 0.88        | 31.09                    | 966.51                                 |
| 2006  | 5           | 99.1                | 0.15        | 0.85        | 28.29                    | 800.25                                 |
| 2009  | 6           | 99                  | 0.18        | 0.82        | 28.19                    | 794.60                                 |
| 2004  | 7           | 97.6                | 0.21        | 0.79        | 26.79                    | 717.64                                 |
| 2002  | 8           | 92.6                | 0.24        | 0.76        | 21.79                    | 474.75                                 |
| 2016  | 9           | 91.5                | 0.26        | 0.74        | 20.69                    | 428.02                                 |
| 1997  | 10          | 89.5                | 0.29        | 0.71        | 18.69                    | 349.27                                 |
| 2012  | 11          | 88.3                | 0.32        | 0.68        | 17.49                    | 305.86                                 |
| 2010  | 12          | 81.2                | 0.35        | 0.65        | 10.39                    | 107.93                                 |
| 2011  | 13          | 79.5                | 0.38        | 0.62        | 8.69                     | 75.49                                  |
| 2007  | 14          | 79.3                | 0.41        | 0.59        | 8.49                     | 72.06                                  |
| 1996  | 15          | 67.9                | 0.44        | 0.56        | -2.91                    | 8.48                                   |
| 1992  | 16          | 67.6                | 0.47        | 0.53        | -3.21                    | 10.31                                  |
| 2013  | 17          | 66.5                | 0.50        | 0.50        | -4.31                    | 18.59                                  |
| 2015  | 18          | 63.1                | 0.53        | 0.47        | -7.71                    | 59.46                                  |
| 1990  | 19          | 62.5                | 0.56        | 0.44        | -8.31                    | 69.08                                  |
| 2003  | 20          | 61.5                | 0.59        | 0.41        | -9.31                    | 86.70                                  |
| 2008  | 21          | 61.3                | 0.62        | 0.38        | -9.51                    | 90.46                                  |
| 2019  | 22          | 58.9                | 0.65        | 0.35        | -11.91                   | 141.88                                 |
| 2005  | 23          | 57.9                | 0.68        | 0.32        | -12.91                   | 166.70                                 |
| 2020  | 24          | 54.8                | 0.71        | 0.29        | -16.01                   | 256.36                                 |
| 2017  | 25          | 53.1                | 0.74        | 0.26        | -17.71                   | 313.69                                 |
| 1995  | 26          | 52.2                | 0.76        | 0.24        | -18.61                   | 346.38                                 |
| 1993  | 27          | 48.2                | 0.79        | 0.21        | -22.61                   | 511.27                                 |
| 1994  | 28          | 47.6                | 0.82        | 0.18        | -23.21                   | 538.76                                 |
| 1999  | 29          | 39.3                | 0.85        | 0.15        | -31.51                   | 992.96                                 |
| 2000  | 30          | 34.1                | 0.88        | 0.12        | -36.71                   | 1347.72                                |
| 2014  | 31          | 24.3                | 0.91        | 0.09        | -46.51                   | 2163.30                                |
| 1995  | 32          | 22.19               | 0.94        | 0.06        | -48.62                   | 2364.03                                |
| 1998  | 33          | 19.08               | 0.97        | 0.03        | -51.73                   | 2675.92                                |
|   |             | 2,336.77            | -           |             |                          | 28301.05                               |

### 3.2.5 Air Quality

The Baseline Ambient Air Quality Measurement Report was conducted for the proposed Establishment of BRT Line 5 along Outer Ring Road in Nairobi, on September 11, 2024. The assessment focused on measuring concentrations of several pollutants, including particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>), SO<sub>x</sub>, NO<sub>x</sub>, CO<sub>2</sub>, CO, and TVOCs. The report aimed to establish the current air quality conditions before the project's implementation.

The results indicated that the levels of particulate matter (both PM<sub>10</sub> and PM<sub>2.5</sub>) at all nine sampling points were within the permissible limits set by EMC (Air Quality) Regulations, 2014 and the WHO Air Quality Guidelines. Additionally, the concentrations of sulfur dioxide (SO<sub>2</sub>) and nitrogen dioxide (NO<sub>2</sub>) were also within the allowable limits prescribed by EMC (Air Quality) Regulations, 2014. Total VOC levels were found to be well below the maximum limits defined by both EMC (Air Quality) Regulations, 2014 and WHO standards. Furthermore, the concentrations of CO<sub>2</sub> and CO at all sampling locations complied with the standards set by EMC (Air Quality) Regulations, 2014. Overall, the air quality in the Project area was deemed to be within acceptable levels for all measured pollutants

The results is as shown in **Table 6**, **Table 7**, **Table 8**, **Table 9** and **Table 10**.

**Table 6: PM<sub>10</sub> Analysis Results**

| Location | Time (hrs) | Concentration $\mu\text{g}/\text{m}^3$ |     |     | WHO Air Quality Guidelines PM <sub>10</sub>         | EMC (Air Quality) Reg. 2014 |
|----------|------------|--|-----|-----|---|-----------------------------|
|          |            | AVG                                    | MAX | MIN |   |                             |
| MP1      | 24hrs      | 32.1                                   | 200 | 7   | <b>50 <math>\mu\text{g}/\text{m}^3</math> 24hrs</b> |                             |
| MP2      | 24hrs      | 29.7                                   | 77  | 7   |   |                             |
| MP3      | 24hrs      | 37.9                                   | 201 | 9   |   |                             |
| MP4      | 24hrs      | 35.9                                   | 131 | 18  |   |                             |
| MP5      | 24hrs      | 28.6                                   | 84  | 17  |   |                             |
| MP6      | 24hrs      | 40.0                                   | 102 | 12  |   |                             |
| MP7      | 24hrs      | 33.2                                   | 77  | 12  |   |                             |
| MP8      | 24hrs      | 38.6                                   | 99  | 21  |   |                             |
| MP9      | 24hrs      | 32.1                                   | 103 | 11  |   |                             |

**Table 7: PM<sub>2.5</sub> Analysis Results**

| Location | Time (hrs) | Concentration $\mu\text{g}/\text{m}^3$ |     |     | WHO Air Quality Guidelines PM <sub>10</sub>         | EMC (Air Quality) Reg. 2014 |
|----------|------------|--|-----|-----|---|-----------------------------|
|          |            | AVG                                    | MAX | MIN |   |                             |
| MP1      | 24hrs      | 15.7                                   | 52  | 2   | <b>75 <math>\mu\text{g}/\text{m}^3</math> 24hrs</b> |                             |
| MP2      | 24hrs      | 16.0                                   | 77  | 0   |   |                             |
| MP3      | 24hrs      | 22.6                                   | 102 | 1   |   |                             |
| MP4      | 24hrs      | 22.7                                   | 99  | 2   |   |                             |

|            |       |             |     |   |
|------------|-------|-------------|-----|---|
| <b>MP5</b> | 24hrs | <b>24.1</b> | 101 | 0 |
| <b>MP6</b> | 24hrs | <b>17.2</b> | 44  | 6 |
| <b>MP7</b> | 24hrs | <b>13.6</b> | 45  | 1 |
| <b>MP8</b> | 24hrs | <b>13.5</b> | 23  | 7 |
| <b>MP9</b> | 24hrs | <b>18.9</b> | 62  | 7 |

From the results analysis in tables 5 & 6 above, the two points sampled for both PM<sub>10</sub> and PM<sub>2.5</sub> were within the EMC (Air Quality) Regulations, 2014 and WHO Air Quality Guidelines.

**Table 8: NO<sub>2</sub> & SO<sub>2</sub> Analysis Results**

| Location   | Time (hrs) | NOx Concentration $\mu\text{g}/\text{m}^3$ | SO <sub>2</sub> Concentration $\mu\text{g}/\text{m}^3$ | EMC (Air Quality) Reg. 2014  | WHO Air Quality Guidelines  |
|------------|------------|--|--|--|---|
| <b>MP1</b> | 24hrs      | <b>12.1</b>                                | <b>&lt;1.42</b>  | <b>NO<sub>2</sub> – 100 <math>\mu\text{g}/\text{m}^3</math><br/>SO<sub>2</sub> – 125 <math>\mu\text{g}/\text{m}^3</math></b> | <b>NO<sub>2</sub>~ 40 <math>\mu\text{g}/\text{m}^3</math><br/>SO<sub>2</sub>~20 <math>\mu\text{g}/\text{m}^3</math></b> |
| <b>MP2</b> | 24hrs      | <b>7.6</b>                                 | <b>&lt;1.42</b>  |  |   |
| <b>MP3</b> | 24hrs      | <b>7.65</b>                                | <b>&lt;1.42</b>  |  |   |
| <b>MP4</b> | 24hrs      | <b>8.04</b>                                | <b>&lt;1.42</b>  |  |   |
| <b>MP5</b> | 24hrs      | <b>10.61</b>                               | <b>&lt;1.42</b>  |  |   |
| <b>MP6</b> | 24hrs      | <b>4.22</b>                                | <b>&lt;1.42</b>  |  |   |
| <b>MP7</b> | 24hrs      | <b>4.50</b>                                | <b>&lt;1.42</b>  |  |   |
| <b>MP8</b> | 24hrs      | <b>7.1</b>                                 | <b>&lt;1.42</b>  |  |   |
| <b>MP9</b> | 24hrs      | <b>7.73</b>                                | <b>&lt;1.42</b>  |  |   |

**Table 9: VOC Analysis Results**

| Location   | Time (hrs) | TOTAL VOC    | EMC (Air Quality) Reg. 2014                          |
|------------|------------|--------------|--|
| <b>MP1</b> | 24hrs      | <b>6.69</b>  | <b>VOC – 600 <math>\mu\text{g}/\text{m}^3</math></b> |
| <b>MP2</b> | 24hrs      | <b>7.34</b>  |  |
| <b>MP3</b> | 24hrs      | <b>7.68</b>  |  |
| <b>MP4</b> | 24hrs      | <b>5.45</b>  |  |
| <b>MP5</b> | 24hrs      | <b>8.96</b>  |  |
| <b>MP6</b> | 24hrs      | <b>11.02</b> |  |
| <b>MP7</b> | 24hrs      | <b>6.78</b>  |  |
| <b>MP8</b> | 24hrs      | <b>10.80</b> |  |
| <b>MP9</b> | 24hrs      | <b>5.98</b>  |  |

**Table 10: CO & CO<sub>2</sub> Analysis Results**

| Location | Time (hrs.) | CO Concentration mg/m <sup>3</sup> | CO <sub>2</sub> Concentration mg/m <sup>3</sup> | EMC (Air Quality) Reg. 2014 |
|----------|-------------|------------------------------------|---|-----------------------------|
|          |             | AVG                                | AVG   |                             |
| MP1      | 24hrs       | 0.1                                | 1.4   | 5 mg/m <sup>3</sup>         |
| MP2      | 24hrs       | 0.1                                | 1.41  |                             |
| MP3      | 24hrs       | 0.1                                | 1.37  |                             |
| MP4      | 24hrs       | 0.1                                | 1.2   |                             |
| MP5      | 24hrs       | 0.1                                | 1.46  |                             |
| MP6      | 24hrs       | 0.1                                | 1.42  |                             |
| MP7      | 24hrs       | 0.1                                | 1.25  |                             |
| MP8      | 24hrs       | 0.1                                | 1.31  |                             |
| MP9      | 24hrs       | 0.1                                | 1.39  |                             |

### 3.2.6 Noise and Excessive Vibrations

The Baseline Environmental Noise Measurement Report focuses on a noise survey conducted for the proposed Establishment of BRT Line 5 along Outer Ring Road in Nairobi City County. The main objective of the survey was to assess the environmental noise levels in the area in accordance with both local and international guidelines, including those from EMCA Cap 387, the IFC, and the WHO. The survey took place on September 11, 2024, and measurements were taken at nine key locations, such as Taj Mall, the Jomo Kenyatta International Airport (JKIA) fence, the Pipeline near the bridge, Quarry (opposite the petrol station), Donholm, Mutindwa, Kariobangi, Kenya Muslim Academy, and Allsops. The primary noise sources identified were vehicular traffic, ongoing commercial activities, and people conversing.

The results indicated that the noise levels at all monitoring points exceeded both the IFC's guideline of 70 weighted decibels (dBA) and the EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 daytime limit of 60 dB(A). For example, at Taj Mall, the equivalent continuous noise level (LAeq) was 73.7 dB(A), with a maximum recorded level of 99.1 dB(A). These elevated noise levels were attributed primarily to traffic along Outer Ring Road and surrounding human activities. The report concludes that noise mitigation measures will be necessary during the implementation of the BRT project to address these elevated noise levels. The report also includes equipment calibration certificates and graphical representations of the noise measurement data.

The results is as shown in **Table 11** below:

**Table 11: Outer Ring Road Diurnal Environmental Noise Level Results 11-09-2024**

| ID  | Point Of Measurement                     | LAeq | LAmax | LAmin |
|-----|--|------|-------|-------|
| MP1 | Taj Mall area                            | 73.7 | 99.1  | 56.5  |
| MP2 | JKIA Fence area                          | 70.3 | 98.4  | 55.8  |
| MP3 | Pipeline near the bridge                 | 74.5 | 89.1  | 56.2  |
| MP4 | Quarry (Opposite be petrol station area) | 69.1 | 89.5  | 54.9  |
| MP5 | Donholm (railway station area)           | 70.3 | 97.8  | 57.3  |
| MP6 | Mutindwa area                            | 68.1 | 88.0  | 52.2  |
| MP7 | Kariobangi at the footbridge             | 72.5 | 87.3  | 55.2  |
| MP8 | Kenya Muslim Academy area                | 74.1 | 91    | 60.6  |
| MP9 | Allsops area                             | 74.7 | 96.8  | 59.6  |

### 3.2.7 Hydrological Conditions

#### 3.2.7.1 Drainage

Mathare River, Nairobi River and Ngong River traverses the city rising from the west towards the east, crossing the Outer Ring Road. The streams provide the key sinks and modes of pollution transport without any economic value. The rivers discharge into Athi River.

Most sections in the project area are located on relatively flat terrain and this influences the surface drainage. The Outer Ring Road traverse’s various characteristics of drainage zone where the first half has efficient surface drainage (influenced by Mathare and Nairobi Rivers), the middle sections (Umoja – Tena estate areas) being flat and hence poorly drained. Most road side drains in all the road sections have been highly compromised from social and economic development activities.

A major drainage structure exists along the centreline of the Right of Way from an outfall at Ngong River and runs along the full length of the railway bridge at Taj Mall. This is directly in conflict with the foundations of the bridge piers and would cause great difficulty during construction if left in place. We therefore propose that this drain be removed over the length of this bridge and replaced with a similar one away from the center of the Right of Way.

The proposed roadside drainage (longitudinal drainage) was provided on either Left or Right side or on both side of the BRT Lane depending on the adjacent land slope. The recommended longitudinal side drainage for the proposed project road shall comprise either subsurface drainage pipe beneath the road or/and a trapezoidal shaped drain for the cut-off drains for trapping storm water from external areas.

According to the inventory carried out for all existing drainage structures, a total number of 7 culverts, 11 bridges were found along the road corridor. The major structures, bridges and via ducts were found to be in good condition and the consultant proposes maintenance and protection works, especially around the Central piers along the alignment.

### **3.2.7.2 Water Demand and Supply**

The main sources of water for the residents in Nairobi City County are from Thika Dam (Ndakaini Dam) in Murang'a County, Sasumua Dam in Nyandarua County, Kikuyu Springs, Ruiru Dam and Ngethu Water Works. Although Nairobi River is permanent, its water is unsafe for human consumption.

The rivers traversing Outer Ring Road that is Nairobi River, Ngong River and Mathare River are highly polluted with human waste alongside other domestic sources hence water from these sources will be unsuitable for use in construction and does not support any river line ecosystem. There have been clean-up programs from Nairobi River Commission mainly for Nairobi and Ngong rivers and clear results are yet to show. The rivers discharge into Athi River.

The development of BRT systems in cities like Nairobi requires careful consideration of water resources, given the existing challenges with water supply and distribution. The development of BRT systems can significantly impact urban development and water demand in cities. As BRT corridors are established, they often lead to increased urbanization, resulting in higher population density in the areas they serve. This urban growth drives up residential water demand as more people settle near the transit routes. Additionally, the areas around BRT stations tend to develop commercially, leading to a rise in businesses and industries that require substantial water for their operations. Public amenities such as parks, toilets, and water fountains are also attracted to these areas, further increasing water consumption.

As BRT systems expand, parallel investments in infrastructure, including water supply systems, are often necessary. Upgraded or new pipelines, water treatment plants, and storage facilities may be required to meet the heightened demand. The integration of water-saving technologies and public awareness campaigns can help manage water use in these high-density areas. However, urbanization linked to BRT systems can also lead to environmental challenges. Increased surface runoff due to impervious surfaces can impact groundwater recharge, while water quality may deteriorate due to pollution from

waste and industrial activities. Therefore, coordination between urban planners, water authorities, and environmental agencies is crucial to ensure that water supply infrastructure keeps pace with BRT expansion, and sustainable practices are adopted to protect water resources.

The construction of the Line 5 BRT Nyati Lane will take place in the median of Outer Ring Road, ensuring that the main water supply pipes, which are situated at the far end of the road, remain unaffected. Consequently, there will be no disruption to the water supply during the construction.

To meet the demand and supply of water the following borehole locations were proposed by a Geotechnical Engineer along Outer Ring Road.

The borehole locations proposed by the Geotechnical Engineer are summarized in **Table 12** and **Table 13** below.

**Table 12: List of Proposed Borehole Locations**

| Borehole Locations                              | Number of Boreholes |
|---|---------------------|
| Nairobi River Bridge                            | BH-1,2              |
| Overpass from Outer Ring Stage to Kangundo Road | BH-3~13             |
| Ngong' River Bridge                             | BH-14,15            |
| Pipeline Area                                   | BH-16~21            |
| <b>Total Number of Boreholes</b>                | <b>21</b>           |

**Table 13: Borehole Locations along Outer Ring Road**

| Borehole No. | Longitude | Latitude | Elevation (m) |
|--------------|-----------|----------|---------------|
| 1            | -1.26431  | 36.87940 | 1595          |
| 2            | -1.30594  | 36.88912 | 1612          |
| 3            | -1.27089  | 36.88102 | 1612          |
| 4            | -1.27141  | 36.88125 | 1613          |
| 5            | -1.27233  | 36.88140 | 1613          |
| 6            | -1.27330  | 36.88161 | 1612          |
| 7            | -1.27400  | 36.88176 | 1613          |
| 8            | -1.27473  | 36.88193 | 1613          |
| 9            | -1.27566  | 36.88210 | 1613          |
| 10           | -1.27656  | 36.88228 | 1614          |
| 11           | -1.27744  | 36.88234 | 1616          |
| 12           | -1.27914  | 36.88259 | 1617          |
| 13           | -1.28800  | 36.88401 | 1618          |
| 14           | -1.30585  | 36.88913 | 1612          |
| 15           | -1.30662  | 36.88937 | 1612          |
| 16           | -1.32016  | 36.89767 | 1630          |
| 17           | -1.32084  | 36.89813 | 1632          |
| 18           | -1.32180  | 36.89872 | 1629          |
| 19           | -1.32272  | 36.89936 | 1631          |
| 20           | -1.32352  | 36.89981 | 1633          |
| 21           | -1.32432  | 36.90025 | 1630          |

### **3.2.8 Water and Sanitation**

#### **3.2.8.1 Water Supply Schemes**

NCWSC is the water service provider for the City and a company fully owned by NCCG. Its mandate is to offer water and sanitation services to Nairobi residents on behalf of the NCCG. The water connection is currently at about 80%. To bridge the gap, there are boreholes and wells that are mostly operated by large private consumers (industrial enterprises and hotel complexes) or by individual residential owners in parts of the City that receive only intermittent supply (for example, Langata and Karen). Wells are often shared with neighbors or water is sold for distribution by tankers. Many private well owners are also connected to the main water-supply network (which provides cheaper water) but use groundwater as a back-up.

The neighbourhoods served by Outer Ring Road, is connected to the Nairobi Water Supply mains the NCWSC as the main water provider.

#### **3.2.8.2 Sanitation**

According to NCCIDP, about 61.5% of the population use flush toilets as the main waste disposal method, while 32.1% use pit latrines. The remaining 4.8% of the population have no means of waste disposal. On garbage collection, 36.1% of the communities have their garbage collected by private firms and similar percentage is collected by neighborhood community groups.

NCWSC is the sanitation services provider in the Project area.

### **3.2.9 Solid Waste Management**

Major challenges facing Nairobi City County with respect to solid waste management include management of waste collection and disposal. Nairobi City County generates over 2400 tons of garbage per day projected to be 3200 tons per day by year 2022. Under the current scenario only about 60% of generated waste ends up at the final disposal point. Approximately 10% of generated waste is recycled with the rest ending up in rivers and other undesignated places. Electronic and hazardous waste, though not the mandate of NCCG's Department of Environment, has recently found its way to the Dandora Dumpsite (NCCIDP 2023-2027).

The classification of waste envisaged for the BRT Project are as follows:

1. Construction waste/debris.
2. Non-Hazardous waste:
  - a. Biodegradable waste: food waste,



- b. Combustible waste: paper, cardboard, tyres, plastics, wood and derivatives (chipboard, etc.)
  - c. Non-combustible waste: scrap metal, tins/cans, wire, glass, etc.
  - d. Domestic organic waste (sewage)
  - e. Hazardous Waste: battery, oil and or used lubricants/ hydraulic fluids.
3. Electronic waste-equipment (machinery, etc.).

Solid waste management challenges primarily in the context of drainage and pollution control along Outer Ring Road and nearby rivers, such as the Mathare, Nairobi, and Ngong Rivers. These rivers, crucial for drainage, have been heavily polluted by industrial waste and solid waste from nearby residential developments. Inefficient management of surface drainage systems is a significant issue, with roadside drains often blocked or compromised by illegal waste disposal and social activities. In particular, garbage is frequently dumped along the median and roadside areas, further exacerbating drainage problems. The report underscores the importance of maintaining and protecting these drainage systems and addressing the growing issue of solid waste as part of a broader environmental management strategy.

### **3.2.10 Geotechnical Design**

The geotechnical design process typically includes site investigations (such as soil sampling and testing), assessing the properties of the soil, and designing foundations, slopes, embankments, or other earth-related structures based on these assessments.

The BRT Line 5 project geotechnical investigations were carried out for 10.435 km at the median of the carriage way.

The geotechnical design for BRT Line 5 is a critical aspect of the overall project, ensuring that the infrastructure can be safely supported by the underlying soil and foundation systems. The process began with extensive fieldwork, which involved the drilling of boreholes at key locations along the alignment of the proposed BRT route. These boreholes were strategically placed, especially near bridges, stations, and other important structures, to assess the subsurface conditions that would influence foundation design. The geotechnical team collected soil samples during this process, which were sent for further laboratory testing.

In the laboratory, these soil samples underwent a series of tests to determine their physical and mechanical properties. Tests such as particle size analysis, Atterberg limits, and Unconfined Compressive Strength (UCS) were performed. These tests helped in classifying the soils and understanding their behavior under load. By evaluating the soil's strength, compressibility, and other characteristics, the design team could ensure that the soils were suitable to support the various structures along the BRT route. This data was crucial in guiding decisions about the types of foundations that would be necessary for different sections of the project.

Foundation analysis was a major component of the geotechnical design. The stability of foundations, especially for the bridges and stations, was carefully analyzed. Multiple foundation types were considered, and resistance factors were applied to ensure that the chosen designs could handle the loads expected during the operation of the BRT system. The analysis factored in the varying soil conditions along the route, including areas with weaker soils that required more robust foundation solutions to ensure long-term stability.

Based on these investigations, the geotechnical team provided specific recommendations for foundation types in different areas. These recommendations were tailored to the unique soil conditions encountered along the alignment. For instance, areas with softer soils required deeper or more reinforced foundations to prevent settlement or failure, while areas with stronger soils could accommodate more standard foundation designs. Overall, the geotechnical design plays a vital role in ensuring the safety and longevity of the BRT infrastructure, including the bridges, stations, and the road itself. By thoroughly analyzing the subsurface conditions and tailoring the foundation designs to the specific needs of each segment, the project aims to deliver a reliable and durable transit system for Nairobi.

### **3.2.11 Ecological Conditions**

The County is predominantly a terrestrial habitat that supports a diverse web of biodiversity and ecosystems. It is home to about 100 species of mammals, 527 bird species and a variety of plant species. The existence of Nairobi National Park has been of prestigious value as the only park within a city. The Park is covered by a highland of forest hardwoods. Variety of birds and animals find their home in the Park including the Big Five.

To the North west of the city, adjacent to the Rift Valley is an area of undulating grassland with a covering of rich well- drained “red- coffee soils”. To the North- East of the city, the high and ever sloping land is dissected by South- East flowing streams which have formed a series of steep sided parallel ridges and valleys. South and East of Nairobi are grassland plains of poorly drained “black cotton clays”.

#### **3.2.7.1 Flora**

The common flora in Nairobi includes indigenous trees such as the *Newtonia buchananii* (Mukoi) and *Trichilia-roke* (Mutuati) trees. In some areas, the vegetation is primarily dry savannah, open grass plains with scattered *Acacia* bushes. Permanent rivers with riverine vegetation are also evident.

Common flora within the proposed project site include; Yellow *Acacia* (*Vachellia xanthophloea*), Manna (*Fraxinus ornus*), Nile Tulip (*Markhamia lutea*), Mimosa Tree (*Albizia julibrissin*), White bottlebrush (*Banksia integrifolia*), flood plain *Acacia*

(*Vachellia Xanthophloea*), Cypress (*Cupressus lusitanica*), Pawpaw (*Carica Papaya*), Eve's Pin (*Austrocylandropuntia*) and cactus (*Subulata*).

The natural vegetation along the corridor has been greatly modified and destroyed. The increase in the population as well as developments in the project area has contributed to the destruction of the vegetation so as to cater for the increasing pressure on the land resources. Along the River riparian there is the replanting of trees and grass to help protect the water resources.

### **3.2.7.2 Fauna**

Nairobi City County is endowed with various game species like Ostrich, Hyenas, Gazelles; Lions, Zebras, Giraffes, Warthog and varieties of Birds and snakes. Full exploitation of wildlife resources is hampered by frequent human-wildlife conflict. The wildlife is found all over the vast County hence conservation and management has been a challenge. There is a need to establish sanctuaries and conservancies as well as water structures.

The fauna in the Project area is predominantly domesticated animals such as dogs and cats, as well as avifauna due to intense anthropogenic activities. Nevertheless, animals such as cattle were also seen during the survey, mainly along the service road and the islands at interchanges. It is highly recommended that the City Council enforcement team removes the animals from using the corridor as they have been observed to impede movement of both vehicular and pedestrian traffic.

## **3.3 Socio-Economic Environment**

### **3.3.1 Population**

The northern and eastern part of Nairobi City County, where the project road largely traverses, is the most densely populated part of the City. Besides the human settlements in the area, the project area is also adjacent to the industrial suburbs of Baba Dogo, Kayole and the main Industrial Area, attracting major movement in and out of the region.

This population of the areas served by the project road is ethnically mixed with all tribes of the country being represented. The population is dominated by people in the age bracket of 20-30years (46.4%). 30-40 years (25.2%). Those below 20 years and over 60years comprise 4.6% and 2.3% respectively.

### **3.3.2 Population Growth**

The Entire project road is situated within Nairobi, which is the capital city of Kenya. Nairobi is found within the Greater NRM, which consists of 5 out of 47 counties in Kenya which generates about 60% of the entire nation's Gross Domestic Product (GDP). The NMR regions are illustrated in **Table 14** overleaf.

**Table 14: Nairobi Metropolitan Area**

| Name                | Country          | Area (km <sup>2</sup> ) | Cities/towns/municipalities in the Counties                                |
|---------------------|------------------|-------------------------|--|
| Core Nairobi        | Nairobi Country  | 696                     | Nairobi  |
| Northern Metro      | Kiambu Country   | 2,449.2                 | Kiambu, Thika, Limuru, Ruiru, Karuri, Kikuyu, Ruaka, Kahawa and Githunguri |
| North Eastern Metro | Murang'a Country | 2,325.8                 | Gatanga, Kandara, Kenol/Kabati, Murang'a                                   |
| Southern Metro      | Kajiado Country  | 21,292.7                | Kajiado, Olkejuado, Bissil, Ngong, Kitengela, Kiserian, Ongata Rongai      |
| Eastern Metro       | Machakos Country | 5,952.9                 | Kangundo-Tala, Machakos, Athi River  |
| Totals              | Nairobi Metro    | 32,715.5                | -  |

*Source: Nairobi Metro/ Kenya Census Archived 24 January 2021 at the Wayback Machine*

Nairobi is the country's largest city by population, and has experienced one of the highest growth rates of any city in Africa. Since its foundation in 1899, Nairobi has grown to become the second largest city in the African Great Lakes, despite being one of youngest cities in the region.

Kenya's population grew at an average annual rate of 2.1% from 38,610,097 in 2009 to 47,564,296 in 2019, while Kenya's capital, Nairobi, grew at an annual average rate of 3.4%, from 3,138,369 in 2009 to 4,397,073 in 2019. It is estimated that Nairobi's population will reach 5 million in 2025.

Nairobi covers an area of 696 km<sup>2</sup> of Kenya's total area of 580,876 km<sup>2</sup>. In comparison, Nairobi should account for 0.1% of Kenya's population, but currently accounts for 9.2% of Kenya's population. Thus, the population density of Kenya is 81.9 person/km<sup>2</sup>, but in Nairobi it is 6,245.8 person/km<sup>2</sup>, which is 76 times higher than Kenya 's total population density.

### 3.3.2.1 Demography and Administration

According to the results of the KPHC 2019, which was conducted by KNBS, Nairobi City County has a population of 4,397,073 comprising of 2,192,452 males, 2,204,376 females and 245 intersex persons. The County population density is 6,247 people per square kilometre. Outer Ring Road is entirely located in Nairobi City County and traverses two districts of Nairobi East and Nairobi North. Going by the current sub-divisions, the road runs from East to West and is the boundary dividing various districts namely Embakasi, Njiru and Kasarani respectively to the North while Makadara, Starehe and Kamukunji all to the South of the road. It traverses the six constituencies of Embakasi, Kamukunji, Mathare, Makadara, Njiru and Kasarani. As illustrated in **Table 15** overleaf.

**Table 15: Population distribution as per Constituency**

| No | Sub-County | Male    | Female  | Intersex | Total   |
|----|------------|---------|---------|----------|---------|
| 1. | Kamukunji  | 136,670 | 131,599 | 7        | 268,276 |
| 2. | Embakasi   | 492,476 | 496,270 | 62       | 988,808 |
| 3. | Makadara   | 96,369  | 93,157  | 10       | 189,536 |
| 4. | Mathare    | 106,522 | 100,028 | 14       | 206,564 |
| 5. | Kasarani   | 381,234 | 399,385 | 37       | 780,656 |
| 6. | Njiru      | 307,642 | 318,809 | 31       | 626,482 |

KPHC 2019

### 3.3.2.2 Disability

According to KNBS 2019 1.46% (56,346) of the individuals above five years of age live with at least one form of disability. Amongst the PWD, majority are female at 54.5% of the total while men constitute 45.5%. The most prevalent form of disability is visual disability, Mobility and cognitive with 18,790, 14,551 and 6,712 individuals in 2019 respectively. Comparatively, the age group 55+ had the highest proportion of PWD compared the total number of people in the age category at 8.5%, followed by the age group 35-54 at 1.6%.

In addition to the construction of new pedestrian footbridges, the disconnects of the walkways and cycle paths will be repaired and made accessible and comfortable to vulnerable road users, especially the pedestrians that use wheelchairs. Providing for their accessibility accounts for all other vulnerable road users such as the elderly, children, pregnant women, and the disabled.

Lifts will also be installed at the stations to facilitate easy mobility and accessibility for PWD. Additionally, the buses used for the BRT system will be designed to be disability-friendly, ensuring that individuals with mobility challenges, such as those who use wheelchairs or other assistive devices, can access the buses and stations with ease. These measures aim to promote inclusivity and equal access to transportation for all, regardless of physical ability.

### 3.3.3 Education

The 2019 census collected data on both formal and non-formal education to assess the educational attainment of individuals aged 3 years and older. Of the population, 17.8 million were enrolled in a school or learning institution; 11.6 million had completed their education; 6.9 million had left school without completing their studies; and 7.1 million had never attended school. The data reveals that 10.0 million people were attending primary school, 3.4 million were in secondary school, and 3.3 million were enrolled in pre-primary education. Approximately 500,000 individuals were pursuing middle-level college or technical training, while 471,000 were attending university. The

majority of respondents had completed primary education, followed by those with secondary education. In total, 1.3 million individuals had attained a university education.

### **3.3.3.1 Pre-School Education**

Nairobi City County has 211 public ECD centres. Among these, 21 are stand-alone ECD centres while 190 are in main Primary Schools. The private ECD centres are 344 in number. The total number of ECD Teachers is 413. The Teacher to Pupil ratio in the pre-primary school is 1:29. The total enrolment in the Public ECD centres is 12,019 with that of Private ECD centres being 182,618. The pre-primary retention rate is 99% with a drop-out rate of 0.2% while the transition rate is 99% (NCCIDP 2023-2027). Hope Academy, Rising Angels Star Academy and Learning on Academy are some of the preschools along Outer Ring Road.

### **3.3.3.2 Primary Education**

Nairobi City County has 205 public primary schools with total enrolment of 193,058 and 2000 private primary schools with a total enrolment of 254,476. The Teacher to Pupil ratio in the primary schools is 1:47. The gross enrolment rate is 84% while the net enrolment rate is 77.8%. Dropout rate stands at 3.6%. The average years of attendance for Primary School are 8 years while the retention rate is 90%. Transition rate to Secondary School is at 78% (NCCIDP 2023-2027). Marura Primary is one of the schools along Outer Ring Road.

### **3.3.3.3 Secondary Education**

Nairobi City County has 95 public secondary schools and 57 private secondary schools with 2,028 Teachers. The Teacher to Pupil ratio is 1:24 with a total enrolment of 48,669. The gross enrolment rate is at 28.6% while the net enrolment is 25.3%. The dropout rate is 5.5%; completion rate is 91.8% while the retention rate is 94.6% (NCCIDP 2023-2027). Kenya Muslim Secondary is one of the schools along the Outer Ring Road.

### **3.3.3.4 Tertiary Education**

Nairobi City County hosts three Public Universities that is, University of Nairobi (UoN), Kenyatta University and Technical University of Kenya (TUK) with UoN being the oldest Public University in the Country. There are 10 Private Universities and 16 University Colleges and Campuses operated by both Public and Private Universities in the County. Most of the campuses are located within the Central Business District (CBD). In addition, the County has 237 Science and Technology Institutes (NCCIDP 2023-2027). Tertiary institutions along Outer Ring Road include; Jonam technical college and Topmax College among others.

### **3.3.3.5 Literacy**

Nairobi City County has a total of 224 Adult Literacy Centres. On literacy level, 96.1% of the population can read and write while 2.8% of the population cannot read or write (NCCIDP 2023-2027).

### **3.3.4 Employment**

According to KPHC 2019 Vol IV economically active population was 22.3 million, comprising the working (19.7 million) and those seeking work (2.6 million). Females accounted for 50.2% of the total working population. The proportion of males in the urban areas that reported having worked was 50.4% compared to 40.6% of females. A total of 18.9 million individuals were outside the labour force during the reference period. There were 10.1 million youth aged 18-34 years and 4.1 million youth aged 15-24 years in the labour force.

#### **3.3.4.1 Wage Earners**

Nairobi City County 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 industries also play a 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 CBD, Industrial Area, along Mombasa Road, along Thika Road and Dandora (NCCIDP 2023-2027).

#### **3.3.4.2 Labour Force**

According to NCCIDP 2022-2027, the County has a labour 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 labour force, 1,832,751 were classified as employed while 315,854 were seeking for employment. The youthful proportion of the labour force consists of 561,457 males and 648,756 females.

#### **3.3.4.3 Self-Employed**

A large segment of the labour force in Nairobi City County 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 which use low and simple technologies while employing few people per establishment. The ease of entry and exit into the informal sector, coupled with the use of low level of technology, makes it an easy avenue for employment creation especially for the youth (NCCIDP 2023-2027).

#### **3.3.4.4 Unemployment Levels**

The level of unemployment in Nairobi City County stands at 14.70% with the female unemployment rate standing at 18.99% while that of males is 11.55% as per the KPHC, 2019. The “working poor” account for a substantial proportion of all the poor in Nairobi. This reflects in part the fact that the poor are employed in low productivity industries, including the informal sector.

#### **3.3.5 Economic Activities**

According to the 2021 Gross County report, Nairobi contributed 27.5% of total economy's Gross Value Added (GVA) between 2013-2020. The main sectors that contributed to the high GVA include manufacturing, other industries and construction activities as well as services activities (all economic activities excluding agriculture and industry).

Nairobi City County is a major trading hub that offers a conducive environment for businesses run by both locals and international communities. As detailed in NCCIDP 2023-2027, Nairobi City County hosts 32,129 registered businesses, including retail shops, supermarkets, wholesalers, hawkers, hotels, petrol stations, liquor outlets, and informal enterprises. Many middle-income residents earn their income from these business activities.

The county has a variety of markets, including open-air, self-constructed, development tenant purchase, rental, hawkers', and wholesale markets. Notable markets include Gikomba Market, known for affordable second-hand goods, and Maasai Market, popular for jewelry and artwork. Other markets include Toi Market, City Market, Muthurwa Market, and Githurai Market.

Nairobi City County is Kenya's primary commercial center and hosts the largest industrial hub, contributing about 20% to the nation's GDP. The county accommodates around 80% of Kenya's industries, providing significant employment opportunities. There are 2,061 industries in Nairobi City County, with 422 involved in manufacturing, mainly located in the Industrial Area, Kariobangi, and Baba Ndogo. These industries produce goods such as processed foods, beer, vehicles, soaps, construction materials, engineering products, textiles, and chemicals.

The surrounding areas of Nairobi are fertile agricultural lands where small-scale farmers grow crops like maize and beans, especially in Njiru, Langata, and Kasarani. Other crops include sweet and Irish potatoes, sorghum, cassava, kales, fruits, and high-value crops like onions, tomatoes, Swiss chard, and coffee. These crops are mostly for household consumption, with any surplus sold for extra income.

Nairobi City County is a key hub for tourism in East Africa, thanks to its proximity to



numerous attractions in Kenya and the region. As Kenya's capital and a major commercial center, it draws both business and leisure tourists, partly due to the presence of JKIA. Nairobi City County is home to major parks like Nairobi National Park, Nairobi Safari Walk, and Nairobi Mini Orphanage, as well as museums such as the Nairobi National Museum, Nairobi Gallery, and Nairobi Snake Park, which showcase Kenya's rich heritage.

The tourism sector is well-supported by a range of world-class hotels, including eight 5-star and eight 4-star hotels with a combined capacity of 5,700 beds. Other notable accommodations include 3-star, 2-star, and unclassified hotels. The county also boasts the largest ice-skating rink in East Africa at Panari Hotel's Sky Centre. Bed occupancy in high-class hotels averages 90%, with a growth rate of 9.7% (NCCIDP 2023-2027).

As the nation's capital, Nairobi City County also hosts the highest concentration of financial institutions, including 43 commercial banks, 94 Forex Bureaus, and 44 microfinance institutions, making it a regional financial hub. Mobile banking is growing, led by Safaricom Plc, the largest telecommunications company in the country (NCCIDP 2023-2027).

The economic activities along the project road corridor range from modern formal sector that includes wages and salaried employment in the private and public sector. The informal sector includes retail trade activities. These businesses consist of both small scale and large-scale informal establishments. There are a number of major markets on the project road including Kariobangi market.

The wider economic benefits are the non-quantifiable benefits that will be accrued from the implementation of the BRT project but cannot be expressed in monetary terms. Given the lack of several parameters that can be included in Highway Development and Management System (HDM-4) analysis, these benefits are qualitative. The indirect effects can range from intermodal effects to secondary impacts. A brief discussion of some of the benefits is presented below:

- **Employment Effects**

Implementation of the BRT Line 5 project will create job opportunities directly and indirectly to skilled and unskilled people during the construction period. The earnings from the project will have multiplier effects to the various sectors in the economy.

- **Land Value Uplift**

This measures the difference between the price of land in its new and former uses and represents the private gain to landowners. Following the implementation of BRT Line 5, which will improve connectivity, the value of properties along the corridor and bare land is likely to go up.

- **Improved Access to Essential Services**

Owing to the reduction in travel time, transit riders will be able to access essential services without any delay. This will be enhanced further, once the other BRT Lines in the city are implemented

- **Growth of Local Economy**

This will result from the local purchases that will be made during the construction period. Materials such as gravel, sand, hardstones etc. will be purchased by the contractor and thus injecting a substantial amount of money to the economy

- **Reduction in the Cost of Living**

Owing to the decrease in the cost of transportation of good and services following implementation of BRT Line 5. This will have a direct impact on the cost of living especially given the high inflation

### **3.3.6 Land and Land Use**

Urban land use refers to spatial distribution of social and economic activities. Accordingly, an up-to- date land use inventory is frequently required to facilitate urban planning and growth patterns as well as monitoring of urban expansion. A study by the Department of Resource Surveys and Remote Sensing (DRSRS 1994) identified eight major land-use classes in Nairobi.

Nairobi City County has a total area of 696.3 km<sup>2</sup>. Land use within the County is divided into categories namely residential, industrial/commercial, infrastructural, recreational, water bodies and riverine, urban agriculture, open lands, others (including protected areas) (NCCIDP 2023-2027). This is illustrated in **Table 16** below:

**Table 16: Land Use in Nairobi City County**

| <b>Land Use Type</b>                   | <b>Area (km<sup>2</sup>)</b> | <b>Percentage (%)</b> |
|--|------------------------------|-----------------------|
| Residential Areas                      | 175.6                        | 25.22                 |
| Industrial/Commercial/Service Centre's | 31.8                         | 4.57                  |
| Infrastructure                         | 15.9                         | 2.28                  |
| Recreation                             | 12                           | 1.72                  |
| Water bodies and Riverine Areas        | 11.8                         | 1.69                  |
| Urban Agriculture                      | 96.8                         | 13.9                  |
| Open Lands                             | 198.8                        | 28.55                 |
| Others (including protected areas)     | 153.6                        | 22.06                 |
| <b>Total</b>                           | <b>696.3</b>                 | <b>100</b>            |

Outer Ring Road traverses an intense development of industrial establishments from the GSU premises intersection to Mathare River Crossing on the Left-Hand Side and at Jogoo Road-Outer Ring Junction up to Ngong River on the Right-Hand Side after the Tassia Estate. Commercial Centers such as banks, retails outlets, fuel stations, market centers and residential estates are prominent along this road mostly high density i.e. Huruma, Kariobangi, Dandora, Umoja and Donholm estates.

### **3.3.7 Housing**

The proportion of households owning the main dwelling unit they occupied was 61.3% while those occupying rented/provided dwelling units were 38.7%. Majority (93.9%) of the owned dwelling units were constructed, 3.3% were inherited and 2.8% were purchased. The 2019 KPHC data shows that 80.3% of the households occupied dwelling units that had iron sheet as the main roofing material followed by concrete/cement at 8.2%. The dominant material used for wall construction was mud/cow dung at 27.5% followed by stone with lime/cement at 16.5%. Dwelling units with concrete walls accounted for 16.3% of the total. The predominant floor material was concrete/cement accounting for 43.7% followed by earth/sand floors at 30.0%.

The housing type by wall materials in Nairobi City County is mainly characterized by stone, brick/block, mud/wood and corrugated iron sheet. The stone and block walled houses account for 65.9% while wood and corrugated iron sheet account for 31.1%. The classification by floor type indicates that 75.8% of household have cement floor, 14.2% earthen floor, 7.5% tiles and 2.2% for those with wooden floor. Most of the households in Nairobi have corrugated iron sheet roofed houses which accounts for 56.6%. Tiles and concrete roofs account for 12.4% and 27.9% respectively (NCCIDP 2023-2027).

The housing along Outer Ring Road comprises of public/government and commercial premises, and industries these are constructed with stone/blocks, glass, steel, cement/tiles and iron sheets.

### **3.3.8 Transport and Communication Network**

#### **3.3.8.1 Roads and Railways Networks**

NMR has a combined transport network comprising of Roads, Railways, Airways and Pipelines. International Trunk Roads Nos. A104, A109, and A2 pass through the NMR. These cater to international traffic enabling movement of Traffic from Mombasa Port to/from neighbouring land locked countries of Uganda, Rwanda, South Sudan and Ethiopia. The International Trunk Routes A2 and A104 form part of the Trans-African North-South Road corridor from Egypt to South Africa. These international trunk Roads have more than 6 lanes. The major trunk roads in the CBD have more than four (4) lanes, and especially Thika road and Airport North Road have eight (8) lanes.

The County's railway network extends 75 km with 10 functional stations, including Embakasi, Makadara, Nairobi main terminal, Dandora, Githurai, Kahawa, Kibra, Dagoretti, JKIA, and Syokimau (NCCIDP 2023-2027). Enhancements to Makadara, Imara Daima, and Nairobi platforms have improved public transportation and supported socio-economic development.

The BRT will be constructed at the median of Outer Ring Road with thirteen (13) designated pick up and drop points along the 10km stretch of road intended to join the Thika superhighway BRT.

### **3.3.8.2 BRT Networks Plans**

The Outer Ring Road was upgraded between 2014 to 2018 and is mainly composed of main roads with four (4) lanes and service roads with more two (2) lanes by each direction. The Outer Ring Road connects to main transportation facilities such as the airport, railway, and road A2 & A104 in the city.

The surrounding area along project road is mainly covered by residential areas, thus experiencing a high population. However, the project area evidently requires public transportation infrastructures because it has high development potential as a growth corridor in the future according to the Urban Development Master Plan.

The Project aims at building BRT line 5 with advanced technology, providing economically feasible BRT that is appropriate to Nairobi citizen's income level and economic status, securing the citizen's mobility, accessibility and safety and reducing the environmental effects caused by traffic congestion.

The BRT Line 5 project is part of a broader network of BRT lines being developed to enhance connectivity and ease of access around Nairobi. The BRT network aims to create an integrated and efficient public transport system across key corridors. Apart from **Line 5**, which runs along Outer Ring Road, several other lines will be integrated to provide comprehensive citywide coverage. These include:

- Line 1 (Ndovu): Connecting Limuru, Kangemi, CBD, Imara Daima, Athi River, and Kitengela;
- Line 2 (Simba): Linking Rongai, Bomas (via Langata Road), CBD, Ruiru, Thika, and Kenol;
- Line 3 (Chui): Running through Tala, Njiru, Dandora (via Juja Road), CBD, Showground (via Ngong Road), and Ngong; and
- Line 4 (Kifaru): Serving Mama Lucy Hospital, Donholm (via Jogoo Road), CBD, T Mall, Bomas, Karen, and Kikuyu.

The integration of these BRT lines will significantly improve the flow of people and

reduce traffic congestion, connecting major residential, commercial, and industrial areas across Nairobi.

### 3.3.9 Traffic Count

The traffic count data for BRT Line 5 provides a detailed analysis of traffic volumes along key sections of Outer Ring Road in Nairobi. Traffic volumes were measured over a 7-day period, with counts taken for 12 to 24 hours. The peak traffic hours were identified as 7:00 am to 8:00 am in the morning and 5:00 pm to 6:00 pm in the evening, with pm peak hour volumes generally higher than those in the morning. For instance, the section between Thika and Baba Dogo recorded 2,315 vehicles during the pm peak, compared to 2,018 in the am. To account for seasonal variations, a factor of 1.1 was applied to the daily traffic volumes, resulting in the calculation of Annual Average Daily Traffic (AADT). The section between Thika and Baba Dogo, for example, had an AADT of 36,941 vehicles.

The growth in traffic over time, with the section between Juja Road and Kangundo Road seeing a significant increase in traffic, growing by 197% between 2012 and 2022. High volumes were observed at major interchanges, particularly at the Donholm Interchange, which processed over 76,000 vehicles in 12 hours. This traffic data is crucial for understanding current road usage and informing the design of BRT Line 5, as well as for forecasting future traffic demands along the Outer Ring Road corridor.

The following tables show the traffic count data information in table form:

**Table 17** below shows the Traffic Volumes (am and pm peak) by Direction (2022).

**Table 17 Traffic Volumes during Peak Hours across different Sections of the Outer Ring Road**

| Road Section                             | AM Peak Volumes (veh) |       |       | PM Peak Volumes (veh) |       |       |
|--|-----------------------|-------|-------|-----------------------|-------|-------|
|  | NB/WB                 | SB/EB | Total | NB/WB                 | SB/EB | Total |
| <b>S1-ALL</b> Thika to Baba Dogo         | 1,252                 | 766   | 2,018 | 1,359                 | 956   | 2,315 |
| <b>S2-ALL</b> Baba Dogo - Juja           | 1,876                 | 1,923 | 3,799 | 1,507                 | 2,139 | 3,646 |
| <b>S3-ALL</b> Juja - Kangundo Road       | 1,397                 | 1,303 | 2,699 | 1,750                 | 1,150 | 2,899 |
| <b>S4-ALL</b> Kangundo - Jogoo Road      | 1,082                 | 1,943 | 3,025 | 1,599                 | 1,656 | 3,256 |
| <b>S5-ALL</b> Jogoo Road - Savannah Road | 1,405                 | 1,581 | 2,986 | 1,350                 | 1,700 | 3,050 |
| <b>S6-ALL</b> Savannah Road              | 1,171                 | 1,154 | 2,325 | 945                   | 1,241 | 2,186 |

|   |       |       |       |       |       |       |
|---|-------|-------|-------|-------|-------|-------|
| - Fedha Road                                  |       |       |       |       |       |       |
| <b>S7-ALL</b> Fedha Road - Airport North Road | 2,277 | 1,515 | 3,792 | 1,707 | 1,587 | 3,294 |

**Table 18** below shows the Traffic Volumes (24 Hours and AADT) by Direction (2022):

**Table 18: The 24-hour Traffic Counts and the Annual Average Daily Traffic Values after applying a Seasonal Factors**

| Road Section                                  | 24 Hour (veh) |        |        | AADT   |        |        |
|---|---------------|--------|--------|--------|--------|--------|
|   | NB/WB         | SB/EB  | Total  | NB/WB  | SB/EB  | Total  |
| <b>S1-ALL</b> Thika to Baba Dogo              | 20,862        | 12,721 | 33,583 | 22,948 | 13,993 | 36,941 |
| <b>S2-ALL</b> Baba Dogo - Juja                | 17,198        | 15,676 | 32,874 | 18,918 | 17,244 | 36,161 |
| <b>S3-ALL</b> Juja - Kangundo Road            | 17,733        | 11,198 | 28,931 | 19,506 | 12,318 | 31,824 |
| <b>S4-ALL</b> Kangundo - Jogoo Road           | 12,647        | 19,449 | 32,096 | 13,912 | 21,394 | 35,306 |
| <b>S5-ALL</b> Jogoo Road - Savannah Road      | 16,373        | 16,417 | 32,790 | 18,011 | 18,059 | 36,069 |
| <b>S6-ALL</b> Savannah Road - Fedha Road      | 11,922        | 10,137 | 22,059 | 13,114 | 11,151 | 24,265 |
| <b>S7-ALL</b> Fedha Road - Airport North Road | 21,418        | 22,354 | 43,772 | 23,559 | 24,590 | 48,149 |

**Table 19** below shows growth of traffic flows over the years.

**Table 19: Comparison of Traffic Volumes from 2012, 2016, and 2022: Showing the Growth in Traffic along different Sections**

| Sections                        | All Volumes (veh) |            |            | Absolute Growth  |                  |
|---------------------------------|-------------------|------------|------------|------------------|------------------|
|                                 | 2012 (veh)        | 2016 (veh) | 2022 (veh) | Growth 2012~2016 | Growth 2012~2022 |
| <b>S1</b> Thika to Baba Dogo    | 17,500            | 31,100     | 33,543     | 78%              | 92%              |
| <b>S3</b> Juja - Kangundo Road  | 14,500            | 28,200     | 43,005     | 94%              | 197%             |
| <b>S4</b> Kangundo - Jogoo Road | 17,150            | 17,400     | 39,408     | 1%               | 130%             |

These tables reflect the substantial growth in traffic volumes along the Outer Ring Road

corridor, with certain sections experiencing over 100% increases in traffic between 2012 and 2022. This data underscores the increasing demand on the corridor, informing the design and future planning of the BRT Line 5.

### **3.3.9.1 Traffic Surveys and Analysis**

A comprehensive traffic analysis and modelling was undertaken to support the design of the BRT Line 5 project. The Traffic Analysis component of the Study was aimed at collecting and analyzing all the traffic related data along the study corridor and confirming the adequacy of the provided facilities. Observed traffic volumes in the base year 2022 ranged from 24,265 AADT to 48,149 AADT, with the highest observed traffic at the Fedha Road to Airport North Road section. The peak period of travel was from 7 to 8 am during the am period and 5 to 6 pm during the pm period. Travel time surveys showed that it takes a private vehicle 15 minutes to traverse the corridor while matatus take up to 29 minutes. The public transit service was characterized by the use of matatu services with 21 designated stops, lack of fixed schedules, and a mix of express and non-express services. The busiest matatus stops were at Allsops and Donholm with over 35,000 boarding and alighting passengers over a 12-hour period. The survey revealed that around 70% of the people traversing the corridor used matatus while the remainder used private vehicle and other transport means.

The corridor has 10 pedestrian bridges and eight (8) at grade crossing points at collector road sections. The highest crossing occurred at the Fedha pedestrian bridge with over 17,500 pedestrians and other NMTs such as cyclists and handcarts over a 12-hour period, while the highest parallel movements were witnessed at the Allsops section with over 25,000 pedestrians and other NMTs. Most sidewalks had encroachments from temporary businesses which reduced the effective widths used by pedestrians. Accident records indicated 365 crashes between 2017 to 2022 of which 40% were fatal, the majority involving pedestrians. The Donholm to Savannah section registered the highest number of accidents.

Vehicular traffic operations assessment was undertaken using the Aimsun Microsimulation Model. After the creation of a representative calibrated and validated model, the operations of the 12 interchanges and junctions showed that the Juja interchange, Mutarakawa Roundabout, Mumias South Junction and the Allsops Interchange had poor Levels of Service of E or F.

Demand Forecasting modelling was done to assess future auto and transit demands. Implementation of BRT is planned in Outer Ring Road corridor with an anticipated opening date of 2025. The TRANSCAD model was used in analysis that built upon earlier analysis undertaken during the feasibility study stage. The analysis provided future roadway demands as well future ridership of the proposed BRT service under different scenarios. The main findings of the Study were travel demands would increase by 26% in 2025, 56% by 2030 and 109% in 2040, peak hour ridership of BRT Line 05 on Outer

Ring Road will be 6,566, 7,649 and 13,011 for the years 2025, 2030 and 2040 respectively, and that without the BRT Line 02 in operation at opening year, reported demands would be reduced by up to 30%.

Transit assessment included assessment of fleet size and operations that was based on the Institute for Transportation and Development Policy (ITDP) and Nairobi Metropolitan Area Transport Authority (NaMATA) guidelines on the basis of the maximum bus capacity and anticipated loading along the route. Required BRT operational frequencies were estimated resulting in recommended service headways of 5 minutes in 2025, 4 minutes in 2030 and 3 minutes in 2040. The design considered that buses would typically run for 8 to 12 hours only, and additional buses were provided to allow for redundancies during maintenance, replacement and emergency purposes. A fleet size of 36 buses in 2025, 65 in 2030 and ultimately 95 in 2040 was obtained.

The reliability analysis undertaken with varying dwell times at the major transfer stations (Station 1-Thika Road, Station 5-Juja Road and Station 7-Jogoo Road) showed that in 2025 the BRT buses would bunch if the dwell time varied by 30 seconds or more. Given that all station were designed to allow for 3 sub-stops, the impact of potential bunching will not be significant.

To improve future operations, several improvements were proposed including addition of slip lanes, implementing free flow operations at the Allsops interchange for the northbound traffic travelling from Outer Ring Road to Thika, as well as for traffic travelling from CBD to Outer Ring Road. Furthermore, widening of approaches at Juja and Kangundo interchanges and increasing of approach lanes at terminal intersections were recommended.

The pavement loading class necessary for the BRT lanes was estimated using the projected BRT bus headways in the various horizon years. It showed that over a 16-hour period 192 BRT buses would travel in each direction in 2025, 240 in 2030 and 320 in 2040. Equivalence factors were based on the recommended NaMATA guidelines of a maximum weight of 30,000 kg for an articulated BRT bus. On that basis, the analysis recommended a Pavement Class of T3 for both the 20-year and 40-year design period.

### **3.3.10 Information Communication and Technology**

Information on ownership and usage of selected ICT equipment and services is presented in Tables 2.31 to 2.34. The KPHC results show that 2,772,719 of individuals aged 3 years and above owned a mobile phone. More females (1,392,497) than males (1,380,088) owned a mobile phone. 2019 Kenya Population and Housing Census: Volume IV data shows that 52.4% of individuals aged 3 years and above used internet while 28.0% used a computer. The proportion of population aged 15 years and above who searched and bought goods and services online was 14.0%.



The ICT sub-sector has experienced mixed growth in the recent past. While Nairobi City County has 38 post office branches, the growth of postal services has rather been declining due to increase in mobile telephony. Mobile telephony has the highest coverage in Nairobi compared to other parts of the country with over 95% of the inhabitants having access to mobile communication. The players engaged in mobile telecommunication include: Safaricom Plc, Telkom Kenya and Airtel Kenya while those in mailing services include Kenya Postal Corporation, Group 4 Securities, Direct Handling Limited and Wells Fargo among others (NCCIDP 2023-2027).

The Information, Communication and Technology Solutions used in BRT Line 5 include:

- ITS: Real-time bus tracking through GPS and beacon-based systems that provide accurate location data to both passengers and operators. Wireless communication between buses and the control center, enabling smooth traffic management and real-time updates;
- BIS: Real-time collection of bus location data, passenger information, and vehicle status, enhancing the efficiency of fleet management. Passenger guidance through on-board digital signage, voice announcements, and estimated arrival information;
- Automatic Fare Collection System: Contactless payments using smart cards integrated with other payment systems like MPESA and bank services. These systems allow for quick, station-based fare collection;
- Network and Communication Infrastructure: Bus stations and vehicles are equipped with Wi-Fi and LAN access points to ensure reliable communication. A secure network firewall with LTE connectivity ensures robust data transfer between buses, stations, and the control center;
- CCTV and Surveillance Systems: Both stations and buses are fitted with CCTV systems that can stream and record video over a private network, enhancing passenger safety; and
- Centralized Control and Maintenance: A Bus Information Center (BIC) is established to monitor the entire BRT network, providing centralized management of all ICT systems, including fare collection, bus operations, and system maintenance.

These ICT solutions will enhance operational efficiency, passenger safety, and overall service quality.

### **3.3.11 Financial Institutions**

Nairobi City County being the host of the Country's capital City has the highest concentration of financial institutions. Leading local and international banks have set operations in the city creating a vibrant and competitive financial eco-system. Some of Kenya's largest banks are Equity Bank, KCB Bank, and Cooperative Bank among others. Some of leading international banks are ABSA Bank, Standard Chartered Bank and Bank

of Africa.

There are 43 Commercial banks with a network of 364 branches that operate in different parts of the County with the City Centre having the highest concentration. The County has 94 Forex Bureaus and 44 Microfinance Institutions (MFIs). The mobile banking is also growing with the help of Safaricom which is the largest telecommunication company. The huge network of financial institutions coupled with highly skilled personnel makes the County a regional hub in financial services (NCCIDP 2023-2027).

Financial institutions along Outer Ring Road include Co-operative Bank, Equity Bank, Consolidated Bank, SBM Bank, ABSA Bank, and Pesapoint Bank among others.

### **3.3.12 Energy Access**

The main sources of energy in Nairobi City County are electricity, solar, LPG, biogas, paraffin, charcoal and firewood. Lack of access to clean sources of energy is a major impediment to development due to health-related complications such as increased respiratory infections and air pollution. The type of cooking fuel used by households is related to their socio-economic status.

High level energy sources are cleaner but cost more and are used by households with higher levels of income compared to simpler sources of fuel, mainly firewood, which are mainly used by households with a lower socio-economic profile. For instance, 63.2% of the population use paraffin as cooking fuel. Other sources of energy for cooking include LPG (20.2%), charcoal (10.5%) and firewood (1.8%). About 68.2% of households use electricity as a means of lighting 28.8% use paraffin while 2.9% and 1.7% use grass and dry cells respectively (NCCIDP 2023-2027).

Electricity is the main source of energy used by businesses and households along Outer Ring Road.

As outlined in the BRT ITS manual the energy solutions to be used will utilize power from the vehicle's alternator, preventing battery discharge by drawing power only when the engine is running. This power will support various on-board systems such as GPS, communication systems, and passenger information displays. A detailed power plan ensures optimized energy usage based on equipment demands, with a total estimated power consumption of around 266W for critical components like driver terminals, passenger displays, and integrated terminals.

The architectural designs for the BRT system integrate energy solutions focused on powering communication and information systems in the stations. The system power for stations is supplied either by a central electric distribution box in the BRT shelter or by drawing power from nearby street lights. Additionally, backup power systems, such as UPS system, are incorporated to maintain operation during power failures. These

architectural elements ensure that all critical components, such as CCTV, information terminals, and lighting, operate efficiently while being safeguarded against power disruptions.

The electric buses for the BRT system will be charged both along the road and at designated Depots. The Depots will feature charging stations equipped with the necessary infrastructure to charge multiple buses simultaneously. Along the road, charging stations will be strategically placed at specific intervals to allow for quick top-ups during operation. These stations will ensure that buses maintain sufficient power for continuous service throughout the day.

In terms of energy sources for streetlights, power for streetlights and other roadside equipment will be supplied by nearby power distribution systems or through integration with the BRT shelter's central electric distribution box. This helps to maintain a stable power supply for both streetlights and the electric bus charging systems, ensuring efficient operation.

### **3.3.13 Health**

#### **3.3.13.1 Health Access**

Nairobi City County hosts 16 Sub-County hospitals, 9 mission hospitals, 32 private hospitals, 15 nursing homes, 38 public health centres as well as 45 private health centres, 30 public dispensaries, 84 private clinics and 22 public clinics. Kenyatta National Hospital, a Level 5 Hospital, is the major referral hospital in the County. It has a total bed capacity of 1,800. The doctor patient ratio stands at 1:7,816 (NCCIDP 2023-2027).

Health facilities along Outer Ring Road comprises of public facilities sponsored by the central government or the Nairobi City County. There are also health facilities sponsored by religious organizations where services are offered at cost or private clinics that are distributed within the neighbourhoods of Outer Ring Road. Some of the health facilities along Outer Ring Road include Aga Khan Donholm, Bliss Medical Centre, Penda Medical, Royal Victory Hospital, and Equity Medical among others.

## 4. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

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### 4.1 Environmental Impact Assessment Process in Kenya

The Environmental and Social Impact Assessment (ESIA) process in accordance with the Legal Notice No. 31 of the Kenya Gazette Supplement No. 62, dated 30<sup>th</sup> April 2019 classifies projects that require ESIA into three:

- Low risk project;
- Medium risk projects; and
- High Risk Projects.

According to the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019, every Proponent undertaking a Project specified in the Second Schedule of the Act as being a low risk Project or a medium risk Project, shall submit to the Authority a Summary Project Report (SPR), where the Authority considers that the proposed Project may have a significant adverse environmental impact, it shall recommend that the Proponent prepare and submit a Comprehensive Project Report (CPR); or where the Authority considers that the proposed Project is not likely to have any significant adverse environmental impact, it shall exempt the Proponent from submitting a CPR and issue the Proponent with an approval to proceed with the Project.

According to the EIAA Regulations, 2003, every Proponent undertaking an Environmental Impact Assessment Study specified in the Second Schedule of the Act as being a high-risk Project, shall submit to the Authority TOR during the scoping exercise to be approved by NEMA. After which the ESIA Study shall be prepared in accordance to Regulation 16, 17, 18 and 19 of the Regulations.

The Authority prepared and submitted the proposed Projects' TOR to NEMA for review and approval in accordance to regulation 11. The approved TOR and the approval letter are attached as **Appendix 6**.

**Figure 1** overleaf is a schematic presentation of the current EIA process in Kenya.

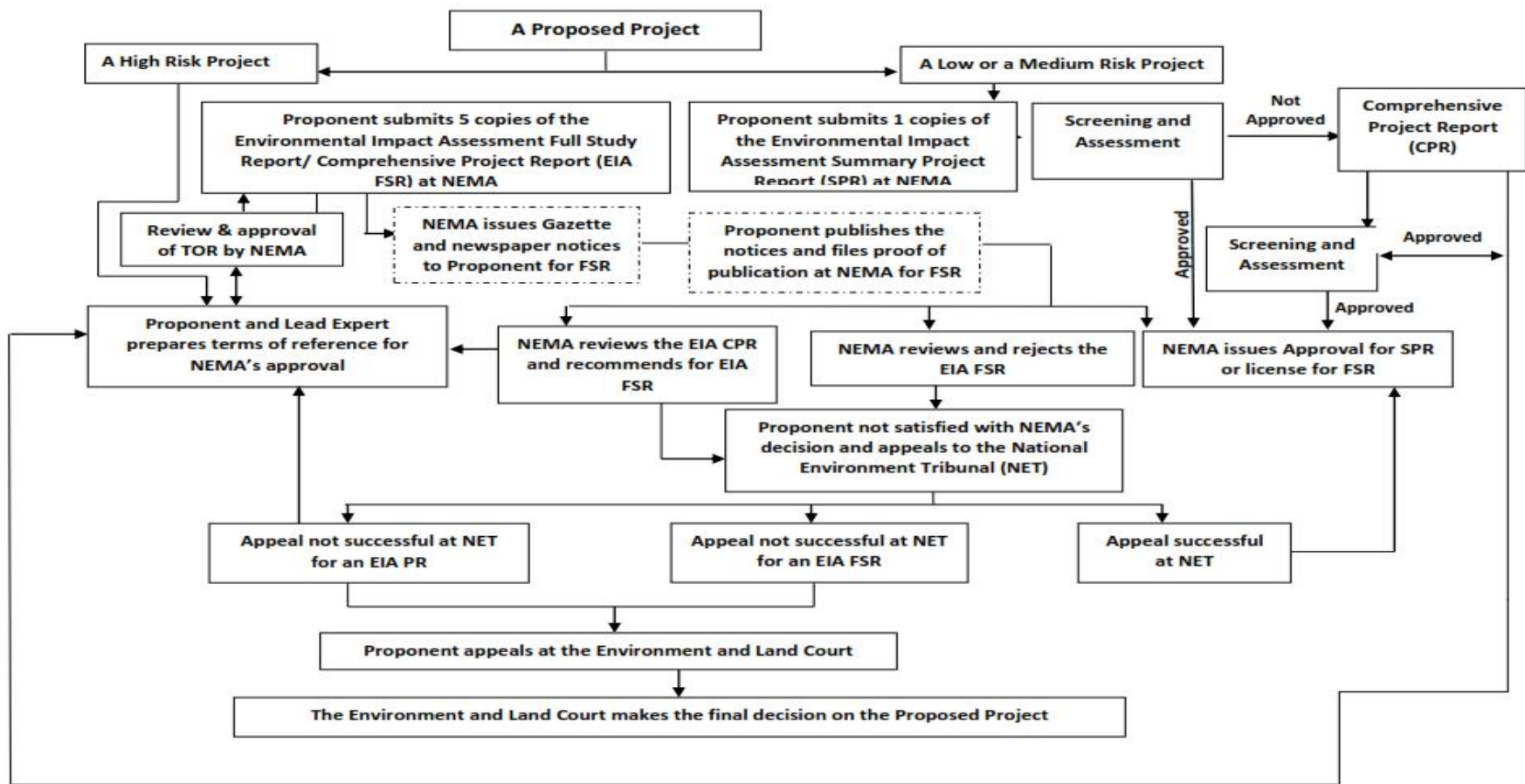


Figure 1: Schematic Presentation of the Current Environmental Impact Assessment (EIA) Process in Kenya

## **4.2 National Environmental Policy, 2013**

The National Environmental Policy is an outcome of the Sessional Paper No. 6 of 1999 entitled “Environment and Development”. The overall goal of the policy is better quality of life for present and future generations through sustainable management and use of the environment and natural resources. One of the objectives of the Policy is to promote use of vital tools such as ESIA necessary to ensure environmental quality and resource productivity on long term basis.

The Policy among other important objectives calls for promotion of domestication, coordination and maximization of benefits from Strategic Multilateral Environmental Agreements (MEAs). The Policy further calls for integration of environmental concerns into development policies, plans and activities.

The National Environmental Policy proposes a broad range of measures and actions responding to key environmental issues and challenges. It seeks to provide the framework for an integrated approach to planning and sustainable management of natural resources in the Country. It recognises the various vulnerable ecosystems and proposes various policy measures not only to mainstream sound environmental management practices in all sectors of society throughout the Country but also recommends strong institutional and governance measures to support the achievement of the desired objectives and goal.

### **Relevance**

The Policy requires that projects such as this one, which are likely to have significant environmental and social impacts should be undertaken with sound Environmental Management Plan.

## **4.3 Sectoral Policies and Legislation**

The Former Ministry of Roads produced the “Standard Specification for Road and Bridge Construction” in 1986. These are often referred to when addressing aspects of road projects environmental impacts. The following key clauses are included in the specifications:

- Section 1: General;
- Clause 6: Quarries, Borrow Pits, Stockpile and Spoil Areas;
- Clause 115, sub-clauses (c), (e), (f), (g), (i) and (k) General Conditions for Protection of Environment;
- Clause 116: Protection of Water Resources;
- Clause 117: Health, Safety and Accidents;
- Clause 118: Preservation and Maintenance of Fences and Gates;
- Clause 119: Use of Explosives;
- Clause 120: Protection of Existing Works and Services; and
- Clause 124: Provision of Land.

## **Relevance**

The proposed Project should comply with the Standard Specifications for Road and Bridge Construction of 1986 in order to ensure environmentally sustainable development within and around the proposed Project.

### **4.4 Environmental Guidelines for Roads and Bridges, 2010**

The Environmental Guidelines for Roads and Bridges provide detailed analysis of environmental issues arising from road works along with mitigation measures that have been used successfully in national and international contexts. The guidelines identify the direct and indirect effects from road works on the biophysical environment – land, water, air, vegetation, etc. as well as the socio-economic and cultural environments for instance, public health, welfare and safety and valued traditions from the present and past.

The guidelines underscore the importance of public consultations and participation in all aspects of road-transportation development, thereby ensuring accountability, fairness and sustainability.

However, the guidelines do not address environmental impacts from road transport, including:

- Vehicle emissions that degrade air quality, e.g. carbon dioxide, ozone, nitrous oxides etc.;
- Road safety issues that arise from unsafe road designs, failure to correct black spots, etc.;
- Vehicle inspections that require repairs to ensure road-worthiness for all transport modes;
- Passenger safety vis a vis use of seat belts; and
- Vehicle overloading.

Environmental Guidelines for Roads and Bridges, 2010 cover the following guidelines for activities that can affect the water quality:

- Contractor Camp Guidelines;
- Site Preparation Guidelines;
- Earthworks Guidelines;
- Drainage Guidelines;
- Borrow Pit Guidelines;
- Rock Quarries Guidelines;
- Sand Sources Guidelines;
- Water Sources Guidelines;
- Bitumen Processes Guidelines;
- Culverts Guidelines; and

- Bridges Guidelines.

In addition, it contains the following guidelines:

- Air Quality Guidelines;
- Noise and Ground Vibrations;
- Land Use Including:
  - Material Site Guidelines;
  - Debris Disposal Guidelines; and
  - Road-Induced Changes in Resource Management Guidelines.
- Community Health Including:
  - STDs and HIV/AIDS Guidelines;
  - Vector Borne Diseases Guidelines;
  - Fugitive Dust Guidelines;
  - Noise Guidelines; and
  - Ground Vibration Guidelines.
  - Community Welfare which includes Job Opportunities Guidelines; and
  - Cultural and Natural Heritage Guidelines which include Landscape and Visual Intrusion Guidelines.

### **Relevance**

The guideline provides some of the mitigation measures to alleviate environmental degradation in the proposed Project.

#### **4.5 Guidelines for Prevention and Control of Soil Erosion in Road Works, 2010**

The guidelines for prevention and control of soil erosion in the road works provide brief introductions on the planning, costing and construction of soil and water conservation structures commonly used in rural road infrastructure delivery. The guidelines present illustrations real life examples and work methodologies that assist Engineers and Contractors to develop effective construction and supervision techniques, on the prevention and control of soil erosion in road works.

The guidelines provide basic information on techniques for the identification and assessment of the challenges and planning of mitigation measures related to erosion control works. The guidelines also provide tips on, among others:

- The design and construction of waterways and soil erosion control measures in the road drainage systems;



- Soil erosion control measures needed in the upper and lower catchment areas to reduce soil erosion and mitigate against anticipated damages from the road drainage discharge;
- Some solutions for soil erosion control on road sections with specific conditions not catered for in standard designs;
- The use of Vetiver grass to stabilize and heal erosion damages; and
- Costing of works related to prevention and control of soil erosion.

The guidelines have been developed primarily to benefit Engineers and Technicians, Contractors and their Supervisors, Consultants and other potential users involved in road works that are often not aware of the extent of damages caused by uncontrolled runoff from the road servitude. Established Contractors, Professional Engineers, Regional Agricultural Officers, Environmentalists, Programme Managers and Planners may also use these guidelines as reference for some of their planning, design and supervision works.

These guidelines are intended to introduce basic soil and water conservation principles and techniques, related to road works.

### **Relevance**

The guidelines provide some of the mitigation measures to alleviate environmental degradation.

#### **4.6 Integrated National Transport Policy, 2024**

The Policy aims to develop, operate and maintain an efficient, cost effective, safe, secure and integrated transport system that links the Transport Policy with other sectoral policies, in order to achieve national and international development objectives in a socially, economically and environmentally sustainable manner.

The Policy acknowledges that an efficient transport system is an important prerequisite for facilitating national and regional integration; promoting trade and economic development; supporting other sectors of the economy; contributing to poverty reduction; minimizing effects to climate change; and, wealth creation.

The Policy covers key transport sector challenges and policy recommendations related to transport infrastructure planning, development and management, legal, institutional and regulatory framework for the sector, safety and security, financing, gender mainstreaming, utilization of ICT, Climate Change, Environment and social considerations.

On issues of implementation, it suggests enforcement of the EMCA Cap 387 and the OSHA, 2007 to ensure the safety and health for all persons and property within oil and gas facilities; shall be observed to ensure that environmental issues are explicitly part of multiple criteria decision-making systems.

The Policy instructs the Government to develop and introduce energy saving measures and technologies that will reduce carbon footprint. It goes further to suggest the provision of a regulatory framework and appropriate fiscal policies to promote energy efficient and low-emission freight transport, including shifting long-distance freight from road to rail and establishment of an effective disaster management measures along the major highway corridors.

### **Relevance**

The Policy instructs on sustainable stimulation of rapid development and efficient management of a safe, widely accessible transport system that responds to modern technological advancement in a rapidly changing and globalized environment and requires that projects should be subjected to Strategic Environmental and Social Assessment in line with NEMA Guidelines.

#### **4.7 Bus Rapid Transit Design Framework, 2018**

BRT is a high quality bus-based transit system that delivers fast, comfortable, and cost effective urban mobility through the provision of segregated right-of-way infrastructure as well as rapid and frequent operations. This framework was formulated by the NaMATA. BRT holds several advantages including greater flexibility, shorter door to door travel times, faster implementation time, improved accessibility and lower construction and operating cost. Realizing the advantages of BRT is a function of several design elements including:

- Dedicated lanes- faster speeds because buses can bypass congestion in mixed traffic lane;
- Median busway alignment- avoided interface with property entrance, side streets on street parking and pedestrian movement; reduced conflict with mixed traffic;
- Platform level boarding- avoided delays during boarding and alighting. It is accessible to all users regardless of disability;
- Off-board fare collection – the feature has multiple door boarding and avoidance of queues for fare payment and validation; and,
- Intersection treatment – reduction in signal phases if right turns across the busway are avoided. This improves safety due to reduction in potential conflict points.

In combination, these features enable BRT to offer high capacity, high speeds and safe and convenient access for all users. Planning for BRT considers several factors including the network selection and BRT configuration and system capacity. The BRT system design comprises of corridor capacity, station saturation and service design. The infrastructure design will incorporate street elements (busway placement, intersection treatment and station position); median lanes, pavement design, intersection design, provision for ITS and camber and gradients.

The Framework also covers the station design (alignment, layout, amenities and passenger access); standards of the BRT vehicles to be used in the proposed Project, operation controls

and non-motorised transport access including footpaths, pedestrian crossing and bicycle infrastructure.

The Framework highlights the need for integration of multiple public transport modes close together. The physical design of intermodal facilities will be guided by the following principles:

- Walking paths should be short and direct with minimal level difference for transferring passengers;
- Adequate clear space for passenger movement should be provided to prevent bottlenecks;
- Passenger areas should be protected from sun and rain; and,
- Robust public information should be provided to enable users navigate the areas.

The Depot should include areas for refueling, cleaning, repairs, administration and parking. The interior layout should allow for convenient maneuvering of buses. The framework highlights that the geometric design of the Depot entry should be designed in conjunction with that of the BRT corridor.

### **Relevance**

This Framework will guide KURA and the Contractor during the construction of the BRT Line 5 infrastructure.

#### **4.8 Sessional Paper No. 3 of 2009 on Land Policy**

The principles stated in the Policy, reflect a reaction to the emphasis over the last 65 years on individual ownership of land. It adopts the position that individual tenure and customary tenure should co-exist and benefit from equal guarantees of tenure security.

In section 3.2, Land Policy is linked to constitutional reforms; regulation of property rights is vested in the government by the Constitution with powers to regulate how private land is used in order to protect the public interest. The Government exercises these powers through compulsory acquisition and development control. Compulsory acquisition is the power of the state to take over land owned privately for a public purpose. However, the Government must make prompt payment of compensation.

Section 3.6 under land issues requiring special intervention assert that “Land Rights of minority communities shall be protected through a law to be passed specifically to secure their rights as individuals and groups and recognition of their resource management systems to ensure sustainability”.

It further states, “Land rights of vulnerable groups (namely subsistence farmers, pastoralists, hunters and gatherers, agricultural labourers, unskilled workers, unemployed youth, persons with disabilities, persons living with HIV and AIDS, orphans, slum and street

dwellers and the aged, shall be addressed by creating a system for identifying, monitoring and assessment, resettling them, facilitating their participation in decision making over land an land based resources, and protecting their land rights”.

### **Relevance**

The proposed Project will be carried out in the median of the Outer Ring Road and thus no land acquisition will be done. However, if a scenario arises during the proposed Project implementation and land is acquired, this Policy document will come in handy.

#### **4.9 Session No. 1 of 2017 on National Land Use Policy**

The overall goal of the National Land Use Policy is to provide legal, administrative, institutional and technological framework for optimal utilization and productivity of land related resources in a sustainable and desirable manner at national, County and community levels.

The Policy is premised on the philosophy of economic productivity, social responsibility, environmental sustainability and cultural conservation. Key principles informing it include efficiency, access to land use information, equity, elimination of discrimination and public benefit sharing.

The Policy is cognizant of numerous factors that affect land use in Kenya which include geographic and ecological features, population distribution, social, historical, cultural and economic factors. Other key factors are administrative, institutional and policy instruments, investment, urbanization and land tenure.

The Government shall institute mechanisms designed to induce land owners to put their land to productive use and encourage the application of efficient technology for the intensification of land use.

Urban land use will be improved through measures such as establishing transparent, accountable, sustainable, comprehensive and participatory governance structures and decision-making processes.

Other key measures address issues of land cover, land use data and land use planning. Land use plans shall be developed at both National and County levels with full participation of all stakeholders and strict adherence to them shall be enforced.

Harmonization of laws and policies, mapping and documentation of all land uses in the Country, developing a framework for incentives to encourage maintenance of forest cover, land banking for industrial, commercial, agricultural, residential and infrastructure development are other critical measures that shall be taken.

## **Relevance**

KURA shall adhere to the Policy and its implementation especially on urban land use improvement. This means adherence to the land use plans in the area of Project implementation.

### **4.10 Sessional Paper No. 3 of 2018 on Water and Sanitation Services Policy**

The Nairobi City County in conjunction with the NCWSC came up with the water and sanitation service Policy to guide the County in effective provision of quality water and sanitation services to the city residents. The Policy provides the framework for efficiency in water resource management; ensure security and integrity of water and sanitation systems and defines institutional structures to effectively implement the Policy.

The Policy promotes the principle of the devolved system of government as anchored in the Constitution. The Policy takes into account the legislative frameworks for devolved government, specifically, the Urban Area and Cities Act, 2011; the County Government Act 2012; and the Inter-Governmental Relations Act 2012.

The specific objectives of this Policy are:

- To promote the conservation, preservation and efficient management and use of water;
- Provide for the development and maintenance of the County's infrastructure for water and sanitation services support; and,
- Promote the shared responsibility of all persons residing and or carrying out business within the County for the conservation, prudent use and management of water; while promoting inter-agency and inter-government collaboration in protecting the interests of consumers of water and sanitation services within the County.

Nairobi City County will adopt an integrated approach to planning, development and management of water and sanitation services. At the water and sanitation service provision level, integration will recognize the inter-linkage between water and sanitation services; the physical infrastructure in roads and housing; spatial planning and land use planning. The County will engage the National Land Commission to ensure that land and leeways required for infrastructure development are secured through a Gazette notice.

## **Relevance**

KURA shall adhere to the Policy and its implementation especially on efficient water use. This means adherence to the water and sanitation policies in the area of Project implementation.

#### **4.11 Poverty Reduction Strategy Paper-2nd Medium Term Plan, 2014**

It seeks to build on the successes of the Medium-Term Plan (MTP)-1, including macroeconomic stability, the enactment of the Constitution 2010, infrastructure development, the growth of the services sector and improved access to education. At the same time, it recognizes remaining challenges, including a low and declining share of manufacturing, low agricultural productivity, high energy costs, a still limited transport infrastructure, a narrow export base and major economic and social disparities across the country. The MTP-2 aims to continue the positive trend in areas where substantial progress was achieved as well as to increase attention on areas where progress was slower while keeping the same priority sectors.

The objective of the Poverty Reduction Strategy Paper (PRSP) is to reduce the incidence of poverty in both urban and rural areas by 50% by the year 2030 as well as strengthening the capabilities of the poor and the vulnerable groups to earn income. It also aims to narrow gender and geographical disparities and create a healthy, better educated and more productive population. The plan has been prepared in line with the goals and commitment of the World Summit for Social Development (WSSD) of 1995 and focuses on the four WSSD themes of poverty eradication, reduction of unemployment, social integration of the disadvantaged people and creation of enabling economic, political and cultural environment.

This Plan is to be implemented by the Poverty Eradication Commission (PEC) formed in collaboration with Government Ministries; Christian CBOs, the Private Sector, NGOs and bilateral and multilateral donors. The National Population Education Project (NPEP) emphasizes the empowerment of poor people and their communities to better manage their resources for collective advancement. The PRSP has the twin objectives of poverty reduction and economic growth. The paper articulates Kenya's commitment and approach to fighting poverty, with the basic rationale that the war against poverty cannot be won without participation of the poor themselves. Any development project that incorporates these strategies in its plans is most welcome in Kenya.

#### **Relevance**

There is a marked increase in the number of people unable to access clean water, clothing, shelter, health services and education due to lack of employment. KURA will be tasked with ensuring that the Contractor uses local labour in the construction work.

#### **4.12 Policy Paper on Environment and Development (Sessional Paper No. 6 of 1999)**

The key objectives of the Policy include:

- To ensure that from the onset, all the development policies, programmes and projects take environmental considerations into account;
- To ensure that an independent EIA report is prepared for any industrial venture or other development before implementation; and

- To come with effluent standards that will conform to acceptable health guidelines.

Under this paper, broad categories of development issues have been covered that require a sustainable development approach. These issues relate to waste management and human settlement. The Policy recommends the need for enhanced reuse/recycling of the residues including waste water, use of raw or non-waste technologies, increased public awareness rising and appreciation of the clean environment.

It also encourages participation of the stakeholders in the management of the waste within their localities. Regarding human settlement, the paper encourages better planning in both rural and urban areas and provision of basic needs such as water, drainage and waste disposal facilities among others.

### **Relevance**

KURA will ensure under this project that issues to do with waste management are done in a sustainable development approach. Stakeholders will continually be sensitized to appreciate clean environment.

#### **4.13 Policy Statements and Guidelines on Mainstreaming Cross-Cutting Issues, 2013**

The Ministry in charge of roads recognizes its' obligation to mainstream social dimensions, such as community participation, gender, persons with disability, child rights and HIV/AIDS, in to its' Policies and Strategies. The Policy Statements and Guidelines were developed in accordance with the Constitution of Kenya and existing National Policies, such as vision 2030, legal instruments such as Acts of Parliament and are complementary to the various International and National Protocols.

The overall goal of the Policy Statement and Guidelines for each section presented herein is to guide mainstreaming of activities in order to enhance community participation, promote gender equity and equality, involve persons with disabilities, promote child rights and ensure that persons living with HIV/AIDS are encouraged to contribute to the roads sub-sector. These include:

#### **4.14 Mainstreaming Community Participation in the Roads Sub-sector**

Mainstreaming community participation will involve addressing community concerns at every stage of the roads development cycle that includes; planning (identification and design) implementation (construction and maintenance), and monitoring and evaluation of projects.

The goal of this Policy is to promote community participation through integrated approach to roads development practice, to ensure employment and wealth creation, sustainability, ownership and accountability in the roads sub-sector. The Policy sets out a framework and provides guidelines for community participation, as well as collaboration with partners in all roads infrastructure development. It applies to all implementing agencies in the roads

sub-sector including National and County Government, Ministries, Departments, State Corporations, Training Institutions and Actors in the Private Sector.

#### **4.15 Gender Mainstreaming in the Roads Sub-Sector**

Gender is a socio-economic phenomenon involving roles and functions of men, women, boys and girls as they relate to and complement each other within a specific socio-cultural and economic context.

The basis of gender mainstreaming in the roads sub-sector is that men, women, boys and girls have different needs, priorities and constraints that should be appropriately addressed. The guidelines also address issues of capacity development and resource mobilization.

The overall goal of this Policy is to facilitate the mainstreaming of gender issues in the planning, design, implementation, monitoring and evaluation of all programs, projects and activities in the roads sub-sector.

#### **4.16 Mainstreaming Child Rights and Protection in the Roads Sub-sector**

In the roads sub-sector, all road operations and activities will, among others, embrace the child rights principles as enshrined in the United Nations High Commissioner for Refugees (UNHCR) and in the Children's Act 2001. These principles include; non-discrimination, maximum survival and development, best interest of the child, participation (child's opinions) and compliance with the child rights practices and stipulated code of conduct.

The goal of this Policy is to mainstream child rights in the roads sub-sector with a view of enhancing road use safety, and protection of the child from labour, sexual and any other form of child abuse in the roads project cycle.

#### **4.17 Mainstreaming Disability Issues in the Roads Sub-Sector**

The Government of Kenya acknowledges disability as a phenomenon that cuts across all spheres of the society and which requires support from all sectors. The Government and other stakeholders offer a wide range of services to persons with disabilities; however, these services have only reached a small percentage of the population and are unequally distributed among various disabilities.

The situational analysis report of 2010 related to the mainstreaming of cross-cutting social issues, by Swedish International Development Agency (SIDA)/Kenya Rural Roads Authority, preceding the development of the policy statement revealed that the roads sub-sector in Kenya has put in place limited measures or mechanisms to address the plight of persons with disabilities.

The fundamental principle is the inclusion of issues concerning persons with disabilities at all levels of the road's development cycle, in line with international and national instruments on disability. These issues include:



- i) Respect for the inherent dignity, individual autonomy including the freedom to make decisions and choices, and independence of persons with disabilities;
- ii) Non-discrimination;
- iii) Full and effective participation and inclusion in society;
- iv) Respect for difference and acceptance of persons with disabilities as part of human diversity and humanity;
- v) Equal and equitable access to opportunity;
- vi) Accessibility and mobility; and
- vii) Equality between men and women, boys, and girls with disabilities.

#### **4.18 Mainstreaming HIV/AIDS Issues in the Roads Sub-Sector**

Mainstreaming HIV/AIDS concerns other than in the health sector is a new and evolving concept. It is premised on putting in place a process of addressing HIV/AIDS concerns in the development sector where the epidemic may not ordinarily be addressed. Mainstreaming HIV/AIDS in the roads sub-sector therefore must involve adapting the roads sub-sectors core business to cope effectively and in a sustainable way with the realities of HIV/AIDS.

The roads infrastructure plays a major role in catalyzing economic growth in the Country and enhances access to HIV/AIDS services. However, it also contributes to the spread of HIV infections and may increase the impact of HIV/AIDS. It is important that HIV/AIDS mitigation measures are mainstreamed in to the roads sub-sector to enable the roads authorities and agencies to address the causes and effects of the epidemic in a more concerted and sustainable nature. The principles that guide this policy include:

- i) Recognition of HIV/AIDS as an issue in the road's construction site and transit corridors;
- ii) Non-discrimination of people on the basis of their real or perceived HIV status;
- iii) Attention to gender issues especially among women due to biological, socio-cultural and economic reasons;
- iv) Safe and healthy work environment among employees in the roads sub-sector in order to minimize the risk of HIV transmission;
- v) Screening for the purpose of employment or recruitment;
- vi) Confidentiality; and
- vii) Continuation of employment relationship.

#### **Relevance**

KURA will ensure that the Project takes into consideration the above cross-cutting issues through the Contractor.

#### **4.19 National Occupational Safety and Health Policy, 2012**

The Policy applies to all workplaces in all sectors of the economy and all forms of work guided by the existing laws on OSH, Work Injury Benefits and other relevant regional and International Labour Standards without any exemption. The main focus is prevention and control of work-related accidents and diseases, compensation and rehabilitation of workers injured in the course of work and those who contract occupational diseases.

The principles that guide the Policy are existing national laws and policies, International Labour Organization (ILO) Conventions, Codes of Practice and Guidelines in OSH, and WHO and ILO Action Plans.

To ensure effective and efficient compensation of workers who are injured in the course of their employment, the work injury benefits legislation will be reviewed and strengthened with due regard to the relevant ILO Conventions and international best practices. The Government in collaboration with other stakeholders will establish a fund to cater for compensation and rehabilitation of injured workers.

The Government will enhance mechanism of ensuring compliance through inspections, prosecutions and by streamlining self-regulation through workplace safety and health committees and improvement of OSH services by approved persons and institutions. A system of tax waiver or exemption on equipment used for ensuring safety and health will be established. For promotion of OSH, an award system for best performing individuals and organizations and sanctions for poor performance will be established.

In the implementation of this Policy, the Government, employers, workers and other stakeholders shall have the following roles:

- **The Government** – shall create enabling environment for the implementation of the National OSH Policy. In particular, the Government will put in place regulatory and legal framework and facilitate resource mobilization for provision of effective occupational safety and health services.
- **Employers** – will ensure safety and health at workplace for prevention of occupational accidents and diseases. They will also ensure prompt compensation of workers who may suffer injury or ill health at work.
- **Workers** – will participate in Workplace OSH Committees, report any hazardous situation and comply with OSH requirements at workplace.
- **County Government** – will complement efforts of the national government and other stakeholders in the promotion of OSH.
- **Development Partners** – will collaborate and complement the efforts of the government in the promotion and provision of OSH services.
- **Civil Organizations** – community-based organizations and religious institutions among others will collaborate and complement government efforts in OSH issues.

## **Relevance**

KURA and the Contractor will enhance mechanism of ensuring compliance through inspections, prosecutions and by streamlining self-regulation through workplace safety and health committees and improvement of OSH services by approved persons and institutions.

### **4.20 Kenya Vision 2030**

Following the expiry of the Economic Recovery Strategy (2003-2007), Kenya's Development Agenda is now anchored on the Kenya Vision 2030, which aims at creating "a globally competitive and prosperous Country with a high quality of life by 2030". It aims to transform Kenya into "a newly –industrialized, middle-income country providing a high quality of life to all its citizens in a clean and secure environment.

The Vision is anchored on three key pillars: economic, social and political. The economic pillar aims to achieve an average economic growth rate in order to generate more resources to meet the SDGs and Vision 2030 goals. The social pillar seeks to achieve a just, cohesive and equitable social development in a clean and secure environment, while the political pillar aims for a democratic, issue-based, people-centered, result-oriented and accountable system. Development of the road network falls under the first pillar-fostering economic growth.

The Kenya Vision 2030 has guided development planning in the Country since the year 2008. Implementation of the Vision 2030 has been through successive five-year MTPs: First MTP 2008-2012; Second MTP 2013-2017; Third MTP 2018-2022 and Fourth MTP 2023-2027. Implementation of these MTPs has resulted in phenomenal growth of the economy, which led to the attainment of the Lower Middle-Income Country status in 2014. However, some key milestones on the journey towards the Vision 2030 goals have not been realized. This has been due to internal and external challenges, which include climate change - prolonged droughts, and invasion of pests and diseases that affected the performance of the agriculture sector; the emergence of Corona Virus 2019 (COVID-19) pandemic; global supply chain disruptions; exchange rate volatility; rising interest rates; and narrow fiscal space.

## **Relevance**

Kenya Vision 2030 is anchored on several foundations one of them being infrastructure development. Therefore, KURA infrastructural plans are geared towards improving the road networks in the Country which is also part of the Country's Vision 2030 in as far as the infrastructure sector is concerned.

### **4.21 The National Biodiversity Strategy and Action Plan, 2007**

The overall objective of the National Biodiversity Strategy and Action Plan (NBSAP) is to address the national and international undertakings elaborated in Article 6 of the Convention on Biological Diversity. It is a national framework of action to ensure that the

present rate of biodiversity loss is reversed, and the present levels of biological resources are maintained at sustainable levels for posterity. The general objectives of the strategy are to conserve Kenya's biodiversity to sustainably use its components; to fairly and equitably share the benefits arising from the utilization of biological resources among the stakeholders; and to enhance technical and scientific cooperation nationally and internationally, including the exchange of information in support of biological conservation.

### **Relevance**

The Project falls where there is little to none Biodiversity since construction will be undertaken in the existing road island. However, should the project come across endangered flora and fauna then their conservation will be of primary importance.

#### **4.22 Sustainable Development Goals, 2015**

The SDGs provide a framework for the entire international community to work together towards a common end making sure that human development reaches everyone, everywhere. If these goals are achieved, world poverty will be cut by half, tens of millions of lives will be saved, and billions more people will have the opportunity to benefit from the global economy.

Up to 2015, the development agenda was centered on Millennium Development Goals (MDGs), which were officially established following the Millennium Summit of the United Nations (UN) in 2000. The MDGs were supposed to be achieved by 2015, so a further process was needed to agree and develop development goals from 2015-2030. Discussion on the post 2015 framework for international development began well in advance. On 19th July 2014, the UN General Assembly's Open Working Group on SDGs forwarded a proposal for the SDGs to Assembly.

A final document was adopted at the UN Sustainable Development Summit in September 2015 in New York USA. It contained 17 goals with 169 targets covering a broad range of sustainable development issues one of which is to ensure availability and sustainable management of water and sanitation for all. This is goal number 6 in the SDG. Kenya has made great strides in achieving goal number 7 in the MDG's these efforts will be carried on into the new era of SDG.

### **Relevance**

The proposed Project will contribute to alleviating urban poverty while this ESIA study has been done for the proposed Project to ensure that it mainstreams environmental sustainability especially during the time of construction and implementation.

#### **4.23 National Water Policy No. 1 of 2021**

The National Water Policy was promulgated in April 1999 as Sessional Paper No. 1 of 1999. The Session Paper No. 1 of 2021 builds on the success, challenges and lessons learnt from the previous policy frameworks including the Sessional Paper of 1999, Sessional Paper No. 10 of 2012 and the provisions of the Kenya Vision 2030 on water conservation and management.

Water plays a significant role in the national development of a Country with respect to social, economic and environmental spheres. This Policy takes into account elements of water sector that are enablers for the Country to meet varied objectives including climate change planning, resource mobilization and financing as well as institutional arrangements. It proposes a range of measures and actions through which the Country can respond to the challenges facing the water sector.

The Policy tackles issues pertaining to water supply and sanitation facilities development, institutional framework and financing of the sector. The objective of the Policy is to re-engineer the water sector through interventions that are geared towards achieving sustainable development in the Country in consonance with the SDGs. According to the Policy, every sector player shall act in a manner that respects, protects and fulfills the human right to clean and safe water in adequate quantities and the human rights to reasonable standards of sanitation, the needs and rights of riparian communities as well as guaranteeing access rights to other users for surface and ground water.

The overall objective of the National Water Policy is to lay the foundation for the rational and efficient framework for meeting the water needs for national economic development, poverty alleviation, environmental protection and social wellbeing of the people through sustainable water resource management.

#### **Relevance**

KURA through the Contractor will ensure that the project takes into consideration sustainable water resource management and sanitation services.

#### **4.24 Sessional Paper No. 5 on the Development and Management of the Road Sub-sector for Sustainable Economic Growth, 2006**

The Policies outlined in this sessional paper focus on providing an appropriate road network through road maintenance, development of technical standards, NMT, traffic management, road safety, roads and land use planning, and axle load compliance. It also outlined legislation, classifying various roads, human resources, public awareness and stakeholder involvement, as well as crosscutting issues such as environment, HIV/AIDS, gender, and special interest groups.

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.

The key objectives of the Policies are:

- To reduce transport costs and travel time by improving the condition of roads, including reducing congestion on urban roads by increasing capacity;
- To increase accessibility;
- To optimize use of available resources;
- To increase the resources available for investment in the road sector;
- To enhance preservation of existing road assets;
- To create a conducive environment for increased private public partnership;
- To enhance road safety and cater adequately to the needs of NMT;
- To enhance ownership through stakeholders' participation in the road sector; and
- To achieve an optimal institutional framework for effective implementation.

### **Relevance**

The proposed Project will aid in achieving some of the objectives set out in the Policy, such as reducing transport costs and travel time, increased accessibility and reduced congestion on urban roads.

#### **4.25 East African Community Climate Change Master Plan 2011-2031**

The East African Community Climate Change Master Plan (EACCCMP) is an outcome of a consultative and participatory process for a unified regional approach to combat climate change. It was developed by the East African Community (EAC) Partner States (Republic of Burundi, Republic of Kenya, Republic of Rwanda, United Republic of Tanzania, and Republic of Uganda) with facilitation of the EAC Secretariat. The purpose of the Master Plan is to provide a long term vision and a basis for Partner States to operationalize a comprehensive framework for adapting to and mitigating climate change in line with the EAC Protocol on Environment and Natural Resources Management and with international climate change agreements. The Master Plans vision is to ensure that *the people, the economy and the ecosystems of EAC Partner States are climate resilient and adapt accordingly to climate change.*

The main regional issues which have been identified and prioritised by the EAC Partner States, as being vulnerable to climate change are:

- Agriculture (crops, livestock and fisheries) and Food Security;
- Water Security;
- Energy Security;
- Ecosystems Services and Biodiversity;
- Tourism;

- Infrastructure (buildings, roads, railways, waterways and airways);
- Human health, Sanitation and Settlement;
- Trade and Industry; and,
- Education, Science and Technology.

To ensure that the above sectors are climate proofed the Master Plan has established eight key Pillars:

**Adaptation Interventions:** EAC Partner States have a young and growing population distributed in all eco regions including areas vulnerable to extreme climatic events such as floods and droughts. Adapting to or coping with climate change is of utmost importance in order to ensure socioeconomic and environmental systems function and development. Adaptation is crucial because climate change will occur regardless of future GHG emissions reduction measures.

**Mitigation Interventions:** The Master Plan identifies the three most polluting sectors in the region- land use (including forestry and agriculture) energy and transport and recommends mitigation interventions. By undertaking mitigation Interventions, EAC Partner States will be contributing towards the achievement of Objective II of the UNFCCC and also benefit through development of renewable energy resources such as Geothermal, wind, solar and biomass. Such development can benefit from the Carbon markets under the Kyoto Protocols.

**Technology Development and Transfer:** Research is crucial for the understanding of climate change causes, manifestation and impact as well as developing appropriate responses in terms of Policy, technology and innovation. The Master Plan provides an overview of current global climate change monitoring, detection, and attribution. There is poor and inadequate meteorological infrastructure in the region to undertake much needed coordinated and enhanced meteorological research and channel it to where it is most needed. The Master Plan outlines recommendation measures to address this state. The Master Plan also recommends measures for international and regional cooperation to facilitate technology development and transfer.

**Capacity Building:** Implementing adaptation and mitigation interventions require new knowledge, new skills, new expertise, new capacities and close cooperation of different sectors to effectively counter the challenges posed by climate change and explore opportunities associated with it. Capacity gaps identified regionally range from scenario modelling to the ability to assess and critically analyse climate change information needed to feed into adaptation and mitigation Policy development and implementation. There is therefore need for climate change capacity building and training targeting government staff, pivotal in driving government Policies, and other stakeholders such as researchers, who are the primary custodians of current scientific climate change knowledge and the private sector. The need to equip the young generation with climate change knowledge and skills necessary for adaptation and mitigation is crucial. Introduction and more integration of climate change into university curriculum is an area that the Master Plan emphasizes. The Master Plan focuses on capacity of the institutions in the region, primarily academic

research, governmental and Non-governmental, to competently handle various aspects of climate change.

**Education, Training and Public Awareness:** The level of climate change awareness is generally low because climate change is a relatively new and developing concept in the general public domain. Similarly, there is a critical dearth of climate change content in the education curricula of most developing Countries at nearly all levels of education, ranging from primary through to tertiary. This is true for the EAC Partner States where climate change education and training is limited to a few courses at some colleges and universities. These courses serve as an introduction to climate change in response to the interest of teachers, lecturers and professors teaching these courses, and make no deliberate attempt at the higher level of colleges or universities administration to formally incorporate climate change into their curricula.

**Gender, Youth and Marginalised Groups:** Gender is important determinant of adaptive capacity. In most cases, women, the youth and children make up a large number of the poor in communities that are highly dependent on local natural resources for their livelihood and are disproportionately vulnerable to and affected by climate change. Women in rural areas have the major responsibility for household water supply, energy for cooking and heating, and food security. As a result, they are negatively affected by drought, uncertain rainfall and deforestation. Because of their roles, unequal access to resources and limited mobility, women in many contexts are disproportionately affected by natural disasters, such as floods, fires, and mudslides. In addition, persons residing in marginalised areas like in drought and flood prone regions as well as the handicapped, elderly and other marginalised persons are also at greater risk of climate change and climate variability. The Master Plan has acknowledged this disproportionate vulnerability of differentiated groups to climate change and recommended differentiated strategies for responding to the environmental and humanitarian crisis caused by climate change.

**Climate Risk Management and Disaster Risk Reduction:** Climate Risk Management (CRM) and Disaster Risk Reduction (DRR) is a conceptual Framework consisting of ways and means of minimising disaster risks by reducing the degree of vulnerability and increasing resilience capacity of the communities. DRR offers options for prevention, mitigation and preparedness to the adverse impacts of natural hazards with a sustainable development approach. The Master Plan aims at addressing community resilience against vagaries of weather and climate through application of stringent climate risk management principles. Some of the approaches involve strengthening regional Meteorological and Hydrological Services (NMHS); improve climate early warning systems to promote efficient management and utilisation of natural resources including protection of vulnerable ecosystems. DRR is therefore a good tool for climate change adaptation which should be integrated in the Climate Change Master Plan in line with the already developed EAC Climate Change Policy and Strategy.

**Climate Finance:** Achieving the strategies vision of a *Resilient people, economy, and ecosystem* requires substantial and additional financial resources to implement the proposed actions. Within the EAC, Climate Change activities are currently being supported



through Partner States contributions, EAC Partnership Fund and other development partners. Recognising that existing funding mechanisms from the UNFCCC and other sources have inherent multiple challenges, the Master Plan recommends means through which such financing may be obtained.

The Master Plan recommends the immediate establishment of a climate change coordination unit to coordinate and facilitate implementation of the EACCCMP and strategies.

### **Relevance**

KURA and the Contractor will be guided by these Policies during the preparation and implementation of collective measures to address Climate Change impacts that may arise during the proposed Project implementation

#### **4.26 East African Community Climate Change Policy**

The EAC Climate Change Policy and strategies was formulated to address the adverse impacts of Climate Change in the region and harness any potential opportunities posed by Climate Change in the context of the principle of sustainable development.

The overall objective of the EAC Climate Change Policy is to guide Partner States and other stakeholders on the preparation and implementation of collective measures to address Climate Change in the region, while assuring sustainable social and economic development. The Policy prescribes statements and actions to guide Climate Change adaptation and mitigation to reduce the vulnerability of the region and enhance adaptive capacity and build socioeconomic resilience of vulnerable populations and ecosystems. Adaptation to Climate Change is of priority to the EAC region in view of the high vulnerability of the region to the impacts of Climate Change, with the emerging associated challenges, especially food security.

The EAC Climate Change Policy prioritizes adaptation measures; regions, sectors and communities that are more vulnerable to climate change impacts; mainstreaming climate change into national development plans; social and economic development; as well as partnerships, collaboration and synergies among various stakeholders. This Strategy elaborates on these areas of distinctiveness with regard to environment and development of critical importance to the Partner States and the region in an integrated manner according to the EAC Climate Change Policy. These include, but are not limited to the following: Water resources; Agriculture (crop, livestock and fisheries production); Wildlife; Coastal and marine ecosystems; Land use and soil protection; Wetlands; Forestry; Health; Disaster risk management; Energy; Tourism; Industry; Gender and community development; Transport and Infrastructure; Education; and Human settlements.

The EACCCMP provides a long-term vision and a basis for the EAC Partner States to operationalize a comprehensive framework for adapting to and mitigating Climate Change

in line with the EAC Protocol on Environment and Natural Resources Management and with international climate change agreements.

### **Relevance**

KURA and the Contractor will be guided by these Policies during the preparation and implementation of collective measures to address Climate Change impacts that may arise during the proposed Project implementation.

#### **4.27 National Adaptation Plan 2015-2030**

Kenya, like other African countries, is bearing the brunt of climate variability and change, hence the need for a coordinated approach to address related vulnerabilities and risks. Adaptation and resilience remain Kenya's and Africa's priority response to climate change. Kenya has been in the forefront of advocating for climate change. It is in this respect that the Country launched a National Climate Change Response Strategy (NCCRS) in 2010 and a National Climate Change Action Plan (NCCAP) in 2013. This National Adaptation Plan (NAP) builds on the foundation laid by the NCCRS and the NCCAP. Additionally, the NAP is the basis for the adaptation component of Kenya's intended Nationally Determined Contributions (NDC) that was submitted to the UNFCCC Secretariat. The aim of this NAP is to consolidate the Country's vision on adaptation supported by macro-level adaptation actions that relate with the economic sectors and County level vulnerabilities to enhance long term resilience and adaptive capacity. This NAP presents adaptation actions that cover the time frame 2015-2030.

The NAP is anchored in the Constitution of Kenya and Vision 2030 - Kenya's blueprint for development. It also aligns itself with the MTP and Medium-Term Expenditure Framework (MTEF) planning processes. The NAP is also aligned with the Climate Change Act. In the Second MTP sectors, climate change adaptation is represented in the drought risk management and ending drought emergencies, environment, water, energy, agriculture, livestock, and fisheries sectors. Several programmes under these sectors aim to enhance resilience and reduce vulnerabilities of communities and systems affected by climate hazards. The NAP provides a background of Kenya's national circumstances, including socio-economic circumstances; and future climate scenarios that the Country needs to consider in decision making, planning and budgetary processes. A vulnerability analysis is also presented against the identified hazards in the NCCAP, namely drought, floods, and sea level rise. The NAP recognises the governance and institutional arrangements for implementation of adaptation actions as stipulated in the NCCAP and Climate Change Act. The NAP proposes adaptation indicators at county, sectoral and national levels for monitoring and evaluation. These indicators will guide the collection of data and information on adaptation outcomes, which will be aggregated at the national level. These indicators are derived from an adaptation theory of change that is based on the macro-level adaptation actions and the adaptation vision that is *enhanced climate resilience towards the attainment of Vision 2030*.

The objectives of the NAP are to:

- Highlight the importance of adaptation and resilience building actions in development;
- Integrate climate change adaptation into national and county level development planning and budgeting processes;
- Enhance the resilience of public and private sector investment in the national transformation, economic and social and pillars of Vision 2030 to climate shocks;
- Enhance synergies between adaptation and mitigation actions in order to attain a low carbon climate resilient economy; and,
- Enhance resilience of vulnerable populations to climate shocks through adaptation and disaster risk reduction strategies.

Adaptation activities under the foundations for national transformation pillar include implementing renewable energy projects, climate proofing of infrastructure and promotion and transfer of climate smart technology into various sectors. Outputs from these activities include increased uptake of climate smart technologies and an increase in climate smart infrastructure. This will eventually lead to an outcome on strengthened climate smart public service delivery.

### **Relevance**

KURA will take into account the above climate adaptive measures and implement them in the BRT Line 5 proposed Project in order to contribute towards sustainable environment.

## **4.28 National Climate Change Action Plan**

### **4.28.1 National Climate Change Action Plan 2018-2022**

The NCCAP 2018-2022, is a five-year plan that was drafted to aid Kenya adapt to climate change and reduce GHG emissions. The Climate Change Act, 2016 requires the Government to develop action plans to guide the mainstreaming of climate change into sector functions. NCCAP 2018-2022 aimed to further Kenya's development goals by providing mechanisms and measures that achieve low carbon climate resilient development. A low carbon climate resilient development pathway emphasises sustainable development and prioritises adaptation, recognising the importance of increasing the climate resilience of vulnerable groups, including women, youth, persons with disabilities, and marginalised and minority communities. NCCAP 2018-2022 builds on the first action plan (2013-2017), sets out actions to implement the Climate Change Act (2016), and provides a framework for Kenya to deliver on its NDC to the Paris Agreement.

NCCAP 2018-2022 sets out seven priority climate action areas with adaptation and mitigation actions. Enabling actions are identified in the areas of the policy and regulatory environment, capacity building and knowledge management, technology and innovation, climate finance, and measurement, reporting and verification. NCCAP 2018-2022 guides the climate actions of the national and county governments, the private sector, civil society

and other actors. Climate change is a shared responsibility between the national and county governments, in line with the Constitution of Kenya (2010). The implementation of this action plan is, therefore, coordinated between the two levels of government.

#### **4.28.2 National Climate Change Action Plan 2023-2027**

Kenya has made considerable efforts to address the ensuing challenges posed by climate change through policy, legal and institutional fronts. The NCCRS 2010 is the first national policy document developed to acknowledge the reality of climate change in Kenya. The National Climate Change Act, 2016 provides for the development of a five-year NCCAP to guide the mainstreaming of adaptation and mitigation actions into the sector functions of the national and county governments. Kenya's third Action Plan on climate change (NCCAP 2023-2027) builds on the previous Action Plans and provides a framework for Kenya to deliver on its NDC. Additionally, the Government continues to make deliberate efforts to mainstream climate actions and green economy in the development planning processes including through the MTPs as well the sectoral plans and strategies that promotes green growth and sustainable natural resource management.

The Policy provides a legal and institutional Framework to guide and promote climate finance flows in Kenya, tracking of climate finance through budget coding, enhanced private sector participation, accelerated green economy through technology transfer, and enhanced benefit sharing from climate change proceeds in the Country. Further, the Policy sets out guiding Framework to enhance national financial systems and institutional capacity to effectively access, manage, monitor and report scaled-up climate finance in a transparent and accountable manner.

The current climate crisis has a huge financial burden on Kenya hence the urgent need to mobilize sustainable financing through more innovative public and private finance approaches that respond to the current financing needs. There is therefore a need for a Framework that will better position the country to rapidly mobilize and scale up climate finance for priority climate change actions. The main objective of this plan is to develop a comprehensive National Climate Finance Mobilization Strategy that will ensure that climate finance is effectively mobilized, accessed, utilized, scaled up, tracked and transparently reported to contribute to the achievement of low-emission and climate resilient development in Kenya

#### **Relevance**

KURA will ensure that the proposed Project delivers climate resilience actions and strengthen County and national governments' capacity to manage climate risks.

#### **4.28.3 National Climate Change Response Strategy 2010**

In response to the challenges and opportunities posed by climate change, Kenya developed this NCCRS. The vision of the Strategy is for a prosperous and climate change resilient Kenya. The mission is to strengthen and focus nationwide actions towards climate change

adaptation and GHG emission mitigation. This will be achieved by ensuring commitment and engagement of all stakeholders while taking into account the vulnerable nature of Kenya's natural resources and society. The objectives of this response strategy are to: enhance understanding of the global climate change regime; negotiate processes, international agreements, Policies and processes and most importantly the positions Kenya needs to take in order to maximize beneficial effects of climate change; assess the evidence and impacts of climate change in Kenya; recommend robust adaptation and mitigation measures needed to minimize risks associated with climate change while maximizing opportunities; enhance understanding of climate change and its impacts nationally and in local regions; recommend vulnerability assessment, impact monitoring and capacity building framework needs as a response to climate change; recommend research and technological needs to respond to climate change impacts, and avenues for transferring existing technologies; recommend a conducive and enabling policy, legal and institutional framework to combat climate change, and provide a concerted action plan coupled with resource mobilization plan and robust monitoring and evaluation plan to combat climate change.

As global GHG emissions are continuing unabated, climate change impacts are likely to intensify an already precarious situation into the future. If no action is taken to reduce or minimize expected impacts from climate change, the costs to society and the economy will be immense. The Strategy therefore identifies the sectors that are most vulnerable to climate change impacts and proposes interventions to reduce or mitigate these impacts, while promoting a low-carbon economy and climate change-resilient production systems. In addition, the Strategy proposes the establishment of a dedicated climate change secretariat that will oversee the implementation of these strategies.

Activities identified in the Action Plan require substantial additional and adequate financial resources for their implementation, and funding is therefore required from both internal and external sources. Given the importance of adaptation, it is recommended that the Kenyan Government create a multi-stakeholder National Adaptation Facility (NAF) for mobilizing resources for adaptation activities

### **Relevance**

KURA will mainstream climate-proofing and climate change responsive activities in their programmes and projects including the BRT Line 5 proposed Project in accordance with the action plans of this strategy.

#### 4.29 Legal Framework

The Legal Framework is as described in **Table 20** below.

**Table 20: Key Environmental Legal Sections in Kenya**

| Legal Section                                 | Relevant Provisions  | Compliance Aspects   |
|---|--|--|
| <p><b>The Constitution of Kenya, 2010</b></p> | <p>In the Constitution of Kenya, 2010 Part II (Environment and Natural Resources), (I) the State clearly undertakes to carry out the following:</p> <ul style="list-style-type: none"> <li>▪ Ensure Sustainable exploitation, utilization, management and conservation of the environment and natural resources and ensure the equitable sharing of the accruing benefits;</li> <li>▪ Work to achieve and maintain a tree cover of at least ten percent of the land area of Kenya;</li> <li>▪ Protect and enhance intellectual property in, and indigenous knowledge of biodiversity and the genetic resources of the communities;</li> <li>▪ Encourage public participation in the management, protection and conservation of the environment;</li> <li>▪ Protect genetic resources and biological diversity;</li> <li>▪ Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;</li> <li>▪ Eliminate processes and activities that are likely to endanger the environment; and</li> <li>▪ Utilize the environment and natural resources for the benefit of the people of Kenya.</li> </ul> <p>(II) “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.</p> <p>Chapter 5 on land and environment emphasizes on the following:</p> <ul style="list-style-type: none"> <li>▪ Land use and management shall by law benefit local communities;</li> <li>▪ Community land is protected from encroachment by state;</li> </ul> | <p>The Project should observe the conditions stated alongside in as far as environmental protection is concerned.</p> <p>It should also take into account the protection of the rights of every Kenyan to a healthy environment including the rights of all community members within the Project area.</p> |

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|   | <ul style="list-style-type: none"> <li>▪ Rivers, forests and water bodies shall be protected by law;</li> <li>▪ Equitable access to land;</li> <li>▪ All lawful land rights are secured; only someone who has stolen land needs to worry; and</li> <li>▪ County Governments will manage land in trust of the people in accordance with the constitution.</li> </ul>   |  |
| <p><b>The Environmental Management and Coordination Act Cap 387</b></p> | <p>Part II of the Environmental Management and Coordination Act Cap 387 states that every person in Kenya is entitled to a clean and healthy environment in accordance with the Constitution and has the duty to safeguard and enhance the environment. In order to partly ensure this is achieved, Part VI of the Act directs that any person being a proponent, prior to commencement of any undertaking specified in the Second Schedule to the Act, submit a project report or a study report to the Authority for issuance of an Approval or an EIA License. The Environmental (Impact Assessment and Audit) Regulations (2003), Environmental (Impact Assessment and Audit) (Amendment) Regulations (2016) and Environmental (Impact Assessment and Audit) (Amendment) Regulations (2019) provide the basis for procedures for carrying out ESIA and EA.</p> <p>According to Section 68 of the Act, the Authority shall be responsible for carrying out EA of all activities that are likely to have significant effect on the environment. All undertakings listed in the Second Schedule of the Act are mandated to be subjected to the EA process, keep accurate records and make annual reports to NEMA or its designated agents may, in writing, require. The Environmental (Impact Assessment and Audit) Regulations (2003), provide the basis for procedures for carrying out ESIA and EA.</p> <p>Section 87 Sub-Section 1 states that no person shall discharge or dispose of any wastes, whether generated within or outside Kenya, in such a manner as to cause pollution to the environment or ill health to any person, while Section 88 provides for acquiring of a license for generation, transporting or operating waste disposal facility. According to Section 89, any person who, at the commencement of this Act, owns or operates a waste disposal site or plant or generate hazardous waste, shall apply to the NEMA for a license. Sections 90 through 100 outlines more regulations on management of hazardous and toxic substances including oils, chemicals and pesticides.</p> | <p>This applies in all aspects of the project including among others;</p> <ul style="list-style-type: none"> <li>A. Social disruption control;</li> <li>B. Waste management;</li> <li>C. Effluent discharge practices;</li> <li>D. Aerial emissions;</li> <li>E. Excessive noise and vibrations;</li> <li>F. Excavations and soil loss; and</li> <li>G. Adverse interference with natural resources including wetlands and water resources.</li> </ul> <p>The project cycle should ensure compliance with this statute all the time.</p> |

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|  | <p>Finally, the environmental impact assessment guidelines require that study be conducted in accordance with the issues and general guidelines spelt out in the second and third schedules of the regulations. These include coverage of the issues on schedule 2 (ecological, social, landscape, land use and water considerations) and general guidelines on schedule 3 (impacts and their sources, project details, national legislation, mitigation measures, a management plan and environmental auditing schedules and procedures).</p>  |   |
| <p><b>Environmental (Impact Assessment and Audit) Regulations, 2003 and its Amendments</b></p> | <p>The Environmental (Impact Assessment and Audit) Regulations, 2003 states in Regulation 3 that “the Regulations shall apply to all policies, plans, programmes, projects and activities specified in Part IV, Part V and the Second Schedule of the Act”.</p> <p>Regulation 4(1) further states that:</p> <p>“...no Proponent shall implement a project:</p> <p style="padding-left: 40px;"><i>(a) Likely to have a negative environmental impact; or</i></p> <p style="padding-left: 40px;"><i>(b) For which an environmental impact assessment is required under the Act or these Regulations, unless an environmental impact assessment has been concluded and approved in accordance with these Regulations...</i>”</p> <p>Part V Regulation 31 states that an environmental audit is expected to be undertaken on the development activities likely to have adverse environmental impacts. The audit exercise is expected to be conducted by a qualified environmental lead expert or environmental inspector registered in accordance with Regulation 14.</p> <p>According to Regulation 31(3) the environmental Audit study is prepared based on the baseline information provided in the EIA study report which will be used as baseline information upon which subsequent environmental control audit studies shall be undertaken.</p> <p>According to Regulation 31(7) information required to be included in the audit report is mentioned; past and present impacts of the project, responsibility and proficiency of the operators of the project, existing internal control mechanisms to identify and mitigate activities with</p> | <p>This report has been compiled in compliance with the Environmental (Impact Assessment and Audit) Regulations, 2003 as read together with the Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2016.</p> <p>KURA will be expected to carry out EA of the Project during the operation stage of the project.</p> |



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|               | <p>negative environmental impacts, existing internal control mechanisms to ensure workers health and safety, existence of environmental awareness and sensitization measures including environmental standards and regulations, law and policy for managerial and operational personnel.</p> <p><b>Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2016:</b> These Regulations amend Regulation 9 of the Environmental (Impact Assessment and Audit) Regulations, 2003. These amendments review the timelines for NEMA to share reports with the lead agencies and the period of review and reverting to NEMA with their comments. The amendments also review the period NEMA requires to review and comment or license a Project. The amendments further revised the fees for application for registration as an Environmental Impact Assessment/Audit Expert.</p> <p><b>Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019:</b> These Regulations deletes Regulation 7 in the Principal Regulations and substitutes it with a new regulation anchored on the concept of risk-based screening of environmental impacts in the ESIA process as either low risk, medium risk or high risk. The new regulation was in alignment with Legal Notice No. 31 of the Kenya Gazette Supplement No. 62, dated 30<sup>th</sup> April 2019 which classifies projects that require ESIA into three: Low Risk Project, Medium Risk Projects and High Risk Projects. According to the new regulation:</p> <ul style="list-style-type: none"> <li>▪ Every proponent undertaking a project specified in the Second Schedule of the Act as being a low risk project or a medium risk project, shall submit to the Authority a SPR of the likely environmental effect of the project;</li> <li>▪ Upon receipt of the SPR, the Authority shall within five days review the SPR. The Authority shall issue the proponent with an approval to proceed with the project where the Authority considers that the proposed Project is not likely to have any significant adverse environmental impact. Where the Authority considers that the proposed Project may have a significant adverse environmental impact, it shall recommend that the proponent prepare and submit a Study Report for review as per the Regulations.</li> </ul> |                    |

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| <p><b>Environmental Management and Coordination (Water Quality) Regulations, 2006</b></p> | <p>These Regulations were drawn under Section 147 of EMCA Cap 387. In accordance with the Regulations, every person shall refrain from acts that could directly or indirectly cause immediate or subsequent water pollution and no one should throw or cause to flow into water resources any materials such as to contaminate the water. The Regulations also provides for protection of springs, streams and other water sources from pollution.</p> <p>Regulation 8 of these Regulations provides for compliance with water quality standards. It states that <i>“all operators and suppliers of treated water, containerized water and all water vendors shall comply with the relevant quality standards in force as may be prescribed by the relevant lead agencies”</i>.</p> <p>Regulation 9 of these Regulations provides for water quality monitoring. It states that the <i>“Authority in consultation with the relevant lead agency, shall maintain water quality monitoring for sources of domestic water at least twice every calendar year and such monitoring records shall be in the prescribed form as set out in the second schedule to these regulations”</i>. The Table below shows the quality standards for sources of domestic water.</p> <table border="1"> <thead> <tr> <th>Parameter</th> <th>Guide Value (Maximum allowable)</th> </tr> </thead> <tbody> <tr> <td>Ph</td> <td>6.5 – 8.5</td> </tr> <tr> <td>Suspended solids</td> <td>30 (mg/l)</td> </tr> <tr> <td>Nitrate – NO<sub>3</sub></td> <td>10 (mg/l)</td> </tr> <tr> <td>Ammonia – NH<sub>3</sub></td> <td>0.5 (mg/l)</td> </tr> <tr> <td>Nitrite – NO<sub>2</sub></td> <td>3 (mg/l)</td> </tr> <tr> <td>Total dissolved solids</td> <td>1200 (mg/l)</td> </tr> <tr> <td><i>E.coli</i></td> <td>Nil/100ml</td> </tr> <tr> <td>Fluoride</td> <td>1.5 (mg/l)</td> </tr> <tr> <td>Phenols</td> <td>Nil (mg/l)</td> </tr> <tr> <td>Arsenic</td> <td>0.01 (mg/l)</td> </tr> <tr> <td>Cadmium</td> <td>0.01 (mg/l)</td> </tr> </tbody> </table> | Parameter          | Guide Value (Maximum allowable) | Ph | 6.5 – 8.5 | Suspended solids | 30 (mg/l) | Nitrate – NO <sub>3</sub> | 10 (mg/l) | Ammonia – NH <sub>3</sub> | 0.5 (mg/l) | Nitrite – NO <sub>2</sub> | 3 (mg/l) | Total dissolved solids | 1200 (mg/l) | <i>E.coli</i> | Nil/100ml | Fluoride | 1.5 (mg/l) | Phenols | Nil (mg/l) | Arsenic | 0.01 (mg/l) | Cadmium | 0.01 (mg/l) | <p>Applies anytime there is a discharge of effluent into the environment without meeting the established standards. This requires all time compliance through the project cycle.</p> <p>The proposed Project will generate some waste water from its construction activities. Therefore, the waste management must comply with the standards specified in these Regulations.</p> |
| Parameter   | Guide Value (Maximum allowable)   |                    |                                 |    |           |                  |           |                           |           |                           |            |                           |          |                        |             |               |           |          |            |         |            |         |             |         |             |  |
| Ph  | 6.5 – 8.5   |                    |                                 |    |           |                  |           |                           |           |                           |            |                           |          |                        |             |               |           |          |            |         |            |         |             |         |             |  |
| Suspended solids  | 30 (mg/l)   |                    |                                 |    |           |                  |           |                           |           |                           |            |                           |          |                        |             |               |           |          |            |         |            |         |             |         |             |  |
| Nitrate – NO <sub>3</sub>   | 10 (mg/l)   |                    |                                 |    |           |                  |           |                           |           |                           |            |                           |          |                        |             |               |           |          |            |         |            |         |             |         |             |  |
| Ammonia – NH <sub>3</sub>   | 0.5 (mg/l)  |                    |                                 |    |           |                  |           |                           |           |                           |            |                           |          |                        |             |               |           |          |            |         |            |         |             |         |             |  |
| Nitrite – NO <sub>2</sub>   | 3 (mg/l)  |                    |                                 |    |           |                  |           |                           |           |                           |            |                           |          |                        |             |               |           |          |            |         |            |         |             |         |             |  |
| Total dissolved solids  | 1200 (mg/l)   |                    |                                 |    |           |                  |           |                           |           |                           |            |                           |          |                        |             |               |           |          |            |         |            |         |             |         |             |  |
| <i>E.coli</i>   | Nil/100ml   |                    |                                 |    |           |                  |           |                           |           |                           |            |                           |          |                        |             |               |           |          |            |         |            |         |             |         |             |  |
| Fluoride  | 1.5 (mg/l)  |                    |                                 |    |           |                  |           |                           |           |                           |            |                           |          |                        |             |               |           |          |            |         |            |         |             |         |             |  |
| Phenols   | Nil (mg/l)  |                    |                                 |    |           |                  |           |                           |           |                           |            |                           |          |                        |             |               |           |          |            |         |            |         |             |         |             |  |
| Arsenic   | 0.01 (mg/l)   |                    |                                 |    |           |                  |           |                           |           |                           |            |                           |          |                        |             |               |           |          |            |         |            |         |             |         |             |  |
| Cadmium   | 0.01 (mg/l)   |                    |                                 |    |           |                  |           |                           |           |                           |            |                           |          |                        |             |               |           |          |            |         |            |         |             |         |             |  |

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|  | Lead   | 0.05 (mg/l) |  |
|  | Selenium   | 0.01 (mg/l) |  |
|  | Copper   | 0.05 (mg/l) |  |
|  | Zinc   | 1.5 (mg/l)  |  |
|  | Alkyl benzyl sulphates   | 0.5 (mg/l)  |  |
|  | Permanganate Value (PV)  | 1.0 (mg/l)  |  |
| <p><b>Environmental Management and Coordination (Waste Management) Regulations, 2006</b></p> | <p>These Regulations were established under Sections 92 and 147 of EMCA Cap 387. Under the Regulations, a waste generator is defined as any person whose activities produces waste while waste management is the administration or operation used in handling, packaging, treatment, conditioning, storage and disposal of waste.</p> <p>Regulation 4(1) states that no person shall dispose of any waste on a public highway, street, road, recreational area or in any place except in a designated receptacle. Regulation 4(2) further states that a waste generator shall collect, segregate and dispose such waste in the manner provided for under these regulations.</p> <p>Regulation 5(1) provides for cleaner production methods. It states <i>that “a waste generator shall minimize the waste generated by adopting the following cleaner production methods:</i></p> <p style="margin-left: 40px;"><i>(a) Improvement of production process through:</i></p> <p style="margin-left: 80px;"><i>(i) Conserving raw materials and energy;</i></p> <p style="margin-left: 80px;"><i>(ii) Eliminating the use of toxic raw materials; and</i></p> <p style="margin-left: 80px;"><i>(iii) Reducing toxic emissions and waste.</i></p> <p style="margin-left: 40px;"><i>(b) Monitoring the product cycle from beginning to end by:</i></p> <p style="margin-left: 80px;"><i>(i) Identifying and eliminating potential negative impacts of the product;</i></p> <p style="margin-left: 80px;"><i>(ii) Enabling the recovery and re-use of the product where possible; and</i></p> <p style="margin-left: 80px;"><i>(iii) Incorporating environmental concerns in the design and disposal of a product”.</i></p> |             | <p>These Regulations shall apply on disposal of solid wastes into the environment. The Proponent should comply with the established standards and procedures all the time.</p> <p>The proposed Project during construction phase will generate solid wastes such as soil debris, cement bags, plastic containers, vehicle spare parts, waste oil, stripped off vegetation which will need to be disposed as per the guideline in the Regulations. Electronic waste generated from ITS materials will also be disposed in a sustainable manner.</p> |

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|  | <p>Regulation 8 provides for responsibility of waste transporters. It states that <i>“any person granted a license to transport waste shall ensure that:</i></p> <ol style="list-style-type: none"> <li><i>1) The collection and transportation of such waste is conducted in such a manner that will not cause scattering of the waste;</i></li> <li><i>2) The vehicles and equipment for the transportation of waste are in such a state that shall cause scattering of, flowing out of waste or emission of noxious smells from such waste;</i></li> <li><i>3) The vehicles for transportation and other means of conveyance of waste follow the scheduled routes approved by the Authority from the point of collection to the disposal site or plant and</i></li> <li><i>4) He or his agent (s) possess at all times during transportation of the waste, a duly filled tracking document as set out in Form III in the first schedule to these regulations and shall produce the same tracking document on demand to any law enforcement officer”.</i></li> </ol> |   |
| <p><b>The Sustainable Waste Management Act, 2022</b></p> | <p>This Act establish the legal and institutional framework for the sustainable management of waste; ensure the realization of the constitutional provision on the right to a clean and healthy environment. As per Part I Section 3, the following are the objectives of this Act: -</p> <ol style="list-style-type: none"> <li>3. Promote sustainable waste management;</li> <li>4. Improve the health of all Kenyans by ensuring a clean and healthy environment;</li> <li>5. Reduce air, land, fresh water and marine pollution;</li> <li>6. Promote and ensure the effective delivery of waste services;</li> <li>7. Create an enabling environment for employment in the green economy in waste management, recycling and recovery;</li> <li>8. Establish an environmentally sound infrastructure and system for sustainable waste management;</li> <li>9. Promote circular economy practices for green growth;</li> <li>10. Mainstream resource efficiency principles in sustainable consumption and production practices; and</li> </ol>                       | <p>The Contractor shall generate waste in the process of fulfilling his contractual obligations. Therefore, the Proponent shall ensure that the Contractor adheres to all the provisions of this Act. The Proponent through the Deputy Director-Environmental and Social Safeguards, shall periodically inspect the Contractor’s adherence to the provisions of this Act, monitor and review performance of his Waste Management Plan to achieve sustainable waste management in the proposed Project. This Act shall</p> |

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|               | <p>11. Inculcate responsible public behavior on waste and environment.</p> <p>Part II Section 6 provides for the creation of the Waste Management Council established by the Cabinet Secretary (CS). The Council shall comprise of 9 members including the chairperson who shall be appointed by the President. The CS establish a waste management secretariat for the Council. Part IV Section 15 states that the CS shall prescribe measures for the reduction of waste, and the environmentally sound reuse, recycling and recovery of waste. The CS shall: -</p> <ul style="list-style-type: none"> <li>a. Develop regulations on waste management;</li> <li>b. In consultation with county governments, publish model county waste management laws and regulations; and</li> <li>c. Develop a National Waste Management Strategy.</li> </ul> <p>The CS shall develop a national waste management strategy and action plan within two years of the coming into force of this Act, which shall be reviewed every five years. According to Part IV Section 19, A private sector entity shall prepare a three-year waste management plan and submit an annual monitoring report to the Authority (NEMA). Part IV Section 19 (4) states that a private entity shall: -</p> <ul style="list-style-type: none"> <li>a. Adopt the following cleaner production principles including: <ul style="list-style-type: none"> <li>(i) Improvement of production processes through conserving raw materials and energy;</li> <li>(ii) Limiting the use of toxic raw materials to safe levels within such time as may be prescribed by the Authority (NEMA);</li> <li>(iii) Reducing toxic emissions and wastes; and</li> <li>(iv) Monitoring the product cycle from beginning to end by.</li> </ul> </li> <li>b. Identify and eliminate potential negative impacts of the product;</li> <li>c. Enable the recovery and reuse of the product where possible;</li> </ul> | <p>also guide the Proponent on the proper management and disposal of e-waste generated from the ITS infrastructure.</p> |

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|  | <p>d. Reclaim and recycle;</p> <p>e. Incorporate environmental concerns in the design, process and disposal of the product;</p> <p>f. Collect, segregate and dispose of or cause to be disposed of the waste in accordance with this Act;</p> <p>g. Shall segregate waste by separating hazardous waste from non-hazardous waste and dispose of the waste in a facility provided by the county government or the Authority (NEMA);</p> <p>h. Transfer the waste to a person who is licensed to transport and dispose of the waste in accordance with this Act;</p> <p>i. Clean up and restore the site it was using to its natural state;</p> <p>j. Prepare a waste management plan and integrate it in its corporate strategies and plans; and</p> <p>k. Provide waste segregation receptacles at its premises for organic, plastic and general dry waste.</p> <p>Part IV Section 20 (1) states that A person who generates waste in Kenya shall: -</p> <p>a. Segregate the waste at source in accordance with the provisions of this Act; and</p> <p>b. Dispose the waste to only licensed waste service providers or at collection points designated in accordance with the provisions of this Act.</p> <p>Part VIII Section 30 (1) states that a person who fails to manage waste in accordance with this Act shall be required to clean up and restore the site where the waste was being managed to its natural state.</p> |  |
| <p><b>Nairobi City County Solid Waste Management Act, 2015</b></p> | <p>The objectives of this Act are to:</p> <ul style="list-style-type: none"> <li>▪ Provide a County legal Framework for solid waste management function as spelt out in the Constitution of Kenya;</li> <li>▪ Provide for Framework to encourage public participation in the management, protection and conservation of the environment;</li> </ul>  | <p>KURA shall ensure that the Contractor adheres to all the provisions of this Act for the proper management and disposal of solid waste generated during the proposed Project implementation.</p> |

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|  | <ul style="list-style-type: none"> <li>▪ Provide for a legal basis of the implementation of the County integrated solid waste management plan; and,</li> <li>▪ Provide for and regulate the participation of the various actors in solid waste management in the County.</li> </ul> <p>The Act states that solid waste management shall be a shared responsibility amongst all actors including the County Government, generators, owners and occupiers of premises and contracted service providers. Every person within the County is entitled to a clean and healthy environment and has a duty to safeguard and enhance the quality of the environment.</p> <p>The Act states that a person shall not be licensed to carry out a business or an activity that generates solid waste unless that person demonstrates that he/she has established measures to minimize solid waste generation by adopting the following cleaner production principles:</p> <ul style="list-style-type: none"> <li>▪ Improvement of production process through conserving raw materials and energy;</li> <li>▪ Incorporating environmental concerns in the design, process and disposal of a product; and,</li> <li>▪ Monitoring the product cycle from beginning to end in order to enable the recovery and reuse of the product where possible and to facilitate reclamation and recycling.</li> </ul> <p>The Act states that every owner or occupier of any premises shall provide it with an appropriate waste container and maintain it in accordance with this Act and shall cause all domestic waste from his/her premises to be placed in such a container and not anywhere else.</p> |   |
| <b>Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009</b> | <p>Regulation 3(1) of these Regulations 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 and Regulation 3(2) states that in determining whether noise is loud, unreasonable, unnecessary or unusual. Part II Regulation 4 also states that: except as otherwise provided in these Regulations, no person shall (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive</p>  | <p>Effects of activities with noise and vibrations in excess of the established standards.</p> <p>The excessive noise and vibrations during road construction are likely to be produced from haulage of</p> |

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|               | <p>vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30m from any moving source.</p> <p>Regulation 5 of these regulations provides for permissible noise levels. The Regulation states that <i>“No person shall cause noise from any source which exceeds any sound level as set out in the applicable column in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property”</i>. The Table below shows the permissible noise levels as set in the First Schedule to these Regulations.</p> <table border="1"> <thead> <tr> <th colspan="2">Zone</th> <th colspan="2">Sound Level Limits dB(A)<br/>(Leq, 14h)</th> <th colspan="2">Noise Rating Levels (NR)<br/>(Leq, 14h)</th> </tr> <tr> <th colspan="2"></th> <th>Day</th> <th>Night</th> <th>Day</th> <th>Night</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Silent Zone</td> <td>40</td> <td>35</td> <td>30</td> <td>25</td> </tr> <tr> <td>B</td> <td>Places of worship</td> <td>40</td> <td>35</td> <td>30</td> <td>25</td> </tr> <tr> <td rowspan="2">C</td> <td>Residential:</td> <td>45</td> <td>35</td> <td>35</td> <td>25</td> </tr> <tr> <td>Indoor<br/>Outdoor</td> <td>50</td> <td>35</td> <td>40</td> <td>25</td> </tr> <tr> <td>D</td> <td>Mixed residential<br/>(with some commercial and places of entertainment)</td> <td>55</td> <td>35</td> <td>50</td> <td>25</td> </tr> <tr> <td>E</td> <td>Commercial</td> <td>60</td> <td>35</td> <td>55</td> <td>25</td> </tr> </tbody> </table> <p><b><u>Time Frame</u></b></p> <p>Day: 6.01 a.m. – 8.00 p.m. (Leq, 14 h); Night: 8.01 p.m. – 6.00 a.m. (Leq, 10h)</p> <p>Regulation 13 of these Regulations provides for construction at night. Regulation 13 (1) states that <i>“Except for the purposes specified in sub-Regulation (2) hereunder, 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 works</i></p> | Zone                                   |       | Sound Level Limits dB(A)<br>(Leq, 14h) |       | Noise Rating Levels (NR)<br>(Leq, 14h) |  |  |  | Day | Night | Day | Night | A | Silent Zone | 40 | 35 | 30 | 25 | B | Places of worship | 40 | 35 | 30 | 25 | C | Residential: | 45 | 35 | 35 | 25 | Indoor<br>Outdoor | 50 | 35 | 40 | 25 | D | Mixed residential<br>(with some commercial and places of entertainment) | 55 | 35 | 50 | 25 | E | Commercial | 60 | 35 | 55 | 25 | <p>materials from the source to construction areas. The Contractor for civil works will be required to ensure adherence with the above regulations in order to promote a healthy and safe working environment throughout the construction phase.</p> <p>This shall include regular inspection and maintenance of equipment and prohibition of unnecessary hooting of vehicles.</p> |
| Zone          |  | Sound Level Limits dB(A)<br>(Leq, 14h) |       | Noise Rating Levels (NR)<br>(Leq, 14h) |       |  |  |  |  |     |       |     |       |   |             |    |    |    |    |   |                   |    |    |    |    |   |              |    |    |    |    |                   |    |    |    |    |   |   |    |    |    |    |   |            |    |    |    |    |  |
|               |  | Day                                    | Night | Day                                    | Night |  |  |  |  |     |       |     |       |   |             |    |    |    |    |   |                   |    |    |    |    |   |              |    |    |    |    |                   |    |    |    |    |   |   |    |    |    |    |   |            |    |    |    |    |  |
| A             | Silent Zone  | 40                                     | 35    | 30                                     | 25    |  |  |  |  |     |       |     |       |   |             |    |    |    |    |   |                   |    |    |    |    |   |              |    |    |    |    |                   |    |    |    |    |   |   |    |    |    |    |   |            |    |    |    |    |  |
| B             | Places of worship  | 40                                     | 35    | 30                                     | 25    |  |  |  |  |     |       |     |       |   |             |    |    |    |    |   |                   |    |    |    |    |   |              |    |    |    |    |                   |    |    |    |    |   |   |    |    |    |    |   |            |    |    |    |    |  |
| C             | Residential:   | 45                                     | 35    | 35                                     | 25    |  |  |  |  |     |       |     |       |   |             |    |    |    |    |   |                   |    |    |    |    |   |              |    |    |    |    |                   |    |    |    |    |   |   |    |    |    |    |   |            |    |    |    |    |  |
|               | Indoor<br>Outdoor  | 50                                     | 35    | 40                                     | 25    |  |  |  |  |     |       |     |       |   |             |    |    |    |    |   |                   |    |    |    |    |   |              |    |    |    |    |                   |    |    |    |    |   |   |    |    |    |    |   |            |    |    |    |    |  |
| D             | Mixed residential<br>(with some commercial and places of entertainment)  | 55                                     | 35    | 50                                     | 25    |  |  |  |  |     |       |     |       |   |             |    |    |    |    |   |                   |    |    |    |    |   |              |    |    |    |    |                   |    |    |    |    |   |   |    |    |    |    |   |            |    |    |    |    |  |
| E             | Commercial   | 60                                     | 35    | 55                                     | 25    |  |  |  |  |     |       |     |       |   |             |    |    |    |    |   |                   |    |    |    |    |   |              |    |    |    |    |                   |    |    |    |    |   |   |    |    |    |    |   |            |    |    |    |    |  |



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|               | <p><i>so as to emit noise in excess of the permissible levels as set out in the Second Schedule of these regulations”.</i></p> <p>Regulation 13 (2) states that “This Regulation shall not be deemed to prohibit-</p> <ol style="list-style-type: none"> <li>1. <i>Any work of an emergency nature;</i></li> <li>2. <i>Work of a domestic nature on buildings, structures or projects being undertaken by a person residing in such premises; or</i></li> <li>3. <i>Public utility construction, or, with respect to construction of public works, projects exclusively relating to roads, bridges, airports, public schools and sidewalks.</i></li> </ol> <p>Provided that, if any domestic power tool, including but not limited to mechanically powered saws, sanders, grinders and lawn and garden tools used outdoors, is operated during the night time hours, no person shall operate such machinery so as to cause noise within a residential building or across a residential real property boundary where such noise interferes with the comfort, repose, health or safety of members of the public within any building or outside of a building, at 30 m or more from the source of the sound”.</p> <p>Regulation 14 of these Regulations provides for noise, excessive vibrations from construction, demolition, mining or quarrying sites. Regulation 14 (1) states that “Where defined work of construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose requirements on how the work is to be carried out including but not limited to requirements regarding-</p> <ol style="list-style-type: none"> <li>a. <i>Machinery that may be used, and</i></li> <li>b. <i>The permitted levels of noise as stipulated in the Second and Third Schedules to these Regulations”.</i></li> </ol> <p>Regulation 14(3) further states that “Any person carrying out construction, demolition, mining or quarrying works shall ensure that the vibration levels do not exceed 0.5 centimetres per second beyond any source property boundary or 30 m from the moving source”.</p> |                    |

| Legal Section                                    | Relevant Provisions   | Compliance Aspects  |       |   |  |  |  |     |       |     |  |    |    |      |             |    |    |       |   |    |    |  |
|--|---|---|-------|---|--|--|--|-----|-------|-----|--|----|----|------|-------------|----|----|-------|---|----|----|--|
|  | <p>Regulation 15 of these Regulations states that “Any person intending to carry out construction, demolition, mining or quarrying work shall, during the Environmental Impact Assessment studies-</p> <p style="margin-left: 40px;">a) <i>Identify natural resources, land uses or activities which may be affected by noise or excessive vibrations from the construction, demolition, mining or quarrying;</i></p> <p style="margin-left: 40px;">b) <i>Determine the measures which are needed in the plans and specifications to minimize or eliminate adverse construction, demolition, mining or quarrying noise or vibration impacts; and</i></p> <p style="margin-left: 40px;">c) <i>Incorporate the needed abatement measures in the plans and specification”.</i></p> <p>The Table below shows the maximum permissible noise levels for construction sites (measurement taken within the facility) as per the second schedule of these regulations.</p> <table border="1"> <thead> <tr> <th colspan="2">Facility</th> <th colspan="2">Maximum Noise Level Permitted (Leq) in dB (A)</th> </tr> <tr> <th colspan="2"></th> <th>Day</th> <th>Night</th> </tr> </thead> <tbody> <tr> <td>(i)</td> <td>Health facilities, educational institutions, homes for disabled etc.</td> <td>60</td> <td>35</td> </tr> <tr> <td>(ii)</td> <td>Residential</td> <td>60</td> <td>35</td> </tr> <tr> <td>(iii)</td> <td>Areas other than those prescribed in (i) and (ii)</td> <td>75</td> <td>65</td> </tr> </tbody> </table> <p style="margin-left: 40px;"><b><u>Time Frame</u></b><br/>                     Day: 6.01 a.m. – 6.00 p.m. (Leq, 14 h)<br/>                     Night: 6.01 p.m. – 6.00 a.m. (Leq, 14 h)</p> | Facility  |       | Maximum Noise Level Permitted (Leq) in dB (A) |  |  |  | Day | Night | (i) | Health facilities, educational institutions, homes for disabled etc. | 60 | 35 | (ii) | Residential | 60 | 35 | (iii) | Areas other than those prescribed in (i) and (ii) | 75 | 65 |  |
| Facility   |   | Maximum Noise Level Permitted (Leq) in dB (A)   |       |   |  |  |  |     |       |     |  |    |    |      |             |    |    |       |   |    |    |  |
|  |   | Day   | Night |   |  |  |  |     |       |     |  |    |    |      |             |    |    |       |   |    |    |  |
| (i)  | Health facilities, educational institutions, homes for disabled etc.  | 60  | 35    |   |  |  |  |     |       |     |  |    |    |      |             |    |    |       |   |    |    |  |
| (ii)   | Residential   | 60  | 35    |   |  |  |  |     |       |     |  |    |    |      |             |    |    |       |   |    |    |  |
| (iii)  | Areas other than those prescribed in (i) and (ii)   | 75  | 65    |   |  |  |  |     |       |     |  |    |    |      |             |    |    |       |   |    |    |  |
| <b>Environmental Management and Coordination</b> | Regulation 4 of these Regulations states that no person shall engage in any activity that may have adverse impacts on ecosystems, lead to introduction of exotic species or lead to unsustainable use of natural resources without an EIA license. The Regulations puts in place measures to control and  | <ul style="list-style-type: none"> <li>■ Has relevance on activities interfering with natural habitats</li> </ul> |       |   |  |  |  |     |       |     |  |    |    |      |             |    |    |       |   |    |    |  |

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| <b>(Conservation of Biodiversity Diversity and Resources Access to Genetic Resources and Benefit Sharing), Regulations, 2006</b> | regulate access and utilization of biological diversity that include among others banning and restricting access to threatened species for regeneration purposes. It also provides for protection of land, sea, Lake or river declared to be a protected natural environmental system in accordance to section 54 of EMCA Cap 387.   | and genetic species therein.<br><ul style="list-style-type: none"> <li>▪ Any identified affected species need to be determined during an ESIA process and restoration plan established before any Project implementation can commence.</li> </ul> |
| <b>Environmental Management and Coordination (Air Quality) Regulations, 2014</b>   | The objective of these Regulations is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources such as mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in EMCA Cap 387. It also covers any other air pollution source as may be determined by the Minister in consultation with the Authority. Emission limits for various areas and facilities have been set. The Regulations provide the procedure for designating controlled areas, and the objectives of air quality management plans for these areas.   | The Regulations will be applied during the collection and measurement of data on air quality for construction monitoring.   |
| <b>The Nairobi City County Air Quality Act, 2022</b>   | This Act shall apply to: <ul style="list-style-type: none"> <li>▪ Any premises used for any industrial or any trade purposes, or in which matter is burnt in connection with any industrial or trade purposes, including open burning whether or not the premises are prescribed in the act;</li> <li>▪ Any other premises or process that discharges/emits or is capable of discharging and or emitting air pollutants into the air;</li> <li>▪ Any industrial plant;</li> <li>▪ Any fuel burning equipment including vehicular, industrial and domestic sources;</li> <li>▪ All quarrying and mining activities;</li> <li>▪ All premises, places, processes, operations, or works to which the provisions of the Act and Regulations made there under apply; and,</li> <li>▪ Any other appliance or activity that may by order be specified by the executive committee member in the Kenya Gazette.</li> </ul> | The Regulations will be applied by the Authority and the Contractor before, during and after construction of the BRT Line 5 proposed Project to maintain the existing air quality levels along Outer Ring Road.                                   |

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|                            | <p>Section 8 states that the owner or occupier of the premises involved in any activity or industry that is likely to cause air pollution shall incorporate measures to reduce the emission of air pollutants to the atmosphere in accordance with the best available techniques economically achievable approved by the Chief Officer responsible for environmental issues within Nairobi City County. Section 9 states that no person shall discharge a pollutant into the air from any source without a license. It also states that no person shall discharge a pollutant in to the air from any source or equipment which causes concentration in the ambient air which is greater than the maximum concentration specified in a license. Section 10 states that maximum ambient air pollution levels will be determined based on ground level concentration standards as specified in the Regulations under this Act.</p> <p>Section 15 states that no person shall dilute, or cause or permit to be diluted any emission at any time or point before it is emitted to the atmosphere. Section 16 states that an owner or occupier of a premise shall use the best practicable means to prevent the emission of hazardous substances and to render harmless and inoffensive those substances necessarily discharged. Section 17 states that an owner or occupier of a premise shall conduct monitoring of emissions to ascertain no harm to the occupants or public at large.</p> |  |
| <b>The Water Act, 2016</b> | <p>The purpose of the Act as per Section 3 is to provide for the regulation, management and development of water resources and water and sewerage services in line with the Constitution. Section 4 requires the CS, the Authority, the Regulatory Board, County Governments and any person administering or applying this Act to be guided by the principles and values set out in Articles 10, 43, 60 and 232 of the Constitution.</p> <p>Part II Section 5 vest ownership of all land resources to the national government who hold them in trust for the Kenyan people. Section 6 states that “<i>The Authority established in section 11 shall serve as an agent of the national government and regulate the management and use of water resources</i>”. Section 10 (1) mandates the CS within one year of commencement of this Act and every five years thereafter, following public participation, to formulate a National Water Resource Strategy. The purpose of the National Water Strategy as per Section 10 (2) shall be to provide the Government's plans and programs for the protection, conservation, control and management of</p>   | <ul style="list-style-type: none"> <li>■ The Contractor is required to comply with all the requirements of this Act.</li> <li>■ The Contractor shall apply relevant abstraction permit with WRA</li> </ul> |

| Legal Section | Relevant Provisions   | Compliance Aspects |
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|               | <p>water resources.</p> <p>Part III Section 11 (1) provides for the establishment of the WRA. According to Section 12, the functions of the Authority are to:</p> <ul style="list-style-type: none"> <li>a) Formulate and enforce standards, procedures and Regulations for the management and use of water resources and flood mitigation;</li> <li>b) Regulate the management and use of water resources;</li> <li>c) Enforce Regulations made under this Act;</li> <li>d) Receive water permit applications for water abstraction, water use and recharge and determine, issue, vary water permits; and enforce the conditions of those permits;</li> <li>e) Collect water permit fees and water use charges;</li> <li>f) Determine and set permit and water use fees;</li> <li>g) Provide information and advice to the CS for formulation of policy on national water resource management, water storage and flood control strategies;</li> <li>h) Coordinate with other regional, national and international bodies for the better regulation of the management and use of water resources; and</li> <li>i) Advise the CS generally on the management and use of water resources.</li> </ul> <p>Section 20 subsection (1) states that <i>“The Authority shall prescribe the criteria for classifying water resources for the purpose of determining water resources quality objectives for each class of water resource”</i>. Subsection 4 <i>“All State organs shall, when exercising any statutory power or performing any statutory duty, take into account and give effect to the resource quality objectives determined under this section in respect of a water resource”</i>. According to Section 36, a permit is required for any of the following purposes: Any use of water from a water resource, except as provided by Section 37; 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.</p> |                    |

| Legal Section                                  | Relevant Provisions   | Compliance Aspects  |
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|  | <p>As per Section 38 (1), a person who: without a permit, constructs or employs works for a purpose for which a permit is required; or being the holder of a permit, constructs or employs any such works in contravention of the conditions of the permit, commits an offence. In Subsection 2, the holder of a permit authorizing the construction of works who, without the permission of the Authority takes water from any water resource: by means of any works not authorized by the permit; or before the whole of the works authorized by the permit have been certified, in accordance with the conditions of the permit, commits an offence.</p> <p>As per Section 40 (1), “An application for a permit shall be made to the Authority at the applicable basin area”, and in Section 40 (4), “An application for a permit shall be the subject of public consultation and, where applicable, of EIA in accordance with the requirements of the EMCA Cap 387. 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”.</p> <p>According to Section 143 (l ), a person shall not without authority conferred under this Act: wilfully obstruct, interfere with, divert or obstruct water from any watercourse or any water resource, or negligently allow any such obstruction, interference, diversion or abstraction; or throw, convey, cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive matter or thing into or near to any water resource in such manner as to cause, or be likely to cause, pollution of the water resource.</p> |   |
| <p><b>Water Resources Regulation, 2021</b></p> | <p>The Regulations implement provision of the Water Act, No. 43 of 2016. They shall apply to the regulation, management, use and development of all water resources, perennial or seasonal and including water resources of the territorial sea.</p> <p>Issues covered by these regulations include:</p> <ul style="list-style-type: none"> <li>▪ Prescription of water use activities;</li> <li>▪ Issue of approvals, permits and authorizations for water use and water works;</li> <li>▪ Guidelines on surface water including declaration of a watercourse, wetlands, land</li> </ul>   | <p>1. Sets the standard procedures and rules to be followed in the utilization of water resources including controls, modes of use and responsibilities in protection of the resources.</p> |

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|   | <p>reclamation, water use for irrigation, and works associated for protection and control of fish;</p> <ul style="list-style-type: none"> <li>▪ Groundwater development including boreholes and issues of specific permits and authorization;</li> <li>▪ Water quality monitoring and liquid waste disposal including control of water pollution, water quality monitoring, inspection and controls concerning water works;</li> <li>▪ Water use charges that is the penalties for misuse;</li> <li>▪ Roles and powers of water resource users' associations and basin water resources committees;</li> <li>▪ Identification of protected and designated groundwater conservation areas;</li> <li>▪ Categories of water sector professionals and contractors and related permits and licenses; and,</li> <li>▪ Composition of reserves.</li> </ul>  |  |
| <p><b>Climate Change Act, 2016 and its Amendment of 2023.</b></p> | <p>This Act shall be applied for the development, management, implementation and regulation purposes. Of mechanisms to enhance climate change resilience and low carbon development for the sustainable development of Kenya. Section 3(2) states that without prejudice to subsection (1), this Act shall be applied in all sectors of the economy by the National and County Governments to:</p> <ol style="list-style-type: none"> <li>a) Mainstream climate change responses into development planning, decision making and implementation;</li> <li>b) Build resilience and enhance adaptive capacity to the impacts of climate change;</li> <li>c) Formulate programmes and plans to enhance the resilience and adaptive capacity of human and ecological systems to the impacts of climate change;</li> <li>d) Mainstream and reinforce climate change disaster risk reduction into strategies and actions of public and private entities;</li> <li>e) Mainstream intergenerational and gender equity in all aspects of climate change responses; provide incentives and obligations for private sector contribution in achieving low carbon climate resilient development;</li> <li>f) Promote low carbon technologies, improve efficiency and reduce emissions intensity by</li> </ol> | <p>The Proponent will ensure development, management, implementation and regulation mechanisms to ensure climate change resilience are incorporated in the proposed Project. The Proponent will also be guided by these Regulations in order to minimize or avoid climate impacts that may be anticipated during the implementation of the proposed Project.</p> |

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|               | <p>facilitating approaches and uptake of technologies that support low carbon, and climate resilient development;</p> <p>g) Facilitate capacity development for public participation in climate change responses through awareness creation, consultation, representation and access to information; mobilize and transparently manage public and other financial resources for climate change response;</p> <p>h) Provide mechanisms for, and facilitate climate change research and development, training and capacity building;</p> <p>i) Mainstream the principle of sustainable development into the planning for and decision making on climate change response; and</p> <p>j) Integrate climate change into the exercise of power and functions of all levels of governance, and to enhance cooperative climate change governance between the national government and county governments.</p> <p>Section 13 (1) states that the CS shall, in accordance with Article 10 of the Constitution and Section 3 of this Act, and through public consultation, formulate a NCCAP. Section 13 (3) states that the NCCAP shall prescribe measures and mechanisms:</p> <p>a) To guide the County toward the achievement of low carbon climate resilient sustainable development;</p> <p>b) To set out actions for mainstreaming climate change responses into sector functions;</p> <p>c) For adaptation to climate change;</p> <p>d) For mitigation against climate change;</p> <p>e) To specifically identify all actions required as enablers to climate change response;</p> <p>f) To mainstream climate change disaster risk reduction actions in development programmes;</p> <p>g) To set out a structure for public awareness and engagement in climate change response and disaster reduction;</p> <p>h) To identify strategic areas of national infrastructure requiring climate proofing;</p> <p>i) To review and determine mechanisms for climate change knowledge management and access to information;</p> <p>j) To enhance energy conservation, efficiency and use of renewable energy in industrial,</p> |                    |



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|               | <p>commercial, transport, domestic and other uses; to strengthen approaches to climate change research and development training and technology transfer;</p> <p>k) To review and recommend duties of public and private bodies on climate change;</p> <p>l) To review levels and trends of GHG emissions; and</p> <p>m) To identify outputs, overall budget estimates and timeframes to realize expected results.</p> <p>Subsection (4) implies that without prejudice to the foregoing, the NCCAP shall address all sectors of the economy and provide mechanisms for mainstreaming of the NCCAP into those sectors. Section 6 allows the Climate Change Council to include the provision of guidance and policy direction on carbon markets to the national and county governments, the public and other stakeholders. Section 17(1) states that NEMA shall on behalf of the Council:</p> <p>a) Monitor, investigate and report on whether public and private entities are in compliance with the assigned climate change duties; and</p> <p>b) Ascertain that private entities are in conformity with instructions prescribed under section 16 of this Act; and regulate, enforce and monitor compliance on levels of GHG gas emissions as set by the Council under this Act.</p> <p>Section 17 (5): NEMA shall, annually, report to the Council on the performance of functions under this Act, and such report shall form part of the report by the Council to the National Assembly. Section 19 (1) states that a County Government shall, in performance of its functions, integrate and mainstream climate change actions, interventions and duties set out in this Act, and the County NCCAP into various sectors. Subsection (2); A County Government shall, in development, updating and approval of the County Integrated Development Plan, and the County Sectoral Plans mainstream the implementation of the NCCAP, taking into account National and County priorities.</p> <p>Section 20 states that NEMA shall integrate climate risk and vulnerability assessment into all forms of assessment, and for that purpose liaise with relevant lead agencies for their technical advice. Section 23 requires every land-based project to have a community development</p> |                    |

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|               | <p>agreement. The community development agreement shall outline the relationships and obligations of the proponent of the project in public and community land where the project is under development. The community development agreements must encompass the annual social contribution, calculated as a percentage of the previous year's aggregate earnings from carbon trading project, to the local community with the contribution set at 40% per annum for land based projects and 25% per annum for non-land based projects.</p> <p><b>The Climate Change (Monitoring, Reporting and Verification) Regulations, 2021:</b> These Regulations shall apply to the monitoring, reporting and verification of all of the following:</p> <ul style="list-style-type: none"> <li>▪ GHG emissions;</li> <li>▪ Mitigation actions;</li> <li>▪ Adaptation actions; and,</li> <li>▪ Climate change enablers including climate finance, technology development and transfer and capacity building.</li> </ul> <p>In overseeing monitoring, reporting and verification, the CS shall enforce the following principles:</p> <ol style="list-style-type: none"> <li>i) Accuracy of data provided that is neither systematically or knowingly inaccurate;</li> <li>ii) Completeness of all processes and activities;</li> <li>iii) Consistency and comparability over time;</li> <li>iv) Utilization of reliable methodologies and data sets;</li> <li>v) Reliance and linkages with already existing monitoring and reporting systems;</li> <li>vi) Contextualization of the process;</li> <li>vii) Continuous improvement as a result of the recommendations arising from verification reports in consequent monitoring and reporting; and,</li> <li>viii) Coordination by public and private entities.</li> </ol> <p>NEMA shall regulate, enforce and monitor compliance on the levels of GHG emissions as set by</p> |                    |

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|               | <p>the council. The CS shall determine the method for estimating GHG emissions; ensure consistency with the best national and international practices and when necessary, recommend that the Country adopts a different tier and methodology for reporting on GHG emissions.</p> <p><b>The Climate Change (Duties and Incentives) Regulations, 2021:</b> These Regulations shall impose climate change duties on public entities in the national and county governments. Each public entity at any level of government shall bear the duty to enhance the nations’ adaptation ambition by mainstreaming and integrating any adaptation duties as outlined in the NCCAP, the NDC and the NAP that are currently in force, into its laws, policies, programs, projects, plans and any additional relevant activities.</p> <p>In addition to the duties set out above, each public entity at both the national and county government shall:</p> <ul style="list-style-type: none"> <li>▪ Set out its strategy and objectives on climate change mitigation and adaptation;</li> <li>▪ Perform its activities in a manner that increases awareness of the need to mitigate against and adapt to climate change;</li> <li>▪ Build the capacity of its staff and stakeholders to assess risk and implement action related to climate change in decision making;</li> <li>▪ Dedicate an amount in its annual budget that shall be directed towards climate change activities;</li> <li>▪ Assess itself against the climate change assessment tool;</li> <li>▪ Determine its capability and performance in relation to the public entity’s climate change duties; and</li> <li>▪ Implement oversight mechanisms over all projects to ensure that they comply with climate change laws and policies.</li> </ul> <p>The CS may where applicable grant non-fiscal incentives for the promotion of climate change initiatives including but not limited to:</p> |                    |

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|               | <p>a) Allowing the use of emission offsets in accordance with any Regulations on carbon trading for the time being in force;</p> <p>b) Promoting public-private partnership for climate initiatives by developing relevant guidelines; and,</p> <p>c) Developing award schemes for private entities that have developed scalable innovative climate actions.</p> <p>Climate change initiatives eligible for incentives shall include but not be limited to:</p> <ul style="list-style-type: none"> <li>▪ Energy and resource efficiency activities across sectors;</li> <li>▪ Climate smart agriculture activities;</li> <li>▪ Low carbon and efficient transportation systems;</li> <li>▪ Sustainable waste management systems;</li> <li>▪ Clean, efficient and sustainable energy technologies;</li> <li>▪ Nature based solutions for mitigation and adaptation;</li> <li>▪ Activities to increase tree cover to at least 10% of Kenya’s land area;</li> <li>▪ Activities to enhance adaptive capacity, climate resilience and loss and damage across all sectors of the economy;</li> <li>▪ Activities to increase the uptake of adaptation technology amongst women, youth and additional groups in vulnerable situations; and,</li> <li>▪ Any other activities or climate related initiatives.</li> </ul> <p><b>The Climate Change (Public Participation and Access to Climate Change Information) Regulation, 2023:</b> The Regulation states that a responsible authority shall ensure fair and equal access to the public participation process to all members of the public and stakeholders in the climate change sector. Where any members of the public and stakeholders are not conversant with the official languages of the Republic, or by reason of disability are unable to participate in the process the responsible authority shall provide an interpreter who can translate the information relating to a proposed action into the local language or sign language for the affected members or</p> |                    |

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|               | <p>stakeholders. When conducting public participation under these Regulations, a responsible authority shall be guided by the following principles:</p> <ul style="list-style-type: none"> <li>(i) Public consultation shall be undertaken within timelines that allow constructive engagement with persons affected by the proposal;</li> <li>(ii) Public consultation shall be effective and not merely procedural; and,</li> <li>(iii) The contribution of the public shall impact the threshold of decision making on climate change where: <ul style="list-style-type: none"> <li>a) all relevant stakeholders directly affected by proposed action and the public are adequately consulted;</li> <li>b) the responsible authority can demonstrate that sufficient amount of feedback is drawn from the public consultation; and,</li> <li>c) there is evidence that the feedback received from the public consultation has been considered in developing the proposed action and in the decision made pursuant to the proposed action.</li> </ul> </li> </ul> <p>The responsible authority shall publish a notice calling for comments on a proposed action before commencing the conduct of public consultation. They shall then avail information on matters relating to climate change to a member of the public upon request and in a reasonably expeditious, simple and accessible manner.</p> <p><b>The Climate Change (Carbon Markets) Regulations, 2024:</b> Carbon market is a specialised type of financial market through which carbon credits can be bought and sold. Carbon credits are essentially permits that allow the purchaser to emit a certain amount of carbon dioxide or other GHG. Carbon markets helps to channel financial resources to support emissions reduction. The regulations seek to provide the legal framework for the operation of carbon projects and markets. These Regulations shall apply to:</p> <ul style="list-style-type: none"> <li>i. principles governing trading in carbon markets;</li> </ul> |                    |

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|                                    | <p>ii. participation in carbon markets;</p> <p>iii. environmental impact assessment relating to carbon markets projects;</p> <p>iv. social and environmental benefits relating to carbon markets; and,</p> <p>v. published whitelists of eligible technologies.</p> <p>The objectives of these Regulations are:</p> <ul style="list-style-type: none"> <li>▪ to provide a framework for implementation of carbon market projects;</li> <li>▪ to create incentives and implement initiatives to support GHG emissions reduction and removal targets of in line with Nationally Determined Contributions; and,</li> <li>▪ to provide guidance on the annual social contribution for carbon market projects.</li> </ul> <p>The administration of these Regulations, shall comply with the fundamental principles enshrined in the Paris Agreement including: all transactions in carbon trading as carried out under these Regulations shall result in the additional effect of a reduction and removal of GHG emissions; all mitigation outcomes which are reported under the requirements of these Regulations are to be accounted for in tonnes of carbon dioxide equivalent; all carbon offset projects shall ensure that emissions are kept out of the atmosphere for a reasonable length of time in accordance with the relevant carbon standards; all emission reductions and removals must be carefully recorded and documented for every offset scheme, utilizing appropriate accounting terms, corresponding adjustments where applicable, and location of offset as required by the UNFCCC and other standard bodies; and all carbon markets projects shall adhere to environmental integrity.</p> |   |
| <b>Public Health Act (Cap 242)</b> | <p>Part IX Section 115 states that no person shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires Local Authorities to take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health.</p> <p>Such nuisance or conditions are defined under Section 118 as waste pipes, sewers, drains or refuse pits in such a state, situated or constructed as, in the opinion of the medical officer of health, to be offensive or injurious to health. Any noxious matter or waste water flowing or</p>   | <p>All health and safety measures should be put in place by the Proponent and the Contractor to ensure the Project workers and the neighbouring communities are not exposed to the stated nuisance under this Act during the construction of the BRT line 5. In case the proposed</p> |

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|   | <p>discharged from any premises into Public Street or into the gutter or side channel or watercourse, irrigation channel or bed not approved for discharge is also deemed as a nuisance. Other nuisances are accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin.</p> <p>On the responsibility of local authorities, Part XI Section 129 of the Act states in part “It shall be the duty of every local authority to take all lawful, necessary and reasonably practicable measures for preventing any pollution dangerous to health of any supply of water which the public within its district has a right to use and does use for drinking or domestic purposes, and purifying such supply so polluted”. Section 130 provides for making and imposing on local authorities and others the duty of enforcing rules in respect of prohibiting use of water supply or erection of structures draining filth or noxious matter into water supply as mentioned in section 129.</p> | <p>Project construction nicks a waste or sewer pipe, then the Contractor should follow the required procedures to minimize the potential negative impacts that may arise.</p>  |
| <p><b>The Public Health (Drainage and Latrine) Rules, Cap 130 of 1958</b></p> | <p>Rule 85 provides that every owner or occupier of every workshop, workplace or other premises where persons are employed shall provide proper and sufficient latrines for use by employees.</p> <p>Rule 87 requires every Contractor, builder or other person employing workmen for the demolition, construction, reconstruction or alteration of any building or other work in any way connected with building to provide, in an approved, position sufficient and convenient temporary latrines for use by such workmen. Rule 91 provides that no person shall construct a latrine in connection with a building other than a WC or a urinal, where any part of the site of such building is within 200 feet (ft) of a sewer belonging to the local authority which is at a suitable level, and where there is sufficient water supply.</p>  | <p>This Rule is applicable to the project since the Contractor for Civil Works will be required to provide toilets for use by workers and visitors to the site during construction phase of the proposed Project. Sufficient latrines will also be required for project staff.</p> |
| <p><b>The Penal Code (Cap. 63)</b></p>  | <p>Section 191 of the Penal Code states that any person or institution that voluntarily corrupts or foils water for public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same Penal Code states that a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons/institution in dwellings or business premises in the neighbourhood or those passing along public way, commit an offence.</p>   | <p>This statute controls public nuisance including safety and security from construction activities.</p>   |
| <p><b>The Lands Act, No. 6 of 2012</b></p>                                    | <p>Part II Section 8 provides guidelines on management of public land by National Land Commission on behalf of both National and County Governments. This law in Section 8(b) stipulates that the Commission shall evaluate all parcels of public land based on land capability classification, land</p>   | <p>This part of the law seeks to preserve and direct management of fragile public land held by the various</p>   |

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|   | <p>resources mapping consideration, overall potential for use, and resource evaluation data for land use planning. Section 8(d) stipulates that the Commission may require the land to be used for specified purposes subject to such conditions, covenants, encumbrances or reservations as are specified in the relevant order or other instrument.</p> <p>In managing public land, the Commission is further required in Section 10(1) to prescribe guidelines for the management of public land by all public agencies, statutory bodies and state corporations in actual occupation or use. In these guidelines management priorities and operational principles for the management of public land resources for identified uses shall be stated.</p> <p>This in essence means that the Commission shall take appropriate action to maintain public land that has endangered or endemic species of flora and fauna, critical habitats or protected areas. As well the Commission shall identify ecologically sensitive areas that are within public lands and demarcate or take any other justified action on those areas and act to prevent environmental degradation and climate change.</p> <p>Section 107 of the Act requires that National or County Governments after satisfying that it is necessary to acquire land for public development; the respective CS will submit a request to the Land Commission. Upon approval, the target land will be geo-referenced and authenticated at the national and county levels (Section 110). In accordance with Section 111, just compensation shall be paid promptly to all persons whose interests have been affected by the land acquisition.</p> | <p>public bodies for sustainable development.</p> <p>KURA is a public body and once land has been acquired for roads, it is vested into their custody as the acquiring body. Thus expected to comply with this statute.</p> <p>KURA and the Contractor will also be required to ensure protection of any sensitive habitats and endangered species that may be identified.</p> |
| <p><b>Physical and Land Use Planning Act No. 13 of 2019</b></p> | <p>This Act of Parliament is to make provision for the planning, use, regulation and development of land and for connected purposes. The objects of this Act are to provide:</p> <ol style="list-style-type: none"> <li>The principles, procedures and standards for the preparation and implementation of physical and land use development plans at the National, County, Urban, Rural and Cities level;</li> <li>The administration and management of physical and land use planning in Kenya;</li> <li>The procedures and standards for development control and the regulation of physical planning and land use;</li> <li>A framework for the co-ordination of physical and land use planning by County</li> </ol>   | <p>The Project is compatible with the existing physical plans and approved development and land use.</p> <p>KURA undertakes public consultation through holding public consultation meetings and the administration of structured</p>  |



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|               | <p>Governments;</p> <ul style="list-style-type: none"> <li>e) A mechanism for dispute resolution with respect to physical and land use planning;</li> <li>f) A framework for equitable and sustainable use, planning and management of land;</li> <li>g) The functions of and the relationship between planning authorities;</li> <li>h) A robust, comprehensive and responsive system of physical and land use planning and regulation; and</li> <li>i) A framework to ensure that investments in property benefit local communities and their economies.</li> </ul> <p>Section 5 of the Act states that every person engaged in physical and land use planning and regulation shall adhere to the following principles and norms of physical and land use planning;</p> <ul style="list-style-type: none"> <li>a) Physical and land use planning shall promote sustainable use of land and liveable communities which integrates human needs in any locality;</li> <li>b) Development activities shall be planned in a manner that integrates economic, social and environmental needs of present and future generations;</li> <li>c) Physical and land use planning shall be comprehensive, sustainable and integrated at all levels of government, taking into consideration the interests of all parties concerned;</li> <li>d) Physical and land use planning shall take into consideration long-term optimum utilization of land and conservation of scarce land resource including preservation of land with important functions;</li> <li>e) Physical and land use planning shall be inclusive and must take into consideration the culture and heritage of people concerned; and</li> <li>f) Physical and land use planning shall take into account new approaches such as transit-oriented development, mixed land-uses, planning for public transport and non-motorized transport among others to achieve sustainable development and more efficient use of natural resources.</li> </ul> <p>Section 55 (1) of the Act provide the objectives of development control as:</p> | <p>questionnaire (s) to promote public awareness on proposed Project. This helps in creating awareness on best environmental protection and preservation, and to promote public safety and health during construction and operational phases.</p> |

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|               | <ul style="list-style-type: none"> <li>▪ To ensure orderly physical and land use development;</li> <li>▪ To ensure optimal land use;</li> <li>▪ To ensure the proper execution and implementation of approved physical and land use development plans;</li> <li>▪ To protect and conserve the environment;</li> <li>▪ To promote public safety and health;</li> <li>▪ To promote public participation in physical and land use development decision-making;</li> <li>▪ To ensure orderly and planned building development, planning, design, construction, operation and maintenance; and</li> <li>▪ To promote the safeguarding of national security.</li> </ul> <p>Section 56 of the Act provide that the Urban Areas and Cities Act, 2011, and the County Governments Act, 2012, that the County Governments shall have the power within their areas of jurisdiction to: prohibit or control the use and development of land and buildings in the interests of proper and orderly development of its area; control or prohibit the subdivision of land; consider and approve all development applications and grant all development permissions; ensure the proper execution and implementation of approved physical and land use development plans; formulate by-laws to regulate zoning in respect of use and density of development; reserve and maintain all the land planned for open spaces, parks, urban forests and green belts in accordance with the approved physical and land use development plans; and consider and determine development planning applications made in respect of land adjoining or within reasonable vicinity of safeguarding areas.</p> <p>Section 57 states that person who commences any development without obtaining development permission commits an offence and is liable on conviction to a fine not exceeding five hundred thousand shillings or to imprisonment for a term not exceeding two months or to both. The Act also states that in case one has commenced a development without obtaining development permission to restore the land on which the development is taking place to its original condition</p> |                    |

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|   | <p>or as near to its original condition as is possible and that such restoration shall take place within ninety days. If no action is taken, then the relevant County Executive Committee Member will restore the land and recover the cost incurred thereto from the developer. In addition, the same section also states that no person shall carry out development within the area of a local authority without development permission granted by the relevant County Executive Committee Member. The third schedule states that any Planning authorities shall require applications for major developments to be subjected to environmental and social impact assessment.</p>   |   |
| <p><b>Internally Displaced Persons Protection and Assistance to Internally Displaced Persons and Affected Communities Act, 2012</b></p> | <p>This Act applies to all internally displaced persons either through calamities, social conflicts or development projects and is guided by the Bills of Rights under the Constitution of Kenya. Section 5 of the Act lists development projects among the displacement factors and outlines involvement of the affected persons through awareness, sensitization, training and education on causes, impacts, consequences and prevention measures.</p> <p>Under Section 6 of the Act indicates displacements and relocations from development projects will take place only justified by compelling and overriding public interests. The procedures to follow are listed under Section 22 such as to include:</p> <ul style="list-style-type: none"> <li>▪ Justification as to why the displacement is unavoidable and that there is no other feasible alternative;</li> <li>▪ Seeking free and informed consent from the affected persons;</li> <li>▪ Holding public hearing on the project planning;</li> <li>▪ Provision of reasonable notice time to allow affected persons review and react to the displacement conditions; and</li> <li>▪ Displacement process should reflect respect to human rights.</li> </ul> <p>Relocation of the affected persons will be guided by the following factors:</p> <ul style="list-style-type: none"> <li>▪ Full information on the affected persons and ensuring their participation;</li> </ul> | <p>The Project has no displacements since the construction of the BRT Infrastructure will be restricted to the existing road island and will not touch on private property.</p> |

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|   | <ul style="list-style-type: none"> <li>▪ Identification of safe, adequate and habitable alternatives;</li> <li>▪ Availability of safety, nutrition, health and hygiene as well as protection at the new locations; and</li> <li>▪ Acceptability by the host communities in the new locations.</li> </ul>  |   |
| <p><b>HIV/AIDS Prevention and Control Act (Act No.14 of 2006)</b></p> | <p>Part 11, Section 7 requires HIV and AIDS education in the work place. The government is expected to ensure provision of basic information and instruction on HIV and AIDS prevention and control to; Employees of all Government Ministries, Departments, Authorities, and Other Agencies; and, Employees of Private and Informal Sectors. The information on HIV/AIDS is expected to be treated with confidentiality at the work place and positive attitudes shown towards infected employees and workers.</p> <p>Part IV dealing with Testing, Screening and Access Health Care Services, states that: -</p> <ol style="list-style-type: none"> <li>1. Subject to this Act, no person shall compel another to undergo an HIV test.</li> <li>2. Without prejudice to the generality of Sub-Section (1), no person shall compel another to undergo an HIV test as a precondition to, or for continued enjoyment of: <ul style="list-style-type: none"> <li>a) Employment;</li> <li>b) Marriage;</li> <li>c) Admission into any educational institution;</li> <li>d) Entry into or travel out of the Country; or</li> <li>e) The provision of healthcare, insurance cover or any other service.</li> </ul> </li> <li>3. Notwithstanding the provisions of Sub-Section (1), a person charged with an offence of a sexual nature under the Sexual Offences Act, 2006 may be compelled to undergo an HIV test.</li> <li>4. A person who contravenes any of the provisions of this section commits an offence.</li> </ol> <p>-No person shall carry out a HIV test except in a testing centre approved by the Minister under</p> | <p>During the proposed Project implementation, the Contractor is expected to create sensitization and awareness to the employees and the local communities on the issues related to HIV/AIDS.</p> |

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|               | <p>this section or in the manner specified under paragraph (d) of subsection (4).</p> <p>-No person shall carry out an HIV test unless such person is a healthcare provider approved by the Minister for that purpose.</p> <p>-No person shall provide pre-test or post-test counselling for the purposes of section 17 unless such person is approved by the Minister under this section.</p> <p>Part 17 stipulates that every testing centre shall provide pre-test and post-test counselling to a person undergoing an HIV test and any other person likely to be affected by the results of such test.</p> <p>The results of an HIV test shall be confidential and shall only be released-</p> <ol style="list-style-type: none"> <li>a) To the tested person; or</li> <li>b) In the case of a child, to a parent or legal guardian of such child;</li> </ol> <p>Provided that where any such child consents to an HIV test directly under Section 14(1)(b), the results thereof shall be released to the child; or</p> <p>(c) In the case of a person with a disability which, in the opinion of the medical practitioner undertaking the test, renders him incapable of comprehending such result to-</p> <ol style="list-style-type: none"> <li>i. The guardian of that person;</li> <li>ii. A partner of that person;</li> <li>iii. A parent of that person; or</li> <li>iv. An adult offspring of that person.</li> </ol> <p>Part V dealing with confidentiality states that:</p> <p>-No person shall record, collect, transmit or store records, information or forms in respect of HIV tests or related medical assessments of another person otherwise than in accordance with the privacy guidelines prescribed under this Section.</p> |                    |

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|               | <p>-No person shall disclose any information concerning the result of an HIV test or any related assessments to any other person except-</p> <ul style="list-style-type: none"> <li>a) With the written consent of that person;</li> <li>b) If that person has died, with the written consent of that person's partner, personal representative, administrator or executor; or</li> <li>c) If that person is a child, with the written consent of a parent or legal guardian of that child:</li> </ul> <p>Part VI dealing with Transmission of HIV states that:</p> <ol style="list-style-type: none"> <li>1. A person who is and is aware of being infected with HIV or is carrying and is aware of carrying the HIV virus shall-             <ol style="list-style-type: none"> <li>1. Take all reasonable measures and precautions to prevent the transmission of HIV to others; and</li> <li>2. Inform, in advance, any sexual contact or person with whom needles are shared of that fact.</li> </ol> </li> <li>2. A person who is and is aware of being infected with HIV or who is carrying and is aware of carrying HIV shall not, knowingly and recklessly, place another person at risk of becoming infected with HIV unless that other person knew that fact and voluntarily accepted the risk of being infected.</li> <li>3. A person who contravenes the provisions of Sub-Sections (1) or (2) commits an offence and shall be liable upon conviction to a fine not exceeding five hundred thousand shillings or to imprisonment for a term not exceeding seven years, or to both such fine and imprisonment.</li> <li>4. A person referred to in Sub-Section (1) or (2) may request any medical practitioner or any person approved by the Minister under section 16 to inform and counsel a sexual contact of the HIV status of that person.</li> <li>5. A request under Sub-Section (4) shall be in the prescribed form.</li> </ol> |                    |

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|               | <p>Part VIII dealing with Discriminatory Acts and Policies states that:</p> <ol style="list-style-type: none"> <li>1. Subject to Sub-Section (2), no person shall be-               <ol style="list-style-type: none"> <li>a) Denied access to any employment for which he is qualified; or</li> <li>b) Transferred, denied promotion or have his employment terminated, on the ground only of his actual, perceived or suspected HIV status.</li> </ol> </li> <li>2. Sub-Section (1) shall not apply in any case where an employer can prove, on application to the Tribunal that the requirements of the employment in question are that a person be in a particular state of health or medical or clinical condition.</li> </ol> <p>- A person's freedom of abode, lodging, or travel, within or outside Kenya shall not be denied or restricted on the grounds only of the person's actual, perceived or suspected HIV status.<br/>           -No person shall be quarantined, placed in isolation, refused lawful entry or deported from Kenya on the grounds only of the person's actual, perceived or suspected HIV status.<br/>           -No person shall be denied the right to seek an elective or other public office on the grounds only of the person's actual, perceived or suspected HIV status.</p> <ol style="list-style-type: none"> <li>1. Subject to this Act, no person shall be compelled to undergo a HIV test or to disclose his HIV status for the purpose only of gaining access to any credit or loan services, medical, accident or life insurance or the extension or continuation of any such services.</li> <li>2. Notwithstanding the provisions of Sub-Section (1), an insurer, re-insurer or health maintenance organization shall, in the case of life and healthcare service insurance cover, devise a reasonable limit of cover for which a proposer shall not be required to disclose his or her HIV status.</li> <li>3. Where a proposer seeks a cover exceeding the no test limit prescribed under Sub-Section (2) the insurer, reinsurer or health maintenance organization may, subject to this Act, require the proposer to undergo an HIV test.</li> </ol> |                    |

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| <b>Traffic Act (Cap. 403)</b> | <p>Section 91 states that (1) Every person who, without the written permission of the highway Authority:</p> <ul style="list-style-type: none"> <li>a) Encroaches on a road or on any land reserved therefore at the side or sides thereof by making or erecting any building, fence, ditch, advertisement sign or other obstacle, or by digging thereon or by planting or sowing any tree, shrub or seeds thereon; or</li> <li>b) Deposits or causes to be deposited in any manner whatever on a road any material or matter, other than road-making materials deposited for the purpose of making up or repairing the road; or</li> <li>c) Digs up, removes or alters in any way the soil or surface of a road, or of any land reserved therefore at the side or sides thereof, or if done for the purpose of moving a vehicle without immediately thereafter making good the damage; or</li> <li>d) Willfully fills up, alters or obstructs any ditch or drain, whether on a road or contiguous thereto, made by or under the control of the highway authority, to carry water off the road or to keep it from flowing on to the road; or</li> <li>e) Allows any sludge or any filthy or noisome matter to flow from any building or land in his occupation on to a road or into any ditch or drain made by the highway authority; or</li> <li>f) Causes or allows any timber, sledge, plough or other heavy material, vehicle or implement not wholly raised above the ground on wheels to be dragged on a road; or</li> <li>g) Pitches any tent, booth or stall on a road; or</li> <li>h) Makes any fire on any road, shall be guilty of an offence.</li> </ul> <p>(2) It shall be lawful for the highway authority to remove anything whatsoever which has been placed or erected on a road or land reserved therefore in contravention of this section.</p> <p>Under the Traffic sign rules Part 13, temporary traffic sign signal unit may be used for purposes of controlling the movement of vehicles on the road where the road works are in progress or where the width of the carriageway is temporary restricted.</p> | <p>This Section of the law makes it illegal for any form of encroachment to be erected in a road reserve without express permission from the Authority</p> |
| <b>Kenya Roads Act, 2007</b>  | <p>Section 10 shows KURA's responsibility for the management, development, rehabilitation and maintenance of all public roads in cities and municipalities in Kenya except where the roads are national roads.</p>  | <p>KURA employee will be allowed to preserve traffic safety and ensure safe operation of any service</p>   |



| Legal Section   | Relevant Provisions   | Compliance Aspects   |
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|   | <p>Section 10 Part II shows the authorities powers and duties which entails; constructing, rehabilitating and maintaining roads, control road reserve and access to road side developments, implement the road policies, ensure quality of road works is in accordance with the standards, planning development and maintenance of urban roads, liaising and coordinating with other road authorities in planning and operation in respect of the road.</p> <p>Section 22 gives the authority powers a) to acquire land when not public land by negotiating and agreeing with the registered land owner, b) if such land is public land and the authority is unable to acquire it by agreement; the Minister for public land can be notified who may place such land at the disposal of the authority.</p> <p>Section 24 gives power to the employee of an authority to enter land, prevent accidents, preserve traffic safety, and ensure safe operation of any service provided by such an authority or repairing damage caused by accidents.</p> <p>Section 49 prohibits one from erecting structures on or over or below the road reserve or land in a building restricted area as well as making structural alterations on the road without a written permission of the Authority. The Authority may in its discretion give or refuse to give permission. A person, who contravenes, commits an offence and is liable on conviction to a term to a term not exceeding one year or a fine of Ksh 100,000.</p> | <p>provided by KURA during the construction of the proposed Project. The Proponent will also ensure that no illegal structures are erected on or over or below the BRT Line 5 without a written permission of the Authority.</p> |
| <p><b>National Construction Authority Act, No. 41 of 2011</b></p> | <p>Part III of this Act states the necessary requirements for registration to the Authority by Contractors. The Section also covers registration by foreign contractors stating that the Board may accredit a firm incorporated outside Kenya to carry out construction works in Kenya for a prescribed period where the firm meets the conditions prescribed by the Board. Section 18 goes on to state that the registration of a firm under this section shall entitle it to undertake work only for the period of time prescribed by the Board in subsection (1), and on the expiry of that period that firm shall cease to be so registered, and shall return the registration certificate to the Board. It informs that a firm registered under this section shall during the period of the contracted works, and in relation to things done or omitted to be done in the course of the contracted works, be</p>   | <p>KURA will award the proposed Project tender to a Contractor that is registered by the National Construction Authority.</p>  |

| Legal Section                                  | Relevant Provisions  | Compliance Aspects   |
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|  | <p>treated as being duly registered under this Act as a contractor.</p> <p>Section 22 states that the Board of the Authority may institute an inquiry into the conduct of a contractor on its own initiative or upon receipt of a complaint addressed to the Board in writing, made by or on behalf of any person alleging unprofessional conduct on the part of a registered person.</p>  |  |
| <p><b>The National Building Code, 2022</b></p> | <p>The purpose of this Code is to promote order and safety in construction works, and the health and safety of persons in or about construction works. The scope of this Code provides:</p> <ul style="list-style-type: none"> <li>▪ for the design, construction, operation, inspection and maintenance of a building;</li> <li>▪ standards for design, building materials, products, elements, systems and services;</li> <li>▪ standards for infrastructure services;</li> <li>▪ standards for the operations and works at a construction site;</li> <li>▪ for disaster management at a construction site; and,</li> <li>▪ for the safety and security of the users and occupants of a building.</li> </ul> <p>Section 5 states that a person who intends to undertake any construction works shall obtain –</p> <ol style="list-style-type: none"> <li>a. A development permission in accordance with the Physical and Land Use Planning Act, 2019;</li> <li>b. An environmental impact assessment license issued in accordance with the Environmental Management and Coordination Act Cap 387;</li> <li>c. A compliance certificate issued in accordance with the Act; and,</li> <li>d. Any other applicable approval.</li> </ol> <p>Section 6 states that the preparation of the design and supervision of the works in a building shall only be undertaken by a registered and licensed professional. A professional includes a physical planner, architect, engineer, land surveyor, building surveyor and quantity surveyor</p> | <p>KURA and the Contractor will be guided by this code especially during the construction of the BRT Depot and station points.</p> |

| Legal Section | Relevant Provisions  | Compliance Aspects |
|---------------|--|--------------------|
|               | <p>duly registered under the relevant law.</p> <p>Part II<br/>Section 7 states that an owner engaging in construction works shall comply with the conditions as may be imposed by the approving authority regarding the siting, size, height, shape and appearance of the building to safeguard, maintain or impose the dignity or preserve the amenity and general appearance of a road, square, public place.</p> <p>A building, an out-building, latrine and all drain and sanitary apparatus of any kind pertaining to the building, shall be situated on the site so as to ensure hygienic and sanitary conditions and avoid, as much as possible, any form of nuisance from the position of the latrines or buildings.</p> <p>Section 13 indicates that the formation, laying out, material widening of a means of access or an erection, shall not be constructed so as to obstruct the view of a person using a road used by vehicular traffic, at or near a bend, corner, junction or intersection in a manner that is likely to cause danger to the person.</p> <p>Part III<br/>Section 39 states that a pedestrian guarding shall be provided where it is necessary to guard the edges of any part of floor, window that opens outwards, gallery, balcony, roof, any other place to which people have access, unless it is only for the purpose of maintenance or repair and a light well, basement area or a sunken area next to a building.</p> <p>Section 41 states that if a vehicle has access to a floor, roof or ramp which forms part of a building, a barrier shall be provided on an edge which is level with, or above the floor or ground, or another route for vehicles to a height of between 375 mm and 610 mm above the ground.</p> <p>Part IV<br/>Section 47 states that before the erection, alteration, scaffolding or demolition of a building, the owner of the plot on which the building is located shall erect a fence, hoarding or barricade, to</p> |                    |

| Legal Section | Relevant Provisions  | Compliance Aspects |
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|               | <p>prevent the public from entering the plot and to protect the public from the activities on the plot. The fence, hoarding or barricade erected shall be retained for as long as is necessary and maintained by the owner in a safe condition and any access to the plot shall be subject to approval of the owner.</p> <p>Section 52 states that an owner of a plot on which excavation work is in progress, or on which a building is being erected or demolished, shall take precautions in relation to the working area, on the surrounding roads and footways, to limit to a reasonable level the amount of dust arising from the construction works in accordance with the Environmental Management and Coordination (Air Quality) Regulations, 2014. Section 54 indicates that where excessive rubble, rubbish, other debris or combustible waste material accumulates on a construction site before or during construction works, the approving authority may, by written notice, order the owner of the site to have the rubble, rubbish, other debris or combustible waste material removed within the period specified in the notice. The Act allows a person engaging in construction works to construct a temporary contractor's shed on the construction site.</p> <p>Part XIV Section 245 highlights the compulsory drainage of a building indicating that an owner shall ensure that a suitable means of disposal of waterborne sewage is available and shall provide a drainage installation.</p> <p>Part XVI states that an owner shall provide for a landscaped area and the landscape design shall be prepared by an architect.</p> <p>Part XIX states that every building shall have an approved means of refuse storage and disposal. An area designated for refuse storage or disposal shall be located such that it can be accessed from a road for the purpose of removing the refuse.</p> <p>Part XXI states that a building shall be designed, constructed and equipped in a manner that ensures that in case of a fire the protection of occupants therein is ensured and that protection provides for the safe evacuation of the occupants, the spread and intensity of the fire</p> |                    |

| Legal Section  | Relevant Provisions  | Compliance Aspects   |
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|  | <p>within the building and the spread of fire to another building is minimized and sufficient stability is retained to ensure that the building does not endanger another building. Firefighting equipment shall be provided in every public building.</p> <p>Part XXIII states that a Contractor shall plan, manage and monitor construction works in a way that ensures that the construction works is carried out with minimal risk to health and safety. A contractor shall ensure that a sub-contractor appointed to carry out construction works in relation to a project is informed of the minimum amount of time allowed for planning and preparation before the commencement of the construction works.</p>  |  |
| <p><b>Urban Areas and Cities (Amendment) Act No. 3 of 2019</b></p> | <p>The Amendments to the Urban Areas and Cities Act, No. 13 of 2011 referred as the Principal Act has introduced a new procedure for the delineation of the boundaries of urban areas or cities. The Amendment Act states that the delineation may be initiated by the CS or by the relevant County Government making a written request to the CS to appoint an ad hoc committee, appointed by a notice in the Kenya Gazette. The ad hoc committee shall comprise of nine (9) members, with the representative of the Independent Electoral and Boundaries Commission being the chairperson. Where the boundaries of an urban area extend in more than one County, membership of the ad hoc committee shall include representatives of the relevant Counties and the proposal for delineation of the boundaries shall be handled by the Council of Governors.</p> <p>The Amendment Act vests the management of towns in a town committee comprising five (5) members being the County Executive Committee member for urban areas and cities; two (2) members competitively appointed by the governor; a cluster representing registered associations of the informal sector and a cluster representing the business community. The members of the town committee shall be appointed by the County Governor with the approval of the County Assembly.</p> <p>The principal Act provided that for a town to be classified as a municipality, the town had to have a population of between seventy thousand (70,000) and two hundred and forty-nine thousand (249,000) residents. The Amendment Act has reduced this number, stating that for an urban area to be classified as a municipality it has to have a resident population of a least fifty thousand</p> | <p>BRT Line 5 is located in Nairobi City County thus KURA will liaise with the city committee in charge of managing the city’s development to ensure the smooth sailing of the proposed Project. The committee will aid in problem solving and representing the interests of their members to the Authority through the proposed Project implementation phase.</p> |

| Legal Section | Relevant Provisions   | Compliance Aspects |
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|               | <p>(50,000) and provide the services listed in the First Schedule of the Amendment Act. Such services would include: planning and development control, water and sanitation, ambulance services, among others.</p> <p>The principal Act provided that for an area to be classified as a city, the area had to have a population of at least five hundred thousand (500,000) residents. The Amendment Act has reduced this number to two hundred and fifty thousand (250,000) and provides that the area has to have the capacity to effectively and efficiently deliver services to its residents and has in existence, the services provided in the First Schedule of the Amendment Act. These services include: planning and development control, city economic development plan, disaster management and conference facilities, among others.</p> <p>The Amendment Act provides that members of the Board of a city shall be constituted by twelve (12) members being the County Executive Committee member responsible for cities &amp; urban areas; six (6) members who are competitively appointed by the Governor, with the approval of the County Assembly; a secretary appointed by the County Public Service Board and four (4) members, appointed by the County Governor with the approval of the County Assembly nominated by:</p> <ul style="list-style-type: none"> <li>i. An umbrella body representing professional associations in the area;</li> <li>ii. An association representing the private sector in the area;</li> <li>iii. A cluster representing registered associations in the informal sector in the area; and</li> <li>iv. A cluster representing registered neighbourhood associations in the area.</li> </ul> <p>The Amendment Act provides that members of the Board of a municipality shall be constituted by nine (9) members being the county executive committee member for cities and urban areas; three (3) members appointed by the county governor, with the approval of the County Assembly; the Chief Officer responsible for urban development, the Municipal Manager who shall be the secretary of the board and an ex officio member of the board and four (4) members, appointed by the County Governor with the approval of the County Assembly nominated by:</p> |                    |

| Legal Section  | Relevant Provisions   | Compliance Aspects  |
|--|---|---|
|  | <p>i) An umbrella body representing professional associations in the area;<br/>                     ii) An association representing the private sector in the area;<br/>                     iii) A cluster representing registered associations in the informal sector in the area; and<br/>                     iv) A cluster representing registered neighbourhood associations in the area.</p> <p>The Amendment Act vests the management of towns in a town committee comprising five (5) members being the County Executive Committee Member for urban areas and cities; two (2) members competitively appointed by the Governor; a cluster representing registered associations of the informal sector and a cluster representing the business community. The members of the town committee shall be appointed by the County Governor with the approval of the County Assembly.</p>  |   |
| <p><b>Occupation Safety and Health Act, 2007</b></p> | <p>This is an Act of Parliament that provides for the safety, health and welfare of workers and all persons lawfully present at work places to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. Section 3 (1) states <i>“that the Act shall apply to all workplaces where any person is at work, whether temporarily or permanently”</i>.</p> <p>Section 13 part 1(a) the employee is expected to ensure his own safety and health and of the other person who may be affected by his acts or omissions at work place, (c)requires the employee at all times to use protective equipment or clothing provided by the employer for purpose of preventing risks to his safety and health, (f) report to the supervisor any accidents or injury that arise in connection with his work Part 2 states that any employee who fails to follow this section commits an offence and shall on conviction be liable to a fine or imprisonment.</p> <p>Section 21 provides that the employer or self-employed person to notify the OSH Officer of any accidents, dangerous occurrence, or occupational poisoning which has occurred at the work place. Section 32 gives power to the OSH officer to enter inspects examine by day or night, a work place which he has reasonable cause to believe to be a work place and any part of any building of which forms a work place.</p> | <p>This statute handles issues of health and safety especially during the project construction.</p> |

| Legal Section | Relevant Provisions   | Compliance Aspects |
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|               | <p>Part V of the Act provides for the registration of workplaces. Section 43 states that <i>“the Director shall keep a register of workplaces in which he shall cause to be entered such particulars in relation to every workplace required to be registered under this Act as he may consider necessary”</i>. Section 44 (1) further states that <i>“Before any person occupies or uses any premises as workplace, he shall apply for the registration of the premises by sending to the Director a written notice containing the particulars set out in the fourth schedule”</i> Section 44 (2) states that <i>“Upon receipt of the notice referred to in subsection (1), the Director shall take such steps as may be necessary to satisfy himself that the premises are suitable for use as a workplace of the nature stated in the notice, and upon being so satisfied, shall cause the premises to be registered and shall issue to the applicant, upon payment of the prescribed fee, a certificate of registration in the form set out in the Fifth Schedule”</i>. Section 44 (4) states that <i>“All workplaces which were registered under the Factories and Other Places of Work Act (now repealed) shall be deemed to have been registered under this Act”</i>.</p> <p>Part VI of the OSH Act, 2007, addresses provisions concerning health. These provisions are:</p> <ul style="list-style-type: none"> <li>i. Cleanliness;</li> <li>ii. Overcrowding;</li> <li>iii. Ventilation;</li> <li>iv. Lighting;</li> <li>v. Drainage of floors; and</li> <li>vi. Sanitary conveniences.</li> </ul> <p>These provisions are to be enforced by the Department of Occupational Health and Safety of the Ministry of Labour and Social Protection.</p> <p>According to the scale for sanitary accommodation issued by Director of Occupational Safety and Health, LD280, the table below shows the guides for scale for sanitary accommodation:</p> |                    |



| Legal Section | Relevant Provisions  |              |                   |               |                   |  | Compliance Aspects |  |          |  |               |  |              |                   |              |                   |              |                   |        |   |        |   |       |   |         |   |         |   |        |   |         |   |         |   |         |   |         |   |          |   |         |   |         |   |           |        |          |   |          |   |          |          |           |        |           |        |  |  |          |          |          |        |  |  |  |  |  |
|---------------|--|--------------|-------------------|---------------|-------------------|--|--------------------|--|----------|--|---------------|--|--------------|-------------------|--------------|-------------------|--------------|-------------------|--------|---|--------|---|-------|---|---------|---|---------|---|--------|---|---------|---|---------|---|---------|---|---------|---|----------|---|---------|---|---------|---|-----------|--------|----------|---|----------|---|----------|----------|-----------|--------|-----------|--------|--|--|----------|----------|----------|--------|--|--|--|--|--|
|               | <table border="1"> <thead> <tr> <th colspan="2">Ladies WC</th> <th colspan="2">Gents WC</th> <th colspan="2">Gents Urinals</th> </tr> <tr> <th>No. of staff</th> <th>No. of facilities</th> <th>No. of staff</th> <th>No. of facilities</th> <th>No. of staff</th> <th>No. of facilities</th> </tr> </thead> <tbody> <tr> <td>1 – 12</td> <td>1</td> <td>1 – 15</td> <td>1</td> <td>1 - 6</td> <td>0</td> </tr> <tr> <td>13 – 20</td> <td>2</td> <td>15 – 35</td> <td>2</td> <td>7 - 20</td> <td>1</td> </tr> <tr> <td>21 – 40</td> <td>3</td> <td>36 – 65</td> <td>3</td> <td>21 - 45</td> <td>2</td> </tr> <tr> <td>41 – 57</td> <td>4</td> <td>66 – 100</td> <td>4</td> <td>46 - 70</td> <td>3</td> </tr> <tr> <td>58 – 77</td> <td>5</td> <td>101 – 200</td> <td>Add 3%</td> <td>71 - 100</td> <td>4</td> </tr> <tr> <td>78 – 100</td> <td>6</td> <td>Over 200</td> <td>Add 2.5%</td> <td>101 - 200</td> <td>Add 3%</td> </tr> <tr> <td>101 – 200</td> <td>Add 5%</td> <td colspan="2"></td> <td>Over 200</td> <td>Add 2.5%</td> </tr> <tr> <td>Over 200</td> <td>Add 4%</td> <td colspan="2"></td> <td colspan="2"></td> </tr> </tbody> </table> <p>Section 55 requires all plant, machinery and equipment whether fixed or mobile for use at work place to be used for designed work and operated by a competent person.</p> <p>Part VIII of the OSH Act, 2007 describes safety general provisions.</p> <p>Section 74 (1) provides for storage. It states that <i>“all goods, articles and substances stored in a workplace shall be stored or stacked –</i></p> <ul style="list-style-type: none"> <li><i>a. In such a manner as will ensure their stability and prevent any fall or collapse of the stack;</i></li> <li><i>b. In such manner as not to interfere with the adequate distribution of the natural or artificial light, the natural ventilation systems, the proper operation of machines or other equipment, the unobstructed use of passageways, gangways or traffic lanes, and the efficient functioning of sprinkler systems, the unobstructed access to other fire extinguishing equipment within the workplace; and</i></li> <li><i>c. On firm foundations not liable to overload any floor”.</i></li> </ul> <p>Section 74 (2) further states that <i>“No goods, articles or substances shall be stored or stacked</i></p> |              |                   |               |                   |  | Ladies WC          |  | Gents WC |  | Gents Urinals |  | No. of staff | No. of facilities | No. of staff | No. of facilities | No. of staff | No. of facilities | 1 – 12 | 1 | 1 – 15 | 1 | 1 - 6 | 0 | 13 – 20 | 2 | 15 – 35 | 2 | 7 - 20 | 1 | 21 – 40 | 3 | 36 – 65 | 3 | 21 - 45 | 2 | 41 – 57 | 4 | 66 – 100 | 4 | 46 - 70 | 3 | 58 – 77 | 5 | 101 – 200 | Add 3% | 71 - 100 | 4 | 78 – 100 | 6 | Over 200 | Add 2.5% | 101 - 200 | Add 3% | 101 – 200 | Add 5% |  |  | Over 200 | Add 2.5% | Over 200 | Add 4% |  |  |  |  |  |
| Ladies WC     |  | Gents WC     |                   | Gents Urinals |                   |  |                    |  |          |  |               |  |              |                   |              |                   |              |                   |        |   |        |   |       |   |         |   |         |   |        |   |         |   |         |   |         |   |         |   |          |   |         |   |         |   |           |        |          |   |          |   |          |          |           |        |           |        |  |  |          |          |          |        |  |  |  |  |  |
| No. of staff  | No. of facilities  | No. of staff | No. of facilities | No. of staff  | No. of facilities |  |                    |  |          |  |               |  |              |                   |              |                   |              |                   |        |   |        |   |       |   |         |   |         |   |        |   |         |   |         |   |         |   |         |   |          |   |         |   |         |   |           |        |          |   |          |   |          |          |           |        |           |        |  |  |          |          |          |        |  |  |  |  |  |
| 1 – 12        | 1  | 1 – 15       | 1                 | 1 - 6         | 0                 |  |                    |  |          |  |               |  |              |                   |              |                   |              |                   |        |   |        |   |       |   |         |   |         |   |        |   |         |   |         |   |         |   |         |   |          |   |         |   |         |   |           |        |          |   |          |   |          |          |           |        |           |        |  |  |          |          |          |        |  |  |  |  |  |
| 13 – 20       | 2  | 15 – 35      | 2                 | 7 - 20        | 1                 |  |                    |  |          |  |               |  |              |                   |              |                   |              |                   |        |   |        |   |       |   |         |   |         |   |        |   |         |   |         |   |         |   |         |   |          |   |         |   |         |   |           |        |          |   |          |   |          |          |           |        |           |        |  |  |          |          |          |        |  |  |  |  |  |
| 21 – 40       | 3  | 36 – 65      | 3                 | 21 - 45       | 2                 |  |                    |  |          |  |               |  |              |                   |              |                   |              |                   |        |   |        |   |       |   |         |   |         |   |        |   |         |   |         |   |         |   |         |   |          |   |         |   |         |   |           |        |          |   |          |   |          |          |           |        |           |        |  |  |          |          |          |        |  |  |  |  |  |
| 41 – 57       | 4  | 66 – 100     | 4                 | 46 - 70       | 3                 |  |                    |  |          |  |               |  |              |                   |              |                   |              |                   |        |   |        |   |       |   |         |   |         |   |        |   |         |   |         |   |         |   |         |   |          |   |         |   |         |   |           |        |          |   |          |   |          |          |           |        |           |        |  |  |          |          |          |        |  |  |  |  |  |
| 58 – 77       | 5  | 101 – 200    | Add 3%            | 71 - 100      | 4                 |  |                    |  |          |  |               |  |              |                   |              |                   |              |                   |        |   |        |   |       |   |         |   |         |   |        |   |         |   |         |   |         |   |         |   |          |   |         |   |         |   |           |        |          |   |          |   |          |          |           |        |           |        |  |  |          |          |          |        |  |  |  |  |  |
| 78 – 100      | 6  | Over 200     | Add 2.5%          | 101 - 200     | Add 3%            |  |                    |  |          |  |               |  |              |                   |              |                   |              |                   |        |   |        |   |       |   |         |   |         |   |        |   |         |   |         |   |         |   |         |   |          |   |         |   |         |   |           |        |          |   |          |   |          |          |           |        |           |        |  |  |          |          |          |        |  |  |  |  |  |
| 101 – 200     | Add 5%   |              |                   | Over 200      | Add 2.5%          |  |                    |  |          |  |               |  |              |                   |              |                   |              |                   |        |   |        |   |       |   |         |   |         |   |        |   |         |   |         |   |         |   |         |   |          |   |         |   |         |   |           |        |          |   |          |   |          |          |           |        |           |        |  |  |          |          |          |        |  |  |  |  |  |
| Over 200      | Add 4%   |              |                   |               |                   |  |                    |  |          |  |               |  |              |                   |              |                   |              |                   |        |   |        |   |       |   |         |   |         |   |        |   |         |   |         |   |         |   |         |   |          |   |         |   |         |   |           |        |          |   |          |   |          |          |           |        |           |        |  |  |          |          |          |        |  |  |  |  |  |

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|  | <p><i>against a wall or partition unless the wall or partition is of sufficient strength to withstand any pressure caused thereby”.</i></p> <p>Section 76 provides for ergonomics at the workplace. Section 76 (1) states that “<i>Machinery, equipment, personal protective equipment, appliances and hand tools used in all workplaces shall comply with the prescribed safety and health standards and be appropriately installed, maintained and safe guarded”.</i></p> <p>Section 76 (2) states that “<i>Every employer shall take necessary steps to ensure that workstations, equipment and work tasks are adapted to fit the employee and the employee’s ability including protection against mental strain”.</i></p> <p>According to Section 76 (3) “<i>Every manufacturer, importer and supplier or an agent of a manufacturer, importer and supplier of the machinery and equipment referred to in paragraph (1) shall ensure that the equipment complies with the safety and health standards prescribed under this Act and shall provide adequate and appropriate information including hazard warning signs”.</i></p> <p>Section 76 (4) further states that “<i>An employer shall not require or permit any of his employees to engage in the manual handling or transportation of a load which by reason of its weight is likely to cause the employee to suffer bodily injury”.</i></p> <p>Section 97 prohibits employers to employ persons below the age of 18 years at the work place or perform work by which its nature it’s likely to harm the person’s safety or health.</p> |  |
| <p><b>Public Roads and Roads of Access (Cap 399)</b></p> | <p>Section 9 of this Act states that in where any owner or occupier of land is in respect of his land so situated in relation to a public road which is passable to vehicular traffic, or to a railway station or halt, that he has not reasonable access to the same, he may make application to the board of the district in which such land is situated for leave to construct a road or roads (hereinafter called a road of access) over any lands lying between his land and such public road or railway station or halt, and every such application shall be made in duplicate in the form and contain the</p>   | <p>The proposed Project construction is based on an existing road island .</p> |

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|   | <p>particulars required by the First Schedule to this Act: Provided that, if the applicant is unable to make the sketch plan mentioned in the said Schedule without entering upon the lands over which he proposes that the road of access is to pass, he may apply to the board for leave to enter upon the said lands for the purpose of making the said sketch plan and the board may then make an order entitling the applicant to enter on the said lands. Should the said road of access pass through an existing fenced enclosure, or an enclosure which at the time of granting the road of access was not fenced but which subsequently becomes fenced, the board in its discretion may require the applicant to provide, erect and maintain to its satisfaction a fence or fences of approved design, and shall apportion the cost of such fencing and its maintenance between the parties interested as it shall deem fit.</p> |  |
| <p><b>Work Injury Benefits Act (WIBA), 2007</b></p> | <p>It is an Act of Parliament to provide for compensation to workmen for injuries suffered in the course of their employment. It outlines the following:</p> <ul style="list-style-type: none"> <li>▪ Employer’s liability for compensation for death or incapacity resulting from accident;</li> <li>▪ Compensation in fatal cases;</li> <li>▪ Compensation in case of permanent partial incapacity;</li> <li>▪ Compensation in case of temporary incapacity;</li> <li>▪ Persons entitled to compensation and methods of calculating the earnings;</li> <li>▪ No compensation shall be payable under this Act in respect of any incapacity or death resulting from a deliberate self-injury; and</li> <li>▪ Notice of an accident, causing injury to a workman, of such a nature as would entitle him for compensation shall be given in the prescribed form to the Director.</li> </ul>   | <p>The Contractor will need to abide by all the provisions of WIBA in managing hazardous environment and according injured persons their dues in terms of shouldering the medical expenses or compensation of the families should there be loss of life.</p> |
| <p><b>Employment Act, 2007</b></p>                  | <p>This is an Act of Parliament that declares and defines the fundamental rights of employees, provides basic conditions of employment of employees, regulates employment of children, and provides for matters connected with the foregoing.</p> <p>In Section 4 (1), the Act highlights the prohibition against forced labour stating that no person shall use or assist any other person in recruiting, trafficking or using forced labour. A person who</p>   | <p>The Contractor will ensure adherence to this Act during implementation of the Project.</p>  |

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|               | <p>contravenes the provisions of this section commits an offence and shall, on conviction be liable to a fine not exceeding five hundred thousand shillings or to imprisonment for a term not exceeding two years or to both.</p> <p>Section 5 (1) states that it shall be the duty of the Minister, labour officers and the Industrial Court to;</p> <ul style="list-style-type: none"> <li>a) Promote equality of opportunity in employment in order to eliminate discrimination in employment; and</li> <li>b) Promote and guarantee equality of opportunity for a person who is migrant worker or a member of the family of the migrant worker, lawfully within Kenya</li> </ul> <p>Part II</p> <p>An employer shall promote equal opportunity in employment and strive to eliminate discrimination in any employment policy or practice. No employer shall discriminate directly or indirectly, against an employee or prospective employee or harass an employee or prospective employee;</p> <ul style="list-style-type: none"> <li>a) On grounds of race, colour, sex, language, religion, political or other opinion, nationality, ethnic or social origin, disability, pregnancy, mental status or HIV status; and</li> <li>b) In respect of recruitment, training, promotion, terms and conditions of employment, termination of employment or other matters arising out of the employment.</li> </ul> <p>Section 5(4) States that is not discrimination to;</p> <ul style="list-style-type: none"> <li>a) Take affirmative action measures consistent with the promotion of equality or the elimination of discrimination in the workplace;</li> <li>b) Distinguish, exclude or prefer any person on the basis of an inherent requirement of a job;</li> <li>c) Employ a citizen in accordance with the national employment policy; or</li> <li>d) Restrict access to limited categories of employment where it is necessary in the interest of State security.</li> </ul> |                    |

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|               | <p>Section 5 (5) States that an employer shall pay his employees equal remuneration for work of equal value. An employer shall pay his employees equal remuneration for work of equal value. (6) An employer who contravenes the provision of the section commits an offence. (7) In any proceedings where a contravention of this section is alleged, the employer shall bear the burden of proving that the discrimination did not take place as alleged, and that the discriminatory act or omission is not based on any of the grounds specified in this section.</p> <p>Section 6 of the Act outlines that an employee is sexually harassed if the employer of that employee or a representative of that employer or a co-worker;</p> <p>a) Directly or indirectly requests that employee for sexual intercourse, sexual contact or any other form of sexual activity that contains an implied or express;</p> <ul style="list-style-type: none"> <li>▪ Promise of preferential treatment in employment;</li> <li>▪ Threat of detrimental treatment in employment; or</li> <li>▪ Threat about the present or future employment status of the employee;</li> </ul> <p>b) Uses language whether written or spoken of a sexual nature;</p> <p>c) Uses visual material of a sexual nature; or</p> <p>d) Shows physical behaviour of a sexual nature which directly or indirectly subjects the employee to behaviour that is unwelcome or offensive to that employee and that by its nature has a detrimental effect on that employee’s employment, job performance, or job satisfaction.</p> <p>Section 15 of the Act states that an employer shall display a statement in the prescribed form of the employee’s rights under this Act in a conspicuous place, which is accessible to all the employees.</p> <p>Part IV Section 17 (1) Subject to this Act, an employer shall pay the entire amount of the wages earned by or payable to an employee in respect of work done by the employee in pursuance of a contract of service directly, in the currency of Kenya; in cash, into an account at a bank, or building society, designated by the employee and by cheque, postal order or money order in</p> |                    |

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|               | <p>favour of the employee, or in the absence of an employee, to a person other than the employee, if the person is duly authorised by the employee in writing to receive the wages on the employee's behalf.</p> <p>Section 17 (2) an employer shall pay wages to an employee on a working day, and during working hours, at or near to the place of employment or at such other place as may be agreed between the employer and the employee.</p> <p>Subject to subsection (1) of Section 18 outlines that wages or salaries shall be deemed to be due –</p> <ul style="list-style-type: none"> <li>a) In the case of a casual employee, at the end of the day;</li> <li>b) In the case of an employee employed for a period of more than a day but not exceeding one month, at the end of that period;</li> <li>c) In the case of an employee employed for a period exceeding one month, at the end of each month or part thereof; and</li> <li>d) In the case of an employee employed for an indefinite period or on a journey, at the expiration of each month or of such period, whichever date is the earlier, and on the completion of the journey, respectively.</li> </ul> <p>Section 18(1) states that notwithstanding section 17(1), an employer may deduct from the wages of his employee:</p> <ul style="list-style-type: none"> <li>a) Any amount due from the employee as a contribution to any provident fund or superannuation scheme or any other scheme approved by the Commissioner for Labour to which the employee has agreed to contribute;</li> <li>b) A reasonable amount for any damage done to, or loss of, any property lawfully in the possession or custody of the employer occasioned by the wilful default of the employee;</li> <li>c) An amount not exceeding one day's wages in respect of each working day for the whole of which the employee, without leave or other lawful cause, absents himself from the premises of the employer or other place proper and appointed for the performance of his work;</li> </ul> |                    |

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|               | <p>d) An amount equal to the amount of any shortage of money arising through the negligence or dishonesty of the employee whose contract of service provides specifically for his being entrusted with the receipt, custody and payment of money;</p> <p>e) Any amount paid to the employee in error as wages in excess of the amount of wages due to him;</p> <p>f) Any amount the deduction of which is authorised by any written law for the time being in force, collective agreement, wage determination, court order or arbitration award;</p> <p>g) Any amount in which the employer has no direct or indirect beneficial interest, and which the employee has requested the employer in writing to deduct from his wages;</p> <p>h) An amount due and payable by the employee under and in accordance with the terms of an agreement in writing, by way of repayment or part repayment of a loan of money made to him by the employer, not exceeding fifty percent of the wages payable to that employee after the deduction of all such other amounts as may be due from him under this section; and</p> <p>i) Such other amounts as the Minister may prescribe.</p> <p>Section 18 (2) states that no employer shall make a deduction from the wages payable to an employee as an advance of wages in consideration of, or as a reward for, the provision of employment for that employee, or for retaining the employee in employment. Subsection (4) states that an employer who deducts an amount from an employee’s remuneration in accordance with subsection (1)(a), (f), (g) and (h) shall pay the amount so deducted in accordance with the time period and other requirements specified in the law, agreement court order or arbitration as the case may be. Subsection (5); An employer who fails to comply with the provisions of subsection (4) commits an offence and shall on conviction be liable to a fine not exceeding one hundred thousand shillings or to imprisonment for a term not exceeding two years, or to both. Subsection (6); Where proceedings are brought under subsection (5) in respect of failure by the employer to remit deductions from an employee’s remuneration, the court may, in addition to fining the employer order the employer to refund to the employee the amount deducted from the employee’s wages and pay the intended beneficiary on behalf of the employee with the employer’s own funds.</p> |                    |

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|               | <p>Section 21 (1); A statement of statutory deductions shall be in writing, contain, in relation to each deduction comprised in the aggregate amount of deductions, particulars of the amount of the deduction, the intervals at which the deduction is to be made and the purpose for which it is made. Section 27 (1) An employer shall regulate the working hours of each employee in accordance with the provisions of this Act and any other written law. Subsection (2) Notwithstanding subsection (1), an employee shall be entitled to at least one rest day in every period of seven days.</p> <p>Section 28 (1) An employee shall be entitled:</p> <ul style="list-style-type: none"> <li>a) After every twelve consecutive months of service with his employer to not less than twenty-one working days of leave with full pay;</li> <li>b) Where employment is terminated after the completion of two or more consecutive months of service during any twelve months' leave-earning period, to not less than one and three-quarter days of leave with full pay, in respect of each completed month of service in that period, to be taken consecutively.</li> </ul> <p>Subsection (2) states that an employer may, with the consent of the employee divide the minimum annual leave entitlement under subsection (1) (a) into different parts to be taken at different intervals.</p> <p>Section 29 (1) outlines that a female employee shall be entitled to three months' maternity leave with full pay. Subsection (2) On expiry of a female employee's maternity leave as provided in subsections (1) and (3), the female employee shall have the right to return to the job which she held immediately prior to her maternity leave or to a reasonably suitable job on terms and conditions not less favourable than those which would have applied had she not been on maternity leave. Subsection (7) states that no female employee shall forfeit her annual leave entitlement under section 28 on account of having taken her maternity leave. Subsection (8) highlights that a male employee shall be entitled to two weeks' paternity leave with full pay.</p> <p>Section 30 (1): After two consecutive months of service with his employer, an employee shall be</p> |                    |



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|               | <p>entitled to sick leave of not less than seven days with full pay and thereafter to sick leave of seven days with half pay, in each period of twelve consecutive months of service, subject to production by the employee of a certificate of incapacity to work signed by a duly qualified medical practitioner or a person acting on the practitioner's behalf in charge of a dispensary or medical aid centre. Section 31 (1) states that an employer shall at all times, at his own expense, provide reasonable housing accommodation for each of his employees either at or near to the place of employment, or shall pay to the employee such sufficient sum, as rent, in addition to the wages or salary of the employee, as will enable the employee to obtain reasonable accommodation. Subsection (2); This section shall not apply to an employee whose contract of service:</p> <ul style="list-style-type: none"> <li>a) Contains a provision which consolidates as part of the basic wage or salary of the employee, an element intended to be used by the employee as rent or which is otherwise intended to enable the employee to provide himself with housing accommodation; or</li> <li>b) Is the subject matter of or is otherwise covered by a collective agreement, which provides consolidation of wages as provided in paragraph (a).</li> </ul> <p>Section 32 states that an employer shall provide a sufficient supply of wholesome water for the use of his employees at the place of employment and, as the case may be, within a reasonable distance of any housing accommodation provided for the employees by the employer. Section 37 of this Act allows for conversion of casual employment to term contract, notwithstanding any provisions of this Act, where a casual employee;</p> <ul style="list-style-type: none"> <li>a) Works for a period or a number of continuous working days which amount in the aggregate to the equivalent of not less than one month; or</li> <li>b) Performs work which cannot reasonably be expected to be completed within a period, or a number of working days amounting in the aggregate to the equivalent of three months or more, the contract of service of the casual employee shall be deemed to be one where wages are paid monthly.</li> </ul> <p>Section 53 (1) implies that notwithstanding any provision of any written law, no person shall</p> |                    |

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|                   | <p>employ a child in any activity which constitutes worst form of child labour. Notwithstanding subsection (2) employment of a child in any work, constituting worst form of child labour shall constitute a cognizable offence punishable under section 64 or any other written law provided that no person shall be punished twice for the same offence. Section 56 (1) states that no person shall employ a child who has not attained the age of thirteen years whether gainfully or otherwise in any undertaking. Subsection (2); A child of between thirteen years of age and sixteen years of age may be employed to perform light work which is-</p> <ul style="list-style-type: none"> <li>▪ Not likely to be harmful to the child’s health or development; and</li> <li>▪ Not such as to prejudice the child’s attendance at school, his participation in vocational orientation or training programmes approved by Minister or his capacity to benefit from the instructions received.</li> </ul> <p>Subsection (3) states the Minister may make rules prescribing light work in which a child of between thirteen years of age and sixteen years of age may be employed and the terms and conditions of that employment. Section (57) Subject to the provisions of the Industrial Training Act relating to contracts of apprenticeship or indentured learnership, a person who employs a child of between thirteen and sixteen years of age, or causes such a child to be employed, or being the parent or guardian or other person having for the time being the charge of or control over the child, allows the child to be employed, otherwise than under a verbal contract of service commits an offence and shall on conviction be liable to a fine not exceeding one hundred thousand shillings or to imprisonment for a term not exceeding six months or to both. Section 58 implies that no person shall employ a child of between thirteen and sixteen years of age, other than one serving under a contract of apprenticeship or indentured learnership in accordance with the provisions of the Industrial Training Act, in an industrial undertaking to attend to machinery.</p> <p>Section 64 states that a person who uses a child in any activity constituting worst form of child labour commits an offence and shall on conviction be liable to a fine not exceeding two hundred thousand shillings or to imprisonment for a term not exceeding twelve months or to both.</p> |                             |
| <b>The County</b> | This Act of Parliament that gave effect to Chapter eleven of the Constitution which is to provide  | The proposed Project during |

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| <p><b>Government Act, 2012</b></p> | <p>for County Governments’ powers, functions and responsibilities to deliver services and for connected purposes.</p> <p>The object and purpose of this Act is to:</p> <ul style="list-style-type: none"> <li>▪ Provide for matters necessary or convenient to give effect to Chapter Eleven of the Constitution pursuant to Article 200 of the Constitution;</li> <li>▪ Give effect to the objects and principles of devolution as set out in Articles 174 and 175 of the Constitution;</li> <li>▪ Give effect to Article 176(2) of the Constitution in respect of further decentralization;</li> <li>▪ Provide for the powers, privileges and immunities of County assemblies, their committees and members under Article 196 of the Constitution;</li> <li>▪ Provide for public participation in the conduct of the activities of the county assembly as required under Article 196 of the Constitution;</li> <li>▪ Seek to ensure that the community and cultural diversity of a county is reflected in its county assembly and county executive committee as contemplated in Article 197 of the Constitution;</li> <li>▪ Prescribe mechanisms to protect minorities within counties pursuant to Article 197 of the Constitution;</li> <li>▪ Give effect to Article 176(2) of the Constitution in respect of further decentralization;</li> <li>▪ Provide for the powers, privileges and immunities of county assemblies, their committees and members under Article 196 of the Constitution;</li> <li>▪ Provide for public participation in the conduct of the activities of the county assembly as required under Article 196 of the Constitution;</li> <li>▪ Seek to ensure that the community and cultural diversity of a county is reflected in its county assembly and county executive committee as contemplated in Article 197 of the Constitution;</li> </ul> <p>Prescribe mechanisms to protect minorities within counties pursuant to Article 197 of the</p> | <p>construction and operation phases should be in line with the regulations of this Act set by the Senate and the CS.</p> <p>KURA will ensure it consults and works closely with Nairobi City County Government throughout the Project Cycle.</p> |

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|                          | <p>Constitution;</p> <p>The County Government Act, 2012 repealed the Local Government Act. Section 114 of this Act, Sub-Sections (1) and (2) require that a project of national significance in a County be preceded by mandatory public hearings for approval. (1) Development of nationally significant development projects within Counties shall be preceded by mandatory public hearings in each of the affected Counties. (2) Projects under, (1) shall, subsequent to the mandatory public hearings, be considered and approved or rejected by the County Assembly. In addition, Section 115, Sub-Section (1) Public Participation in the County planning processes shall be mandatory and be facilitated through the mechanism stated under this section.</p> <p>The Act further states in Section 108 under County Integrated Development Plan, (2) (b) requires each County Integrated Development Plan to at least identify (as informed by the strategies and programmes set out in the plan):</p> <ul style="list-style-type: none"> <li>▪ Any investment initiatives in the County;</li> <li>▪ Any development initiatives in the County, including infrastructure, physical, social, economic and institutional development;</li> <li>▪ All known projects, plans and programme to be implemented within the County by any organ of state; and</li> <li>▪ The key performance indicators set by the County.</li> </ul> <p>There being no regulations set that touch on road projects, the Project will according to the County Government Act, 2012 (Section 135 Sub-Section (1) the CS may make regulations for the better carrying out of the purposes and provisions of this Act and such regulations may be made in respect of all County Governments and further units of Decentralization generally or for any class of County Governments and further units of decentralization) comply to the set regulations and by laws.</p> |                                  |
| <b>Intergovernmental</b> | The intergovernmental Relations Act of Parliament establish a framework for consultation and  | It will be necessary for KURA to |

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| <b>Relations Act No. 2 of 2012</b>                | <p>cooperation between the national and County governments and amongst County governments; to establish mechanisms for the resolution of intergovernmental disputes pursuant to Article 6 and 189 of the Constitution, and for connected purposes.</p> <p>The objects and purpose of this Act are to:</p> <ul style="list-style-type: none"> <li>▪ Provide a framework for consultation and cooperation between the national and County governments;</li> <li>▪ Provide a framework for consultation and cooperation amongst county governments;</li> <li>▪ Establish institutional structures and mechanisms for intergovernmental relations;</li> <li>▪ Provide a framework for the inclusive consideration of any matter that affects relations between the two levels of government and amongst county governments;</li> <li>▪ Give effect of Articles 187 and 200 of the Constitution, in respect of the transfer of functions and powers by one level of government to another, including the transfer of legislative powers from the national government to the county government; and</li> <li>▪ Provide mechanisms for the resolution of intergovernmental disputes where they arise.</li> </ul> | work with County Government and NaMATA during the proposed Project as the Act requires.                               |
| <b>Land Registration Act No.3 of 2012</b>         | <p>It is an Act of Parliament to revise, consolidate and rationalize the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes. The Act applies to:</p> <ul style="list-style-type: none"> <li>▪ Registration of interests in all public land as declared by Article 62 of the Constitution;</li> <li>▪ Registration of interests in all private land as declared by Article 64 of the Constitution; and</li> <li>▪ Registration and recording of community interests in land.</li> </ul>  | KURA will not acquire any land under this Project since it will use the existing road island as a designated reserve. |
| <b>National Land Commission Act No. 5 of 2012</b> | <p>This is an Act of Parliament to make further provision as to the functions and powers of the National Land Commission, 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.</p>  | It may be necessary for KURA to work with the Commission especially in regard to any potential land conflicts.        |

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|  | <p>The object and purpose of this Act is to provide: -</p> <ol style="list-style-type: none"> <li>3 For the management and administration of land in accordance with the principles of land policy set out in Article 60 of the Constitution and the national land policy; No. 5 of 2012 National Land Commission [Rev. 2016].</li> <li>4 For the operations, powers, responsibilities and additional functions of the Commission pursuant to Article 67(3) of the Constitution;</li> <li>5 A legal framework for the identification and appointment of the chairperson, members and the secretary of the Commission pursuant to Article 250(2) and (12) (a) of the Constitution; and</li> <li>6 For a linkage between the Commissions, County Governments and other institutions dealing with land and land related resources.</li> </ol>  |   |
| <p><b>Children Act No. 8 of 2001</b></p> | <p>This Act of Parliament to make provision for the parental responsibility, fostering, adoption, custody, maintenance, guardianship, care and protection of Children; to make provision for the administration of children’s institution; to give effect to the principles of the Convention on the Rights of the Child and African Charter on the Rights and Welfare of the Child and for connected purposes.</p> <p>The Legislation is divided into fourteen parts, where Part II provides for Safeguards for the rights and welfare of the Child. The object and purpose of this Act is for:</p> <ul style="list-style-type: none"> <li>▪ Every child shall have an inherent right to life and it shall be the responsibility of the Government and the family to ensure the survival and development of the child;</li> <li>▪ In all actions concerning children, whether undertaken by public or private social welfare institutions, courts of law, administrative authorities or legislative bodies, the best interests of the child shall be a primary consideration;</li> <li>▪ All judicial and administrative institutions, and all persons acting in the name of these institutions, shall treat the interests of the child as the first and paramount consideration;</li> <li>▪ The child shall be accorded an opportunity to express his opinion, and that opinion shall be</li> </ul> | <p>The Project will embrace child rights principles as enshrined in the Act by enhancing road use safety and protection from child labour, sexual and any other form of child abuse in the Project cycle.</p> |

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|               | <p>taken into account as may be appropriate taking into account the child's age and the degree of maturity;</p> <ul style="list-style-type: none"> <li>▪ No child shall be subjected to discrimination on the ground of origin, sex, religion, creed, custom, language, opinion, conscience, colour, birth, social, political, economic or other status, race, disability, tribe, residence or local connection;</li> <li>▪ Right to parental care;</li> <li>▪ Right to education;</li> <li>▪ Right to religious education;</li> <li>▪ Right to healthcare; and</li> <li>▪ Protection from child labour and armed conflict - every child shall be protected from economic exploration and any work that is likely to be hazardous or interfere with the child's health or physical, mental, spiritual, moral or social development. In this Act child labour refers to any situation where a child provides labour in exchange for payment and includes: - <ul style="list-style-type: none"> <li>a) Any situation where a child provides labour as an assistant to another person and his labour is deemed to be the labour of that other person; and</li> <li>b) For the purposes of payment; any situation where a child's labour is used for gain by any individual or institution whether or not the child benefits directly or indirectly; and any situation where there is in existence a contract for services where the party providing the services is a child whether the person using the services does so directly or by agent.</li> </ul> </li> <li>▪ Every child shall have a right to a name and nationality and where a child is deprived of his identity the Government shall provide appropriate assistance and protection, with a view to establishing his identity;</li> <li>▪ A disabled child shall have the right to be treated with dignity, and to be accorded appropriate medical treatment, special care, education and training free of charge or at a reduced cost whenever possible;</li> <li>▪ Protection from abuse;</li> </ul> |                    |

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|--|---|---|
|  | <ul style="list-style-type: none"> <li>▪ Protection from cultural rites;</li> <li>▪ Protection from sexual exploitation;</li> <li>▪ Protection from drugs;</li> <li>▪ A child shall be entitled to leisure, play and participation in cultural and artistic activities;</li> <li>▪ Torture and deprivation of liberty; and</li> <li>▪ Every child shall have the right to privacy subject to parental guidance.</li> </ul>  |   |
| <p><b>National Transport and Road Safety Authority Act, 2012</b></p> | <p>The National Transport and Safety Authority Act, Number 33 on 26th October 2012, was the Act through which the National Transport and Safety Authority was established. The objective of forming the Authority was to harmonize the operations of the key road transport departments and help in effectively managing the road transport sub-sector and minimizing loss of lives through road accidents.</p> <p>The set-out functions of the Authority according to Section 4 (1) of the Act are:</p> <p><i>(1) The functions of the Authority shall be to-</i></p> <ul style="list-style-type: none"> <li><i>a) Advise and make recommendations to the CS on matters relating to road transport and safety;</i></li> <li><i>b) Implement policies relating to road transport and safety;</i></li> <li><i>c) Plan, manage and regulate the road transport system in accordance with the provisions of this Act;</i></li> <li><i>d) Ensure the provision of safe, reliable and efficient road transport services; and</i></li> <li><i>e) Administer the Act of Parliament set out in the First Schedule and any other written law.</i></li> </ul> | <p>KURA works hand in hand with the Authority to ensure that safe roads are constructed for all.</p>                              |
| <p><b>Data Protection Act, 2019</b></p>                              | <p>Part IV<br/>Every data controller or data processor shall ensure that personal data is-</p> <ul style="list-style-type: none"> <li>a) processed in accordance with the right to privacy of the data subject;</li> </ul>  | <p>KURA will work together with the office of data protection commissioner to ensure the ITS components to be included in the</p> |



| Legal Section | Relevant Provisions  | Compliance Aspects  |
|---------------|--|---|
|               | <p>b) processed lawfully, fairly and in a transparent manner in relation to any data subject;</p> <p>c) collected for explicit, specified and legitimate purposes and not further processed in a manner incompatible with those purposes;</p> <p>d) adequate, relevant, limited to what is necessary in relation to the purposes for which it is processed;</p> <p>e) collected only where a valid explanation is provided whenever information relating to family or private affairs is required;</p> <p>f) accurate and, where necessary, kept up to date, with every reasonable step being taken to ensure that any inaccurate personal data is erased or rectified without delay;</p> <p>g) kept in a form which identifies the data subjects for no longer than is necessary for the purposes which it was collected; and</p> <p>h) not transferred outside Kenya, unless there is proof of adequate data protection safeguards or consent from the data subject.</p> <p>A data controller or data processor shall collect personal data directly from the data subject. The Act also states that personal data may be collected indirectly where –</p> <p>a) the data is contained in a public record;</p> <p>b) the data subject has deliberately made the data public;</p> <p>c) the data subject has consented to the collection from another source;</p> <p>d) the data subject has an incapacity, the guardian appointed has consented to the collection from another source;</p> <p>e) the collection from another source would not prejudice the interests of the data subject;</p> <p>f) collection of data from another source is necessary –</p> <p>(i) for the prevention, detection, investigation, prosecution and punishment of crime;</p> <p>(ii) for the enforcement of a law which imposes a pecuniary penalty; or 16 Data Protection No. 24 of 2019</p> <p>(iii) for the protection of the interests of the data subject or another person.</p> <p>A data controller or data processor shall collect, store or use personal data for a purpose which is lawful, specific and explicitly defined.</p> | <p>proposed Project are controlled in accordance to the stated Acts' conditions. Personal data of the BRT Line 5 users will be processed in accordance to these laws.</p> |

| Legal Section | Relevant Provisions  | Compliance Aspects |
|---------------|--|--------------------|
|               | <p>A data controller or data processor shall not process personal data, unless –</p> <ul style="list-style-type: none"> <li>a) the data subject consents to the processing for one or more specified purposes; or</li> <li>b) the processing is necessary - <ul style="list-style-type: none"> <li>(i) for the performance of a contract to which the data subject is a party or in order to take steps at the request of the data subject before entering into a contract;</li> <li>(ii) for compliance with any legal obligation to which the controller is subject;</li> <li>(iii) in order to protect the vital interests of the data subject or another natural person;</li> <li>(iv) for the performance of a task carried out in the public interest or in the exercise of official authority vested in the controller;</li> <li>(v) the performance of any task carried out by a public authority;</li> <li>(vi) for the exercise, by any person in the public interest, of any other functions of a public nature;</li> <li>(vii) for the legitimate interests pursued by the data controller or data processor by a third party to whom the data is disclosed, except if the processing is unwarranted in any particular case having regard to the harm and prejudice to the rights and freedoms or legitimate interests of the data subject; or</li> <li>(viii) for the purpose of historical, statistical, journalistic, literature and art or scientific research.</li> </ul> </li> </ul> <p>Further processing of personal data shall be in accordance with the purpose of collection.</p> <p>Part V</p> <p>Sensitive personal data of a data subject may be processed where—</p> <ul style="list-style-type: none"> <li>a) the processing is carried out in the course of legitimate activities with appropriate safeguards by a foundation, association or any other not for profit body with a political, philosophical, religious or trade union aim and on condition that the processing relates solely to the members of the body or to persons who have regular contact with it in</li> </ul> |                    |

| Legal Section | Relevant Provisions  | Compliance Aspects |
|---------------|--|--------------------|
|               | <p>connection with its purposes and the personal data is not disclosed outside that body without the consent of the data subject.</p> <p>b) the processing relates to personal data which is manifestly made public by the data subject; or</p> <p>c) processing is necessary for –</p> <p>(i) the establishment, exercise or defense of a legal claim;</p> <p>(ii) the purpose of carrying out the obligations and exercising specific rights of the controller or of the data subject; or</p> <p>(iii) protecting the vital interests of the data subject or another person where the data subject is physically or legally incapable of giving consent.</p> |                    |

#### **4.30 Institutional and Administrative Framework**

There are many organizations involved in environmental management in the Country. These organizations include the Ministry of Environment, Climate Change and Forestry; NEMA; Ministry of Roads and Transport; Ministry of Lands, Public Works, Housing and Urban Development; Ministry of Water, Sanitation and Irrigation, etc.

##### **4.30.1 National Environment Management Authority**

The objective and purpose for which NEMA was established is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of the government in the implementation of all policies relating to the environment.

In addition to NEMA, EMCA Cap 387 provides for the establishment and enforcement of environmental quality standards to be set by the CS in consultation with the Authority, which will govern the discharge, limits to the environment by the proposed Project.

NEMA's mandate is designated to the following committees in liaison with the County Governments:

##### **Relevance**

NEMA must approve the proposed Project before implementation and also participate in subsequent stages of construction as well as environmental management and annual audits review.

##### **4.30.2 County Environment Committees**

According to EMC(A)A, 2015, the Governor by notice in the gazette shall appoint a County Environment Committee (CEC) of the County.

The CECs are responsible for the proper management of the environment within the County for which it is appointed; develop a County Strategic Environmental Action Plan every five years; and perform such additional functions as are prescribed by EMC(A)A, 2015 or as may, from to time, be assigned by the Governor by notice in the Gazette.

##### **Relevance**

KURA ensures that the Project abides by the laws and plans of the CEC.

##### **4.30.3 National Environment Complaints Committee**

The National Environment Complaints Committee performs the following functions:

- to investigate

- i) any allegations or complaints against any person or against the Authority in relation to the condition of the environment in Kenya;
  - ii) on its own motion, any suspected case of environmental degradation, and to make a report of its findings together with its recommendations thereon to the CS;
- to prepare and submit to the CS, periodic reports of its activities which report shall form part of the annual report on the state of the environment under section 9(3);
  - undertake public interest litigation on behalf of the citizens in environmental matters; and
  - to perform such other functions and exercise such powers as may be assigned to it by the CS.

### **Relevance**

Provides a forum for Environmental conflict resolutions between the Public and KURA in case of any allegations regarding the proposed Project.

#### **4.30.4 National Environment Tribunal**

National Environment Tribunal (NET) guides the handling of any case related to environmental offences in the Republic of Kenya.

### **Relevance**

KURA can appeal to the Tribunal when it is not satisfied with NEMA's decisions especially on licensing.

#### **4.30.5 Environment and Land Court**

The Court was established under Section 4 of the Environment and Land Court Act No. 19 of 2011. It has the Jurisdiction to hear any other disputes relating to environment and land.

### **Relevance**

The Court is the final arbiter in any environmental matter whereby in the event KURA feels aggrieved by NET's decision they can appeal.

#### **4.30.6 Ministry of Environment, Climate Change & Forestry**

The CS is the accounting Officer in the line Ministry and:

- i. Is responsible for policy formulation and directions for purposes of the Act;
- ii. Sets national goals and objectives and determine policies and priorities for the protection of the environment;
- iii. Promotes co-operation among public departments, County Governments, private sector, NGOs and such other organizations engaged in environmental protection programs;

- iv. Provide evidence of public participation in the formulation of the policy and the environment action plan; and,
- v. Performs such other functions as are assigned under the Act.

### **Relevance**

KURA should ensure that the Project abides by the goals and objectives of the Ministry of Environment, Climate Change and Forestry.

#### **4.30.7 The World Commission on Environment and Development of 1987**

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

### **Relevance**

KURA ensures that the Project is sustainable in all spheres, it does not cause damage to the environment while at the same time improves the living standards of the people around it.

#### **4.30.8 The Ministry of Roads and Transport**

The Transport Sector in Kenya encompasses a transport system comprising of road, rail, air and maritime. The sector is crucial in the promotion of socio-economic activities and development since an efficient and effective transport system a mainspring for rapid and sustained development in terms of national, regional and international integration, trade facilitation, poverty reduction and improvement of welfare of the citizen. The Ministry has two State Departments with distinct, interrelated and interdependent functions as follows:

##### **1. State Department for Roads**

The Departments functions are:

- National Roads Development;
- Development, Standardization and Maintenance of Roads;
- Materials Testing and Advise on Usage;
- Protection of Road Reserves;
- Maintenance of Security Roads;
- Administer Mechanical and Transport Fund;

- Registration of Engineers;
- Mechanical and Transport Services; and
- Enforcement of Axle Load Control.

## **2. State Department for Transport**

The Departments functions are:

- Transport Policy Management;
- Rail Transport and Infrastructure Management;
- Fast Tracking Identified Northern Corridor Transport and Lamu Port South Sudan Ethiopia Transport (LAPSSET) Corridor Projects;
- Oversight and Coordination of Northern Corridor Transport and LAPSSET Programmes Implementation;
- Civil Aviation Management and Training;
- Registration and Insurance of Motor Vehicles;
- Motor Vehicle Inspection;
- National Transport Safety;
- National Road Safety Management;
- National Road Transport Policy;
- Axle Load Control Policy and Standards;
- Development and Maintenance of Airstrips; and
- Overseeing the establishment of an integrated, efficient, effective and sustainable Urban Public Transport System within the Nairobi Metropolitan Area (NMA).

### **Relevance**

The functions of the two State Departments are interrelated and interdependent, and are applicable within the Project cycle. KURA the Proponent is among the institutions in the State Department for Roads.

#### **4.30.9 Kenya Urban Roads Authority**

KURA was established by the Kenya Roads Act, 2007. KURA is an autonomous road agency, responsible for the Development, Rehabilitation and Maintenance of National Urban Roads

The main functions of KURA are:

- Constructing, upgrading, rehabilitating and maintaining roads under its control;
- Controlling urban roads reserves and access to roadside developments;
- Implementing road policies in relation to urban roads;

- Ensuring adherence by motorists to the rules and guidelines on axle load control prescribed under the Traffic Act Cap 403 and any Regulations under the Act;
- Ensuring that the quality of road works is in accordance with such standards as may be defined by the CS;
- In collaboration with the Ministry responsible for transport and the Police Department, oversee the management of traffic and road safety on urban roads;
- Monitoring and evaluating the use of urban roads;
- Planning the development and maintenance of urban roads;
- Collecting and collating all such data related to the use of urban roads as may be necessary for efficient forward planning under this Act;
- Preparing the roads works programmes for all urban roads;
- Liaising and coordinating with other road authorities in planning and on operations in respect of roads;
- Advising the CS on all issues relating to urban roads; and
- Performing such other functions related to the implementation of this Act as may be directed by the CS.

KURA has established Directorate of Urban Roads Planning & Design headed by a Director and has the following functions:

- Social Economic and Environmental Planning for Projects,
- Conducting ESIA's;
- Conducting EAs for Projects;
- Carrying out Environmental and Social Monitoring of ongoing Projects;
- Setting standards for compliance with the ESMMP developed by the ESIA's;
- Ensuring that the quality of road works is in accordance with such standards as may be defined by the CS;
- In collaboration with the Ministry for Roads and Transport and the Police Department, oversee the management of the Traffic and Road Safety on Urban Roads;
- Collecting and collating all such data related to the use of urban roads as may be necessary for efficient forward planning under the Kenya Roads Act, 2007;
- Liaising and coordinating with other road authorities in planning and on operations in respect of roads; and
- Performing such other functions related to the implementation of the Kenya Roads Act, 2007 as may be directed by the CS.

### **Relevance**

In regard to this Project, the Environmental and Social Safeguards Department (ESSD) will be crucial in setting standards for compliance with the ESMMP developed in this ESIA Study Report for BRT Line 5.



#### **4.30.10 Water Resources Authority**

WRA is responsible for regulation of water resources issues 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;
- Catchments and water quality management;
- Regulation and control of water use; and
- Coordination of the Integrated Water Resource Management (IWRM) Plan.

#### **Relevance**

There are surface water sources and a wetland in the project area. The Contractor will however, need to consult WRA for the best source of water for construction as well as the management of the wetlands on the proposed Project area.

#### **4.30.11 National Transport and Safety Authority**

The National Transport and Safety Authority (NTSA) was established through an Act of Parliament; Act Number 33 on 26<sup>th</sup> October 2012. The objective of forming the Authority was to harmonize the operations of the key road transport departments and help in effectively managing the road transport sub-sector and minimizing loss of lives through road accidents.

#### **Relevance**

The road designs need to aid in achieving the acceptable speeds set by NTSA to avoid loss of lives. In addition, there should be adequate pedestrian footbridges along the road and road safety awareness programmes.

#### **4.30.12 Kenya Roads Board**

The main objective of Kenya Roads Board (KRB) is to oversee the road network in Kenya and thereby coordinate its development, rehabilitation and maintenance and is the principal adviser to the Government on all matters related development, rehabilitation and maintenance. It ensures prudent sourcing and optimal utilization of resources for socio-economic development.

### **Relevance**

KRB will oversee and coordinate the development of the BRT Line 5 Project ensuring optimal utilization of funds to achieve a sustainable road network.

#### **4.30.13 Nairobi Metropolitan Area Transport Authority**

NaMATA was established by an Executive Order through Legal Notice No. 18 of 17<sup>th</sup> February, 2017 with the main mandate of overseeing the establishment of an integrated, efficient, effective and sustainable public transport system within NMA. The NMA is made up of Kajiado, Kiambu, Machakos, Murang'a and Nairobi City Counties.

The Authority shall:

- Develop, formulate, and implement strategies, plans and policies in relation to public transport;
- Coordinate the development, management and maintenance of the Mass Rapid Transport (MRT) with other Government Agencies and Parties;
- Regulate and enter into agreement with MRT operators and service providers;
- Integration of all modes of transport, as well as transport and land use planning;
- Research and development to provide evidentially based MRTs network; and,
- Improve the environmental sustainability of the transport system in the Metropolitan area.

### **Relevance**

It is necessary that the KURA and the Contractor incorporate the BRT Framework of NaMATA in the proposed Project.

#### **4.30.14 Nairobi Rivers Commission**

The Commission was established through a Gazette Notice number 14891 on 2<sup>nd</sup> December, 2022. The aim of the commission is to reclaim the rivers of Nairobi as a spine to the city's blue and green infrastructure for a better urban environment and quality of life. The commission envisages a collaborative approach, together with other stakeholders and development partners to secure, protect and restore the critical River Basin to achieve the shared goal of reclaiming the Rivers in Nairobi.

### **Relevance**

There are several rivers trans versing the proposed Project Road including Nairobi River and Ngong River thus KURA will work closely with the Nairobi Rivers Commission (NRC) to ensure that they are protected from pollution that may arise during construction.

#### **4.30.15 Radiation Protection Board**

The Radiation Protection Board was established through the Radiation Protection Act, 2012. The main functions of the Board include:

- To advise the Minister on matters relating to radiation protection and radioactive waste disposal;
- To implement the provisions of this Act and regulations made thereunder;
- To grant or refuse to grant or to extend licenses issued under this Act and to impose any necessary conditions on a license so granted; and
- To keep a register of the owners of irradiating devices, radioactive materials and other sources of ionizing radiation imported into or manufactured in Kenya and of premises licensed to dispose of radioactive waste.

#### **Relevance**

It is important that the Project follow all the regulations set forth by the Radiation Protection Board, in case of use of any encounter with radioactive material.

#### **4.30.16 The Export-Import Bank of Korea**

The Export-Import Bank of Korea (Korea Exim bank) is an official export credit agency providing comprehensive export credit and guarantee programs to support Korean enterprises in conducting overseas business. The bank was established in 1976. Since its establishment, the bank has actively supported Korea's export-led economy and facilitated economic cooperation with foreign countries. Korea Exim bank's primary services include export loans, trade finance and guarantee programs structured to meet the needs of clients in a direct effort to both complement and strengthen the clients' competitiveness in global markets. The international guidelines applicable to Projects financed by Exim bank are as follows:

##### **i. Private Sector Projects**

The default international guidelines applicable to private sector projects, those with financing structured as limited recourse project finance or corporate risk are the IFC Performance Standards on Environmental and Social Sustainability and the Environmental Health and Safety (EHS) Guidelines of the World Bank Group.

##### **ii. Public Sector Projects**

The bank encourages sovereign foreign buyers to apply the IFC performance standards and the EHS guidelines of the World Bank Group to the construction and operation of Projects. Alternatively, should a sovereign foreign buyer opt instead to apply the ten Environmental Safeguard Policies of the World Bank with the applicable EHS guidelines of the World Bank Group, Exim bank will require supplemental information about the proposed Project's Environmental and Social Impacts that may be needed to meet the requirements of the IFC performance standards.

## **Relevance**

KURA will apply the set conditions by the Korea Exim Bank (who are the proposed Project Sponsors) incorporating the IFC performance standards and the ten Environmental Safeguard Policies to the BRT Line 5 Project implementation and operation.

### **4.31 The International Finance Corporation's Performance Standards on Environmental and Social Sustainability**

The IFC performance standards as revised in January, 2012 provides the proponent with instruments to structure, design, construct and manage the operations of projects in an environmentally and socially acceptable manner while identifying measures to avoid or mitigate adverse impacts resulting from the projects. These performance standards are intended to focus on outcomes rather than process, thereby stressing the implementation of sound environmental and social mitigation measures that achieve desired outcomes. These performance standards include:

- Assessment and management of environmental and social risks and impacts;
- Labour and working conditions;
- Resource efficiency and pollution prevention;
- Community health, safety and security;
- Land acquisition and involuntary resettlement;
- Biodiversity conservation and sustainable management of living natural resources;
- Indigenous people; and
- Cultural heritage.

The proposed Project will trigger the below discussed IFC performance standards.

#### **4.31.1 Assessment and Management of Environmental and Social Risks and Impacts**

This performance standard establishes the importance of integrated assessment to identify the environmental and social impacts, risks and opportunities of projects. It also establishes effective community engagement through disclosure of project related information and consultation with local communities on matters that directly affect them.

## **Relevance**

KURA will integrate this performance standard into the core proposed Project implementation in order to anticipate environmental and social risks posed by the proposed Project activities and avoid, minimize and compensate for the impacts where necessary.

#### **4.31.2 Labour and Working Conditions**

This performance standard recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. The requirements set out in this performance standard have been in part guided by a number of international conventions and instruments including those of the ILO and the UN.

##### **Relevance**

KURA and the Contractor recognises that the workforce is its valuable asset thus the Authority will ensure a sound worker-management relationship for the success of the proposed Project.

#### **4.31.3 Resource Efficiency and Pollution Prevention**

This performance standard recognises that increased economic activity and urbanization often generate increased levels of pollution to air, water and land and consume finite resources in a manner that may threaten people and the environment at the local, regional and global levels. More efficient and effective resource use and pollution prevention and GHG emission avoidance and mitigation technologies and practices have become more accessible and achievable.

This performance standard outlines a project level approach to resource efficiency and pollution prevention and control in line with internationally disseminated technologies and practices.

##### **Relevance**

This performance standard will guide KURA to integrate practices and technologies that promote energy efficiency, use resources, including energy and water, sustainably.

#### **4.31.4 Community Health, Safety and Security**

This performance standard addresses potential risks and impacts to the affected communities from project activities. It requires the Proponent to evaluate the risks and impacts to the health and safety of the affected communities during the project life cycle and to establish preventive and control measures consistent with good international industry practice.

##### **Relevance**

KURA will adopt responsible practices to reduce risks to the communities affected by the proposed Project including through emergency preparedness and response, security force management and the design safety measures.

#### **4.31.5 Biodiversity Conservation and Sustainable Management of Living Natural Resources**

This performance standard recognizes that protecting and conserving biodiversity, maintaining ecosystem services and sustainably managing living natural resources are fundamental to sustainable development. There are four types of ecosystem services including provision services, regulating services, cultural services and supporting services. Impacts on biodiversity can often adversely affect the delivery of ecosystem services.

##### **Relevance**

KURA will sustainably manage and mitigate impacts on biodiversity and ecosystem services throughout the proposed Project life cycle being guided by this performance standard.

#### **4.32 The World Bank Environmental and Social Framework**

The World Bank Group Environmental and Social framework sets out the World Bank's commitment to sustainable development through a set of policies and environmental and social standards that are designed to support borrowers' projects, with the aim of ending extreme poverty and promoting shared prosperity.

The World Bank environmental and social framework supplement the IFC Performance Standards. They provide technical reference documents with general and industry specific examples of good international industry practices. The guidelines contain environmental performance levels and measures for projects in the various industrial sectors that are considered to be achievable in facilities at reasonable cost using existing technology. The framework also includes provision on grievance redress and accountability.

The ten environmental and social standards that the project will meet through the project life cycle include:

- Assessment and management of environmental and social risks and impacts;
- Labour and working conditions;
- Resource efficiency and pollution prevention and management;
- Community health and safety;
- Land acquisition, restrictions on land use and involuntary resettlement;
- Biodiversity conservation and sustainable management of living natural resources, indigenous people/ sub-saharan African historically undeserved traditional local communities;
- Cultural heritage;
- Financial intermediaries; and
- Stakeholder engagement and information disclosure.

The proposed Project will trigger the below discussed Environmental and Social Standards (ESS).

#### **4.32.1 Assessment and Management of Environmental and Social Risks and Impacts**

This standard sets out the Proponents responsibility for assessing, managing and monitoring environmental and social risks and impacts associated with each stage of the Project in order to achieve environmental and social outcomes consistent with the ESS. The objectives of this ESS are:

- To identify, evaluate and manage the environment and social risks and impacts of the proposed Project in a manner consistent with the ESS;
- To adopt a mitigation hierarchy approach to:
  - (i) anticipate and avoid risks and impacts;
  - (ii) where avoidance is not possible, minimize or reduce risks to acceptable levels;
  - (iii) once risks and impacts have been reduced, mitigate; and
  - (iv) where significant residual impacts remain, compensate for or offset them, where technically and financially feasible.
- To adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities resulting from the proposed Project;
- To utilize National environmental and social institutions, systems, laws, regulations and procedures in the assessment, development and implementation of Projects whenever appropriate; and,
- To promote improved environmental and social performance, in ways which recognize and enhance borrower capacity.

#### **Relevance**

It is anticipated that the proposed Project will have significant and adverse potential impacts and that the direct and indirect environmental and social impacts are likely to be diverse. The main issues will result from the construction and operational phases of the proposed Project activities particularly dust and air emissions, noise pollution and vibration, soil erosion due to excavation and earthworks and pollution of soil and water sources from spillage of oils and sediments. An ESIA Study Report which includes an ESMMP has been prepared to fulfill the requirements of this ESS.

#### **4.32.2 Labour and Working Conditions**

This ESS recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. The specific objectives of this ESS include:

- To promote of safety and health at work;
- To promote the fair treatment, nondiscrimination and equal opportunity of Project workers;

- To protect project workers, including vulnerable workers such as women, persons living with disability and community workers;
- To prevent the use of all forms of forced labour and child labour;
- To support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law; and
- To provide project workers with accessible means to raise workplace concern.

### **Relevance**

KURA and the Contractor will promote sound worker-management relationship and enhance the development benefits of the proposed Project by treating workers in the proposed Project fairly and providing safe and healthy working conditions.

#### **4.32.3 Resource Efficiency and Pollution Prevention and Management**

This ESS recognizes that economic activities and urbanization often generate pollution to air, water and land and consume finite resources that may threaten people, ecosystem services and the environment at the local, regional and global levels. The current and projected atmospheric concentration of GHG, threatens the welfare of current and future generations.

### **Relevance**

KURA will ensure more efficient and effective resource use, pollution prevention and GHG emission avoidance, and adopt mitigation technologies and practices on the proposed Project.

#### **4.32.4 Community Health and Safety**

This ESS recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, these communities already subjected to impacts from climate change may also experience an acceleration or intensification of impacts due to Project activities. This ESS aims to promote quality and safety and considerations relating to climate change in the design and construction of infrastructure. It also aims to minimize or avoid community exposure to project related traffic and road safety risks, diseases and hazardous material.

### **Relevance**

KURA will evaluate the risks and impacts of the proposed Project on the health and safety of any community that may be affected during the proposed Project life cycle.

#### **4.32.5 Biodiversity Conservation and Sustainable Management of Living Natural Resources**

This ESS recognizes that protecting and conserving biodiversity and sustainably managing natural living resources are fundamental to sustainable development.



The specific objectives of this ESS include:

- To protect and conserve biodiversity and habitats;
- To apply the mitigation hierarchy and the precautionary approach in the design and implementation of Projects that could have an impact on biodiversity;
- To promote the sustainable management of living natural resources; and,
- To support livelihoods of local communities, including indigenous people and inclusive economic development through the adoption of practices that integrate conservation needs and development priorities.

### **Relevance**

KURA will identify the potential risks and impacts on habitats and the biodiversity located along the proposed Project Area. The Authority will implement measures to minimize adverse impacts and restore biodiversity in accordance with the mitigation hierarchy.

#### **4.32.6 Stakeholder Engagement and Information Disclosure**

This ESS recognizes the importance of open and transparent engagement between the Proponent and the Project Stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social sustainability of Projects, enhance Project acceptance and make a significant contribution to successful Project design and implementation.

### **Relevance**

KURA has undertaken stakeholders' engagement through questionnaire interviews along the Project Road and stakeholders' consultation meetings with the key stakeholders involved and affected by the BRT Line 5 Project. The Authority will further engage with the stakeholders throughout the proposed Project life cycle and will provide them with timely, relevant, understandable and accessible information. The consultations will be free of manipulation, interference, coercion, discrimination and intimidation.

#### **4.33 International Conventions and Treaties**

A treaty is a binding agreement under International Law concluded by subjects of International Law, namely states and international organizations. Treaties can be called by many names including; International Agreements, Protocols, Covenants, Conventions, Exchanges of Letters, Exchanges of Notes, etc. However, all of these are equally treaties and the rules are the same regardless of what the treaty is called.

Treaties can be loosely compared to contracts; both are means of willing parties assuming obligations among themselves, and a party to either that fails to live up to their obligations can be held legally liable for that breach. The central principle of treaty law is expressed in the *maxim pactasunt servanda*, translated as "pacts must be respected."

Kenya has ratified the following Project-relevant international conventions:

#### **4.33.1 United Nations Framework Convention on Climate Change, 1994**

The Convention on Climate Change sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognizes that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other GHG. The Convention enjoys near universal membership, with 191 countries having ratified.

Under the Convention, governments:

- Gather and share information on GHG emissions, national policies and best practices;
- Launch national strategies for addressing GHG emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and,
- Co-operate in preparing for adaptation to the impacts of climate change.

The Convention entered into force on 21<sup>st</sup> March 1994.

The landmark UNFCCC was opened for signature at the 1992 United Nations Conference on Environment and Development (UNCED) Conference in Rio de Janeiro (known by its popular title, the Earth Summit). On June 12<sup>th</sup> 1992, 154 nations signed the UNFCCC that upon ratification committed signatories' governments to a voluntary "non-binding aim" to reduce atmospheric concentrations of GHG with the goal of "preventing dangerous anthropogenic interference with Earth's climate system." These actions were aimed primarily at industrialized countries, with the intention of stabilizing their emissions of GHG at 1990 levels by the year 2000; and other responsibilities would be incumbent upon all UNFCCC parties. The parties agreed in general that they would recognize "common but differentiated responsibilities," with greater responsibility for reducing GHG emissions in the near term on the part of developed/industrialized countries, which were listed and identified in Annex I of the UNFCCC and thereafter referred to as "Annex I" countries.

Kenya signed the UNFCCC on 12th July 1992, ratified it on 30th August 1994 and started enforcing it on 28th November 1994.

#### **Relevance**

KURA and the Contractor will be required to observe the above convention in all its operations throughout the project cycle in reducing emission of GHG leading to climate change.

#### **4.33.2 Kyoto Protocol, 1997**

According to a press release from the United Nations Environment Programme:

*"The Kyoto Protocol is an agreement under which industrialized countries will reduce their collective emissions of greenhouse gases by 5.2% compared to the year 1990 (but note that, compared to the emissions levels that would be expected by 2010 without the Protocol, this target represents a 29% cut). The goal is to lower overall emissions of six greenhouse gases - carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, hydrofluorocarbons, and perfluorocarbons - calculated as an average over the five-year period of 2008-12"* ([http://en.wikipedia.org/wiki/kyoto\\_protocol](http://en.wikipedia.org/wiki/kyoto_protocol)).

It is an agreement negotiated as an amendment to UNFCCC, which was adopted at the Earth Summit in Rio de Janeiro in 1992. All parties to the UNFCCC can sign or ratify the Kyoto Protocol, while non-parties to the UNFCCC cannot. The Kyoto Protocol was adopted at the third session of the Conference of Parties (COP) to the UNFCCC in 1997 in Kyoto, Japan.

Kenya's accession was presented on 25<sup>th</sup> February 2005 and the Protocol acceded on 26<sup>th</sup> May 2005.

### **Relevance**

The Contractor will be required to carry out regular inspection and maintenance of construction equipment in order to reduce the levels of Green House Carbons (GHCs) emissions into the atmosphere.

#### **4.33.3 Convention on Biological Diversity, 1993**

The Convention entered into force on 29<sup>th</sup> December 1993, which was 90 days after the 30<sup>th</sup> ratification. The first session of COP was scheduled for 28<sup>th</sup> November to 9<sup>th</sup> December 1994 in the Bahamas. Kenya is a signatory of the convention which has three main goals namely:

- Conservation of biological diversity (or Biodiversity);
- Sustainable use of its components; and
- Fair and equitable sharing of benefits arising from genetic resources.

### **Relevance**

Although the proposed Project is in an urban ecosystem, the Contractor and KURA should look out for species of conservation importance if established in the baseline environmental study in liaison with the National Museums of Kenya.

#### **4.33.4 The 1985 Vienna Convention for the Protection of the Ozone Layer**

The Vienna Convention for the Protection of the Ozone Layer, 1985 was adopted after consensus was reached on 22<sup>nd</sup> March 1985. The overall objective of the Vienna Convention is to protect human health and the environment against the effects of ozone depletion. As a framework convention, it does not establish any specific controls on ozone depleting substances. Instead, it establishes a general obligation upon the parties to protect the ozone layer (article 2)

and emphasizes the need for international cooperation. For instance, GHG might be released from the asphalt fumes at the asphalt plants.

### **Relevance**

KURA and the Contractor will be required to observe the above convention in all its operations throughout the project cycle in reducing emission of GHG.

#### **4.33.5 The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer**

The Montreal Protocol on Substances that Deplete the Ozone Layer is a significant milestone in international environmental law. It establishes firm targets for reducing and eventually eliminating consumption and production of a range of ozone depleting substances. These substances are enumerated in Annexes A-E to the Protocol and are to be phased out within the schedule given in article 2A – 2I.

### **Relevance**

KURA and the Contractor will be required to observe the above convention in all its operations throughout the project cycle in reducing emission of Ozone Depleting Substances (ODS).

#### **4.33.6 The Paris Agreement**

The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris, France, on 12<sup>th</sup> December 2015. It entered into force on 4 November 2016. Its overarching goal is to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. Kenya ratified the agreement on December 28, 2016.

Implementation of the Paris Agreement requires economic and social transformation, based on the best available science. The Paris Agreement works on a five-year cycle of increasingly ambitious climate action.

Since 2020, Countries have been submitting their national climate action plans, known as NDC. Each successive NDC is meant to reflect an increasingly higher degree of ambition compared to the previous version. In their NDCs, countries communicate actions they will take to reduce their GHG emissions in order to reach the goals of the Paris Agreement. Countries also communicate in their NDCs actions they will take to build resilience to adapt to the impacts of climate change.

The Paris Agreement reaffirms that developed countries should take the lead in providing financial assistance to countries that are less endowed and more vulnerable, while for the first time also encouraging voluntary contributions by other Parties. Climate finance is needed for mitigation, because large-scale investments are required to significantly reduce emissions.

Climate finance is equally important for adaptation, as significant financial resources are needed to adapt to the adverse effects and reduce the impacts of a changing climate.

**Relevance**

KURA and the Contractor will be required to observe the above agreement as well as the NDC in all its operations throughout the project cycle in reducing impacts of climate change.

## **5. PUBLIC PARTICIPATION**

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### **5.1 Government's Policy on Community Participation**

The Government of Kenya Policy on community participation is to involve communities in policy formulation and implementation at the local level. More specifically, the Community Action Planning Programme's objective is to put in place a durable system of intra-community co-operation through collective action, which creates communal discussion forums for the implementation of development activities.

The Kenya government has enshrined the need for human societies' involvement in project development in the Constitution. This has been set out in the EMCA Cap 387 and EIAA Regulations, 2003. Community participation ensures that communities and stakeholders are part and parcel of the proposed developments and in so doing assures the sustainable use of resources. It has also demonstrated successfully that projects that go through this process will acquire high level of acceptance and accrue benefits to a wider section of the society.

Public participation forms a useful component for gathering, understanding and establishing likely impacts of projects determining community and individual preferences and selecting alternatives. Furthermore, through public participation, it is possible to enhance project designs and ensure sustainability of the projects.

### **5.2 Benefits of Public Participation**

#### **5.2.1 Benefits to a Developer**

The following public participation benefits are associated with a developer.

- The developer will benefit from the local knowledge;
- Costs may be saved as key issues are identified by the public and studies are focused on key issues as opposed to a broad range of issues;
- Measure to reduce impacts and enhance benefits will be identified with stakeholders;
- Relations with the communities in the vicinity of the development will be improved;
- Delays in decision making may be reduced because of good participation early in the process;
- The public are unlikely to raise objections to the Project; and
- The developer's image and reputation will be enhanced.

#### **5.2.2 Benefits to Civil Society and Public**

The following public participation benefits are associated with the Civil Society and Public:

- Capacity is built through people playing an active role during the process. The skills learnt can be used in other community projects;
- Civil Society and the public rights are exercised and projected by participating; and
- Inputs will influence the form and nature of the development and is likely to lead to better development that takes societies needs into account.

### **5.2.3 Benefits to Decision Makers**

The following public participation benefits are associated with the decision makers:

- Public participation will improve decisions since there is access to a broader range of perspectives and opinion on the proposed development;
- The development is likely to be more sustainable as it takes people's needs and views into account; and
- Governance and the legitimacy of the government will be improved.

### **5.3 Scope and Objectives**

The Spectrum of Public Participation by the International Association for Public Participation (IAPP) is an international guide used in determining the scope of public participation by defining the public's role in any public participation process. This Study adopted the modified version of the Public Participation Spectrum adapted by Tina Nabatchi in 2012 as outlined in **Figure 3** overleaf. It includes; the modes of communication: one-way or two-way, and deliberative that attend each form of public participation.

The Spectrum of Public Participation describes five general modes of participation that fall on a progressive continuum of increasing public influence over decision-making. The five general modes are; Inform, Consult, Involve, Collaborate, and Empower, thus the potential for deliberative communication increases with greater participant involvement, collaboration, and empowerment.

The input of the stakeholders is useful in the evaluation of the project and functions to fulfil the environmental management strategy set forth by NEMA, which is all-inclusive. The goal (overall objective) of Public Participation and the Promise to the Public respectively were:

- To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solutions; and
- To seek advice and innovative ways in formulating solutions and incorporate stakeholders' advice and recommendations into the Project's decisions to the maximum extent possible.

The public participation specific objectives were:

- To inform the Project Stakeholders of the details of the proposed Project;
- To collect views on the positive impacts anticipated by the Project Stakeholders;
- To collect views on the negative impacts anticipated by the Project Stakeholders;
- To collect views on the enhancement measure from the Project Stakeholders;
- To collect views on the applicable mitigation measures from the Project Stakeholders;
- To collect views on the applicable project alternatives from the Project Stakeholders;
- To collect views on the preferred alternative by the Project Stakeholders; and
- To incorporate to the extent feasible the Project Stakeholders’ view, suggestions and recommendations in the Project implementation.

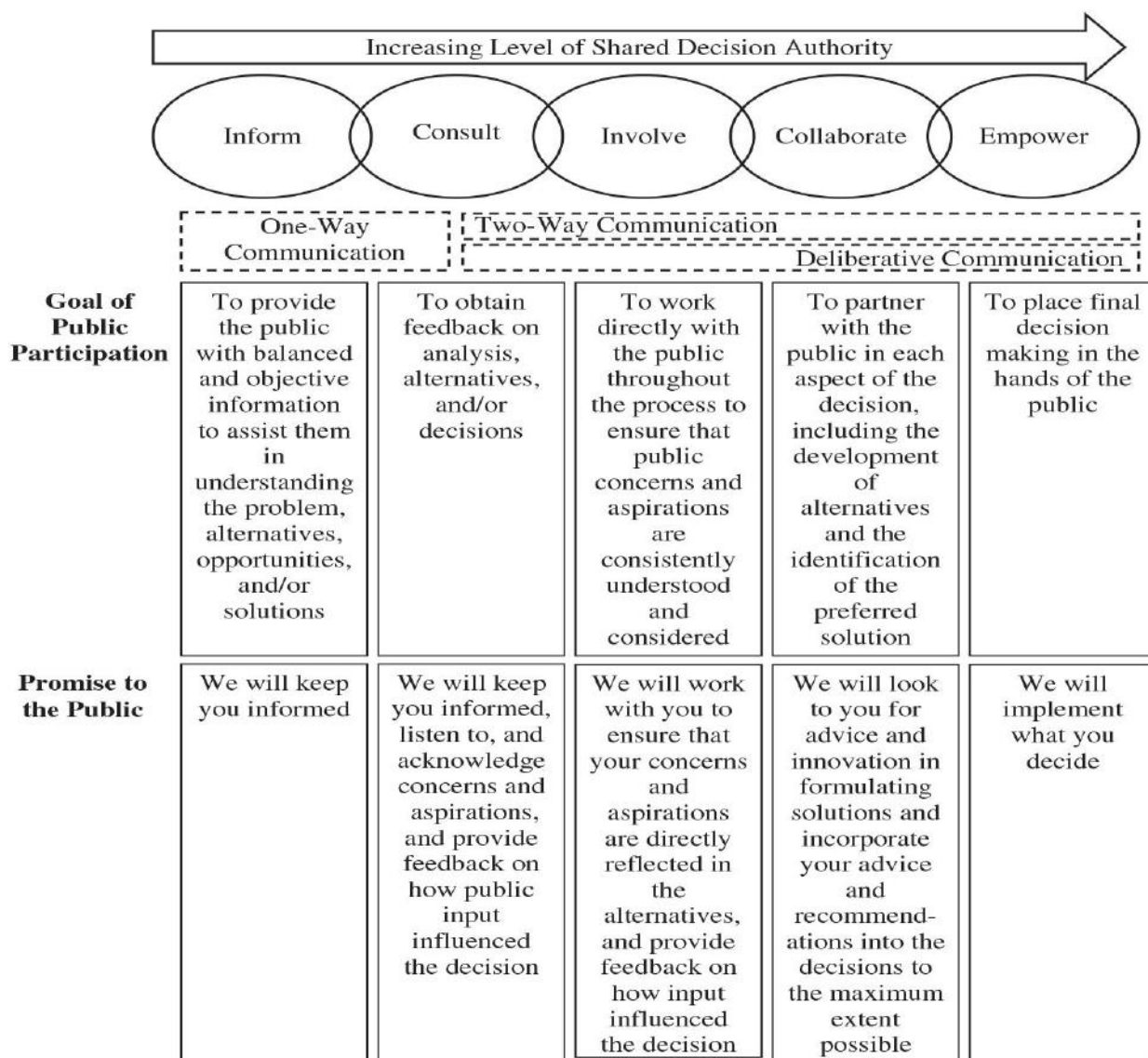


Figure 2: Public Participation Spectrum (Tina Nabatchi, 2012)

#### 5.4 Approach

Public participation with respect to the proposed Project was done through the following methodologies:



- Administration of a Structured Questionnaire; and
- Holding Eight (8) Stakeholders' Consultation Meetings.

#### 5.4.1 Administration of the Structured Questionnaire

The administration of the Structured Questionnaire was done along the Project Road from 26<sup>th</sup> to 29<sup>th</sup> August, 2024. Two Hundred and Five (205) copies of the Questionnaire were filled and returned to the Study team for analysis. Sample copies of the filled Questionnaire capturing the respondents' views/opinions and suggestions are attached as **Appendix 3**.

#### 5.4.2 Questionnaire Analysis

The following analysis is based on the two hundred and five (205) Questionnaire copies filled out by the respondents and analysed by the Study team. Details of the respondents who filled out the Questionnaire are provided in **Table 21** below.

**Table 21: Summary of the Respondents' Details**

| SN  | Name                        | Gender | National ID   | Contact    | Location |
|-----|-----------------------------|--------|---------------|------------|----------|
| 1.  | Salome Mueni                | Female | 334734062     | 0716370286 | Donholm  |
| 2.  | Jared Otieno                | Male   | 7129034       | 0114781287 | Tassia   |
| 3.  | Rothvelt Alozere            | Male   | 24582401      | 0713576971 | Tassia   |
| 4.  | Stephen Wanjala             | Male   | Not Disclosed | 0720114596 | Tassia   |
| 5.  | Dominic Wambua              | Male   | 24876311      | 0724045861 | Tassia   |
| 6.  | Osogo Boniface              | Male   | 32341648      | 0700058866 | Tassia   |
| 7.  | Joash Kombo                 | Male   | 27374862      | 0710954087 | Tassia   |
| 8.  | Jackson Omollo              | Male   | 205983223     | 0791286697 | Tassia   |
| 9.  | Michael Juma Amollo         | Male   | 26762226      | 0717313025 | Tassia   |
| 10. | Charles Ruaru               | Male   | 22648800      | 0728318787 | Tassia   |
| 11. | Paul Njuguna                | Male   | 23794439      | 0715491020 | Tassia   |
| 12. | Total Fedha Service Station | Female | 14609040      | 0786772427 | Fedha    |
| 13. | Abdisiyad Yusuf             | Male   | 28315639      | 0715106182 | Fedha    |
| 14. | Shabani Uthmoni             | Male   | 26166199      | 0712121063 | Fedha    |
| 15. | Catherine Ngugi             | Female | 33305370      | 0716005546 | Fedha    |
| 16. | Eli Kiprono                 | Male   | 27342120      | 0723430123 | Fedha    |
| 17. | Faith Musyoki               | Female | Not Disclosed | 0712683545 | Fedha    |
| 18. | Lucy Kimani                 | Female | Not Disclosed | 0757473686 | Fedha    |
| 19. | Lewis Njema                 | Male   | Not Disclosed | 0796247793 | Fedha    |
| 20. | Mumbi Mbugua                | Female | 38251815      | 0710113898 | Fedha    |
| 21. | Miriam Khalamwa             | Female | 34043783      | 0796353073 | Fedha    |
| 22. | Martin Osundwa              | Male   | 35665262      | 0799473177 | Fedha    |
| 23. | Enoch                       | Male   | Not Disclosed | 0707186535 | Fedha    |
| 24. | Vivian Wanjofu              | Female | 41343919      | 0792781928 | Fedha    |
| 25. | Luqman Petroleum Limited    | Male   | 34168415      | 0722779712 | Fedha    |
| 26. | Daniel Wanyonyi             | Male   | 37013228      | 0791708866 | Pipeline |
| 27. | John Mwangi                 | Male   | Not Disclosed | 0746714899 | Pipeline |
| 28. | Risper Kinyua               | Female | Not Disclosed | 0747104290 | Pipeline |
| 29. | Maxwell Shimoli             | Male   | Not Disclosed | 0790462534 | Pipeline |
| 30. | Willy Munyao Lombe          | Male   | Not Disclosed | 0742375765 | Pipeline |

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| SN  | Name                 | Gender | National ID   | Contact    | Location  |
|-----|----------------------|--------|---------------|------------|-----------|
| 31. | Dennis Nameta        | Male   | 37509118      | 0745395642 | Pipeline  |
| 32. | Steve Kyalo          | Male   | 38805208      | 0703823209 | Pipeline  |
| 33. | Michael Omondi       | Male   | Not Disclosed | 0708445443 | Pipeline  |
| 34. | Tony Mbala           | Male   | 33371429      | 0786319922 | Pipeline  |
| 35. | Mohammed Ali         | Male   | 31851455      | 0729079578 | Pipeline  |
| 36. | Dismas Marita        | Male   | 34942314      | 0701556817 | Pipeline  |
| 37. | Nelson Ngure Onyaa   | Male   | 13827359      | 0723754134 | Pipeline  |
| 38. | Alphonse Muchumbe    | Male   | 13480468      | 0731782002 | Pipeline  |
| 39. | Kennedy Otieno       | Male   | 35464515      | 0796573090 | Pipeline  |
| 40. | Sheryl Omogi         | Female | 42457348      | 0769290386 | Pipeline  |
| 41. | Mary Mueni           | Female | 28625456      | 0716689650 | Pipeline  |
| 42. | Shem Manyinsa        | Male   | 29861978      | 0783929213 | Pipeline  |
| 43. | Felix Kimathi        | Male   | 24917390      | 0726763783 | Taj Mall  |
| 44. | Nehemiah Bina        | Male   | 31750065      | 0758602210 | Taj Mall  |
| 45. | Evangeline Njeru     | Male   | Not Disclosed | 0721469663 | Taj Mall  |
| 46. | Moses Moseti         | Male   | 26755194      | 0723559755 | Taj Mall  |
| 47. | Benson Musyoka Wanja | Male   | 36141589      | 0792375201 | Taj Mall  |
| 48. | Titus Rapemo         | Male   | Not Disclosed | 0718873036 | Taj Mall  |
| 49. | Richard Mutinda      | Male   | 33929916      | 0799890729 | Taj Mall  |
| 50. | Shady Mwanzia        | Male   | Not Disclosed | 0791607351 | Taj Mall  |
| 51. | Tyson Ondiek         | Male   | Not Disclosed | 0792131372 | Taj Mall  |
| 52. | Kevin Wamaita        | Male   | 38128593      | 0794144383 | Taj Mall  |
| 53. | John Kenyatta        | Male   | 38174704      | 0796385340 | Taj Mall  |
| 54. | Daniel Mutinda       | Male   | 24440751      | 0713111402 | Taj Mall  |
| 55. | Moses Kibet          | Male   | 13828733      | 0741113396 | Taj Mall  |
| 56. | Sterling Wafula      | Male   | Not Disclosed | 0706410463 | Taj Mall  |
| 57. | Leo Cardia Mutisa    | Female | 23407828      | 0758827825 | Taj Mall  |
| 58. | Samson Mugendi Njagi | Male   | 22425107      | 0722214407 | Taj Mall  |
| 59. | Purity Kavinya       | Female | 39858394      | 0704008272 | Taj Mall  |
| 60. | John Kimanzi         | Male   | 12962112      | 0721715727 | Taj Mall  |
| 61. | John Kennedy         | Male   | 27976224      | 0708444623 | Taj Mall  |
| 62. | Justus Bosire        | Male   | 22290646      | 0722265264 | Taj Mall  |
| 63. | Walter Oyal          | Male   | 26736442      | 0720640159 | Taj Mall  |
| 64. | Bernard              | Male   | 30135654      | 0714804814 | Taj Mall  |
| 65. | Irene Somba          | Female | 30466037      | 0794643972 | Taj Mall  |
| 66. | Winfred Mutua        | Female | 36595192      | 0799857640 | Taj Mall  |
| 67. | Brian Ochaka         | Male   | Not Disclosed | 0795712159 | Taj Mall  |
| 68. | Dishon Muriithi      | Male   | 34314896      | 0799171879 | Mutindwa  |
| 69. | Martin Mujuku        | Male   | 22728592      | 072385167  | Mutindwa  |
| 70. | Kelvin Gicheru       | Male   | 41809709      | 01145694   | Mutindwa  |
| 71. | Ian Ochieng'         | Male   | 38970434      | 0113774850 | Mutindwa  |
| 72. | Mercy Njoki          | Female | 32087131      | 0713356793 | Mutindwa  |
| 73. | Ronald Murage        | Male   | Not Disclosed | 0757967961 | Mutindwa  |
| 74. | Douglas Chweya       | Male   | 2692063       | 0727246181 | Baba Dogo |
| 75. | Julius Muite         | Male   | 29234433      | 0715967659 | Baba Dogo |
| 76. | Kuria Stephen        | Male   | 1166941       | 0728864063 | Baba Dogo |
| 77. | Rachael Ochieng'     | Female | 30858650      | 0700633620 | Baba Dogo |
| 78. | Jeremiah Oite        | Male   | 8606210       | 0724064486 | Baba Dogo |
| 79. | Earnest Odhiambo     | Male   | 3152280       | 0719757356 | Baba Dogo |
| 80. | Stephen Odhiambo     | Male   | 27691779      | 0727708906 | Baba Dogo |
| 81. | Philip Otieno Owino  | Male   | 11548757      | 0720443289 | Baba Dogo |
| 82. | Douglas Maube        | Male   | Not Disclosed | 0735459134 | Baba Dogo |

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| SN   | Name                              | Gender | National ID   | Contact    | Location   |
|------|-----------------------------------|--------|---------------|------------|------------|
| 83.  | Ali Mohamed                       | Male   | 27393103      | 0724252938 | Baba Dogo  |
| 84.  | Elijah Muchiri                    | Male   | 11828268      | 0722780147 | Baba Dogo  |
| 85.  | Jacob Njuguna                     | Male   | 11667702      | 070011038  | Baba Dogo  |
| 86.  | Keith Otieno                      | Male   | Not Disclosed | 0799319790 | Baba Dogo  |
| 87.  | Nicholas Owino                    | Male   | Not Disclosed | 0726902945 | Baba Dogo  |
| 88.  | Reagan Anone                      | Male   | Not Disclosed | 073299982  | Baba Dogo  |
| 89.  | Amos Amalemba                     | Male   | 26291833      | 0711594310 | Baba Dogo  |
| 90.  | Lillian Randeh                    | Female | 13750073      | 0715587255 | Baba Dogo  |
| 91.  | Mutese Kaele                      | Male   | 27638320      | 0727319117 | Baba Dogo  |
| 92.  | Roselyn Akinyi                    | Female | 10263762      | 0725011387 | Baba Dogo  |
| 93.  | Peter Munene                      | Male   | 12889323      | 0727394781 | Baba Dogo  |
| 94.  | Mary Ochieng'                     | Female | 32069299      | 0716047529 | Baba Dogo  |
| 95.  | Mary Manoti                       | Female | 28640047      | 073480600  | Baba Dogo  |
| 96.  | Isaac Kirima                      | Male   | 24687422      | 0710952522 | Baba Dogo  |
| 97.  | Masiga B. Abdurazakah             | Male   | Not Disclosed | 0718716496 | Kariobangi |
| 98.  | Paul Obuonde Wanyama              | Male   | 6720370       | 0722593256 | Taj Mall   |
| 99.  | Malowa Vincent                    | Male   | 33366616      | 0718367210 | Taj Mall   |
| 100. | Multiple Hauliers (EA) Ltd        | Male   | 10224053      | 0792868759 | Taj Mall   |
| 101. | Amos Chepkwony                    | Male   | 34016862      | 0795291286 | Taj Mall   |
| 102. | Naomi Wambua                      | Female | 34371450      | 0715618530 | Taj Mall   |
| 103. | Kitchen Professionals Ltd         | Female | 22370004      | 0733500011 | Taj Mall   |
| 104. | Shell New Ruaraka Service Station | Male   | 30650414      | 0729353487 | Baba Dogo  |
| 105. | Bayer East Africa Limited         | Male   | Not Disclosed | 0722898360 | Allsops    |
| 106. | Meshack Nzuki                     | Male   | 40734308      | 0746844168 | Mutindwa   |
| 107. | Lewis Kiplagat                    | Male   | 35645549      | 0735510337 | Mutindwa   |
| 108. | Tabitha Karaya                    | Female | Not Disclosed | 0791603728 | Mutindwa   |
| 109. | Ephantus Njoroge                  | Male   | 13432721      | 0735921679 | Mutindwa   |
| 110. | Amina Quality                     | Female | 29125815      | 0717772817 | Mutindwa   |
| 111. | John Mutisya                      | Male   | 27826181      | 0728916851 | Donholm    |
| 112. | Johnson Mwiwa                     | Male   | 23013269      | 0724367428 | Donholm    |
| 113. | Isaac Morara                      | Male   | 24380293      | 0726312161 | Donholm    |
| 114. | Maxwell Khanyis                   | Male   | Not-Disclosed | 0740209573 | Huruma     |
| 115. | Hassan Dae Ume                    | Male   | 24138008      | 0727275183 | Huruma     |
| 116. | Lemize Inter                      | Male   | Not-Disclosed | 0759191744 | Huruma     |
| 117. | Bezelel Bazil                     | Male   | 40587953      | 0746189734 | Huruma     |
| 118. | Rose Gathigia                     | Female | 9291599       | 0790515126 | Kariobangi |
| 119. | Hussein Adan                      | Male   | 24137809      | 0725233087 | Huruma     |
| 120. | Mugu Rose Raha                    | Female | 5941779       | 0720432921 | Huruma     |
| 121. | David Mwangi                      | Male   | Not-Disclosed | 0726621306 | Huruma     |
| 122. | Samson Kirongo                    | Male   | Not-Disclosed | 0708030726 | Kamunde    |
| 123. | Kennedy Gitau                     | Male   | 32308778      | 0728479955 | Donholm    |
| 124. | Linet Ogutu                       | Female | 20025599      | 0716483757 | Donholm    |
| 125. | Wallace Wanjiku                   | Female | 23540540      | 0710446451 | Donholm    |
| 126. | Joseph Ndonge                     | Male   | 37252154      | 0717833536 | Donholm    |
| 127. | Atuya Victor Nyachwaya            | Male   | 32955619      | 0727865624 | Donholm    |
| 128. | Albert Kamenju                    | Male   | 28558030      | 0714568060 | Donholm    |
| 129. | Michael Maina                     | Male   | 23738064      | 0726171960 | Donholm    |
| 130. | Geoffrey Nyambane                 | Male   | 29152234      | 0714302362 | Donholm    |
| 131. | Samuel Nyotu                      | Male   | Not-Disclosed | 0729304646 | Donholm    |
| 132. | Justus Mutua                      | Male   | 29538284      | 0724964293 | Donholm    |
| 133. | Rapando Phelex                    | Male   | 32322337      | 0717001062 | Phelline   |

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| SN   | Name                       | Gender | National ID   | Contact       | Location         |
|------|----------------------------|--------|---------------|---------------|------------------|
| 134. | Josephat Nderitu           | Male   | 34010207      | 0726137641    | Donholm          |
| 135. | Wycliffe Owando            | Male   | 07951579      | 0722449547    | Huruma           |
| 136. | Jonathan Mbutu             | Male   | 33112917      | 0704205427    | Allsops          |
| 137. | Zakayo Kuria               | Male   | Not Disclosed | 0741624209    | Allsops          |
| 138. | Benard Ogeto               | Male   | 275644418     | 0710349820    | Allsops          |
| 139. | Juliana Wambui             | Female | 41375431      | 0938819202    | Allsops          |
| 140. | Alex Musyoka               | Male   | Not Disclosed | 0710782687    | Allsops          |
| 141. | Danson Mutisya             | Male   | 29334127      | Not Disclosed | Allsops          |
| 142. | Peter Gitau                | Male   | 72785565      | 0722671667    | Allsops          |
| 143. | Irene Ntinyaru             | Female | 31943268      | 0781102143    | Manyanja         |
| 144. | John Mulewa                | Male   | 34268341      | 0701244346    | Allsops          |
| 145. | Flora Chelagat Kosgei      | Female | 329177305     | 0723134738    | Allsops          |
| 146. | Ogeto Boniface             | Male   | 15273201      | 0711136103    | Allsops          |
| 147. | Lucy Wanjeri               | Female | Not Disclosed | 0726131690    | Allsops          |
| 148. | Mable Lundu                | Female | Not Disclosed | 0723677891    | Allsops          |
| 149. | Samuel Mbiu                | Male   | Not Disclosed | 0724494126    | Allsops          |
| 150. | James Mwita                | Male   | Not Disclosed | 0729240759    | Allsops          |
| 151. | Brooke Chebet              | Female | 40325209      | 0713159180    | Allsops          |
| 152. | Stephen Kalonzo            | Male   | 40773200      | 0110431995    | Allsops          |
| 153. | Okinyi Dedan Kenneth       | Male   | 24979576      | 0727401399    | Allsops          |
| 154. | Nelly Tauni                | Female | 33726397      | 0727497503    | Allsops          |
| 155. | Mwinzi Dvid Mutati         | Male   | 38277244      | 0799521224    | Babadogo         |
| 156. | Kennedy Kamau              | Male   | 33476148      | 0725853144    | Donholm          |
| 157. | Dennis Wambua              | Male   | 41105508      | 0745949379    | Manyanja         |
| 158. | Rachael Odhiambo           | Female | 7981243       | 0722770779    | Manyanja         |
| 159. | Rachael Wausi              | Female | 41775820      | 0700286086    | Manyanja         |
| 160. | George Onyengo Shiudu      | Male   | 368891895     | 0790030963    | Manyanja         |
| 161. | Benard Mburu               | Male   | 12668319      | 011355076     | Kariobangi South |
| 162. | Patrick Waweru             | Male   | 28249935      | 0794771469    | Kariobangi South |
| 163. | Edwin Maina                | Male   | 37826891      | 0725055695    | Tena             |
| 164. | Tonny Kirwa                | Male   | 37951800      | 0737143623    | Tena             |
| 165. | James Onyango              | Male   | 36781823      | 0792076982    | Tena             |
| 166. | Mary Mwende                | Female | Not Disclosed | 0102735892    | Tena             |
| 167. | Stavin Muhonja             | Male   | 37915617      | 0113747289    | Tena             |
| 168. | Mary Kinyua                | Female | 34574349      | 0723222357    | Tena             |
| 169. | Jack Odero                 | Male   | Not Disclosed | 0714162033    | Tena             |
| 170. | Paul Wambugu               | Male   | 9671549       | 0722457512    | Makadara         |
| 171. | Mugathu Building Solutions | N/A    | Not Disclosed | 0722809728    | Tena             |
| 172. | James Maina                | Male   | 13674006      | 0725651961    | Kariobangi South |
| 173. | Julius Ougu                | Male   | 30560878      | 0714416050    | Tena             |
| 174. | Gilbert Muroki             | Male   | 24352723      | 0707167566    | Tena             |
| 175. | Joel Ndirangu              | Male   | 34608620      | 0702925556    | Tena             |
| 176. | Erick Kimathi Nyaga        | Male   | 13619727      | 0722864674    | Kariobangi       |
| 177. | Jane Kiroiro               | Female | 9380451       | 0712701796    | Kariobangi       |
| 178. | Mbayaki Wanyonyi Emmanuel  | Male   | 36478745      | 0769333494    | Harmony          |
| 179. | John Irungu                | Male   | Not Disclosed | 0726471731    | Huruma           |
| 180. | Abdirizak Shurie           | Male   | 40612311      | 0722895189    | Huruma           |
| 181. | Alex Kimani                | Male   | Not Disclosed | 0798905720    | Huruma           |

| SN   | Name              | Gender | National ID   | Contact       | Location   |
|------|-------------------|--------|---------------|---------------|------------|
| 182. | Metrine Nyikuli   | Male   | 39657419      | 0115272065    | Kamunde    |
| 183. | Pamela Muriuki    | Female | 41289342      | 0705378162    | Kamunde    |
| 184. | Cheryl Odindo     | Female | 38373954      | 0741519595    | Kamunde    |
| 185. | Albert Cheruiyot  | Male   | Not Disclosed | 0720894132    | Kamunde    |
| 186. | Bonface Mutinda   | Male   | 41312960      | 0706609543    | Kamunde    |
| 187. | Kevin Ouma        | Male   | 31537364      | 0702840801    | Kariobangi |
| 188. | Magdalene Musyoka | Female | 34874321      | 0717130744    | Kariobangi |
| 189. | Stephen Lang'o    | Male   | 29393814      | 0768525534    | Kariobangi |
| 190. | Alex Kavoi Peter  | Male   | 41425838      | 0794649604    | Kariobangi |
| 191. | Jairus Okwemba    | Male   | 35355756      | 0712333670    | Kariobangi |
| 192. | Emmanuel Juma     | Male   | 35438272      | 0731813144    | Huruma     |
| 193. | Jack Omondi Ogola | Male   | 22589800      | 0728748915    | Kariobangi |
| 194. | Jack Musau        | Male   | 37801935      | 0757206920    | Kariobangi |
| 195. | Kennedy Chege     | Male   | 20129861      | 0727455356    | Kamunde    |
| 196. | Mary Muthoni      | Female | Not Disclosed | 0725976772    | Kamunde    |
| 197. | Shaban Abdul      | Male   | 14497526      | 0708613918    | Kamunde    |
| 198. | David Githiga     | Male   | Not Disclosed | 0723555442    | Huruma     |
| 199. | Esther Wangari    | Female | Not Disclosed | 0741436994    | Huruma     |
| 200. | Joyce Mumbé       | Female | 34293331      | 0752349695    | Kariobangi |
| 201. | Aidha Suleiman    | Female | Not Disclosed | Not Disclosed | Huruma     |
| 202. | Ruth Katuma       | Female | 33516497      | 0705574779    | Kamunde    |
| 203. | Stella Katuma     | Female | 28913320      | 0703371242    | Kamunde    |
| 204. | Ignatius Kariuki  | Male   | 1078586       | 0721178763    | Kamunde    |
| 205. | Francis Gakeera   | Male   | Not Disclosed | 0714789879    | Huruma     |

### 5.4.3 Issues Raised by the Respondents

One hundred and ninety-one (191) respondents, representing 93% of the total respondents welcomed the proposed Project while fourteen (14) respondent equivalent to 7% of the total respondents did not welcome the proposed Project.

#### 5.4.3.1 Reasons for Welcoming the proposed Project

The respondents provided various reasons for welcoming the proposed Project as summarised in Table 22 below.

Table 22: Reasons for Welcoming the Proposed Project

| Reason for Welcoming the Project                     | No. of Respondents | Percentage of the Respondents (%) |
|--|--------------------|-----------------------------------|
| Enhance traffic efficiency (ease traffic congestion) | 156                | 82                                |
| Generate revenue for County and National Government  | 59                 | 31                                |
| Improved accessibility                               | 127                | 66                                |
| Reduce travel time                                   | 131                | 69                                |
| Improved Non-Motorised Transport (NMT)Facilities     | 53                 | 28                                |

| Reason for Welcoming the Project                                | No. of Respondents | Percentage of the Respondents (%) |
|---|--------------------|-----------------------------------|
| Enhance safety for Persons with Disabilities (PWD) and Security | 56                 | 29                                |

Other reasons for welcoming the proposed Project:

- Improved business operations along Outer Ring Road;
- Standardization of the cost of transportation; and
- Improved aesthetics.

#### **5.4.3.2 Reason for Unwelcoming the proposed Project**

The respondents' reason for not welcoming the proposed Project were:

- Increased and unfair competition to the existing PSVs;
- Implementation of the previous BRT Line 2 stalled i.e Thika Road BRT Project. The respondents raised concern that the proposed BRT Line 5 Project would stall as well; and
- Inadequate space for implementation the proposed Project to standard.

#### **5.4.3.3 Environmental Impacts Anticipated from the Proposed Project**

The respondents were further asked to identify the environmental impacts that they anticipate from the proposed Project. They gave their views as shown in **Table 23** below.

**Table 23: Environmental Impacts Anticipated by Respondents**

| Environmental Impacts                            | No. of Respondents | Percentage of the Respondents (%) |
|--|--------------------|-----------------------------------|
| Positive Environmental Impacts Only              | 162                | 79                                |
| Negative Environmental Impacts Only              | 6                  | 3                                 |
| Both Positive and Negative Environmental Impacts | 37                 | 18                                |

The anticipated positive environmental impacts identified by the respondents who attributed positive environmental impacts only and both positive and negative environmental impacts from the proposed Project are as shown in **Table 24** below.

**Table 24: Anticipated Positive Environmental Impacts**

| Positive Environmental Impact | No. of Respondents | Percentage of the Respondents (%) |
|-------------------------------|--------------------|-----------------------------------|
| Reduced air pollution         | 131                | 66                                |
| Reduced noise pollution       | 104                | 52                                |

| Positive Environmental Impact | No. of Respondents | Percentage of the Respondents (%) |
|-------------------------------|--------------------|-----------------------------------|
| Improve aesthetics            | 116                | 58                                |

The anticipated adverse physical environmental impacts identified by the respondents who attributed both positive and negative environmental impacts from the proposed Project are as shown in **Table 25** below.

**Table 25: Anticipated Adverse Physical Environmental Impacts**

| Negative Environmental Impact | No. of Respondents | Percentage of the Respondents (%) |
|-------------------------------|--------------------|-----------------------------------|
| Land degradation              | 11                 | 26                                |
| Soil erosion                  | 2                  | 5                                 |
| Water depletion               | 5                  | 12                                |
| Poor waste management         | 20                 | 47                                |
| Poor air quality              | 13                 | 30                                |
| Noise pollution               | 18                 | 42                                |

The negative biological environmental impacts identified by the respondents who attributed both positive and negative environmental impacts from the proposed Project are as shown in **Table 26** below.

**Table 26: Anticipated Adverse Biological Environment Impacts**

| Negative Environmental Impact        | No. of Respondents | Percentage of the Respondents (%) |
|--------------------------------------|--------------------|-----------------------------------|
| Destruction of vegetation            | 20                 | 47                                |
| Introduction of invasive species     | 5                  | 12                                |
| Habitat fragmentation and alteration | 5                  | 12                                |
| Threat to wildlife and other animals | 1                  | 2                                 |

#### **5.4.3.3.1 Mitigation of the Negative Environmental Impacts**

Respondents were further asked to state the mitigation measures for the negative environmental impacts they had listed. They suggested the following mitigation measures:

- KURA should facilitate proper and improved waste management,
- KURA should consider tree planting activities in order to restore lost green zones;
- The Contractor should consider use of machinery with minimum noise and vibration;
- KURA should consider educating the locals along the Study Road on the importance of proper waste management and impacts of illegal dumping;
- KURA and the Contractor should ensure restoration of any degraded land during construction especially the green zones;

- KURA should improve drainage system along Outer Ring Road during Construction of the BRT Project to deal with drainage challenges and soil erosion; and
- The Contractor should ensure regular sprinkling water to reduce dust pollution during construction.

#### 5.4.3.4 Climate Change Impacts Anticipated by the Respondents

The anticipated climate change impacts associated with the proposed Project were identified by the respondents as shown in

Table 27 below.

**Table 27: Climate Change Impacts Anticipated by Respondents**

| Climate Change Impacts                            | No. of Respondents | Percentage of the Respondents (%) |
|---|--------------------|-----------------------------------|
| Positive Climate Change Impacts Only              | 147                | 72                                |
| Negative Climate Change Impacts Only              | 6                  | 3                                 |
| Both Positive and Negative Climate Change Impacts | 52                 | 25                                |

The anticipated positive climate change impacts identified by the respondents who attributed positive climate change impacts only and both positive and negative climate change impacts from the proposed Project are as shown in Table 28 below.

**Table 28: Positive Climate Change Impacts Anticipated by Respondents**

| Positive Climate Change Impact   | No. of Respondents | Percentage of the Respondents (%) |
|----------------------------------|--------------------|-----------------------------------|
| Reduced fuel consumption         | 144                | 72                                |
| Reduced greenhouse gas emissions | 104                | 52                                |
| Increase resource use efficiency | 98                 | 49                                |

The anticipated negative climate change impacts identified by the respondents who anticipate negative climate change impacts only, and both positive and negative climate change impacts from the proposed Project are as shown in Table 29 below.

**Table 29: Negative Climate Change Impacts Anticipated by Respondents**

| Negative Climate Change Impact                      | No. of Respondents | Percentage of the Respondents (%) |
|---|--------------------|-----------------------------------|
| Increased greenhouse gas emissions                  | 12                 | 21                                |
| Increase surface runoff                             | 20                 | 34                                |
| Decreased lifetime of the Roads due to storm surges | 16                 | 28                                |
| Damage to drainage system due to flooding and       | 34                 | 59                                |



| <b>Negative Climate Change Impact</b>   | <b>No. of Respondents</b> | <b>Percentage of the Respondents (%)</b> |
|---|---------------------------|--|
| overloading of drains   |                           |  |
| Deterioration of pavement integrity such as softening, traffic related rutting and migration of liquid asphalt due to increase in temperature | 11                        | 19                                       |

#### **5.4.3.4.1 Adaptive Measures for Climate Change Impacts**

The respondents were asked to state the adaptive measures for the adverse climate change impacts they had listed. They suggested the following adaptive measures:

- Use of heat resistant pavement in road Projects in arid and semi-arid areas;
- Carry out regular road maintenance;
- KURA should ensure that the Contractor installs a proper drainage systems during construction; and
- Implement storm water capture and storage systems and road water harvesting.

#### **5.4.3.4.2 Mitigation Measures for Climate Change Impacts**

The respondents were further asked to state the mitigation measures for the negative climate change impacts they had listed. They suggested the following mitigation measures:

- Regular maintenance of motor vehicles;
- Implement efficiency (energy, petroleum, products, water etc.);
- Carry out tree planting and road beautification program (carbon sinks); and
- Provide non-motorized transit facilities.

#### **5.4.3.5 Social Impacts Anticipated by the Respondents**

Regarding the social impacts associated with the proposed Project, the respondents stated them as shown in **Table 30** below:

**Table 30: Social Impacts Anticipated by Respondents**

| <b>Social Impacts</b>                     | <b>No. of Respondents</b> | <b>Percentage of the Respondents (%)</b> |
|---|---------------------------|--|
| Positive Social Impacts Only              | 139                       | 68                                       |
| Negative Social Impacts Only              | 3                         | 2  |
| Both Positive and Negative Social Impacts | 63                        | 30                                       |

The anticipated positive social impacts identified by the respondents who attributed positive social impacts only, and both positive and negative social impacts from the proposed Project are as shown in **Table 31** below.

**Table 31: Anticipated Positive Social Impacts**

| Positive Social Impacts  | No. of Respondents | Percentage of the Respondents (%) |
|--|--------------------|-----------------------------------|
| Time saving for income generating/economic activities  | 170                | 84                                |
| Reduce vehicle resource requirement and operating costs  | 65                 | 32                                |
| Improved city economy from efficient transport   | 96                 | 48                                |
| Reduced investment from utilization of the existing road as compared to dualing/expansion of roads | 49                 | 24                                |
| Increased uptake of passenger transport  | 95                 | 47                                |
| Reduced Traffic Congestion   | 134                | 66                                |
| Transport cost reduction   | 91                 | 45                                |

The anticipated negative social impacts identified by the respondents who anticipated both positive and negative social impacts from the proposed Project are shown in **Table 32** below.

**Table 32: Anticipated Negative Social Impacts**

| Negative Social Impact   | No. of Respondents | Percentage of the Respondents (%) |
|--|--------------------|-----------------------------------|
| Displacement of Project Affected Persons   | 26                 | 39                                |
| Vandalism of Road Furniture and BRT equipment  | 25                 | 38                                |
| Increase in hawkers/vendors during and after Construction                            | 19                 | 29                                |
| Lack of diversions/alternative routes  | 24                 | 36                                |
| Interruption of services [e.g. power lines, water pipes, communication cables, etc.] | 25                 | 38                                |
| Blocking and interruption of accesses to residential property, social amenities etc. | 15                 | 23                                |
| Construction works induced traffic inconveniences                                    | 16                 | 24                                |

#### **5.4.3.6 Mitigation Measures for the Anticipated Negative Social Impacts**

The respondents were further asked to state the mitigation measures for the negative social impacts they had listed. They suggested the following mitigation measures:

- Adequate notice should be issued to those who have encroached to relocate their property;
- Provision of diversions and alternative routes;
- The Contractor should ensure proper planning of construction activities in order to minimize disruptions;

- Liaison with the necessary service providers for efficient relocation of services;
- The Contractor should ensure provision of adequate diversions and alternative routes;
- The works to be confined at the median of Outer Ring Road as much as possible to allow for normal flow of traffic on the carriageway;
- Improve security along Outer Ring Road to curb road asset vandalism; and
- Maintenance of passage of traffic through the works to enhance accessibility.

#### 5.4.3.7 Labour Impacts Anticipated by the Respondents

Regarding the labour impacts associated with the proposed Project, the respondents stated them as shown in

Table 33 below.

**Table 33: Labour Impacts Anticipated by Respondents**

| Labour Impacts                            | No. of Respondents | Percentage of the Respondents (%) |
|---|--------------------|-----------------------------------|
| Positive Labour Impacts Only              | 142                | 69                                |
| Negative Labour Impacts Only              | 2                  | 1                                 |
| Both Positive and Negative Labour Impacts | 61                 | 30                                |

The anticipated positive labour impacts identified by the respondents who attributed positive labour impacts only, and both positive and negative labour impacts from the proposed Project are as shown in Table 34 below.

**Table 34: Anticipated Positive Labour Impacts**

| Positive Labor Impacts                | No. of Respondents | Percentage of the Respondents (%) |
|---------------------------------------|--------------------|-----------------------------------|
| Creation of employment                | 191                | 94                                |
| Improvement of livelihoods            | 147                | 72                                |
| Skill development                     | 98                 | 48                                |
| Promotion of local businesses/economy | 130                | 64                                |

The anticipated negative labour impacts identified by the respondents who anticipated both positive and negative labour impacts from the proposed Project are shown in Table 35 below.

**Table 35: Anticipated Negative Labour Impacts**

| Negative Community Health and Safety Impacts                                  | No. of Respondents | Percentage of the Respondents (%) |
|---|--------------------|-----------------------------------|
| Injuries to workers during project implementation due to disregard for safety | 34                 | 54                                |
| Increased Child Labour  | 7                  | 11                                |

| <b>Negative Community Health and Safety Impacts</b>           | <b>No. of Respondents</b> | <b>Percentage of the Respondents (%)</b> |
|---|---------------------------|--|
| Non-compliance to the minimum wages                           | 44                        | 70                                       |
| Non-remittance of government stipulated deductions            | 16                        | 25                                       |
| Influx of employment and potential employees from other areas | 20                        | 32                                       |

#### **5.4.3.8 Mitigation Measures for the Anticipated Negative Labour Impacts**

The respondents stated the following mitigation measures for the negative labour impacts they anticipated from the proposed Project:

- The Contractor should provide proper personal protective equipment (PPEs) to workers at Site;
- KURA and the Contractor should ensure fair and equitable employment process;
- KURA should ensure that the Contractor is in compliance with minimum wages;
- Proper education on matters safety should be available to all local residents;
- All safety precautionary measures as per OSHA regulations should be adhered to;
- KURA should carry out regular monitoring of Contractor’s personal to curb child involvement;
- The Contractor should ensure all wages are paid on time;
- Provide short-term contract to locals aligned with minimum wage regulation; and
- The Contractor should observe child rights in Project implementation.

#### **5.4.3.9 Proposed Project Impact on Existing Public Service Vehicles**

The respondents were asked to state the impacts they anticipate the implementation of BRT Line 5 Project will have on the existing Public Transport Service, the respondents stated the impacts as shown in **Table 36** below.

**Table 36: Proposed Project Impact on Existing PSVs**

| <b>Proposed Project Impacts on Existing PSVs</b> | <b>No. of Respondents</b> | <b>Percentage of the Respondents (%)</b> |
|--|---------------------------|--|
| Positive Impacts Only                            | 92                        | 45                                       |
| Negative Impacts Only                            | 6                         | 3  |
| Both Positive and Negative Impacts               | 107                       | 52                                       |

The anticipated positive impacts on existing PSVs as identified by the respondents who attributed positive impacts only, and both positive and negative impacts from the proposed Project are as shown in **Table 37** below:

**Table 37: Anticipated Positive Impacts on Existing PSVs**

| Positive Impacts on Existing PSVs        | No. of Respondents | Percentage of the Respondents (%) |
|--|--------------------|-----------------------------------|
| Decrease Congestion                      | 173                | 87                                |
| Standardized Transport Cost              | 150                | 75                                |
| Adherence to traffic rules               | 88                 | 44                                |
| Improved road safety in public transport | 104                | 52                                |

The anticipated negative impacts from the proposed Project on existing PSVs as cited by the respondents who anticipated negative impacts only and both impacts are shown in **Table 38** below.

**Table 38: Anticipated Negative Impacts on Existing PSVs**

| Negative Impacts on Existing PSV | No. of Respondents | Percentage of the Respondents (%) |
|----------------------------------|--------------------|-----------------------------------|
| Unfair Competition               | 70                 | 62                                |
| Reduced demand for existing PSVs | 95                 | 84                                |
| Reduced business opportunities   | 53                 | 47                                |

#### 5.4.3.9.1 Mitigation Measures for the Anticipated Negative Impacts on Existing Public Transport Service

- KURA should consult widely with the existing PSVs SACCOs on the Outer Ring Road route to resolve the issues they have regarding the propose BRT Project;
- KURA should create conducive environment for boda boda riders as well as matatu operators to avoid unfair competition with the upcoming BRT Project;
- The Operator for BRT Line 5 should give a proper catalogue of the BRT bus fares; and
- KURA should ensure liaison with the existing PSVs SACCOs on the route throughout Project implementation.

#### 5.4.3.10 Community Safety and Health Impacts Anticipated by the Respondents

Regarding the community safety and health impacts associated with the proposed Project, the respondents stated them as shown in **Table 39** below.

**Table 39: Community Safety and Health Impacts Anticipated**

| Community Safety and Health Impacts                            | No. of Respondents | Percentage of the Respondents (%) |
|--|--------------------|-----------------------------------|
| Positive Community Safety and Health Impacts Only              | 164                | 80                                |
| Negative Community Safety and Health Impacts Only              | 2                  | 1                                 |
| Both Positive and Negative Community Safety and Health Impacts | 39                 | 19                                |

The anticipated positive community safety and health impacts identified by the respondents who

attributed positive community safety and health impacts only, and both positive and negative community safety and health impacts from the proposed Project are as shown in **Table 40** below:

**Table 40: Positive Community Safety and Health Impacts Anticipated**

| <b>Positive Community Health and Safety Impacts</b>                          | <b>No. of Respondents</b> | <b>Percentage of the Respondents (%)</b> |
|--|---------------------------|--|
| Enhanced security and reduction of incidences of crime                       | 137                       | 67                                       |
| Reduced traffic accidents and collisions                                     | 150                       | 74                                       |
| Reduced respiratory infections (reduced air pollution)                       | 111                       | 55                                       |
| Improved road safety (bus tracking system and traffic violation enforcement) | 107                       | 53                                       |
| Enhance emergency and incident response                                      | 75                        | 37                                       |

The anticipated negative community safety and health impacts cited by the respondents who anticipated negative community safety and health impacts only and both positive and negative community safety and health impacts from the proposed Project are shown in **Table 41** below.

**Table 41: Negative Community Safety and Health Impacts Anticipated**

| <b>Negative Community Health and Safety Impacts</b> | <b>No. of Respondents</b> | <b>Percentage of the Respondents (%)</b> |
|---|---------------------------|--|
| STI and HIV infection                               | 13                        | 32                                       |
| Respiratory infections                              | 16                        | 39                                       |
| Injuries to workers on site                         | 25                        | 61                                       |
| Traffic Accidents                                   | 12                        | 29                                       |

#### **5.4.3.10.1 Mitigation Measures for the Negative Community Safety and Health Risks**

The respondents stated the following mitigation measure for the health and safety risks they anticipated from the proposed Project:

- The Contractor should ensure there is adequate provision of proper first aid kits on site;
- Consider provision of street lighting and proper road signs upon Project completion;
- KURA should create HIV/AIDS awareness with the Project area locals to minimize risk of infections during Project implementation;
- KURA should carry out road safety awareness along Outer Ring Road and provide adequate road safety measures;
- The Contractor should provide adequate access points to the BRT Stations to avoid pedestrian accidents; and
- The Contractor should control dust pollution during construction to minimize respiratory illnesses.

#### **5.4.3.11 Suggestions for the Proponent to Consider**

Suggestions were recommended for KURA and the Contractor by the respondents to consider before and after implementation of the proposed Project. They are as listed below:

- KURA should ensure PWD are considered in the design and implementation of the proposed Project;
- The Contractor should consider proper planning of construction activities in order to minimize disruptions;
- KURA should consider adding an extra lane along the outer Ring Road upon completion of the BRT Line 5;
- KURA should consider the use of only electric/hybrid buses for the proposed BRT Line 5 Project in order to reduce GHG emission;
- KURA should ensure that the drainage system is properly designed and constructed to safely and efficiently drain storm water during the rainy season;
- KURA should improve on the drainage system of Outer Ring Road;
- The Contractor should prioritise local community for employment in the Project;
- Construction works should strictly be undertaken during the day to avoid noise pollution and inconveniencing locals/residents at night;
- KURA should ensure the Project is implemented to completion within stipulated Project period without delays;
- Ensure Liaison with relevant service providers to ensure seamless continuity in the event of disruption;
- KURA should consider replanting of all the lost native tree species where lost and also create of new habitats as compensation;
- KURA should ensure the existing PSVs are not locked out by BRT buses. The existing PSVs should be allowed to operate alongside the BRT buses;
- KURA should consider tree planting activities along Outer Ring Road;
- The Contractor should consider phasing out construction works for BRT Line 5 to mitigate against traffic disruptions;
- KURA and the Contractor should capitalize on night time hours for non-disruptive works;
- KURA should provide a periodic maintenance plan for Outer Ring Road;
- KURA should conduct sufficient public consultation forums to inform locals about BRT Line 5 Project;
- KURA together with the Contractor should ensure there is no destruction of Private property;
- Ensure proper reinforcement of existing pedestrian footbridges along Outer Ring Road;
- KURA should ensure all construction materials are of high quality in order to enhance durability of the Proposed Project;
- KURA should Consider construction of a pedestrian footbridge at Kamunde;

- KURA should consider extension of the proposed BRT Project to Jogoo Road route?
- KURA should ensure that there is proper utilization of the Project funds; and
- KURA should ensure that the Contractor constructs all stations to the required and stipulated design standards.

#### 5.4.4 Stakeholders' Consultation Meetings

Eight (8) Stakeholders' Consultative Meetings were held with the general public, local leaders, representatives from the relevant government institutions, as well as representatives from private institutions and other stakeholders as discussed **Table 42** below. The Attendance Registers and Minutes of the Stakeholders' Consultation Meetings are as attached in **Appendix 4**.

**Table 42: Stakeholders Consultation Meetings**

| SN | Date                            | Venue                          | Participants/<br>Constituencies            | No. of<br>Participants |
|----|---------------------------------|--------------------------------|--|------------------------|
| 1. | 5 <sup>th</sup> September 2024  | Barabara Plaza Auditorium      | Key Stakeholders                           | 120                    |
| 2. | 10 <sup>th</sup> September 2024 | CLS Hall, KAG University       | Makadara & Kamukunji                       | 91                     |
| 3. | 11 <sup>th</sup> September 2024 | Youth Empowerment Hall         | Embakasi West & Embakasi East              | 77                     |
| 4. | 12 <sup>th</sup> September 2024 | Redeemed Gospel Church, Kware  | Embakasi South                             | 84                     |
| 5. | 13 <sup>th</sup> September 2024 | Kenya Assemblies of God, Fedha | Embakasi East                              | 68                     |
| 6. | 17 <sup>th</sup> September 2024 | Royal Victory Hospital, Ruraka | Ruraka & Embakasi North                    | 68                     |
| 7. | 18 <sup>th</sup> September 2024 | Huruma CDF Hall, Huruma        | Mathare                                    | 128                    |
| 8. | 19 <sup>th</sup> September 2024 | Youth Empowerment Hall         | Matatu SACCOs plying Outer Ring Road Route | 80                     |

##### 5.4.4.1 First Stakeholders' Consultation Meeting

The first Stakeholders' Consultation Meeting was held on Thursday 5<sup>th</sup> September, 2024, from 10:00 am to 1:30 pm. The meeting was held at Barabara Plaza Auditorium where one hundred and twenty (120) participants attended. The details of those present at the meeting are provided in **Table 43** below while **Plate 60** and **Plate 61** overleaf illustrates photographs taken during the meeting.

**Table 43: Summary of Stakeholders' Details in the First Meeting**

| SN | Name             | Designation                               | Organization | Contact Details |
|----|------------------|---|--------------|-----------------|
| 1. | Joshua M. Kasoka | Communication Officer                     | NPS          | 0727845753      |
| 2. | Stephen Wambua   | DR  | NPS          | 0721761558      |
| 3. | Evans Sumba      | Programs                                  | FLONE        | 0792893274      |
| 4. | Joseph Kochalle  | Senior Infrastructure Development Officer | NaMATA       | 0727482824      |



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| SN  | Name                  | Designation                               | Organization                | Contact Details  |
|-----|-----------------------|---|-----------------------------|--|
| 5.  | Philip Musondi        | Projects                                  | ICPC                        | 0727876556   |
| 6.  | Job Mucoki            | Senior Environment Officer                | NaMATA                      | 0728674453   |
| 7.  | Amos Simei            | A/A                                       | KURA                        | 0722731726   |
| 8.  | Edwins Mukabanah      | Chairman                                  | ABOK                        | 0722731726   |
| 9.  | Ogonji D. R.          | SATS                                      | ITDP                        | 0705657131   |
| 10. | Lena Gatwiri          | Engineer                                  | CAS                         | 0704617606   |
| 11. | Min Kyeong Jeong      | Engineer                                  | Kunhwa                      | 0795758843   |
| 12. | Vincent Mogaka        | Transport Officer                         | SDOT                        | 0714605603   |
| 13. | Mary Abungu           | Transportation Engineer                   | TIMCON                      | 0705815980   |
| 14. | Michael Kariuki       | Director                                  | ABOK                        | 0722823203   |
| 15. | Sally Otieno          | Environment                               | KURA                        | 0795019748   |
| 16. | Charles Mutuku        | ICT Infrastructure                        | TESPOK                      | 0720075511   |
| 17. | Denis Gichera         | Not Disclosed                             | FEDCO                       | 0722343695   |
| 18. | Atuko Ken             | Chairman                                  | Ruaraka Constituency        | 072054912  |
| 19. | Teressia K Mwendwa    | Sociologist                               | KeRRA                       | 0703754589   |
| 20. | Kelvin Ndepit         | Engineer                                  | NaMATA                      | Not Disclosed  |
| 21. | Simon Mvia            | Manager                                   | RAMTONS                     | 0722834352   |
| 22. | Manish Popat          | Managing Director                         | RAMTONS                     | 0722523300   |
| 23. | Dan Koech             | General Manager                           | South Field                 | 0715859135   |
| 24. | Brian Jobita          | TM  | TIMCON                      | 0725679105   |
| 25. | Githaiga Weru         | Secretary                                 | ABOK                        | 0722610462   |
| 26. | Daniel Ogando         | Assistant Regional Coordinator            | KAM                         | 0728375025   |
| 27. | Andrew Njiru          | SAI- CE/ OPS                              | KCAA                        | 0727818788   |
| 28. | Maureen Wakahia       | Legal Manager                             | Magnate                     | 0710437540   |
| 29. | Eric Mulevu           | Senior DCC                                | Interior                    | 0722508788   |
| 30. | Eng. Nicholas Airi    | ITS Expert                                | NAS/TIMCON                  | 0724297627   |
| 31. | Ken Onyango           | Environment Officer                       | Nairobi Water               | 0724034881   |
| 32. | Eng. Kevin Nyakundi   | Project Engineer                          | KPLC                        | 0724217005   |
| 33. | Khadija M. Omar       | Senior Engineer                           | KRB                         | 0704838007   |
| 34. | Edith Mwinyi          | Senior Engineer                           | KeRRA                       | 0718579010   |
| 35. | Paul Muigai           | Manager                                   | NAKASKI.S                   | 0721128678   |
| 36. | Jimmy Nguji           | C.E.O                                     | Golnrea                     | 0732806213   |
| 37. | Charles Karamba       | Regional coordinator                      | KAM                         | 0702662601   |
| 38. | Ray Otieno            | Engineer                                  | KURA                        | 0792746278   |
| 39. | Dennis Wakaba         | Planner                                   | EMAK                        | 0710252964   |
| 40. | Aisha Yusuf           | Sociologist                               | KURA                        | 0725055001   |
| 41. | Hon. Mark Mwenje      | Member Of National Assembly Embakasi West | Member Of National Assembly | 0714790092   |
| 42. | Eng. Lenah Mutheu     | Engineer (URPD)                           | KURA                        | <a href="mailto:lmutheu@kura.go.ke">lmutheu@kura.go.ke</a> |
| 43. | Josephine D.          | SA  | KPC                         | 0722377645   |
| 44. | Venessa Mbula Mutinda | Intern                                    | KURA                        | 0725706810   |
| 45. | Robert Miyesa         | P & G Officer                             | EPRA                        | 0722953565   |
| 46. | Eng K. K. Kimi        | Engineer (URPD)                           | KURA                        | 0702004958   |
| 47. | Marion Magio          | URPD                                      | KURA                        | 07155137834  |

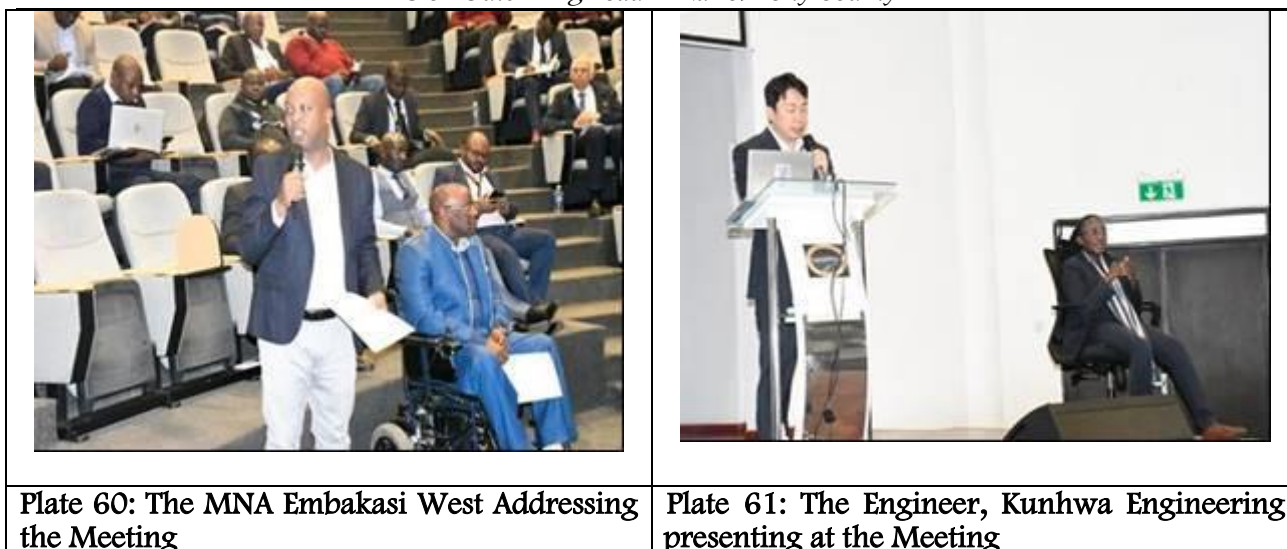
*Environmental and Social Impact Assessment Study Report for the proposed Establishment of Bus Rapid Transit Line 5 on Outer Ring Road in Nairobi City County*

| SN  | Name                | Designation                            | Organization                | Contact Details  |
|-----|---------------------|--|-----------------------------|--|
| 48. | Sara Ayiecho        | CDSO                                   | NCPWD                       | 0722319472   |
| 49. | Sharon Kinya        | Environmentalist                       | KURA                        | 0701254608   |
| 50. | Karen Thairu        | Environmentalist                       | KURA                        | 0741439925   |
| 51. | Stephen Waweru      | Operations                             | AdsRlc                      | 0727985823   |
| 52. | Collince Meshak     | ESSD                                   | KURA                        | 0111276565   |
| 53. | Sheilla Kimeyo      | Engineer (URPD)                        | KURA                        | 0725727606   |
| 54. | Enid Grace A.       | PM                                     | MWA                         | 0734694814   |
| 55. | Joyce Nyambura      | PM                                     | MOA                         | 0743046170   |
| 56. | Eng. Martin Reriani | Engineer (URPD)                        | KURA                        | 0720770986   |
| 57. | Eng. Cecilia Wambua | Senior Engineer. (URPD)                | KURA                        | 0723513183   |
| 58. | Martin Shikuku P.   | NG CDF Chairman                        | MPs Rep                     | 0706272714   |
| 59. | David Naswui        | Senior N                               | NaMATA                      | 0721603246   |
| 60. | Christine Kivuva    | ADOE                                   | NCCG Eng.                   | 0720296539   |
| 61. | Henry Oindo         | Chief Environment Officer              | NCCG                        | 0707961345   |
| 62. | Barly Odhiambo      | Project Manager                        | UON                         | 0754249751   |
| 63. | Mairura Omwenga     | Planners Association of Kenya Chairman | Town/ County TCPAK          | 0721345411   |
| 64. | Hon. Tim Wanyonyi   | Member of National Assembly Westlands  | Member of National Assembly | 0722525176   |
| 65. | Kevin Owano         | Constituency                           | Ruaraka NGCDF               | 0715863399   |
| 66. | Sosytine Kituyi     | Westlands                              | Westlands                   | 0720210570   |
| 67. | Fredrick Otieno     | Westlands                              | Westlands                   | 070723722  |
| 68. | Jared O. Owuor      | AD                                     | KURA                        | 0718880107   |
| 69. | Sophie W. Gichuri   | Eng. Nairobi Region                    | KURA                        | 0729322289   |
| 70. | Achieng Irene       | M&E Officer                            | KURA                        | 0714013852   |
| 71. | Mildred Wangare     | OA                                     | KURA                        | 0735593539   |
| 72. | Monica Wandallo     | Logistics                              | KURA                        | 0722347365   |
| 73. | Faith Muthama       | Logistics                              | KURA                        | 0714419834   |
| 74. | Justus Onyinkwa     | DD (URPD)                              | KURA                        | 0722864092   |
| 75. | Brian Joseph        | Intern                                 | KURA                        | 0704294201   |
| 76. | Josiah Wandurua     | AD-SS                                  | KURA                        | 0721611120   |
| 77. | Mwinyi Bwika        | Assistant Director ITS                 | KURA                        | <a href="mailto:mbwika@kura.go.ke">mbwika@kura.go.ke</a>     |
| 78. | Eng. John Chege     | CE                                     | KPC                         | 0723287087   |
| 79. | Emmanuel Motonga    | ITSO                                   | KURA                        | <a href="mailto:emotonga@kura.go.ke">emotonga@kura.go.ke</a> |
| 80. | Daniel Kuria        | ITSO                                   | KURA                        | <a href="mailto:dkuria@kura.go.ke">dkuria@kura.go.ke</a>     |
| 81. | Everlyne Wangui M.  | Sign Language Interpreter              | CESLIS                      | 0713955988   |
| 82. | Elsie Nge'ndo       | SS-ESS                                 | KURA                        | 0721900048   |
| 83. | Laura Teresa        | ESSD                                   | KURA                        | 0712302046   |
| 84. | Susan Wambua        | ESSD                                   | KURA                        | 0711635206   |
| 85. | Martina Dawson      | Sociologist                            | KURA                        | 0714841643   |
| 86. | Bonface Morang'a    | EHS                                    | KURA                        | 0716625184   |
| 87. | Nicholas A.         | Civil Engineer                         | CAS Consultant              | 0720206966   |
| 88. | Daniel Maina        | Environment                            | KURA                        | 0710300867   |
| 89. | Stephen Otieno      | Sociologist                            | KURA                        | 0726730984   |
| 90. | Anderson Chelimo    | Sociologist                            | KURA                        | 0722567685   |

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| SN   | Name                 | Designation               | Organization           | Contact Details      |
|------|----------------------|---------------------------|------------------------|----------------------|
| 91.  | Mellanie Thurania    | Environmentalist          | KURA                   | 0715860874           |
| 92.  | Cynthia Rutto        | Environmentalist          | KURA                   | 0791159147           |
| 93.  | Jude Obiero          | Legal Counsel             | Nairobi Expressway     | 0715781576           |
| 94.  | Grace Tepeina        | Sociologist               | KURA                   | 0717971895           |
| 95.  | Calvin Nyaume        | President                 | FEDCO                  | 0728246806           |
| 96.  | George O. Opiyo      | Manager                   | Ruaraka Constituency   | 0727078406           |
| 97.  | Stephen Ogola Oduor  | Ruaraka Constituency      | Ruaraka CRC Vice Chair | Ruaraka Constituency |
| 98.  | Dennis Mugo          | Nairobi Water Coordinator | NCWSC                  | 0721305769           |
| 99.  | Higal Elcambo        | Environmentalist          | KeNHA                  | 0742106109           |
| 100. | Arch Reinier Khamala | Architect                 | CAS                    | 0720089512           |
| 101. | Darius Limpaso       | Environment               | NaMATA                 | 0725926825           |
| 102. | Bonface Mukuna       | Lead Engineer             | Liquid Telecom         | 0780522403           |
| 103. | Elijah Muthusi       | Sr. Environmentalist      | KURA                   | 0721802056           |
| 104. | Gladys Adongo        | TE                        | Linicon Associates     | 0715020666           |
| 105. | Philip Musyoka       | TE                        | Liquid Telecom         | 0731777410           |
| 106. | John Nduguiya        | E. A                      | NCWSC                  | 0795624829           |
| 107. | Eng. B. Asin         | AD (URPD)                 | KURA                   | 0723374060           |
| 108. | Zakaria Hajj         | Intern                    | KURA                   | 0705695153           |
| 109. | Karen Wambui         | Sociologist               | KURA                   | 0757072887           |
| 110. | James Mbugua         | Intern                    | KURA                   | 0722626887           |
| 111. | Irene Njeri          | Director                  | FEDCO                  | 0714096096           |
| 112. | Stephen Njogu        | CCO                       | KURA                   | 0725570515           |
| 113. | Calvin Majiwa        | Environmentalist          | KURA                   | 0720272303           |
| 114. | Eng. Bridget Njoroge | Assistant TL              | CAS Consultants        | 0729688830           |
| 115. | Jacinta Odhiambo     | Intern                    | KURA                   | 0798009190           |
| 116. | Alvin Mwangat Baron  | Intern                    | KURA                   | 0708350317           |
| 117. | Brenda Mong'are      | Engineer                  | NaMATA                 | 0704100074           |
| 118. | Ndegwa Eva           | GE                        | KURA                   | 0722853609           |
| 119. | Serem K. K           | ITSO                      | KURA                   | 0110001515           |
| 120. | Col. Kahiga Njoroge  | Director OPS              | Nairobi Rivers Comm    | 0722228912           |

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**Plate 60: The MNA Embakasi West Addressing the Meeting**

**Plate 61: The Engineer, Kunhwa Engineering presenting at the Meeting**

#### 5.4.4.2 Second stakeholders' Consultation Meeting

The second Stakeholders' Consultation Meeting was held on Tuesday 10<sup>th</sup> September, 2024, from 10:05 am to 12:25 pm. The meeting was held at CLS KAG University, Buruburu where ninety-one (91) participants attended. The details of those present at the meeting are provided in **Table 44** below while **Plate 62** and **Plate 63** overleaf illustrates photographs taken during the meeting.

**Table 44: Summary of Stakeholders Details in the Second Meeting**

| SN  | Name                 | Designation    | Organization         | Contact    |
|-----|----------------------|----------------|----------------------|------------|
| 1.  | Pst. Benedict Mutuku | Coordinator    | Ujirani Mwema        | 0722802474 |
| 2.  | Kioko Joshua         | Coordinator    | Ujirani Mwema        | 0723800080 |
| 3.  | Beatrice Akoth       | Representative | Kamunji MNA's office | 0729960149 |
| 4.  | Fauzia Afriq         | Resident       | Makadara             | 0706756678 |
| 5.  | Agnes Ajiambo        | Resident       | Bahati               | 0705898400 |
| 6.  | Joseph W Githinji    | Resident       | Makadara             | 0729431228 |
| 7.  | Alice Gitoho         | Representative | Forward Sacco        | 0722602680 |
| 8.  | Maurice Amahuya      | Representative | Embakasi             | 0775478886 |
| 9.  | John Mwangi          | Coordinator    | Embakasi             | 0702966021 |
| 10. | Charles Kyale        | Representative | Church               | 0775878282 |
| 11. | Abdiwahab Abdalla    | Chief          | NGAO                 | 0722362896 |
| 12. | Elsie Ng'endo        | SS-ESS         | KURA                 | 0721900048 |
| 13. | Paul Mamayu          | Elder          | Viwandani            | 0728490427 |
| 14. | Cathrine Nduta       | Elder          | Makadara             | 0722627724 |
| 15. | Esther Kamene        | KERRA Chair    | Embakasi West        | 0721802371 |
| 16. | Bernard Okwiri       | ACC            | NGAO                 | 0714045334 |
| 17. | Margeret Wahome      | Chief          | NGAO                 | 0722697570 |
| 18. | Cynthia Rutto        | ESSD           | KURA                 | 0791159147 |
| 19. | Mellanie Karimi      | ESSD           | KURA                 | 0715860874 |
| 20. | Laura Teresa         | ESSD           | KURA                 | 0712302046 |
| 21. | Susan Wambua         | ESSD           | KURA                 | 0711635206 |

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| <b>SN</b> | <b>Name</b>        | <b>Designation</b>                | <b>Organization</b> | <b>Contact</b> |
|-----------|--------------------|-----------------------------------|---------------------|----------------|
| 22.       | Dafalla Aisha      | Elder                             | Kimathi Estate      | 0742470330     |
| 23.       | Ceciliah Wanjohi   | Elder                             | Bahati              | 0727710379     |
| 24.       | Paul Temesi        | SACCO                             | KURA                | 0723909183     |
| 25.       | Joseph Mwirichia   | Elder                             | Jericho             | 0722868092     |
| 26.       | Job Mucoki         | Environmentalist                  | NaMATA              | 0728674453     |
| 27.       | George Owour       | Elder                             | Makadara            | 0759150080     |
| 28.       | Ivy Wangui         | Elder Representative              | Makadara            | 0796332155     |
| 29.       | N Kariithi         | Elder                             | Kimathi             | 0700546733     |
| 30.       | Richard Onwonga    | Elder                             | Bahati              | 0724670064     |
| 31.       | Kioko Musau        | Elder                             | Sinai               | 0710644477     |
| 32.       | John Paul Magana   | Secretary                         | BURA                | 0722314550     |
| 33.       | Patrick Mwai       | Chairperson                       | BURA                | 0722898774     |
| 34.       | Mwangangi Kimetu   | Elder                             | Viwandani           | 0729287009     |
| 35.       | Grace Maina        | Elder                             | Buruburu            | 0723708650     |
| 36.       | Jackline Njoki     | Elder                             | Uhuru               | 0717205816     |
| 37.       | Lawrence Wachira   | Environmentalist                  | KURA                | 0726220121     |
| 38.       | Eng Benjamin Asin  | DD-URPD                           | KURA                | 0723374068     |
| 39.       | Lena Gatwiri       | Consultant                        | CAS Consultant      | 0740617606     |
| 40.       | Marcy Naledi       | Elder                             | Uhuru               | 0710224661     |
| 41.       | William Omondi     | Elder                             | Uhuru               | 0112090157     |
| 42.       | Patrick Odhiambo   | Elder                             | Jericho             | 0721998194     |
| 43.       | Ann Lydia Wambui   | Elder                             | Makadara            | 0722316287     |
| 44.       | Joseph Kanyi Thuku | Elder                             | Bahati              | 0721703311     |
| 45.       | Joshua Kivonge     | Elder                             | Viwandani           | 0728746585     |
| 46.       | Francis Njuguna    | Elder                             | Viwandani           | 0710976948     |
| 47.       | Andrew Owino       | Elder                             | Uhuru               | 0768471211     |
| 48.       | Paul Ireri         | Elder                             | Uhuru               | 0758872352     |
| 49.       | Stephen Mirembe    | Elder                             | Uhuru               | 0715180980     |
| 50.       | Okoth Oloo         | Senior Environmentalist & officer | NaMATA              | 0720253001     |
| 51.       | Reselyn Munuve     | ACC                               | NGAO                | 0719721338     |
| 52.       | Stephen Otieno     | ESSD                              | KURA                | 0726730984     |
| 53.       | Mohamed Adow       | ACC                               | NGAO                | 0720096013     |
| 54.       | Alexander Matiiri  | Chief                             | NGAO                | 0722324283     |
| 55.       | Albanus Mutuku     | Assistant Chief                   | NGAO                | 0721479003     |
| 56.       | Daniel Macharia    | Senior Chief                      | NGAO                | 0715433207     |
| 57.       | Donald Abila       | Assistant Chief                   | NGAO                | 0724291533     |
| 58.       | Alexander Waweru   | Resident                          | Makadara            | 0719672524     |
| 59.       | Bernard Onyango    | Assistant Chief                   | NGAO                | 0722810976     |
| 60.       | Serfina Akoth      | CHP                               | Kimathi             | 0723291661     |
| 61.       | Bsp Selasio Nyaga  | Senior Pastor                     | C.C.C Church        | 0722684438     |
| 62.       | Murimi Joseph      | Elder                             | Chief's camp        | 0720952948     |
| 63.       | Eddah Odede        | Elder                             | Hamza               | 0722758775     |
| 64.       | Elizabeth Oketch   | Elder                             | Hamza               | 0728478900     |
| 65.       | Amos Simel         | Assistant Auditor                 | KURA                | 0722731726     |
| 66.       | Ruth Kariuki       | Elder                             | City Carton         | 0729904312     |
| 67.       | Rose Mwihaki       | Youth Representative              | Not Disclosed       | 0726588031     |

| SN  | Name              | Designation         | Organization           | Contact    |
|-----|-------------------|---------------------|------------------------|------------|
| 68. | Catherine Ndoria  | Secretary           | Buruburu Courts        | 0722966071 |
| 69. | Mary Mumini       | Elder               | Lumumba                | 0722141206 |
| 70. | Julius Owour      | Elder               | Lumumba                | 0722174790 |
| 71. | Jane Gatuma       | Resident            | Jericho                | 0712108581 |
| 72. | Martin Ondieki    | Resident            | Viwandani              | 0721406822 |
| 73. | Eric Liyai        | Resident            | KNBS/RA                | 0725525288 |
| 74. | Kyalo Mukosi      | Resident            | KNBS/RA                | 0721336162 |
| 75. | Jerusha Adenyo    | Environment Officer | NCCG                   | 0720096226 |
| 76. | Ian Obadiah       | Resident            | Jericho                | 0769895612 |
| 77. | Damaris Toboso    | Representative      | Kamukunji              | 0723289374 |
| 78. | Idah Munene       | Representative      | Kamukunji              | 0724005290 |
| 79. | Hellen Nyandiko   | Resident            | Bahati                 | 0722781738 |
| 80. | Beatrice Wangui   | Resident            | Makadara               | 0724582387 |
| 81. | Farida Mueni      | Resident            | Makadara               | 0721473893 |
| 82. | Maureen Wachera   | EMCE Makadara       | NCCG                   | 0704995495 |
| 83. | Juma Salim Juma   | Representative      | Kamukunji MNA's office | 0724688032 |
| 84. | John Odhiambo     | DPC                 | Makadara               | 0722867006 |
| 85. | Abdi Adan         | Representative      | Kamukunji MNA's office | 0716624052 |
| 86. | Zena Ibrahim      | Representative      | Kamukunji              | 0718162788 |
| 87. | Rem Wamalwa       | Elder               | Jamaica                | 0724314341 |
| 88. | Irene Maithya     | Elder               | Jamaica                | 0701237215 |
| 89. | Owala Ochieng J   | Representative      | Kamukunji MNA's office | 0726481910 |
| 90. | Jane Maina        | Elder               | Jamaica                | 0723282195 |
| 91. | Cheboriyot Ngyema | Resident            | Buruburu               | 0726142405 |



**Plate 62: CAS Consultant Presenting Project Design to the Meeting**



**Plate 63: The Environmentalist Presenting the ESIA presentation to the Meeting**

#### **5.4.4.3 Third Stakeholders' Consultation**

The third Stakeholders' Consultation Meeting was held on Wednesday 11<sup>th</sup> September, 2024, from 10.12 am-12.45 pm. The meeting was held at Youth Empowerment Hall, Embakasi where

seventy-seven (77) participants attended. The details of those present at the meeting are provided in **Table 45** below while **Plate 64** and **Plate 65** overleaf illustrates photographs taken during the meeting.

**Table 45: Summary of Stakeholders Details in the Third Meeting**

| SN  | Name              | Designation                | Organization            | Contact Details    |
|-----|-------------------|----------------------------|-------------------------|--------------------|
| 1.  | Judith Odera      | Elder -                    | Tena Estate-Stella      | 0721886155         |
| 2.  | Andrew Gatembo    | Elder                      | Umoja 1-Zone J          | 0722910944         |
| 3.  | Elizabeth Njoroge | Resident                   | Umoja 1                 | 0702361500         |
| 4.  | Millicent Kanyi   | Leader                     | Umoja 1                 | 0722836024         |
| 5.  | Joshua Ombango    | Leader                     | Umoja 1                 | 0708019840         |
| 6.  | Andrew Okoth      | Assistant Chief            | NGAO                    | 0728516694         |
| 7.  | Dorcas W Mungai   | Chairlady                  | M.Y.W.O                 | 0722809127         |
| 8.  | Stacy Mumbe       | Ward Admin                 | NCCG                    | 0729488851         |
| 9.  | Nato Robet Ekai   | I.P                        | NCCG                    | 0758154462         |
| 10. | Lawrence Munyao   | Chairman                   | Embakasi Nyumba Kumi    | 0727219010         |
| 11. | Oremo Julius      | Elder                      | Umoja 1                 | 0725708913         |
| 12. | Joseph Anda       | Member                     | Umoja 1 Nyumba Kumi     | 0702770955         |
| 13. | Alice Gitoko      | PWD Representative         | Embakasi West           | 0722602680         |
| 14. | Saimon Ambetsa    | Resident                   | Kayole C3               | 0713707272         |
| 15. | Charles Karinjahi | Resident                   | Donholm                 | 0722907073         |
| 16. | Samuel Ndegwa     | Resident                   | Mutindwa                | 0791393556         |
| 17. | Cyrus Kimuyu      | Youth Representative       | Pizza Garden            | 0797933079         |
| 18. | Mutia Katee       | Resident                   | Umoja 1                 | 0769470173         |
| 19. | Elsie Ng'endo     | SS-ESS                     | KURA                    | engendo@kura.go.ke |
| 20. | Lawrence Wachira  | Environmentalist           | KURA                    | 0726220121         |
| 21. | Celestine Cope    | ACC-Umoja                  | NGAO                    | 0721140504         |
| 22. | Juliet W Njue     | ACC Embakasi Hq            | NGAO                    | 0719836684         |
| 23. | Stephen K Muanga  | ACC I Embakasi Hq          | NGAO                    | 0727947839         |
| 24. | Peter Mwangi      | Chairman                   | Forward SACCO           | 0723332404         |
| 25. | Lena Gatwiri      | Consultant                 | Kunhwa/Cas Consultant   | 0740617606         |
| 26. | Esther Kamene     | Chairperson                | KeRRA Umoja 1           | 0721802371         |
| 27. | John Mwangi       | Chairman                   | NCYCDFC                 | 0702966021         |
| 28. | Peter Karanja     | Ward Administrator         | NCCG                    | 0723317357         |
| 29. | Rose Ngatia       | Director                   | Rose Counselling Centre | 0725205105         |
| 30. | Collins Obuo      | Officer                    | Uwezo Fund              | 0700724897         |
| 31. | Emily Odhiambo    | Chairlady                  | Umoja                   | 0722613208         |
| 32. | Okoth Oloo        | Senior Environment Officer | NaMATA                  | 0720253001         |
| 33. | Esther Wanjiru    | Youth Representative       | Tushauriane B1 Cluster  | 0795279217         |
| 34. | Samuel Lemka      | Boda Boda Rider            | Kayole B1 Cluster       | 0701697033         |
| 35. | Wilson Mungai     | PWD Representative         | Kayole South            | 0721363270         |

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| SN  | Name                 | Designation             | Organization                   | Contact Details |
|-----|----------------------|-------------------------|--------------------------------|-----------------|
|     | Mburu                |                         |                                |                 |
| 36. | Dennis Nyarabi       | Director                | Utiwo Travellers               | 07146819936     |
| 37. | Rioba Charles        | Chairman                | Umoja Innercore                | 0724176274      |
| 38. | Beverlyn Chepkorir   | ACC Cadet Kayole        | NGAO                           | 0701165941      |
| 39. | Faith Gatimu         | ACC Cadet Umoja         | NGAO                           | 0705364652      |
| 40. | Marycaster Mueni     | ACC Cadet Embakasi Hq   | NGAO                           | 0715390587      |
| 41. | Evans Munene         | Chief -Mukuu Kwa Njenga | NGAO                           | 0729179279      |
| 42. | Edward Kirimi        | Assistant Chief Kware   | NGAO                           | 0722848023      |
| 43. | Job Mucoki           | Environmentalist        | NaMATA                         | 0728674453      |
| 44. | Jadiel Maina         | Resident                | Kayole                         | 0722985349      |
| 45. | Shukri Mohamed       | Resident                | Kware                          | 0716837389      |
| 46. | Thomas Akendo        | Resident                | Embakasi                       | 0721900626      |
| 47. | Dorcas Atieno        | Security                | Jukali Nyumba Kumi             | 0743138981      |
| 48. | Leonard Musungu      | Assistant Chairman      | Bodaboda Society Embakasi West | 0728695127      |
| 49. | Michael Mualuko      | Chairman                | Bodaboda Society Embakasi West | 0711715071      |
| 50. | Ndaia Nzini          | Elder                   | Kware                          | 0725457856      |
| 51. | Michael Muthee       | Bodaboda Rider          | Bodaboda Embakasi              | 0705929775      |
| 52. | John Makori          | Resident                | Kayole                         | 0715048780      |
| 53. | Jacob Otieno         | Resident                | Kayole                         | 0722653342      |
| 54. | Margaret W Nzomo     | PWD Representative      | Komarock                       | 0710538633      |
| 55. | Rhoda Wairimu        | Resident                | Komarock                       | 0759408325      |
| 56. | Michael Mbugua       | Resident                | Kayole                         | 0722643773      |
| 57. | Rispher J Kigen      | Assistant Chief         | Umoja 1                        | 0720236538      |
| 58. | Wamboka Martin Okeke | Senior Chief            | Umoja                          | 0723138114      |
| 59. | David Mwangi Muthoni | Resident                | Umoja 1                        | 0722405172      |
| 60. | Victor Omweno Orina  | Elder                   | Komarock                       | 0711378510      |
| 61. | Benson Onyango       | Elder                   | Embakasi                       | 0724845742      |
| 62. | Martin Wambua Tali   | Elder                   | Embakasi Kware                 | 0712893195      |
| 63. | Stephen Otieno       | Sociologist             | KURA                           | 0726730984      |
| 64. | Paul Temesi          | SACCO                   | KURA                           | 0723909183      |
| 65. | Cynthia Rutto        | ESSD                    | KURA                           | 0791159147      |
| 66. | Mellanie Karimi      | ESSD                    | KURA                           | 0715860874      |
| 67. | Laura Nyongesa       | ESSD                    | KURA                           | 0712302046      |
| 68. | Susan Wambua         | ESSD                    | KURA                           | 0711635206      |
| 69. | Rose Gachago         | C. Comm                 | KURA                           | 0707593545      |
| 70. | Eng. Benjamin Asin   | AD-E                    | KURA                           | 0723374068      |
| 71. | Mourice Amuhay M     | Resident                | Embakasi West                  | 0795478886      |
| 72. | Hassan Njagi         | Elder                   | Embakasi                       | 0720215662      |
| 73. | Haron N Mageto       | Secretary               | Kani SACCO                     | 0721479194      |
| 74. | Christopher Muia     | Chairman                | Umoinner                       | 0722607072      |



| SN  | Name                | Designation     | Organization  | Contact Details |
|-----|---------------------|-----------------|---------------|-----------------|
| 75. | Geoffrey Kung'u     | Resident        | Embakasi      | 0721809131      |
| 76. | Robert Maina        | Committee       | Avenue Park 1 | 0721543268      |
| 77. | Janerose M Githumbi | Assistant Chief | NGAO          | 0721876020      |



#### 5.4.4.4 Fourth Stakeholders' Consultation

The fourth Stakeholders' Consultation Meeting was held on Thursday 12<sup>th</sup> September, 2024, from 10.12 am-12.20 pm. The meeting was held at Redeemed Gospel Church, Kware where eighty-four (84) participants attended. The details of those present at the meeting are provided in **Table 46** below while **Plate 66** and **Plate 67** overleaf illustrates photographs taken during the meeting.

**Table 46: Summary of Stakeholders Details in the Fourth Meeting**

| SN  | Name                   | Designation            | Organization      | Contact    |
|-----|------------------------|------------------------|-------------------|------------|
| 1.  | Martina Dawson         | Sociologist            | KURA              | 0714849643 |
| 2.  | Kennedy Wafula         | AD(ES)                 | KURA              | 0726644392 |
| 3.  | Peter Makali           | ACC                    | NGAO              | 0720252253 |
| 4.  | Ezekiel Ikweri         | Assistant Chief        | NGAO              | 0729173001 |
| 5.  | Edward Kirimi          | Senior Assistant Chief | NGAO              | 0722848023 |
| 6.  | Eng. W. R. Oginga      | D-URPD                 | KURA              | 0722526847 |
| 7.  | John Cheboi            | AD(CC)                 | KURA              | 0722312945 |
| 8.  | Eliud Murigi           | Resident               | Kware             | 0719281626 |
| 9.  | Bonface Morang'a       | Environmentalist       | KURA              | 0716623184 |
| 10. | Susan Kuria            | Resident               | Avenue Park 1     | 0722988322 |
| 11. | Linda Koskei           | Resident               | Avenue Park 2     | 0728309763 |
| 12. | Dennis Ngugi           | Resident               | Mukuru kwa Njenga | 0797673778 |
| 13. | Charity Nthenya Mbithi | Resident               | Kware             | 0704599370 |
| 14. | Kennedy Omboga         | Resident               | Kware             | 0720725992 |

*Environmental and Social Impact Assessment Study Report for the proposed Establishment of Bus Rapid Transit Line 5 on Outer Ring Road in Nairobi City County*

| SN  | Name               | Designation           | Organization             | Contact    |
|-----|--------------------|-----------------------|--------------------------|------------|
| 15. | Anderson Chelimo   | Sociologist           | KURA                     | 0722567685 |
| 16. | Brian Joseph       | ESSD                  | KURA                     | 0704294201 |
| 17. | Vanessa Otieno     | ESSD                  | KURA                     | 0708020495 |
| 18. | Hassan Njagi       | Resident              | Kware                    | 0720215662 |
| 19. | Grace Tepeina      | Sociologist           | KURA                     | 0717971895 |
| 20. | Rose Gachago       | C.COM                 | KURA                     | 0707593545 |
| 21. | Felaine Kathomi    | Resident              | Kware                    | 0721655456 |
| 22. | Maureen Shihanya   | Resident              | Kware                    | 0796509353 |
| 23. | David Nyamwoya     | Resident              | Kware                    | 0791492242 |
| 24. | Lena Gatwiri       | Consultant            | KUNHWA/CAS<br>Consultant | 0740617606 |
| 25. | Susan Mwaniki      | Resident              | Kware                    | 0728231048 |
| 26. | Jeremy Matayo      | Secretary             | Avenue Park 1            | 0111294783 |
| 27. | Benson Maingi      | Mukuru Kwa Njenga     | MCA's Office             | 0721434405 |
| 28. | Evaline Awino      | Resident              | Kware                    | 0724171817 |
| 29. | Amos Abongo        | Resident              | Mukuru kwa Njenga        | 0720850393 |
| 30. | Anthony Nzini      | Village Elder         | Kware                    | 0725457586 |
| 31. | Daniel Okindo      | Village Elder         | Kware                    | 0723807376 |
| 32. | Peter Mbose        | Village Elder         | Kware                    | 0758542645 |
| 33. | Onsoti Mogire      | Village Elder         | Kware                    | 0720863245 |
| 34. | Moureen Mueni      | Resident              | Kware                    | 0715773614 |
| 35. | Shukri Mohammed    | Boda Boda<br>Chairman | Kware                    | 0716837399 |
| 36. | Victor Ahindi      | Youth Leader          | Kware                    | 0741666464 |
| 37. | Brian wagombo      | Youth Leader          | Kware                    | 0716855066 |
| 38. | Duncan Muyale      | Village Elder         | Mukuru Kwa Njenga        | 0718560033 |
| 39. | Mark Maucha        | Village Elder         | Mukuru Kwa Njenga        | 0713154103 |
| 40. | Martin Wambua Tali | Village Elder         | Kware                    | 0712893195 |
| 41. | Dorcas Nduku       | Village Elder         | Swaminarayan             | 0723588543 |
| 42. | Domitila Matheka   | Village Elder         | Stage Mpya               | 0727383684 |
| 43. | Erick Munyao       | Village Elder         | Kware                    | 0111209735 |
| 44. | Alex Munyao        | Village Elder         | Kware                    | 0798945925 |
| 45. | Bonface Kamau      | Village Elder         | Kware                    | 0706701191 |
| 46. | Eng. Benjamin Asin | AD- Engineering       | KURA                     | 0723374068 |
| 47. | Yusuf Abdi         | Resident              | Mukuru Kwa Njenga        | 0725584374 |
| 48. | Rebecca Ambaisi    | Resident              | Kware                    | 0724077076 |
| 49. | Jackson Ndeti      | Resident              | Kware                    | 0721893207 |
| 50. | Brown Chavaseki    | Pastor                | Kware                    | 0722371707 |
| 51. | Eunice Kanyi       | Resident              | Kware                    | 0725278524 |
| 52. | Patricia Mueni     | Village Elder         | Stage Mpya               | 0723066858 |
| 53. | Aida Mutua         | Resident              | Stage Mpya               | 0717328433 |
| 54. | Rukia Godana       | Resident              | Mukuru Kwa Njenga        | 0727767063 |
| 55. | Jane Imari         | Resident              | Kimondo                  | 0724366959 |
| 56. | Morris Mangala     | Village Elder         | Kware                    | 0795070292 |
| 57. | Henry Kivuva       | Agent                 | Lucky Summer             | 0724617112 |
| 58. | Eric Mbindyo       | Resident              | Kware                    | 0725820963 |
| 59. | Alexander Munyao   | Resident              | Kware                    | 0795791392 |
| 60. | Ramadhan Adan      | Resident              | Kware                    | 0793310370 |
| 61. | Robert Odhiambo    | Resident              | Mukuru Kwa Njenga        | 0712102208 |

| SN  | Name                | Designation         | Organization           | Contact    |
|-----|---------------------|---------------------|------------------------|------------|
| 62. | Elias Ochieng       | Resident            | Mukuru Kwa Njenga      | 0717558692 |
| 63. | Mohammed Abdalla    | Resident            | Mukuru Kwa Njenga      | 0722251716 |
| 64. | Paul Temesi         | Sacco               | KURA                   | 0723909183 |
| 65. | Elizabeth Mwangangi | Sociologist         | KURA                   | 0710491478 |
| 66. | Calistus Ochieng    | CHP                 | Kware                  | 0726923180 |
| 67. | Jeff Kiambi         | Resident            | Kware                  | 0721705422 |
| 68. | David Emusungu      | NCC                 | Kware Ward             | 0727728113 |
| 69. | Priscilla Muthini   | Resident            | Stage Mpya             | 0724595438 |
| 70. | Alfred Mutua        | Resident            | Plot 10                | 0700026535 |
| 71. | Ann Maselina        | Resident            | Swaminarayan           | 0705176250 |
| 72. | Nicholas Ndambu     | Kware               | NCA                    | 0723802584 |
| 73. | Beatrice Kiteme     | Resident            | Kware                  | 0714125863 |
| 74. | Kennedy Bitwoli     | Resident            | Stage Mpya             | 0715686607 |
| 75. | Humphrey Aguta      | Resident            | Kware                  | 0111920755 |
| 76. | Juliana Nzilani     | Village Elder       | Kware                  | 0727332103 |
| 77. | Erick Mutisya       | Resident            | Kware                  | 0725915672 |
| 78. | Jeremiah Mutia      | Manager             | MCA's Office           | 0722597919 |
| 79. | Roman Thura         | Project Chairperson | MCA's Office           | 0727030713 |
| 80. | Joshua Mui          | Resident            | Pipeline               | 0729877948 |
| 81. | Rose Ogutu          | Secretary           | Chief's office         | 0726840104 |
| 82. | Evans Munene        | Chief               | NGAO                   | 0729179278 |
| 83. | Moses Onyiri        | Resident            | Kware                  | 0716806688 |
| 84. | Jackline Kwamboka   | Mukuru Kwa Njenga   | Community Organization | 0794018849 |



Plate 66: Members of the Public Attending the Meeting



Plate 67: KURA's Director of Urban Roads Planning & Design Addressing the Meeting

#### 5.4.4.5 Fifth Stakeholders' Consultation Meeting

The fifth Stakeholders' Consultation Meeting was held on Friday 13<sup>th</sup> September, 2024, from 10.35 am-1.00 pm. The meeting was held at KAG Church-Fedha where sixty-eight (68) participants attended. The details of those present at the meeting are provided in **Table 47** below while **Plate 68** and **Plate 69** overleaf illustrates photographs taken during the meeting.

**Table 47: Summary of Stakeholders Details in the Fifth Meeting**

| SN  | Name                 | Designation        | Organization   | Contact Details |
|-----|----------------------|--------------------|----------------|-----------------|
|     | Martina Dawson       | Sociologist        | KURA           | 0714849643      |
| 2.  | Kennedy S. Wafula    | AD-ES              | KURA           | 0726644392      |
| 3.  | Elizabeth Mwangangi  | Sociologist        | KURA           | 0710491478      |
| 4.  | Amos Simel           | A/A                | KURA           | 0722731726      |
| 5.  | Brian Joseph         | Intern             | KURA           | 0722108697      |
| 6.  | Anderson Chelimo     | Sociologist        | KURA           | 0722567685      |
| 7.  | Grace Tepeina        | Sociologist        | KURA           | 0717971895      |
| 8.  | Vanessa Otieno       | ESSD               | KURA           | 0708020495      |
| 9.  | Boniface Moranga     | EHS                | KURA           | 0716623184      |
| 10. | Martin Dawson        | Sociologist        | KURA           | 0714849643      |
| 11. | Andrew Okoti         | Ass. Chief         | NGAO           | 0728516694      |
| 12. | Danvas Atieko        | Electrician        | Mradi          | 0728965424      |
| 13. | Lawrence Munyaio     | Nyumba kumi        | NGAO           | 0727219010      |
| 14. | Joash Wandera        | Resident           | Mradi          | 0720581152      |
| 15. | Charles K Langat     | Snr. Village Elder | Resident       | 0721556507      |
| 16. | Ishmael Githinji     | Elder              | Resident       | 0799859511      |
| 17. | Christine Otiyo      | Asst/Chief         | NGAO           | 0727972005      |
| 18. | Pst. George O Mathew | Pastor Utawala     | M.O.C.M        | 0721428272      |
| 19. | Pamela Rangala       | PCEA Committee     | Utawala        | 0723468144      |
| 20. | Valery Makumbi       | PCEA Committee     | Utawala        | 0723468144      |
| 21. | Lena Gatwiri         | Consultant         | KUNHWA         | 0740617606      |
| 22. | Nancy Kamuri         | Nyumba kumi        | NGAO           | 0721397763      |
| 23. | Mwendwa Muuengei     | Nyumba Kumi        | NGAO           | 0727968161      |
| 24. | Caroline Wambui      | Resident           | Mathare        | 0725267361      |
| 25. | Sabina Mongina       | Resident           | Embakasi       | 0727649131      |
| 26. | Harriet M Adongo     | Peace & Security   | Utawala        | 0707338407      |
| 27. | Phoebe Dibogo        | Upper Savannah     | Embakasi East  | 0707417695      |
| 28. | Elizabeth Otieno     | Upper Savannah     | Embakasi East  | 0720754281      |
| 29. | Koech Billy          | Engineer           | Nairobi County | 0721264414      |
| 30. | Joel Barasa          | Bodaboda           | Utawala        | 0727014339      |
| 31. | Joseph Munguti       | Resident           | Embakasi East  | 0728962780      |
| 32. | Simon Macharia       | Resident           | Telaviv        | 0700686336      |
| 33. | Calvina Choni        | Resident           | Telaviv        | 0701682100      |
| 34. | Samuel Mwangi        | Resident           | Utawala        | 0720172882      |
| 35. | Stephen Otieno       | C.H.P              | Tassia         | 0710586602      |
| 36. | Zablon Karani        | Chairman           | Tassia Welfare | 0723111570      |
| 37. | Martha Muchai        | Resident           | Mradi          | 0714592899      |
| 38. | Wycliff Aguisoma     | Resident           | Mradi          | 0796062772      |
| 39. | Edwin Omwenga        | Resident           | Tassia         | 0716191846      |
| 40. | Haji Saleh           | Resident           | Tassia         | 0718077987      |
| 41. | Jacob Kurgat         | Representative     | Matatu Sacco   | 0728811307      |
| 42. | Eunice B Awuor       | Resident           | Mradi          | 0712175070      |
| 43. | Emmanuel Syengo      | Representative     | NCCG Mobility  | 0707686818      |
| 44. | David Kahula         | Elder              | Tassia         | 0721871664      |
| 45. | Benard Mutesui       | C.H.P              | Embakasi East  | 0726464948      |

| SN  | Name                | Designation        | Organization   | Contact Details |
|-----|---------------------|--------------------|----------------|-----------------|
| 46. | Evans Gituko        | Resident           | Tassia         | 0721374978      |
| 47. | Agnes Wamutwo       | Resident           | Jua kali       | 0720399936      |
| 48. | Joshua Mwanzia      | Resident           | Telaviv        | 0711249623      |
| 49. | Josephine Mwili     | Resident           | Tassia         | 0710536986      |
| 50. | Clement Mutinde     | Resident           | Utawala        | 0706572178      |
| 51. | Ongwankwa Paul      | MCA Representative | Embakasi       | 0702894609      |
| 52. | Oyato Edwin         | Resident           | Tassia         | 0704832520      |
| 53. | Doris Mugambi       | Resident           | Tassia         | 0713235026      |
| 54. | Maxwell Odhiambo    | Opinion leader     | Utawala        | 0721589689      |
| 55. | Maria Goreti Akinyi | Resident           | Embakasi East  | 0791766862      |
| 56. | John Mithiro        | Bodaboda Rider     | Fedha          | 0795028500      |
| 57. | Elijah Nyantika     | Nyumba kumi        | Telaviv        | 0713131511      |
| 58. | Josephine Njagi     | Elder              | Embakasi East  | 0722765890      |
| 59. | Bibian I Machika    | Youth Leader       | Embakasi East  | 0703771273      |
| 60. | Ann Muthoni         | MCA Representative | Utawala        | 0715553859      |
| 61. | Peter Kebalo        | Ward Manager       | Embakasi       | 0723255852      |
| 62. | Peter Makali        | ACC Embakasi       | NGAO           | 0720252253      |
| 63. | Laban Karani        | Church Leader      | Embakasi/fedha | 0799720968      |
| 64. | Dorcas W Mungai     | M.Y.W.O            | Embakasi       | 0722809127      |
| 65. | Jane N Wangonya     | Resident           | Embakasi       | 0724217142      |
| 66. | Moses Maina         | Chief              | NGAO           | 0727932781      |
| 67. | Samuel Mwitukua     | Chief              | NGAO           | 0708185347      |
| 68. | Anne Njeri          | MP Representative  | Embakasi East  | 0720396084      |



**Plate 68: Members of the Public Attending the Meeting**



**Plate 69: The Team from Embakasi East Constituency Addressing the Meeting**

#### 5.4.4.6 Sixth Stakeholders' Consultation Meeting

The sixth Stakeholders' Consultation Meeting was held on Tuesday 17<sup>th</sup> September, 2024, from 10.00 am-1.30 pm. The meeting was held at Royal Victory Hospital, Ruaraka where sixty-eight (68) participants attended. The details of those present at the meeting are provided in **Table 48** overleaf while **Plate 70** and **Plate 71** overleaf illustrates photographs taken during the meeting.

**Table 48: Summary of Stakeholders Details in the Sixth Meeting**

| SN  | Name                    | Designation           | Organization                     | Contact Details |
|-----|-------------------------|-----------------------|----------------------------------|-----------------|
| 1.  | Phyllis Muhonja         | Senior Chief          | NGAO                             | 0721317667      |
| 2.  | Maurice Ohonge          | DCS                   | Children's Office                | 0722377330      |
| 3.  | Moses Warui             | Youth                 | Kware                            | 0799993641      |
| 4.  | Pheny Otieno            | Elder                 | Mathare North                    | 0726697976      |
| 5.  | Aggrey Kere             | Community Coordinator | RUBICOM                          | 0722762950      |
| 6.  | Toddy Kimathi           | Property Manager      | Bayer East Africa Ltd            | 0710455917      |
| 7.  | Mary Kamau              | Property Manager      | ABSA Bank                        | 0721775979      |
| 8.  | Barnabas Ojwaka         | Property Manager      | ABSA Bank                        | 0725271074      |
| 9.  | Amos Omuka              | Administrator         | Bayer East Africa Ltd            | 0725550179      |
| 10. | Grandson Musama         | HRM                   | Jobs Plansen                     | 0740101272      |
| 11. | Daniel Maina            | Environmentalist      | KURA                             | 0710300867      |
| 12. | Samuel M. Wamae         | ACC                   | NGAO                             | 0722558985      |
| 13. | James Kiprop Yagan      | ACC                   | NGAO                             | 0727729787      |
| 14. | Charles B. Mabonga      | SCA                   | NCCG                             | 0721734012      |
| 15. | Collins Orage           | SCA                   | NCCG                             | 0722462525      |
| 16. | Cornel Onyango          | Head teacher          | Rising Angels School             | 0725104006      |
| 17. | Joseph Macharia         | Youth Leader          | Kariobangi Social Justice Centre | 0713211343      |
| 18. | Ruth Ogola              | Administrator         | Kariobangi Social Justice Centre | 0742611920      |
| 19. | Robert Jimwai           | Elder                 | Kariobangi                       | 0705761770      |
| 20. | John Mwangi             | Elder                 | Kariobangi                       | 0701356036      |
| 21. | Michael Mwangi          | Youth Leader          | Kariobangi Social Justice Centre | 0796899915      |
| 22. | Antony Chea W.          | Youth Leader          | Kariobangi Social Justice Centre | 0707131388      |
| 23. | Walter Ogwayo           | Elder                 | Kariobangi                       | 0715402244      |
| 24. | Jared N. Bosire         | Elder                 | Mathare                          | 0748300780      |
| 25. | Charles Otiende Ondieki | Elder                 | Mathare                          | 0723939738      |
| 26. | Francis Mbongo          | Elder                 | Ruaraka                          | 0720249708      |
| 27. | John Ayodo              | Elder                 | Ruaraka                          | 0722293273      |
| 28. | Kennedy Omondi          | Youth                 | Ruaraka                          | 0797222647      |
| 29. | Elizabeth Holo          | Elder                 | Kariobangi                       | 0720369846      |
| 30. | Risper Wadede           | Elder                 | Kariobangi                       | 0700615155      |
| 31. | Angeline Onyango        | Assistant Chief       | NGAO                             | 0723922001      |
| 32. | Frasier Wanjiru         | Elder                 | Kariobangi                       | 0720385046      |
| 33. | Rose Wanjiru            | Elder                 | Kariobangi                       | 0722377624      |
| 34. | Joseph Nafula           | Youth Leader          | Kariobangi                       | 0719747045      |
| 35. | Samson Ongori           | Elder                 | Mathare North                    | 0722682077      |
| 36. | Ann Wambui              | Elder                 | Mathare North                    | 0715554118      |
| 37. | Evans Ombima            | Resident              | Kariobangi                       | 0797252982      |
| 38. | Emmanuel Ochieng        | Elder                 | Mathare North                    | 0703696178      |
| 39. | Caleb Sianje            | Elder                 | Mathare North                    | 0703534097      |
| 40. | Richard Nyabuto         | Elder                 | Mathare North                    | 0713443469      |
| 41. | Peter Maina             | Elder                 | Mathare North                    | 0722771689      |
| 42. | Emmanuel Odhiambo       | Elder                 | Kariobangi                       | 0725321487      |

| SN  | Name                 | Designation                   | Organization               | Contact Details |
|-----|----------------------|-------------------------------|----------------------------|-----------------|
| 43. | Robert Waweru        | Elder                         | Kariobangi                 | 0716504798      |
| 44. | Anne Wanjiru         | Elder                         | Kariobangi                 | 0723940639      |
| 45. | Naomi Githinji       | Company Representative        | Ruaraka                    | 0720633072      |
| 46. | Fracia Gatune        | Women Representative          | Ruaraka                    | 0720787758      |
| 47. | Rose Musieka         | Elder                         | Ruaraka                    | 0795505560      |
| 48. | David Owino          | Elder                         | Ruaraka                    | 0720800830      |
| 49. | Gordon Onyango       | Elder                         | Ruaraka                    | 0725795630      |
| 50. | David Musya          | Elder                         | Ruaraka                    | 0796807471      |
| 51. | Asha Odera           | Elder                         | Ruaraka                    | 0791260782      |
| 52. | Jeremiah Gitau       | Women Representative's office | Ruaraka                    | 0759055971      |
| 53. | Daniel Otieno        | MCA Representative            | Ruaraka                    | 0711863364      |
| 54. | John Mugo            | Elder                         | Ruaraka                    | 0721776776      |
| 55. | James Kanga          | Coordinator                   | Ruaraka Business Community | 0727220563      |
| 56. | Josiah Wandurua      | AD-SS                         | KURA                       | 0721611120      |
| 57. | Paul Temesi          | SACCO                         | KURA                       | 0723909183      |
| 58. | Rosemary Wanjiru     | Elder                         | Ruaraka                    | 0723652147      |
| 59. | Peter Njenga         | Elder                         | Ruaraka                    | 0722609715      |
| 60. | Joseph Njoroge       | Elder                         | Ruaraka                    | 0721526081      |
| 61. | Harrison N. Macharia | Church Representative         | Ruaraka                    | 0723662912      |
| 62. | Zephaniah Bosire     | Village Elder                 | Ruaraka                    | 0725926970      |
| 63. | Halima Kioko         | Nyumba Kumi                   | M/N                        | 0724276764      |
| 64. | Eng. Benjamin Asin   | AD-URPD                       | KURA                       | 0723374068      |
| 65. | Elijah Muthusi       | Senior Environmentalist       | KURA                       | 0721802056      |
| 66. | Calvin Majiwa        | Environmentalist              | KURA                       | 0720272303      |
| 67. | Prof. Wangari Kuria  | Director                      | Royal Victory Hospital     | 0722755681      |
| 68. | Boniface Bacuchi     | Nyumba Kumi                   | M/N                        | 0799912153      |



**Plate 70: Members of the Public Attending the Meeting**



**Plate 71: ESIA Presentation by KURA's Senior Environmentalist**

#### 5.4.4.7 Seventh Stakeholders' Consultation Meeting

The seventh Stakeholders' Consultation Meeting was held on Wednesday 18<sup>th</sup> September, 2024, from 10.00 am-1.30 pm. The meeting was held at Huruma Social Hall where one hundred and twenty-eight (128) participants attended. The details of those present at the meeting are

provided in **Table 49** overleaf while **Plate 72** and **Plate 73** overleaf illustrates photographs taken during the meeting.

**Table 49: Summary of Stakeholders Details in the Seventh Meeting**

| SN  | Name                  | Designation        | Organization                                | Contact Details |
|-----|-----------------------|--------------------|---|-----------------|
| 1.  | Eng. Benjamin Asin    | Assistant Director | KURA  | 0723374068      |
| 2.  | Lena Gatwiri          | Consultant         | KUNHWA/CAS                                  | 0740617606      |
| 3.  | Martina Dawson        | Sociologist        | KURA  | 0714849643      |
| 4.  | Maroa Peter           | Chief              | NGAO  | 0705434033      |
| 5.  | Alaali T. Asha        | Assistant Chief    | NGAO  | 0715739385      |
| 6.  | Eng. Brian Ombee      | Civil Engineer     | CGGC  | 0710454213      |
| 7.  | Nzyoka Mutune         | Elder              | NGAO  | 0723403315      |
| 8.  | Kamande Juma          | Elder              | NGAO  | 0795157845      |
| 9.  | Rose W. Kabati        | Member             | C.H.P                                       | 0711216644      |
| 10. | James K. Mwangangi    | Elder              | Chairman                                    | 0720843168      |
| 11. | Edward M. Njihia      | Elder              | Huruma                                      | 0727210444      |
| 12. | Juliana M. John       | Member             | C.H.P                                       | 0710416111      |
| 13. | Hannah Wangui         | Chairlady          | C.H.P                                       | 0724008923      |
| 14. | Leah Wamahian         | Member             | C.H.P                                       | 0758926552      |
| 15. | Ann Wangari           | Member             | C.H.P                                       | 0720988157      |
| 16. | Rosemary Nyokabi      | Nyumba Kumi        | Huruma                                      | 0799324837      |
| 17. | Josiah Wandurua       | AD-SS              | KURA  | 0721611120      |
| 18. | Patricia Maina        | Kiamaiko           | Resident                                    | 0714693962      |
| 19. | Partick Mwangi        | Kiamaiko           | Resident                                    | 0111666900      |
| 20. | Simon Kabiru          | Kiamaiko           | Resident                                    | 0710424364      |
| 21. | Peter Gichurui        | Nyumba Kumi        | Ngundo                                      | 0722605338      |
| 22. | David Mwaniki         | Chairperson        | Kiamaiko                                    | 0700080808      |
| 23. | Faith Gichuhi         | Mahiira            | Kiamaiko                                    | 0795701004      |
| 24. | James Wanyoike        | Matatu             | Kiamaiko                                    | 0725105890      |
| 25. | Peter Kamwe           | Spare              | Kiamaiko                                    | 0722585306      |
| 26. | Paul Njenga           | Resident           | Kiamaiko                                    | 0722432294      |
| 27. | Samuel Muthoga        | Elder              | Huruma                                      | 0718714214      |
| 28. | Paul Waweru           | Business           | Kiamaiko                                    | 0721334636      |
| 29. | John Owiso            | Chairman           | Outer Ring Road Jua Kali Association (ORJA) | 0721695842      |
| 30. | Benson Owiso          | Member             | ORJA  | 0723485724      |
| 31. | Abdullahi Adan        | Member             | ORJA  | 0741306147      |
| 32. | Ann Nduku             | Elder              | ORJA  | 0713632147      |
| 33. | Rev. Onesmus Kinyingi | Elder              | ORJA  | 0724422814      |
| 34. | Luba Dawe Koech       | Member             | ORJA  | 0721665083      |
| 35. | Gure Buno             | Member             | ORJA  | 0726066737      |
| 36. | Adan Ali              | Member             | ORJA  | 0721256682      |
| 37. | Geoffrey Muthee       | Member             | ORJA  | 0722931823      |
| 38. | Joseph Ndiritu        | Chairman           | Public Transport Operators Union (PUTON)    | 0722351844      |
| 39. | Victor Okech          | Member             | CDF   | 0721876767      |
| 40. | Bonface Maina         | Staff              | NCCG  | 0769356177      |
| 41. | Brian Korir           | Staff              | NCCG  | 0705622875      |
| 42. | Antony Mwangi         | Constable          | NCCG  | 0706678442      |
| 43. | Eunice Wanjiru        | Constable          | NCCG  | 0714450681      |
| 44. | Doris Sipitet         | Staff              | NCCG  | 0790015095      |
| 45. | Elisha Ochieng        | Nyumba Kumi        | Chief Officer                               | 0726836646      |
| 46. | Nelson Mutinda Mwanza | Resident           | Huruma                                      | 0700091468      |



*Environmental and Social Impact Assessment Study Report for the proposed Establishment of Bus Rapid Transit Line 5 on Outer Ring Road in Nairobi City County*

| SN   | Name                   | Designation                 | Organization     | Contact Details |
|------|------------------------|-----------------------------|------------------|-----------------|
| 47.  | Paul W. Kioko          | Resident                    | Huruma           | 0728137370      |
| 48.  | Margaret Ngugi         | Resident                    | Huruma           | 0729908140      |
| 49.  | Phoebe Okoth           | Resident                    | Huruma           | 0722644202      |
| 50.  | Humres Okoth           | Resident                    | Huruma           | 0769126189      |
| 51.  | Margaret Gachuru       | Resident                    | Huruma           | 0799292227      |
| 52.  | Mary Wamaita           | Resident                    | Huruma           | 0715755124      |
| 53.  | Antony Njogu           | Resident                    | Huruma           | 0745145992      |
| 54.  | Edwin Chagira          | Resident                    | Huruma           | 0748868932      |
| 55.  | Julius Amboko          | Resident                    | Huruma           | 0725982388      |
| 56.  | Stephen M.             | Resident                    | Huruma           | 0112513455      |
| 57.  | Patrick Kaveri         | Resident                    | Huruma           | 0727579345      |
| 58.  | James Ngonyoku         | Resident                    | Huruma           | 0721632034      |
| 59.  | Alice Onjwaya          | Resident                    | Huruma           | 0716145729      |
| 60.  | Florence Kilungu       | Resident                    | Huruma           | 0728781015      |
| 61.  | Peter Mwangi           | Member                      | ORJA             | 0722785909      |
| 62.  | Peter Njoroge          | Member                      | CDF              | 0721663329      |
| 63.  | Aisha Yusuf            | Sociologist                 | KURA             | 0725055001      |
| 64.  | Elijah Muthusi         | Snr. Environmentalist       | KURA             | 0721802056      |
| 65.  | Wario Agal             | Nyumba kumi                 | Huruma           | 0722730878      |
| 66.  | Peter K. Irungu        | Nyumba kumi                 | Chairman         | 0722390320      |
| 67.  | Rev. Peter Nuthu       | KAG Mathare                 | Pastor           | 0726024815      |
| 68.  | Mary Kabati            | Nyumba kumi                 | Elder            | 0722970709      |
| 69.  | Ferdinand Maina        | Village Elder               | Chairman         | 0722964613      |
| 70.  | Dagu C. Hutu           | Nyumba kumi                 | Elder            | 0704768491      |
| 71.  | Lydia Wanjiku          | Nyumba kumi                 | Elder            | 0713547563      |
| 72.  | John Mwangi            | Nyumba kumi                 | Elder            | 0725638434      |
| 73.  | James Kariuki          | Nyumba kumi                 | Elder            | 0792047064      |
| 74.  | Michael Gavoji         | Nyumba kumi                 | Elder            | 0701788530      |
| 75.  | Nebert Adeya           | Nyumba kumi                 | Elder            | 0723360136      |
| 76.  | Wilson Kuria           | Naivas Limited              | Management       | 0724213527      |
| 77.  | Rose Ayene             | Interior                    | Chief            | 0720333072      |
| 78.  | Moses Njuguna          | Interior                    | MAA              | 0725576983      |
| 79.  | Peter Njoroge          | Nyumba kumi                 | Member           | 0722346424      |
| 80.  | Tabitha Wambui         | Nyumba kumi                 | Elder            | 0718449671      |
| 81.  | Sophia Moraa           | NG CDF                      | MPs Office       | 0725301998      |
| 82.  | Michael Alembi         | Mathare Constituency Office | Staff            | 0727586312      |
| 83.  | Maurice Njenga         | PWD Organization            | PWD              | 0725923687      |
| 84.  | Robert Kogi Mwangi     | Nyumba kumi                 | Chairman         | 0112920972      |
| 85.  | Jocelyne Liez Mamba    | Nyumba kumi                 | Village Elder    | 0726350903      |
| 86.  | Julius Irungu          | Resident                    | Elder            | 0710644538      |
| 87.  | Samuel Githinji Karuri | MCAs Office                 | Field Officer    | 0720244320      |
| 88.  | Moses Amedha Okeko     | Resident                    | Elder            | 0700903949      |
| 89.  | Collins Ochien'g       | Resident                    | Elder            | 0797729600      |
| 90.  | Hesbon Gwake           | Resident                    | Kiamaiko         | 0726865543      |
| 91.  | Patrick Kioko          | Kiamaiko                    | PWD              | 0725969097      |
| 92.  | Habiba Abdi            | Grogon                      | Resident         | 0711878016      |
| 93.  | Violet Remour          | Grogon                      | Resident         | 0795644416      |
| 94.  | Samuel Njuguna         | JKL Village                 | Resident         | 0721629322      |
| 95.  | James Kamau            | Huruma                      | Resident         | 0746423864      |
| 96.  | Johana Mburu           | Grogon                      | Resident         | 0713565484      |
| 97.  | David Mwangi           | Nairobi City County         | Officer          | 0703250746      |
| 98.  | Samuel Kamanga         | Nyumba Kumi                 | Elder            | 0716319902      |
| 99.  | Eric Mbusi             | Kiamaiko                    | Elder            | 0724532829      |
| 100. | Wepolyo Rodgers        | Huruma                      | Resident         | 0701032388      |
| 101. | Calvin Majiwa          | KURA                        | Environmentalist | 0720272303      |

| SN   | Name                  | Designation | Organization             | Contact Details |
|------|-----------------------|-------------|--------------------------|-----------------|
| 102. | Washington Wachira    | Huruma      | Resident                 | 0704649160      |
| 103. | Rose Gachago          | KURA        | Corporate Communications | 0707593545      |
| 104. | Paul Temesi           | KURA        | SACCO                    | 0723909183      |
| 105. | Alice Atieno          | Huruma      | CHP                      | 0748160746      |
| 106. | Abdallah Omari        | Kiamaiko    | Resident                 | 0724279236      |
| 107. | Lucas Ochien'g        | MPJ         | Chairman                 | 0720866923      |
| 108. | James Maina           | Huruma      | Resident                 | 0728656132      |
| 109. | Edwin Muge            | Huruma      | Resident                 | 0741291191      |
| 110. | Harrison Malambo      | Huruma      | Resident                 | 0745821271      |
| 111. | Peter Kimani          | Huruma      | Resident                 | 0113983812      |
| 112. | Benson Waweru         | Huruma      | Resident                 | 0716402334      |
| 113. | Joseph Mwaura         | Interior    | Chief                    | 0725262988      |
| 114. | Ronaldo Odhiambo      | Huruma      | Resident                 | 0707899133      |
| 115. | Linda Aseyo           | Huruma      | Resident                 | 0721582140      |
| 116. | Enos Iminza           | Huruma      | Resident                 | 0705177611      |
| 117. | Festus Mutinda        | Huruma      | Resident                 | 0720721523      |
| 118. | Robin Wangui          | Huruma      | Resident                 | 0722380597      |
| 119. | Abbas Adan            | Huruma      | Resident                 | 0705799696      |
| 120. | Maureen Juma          | Huruma      | Resident                 | 0728309733      |
| 121. | Cynthia Gwaya         | Huruma      | Resident                 | 0741565559      |
| 122. | Thomas Nyabengo       | Huruma      | Resident                 | 0727439517      |
| 123. | Dennis K. Mue         | Interior    | ACC Huruma               | 0721708354      |
| 124. | Benson K. Mbithi      | Interior    | ACC Mathare              | 0704841899      |
| 125. | Beverline A. Ochieng' | Interior    | Chief - Huruma           | 0728444446      |
| 126. | Martin Shikuku        | MPs Office  | NG CDF Chairman          | 0706272714      |
| 127. | Yvonne Aluodo         | Interior    | Interior                 | 0721320570      |
| 128. | Joseph Mwaura         | ACC         | Interior                 | 0725262988      |



**Plate 72: Members of the Public Attending the Meeting**



**Plate 73: Proposed Project Design Presentation by the CAS Consultant**

#### 5.4.4.8 Eighth Stakeholders' Consultation Meeting

The eighth Stakeholders' Consultation Meeting was held on Thursday 19<sup>th</sup> September, 2024, from 10.30 am-1.50 pm. The meeting was held at Youth Empowerment Hall, Embakasi where eighty (80) participants attended. The details of those present at the meeting are provided in

**Table 50** overleaf while **Plate 74** and **Plate 75** overleaf illustrates photographs taken during the meeting.

**Table 50: Summary of Stakeholders Details in the Eighth Meeting**

| SN  | Name               | Designation                 | Organization              | Contact Details |
|-----|--------------------|-----------------------------|---------------------------|-----------------|
| 1.  | Martina Dawson     | Sociologist                 | KURA                      | 0714849643      |
| 2.  | Josiah Wandurua    | AD-SS                       | KURA                      | 0721611120      |
| 3.  | Elijah Muthusi     | Senior Environmentalist     | KURA                      | 0721802056      |
| 4.  | Henry Michira      | Treasurer                   | TIWAMBA                   | 0722347374      |
| 5.  | Joseph Maina       | Member                      | D.U.T. S                  | 0722329920      |
| 6.  | Bill Mutoro        | Assistant General Secretary | TAWU                      | 0706107807      |
| 7.  | Franklin M. Njuu   | L/O                         | NTSA                      | 0724427708      |
| 8.  | Rodgers Moffath    | Supervisor                  | Citi Hoppa                | 0722985339      |
| 9.  | Joseph Kochale     | Engineer                    | NaMATA                    | 0727482824      |
| 10. | Julius Maina       | Director                    | Forward                   | 0721368972      |
| 11. | Evans Macharia     | Director                    | Embassava                 | 0722339589      |
| 12. | Stanley Wachira    | Operator                    | City Shuttle              | 0725573489      |
| 13. | Brian Ochieng      | Treasurer                   | ROG SACCO                 | 0720668347      |
| 14. | Georgia Ogolla     | Secretary                   | Royal SACCO               | 0790633453      |
| 15. | Bob Maina          | Secretary                   | Rembo Shuttle             | 0729797211      |
| 16. | Jackson Mwangi     | Chairman                    | Indostar                  | 0725580508      |
| 17. | Pius N Njoroge     | V. Chairman                 | MNK SACCO                 | 0720443210      |
| 18. | Geofrey Njogu      | Operation                   | Five Friends Limited      | 0724444763      |
| 19. | Shadrack Ounga     | Vice-Chairman               | Embassava                 | 0724248498      |
| 20. | Joseph Nderitu     | Treasurer                   | Embassava                 | 0758541852      |
| 21. | Peter Mwangi       | Chairman                    | Forward                   | 0723332404      |
| 22. | Benson Wanyoike    | Chairman                    | Embassava                 | 0722663420      |
| 23. | Peter Kinyua       | Secretary                   | ROG SACCO                 | 0726060909      |
| 24. | Benson Matura      | Chairman                    | NaMATA                    | 0733264868      |
| 25. | Peter Waihenya     | Chairman                    | DIXHUIJ                   | 0729690274      |
| 26. | Geofrey Chacha     | Chairman                    | Royalswift SACCO          | 0721665765      |
| 27. | Alfred N. Bichanga | B/M                         | Embassava                 | 0723961440      |
| 28. | Edwin Paul Wangeri | Chairman                    | Sowetamu SACCO            | 0727491216      |
| 29. | Lena Gatwiri       | Consultant                  | KUNHWA/CAS                | 0740617606      |
| 30. | Ahmad Sharif       | Chairman                    | Arbab.V.LTD               | 0720359970      |
| 31. | Rioba Charles      | Chairman                    | Utimo SACCO               | 0724176274      |
| 32. | Joseph Kairo       | Operation                   | Salty SACCO               | 0789440667      |
| 33. | Peter Kilge        | Chairman                    | Libera                    | 0722667431      |
| 34. | Lukas Kyule        | Secretary                   | Embassava                 | 0723359399      |
| 35. | Peterson Munywe    | Board                       | Embassava                 | 0727085855      |
| 36. | Grace Anono        | Operations                  | Matatu Owners Association | 0734694814      |
| 37. | Joyce Nyambura     | Operations                  | Matatu Owners Association | 0743046170      |
| 38. | Stephen Nzomo      | Operations                  | Double M. Company         | 0722429473      |
| 39. | Robert W Barasa    | Director                    | MANMO Investment          | 0721683103      |
| 40. | Kelvin Ndangi      | Eng Development             | NaMATA                    | 0726070775      |
| 41. | Joseph Kimuni      | Secretary                   | Umoimner                  | 0722883253      |
| 42. | Patrick            | Chairman                    | Kayoline                  | 0720478097      |

*Environmental and Social Impact Assessment Study Report for the proposed Establishment of Bus Rapid Transit Line 5 on Outer Ring Road in Nairobi City County*

| <b>SN</b> | <b>Name</b>         | <b>Designation</b> | <b>Organization</b> | <b>Contact Details</b> |
|-----------|---------------------|--------------------|---------------------|------------------------|
| 43.       | Mwinyi Bwika        | AD(ITS)            | KURA                | Mbwilacekura.go.ke     |
| 44.       | Marcel Madede       | Chairman           | Huruma 46 SACCO     | 0748331299             |
| 45.       | Billy Ndemo         | Supervisor         | KANI SACCO          | 0727887169             |
| 46.       | John Makoki         | Trye               | KANI SACCO          | 0715048780             |
| 47.       | Stephen Okerio      | Chairman           | Rembo Shuttle       | 0725260802             |
| 48.       | Abraham Murithi     | Director           | Topmost Shuttle     | 0702400507             |
| 49.       | John Gitu           | Secretary          | Dabu Mat            | 0721657856             |
| 50.       | Erick Opondo        | Chairman           | Soulplane           | 0792863191             |
| 51.       | John Cheboi         | AD-CC              | KURA                | 0722312941             |
| 52.       | Benjamin Asin       | AD-ENGINEER        | KURA                | 0723374068             |
| 53.       | Eric Mulevu         | Senior DCC         | Interior            | 0722508788             |
| 54.       | Juliet W. Njue      | ACC HQ             | Interior            | 0719836684             |
| 55.       | Elsie Ngendo        | Senior Sociologist | KURA                | 0721900048             |
| 56.       | Joseph Kagai        | Chairman           | Sowetamu            | 0724625268             |
| 57.       | Vanessa Mbula       | Graduate Engineer  | KURA                | 0725706810             |
| 58.       | Ndegwa Eva          | Graduate Engineer  | KURA                | 0722853609             |
| 59.       | Marion Magio        | URPD               | KURA                | 0715137834             |
| 60.       | Jacinta Odhiambo    | URPD               | KURA                | 0798009190             |
| 61.       | G. Githinji         | Chairman           | OMA SER LTD         | 0721394144             |
| 62.       | Eng. Wilfred Oginga | D-URPD             | KURA                | woginga@               |
| 63.       | Kevin Njogu         | ROUTE Controller   | SALTY               | 0706684845             |
| 64.       | Maxwel Obilo        | Director           | Outering Suburban   | 0716239196             |
| 65.       | Stephen K. Mwanga   | ACC` 1             | Interior            | 0727947839             |
| 66.       | Rose Gachago        | C.comm             | KURA                | 0707593545             |
| 67.       | Daniel Maina        | Environment        | KURA                | 0710300867             |
| 68.       | Sally Odak          | Environment        | KURA                | 0795019748             |
| 69.       | Milton Ochieng      | P.A system         | B.E.E Centre        | 0796279901             |
| 70.       | James k Wahome      | Chairman           | Nazigi              | 0722677624             |
| 71.       | Peter Mwangi        | Treasurer          | Nazigi SACCO        | 0722518983             |
| 72.       | Muhuri Mathenge     | URPD               | KURA                | 0720336694             |
| 73.       | Eng. Francis Gitau  | Director General   | NaMATA              | 0722615416             |
| 74.       | James Maina         | Attendant          | Nazigi              | 0728636152             |
| 75.       | Dominic Mutwiri     | Operations         | Enabled             | 0720856946             |
| 76.       | John Ndegwa         | Supervisor         | Marimba             | 0724255116             |
| 77.       | Dolido Johnston     | Member             | Marimba             | 0712272159             |
| 78.       | Miehle Kahari       | Supervisor         | Marimba             | 0722104673             |
| 79.       | Benjamin Kimuyu     | Director           | MMOG LTD            | 0721635419             |
| 80.       | Elizabeth Mwangangi | Sociologist        | KURA                | 0710491478             |



**Plate 74: Members of the Public Attending the Meeting**



**Plate 75: The Director General of NaMATA Addressing the Meeting**

#### **5.4.4.9 Key Issues Raised in the Meetings**

##### **5.4.4.9.1 Propose Project Maintenance Framework**

The Participants wanted to know if a maintenance framework has been established for the BRT Project to ensure its sustainability and smooth operation after construction.

KURA informed the meeting that the BRT Project has been structured into three phases: planning, design, and operation, with a comprehensive maintenance framework integrated into the operation phase to ensure long-term efficiency and sustainability. This framework includes regular, preventive, and corrective maintenance of infrastructure, vehicles, and systems. Continuous safety and performance monitoring, staff training, and dedicated budget allocation will support smooth operations. Additionally, maintenance efforts will focus on sustainability by ensuring energy efficiency and environmental friendliness throughout the system's lifespan. This ensures the BRT system remains reliable, safe, and efficient over time.

##### **5.4.4.9.2 Drainage**

The Stakeholders wanted to know how KURA will address the issue of drainage along Outer Ring Road during the construction of BRT Project and what specific solutions will be implemented to improve drainage and prevent flooding to ensure the road infrastructure and BRT system remain functional, particularly during heavy rainfall.

KURA informed the meeting that drainage issues are a nationwide challenge in Kenya, worsened by poor waste management and inadequate infrastructure. Along Outer Ring Road, solid waste blockages are a major cause of drainage problems, leading to flooding. KURA has implemented

performance-based contracts to remove silt and clear drainage paths, but long-term solutions require consistent maintenance and public education on proper waste disposal.

However, drainage improvements are complicated by the location of key outfalls within high-security areas controlled by the Kenya Airports Authority (KAA) and the Kenya Pipeline Company (KPC). Collaboration between multiple stakeholders, along with enhanced civic education and waste management, is necessary to resolve the drainage issues and support the sustainability of the BRT Project. It was also noted that the BRT Project will have provision of drains that will be connected and aligned with the drainage system along Outer Ring Road.

#### **5.4.4.9.3 Implementation of BRT Line 5**

The participants wanted to know what guarantee can KURA offer the stakeholders that the BRT Line 5 Project will be implemented to completion within stipulated time frame. They raised concerns that the Proposed Project will stall just as BRT Line 2, Thika Road Project stalled.

KURA assured the meeting that the necessary funds for Proposed Project have already been secured, which will ensure that the Proposed Project is completed on time unlike BRT Line 2 Project which stalled due to budgetary constraints.

#### **5.4.4.9.4 Traffic Management during Construction**

The Participants wanted to know how KURA plans to manage traffic during the construction of BRT Line 5. KURA assured the meeting that BRT Line 5 will be constructed at the median of Outer Ring Road, which is expected to cause minimal traffic disruptions. However, in areas where significant traffic impact is anticipated, construction will be scheduled during hours or days when traffic is lighter to minimize traffic delays and inconvenience. Moreover, a proper Traffic Management Plan will be devised to ensure minimal disruptions during construction.

#### **5.4.4.9.5 Occupational Health and Safety**

The participants enquired about how KURA will ensure that the Contractor adheres to the OSHA 2007 throughout the Project period

The meeting was assured that the Contractor will adhere to OSHA rules and regulations, this to include the registration of all work places, regular inspections and audits will be conducted, safety training will be mandatory, and compliance will be monitored through established safety protocols and reporting mechanisms throughout the Project period which KURA will oversee.

#### **5.4.4.9.6 Involvement of the Public Service Vehicles**

The participants wanted to know whether KURA has a plan to ensure there is no conflict with the PSVs since the BRT buses have a larger capacity bringing competition to the 14-seating capacity matatus. They wanted to know who will be the key operators of the BRT.

The Deputy Director-Urban Roads Planning Design (DD-URPD), KURA, informed the meeting that there will be collaborations between the NaMATA and the PSVs in the operation plan to ensure all opinions are put into consideration. Moreover, upon implementation of the Proposed Project the transition will be led by NaMATA who will head the operations of the BRT Project. It was noted that the public will then be informed on operation matters in the Project operation stage.

The meeting was informed that BRT is open to all investors since it is for public transport hence Matatu owners, SACCOs and other investors who will have the capacity to invest in the BRT are encouraged to participate once construction works are completed and operations begin.

#### **4.1.1.1 Proposed Project Details**

The participants enquired about the Project commencement date, the proposed budget for the Project and whether the BRT Project had design consideration that would accommodate for the elderly, children and PWD while enhancing their safety.

KURA informed the meeting that the Project is approximated to begin early 2025, currently the Project is at bid preparation stage and acquiring of a Contractor. Regarding the Proposed Project funding, the meeting was informed that the Project is being funded by the Export-Import Bank of Korea (KOREA Exim Bank) with a loan of approximately 59 million US Dollars (USD) (7 billion Kenyan Shillings). Concerning the Project's design considerations to accommodate the PWD, the Consultant informed the meeting that the Project indeed has considered the PWD whereby, all the stations will have provision of a lift/elevator and ramps to ensure easy mobility in and out of the stations. In addition, the stations and the buses are at the same level with only a separation of approximately 50 mm which will allow easy access to passengers with wheelchairs, the bus doors are also wide enough to accommodate wheelchairs. The meeting was further informed that the lifts/elevators are solar powered which can be used in case of power outage, the stations will also have a generator to power the lifts/elevators.

#### **4.1.1.2 Vandalism**

The Participants wanted to know what measures KURA will implement to prevent vandalism of the BRT Line 5 infrastructure during its operation.

KURA informed the meeting that to prevent vandalism of the BRT infrastructure, several measures have been considered and incorporated. These will include using vandal-resistant materials such as non-metal road barriers and solar-powered streetlights, which are less likely to attract vandalism. Additionally, the public is encouraged to actively protect public property and refrain from purchasing stolen or vandalized items. As vandalism is costly to both the government and taxpayers, as it requires expensive repairs and replacements, and it also poses safety risks to road users. It was noted that community vigilance and responsible behaviour are crucial in safeguarding the integrity of the BRT infrastructure as well as all road furniture.

#### **4.1.1.3 Communication Channels**

The Stakeholders wanted to know the communication channels available for the public to engage with KURA.

KURA informed the meeting that the Authority has several communication channels for public engagement. The agency is active on social media platforms, including Facebook and X (formerly Twitter), where updates and interactions can be managed. For direct inquiries, feedback, or concerns, the public can email KURA at [info@kura.go.ke](mailto:info@kura.go.ke). Additionally, KURA has a regional office located in the Industrial Area of Nairobi, which handles local matters, and a head office at Barabara Plaza on Mazao Road, Airport North Road, Nairobi, where broader administrative and strategic functions are managed. These diverse channels ensure that KURA remains accessible and responsive to public needs.

#### **4.1.1.4 Impact on Existing Public Service Vehicles**

The stakeholders sought clarification on whether the PSVs SACCOs will operate on the BRT Project and whether the existing PSVs stages along Outer Ring Road will be affected by the BRT Project.

KURA informed the participants that the current matatu stages along Outer Ring Road will continue to operate without any interference. Normal operations along Outer Ring Road will be maintained, allowing regular PSVs and personal vehicles to operate as usual. The BRT lanes will be however restricted to BRT buses only and closed off to all other vehicles.

#### **4.1.1.5 Training for Employment Opportunities in the Proposed Project**

Some participants wanted to know if KURA will provide training for locals to develop the skills required to work during operation of the BRT Project.

KURA informed the participants that the Authority is only responsible for laying the BRT infrastructure and not its operation. Instead, NaMATA will oversee the Project operations after KURA has completed the construction works. Therefore, locals are advised to seek training independently and to engage NaMATA for matters Proposed Project operations. The stakeholders were also assured that once construction of the BRT is completed and before operations phase commences, there will be public sensitization, civic education, and public awareness campaigns to educate the public on how the BRT system will operate.

#### **4.1.1.6 Establishment of BRT Line 5**

The Matatu operators enquired if the proposed BRT Line 5 Project is a government initiative or a private money-making venture. They wanted to know the role of KURA and NaMATA in the implementation of the proposed Project. The operators further asked why KURA is coming to disrupt the operationalization of matatu sector which has been in operation for a long time.

KURA informed the matatu operators that the Proposed BRT Line 5 Project is a National Government initiative funded by the Korean Government through Exim Bank, with the aim to enhance mobility along Outer Ring Road and other parts of Nairobi City County. It was noted



that KURA is collaborating with NaMATA and other key stakeholders affiliated to transport sector with the ultimate goal of enhancing urban mobility.

Regarding disruption to the existing matatu sector operations, the meeting was informed that the responsibility of KURA is construction of the BRT infrastructure (BRT Lanes, Stations and the Depot) not operation. NaMATA will take over the operation of the BRT after construction. The matatu operators were assured that there will be a consultative meeting dedicated to addressing matatu owners and operators' issues and draw a transition plan with input from the operators.

#### **4.1.1.7 Suggestions and Recommendations**

The stakeholders put forth the following suggestions and recommendation, they include:

- The representative for PWD suggested that KURA and NaMATA should consider universal design that is accessible to everyone;
- Nairobi City County Environment Sector requested KURA for collaboration especially in the public participation. They also requested KURA and the Consultant to share the Project information and details presented in the meeting. They stated that for effective public participation the citizens should be availed with all the presentations and the ESIA study report and continuous engagement should be done;
- Nairobi City County Environment Sector urged KURA to add the Domesticated Law and Policy to the policy, legal and regulatory framework to ensure conformity of the National Laws Act and Air Quality Policy;
- KURA should ensure that the BRT Line 5 Project is implemented in a way that integration with other Line is seamless with less disruption to newly added infrastructure;
- NaMATA and KURA should consider electric buses to reduce green gas emission once the Project is completed, E-mobility envisaging hybrid system;
- KURA should involve operators/investors in the entire process;
- Air quality monitoring team to be stationed along the Outer Ring Road;
- KURA and NaMATA should consider connecting line 5 to JKIA;
- KURA to prioritize constructing bus-bays along Outer Ring Road;
- Matatu Saccos along Outer Ring Road to be involved in every stage of BRT implementation and not the final stage;
- The Contractor should schedule the construction activities in such a way as to minimize disruptions to the flow of traffic;
- KURA should ensure that the drainage system is rectified so as to efficiently drain storm water especially during the rainy season;
- KURA should ensure that there is proper utilization of the Project funds; and
- BRT Line 5 should prioritize the local community members when hiring ticketing agents, drivers and cleaners during the operation phase of the Project.

## **5.5 Stakeholder Engagement Plan**

A Stakeholder Engagement Plan (SEP) for the proposed Project has been prepared to facilitate the engagement of the various Project stakeholders and Project interested parties throughout the

Project's construction and operational phases. The Proposed Project's SEP is a living document, which will be updated through the course of the proposed Project to incorporate changes and updates in relation to the stakeholders. The SEP is designed to ensure effective involvement of all stakeholders and other interested parties. This plan contains the methods and recommendations for ongoing engagement with local communities, government authorities and as well as other stakeholders that may be interested in the proposed Project.

KURA is committed to appropriate technical and cultural approaches through consultation and information disclosure to ensure that adequate and appropriate information is provided to the stakeholders and interested parties in a timely manner. The stakeholder engagement process began during the stakeholders' consultation for the Study. The current phase for which this SEP is prepared aims at keeping authorities and communities informed about progress during construction works and helping resident, communities and road users among others access Project benefits including employment, businesses and ease of travel among others.

### **5.5.1 Objectives**

Following the Study's stakeholders' consultations, relationships were established between the Project Implementers (KURA and the Contractor) and stakeholders, notably resident communities along the Outer Ring Road as well as transporters and other key stakeholders. This SEP seeks to improve and facilitate decision making through meaningful consultation and disclosure where all stakeholders are actively involved in voicing their opinions and concerns that may influence Project's decisions.

The objectives of this SEP are therefore to:

- Understand regulatory stakeholder engagement requirements of the Kenyan legislation;
- Provide guidelines and procedures for engagement with all stakeholders including definition of roles and responsibilities during Project implementation;
- Ensure that necessary information on Project construction and operations are shared regularly and contents are understood;
- Ensure that Project benefits including employment among others are maximized through effective engagement with resident communities and other stakeholders;
- Identify key stakeholders that are affected, and/or able to influence the Project and its activities;
- Identify the most effective methods and structures through which to disseminate Project information, and to ensure regular, accessible, transparent and appropriate consultation; and
- Define roles and responsibilities for the implementation of the SEP as well as effective monitoring and reporting procedures.

### **5.5.2 Significance of Stakeholder Engagement Plan**

The SEP addresses various issues related to the Project namely:

- Identification of Project stakeholders and mechanisms for stakeholder feedback and information sharing;
- An outline for consultation at the local and national levels;
- Addressing issues raised by Project stakeholders; and
- Identifying resources required to implement the plan and monitor its implementation.

The SEP for the proposed Project is as shown in **Table 51** overleaf.

**Table 51: Stakeholder Management Plan for the Proposed Project**

| No. | Organization                 | Specific Stakeholder  | Areas of interest/Topics of Engagement   | Method of Engagement  | Location  | Responsible for the engagement  | Frequency  |
|-----|------------------------------|---|--|---|---|---|--|
| 1.  | The National Government      | <ul style="list-style-type: none"> <li>▪ Deputy County Commissioners for Makadara, Kamukunji, Embakasi, Njiru, Mathare, Kasarani Sub-Counties</li> <li>▪ Members of National Assembly for Embakasi East, Embakasi West and Embakasi South, Embakasi North, Makadara, Kamukunji, Mathere, Ruaraka Constituencies.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Proposed Establishment of BRT Line 5</li> <li>▪ Impact of BRT to existing PSVs</li> <li>▪ General socio-economic community development</li> <li>▪ Socio -Economic development</li> <li>▪ Security</li> <li>▪ Rule of law</li> <li>▪ Accountability</li> <li>▪ Safety</li> <li>▪ Adherence to development plans</li> </ul> | <ul style="list-style-type: none"> <li>▪ Formal meetings</li> <li>▪ Phone/ email/ text messaging</li> </ul> | <ul style="list-style-type: none"> <li>▪ Government Offices,</li> <li>▪ RE's Office</li> <li>▪ Contractor's Campsite</li> <li>▪ Along the Study Road</li> </ul> | <ul style="list-style-type: none"> <li>▪ Resident Engineer</li> <li>▪ Safeguards Officer</li> <li>▪ Contractor</li> </ul> | <ul style="list-style-type: none"> <li>▪ Throughout Construction period</li> </ul> |
| 2.  | County Government            | <ul style="list-style-type: none"> <li>▪ County Secretary</li> <li>▪ County Executive Committee Members</li> <li>▪ Sub-County Administrators</li> <li>▪ Ward Administrators</li> </ul>  | <ul style="list-style-type: none"> <li>▪ General County development</li> <li>▪ Ensuring County social and economic development through the Project</li> <li>▪ Optimal allocation of resources for development</li> <li>▪ Permits and Licenses</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Formal meetings</li> <li>▪ Phone/email/text messaging</li> </ul>   | <ul style="list-style-type: none"> <li>▪ County Government Offices,</li> <li>▪ RE's Office</li> <li>▪ Along the Study Road</li> </ul>                           | <ul style="list-style-type: none"> <li>▪ RE</li> <li>▪ Safeguards Officer</li> <li>▪ Contractor.</li> </ul>               | <ul style="list-style-type: none"> <li>▪ Throughout Construction period</li> </ul> |
| 3.  | Other Government Authorities | <ul style="list-style-type: none"> <li>▪ NaMATA</li> <li>▪ NTSA</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Proposed Establishment of BRT Line 5</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Formal meetings</li> <li>▪ Phone/email/text messaging</li> </ul>   | <ul style="list-style-type: none"> <li>▪ KURA</li> <li>▪ Officess</li> <li>▪ RE's Office</li> </ul>   | <ul style="list-style-type: none"> <li>▪ RE</li> <li>▪ Safeguards Officer</li> <li>▪ Contarctor</li> </ul>                | <ul style="list-style-type: none"> <li>▪ Throughout Construction period</li> </ul> |

| No. | Organization                         | Specific Stakeholder  | Areas of interest/Topics of Engagement   | Method of Engagement  | Location   | Responsible for the engagement  | Frequency  |
|-----|--------------------------------------|---|--|---|--|---|--|
| 4.  | Religious Institutions               | <ul style="list-style-type: none"> <li>▪ Redeemed Gospel Church Kware, Kenya Assemblies of God (KAG) Church Fedha, Buruburu, Mathare, Full Gospel Church, God's Power Church among others</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Project implementation</li> <li>▪ Access to Religious Institutions</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Public Meetings</li> <li>▪ Formal meetings</li> <li>▪ Phone/ email/ text messaging</li> <li>▪ Road Safety Campaigns</li> <li>▪ Flyers and posters</li> <li>▪ GRM</li> <li>▪ Awareness campaigns</li> </ul> | <ul style="list-style-type: none"> <li>▪ Meetings with affected institutions</li> <li>▪ Chiefs' Barazas</li> <li>▪ Along the Study Road</li> </ul> | <ul style="list-style-type: none"> <li>▪ RE</li> <li>▪ Safeguards Officer</li> <li>▪ Contractor.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Throughout Construction period</li> </ul> |
| 5.  | Business Community                   | <ul style="list-style-type: none"> <li>▪ Supermarkets such as Naivas and Quickmart</li> <li>▪ Rafiki Business Park</li> <li>▪ Bayer East Africa Ltd</li> <li>▪ Ruaraka Business Community</li> <li>▪ Dawa Life Science</li> <li>▪ Prabhaki Business Park</li> <li>▪ Trans Wide Pharmaceuticals</li> <li>▪ Open Air Markets</li> <li>▪ Service Stations</li> <li>▪ Retail Shops</li> </ul> | <ul style="list-style-type: none"> <li>▪ Project implementation</li> <li>▪ Access to Business premises</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Formal meetings</li> <li>▪ Phone/email/ text messaging</li> <li>▪ GRM</li> <li>▪ Awareness campaigns</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Meetings with affected businesses</li> <li>▪ Chief Barazas</li> <li>▪ Along the Study Road</li> </ul>     | <ul style="list-style-type: none"> <li>▪ RE</li> <li>▪ Safeguards Officer</li> <li>▪ Contractor.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Throughout Construction period</li> </ul> |
| 6.  | PSVs Operators/ SACCOs/ Associations | <ul style="list-style-type: none"> <li>▪ Forwards Travelers</li> <li>▪ Ummoiner SACCO</li> <li>▪ Utimo SACCO</li> <li>▪ Embasava SACCO</li> <li>▪ Super Metro SACCO</li> <li>▪ Kani SACCO</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Integration of the Proposed Project with existing transport system</li> <li>▪ Involvement in the BRT Project</li> </ul> | <ul style="list-style-type: none"> <li>▪ Public Meetings</li> <li>▪ Formal meetings</li> <li>▪ Phone/ email/ text messaging</li> <li>▪ Road Safety Campaigns</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Meetings with affected businesses</li> <li>▪ Chief Barazas</li> </ul>                                     | <ul style="list-style-type: none"> <li>▪ RE</li> <li>▪ Safeguards Officer</li> <li>▪ Contractor.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Throughout Construction period</li> </ul> |

| No. | Organization       | Specific Stakeholder  | Areas of interest/Topics of Engagement  | Method of Engagement   | Location   | Responsible for the engagement  | Frequency  |
|-----|--------------------|---|---|--|--|---|--|
|     |                    | <ul style="list-style-type: none"> <li>▪ Topmost SACCO</li> <li>▪ Dix Hut SACCO</li> <li>▪ MNK SACCO</li> <li>▪ Salty SACO</li> <li>▪ ROG SACCO</li> <li>▪ Kayoline SACCO</li> <li>▪ City Hoppa</li> <li>▪ City Shuttle</li> <li>▪ Libera SACCO</li> <li>▪ Eastern Link SACCO</li> <li>▪ Double M SACCO</li> <li>▪ Metro Tours SACCO</li> <li>▪ Five Lane SACCO</li> <li>▪ Embakasi Shuttle</li> <li>▪ EBTI SACCO</li> <li>▪ Manmo SACCO</li> <li>▪ Rembo Shuttle</li> <li>▪ Lopha SACCO</li> <li>▪ Chania K SACCO</li> <li>▪ Nazigi SACCO</li> </ul> | <ul style="list-style-type: none"> <li>▪ Road safety Awareness;</li> <li>▪ Creating Awareness on the importance of BRT line 5</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Flyers and posters</li> <li>▪ Training/ Workshops</li> <li>▪ Mass and social media</li> <li>▪ GRM</li> <li>▪ Awareness</li> </ul> | <ul style="list-style-type: none"> <li>▪ Along the Study Road</li> </ul> |   |  |
| 7.  | Local Media        | <ul style="list-style-type: none"> <li>▪ Local Newspapers</li> <li>▪ Community Radios</li> <li>▪ Social media e.g. (WhatsApp groups)</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Project Awareness Creation</li> <li>▪ Advertisement on the awareness creation of the road project</li> <li>▪ Advertising possible diversions</li> <li>▪ Road Safety Awareness Creation</li> <li>▪ GRM</li> </ul> | <ul style="list-style-type: none"> <li>▪ Public Meetings</li> <li>▪ Formal meetings</li> <li>▪ Phone/ email/ text messaging</li> <li>▪ Road Safety Campaigns</li> </ul>    | <ul style="list-style-type: none"> <li>▪ Social media</li> </ul>         | <ul style="list-style-type: none"> <li>▪ KURA</li> <li>▪ Project Communications Officer</li> <li>▪ Safeguards Officer</li> <li>▪ Contractor</li> <li>▪ Local Media Stations Responsible.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Throughout Construction period</li> </ul> |
| 8.  | Service Providers. | <ul style="list-style-type: none"> <li>▪ KPLC;</li> <li>▪ NCWSC water</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Interruption of Utility Services;</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Relocation Committee</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Site and boardroom</li> </ul>   | <ul style="list-style-type: none"> <li>▪ RE</li> <li>▪ Project</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Throughout Construction</li> </ul>        |

| No. | Organization | Specific Stakeholder  | Areas of interest/Topics of Engagement  | Method of Engagement  | Location | Responsible for the engagement   | Frequency |
|-----|--------------|---|---|---|----------|--|-----------|
|     |              | <ul style="list-style-type: none"> <li>▪ pipes; Communication Companies;</li> </ul> | <ul style="list-style-type: none"> <li>▪ Reinstatement of Utility Services</li> </ul> | <ul style="list-style-type: none"> <li>▪ meetings</li> <li>▪ Formal meetings</li> <li>▪ Phone/ email/ text messaging</li> <li>▪ Site Meeting</li> <li>▪ WhatsApp Group</li> </ul> | Meetings | <ul style="list-style-type: none"> <li>▪ Communications Officer</li> <li>▪ Safeguards Officer</li> <li>▪ Contractor</li> </ul> | period    |

## **5.6 Grievance Redress Mechanism**

A GRM is a set of simple and transparent procedures that provide its users with access to safe and confidential means of expressing complaints/concerns and give guidance on how to handle grievance to the point of giving feedback to the complainant. GRM involves the receipt and processing of complaints from individuals or groups negatively affected by activities of a particular project. In order to deal with the grievances that may arise during the implementation of the proposed Project, there is need to incorporate a Grievance Redress Process.

### **5.6.1 Objectives of Grievance Redress Mechanism**

The following are the objectives of establishing a GRM:

- To enable local communities, employees, and other project affected stakeholders to raise grievances with the Proponent and the Contractor in order to seek redress;
- To address complaints and grievances and enhance conflict resolution arising from, and during implementation of the proposed Project;
- To ensure transparency and accountability throughout the implementation of the Project amongst the relevant stakeholders including project beneficiaries;
- To mitigate, manage, and resolve potential or realized negative impacts attributed by the proposed Project;
- To promote positive relations between the project implementers, executors and beneficiaries;
- To fulfil obligations under international human rights law; and
- To allow the Project to be active in identifying solutions to grievances.

### **5.6.2 Scope of Grievance Redress Mechanism**

GRM provides a channel for dispute resolution during the implementation of projects. However, the grievance procedure serves to complement but not replace the existing legal channels such as courts, tribunals and other recourse mechanisms for addressing grievances. The Proposed Project GRM is designed to improve project outcomes by creating public awareness about the project and its objectives, deterring fraud and corruption, mitigating socio-economic and environmental risks and providing the Project implementers (KURA and Contractor) with suggestions and feedback during Project implementation. If this procedure fails to provide a solution, complainants can still seek legal redress.

### **5.6.3 Principles of the Grievance Redress Mechanism**

The effectiveness of GRM is be guided by the following principles:



- Accessibility: The GRM should be accessible to everyone and at any given time. It should take into consideration potential barriers such as language, literacy, awareness, cost or fear of reprisal and seek to address them;
- Predictability: GRM should be time-bound at each stage, and have specified time frames for the responses;
- Fairness: All the procedures therein should be widely perceived as unbiased in regards to access of information and meaningful public participation and consultation;
- Rights compatibility: The outcomes of the mechanism should be consistent with the international and national standards. It should also not restrict access to other redress mechanisms;
- Transparency and accountability: The entire GRM process should be done out of public interest;
- Capability: For an effective GRM, the system needs to be endowed the necessary resources, that is, technical, financial and human resources;
- Feedback: GRM should serve as a means to channel public feedback to improve project outcomes for the people; and
- Address all concerns and handle grievances promptly, effectively in a transparent and culturally appropriate manner.

#### **5.6.4 The Grievance Redress Process**

The Proponent will form a grievance redress committee comprising of its staff, local leaders and some members of the community. The Grievance Committee will receive information from three main sources:

- Directly from affected persons;
- From the Project Implementation Team; and;
- From the Monitoring and Evaluation Officer.

All grievances will be recorded in a grievance log, which will be kept by the Proponent representative/staff. The log would indicate grievances, date lodged, actions taken to address or reasons the grievance was not acted on (i.e., the grievance was not related to project activities), information provided to complainant and date the grievance was closed. Grievances can be lodged at any time, either directly or through a grievance committee member. The process for lodging a complaint is outlined as follows:

- A Grievance Officer will receive the complaint in-person by the complainant;
- The Grievance Officer will seek further information and enter the details into a Grievance Form;
- A local leader (witness) and Complainant will both sign the Grievance Form after they confirm accuracy of the grievance; and
- The Grievance Officer lodges the complaint in the Grievance Log.

Once the grievance has been received in writing and recorded, it is then forwarded to the Project Safeguards Officer who will communicate this to the complainant. If satisfied, the complainant signs to acknowledge that the issue has been resolved satisfactorily. If the complainant is not satisfied, the grievance is forwarded to the Project Engineer/Resident Engineer who will determine its approach. If satisfied, the complainant signs to acknowledge that the issue has been resolved satisfactorily. However, if the complainant is not satisfied, the grievance is lodged to the Directorate responsible, which will determine the approach, and if satisfied, the complainant signs to acknowledge that the issue has been resolved satisfactorily. If the complainant is not satisfied, grievance is lodged to the Director General who will determine the approach and if satisfied, the complainant signs to acknowledge that the issue has been resolved satisfactorily. If the complainant is not satisfied, the grievance will be lodged to the board of Directors who will communicate the solution and status will be reported back to the complainants within 28 days. **Figure 3** overleaf provides a flow chart with key steps that should be followed:

Special considerations shall be made in the GRM to accommodate unique requirements for labour and working conditions, SEA/Sexual Harassment (SH), Gender Based Violence (GBV) and Vulnerable and Marginalized Groups (VMGs).

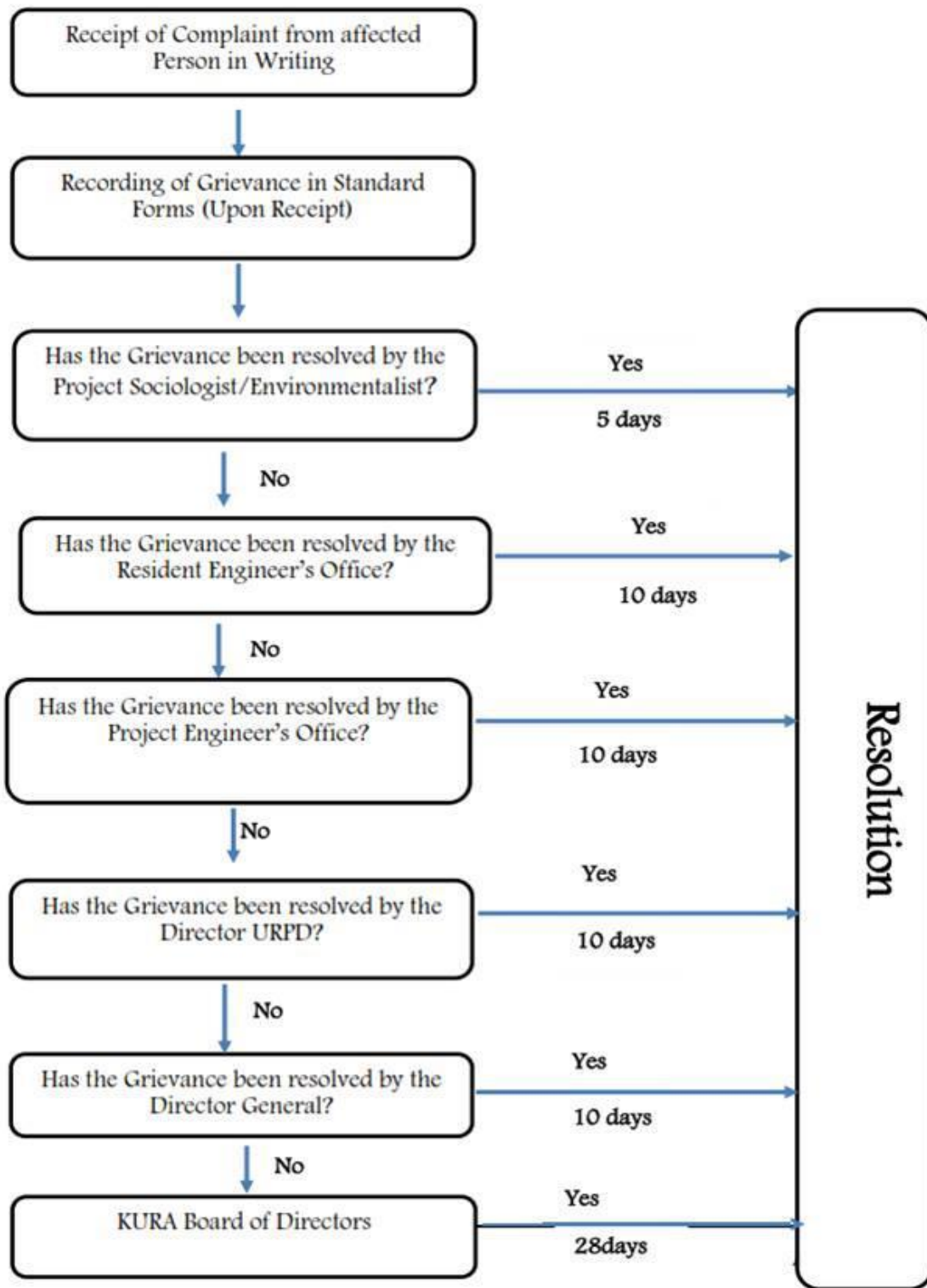


Figure 3: Flow Chart of Grievance Redress Process

## **6. ANALYSIS OF PROJECT ALTERNATIVES**

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### **6.1 Introduction**

This Chapter analyses the proposed Establishment of BRT Line 5 Project alternatives in terms of mode, route, technology, the location and importance of EIA licence in the proposed Project. It describes the “No Action” alternative, alternative transport mode and the proposed Project alternative. It also analyses the alternative equipment, technology and construction materials, analysis of the Depot location and implementation of the proposed Project with and without an EIA licence.

### **6.2 Identification of Alternatives**

The principal alternatives studied in the context of the proposed Project are:

- **Alternative 1:** The “No Action” alternative-the Project site remains as it is;
- **Alternative 2:** Alternative land transport modes;
- **Alternative 3:** Implementation of the BRT Line 5 at the proposed route; and
- **Alternative 4:** Analysis of Alternative Equipment, Technology and Materials.
- **Alternative 5:** Analysis of the Depot location
- **Alternative 6:** Implementation of the proposed Project with & without an EIA licence

#### **6.2.1 Alternative 1: The “No Action” Alternative**

The “No Action” alternative with respect to the proposed Establishment of the BRT Line 5 on Outer Ring Road in Nairobi City County implies that the status quo is maintained. The predominant form of public transport in developing countries is ‘informal transport’ which is operated through paratransit systems that lack definite schedules, stops and routes, low level of regulation and unconventional business practises. The high urbanisation rate in Nairobi City County calls for better planned and governed urban public transport system (Wambulwa et al., 2022).

Under the “No Action” alternative, the Proponent’s proposal would not receive the necessary approval from NEMA. The proposed Project would not be initiated, evidently resulting in the status quo expected to continue and residents along Outer Ring Road continuing to experience the paratransit systems characteristics which include; erratic scheduling and service, selective operation times for private actors’ profit, variability of fares, poor safety, low accessibility to vulnerable groups and lack of capacity to meet demand (Wambulwa et al., 2022). Moreover, the residents along the route will not benefit from a sustainable, efficient, advanced and safer transport system.

From the analysis above, it becomes apparent that the “No Action” alternative is therefore not considered as a viable alternative to the Proponent and to the road users and is therefore discarded accordingly.

### **6.2.2 Alternative 2: Alternative Land Transport Modes**

The alternative land transport modes that exist in the Project areas include road transport and rail transport.

The existing railway line in the proposed Project areas has 5 stations which traverses through Embakasi Village to Nairobi Railway Station. The Commuter Rail is a supplementary mode of transport to the road transport. The Commuter rail connects the Eastlands to the CBD, unlike the BRT which is meant to have 13 stations along the Outer Ring Road aiming to connect Thika Road and Mombasa Road. Moreover, the commuter rail alone does not meet the demand of transport hence majority of residents in these areas have no other option other than to use the road transport causing road congestion. The commuter rail is under the Kenya Railways Corporation. Therefore, expansion of the rail transport is not under KURA mandate. The alternative to the proposed BRT project would be new railway infrastructure will have to be freshly constructed. The new construction will trigger further impacts, especially involuntary resettlement.

The existing road transport is a two-way with each having three lanes and service lines. Nairobi is a growing city where the existing road network in the Project areas continue to be overwhelmed by the private vehicles and public service vehicles. The widening of the existing roads was not considered for the Project because it did not meet criteria related to cost, ridership, environmental impact, consistency with local plans, and public support.

The proposed Establishment of BRT Line 5 project will be aimed at complementing the existing roads which will use the lower cost approach method using the existing road network presenting a future option for the road transport to be improved to cater for the ever-growing population in Nairobi.

### **6.2.3 Alternative 3: Implementation of the BRT Line 5 at the proposed Route**

The Ministry of Roads and Transport in 2014 commissioned a study that harmonized the MRTs corridors and came up with five BRT corridors and four commuter rail corridors. In 2019, the NMA Council gazetted the following BRT corridors; BRT Line 1 (Ndovu), BRT Line 2 (Simba), BRT Line 3 (Chui), BRT Line 4 (Kifaru) and BRT Line 5 (Nyati).

**BRT Line 1 (Ndovu)** Route is Limuru-Kangemi-CBD-Imara Daima-Athi River–Kitengela. This project is proposed under the Expressway Project being implemented by KeNHA and supported

by the World Bank. The implementation of the line was divided into 3 lots, where the detailed engineering studies were awarded to three consortia; Lot 1 (South) GIBB Africa (Kenya), Lot 2 (Centre) COWI (Denmark) and Lot 3 (North) Eser (Turkey). It is under the feasibility study stage.

**BRT Line 2 (Simba)** Route is Rongai-Bomas (Langata Rd)-CBD-Ruiru-Thika-Kenol. The Simba line is being undertaken by STECOL Corporation in joint venture with SMEDI. This line is under construction and is being implemented by KeNHA. The project will be implemented in two phases which include:

- Phase I: Clayworks-Kenyatta University-Githurai-Kasarani-Pangani Underpass-Murang'a Road-Globe Cinema Overpass-Tom Mboya Street-Moi Avenue (approximately 20 km); and
- Phase II: Ruiru-Membley Junction-Clayworks section (approximately 3 km) and Moi Avenue-Haile Selassie Avenue-Kenyatta National Hospital (approximately 4 km).

**BRT Line 3 (Chui)** Route is Tala-Njiru-Dandora (Juja Road)-CBD-Showground (Ngong Road) – Ngong. This project is funded by the European Union and conducted by design consultant Ingérop-LuxConsult. The corridor extends for 18.9 km from Show Ground to Dandora, features 27 BRT stations, 1 depot, 4 junctions provided with a grade-separated fly-over and traffic signalling at other junctions. The line is under KURA which is still under the detailed design stage.

**BRT Line 4 (Kifaru)** Route is Mama Lucy Hospital-Donholm (Jogoo Road)-CBD-T Mall-Bomas-Karen-Kikuyu. Kifaru Line is about 7.1 km long and has 11 stations which is being funded by the European Union and conducted by design consultant Ingérop-LuxConsult. Line 4 is under KURA which is still under the detailed design stage.

**BRT Line 5 (Nyati)** Route is Balozi (Allsops)-Baba Dogo-Donholm-Pipeline-Taj Mall connecting Thika Road (A2), Airport North Road and Mombasa Road (A109). The total length is 10.435 km. The proposed Project is being funded by the Korean Government through the Economic Development Cooperation Fund and KExim Bank, the Client being KURA. The Consultant is Kunhwa Engineering & Consulting Company Limited, joint ventures being the Dohwa Engineering Company Limited, Yooshin Engineering Corporation and Tracom Limited while the Sub Consultants are the CAS Consultants Ltd and TIMCON Transport Consulting Ltd.

This alternative proposes to carry out the Establishment of the BRT Line 5 on Outer Ring Road in Nairobi City County. The Project will be a high-performance system with dedicated median BRT lanes, platform level boarding at stations, off-board fare collection, and intersection treatments that avoid turns across BRT lanes.

Under the proposed Project alternative, the Proponent would be issued with an EIA License. In issuing the license, NEMA would approve the Proponent's proposed Project, provided all environmental measures are complied with during the planning and design, construction and operational and maintenance phases.

Due to the proposed Project, it is anticipated that it would provide a major opportunity for area development, employment opportunities via business environment and accessibility to services to both the residents and non-residents of the area. In addition, a development of this caliber will add to the locality's ability to fuel the growth and development of the wider environment.

The Merits of this alternative are as follows:

- Increased transit ridership in Nairobi City County;
- Improved access to Nairobi City and National Transport Network;
- Increased transit reliability and on-time performance;
- Improved air quality;
- Creation of job opportunities;
- Visual and aesthetic amenities will be improved;
- The local and national economies will improve through creation of market for construction materials; and
- Technology transfer.

From the above analysis of alternatives, the 'proposed Project Option' is the most valid option that should be adopted since it has more positive impacts to the environment and the community in the Project area as a whole with minimal negative impacts that can be minimized or avoided with the implementation of the proposed mitigation measures in the ESMMP.

#### **6.2.4 Alternative 4: Analysis of Alternative Equipment Technology & Materials**

##### **6.2.4.1 Analysis of Alternative Equipment & Technology in BRT**

Most common buses along the Project areas route operate on diesel fuel. There are more advanced technologies that encourage the use of green energy which operate on biodiesel, Compressed Natural Gas (CNG), diesel-electric (Hybrid), electricity using overhead electric wires (Trolley) or rechargeable batteries, and Hydrogen (Fuel Cell), that help in the sustainable development.

There are other models which are equipped with Diesel Particulate Filters (DPF) and Selective Catalytic Reduction (SCR) technology that may be possible to adapt due to the locally provided diesel.

The trolley buses, electrically charged buses and the solar charged buses are not considered in the comparison, since the capital cost of the buses are high and require a high-cost infrastructure of overhead wires and connecting poles in addition to constant electricity supply, which is a challenge in current circumstances in Nairobi.

In Nairobi City County there is BasiGo Company which has come up with the electric buses. There are 3 charging stations located in Kikuyu, Buruburu and Embakasi. BasiGo so far has 19 E-buses since its incorporation to the City in 2021. The seat capacity of the buses is 51 passengers. The full e-bus recharge takes 2 hours. This can be used to further explain the choice of the BRT which will be diesel which is easily accessible along the Outer Ring Road route. The buses meant to operate the BRT will have the seating capacity of approximately 72 passengers which will enhance mass travel. It is however noted to have E-buses as future considerations as part of the BRT Project to achieve climate resilience and environment sustainability. The choice of buses for the BRT system on the Project will be based on the examination of available infrastructure and availability of fuel types in the local market.

The Proponent will use modern, locally and internationally accepted equipment, technology and materials to achieve public health safety, security and environmental quality requirement. Calibration and examination of the Contractor's machines as per the OSHA, 2007 will be done at least once every period of six months, or after any modifications or extensive repair or within a shorter period by a person approved by the Directorate of Occupational Safety and Health Services (DOSHS) and a certificate issued.

#### **6.2.4.2 Analysis of Footbridge Materials**

There are 10 pedestrian footbridges along Outer Ring Road and 9 official and unofficial crossing points at collector roads that either serve or cross the corridor. Four additional pedestrian footbridges have been designed to serve the stations at Allsops, Juja Road, Donholm and Taasia.

Steel's combination of high strength, flexibility, and durability makes it a premier choice for bridge structural design. It is particularly advantageous in projects that require long spans, rapid construction, or innovative design. Steel's recyclability and the ability to prefabricate components further enhance its appeal as a sustainable and efficient material in bridge construction which also adapts well to the demands of climate resilience.

Constructing a bridge deck using concrete provides numerous benefits, including durability, load-bearing capacity, thermal stability, and noise reduction. Concrete's cost-effectiveness and adaptability to various design requirements make it a preferred material for bridge decks. Its sustainability and low maintenance need further enhance its appeal, ensuring that the bridge remains functional and safe for many years.



These pedestrian footbridges have been designed in structural steel except for the deck which is a composite element made of concrete deck supported on steel platform. Aesthetics and functionality have been a major consideration in the design. Concrete works have been limited to substructure only to minimize use of formwork and propping which would cause massive disruption of traffic during implementation. It is also notable there are drainage design consideration which aim at achieving climate resilience by having gutter and drop inlets directing the collected water into down pipes into proposed longitudinal or cross drains in the pedestrian footbridge sections.

The raw materials that will be used in the construction, including bitumen/asphalt, will be locally sourced and will be those that meet the Kenya Bureau of Standards requirements. Equipment that saves energy and time will be given first priority.

### **6.2.5 Analysis of the Depot Location**

The Project alternatives for the Depot location of the BRT system line 5 after thorough analysis, the identified potential locations were; JKIA, and behind Ramtons-Hypermart opposite City Cabanas stage along Mombasa Road. Each with its unique advantages and challenges.

The JKIA location was not considered during the design due to several concerns cited by the KAA since JKIA is a protected area under the Protected Areas Act Cap 204. In addition, the land proposed to have the Depot in JKIA belongs to KAA and required approvals that were yet to be concluded which would help in future considerations for the Depot location.

The location behind Ramtons-Hypermart opposite City Cabanas stage along Mombasa Road was considered due to its strategic positioning, security and accessibility. Furthermore, the site is located on public land which belongs to the Proponent therefore, reduces the land tenure risks for acquisition.

The selected site with regards to the BRT system is typically centrally located, ensuring efficient connectivity to various parts of the Nairobi City. Additionally, the site offers ample space for future expansion, which is crucial for accommodating the growing demand for public transportation in Nairobi City.

Another significant factor in choosing this section is its contribution to climate resilience. The area is less prone to flooding, which is a common issue in other parts of the City. By situating the Depot in a less flood risk zone, we can ensure uninterrupted operations even during adverse weather conditions. This low-risk consideration is vital for maintaining a reliable public transport system, especially in the face of climate change.

### **6.2.6 Implementation of the proposed Project with and without an EIA Licence**

EIA aims at assessing the environmental impacts of infrastructure projects. EIA is used as a tool for environmental protection. Regulation 17 (1) of EIAA Regulations, 2003 states that “During the process of conducting an Environmental Impact Assessment Study under these Regulations, the Proponent shall in consultation with the Authority (NEMA), seek the views of persons who may be affected by the project”, hence putting into much considerations the public opinion in the improvement and development of public infrastructure.

Under Kenya's Environmental legislation, EIA is required for all projects that are likely to have a negative effect on the environment. The law classifies these projects into three groups according to the seriousness of their likely effects as set out in the EMCA Cap 387, EMC(A)A No.5 of 2015 and pursuant to Part 1 Regulation 6 of EIAA Regulations, 2003. These are high, medium and low risk project categories.

Implementing the proposed Project without the EIA license may lead to avoidable malpractices like non-compliance to the law, litigation implications which may lead to delayed project implementation, costs incurred in litigation processes, lost time allocated for project implementation, lack of public participation in implementation of public projects and degradation of the environment which may cause adverse effects to the environment and social welfare of residents along the Outer Ring Road.

This analysis then shows the importance of compliance with EMCA Cap 387 which gives legitimacy of the ESIA process done while ensuring sustainable development and public participation is observed in the implementation of the proposed Project

### **6.3 Conclusion**

This section has analysed the BRT Project alternatives considering the site, scope, technology and materials in the Project implementation. The analysis was used to choose the most suitable alternative and discard the least suitable ones. The alternatives discarded included the “No Action” which would let the continuation of paratransit systems along the Outer Ring Road. The alternative of the existing land transport which include the commuter rail and the road transport were also not considered as viable alternatives, since the commuter rail is not under KURA’s mandate and expansion of the existing road transport did not meet criteria related to cost, ridership, environmental impact, consistency with local plans, and public support. The alternative that looked into other technologies and equipment that are opted in other countries was discarded in reference to the available infrastructure and availability of fuel types in the local market. Technologies like electric buses were however put for future considerations to enhance climate mitigation.

The Establishment of BRT Line 5 on Outer Ring Road in Nairobi City County was considered the most valid option since it will be aimed at complementing the existing roads which will use the lower cost approach method using the existing road network. It also has more positive impacts to the environment and the community in the Project area as a whole. The materials used in the establishment also meet the sustainability criteria, will be locally sourced and will be those that meet the Kenya Bureau of Standards requirements. In addition, the Depot location will be at a less flood risk zone which is vital for maintaining a reliable public transport system, especially in the face of climate change. This Project will also comply with EMCA Cap 387 which gives legitimacy of the ESIA process done while ensuring sustainable development and public participation is observed in the implementation of the proposed Project.

## **7. CLIMATE CHANGE RISKS, ADAPTATION AND MITIGATION**

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### **7.1 Introduction**

Globally transport sector accounts for approximately one-fifth of CO<sub>2</sub> emissions where 24% of the CO<sub>2</sub> emission is from energy sources. Global Transport Emissions 2018 shows that road travel accounts for three-quarters of transport emissions. Most of these emissions comes from passenger vehicles i.e. cars and buses which contribute to 45.1%. Other carbon emissions come from trucks carrying freight. Road transport accounts for 15% of total carbon dioxide emissions. Changes in precipitation, rise in the sea level, extreme weather, and heat pose high risks to transportation. Hazards may affect system performance, safety, and reliability. The coastal area is affected by rising sea levels and extreme storms can lead to flooding and storm surge that causes damage to roads, bridges, and other infrastructures. Flooding affects roadways, and tunnels, weakening roadway materials and traffic congestion. Consequently, people may have trouble accessing homes, schools, stores, and hospitals. Lack of rainfall causes drought and extreme heat can cause wildfire, damaging transportation networks and interfering with road visibility.

BRT is a bus-based mass transit system with specialized design, service, and infrastructure to improve the system and remove typical causes of bus delays. BRT is a high-capacity transport system with its right of way which can be implemented at relatively low cost. It is a key technology in cities in developing countries, which can change the trend of modal shifts towards public transportation, thereby bringing about a range of benefits, including reduced congestion, air pollution, and GHG and better service to people in developing countries.

The use of public transportation is an efficient mode of transport since it emits minimal GHG compared to private cars. While cars usually carry just one or two people at a time, a bus can carry 50 or more, and a train in a large city may carry hundreds of passengers. The transport industry is the fifth emitter of GHG, therefore the shifting from car to public transit can significantly reduce the impact of climate change. People can only choose public transportation when it is their most convenient option. Public transport is delayed by boarding and alighting, intersections, and traffic congestion. The BRT system can avoid causes of delay in public transport making it convenient for use.

Studies indicate that the use of buses in the transport sector reduces the emission of GHG by up to two-thirds per passenger, per kilometre as compared to private cars. The climate change action report by the United Nations states that shifting more trips to public transit is important to curb climate change. Proving reliance on means of public transport also benefits society, for instance, traffic fatality rates are reduced, more active city residents and broader access to jobs, education, and urban services. This makes it a key driver of equitable, sustainable development

in cities around the world. BRT has gained popularity worldwide, deployed in large spans in over 188 cities, moving over 32 million passengers on average, per day. BRTs are prominent in the global south because they offer many benefits for cities that face challenges such as congestion, pollution, poverty, and rapid urbanization. BRTs are considered a cost-effective, flexible, inclusive, and sustainable means of transit when compared to other modes, however, they require careful planning, design, implementation, and management to achieve their full potential.

Interglobal Engineers Limited was contracted by Kenya Urban Roads Authority to carry out a baseline ambient air quality assessment to establish the current environmental conditions before the actualization of their proposed Establishment of BRT Line 5 planned on Outer Ring Road, Nairobi City County. The assessment was carried out on 11<sup>th</sup> September 2024 and involved the measurement of the concentration of PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>x</sub>, NO<sub>x</sub>, CO, CO<sub>2</sub>, and TVOCs.

The air samples for each pollutant were picked from nine predetermined points within the project area to identify any potential exceedances early on so that corrective measures can be implemented to mitigate pollution levels. The standards used to evaluate the measured values are derived from the EMC (Air Quality) Regulations, 2014, and the WHO ambient air quality standards. The findings indicated that levels of particulate dust, Oxides of Sulphur (SO<sub>2</sub>), Oxides of Nitrogen (NO<sub>2</sub>), CO<sub>2</sub> & CO, and total VOC levels were within the Environmental Management and Co-ordination (Air Quality), Regulations, 2014.

### **7.1.1 Climate Change Hazards**

Kenya experiences a bimodal seasonal pattern with rains occurring in March, April, and May (MAM) - “long rains” season, and between October, November, and December (OND - “short rains”. Precipitation in Kenya shows a high degree of temporal and spatial variability. Kenya’s average annual precipitation is typically 680 mm, ranging from less than 250 mm in the northern Arid and Semi Arid Lands (ASALs) areas to about 2000 mm in the western region.

Approximately 82% of Kenya’s land area experiences low and unevenly distributed rainfall, receiving less than 700 mm annually (Government of Kenya, 2018). Three of Kenya’s 47 counties are considered ASALs. Precipitation trends for Kenya are highly variable, with northern areas becoming wetter and southern areas becoming drier since the 1960s.

## **7.1.2 Projected Climate Changes**

**Table 52** and **Table 53** overleaf presents in detail the following Climate Parameters summarized below:

### **7.1.2.1 Temperature**

- The average annual temperature over Kenya is projected to increase by +0.94°C to +1.03°C by 2040 and +2.52°C to +5.13°C by the end of the century;
- Daily maximum temperatures are projected to be as high as 37.6°C by 2040 and 40.7°C by the end of the century;
- Increase in the frequency of ‘hot days’ to 40 days per year by 2040 and as much as 162 days per year by the end of the century; and
- Cooling degree days are projected to increase by 14% by 2040 and as much as 72% by the end of the century.

### **7.1.2.2 Rainfall**

- Rainfall will continue to be highly variable;
- Heavy precipitation events (days with rainfall > 20 mm) are projected to increase in frequency with a possible increase in flash floods (acute short-term events);
- Daily (24-hour) rainfall is projected to increase to as much as 75 mm by 2040 and 120 mm by the end of the century; and
- Rainfall depth of 67 mm = 150 year event.

### **7.1.2.3 Sea Level**

- Sea level is estimated to rise by 250 mm by mid-century and as much as 820 mm by end of the century.

Table 52: Projected Temperature Variations

| Climate Parameter (P)  | Climate Hazard (H)                 | Indicator (I)                            |         | Baseline (1995-2014) Estimated Value | Baseline Likelihood Score (L) | (2020-2039) Estimated Value (p50) | % Increase/decrease from baseline (p50) | (2020-2039) Likelihood Score (p50) | (2040-2059) Estimated Value (p50) | % Increase/decrease from baseline (p50) | (2040-2059) Likelihood Score (p50) | (2080-2099) Estimated Value (p50) | % Increase/decrease from baseline (p50) | (2080-2099) Likelihood Score (p50) | Likelihood Score Methodology | Occurrence Definition    | Climate Scenario | Reference Location | Parameter Source |
|------------------------|------------------------------------|--|---------|--------------------------------------|-------------------------------|-----------------------------------|---|------------------------------------|-----------------------------------|---|------------------------------------|-----------------------------------|---|------------------------------------|------------------------------|--------------------------|------------------|--------------------|------------------|
| Temperature            | Extreme Heat                       | Annual Mean Temperature                  | Tas     | 25.29                                | 3                             | 0.60                              | 2.37%                                   | 3                                  | 0.89                              | 3.52%                                   | 3                                  | 0.88                              | 3.48%                                   | 3                                  | Middle Baseline              | Average Temperature      | SSP1-2.6         | Kenya              | WBG CCKP         |
|                        | Extreme Heat                       | Maximum Average Temperature              | Tamax   | 30.55                                | 3                             | 0.59                              | 1.93%                                   | 3                                  | 0.88                              | 2.88%                                   | 3                                  | 0.83                              | 2.72%                                   | 3                                  | Middle Baseline              | Average Temperature      | SSP1-2.6         | Kenya              | WBG CCKP         |
|                        | Extreme Heat                       | Minimum Average Temperature              | Tamin   | 20.83                                | 3                             | 0.60                              | 2.88%                                   | 3                                  | 0.91                              | 4.37%                                   | 3                                  | 0.90                              | 4.32%                                   | 3                                  | Middle Baseline              | Average Temperature      | SSP1-2.6         | Kenya              | WBG CCKP         |
|                        | Extreme Heat                       | Days with Tmax > 30°C                    | hd35    | 51.27                                | 3                             | 20.77                             | 40.51%                                  | 4                                  | 28.33                             | 55.25%                                  | 5                                  | 29.18                             | 56.91%                                  | 5                                  | Middle Baseline              | Days per year            | SSP1-2.6         | Kenya              | WBG CCKP         |
|                        | Extreme Heat                       | Number of Summer Days (Tmax > 25°C)      | sd      | 322.20                               | 3                             | 7.22                              | 2.24%                                   | 3                                  | 9.80                              | 3.04%                                   | 3                                  | 9.45                              | 2.93%                                   | 3                                  | Middle Baseline              | Days per year            | SSP1-2.6         | Kenya              | WBG CCKP         |
|                        | Extreme Heat                       | Days with Heat Index > 35°C              | hi35    | 0.35                                 | 3                             | 3.36                              | 961.37%                                 | 5                                  | 7.61                              | 2177.40%                                | 5                                  | 8.87                              | 2537.91%                                | 5                                  | Middle Baseline              | Days per year            | SSP1-2.6         | Kenya              | WBG CCKP         |
|                        | Extreme Heat                       | Warm Spell Duration Index                | wspi    | 5.65                                 | 3                             | 49.04                             | 868.35%                                 | 5                                  | 77.74                             | 1376.54%                                | 5                                  | 79.48                             | 1407.35%                                | 5                                  | Middle Baseline              | Frequency per year       | SSP1-2.6         | Kenya              | WBG CCKP         |
|                        | Extreme Heat                       | Maximum of Daily Maxima                  | tmn     | 17.10                                | 3                             | 0.68                              | 3.98%                                   | 3                                  | 0.93                              | 5.44%                                   | 3                                  | 0.88                              | 5.15%                                   | 3                                  | Middle Baseline              | Frequency per year       | SSP1-2.6         | Kenya              | WBG CCKP         |
|                        | Extreme Heat                       | Minimum of Daily Minima                  | tmx     | 35.50                                | 3                             | 0.62                              | 1.75%                                   | 3                                  | 0.99                              | 2.79%                                   | 3                                  | 1.03                              | 2.90%                                   | 3                                  | Middle Baseline              | Frequency per year       | SSP1-2.6         | Kenya              | WBG CCKP         |
| Extreme Heat           | Cooling Degree Days                | cdd65                                    | 4501.67 | 3                                    | 366.47                        | 8.14%                             | 3                                       | 552.20                             | 12.27%                            | 4                                       | 545.35                             | 12.11%                            | 4                                       | Middle Baseline                    | Degree days per year         | SSP1-2.6                 | Kenya            | WBG CCKP           |                  |
| Rainfall               | Extreme Precipitation and Flooding | Average annual precipitation (mm)        | pr      | 688.56                               | 3                             | 100.26                            | 14.56%                                  | 4                                  | 38.99                             | 5.66%                                   | 3                                  | 66.17                             | 8.16%                                   | 3                                  | Middle Baseline              | Total precipitation (mm) | SSP1-2.6         | Kenya              | WBG CCKP         |
|                        | Extreme Precipitation and Flooding | Days with precipitation > 20mm           | r20mm   | 3.93                                 | 3                             | 0.26                              | 6.62%                                   | 3                                  | 0.40                              | 10.18%                                  | 4                                  | 0.66                              | 16.80%                                  | 4                                  | Middle Baseline              | Days per year            | SSP1-2.6         | Kenya              | WBG CCKP         |
|                        | Extreme Precipitation and Flooding | Days with precipitation > 50mm           | r50mm   | 0.57                                 | 3                             | 0.01                              | 1.91%                                   | 3                                  | 0.00                              | 0.00%                                   | 3                                  | 0.01                              | 1.91%                                   | 3                                  | Middle Baseline              | Days per year            | SSP1-2.6         | Kenya              | WBG CCKP         |
|                        | Extreme Precipitation and Flooding | Average largest 1-day precipitation (mm) | n1day   | 32.28                                | 3                             | 32.00                             | 99.13%                                  | 5                                  | 1.49                              | 4.62%                                   | 3                                  | 3.02                              | 9.36%                                   | 3                                  | Middle Baseline              | Total precipitation (mm) | SSP1-2.6         | Kenya              | WBG CCKP         |
|                        | Extreme Precipitation and Flooding | Average largest 5-day precipitation (mm) | n5day   | 72.45                                | 3                             | 5.66                              | 7.81%                                   | 3                                  | 4.36                              | 6.02%                                   | 3                                  | 7.28                              | 10.02%                                  | 4                                  | Middle Baseline              | Total precipitation (mm) | SSP1-2.6         | Kenya              | WBG CCKP         |
|                        | Extreme Precipitation and Flooding | Maximum Number of Consecutive Wet Days   | cwd     | 19.90                                | 3                             | -3.64                             | -18.29%                                 | 2                                  | -0.56                             | -2.81%                                  | 3                                  | 1.36                              | 6.84%                                   | 3                                  | Middle Baseline              | Days per year            | SSP1-2.6         | Kenya              | WBG CCKP         |
|                        | Drought/Water Scarcity             | Maximum Number of Consecutive Dry Days   | cdd     | 73.52                                | 3                             | 1.22                              | 1.66%                                   | 3                                  | -3.27                             | -4.45%                                  | 3                                  | -6.71                             | -9.13%                                  | 3                                  | Middle Baseline              | Days per year            | SSP1-2.6         | Kenya              | WBG CCKP         |
| Drought/Water Scarcity | SPEI                               | spei12                                   | 0.00    | 3                                    | 0.00                          | 0.00%                             | 3                                       | 0.00                               | 0.00%                             | 3                                       | 0.00                               | 0.00%                             | 3                                       | Middle Baseline                    | Annual probability           | SSP1-2.6                 | Kenya            | WBG CCKP           |                  |
| Sea Level Rise         | Coastal Flood                      | SLR (m)                                  | slr     | 0.00                                 | 3                             | 0.19                              | 100.00%                                 | 5                                  | 0.38                              | 100.00%                                 | 5                                  | 0.38                              | 100.00%                                 | 5                                  | Middle Baseline              | Total depth (m)          | SSP1-2.6         | Kenya              | WBG CCKP         |

**Table 53: Projected Rainfall Change Factor**

**Largest 1-Day Precipitation for Kenya**

| Return Levels, Historical: 1985-2014 (center 2000) (mm)   |                  |        |                  |                  |        |                  |                  |        |                  |                  |        |                  |                  |        |                  |                  |        |                  |
|---|------------------|--------|------------------|------------------|--------|------------------|------------------|--------|------------------|------------------|--------|------------------|------------------|--------|------------------|------------------|--------|------------------|
| Event   | 5-yr             |        |                  | 10-yr            |        |                  | 20-yr            |        |                  | 25-yr            |        |                  | 50-yr            |        |                  | 100-yr           |        |                  |
|   | 10 <sup>th</sup> | median | 90 <sup>th</sup> | 10 <sup>th</sup> | median | 90 <sup>th</sup> | 10 <sup>th</sup> | median | 90 <sup>th</sup> | 10 <sup>th</sup> | median | 90 <sup>th</sup> | 10 <sup>th</sup> | median | 90 <sup>th</sup> | 10 <sup>th</sup> | median | 90 <sup>th</sup> |
| Change in Annual Exceedance Probability, 2010-2039 (center 2025) (change factor for occurrence/ year) |                  |        |                  |                  |        |                  |                  |        |                  |                  |        |                  |                  |        |                  |                  |        |                  |
| Event   | 5-yr             |        |                  | 10-yr            |        |                  | 20-yr            |        |                  | 25-yr            |        |                  | 50-yr            |        |                  | 100-yr           |        |                  |
|   | 10 <sup>th</sup> | median | 90 <sup>th</sup> | 10 <sup>th</sup> | median | 90 <sup>th</sup> | 10 <sup>th</sup> | median | 90 <sup>th</sup> | 10 <sup>th</sup> | median | 90 <sup>th</sup> | 10 <sup>th</sup> | median | 90 <sup>th</sup> | 10 <sup>th</sup> | median | 90 <sup>th</sup> |
| SSP1-1.9  | 0.66             | 1.12   | 1.49             | 0.60             | 1.15   | 1.61             | 0.54             | 1.17   | 1.74             | 0.52             | 1.18   | 1.78             | 0.47             | 1.20   | 1.93             | 0.41             | 1.23   | 2.10             |
| SSP1-2.6  | 0.77             | 1.17   | 1.66             | 0.72             | 1.22   | 1.81             | 0.67             | 1.25   | 2.00             | 0.66             | 1.26   | 2.07             | 0.61             | 1.30   | 2.30             | 0.57             | 1.34   | 2.60             |
| SSP2-4.5  | 0.83             | 1.19   | 1.70             | 0.78             | 1.23   | 1.88             | 0.72             | 1.26   | 2.08             | 0.71             | 1.27   | 2.16             | 0.65             | 1.31   | 2.45             | 0.60             | 1.35   | 2.81             |
| SSP3-7.0  | 0.78             | 1.16   | 1.63             | 0.73             | 1.19   | 1.78             | 0.67             | 1.22   | 1.95             | 0.65             | 1.23   | 2.01             | 0.60             | 1.25   | 2.23             | 0.55             | 1.28   | 2.49             |
| SSP5-8.5  | 0.74             | 1.16   | 1.72             | 0.69             | 1.19   | 1.87             | 0.63             | 1.22   | 2.03             | 0.62             | 1.23   | 2.09             | 0.57             | 1.26   | 2.32             | 0.52             | 1.30   | 2.58             |
| Change in Annual Exceedance Probability, 2010-2039 (center 2025) (change factor for occurrence/ year) |                  |        |                  |                  |        |                  |                  |        |                  |                  |        |                  |                  |        |                  |                  |        |                  |
| Event   | 5-yr             |        |                  | 10-yr            |        |                  | 20-yr            |        |                  | 25-yr            |        |                  | 50-yr            |        |                  | 100-yr           |        |                  |
|   | 10 <sup>th</sup> | median | 90 <sup>th</sup> | 10 <sup>th</sup> | median | 90 <sup>th</sup> | 10 <sup>th</sup> | median | 90 <sup>th</sup> | 10 <sup>th</sup> | median | 90 <sup>th</sup> | 10 <sup>th</sup> | median | 90 <sup>th</sup> | 10 <sup>th</sup> | median | 90 <sup>th</sup> |
| SSP1-1.9  | 0.66             | 1.12   | 1.49             | 0.60             | 1.15   | 1.61             | 0.54             | 1.17   | 1.74             | 0.52             | 1.18   | 1.78             | 0.47             | 1.20   | 1.93             | 0.41             | 1.23   | 2.10             |
| SSP1-2.6  | 0.77             | 1.17   | 1.66             | 0.72             | 1.22   | 1.81             | 0.67             | 1.25   | 2.00             | 0.66             | 1.26   | 2.07             | 0.61             | 1.30   | 2.30             | 0.57             | 1.34   | 2.60             |
| SSP2-4.5  | 0.83             | 1.19   | 1.70             | 0.78             | 1.23   | 1.88             | 0.72             | 1.26   | 2.08             | 0.71             | 1.27   | 2.16             | 0.65             | 1.31   | 2.45             | 0.60             | 1.35   | 2.81             |
| SSP3-7.0  | 0.78             | 1.16   | 1.63             | 0.73             | 1.19   | 1.78             | 0.67             | 1.22   | 1.95             | 0.65             | 1.23   | 2.01             | 0.60             | 1.25   | 2.23             | 0.55             | 1.28   | 2.49             |
| SSP5-8.5  | 0.74             | 1.16   | 1.72             | 0.69             | 1.19   | 1.87             | 0.63             | 1.22   | 2.03             | 0.62             | 1.23   | 2.09             | 0.57             | 1.26   | 2.32             | 0.52             | 1.30   | 2.58             |



## 7.2 Climate Exposure on Outer Ring

The following shows the description of climate change exposures along the Project Road:

- Some sections of the pavement of the Access Road to the proposed Depot are damaged due to regular flooding as shown in **Plate 77** below;
- Some sections of the road pavement are characterized by potholes, due to poor drainage structures as shown in **Plate 78**, and **Plate 78** below;
- Pavement rutting due to excessive heating during a high temperatures season is common along Project Road as shown in **Plate 79** below;
- Some drainage structures are blocked by solid wastes as shown overleaf in **Plate 80**, dumping of solid wastes inside the drainage system is also common along the project Road as shown overleaf in **Plate 81** and Some road infrastructures such as bridges are exposed to soil erosion as shown overleaf in **Plate 82**.



Plate 76: Damaged Road Pavement along Access to the Proposed Depot, City Cabanas



Plate 77: Pothole along the Proposed Project Road, Taj-Mall Bus Station



Plate 78: Pothole along Access to the Proposed Depot at City Cabanas



Plate 79: Pavement Rutting along the Project Road at Taj-Mall Roundabout



**Plate 80: Blocked Drainage along the Project Road, Airport Stage Section**



**Plate 81: Blocked Stormwater Drain along the Project Road at Pipeline Section**



**Plate 82: Eroded Section of Mathare River Bank along Project Road at Kariobang Underpass**

### **7.3 Adaptive Capacity**

The following is the adaptation capacity for the Proponent to encounter climate change exposure along the Outer Ring Road:

- The Proponent will ensure the construction of quality and standard BRT road infrastructure using materials that are less susceptible to high temperatures and other weather elements such as high precipitation;
- The Proponent through the road Assets and Corridor Management Directorate will ensure regular maintenance of damaged road pavement sections and upgrade the bridges;
- The Proponent to ensure the provision of adequate resources for periodic rehabilitation of affected BRT System and other related infrastructure;
- The Proponent will effectively enforce Axle load control along the Outer Ring Road to regulate heavy capacity vehicles from damaging road pavement;

- The Proponent to plant trees and proper landscaping after the construction works to control soil erosion along the BRT Project;
- The Proponent will ensure the implementation of soil erosion control measures such as the construction of gabions, stone pitching, and planting of grass to control erosion along the Project Road;
- Through performance contracting, the proponent will work closely with Nairobi City County for the proper collection and disposal of solid wastes from the proposed Road reserve; and
- The Proponent will ensure an annual EA for the BRT Project for conformity to the Project's operational ESMMP.

#### **7.4 Climate Change Risks**

The study analysis along the outer Ring Road identified flood-prone areas as illustrated below:

- Taj-Mall underpass section at coordinate 1° 19' 20.41" S, 36° 53' 57.30" E, observed during the rainy season as shown below in **Plate 83**, and during a dry season as shown below in **Plate 84**, Ngong River at coordinate 1° 18' 24.92" S, 36° 53' 19.56 " E as shown overleaf in **Plate 85**, Mathare River at coordinate 1° 14' 58.18" S, 36° 52' 41.37" E as shown overleaf in **Plate 86**, and Nairobi River at coordinate 1° 15' 52.62" S, 36° 52' 45.84" E as shown in **Plate 87** overleaf.



**Plate 83: Flooded Area During the Rainy Season**



**Plate 84: Flood Prone During Dry Season**



**Plate 85: Flood Prone Section along the Project Road  
Ngong River**

**Plate 86: Flood Prone Section along the Project Road  
Mathare River**



**Plate 87: Flood Prone Section along the Project Road  
Nairobi River**

#### **7.4.1 Adaptation Capacity**

The Proponent has adopted the following climate change measures along the Project Study area:

- The proponent will ensure the design and construction of climate change resilient infrastructures such as adequate stormwater drainage systems;
- The Proponent is introducing climate-proof transport infrastructure that will not only encourage public transit ridership but also reduce the emission of GHG to the environment;
- The Proponent to strictly comply with the enacted Climate Change Act, 2016 on Climate Change safeguards by enforcing axle load which will significantly reduce carbon emission, and noise pollution during the operational phase of the BRT Project;
- The proponent will closely work with NaMATA for the adoption of E-mobility BRT buses for transport services to reduce GHG emissions and noise;

- The Proponent will link up the BRT System with the ITS for improved surveillance and systematic management of the traffic situation in the city. Proper flow of traffic plays a critical role in carbon emission control;
- The Proponent has constructed a network of NMT facilities along the proposed Establishment of BRT Line 5 and in various urban areas to encourage pedestrian walking and cycling for controlled carbon emission;
- Through capacity building and resource mobilization, KURA's Environmental and Social Safeguard department will manage environmental pollution through the planting of trees and public sensitization on the importance of using BRT during the operational phase;
- The Proponent will liaise with Nairobi City County physical planning and disaster management departments and other concerned stakeholders for proper implementation of the drainage designs of the project;
- The Proponent will provide the BRT System infrastructure depot with critical climate-proof sections such as the vehicle maintenance section, and bus charging area; and
- The Project design will encourage road elevation along flood-prone areas and improve drainage systems.

#### **7.4.2 Mitigation against Climate Change Risks**

Kenya has generally experienced increasing temperatures over vast areas, since 1960s. Over inland areas, the trends in both minimum (night-time/early morning) and maximum (daytime) temperatures depict a general warming through time. However, the increase in the minimum temperatures is steeper than in maximum temperatures. The minimum temperature has risen by 0.7-2.0°C and the maximum by 0.2-1.3°C, depending on the season and region. The combined effect of a steeper increase in minimum temperatures and a less steep increase in maximum temperatures is a lower daily (diurnal) temperature range. Rainfall is projected to increase with many models indicating an intensification of heavy rainfall especially during the wet seasons, and an associated increased risk of flood. Seasonal rainfall trends are mixed, with some locations indicating increasing trends while others show no significant changes. The annual rainfall totals show either neutral or slightly decreasing trends due to a general decline in the main long rains (March -April-May-MAM) season. Most of the standard seasons also depict the same type of patterns in the highest daily rainfall values observed.

Climate change has significantly increased the frequency and intensity of natural hazards such as flooding, erosion, and landslides, also referred to as geohazards. These events pose a growing threat to transport infrastructure in many developing countries. Geohazards can result in significant loss of human life and cause extensive damage to transport infrastructure.

In the most severe cases involving less frequent but more intense geohazards, the primary concern is to prevent potential loss of life and property, minimize damage to infrastructure, and ensure continuity in the provision of public and private services. When it comes to higher frequency, lower impact geohazards such as landslides and flash floods. Improving the resilience of the proposed BRT Line 5 road network against all types of natural hazards can reduce the direct impact of disasters on the community.

## **7.5 The BRT Vulnerability Assessment**

The proposed Establishment of BRT Line 5 along the Outer Ring Road is likely to be vulnerable to climate change such as rising temperatures and changing rainfall patterns. Assessing the vulnerability of critical BRT road infrastructure is a critical step in ensuring the construction of high-quality road infrastructure, and ensuring the government invests scarce funding strategically in road improvement, and toward building climate resilience into the BRT Road network.

KURA will prioritize climate change resilience measures for the proposed Establishment of BRT Line 5 since it is likely to be vulnerable to climate change hazards such as flooding, temperatures, damage to drainage, damage to bridges, soil erosion and sedimentation, fogs and mists, and traffic congestion. The study advised further mitigation and adaptation measures for the identified negative climate change impacts and enhanced the asset management system by building the capacity of engineers.

## **7.6 Positive Climate Change Impacts of the BRT System**

The following are anticipated positive climate change impacts during the operations of the proposed Establishment of BRT Line 5 along the Outer Ring Road:

### **7.6.1 Reduction in GHG Emission Impact**

- **Lower Emission Per Passenger:** The system is designed more efficiently compared to traditional buses. The BRT operates on a higher frequency and greater capacity, thus fewer emissions per passenger as compared to private cars;
- **Green Fleet Management:** Implementing and maintaining low-emission buses, hybrid technologies, or transitioning to electric buses contributes to reducing the environmental footprint of BRT systems;
- **Public Transit Use Motivation:** The BRT system is faster, reliable, and comfortable; therefore, attracts more passengers who will opt for public transportation rather than personal driving leading to reduced vehicle emissions; and
- **Integration with Non-motorized Modes:** integrating the BRT system with non-motorized modes will reduce the emission of GHG by encouraging walking and cycling.

**Reductions in Local Air Pollutants:** Local air pollutants, such as carbon monoxide and particulate matter, pose environmental and public health concerns. By forcing the retirement of less efficient, older transport vehicles, BRT systems can have a positive impact on smog, local pollution, and the health of city residents.

### **7.6.2 Increased Energy Efficiency Impact**

- **Improved Fuel Efficiency:** The BRT system engine is modernized, and can use alternative fuels such as CNG, and electric power which reduces carbon footprint;
- **Reduced Traffic Congestion:** The BRT system usually has dedicated lanes that alleviate traffic congestion and reduce the time a vehicle spends idling, therefore decreasing fuel consumption and gas emission.

- **Efficient Station Design:** Designing BRT stations for energy efficiency and environmental sustainability such as energy-efficient lighting, green spaces, and renewable energy sources in station design;
- **Investment in Clean Technologies:** This will involve investing in clean and renewable technologies for BRT operation which will significantly improve energy efficiency.

### **7.6.3 Public Health and Air Quality Impact**

- **Improved Air Quality:** Through a reduction in the number of private cars on the road, the BRT system reduces air pollutants such as oxides of nitrogen and dust, thus better air quality, and reduced personal exposure to harmful air pollutants.

### **7.6.4 Resilience to Climate Impacts**

- **Adaptation Benefits:** The BRT system provides a reliable transportation option during extreme weather events and other climate change-related interruptions, thus enhancing urban resilience. This is critical for maintaining movement and accessibility during such a crisis.

## **7.7 Negative Climate Change Impacts on the BRT System**

Climate change can disrupt transportation networks, stress infrastructure, and pose safety risks to people. BRT Road infrastructure is prone to the following climate change risks during its operation.

### **7.7.1 Flooding**

Flooding has become common and severe due to climate change and changes in the built Environment. These events significantly impact human well-being, the economy, and various aspects of society. Flooding causes losses to the residents' lives, properties, and infrastructure. Rapid urbanization and climate change's effect can exacerbate the flooding risk. Direct effects can be the physical contact of the water with humans and other objectives in the cities. The indirect damage can be traffic interruption, which is more common in urban areas. Flood events pose a significant challenge to the road network, disrupting the transportation system that is essential for markets, jobs, critical facilities, and emergency services.

### **Adaptation Measures**

KURA will take the following climate change adaptation measures to reduce the impacts of climate change on the proposed BRT Road infrastructure:

- **Elevated BRT System:** The BRT design team has incorporated the impacts of flooding in the Project design by utilizing the flood risk assessment guide. The BRT System will be elevated in areas where flooding is common. This will constitute the construction of raised BRT infrastructure that is above the predicted flood levels and isn't vulnerable to collecting large pools of rainwater. Elevating the road infrastructure will help avoid flooding during seasons of heavy precipitation;
- **Rain Barrels:** The BRT Project System will have an option for collecting floodwater before it pools by placing rain barrels on the side of the BRT infrastructure. The design will provide a

concentrated location for water collection and contain rain that would otherwise pool on the street;

- **Clean Streets:** KURA will liaise with the NCCG to ensure regular removal of solid wastes from the existing BRT drainage system. Road shoulders and storm drains will be clear of debris to reduce the severity of flooding. Cleanup teams can be commissioned by KURA or the NCCG to maintain the integrity of the BRT System;
- **Vegetation:** Trees decrease flooding through high precipitation. In light showers, leaves and branches capture or absorb water on their surfaces, where it can evaporate rather than run to the ground. Water that runs down branches, bark, and roots is channeled to soil and groundwater. Roots also help build the water-holding capacity of soil. Tendrils both big and small create pockets that increase the permeability of soil. Roots also prevent soil erosion by binding it. Greater soil depth means more strata to absorb water. KURA will liaise with KFS and other stakeholders in planting trees to replace any tree that will be harvested during the construction phase of the proposed Establishment of BRT Line 5;
- **Flood barriers:** Through continuous monitoring and evaluation, KURA to map out the section of its infrastructure prone to flooding and ensure, the installation of flood barriers along the side of the BRT corridor to prevent water from pooling;
- **Urban Planning and Land Use:** KURA will closely liaise with the Urban Planning department in Nairobi City County during the designing phase of the BRT System; and
- **Natural Infrastructure:** KURA to involve relevant experts on appropriate outfall where stormwater will be channeled, during the operations of the proposed Establishment of BRT Line 5 Project.

### 7.7.2 Impact on Vegetation

Clearance of vegetation is common during road construction. Trees are cleared to pave the way for construction works and other critical installations such as services and utilities. Trees absorb and store carbon dioxide. If forests are cleared, or even disturbed, they release carbon dioxide and other GHG. Forest loss and damage are the cause of around 10% of global warming.

#### Mitigation Measures

- **Urban Greening:** Promotion of urban greening efforts including development of green corridors and roadside vegetation. KURA will engage relevant stakeholders such as KFS and other community-based organizations in planting trees along the Outer Ring Road and other selected areas to compensate for the environment. Trees will help to manage stormwater reduce heat and absorb carbon dioxide. Replacement of mature trees with hedges and planting the vegetation at a sufficient distance from the BRT Project; and
- The BRT Line 5 Project will be implemented on the median of the Outer Ring Road. The median section of Outer Ring Road has minimal or no vegetation to be affected. KURA will plant more trees to replace a few that may be affected during the construction phase of the BRT Line 5 Project.

### 7.7.3 Increased Temperatures

Increased temperature can lead to softening and expansion of road pavement, creating rutting and potholes, especially on high-traffic roads. Heat causes damage to roads, rails, and other transportation



infrastructure, forcing closures and delays of key transportation systems. Extreme temperatures accelerate the aging of binders and also hinder construction activities. Increased temperature can lead to:

- Reduced water availability during construction can compromise the ability to compact materials;
- Increased desertification can lead to sand cover on roads, reducing road safety and increasing maintenance costs.

The BRT Project is most likely to absorb and re-emit the sun's heat more compared to natural landscape (unpaved sections), these packets of heat are commonly known as heat islands which can have heating effects on the surrounding environment.

Road pavement is associated with major risks that are also associated with climate change. High temperatures pose a high risk of asphalt rutting, flushing, and bleeding of bituminous surfaces and/or cracking. Loss of stiffness of the asphalt mixtures occurs due to increased temperatures leading to irreversible deformation, thus causing damage to the road pavement.

### **Adaptation and Mitigation Measures**

- Planting of trees after implementation of the BRT System to provide shade and help to reduce the impact of carbon emissions and restore natural ecosystems;
- Increased investment in BRT System maintenance and repair programs, focusing on the use of heat-resistant road materials;
- Greater usage of permeable materials in civic infrastructure and residential construction can reduce the urban heat island effect;
- The BRT buses will improve public transportation and reduce personal vehicle usage thus helping in reducing extreme heat;
- Adjustment of both bituminous mixture design and structural design of the pavement;
- Change of the design for concrete pavement mixture to lower the amount of water needed;
- Greater use of concrete due to its higher temperature resistance;
- Increase the reflectance (albedo) of the BRT surface e.g. using bright, colored elements on the BRT or reflective coatings of BRT surfaces; and
- Cooling the BRT pavements with water.

#### **7.7.4 Fog and Mists**

Adverse weather conditions and low-intensity illumination cause poor visibility, which can lead to traffic congestion and compromise safety. One natural weather condition that poses a significant risk is fog. Fog is caused by the difference between air temperature and dew point, and consists of small droplets suspended in the air near the surface. When fog forms on the surface, it appears as a cloud that reduces visibility and can lead to accidents on roads that are typically safe. Reduced visibility increases the risk of rear-end crashes and multiple-vehicle collisions, and results in long traffic queues that take more time to dissipate. Mists reduce visibility to a lesser degree than fog.

## **Adaptation Measures**

The following are safety measures during conditions while driving:

- Drivers to reduce speeding and turn on the headlights to see clearly;
- The lamps should be used when the view is less than 100 m in front, to increase the view and help other drivers see better;
- There should be no use of high-beam headlights during fog. The bright light affects the driver's vision by creating a reflection of the mist which reduces the ability to see while driving;
- Drivers should not rely on parking lights alone; they do little to increase visibility in daytime fog;
- Drivers to avoid use of emergency flasher. Studies have shown that drivers are attracted to flashing lights and tend to drive into them inadvertently;
- Always control your speed - You need to allow for enough space between your car and the one in front of you.
- Keep your minimum safety gap to three seconds in ideal conditions; with the decreased visibility fog causes, this interval should be increased substantially;
- Use the edge of the road as a guide rather than the centre line, to avoid running into oncoming traffic or becoming distracted by their headlights;
- Remember that other drivers have a limited sight distance and that fog can leave roadways slick;
- Signal your intentions early, and when you use your brakes, don't stomp on them;
- Do not attempt to pass other vehicles in foggy conditions - Remain calm and patient;
- Look and listen for any hazards that may be ahead - Reduce the distractions in your vehicle. Turn off the cell phone, your full attention is required;
- At a junction with limited visibility, stop, wind down the window, and listen for traffic. When you are sure it is safe to emerge, do so positively and do not hesitate in a position that puts you directly in the path of approaching vehicles;
- If you can't drive any further, pull well onto the shoulder, getting your vehicle completely off the road in a protected area from other traffic; and
- Once you have left the road, turn off your driving lights and turn on your flashers so others know you're there but won't think you are driving on the road.

### **7.7.5 Damage of Drainage Infrastructures**

The drainage systems include pipes, culverts, ditches, and tunnels that are used to carry water away from roads and bridges. As climate change progresses, increased stormwater will cause more runoff into these drainage systems, which could lead to increased flooding if not properly managed. The highway drainage system is designed to handle the amount of water it receives from precipitation, partly by removing excess water from the highway surface. If there were an increase in rainfall due to climate change, then this system could be affected. Changes in precipitation patterns may also lead to increased erosion along highway shoulders as well as other areas where runoff collects during storms. This can cause surface water drainage pipes located near these areas to become clogged with debris, which can lead to leaks and serious damage if not repaired quickly enough. Runoff can cause flooding and damage infrastructure that was not designed to handle the increased flows.

## **Adaptation Measures**

The Outer Ring Road was recently constructed and all the drainage structures are well defined. The main drainage structures along the proposed Establishment of BRT Line 5 Project include 3 main bridges (Mathare, Nairobi, and Ngong Rivers), Cross circular drains, and open and closed side/median drains. The following are adaptation measures to enhance the BRT Line 5 drainage performance:

- Where the BRT lane at the Station is separated from the public lanes, Rectangular U-Drains will be provided to collect surface runoffs and avoid aqua planning;
- Bridge, Elevated Lane, and pedestrian footbridge sections will have Gutter and Drop inlets directing the collected water into down pipes into proposed longitudinal or cross drains;
- To enable efficient drainage on the entire Outer Ring Road corridor, additional works i.e. covering of drains, and introduction of screens to avert clogging needs will be carried out;
- All Existing drainage structures running longitudinally will be covered to enhance water flow and safety of road users;
- Drop inlets and cross drains are provided at regular intervals to relief the median drains;
- Steel gratings are to be installed at regular intervals of 200-300 m to enable filtering of debris clogging the drainage systems;
- Periodic maintenance of the drainage structures will be carried out;
- **Infrastructure and Design:** KURA has constructed a well-planned drainage system to handle increased stormwater during the rainy seasons. It includes properly sized stormwater drains, culverts, and retention ponds to efficiently move water away from BRT infrastructure;
- **Resilience and Flexibility:** KURA to ensure the construction of a standard drainage system that accounts for future uncertainties, such as changing precipitation patterns. Flexibility in design allows the BRT system to adapt to changing conditions;
- Retrofit the BRT structures to ensure appropriate protection; and
- Increase drainage capacities to accommodate more intense rainfall and erosion events.

### **7.7.6 Damage to Bridges Infrastructure**

Road infrastructures such as bridges can be damaged by flooding along a highway. Bridges are mainly vulnerable to bank erosion and scour related to flow events. Bridges are also prone to corrosion due to saltwater intrusion during flooding events, which can weaken their structure over time and make them more vulnerable if they're hit by another flood event soon after the first one occurred. Higher temperatures and extreme heat can cause bridges to be stressed by thermal expansion and movement and lead to premature deterioration of the structure.

Increased frequency of extreme precipitation events can reduce the service life of bridges by:

- Increasing the scouring rate of piers and bridge foundations, and build-up of sediments;
- Increasing moisture levels in soil that may lead to loss of structural foundation integrity; and
- Small-scale bridges are more vulnerable since they are often not designed to withstand powerful floods or strong winds.

The storm surges during rainy seasons along the BRT Line 5 can:

- Damage bridges and connected roadways due to flooding, inundation, and erosion of land that accommodates infrastructure;
- Decrease the expected lifetime of bridges; and
- Result in scour by eroding riverbeds and exposing piers and bridge foundations.

### **Adaptation Measures**

The following are adaptive characteristics for the BRT bridges along the Outer Ring Road:

- All bridge superstructure elements are of reinforced concrete;
- Deck structures comprise continuous pre-cast girders constructed to be monolithic with in-situ transverse slabs;
- The bridges have been provided with high-containment vehicular parapets;
- Bridge 1 is on a substantial horizontal curve (506 m) and is designed with a superelevation of 4.5%. The other bridges are on straights (or nominal curvatures) and are designed with a normal camber of 2.5%;
- Bridge piers are of similar form to the adjacent ones on the existing carriageways comprising reinforced concrete walls or circular columns;
- Because of the presence of highly competent rock, isolated pad footing foundations have been adopted;
- Use paving materials that are more resistant to expansion in extreme heat conditions;
- Build small-scale bridges with heat-resistant materials or use coatings;
- Protect bridges from damages caused by flooding by strengthening the bridge piers and foundations, or by increasing the hydraulic capacity of the bridge by raising the bridge deck;
- Minimize the occurrence of flooding or reduce its magnitude by increasing infiltration within the catchment area draining through the bridge structure, or diverting high flows to drainage systems with a higher drainage capacity; and
- Protect bridges from powerful storm surges and waves by reinforcing piers, columns, and bridge foundations against scouring.

#### **7.7.7 Soil Erosion and Sedimentation**

Erosion of the road surface, embankment slopes, and side drains results in significant problems, not only aesthetic and environmental but more importantly in the road management context, leading to excessive maintenance requirements and potentially to complete failure of the infrastructure facility. Surface damage caused by erosion leads to concentrations of water, excessive loss of material as silt, and increased water flow velocities. Uncontrolled erosion of the road support layers can eventually lead to the collapse of the pavement or structure.

### **Mitigation and Adaptation Measures**

KURA will adopt the following measures to control soil erosion and sedimentation resulting from climate change impacts in the proposed Establishment of BRT Line 5:

- **Plant grass and shrubs:** Bare soil is easily swept away by wind and water, the two main causes of erosion. Plant roots hold the soil together, while their leaves block rain and stop it from breaking the soil apart. Shrubs and grass will be planted along the Outer Ring to control soil erosion and sedimentation;
- **Build retaining walls:** Badly eroded slopes will continue to collapse downhill until they are stabilized. Construction of retaining wall at the base of the slope along the proposed Project will block the soil and slow down the collapse;
- **Pitched Drainage:** Stone pitching of drainage structures along the slopes, embankments, or riverbanks will be done to control erosion and provide stability along the Outer Ring Road;
- **Installation of Gabions:** The construction of gabions along the outer Ring Road will slow the velocity of concentrated runoff or stabilize slopes with seepage problems and/or non-cohesive soils. Gabions can be used at soil-water interfaces, where the soil conditions, water turbulence, water velocity, and expected vegetative cover are such that the soil may erode under the design flow conditions.

### **7.7.8 Traffic Congestion/Delay Impact**

Extreme weather events have devastating impacts on human life and physical infrastructure. Stark during transportation can lead to delay, disruption, and failure of critical social activities such as business operations. Traffic congestion significantly contributes to climate change due to the emissions of GHG such as CO<sub>2</sub>, NO<sub>2</sub> and O<sub>3</sub>. Rapid urbanization and poor planning coupled with increased motorization and fragmented public transport systems in cities such as Nairobi have led to increased vehicular emissions along the various roads and within the CBD.

#### **Traffic Adaptation Measures**

- The BRT station will have approximately 14 stations and a Depot at Cabanas along Mombasa Road. Strategic BRT stations and depots will improve the efficiency of their operation which will significantly control traffic congestion in Nairobi City County;
- BRT Line 5 considered two trunk services: Normal services every 5 minutes at opening in the year 2025 and express services every 15 minutes. It is envisioned that the feeder services will be serviced by specially designated matatu SACCOs. The recommended service headways were 5 minutes in the year 2025, 4 minutes in 2030, and 3 minutes in 2040. The recommended fleet is 30 buses in 2025, 60 in 2030, and 95 buses in 2040;
- Integration of Line 5 with Line 2 is vital as it will increase the corridor capacity. All BRT Systems in Nairobi City will be Integrated by the NaMATA design teams;
- The modal split was premised upon Multinomial Logit Model analysis that showed that both BRT and matatus will be used in the corridor in the ratio of 2:1 (30% to 70% ratio) in favour of the matatus. However, it is expected that the BRT will be more dominant as time elapses as passengers recognize its superior service levels thereby attracting up to 70% of the public transportation demand in the 2040 design year. Owing nature of the Outer Ring Road Corridor, it will not be possible to eliminate matatu operations in the corridor as matatus are expected to continue providing direct connections to the CBD from the surrounding estates;

- Incorporating universal design principles in station architecture and bus interiors ensures that BRT infrastructure is accessible to all people; and
- Designing and enforcing dedicated bus lanes will optimize traffic flow through the BRT route.

## **7.8 Climate risk management**

Climate risk management refers to an approach to climate-sensitive decision making. The approach seeks to promote sustainable development by reducing the vulnerability associated with climate risk. Climate risk management involves strategies aimed at maximizing positive and minimizing negative outcomes for the society. The Climate Change Risk Control and Management Plan for the proposed Project is as detailed in **Table 54** overleaf.

Table 54: Climate Change Risk Control and Management Plan

| Vulnerability/<br>Risk   | Intervention/Control<br>Measure:<br>(Enabler/Adaptation/Mitigation)              | Indicator   | Responsibility | Timeline<br>(Design=D)<br>(Construction=C)<br>(Operation=O) |   |   | Unit Cost<br>(Ksh 1<br>Million)<br>(To be<br>determined<br>=TBD] |
|--|--|---|----------------|---|---|---|--|
|  |  |   |                | D   | C | O |  |
| <b>Objective 1: To build climate change resilient BRT infrastructure</b> |  |   |                |   |   |   |  |
| Flooding leading to damage to road infrastructure                        | Design and Construction of box culverts and closed drains with adequate capacity | Number of box culverts  | KURA           | √   | √ | √ | 5  |
|  | Design and Construction of closed drains with adequate capacity                  | Length in kms of closed drains  | KURA           | √   | √ | √ | 20   |
|  | Design and Construction of service ducts with adequate capacity                  | Length in kms of service ducts  | KURA/NCCG      | √   | √ | √ | 5  |
| Flooding leading to damage to abutting properties                        | Proper transport planning and controls   | Transport plan with climate resilient considerations. Monitoring Reports for implementation | KURA/MORT      | √   | √ | √ | 2  |
| Wetness of the road surface  | Improve the roughness index by surface dressing with suitable material           | Length in kms of surface dressed road   | KURA           | √   | √ | √ | 10   |
| Encroachment on the road   | Marking and reclamation of the road reserve                                      | Length in kms of reclaimed road reserve   | KURA/NCCG      | √   | √ | √ | 15   |
| Encroachment on  | Marking and reclamation of   | Length in kms of reclaimed  | KURA/NCCG/NRC  | √   | √ | √ | 15   |

| Vulnerability/<br>Risk   | Intervention/Control<br>Measure:<br>(Enabler/Adaptation/Mitigation)                                     | Indicator  | Responsibility   | Timeline<br>(Design=D)<br>(Construction=C)<br>(Operation=O) |   |   | Unit Cost<br>(Ksh 1<br>Million)<br>(To be<br>determined<br>=TBD] |
|--|---|--|------------------|---|---|---|--|
|  |   |  |                  | D   | C | O |  |
| the riparian<br>reserve  | the riparian reserve  | riparian reserve   |                  |   |   |   |  |
| Landslides   | Construction and<br>maintenance of retaining<br>walls   | Length in kms of reinforced<br>retaining wall              | KURA             | √   | √ | √ | 100  |
| High wind<br>speeds  | Design, construct and<br>maintain the BRT<br>infrastructure with safety<br>consideration of wind speeds | Length in kms of BRT.<br>Wind speed risk<br>considerations | KURA/NaMATA/NCCG | √   | √ | √ | TBD  |
| Fog and mist   | Design, construct and<br>maintain the BRT<br>infrastructure with<br>consideration of fog and mist       | Length in kms of with fog<br>risk considerations           | KURA/NaMATA/NCCG | √   | √ | √ | TBD  |
| High<br>temperatures<br>leading to<br>Softening and<br>Rutting of the<br>road and loss of<br>structural<br>integrity | Apply improved design mix<br>for the materials  | Length in kms of improved<br>design mix of the sub-base    | KURA             | √   | √ | √ | 15   |
| <b>Objective 2: To decarbonate and green the BRT infrastructure and operations</b>                                   |   |  |                  |   |   |   |  |
| Emission of GHG<br>from the road   | Construction and operation<br>of NMT Infrastructure   | Length of in kms NMT<br>Constructed                        | KURA             | √   | √ | √ | 10   |



| Vulnerability/<br>Risk  | Intervention/Control<br>Measure:<br>(Enabler/Adaptation/Mitigation)   | Indicator   | Responsibility   | Timeline<br>(Design=D)<br>(Construction=C)<br>(Operation=O) |   |   | Unit Cost<br>(Ksh 1<br>Million)<br>(To be<br>determined<br>=TBD] |
|---|---|---|------------------|---|---|---|--|
|   |   |   |                  | D   | C | O |  |
| transport system  | Use of green cement during construction and maintenance   | Quantity of green cement used in the construction and maintenance   | KURA             | √   | √ | √ | TBD  |
|   | Use of hybrid engine Buses on the BRT   | Number of Buses with Hybrid engines                                 | NaMATA/NCCG/NEMA | √   | √ | √ | TBD  |
|   | Use of solar energy on the infrastructure and services including street lighting, Depot and the Traffic Management Centre (TMC) | Number of solar installations                                       | KURA/NaMATA/NCCG | √   | √ | √ | TBD  |
|   | Use of Intelligent and Smart Technologies in the BRT Infrastructure and operations  | Number of Intelligent and Smart installations within the BRT system | KURA/NaMATA      | √   | √ | √ | TBD  |
|   | Landscaping and grassing of the infrastructure  | Area (Ha) landscaped with grass and greenery                        | KURA             | √   | √ | √ | 15   |
|   | Tree planting and maintenance at strategic points   | Number of trees planted and maintained                              | KURA             | √   | √ | √ | 15   |
|   | <b>Objective 3: To enhance the adaptive capacity of Local stakeholders and institutions for project sustainability</b>          |   |                  |   |   |   |  |
| Loss of local community livelihoods due to climate change exposures | Provide employment opportunities to local communities   | Number of households with jobs from the project                     | KURA/NaMATA/NCCG | √   | √ | √ | TBD  |

| Vulnerability/<br>Risk   | Intervention/Control<br>Measure:<br>(Enabler/Adaptation/Mitigation)   | Indicator  | Responsibility                    | Timeline<br>(Design=D)<br>(Construction=C)<br>(Operation=O) |   |   | Unit Cost<br>(Ksh 1<br>Million)<br>(To be<br>determined<br>=TBD] |
|--|---|--|-----------------------------------|---|---|---|--|
|  |   |  |                                   | D   | C | O |  |
| Loss of public transport livelihoods due to the operations of the BRT project                              | Integration of public transport operators in the running of the BRT project                                     | Number of entities integrated in the operations of the BRT project   | KURA/NaMATA/NCCG                  | √   | √ | √ | TBD  |
| Gaps/weaknesses in Institutional coordination in the design, construction and operation of the BRT Project | Develop, review and implement institutional coordination instruments in the project cycle                       | Number of Memorandum of agreements implemented.<br>Number of Coordination meetings held.<br>Number of grievance redress made | KURA/NaMATA/NCCG                  | √   | √ | √ | TBD  |
| Gaps in physical and land use planning and development control   | Harmonize and enforce development control instruments within the BRT project catchment                          | Number of Reviewed regulatory instruments on BRT project   | MOTI/NaMATA/NEMA/KURA/NCCG        | √   | √ | √ | TBD  |
|  |   | Number of joint development control enforcement operations with the catchment.   | MOTI/NEMA/NaMATA/KURA/NCCG /MOLUD | √   | √ | √ | TBD  |
| Gaps in technical and financial capacities to control climate change risks                                 | Develop, review and implement instruments for enhancing technical and financial capacities in the project cycle | Number of competent experts on climate change engaged.<br>Amount of funds allocated to climate proof the BRT                 | MOTI/KURA/NCCG/NaMATA             | √   | √ | √ | TBD  |

| Vulnerability/<br>Risk | Intervention/Control<br>Measure:<br>(Enabler/Adaptation/Mitigation) | Indicator       | Responsibility | Timeline<br>(Design=D)<br>(Construction=C)<br>(Operation=O) |   |   | Unit Cost<br>(Ksh 1<br>Million)<br>(To be<br>determined<br>=TBD] |
|------------------------|---|-----------------|----------------|---|---|---|--|
|                        |   |                 |                | D   | C | O |  |
|                        |   | infrastructure. |                |   |   |   |  |

## **7.9 Conclusion**

The BRT system provides an appropriate approach to reducing GHG emissions and improving urban mobility for sustainable development. When the system is effectively implemented, it becomes a key component strategy in combating climate change and building a more resilient and livable city. The system is designed more efficiently compared to traditional buses. The BRT system is faster, reliable, and comfortable therefore attracting more passengers who will opt for public transportation rather than personal driving leading to reduced vehicle emissions.

## **8. IDENTIFICATION OF POTENTIAL IMPACTS**

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### **8.1 Introduction**

This Chapter identifies and predicts the potential impacts on different environmental components due to the construction, operation and decommissioning of BRT Line 5. It details all the potential impacts on biophysical and socio-economic components of the local environment due to the proposed activities and sub-activities.

Prediction of impacts is the most important component in ESIA studies. Several qualitative and quantitative techniques and methodologies are used to conduct analysis of the potential impacts likely to accrue as a result of the proposed development activities on physical, ecological and socio-economic environment. Such predictions are superimposed over the baseline (pre-project) status of the environmental quality to derive at the ultimate (post-project) scenario of environmental conditions. The prediction of the impacts helps to minimize the adverse impacts and maximize the beneficial impacts on environmental quality during pre and post project execution.

The proposed Establishment of BRT Line 5 Project in Nairobi City County would create impacts on the environment in three distinct phases:

- During construction phase;
- During operation phase; and
- During decommissioning phase.

### **8.2 Positive Impacts during Construction Phase**

A number of positive impacts are associated with the proposed Project during construction phase. These are as discussed below.

#### **8.2.1 Employment Opportunities**

The proposed Establishment of BRT Line 5 will directly and indirectly create employment for a number of workers, especially casual or unskilled workers. However, the exact number cannot be predetermined at this stage. All in all, the services of the following groups of people will be required during the construction phase among others:

- Contractor;
- Casual Labourers;
- Engineers;
- Site Manager;
- Inspector of Works;
- Laboratory Technologist;

- Survey Assistant/Leveler;
- Laboratory Assistants;
- Environmentalist/Sociologist;
- Office Assistants;
- Transporters;
- Security Officers; and
- Other Technical Staff.

Though employment will be temporary (only during construction), those who will be employed will earn income hence use the money to satisfy some of their needs.

### **8.2.2 Stimulation of Trade and Services**

The proposed Project will require supply of large quantities of road construction materials most of which will be sourced locally in the region and from surrounding regions. The increase in the demand for road construction materials such as hard stones, sand, gravel, bitumen and aggregates for the establishment of the proposed Project required during the planning and construction will stimulate local and regional trade.

Producers and suppliers of materials such as hard stones, sand, gravel, aggregates, bitumen and cement will thus get market for their goods as the proposed Project provides ready market for road construction materials suppliers such as quarrying companies and individuals with such materials.

In addition, the owners of the nearby business premises are also likely to benefit as a result of the construction workers purchasing some of the items from their shops.

### **8.2.3 Source of Revenue to the Government**

Purchase of the various raw materials and finished products will attract VAT. This will be a source of revenue to the government which in turn may lead to the improvement of the national economy.

The informal traders especially food vendors are also envisaged to increase as the demand for supply of food to the Contractors' employees grows around the Project Site. This is direct revenue to the traders and their employees.

## **8.3 Negative Impacts during Construction Phase**

Most of the impacts during the construction phase of a Project are usually negative. However, the greater percentage of these impacts are temporary and can be adequately mitigated by taking the necessary precautions. The negative impacts anticipated from the proposed Project during the Construction Phase are as discussed in the subsections below.

### **8.3.1 Degradation of Construction Materials Sourcing Sites**

Impacts related to the construction material sites such as gravel sites, sand harvesting sites and quarry sites include clearance of vegetation, landscape scars, dust and general disturbance during excavation and the need to reinstate or landscape the gravel sites when the Contractor has completed excavation works.

Material sites if not reinstated and rehabilitated after project completion, will create a badlands type of landscape with water bodies, scattered boulders and rubble of ballast on the soil surface. This calls for economic use of these stone resources by the Contractor to avoid wastage. The pools of water that will form during the rainy season, without outflow on the borrow pits shall be suitable habitats for disease vectors for example: malaria, bilharzias and liver fluke. Further impacts in case such borrow pits are abandoned, and left without being rehabilitated are:

- Once borrow pits and quarry sites are filled with water, their banks can burst hence causing flood and associated damage within the nearby sites;
- Unfenced quarry and borrow pits sites full of water will be risky to public especially children, livestock and wildlife due to drowning associated deaths, therefore should be fenced off when in use; and
- Illegal excavation of ballast for sale from abandoned quarries will lead to development of badlands leading to erosion of topsoil.

Sand harvesting on the other hand should not be done in rivers as it may cause the following environmental problems:

- Siltation of the river; and
- Drying of river beds hence affecting the water table/storage capacity of the river.

### **8.3.2 Occupational Safety and Health Risks**

Risk is the probability of occurrence of an event that has a potential of causing harm or damage to property occurring in a given time and the magnitude of the harm or damage caused. Construction sites always present an element of danger given the intense interactions between the worker and workplace hazards. Hazard being a disposition or anything that can cause harm or damage to property. Construction workers are likely to suffer from workplace incidents (i.e. near miss, dangerous occurrences, accidents or occupational diseases) mainly as a result of the intensive engineering and construction activities. Such incidents can result from working in a confined space (e.g. deep excavations, etc.), working at height, awkward working position, hand-held tools, plant, construction equipment, sharp edges, manual material handling, and handling hazardous construction materials. The Project site including any other workspace where the Project activities will be undertaken qualify to be a workplace, hence workplace incidents will be likely.

### **8.3.3 Noise Pollution and Vibration**

Noise pollution and vibration is likely to occur due to site excavation, grading and offloading of construction materials at the Project site. Noise pollution and vibration is also likely to occur as a result of excavation activities, use of porker vibrator, use of mixers and communication from construction workers on site. The proposed Establishment of BRT Line 5 will be a potential source of disturbance to those in the

neighboring Outer Ring Road. However, explosives will not be used during excavation hence adverse impacts to the construction workers and neighbouring premises will not be experienced.

### **8.3.4 Impacts on Air Quality**

Potential impacts on the air quality during construction phase will be due to exhaust and dust emissions generated by the construction equipment. Motor vehicles used to mobilise materials for construction and operating of construction vehicles and equipment's would cause a potentially significant air quality impact by emitting pollutants through exhaust emissions.

The sources of air emission can be grouped into three categories namely:

- Point Source;
- Area Source; and
- Line Source.

A point source is a single source emission with an identified location; an area source is when the source of emission is mainly widely distributed point sources having relatively comparable significance; and a line source is when the sources of emission from a number of fixed or moving facilities have relatively comparable significance, such as roads.

Dust emission is likely to occur during site clearance, excavation and spreading of top soil during construction of the proposed Project especially if the activities are taking place during dry season. However, there will be very small possibility of particulate matter suspended and settle-able particles affecting the site workers and even neighbour's health, since construction method of minimum excavation and nil cart away of soil will be applied and only residential material and debris carted away.

Dust in road construction areas originates mainly from the scraping of the earth surfaces, from the movement of heavy machinery on earth roads especially deviation routes and from haulage activities of the ballast chipping. Already there is significant dust along the Access Road to the Depot at its current status especially during the dry season.

During the period of maximum construction activity, the fuel consumption at the Project site is expected to rise significantly and the background concentrations of suspended particulate matter (SPM), respiratory particulate matter (RPM), sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>) and both carbon monoxide (CO) and lead (*Pb*) are also expected to rise.

These emissions can have significant cardio-pulmonary and respiratory effects on the local population; the health effects may range from subtle biochemical and physiological changes to difficulty in breathing, wheezing, coughing and aggravation of existing respiratory and cardiac condition. The impact of such emissions can be greater in areas where the materials are sourced and at construction site. Activities associated with site clearance, excavations, spreading of the top soil during construction, frequent vehicle turning and slow vehicle movement loading, and offloading areas can be implicated in this process. **Table 55** overleaf is a summary of the impact of these emissions on human health.



**Table 55: Summary of Impacts of Emissions on Human Health**

| Pollutant                               | Source  | Primary effects  |
|---|---|--|
| <b>Sulphur Dioxide (SO<sub>2</sub>)</b> | Combustion of sulphur containing fossil fuels for: <ul style="list-style-type: none"> <li>▪ Construction equipment;</li> <li>▪ Vehicle; and</li> <li>▪ Diesel engine</li> </ul> | <ul style="list-style-type: none"> <li>▪ Plant injury;</li> <li>▪ Reduced visibility;</li> <li>▪ Deterioration of metals, textiles, leather, finishes and coatings;</li> <li>▪ Aggravation of respiratory diseases (asthma, emphysema); and</li> <li>▪ Irritation.</li> </ul>  |
| <b>Nitrogen Oxides (NO<sub>x</sub>)</b> | Combustion of fossil fuel from: <ul style="list-style-type: none"> <li>▪ Construction equipment;</li> <li>▪ Vehicles; and</li> <li>▪ Diesel generators.</li> </ul>              | <ul style="list-style-type: none"> <li>▪ Aggravation of respiratory illness;</li> <li>▪ Reduced visibility;</li> <li>▪ Reduced plant growth; and</li> <li>▪ Formation of acid rain.</li> </ul>   |
| <b>SPM (Dust)</b>                       | <ul style="list-style-type: none"> <li>▪ Construction activities;</li> <li>▪ Combustion of fossil fuels for construction equipment, vehicles and diesel generators.</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Soiling;</li> <li>▪ Reduced visibility;</li> <li>▪ Aggravation of the effects of gaseous pollutants;</li> <li>▪ Increased cough and chest discomfort;</li> <li>▪ Reduced lung function; and</li> <li>▪ Aggravation of respiratory and cardio-respiratory diseases.</li> </ul> |
| <b>Carbon Monoxide (CO)</b>             | Combustion of fossil fuels from: <ul style="list-style-type: none"> <li>▪ Construction equipment;</li> <li>▪ Vehicles; and</li> <li>▪ Diesel generators.</li> </ul>             | <ul style="list-style-type: none"> <li>▪ Plant visibility;</li> <li>▪ Reduced visibility;</li> <li>▪ Deterioration of metals, textiles, leather, finishes, coatings;</li> <li>▪ Irritation of eyes; and</li> <li>▪ Aggravation of respiratory diseases (asthma, emphysema).</li> </ul>                                 |

Even then, dust and exhaust gas emissions from construction machineries will be temporary. Therefore, no adverse impacts, except for those close to Outer Ring Road, Access Road to the Depot and the construction workers, are likely to be affected. On completion of the construction, the adverse impacts of SPM, RPM and engine emissions on ambient air close to the construction site will be eliminated.

### **8.3.5 Interruption of Existing Services Installation**

Outer Ring Road and the Access Road to the Depot have several installations and utility infrastructure on their road reserves and within the carriage. The following are some of the installations along the road reserves.

- Electricity lines/poles;
- Street lights;
- Water supply lines;
- Sewer lines; and
- Internet/data cables.

These services are critical and have implications with spillover effects on the social and economic performance as some will have to be relocated, as necessary to other places to pave way for the Establishment of BRT Line 5.

### **8.3.6 Clearing of Vegetation**

Vegetation to be affected includes grasses, hedges shrubs and trees. Some of the vegetation that falls within the construction areas will be cleared to pave way for the construction works. A section of the Depot Site is also covered with vegetation that will be cleared to allow for the construction BRT Line 5 Depot.

### **8.3.7 Generation and Disposal of Solid Waste**

Construction activities will result in the creation of various solid wastes that will need to be disposed. Such wastes include:

- Surplus earth and rock (spoil);
- Metal scraps;
- Plastics (wrappings and containers);
- Wood;
- Workshop wastes including used oil filters;
- Electronic wastes,
- Cement packaging waste; and
- Waste concrete.

These wastes may have a direct impact on the environment. Disposal of the same solid wastes off-site could also be a social inconvenience if done in wrong places. The off-site effects could be un-aesthetics view, pest breeding, unhygienic conditions, and pollution of physical environment. The site should therefore be kept clean, neat and tidy at all times.

### **8.3.8 Increased Water Demand**

During construction phase, the construction works will create additional water demand in addition to the existing demand. Water will mostly be used in the following activities:

- Controlling dust on site;
- Concrete works;
- Washing of machinery and equipment;
- Washing and drinking by construction workers; and
- General cleaning.

### **8.3.9 Increased Storm Water Runoff from New Impervious Areas**

The proposed Establishment of BRT Line 5 will involve construction of tarmacked carriageway at the median of Outer Ring Road, paved footpath, culverts installations and drainage works which will result in additional runoff through creation of impervious areas. These areas generally have higher runoff coefficients than natural areas, and increased flood peaks are a common occurrence in developed areas. The storm water runoff is likely to increase the flooding on the neighbouring lands if not properly channelled to the natural water course.

### **8.3.10 Delays in Transportation**

Outer Ring Road which is characterized with heavy traffic especially during peak hours will require traffic to be controlled and, in some cases in some sections, complete road closure will be necessary. This will entail disruption of traffic flows resulting in delay to transport people and goods. There will also be delays caused by diversion and deviations during construction.

### **8.3.11 Pollution of Rivers**

Outer Ring Road crosses all the Nairobi Rivers (Mathare River, Nairobi River and Ngong River) which are polluted with uncollected garbage; human waste from informal settlements; industrial wastes in the form of gaseous emissions, liquid effluents, agro-chemicals, petro-chemicals, metals and over-flowing sewers. The riparian reserves of the three Nairobi Rivers are encroached by numerous informal and formal settlements without adequate sewerage and sanitation services. Nonetheless, the Establishment of BRT Line 5 will further pollute the rivers during construction phase. Further pollution of the rivers diminishes their chances of having a healthy ecosystem. Water quality impacts attributed to erosion, sedimentation, and polluted runoff associated with the Establishment of BRT Line 5 will be limited the three rivers.

### **8.3.12 Increased Insecurity**

Insecurity in the Project area is likely to increase due to increased activities in the area which will attract people from different areas. Some of these people may be of a questionable character and their main aim may be to commit a crime. Additionally, access to security services may be hampered due to delays in traffic.

### **8.3.13 Fuel and Lubricants Spills**

The construction phase will involve the use of stationary and mobile plant and equipment requiring fuelling and lubricating. Construction of permanent and temporary fuel and lubricants storage facilities is likely. As with any construction activity this will increase the possibility of accidental fuel and/or oil/grease spillages at or off site by the construction equipment. The most likely impacts being contamination of soil and water by engine oil, diesel, petrol and grease from construction equipment.

Contaminated soil is injurious to plant growth as well as edaphon/soil life and must be removed. Contamination of water is potentially more serious since pollutants may move fast destroying aquatic life and rendering water unsafe for use be it domestic, livestock or industrial use.

Fuel and oil spills are most likely to take place at the Contractor's Yard where oil and fuel is likely to be stored.

### **8.3.14 Impacts of Wastewater**

During construction phase, various liquid wastes including grey water and black water (respectively washing water and sewage), concrete washings, runoff from camp and workshop areas, and various liquid waste streams from washing construction vehicles and equipment washing will be generated. These wastes pose real toxicity and quality threats to the soil and ground water.

### **8.3.15 Impact on Local Resources**

Increased population associated with road construction workers may exert pressure on local resources such as water and land and may trigger price increases for commodities and services. Similarly, increased population associated with road construction workers and job speculators will stress the existing social services such as housing, health facilities and sanitation.

### **8.3.16 Contractor's Camp Site**

The Contractor will need to establish camps including site offices, workshops, stores, vehicle parking and staff accommodation if need be. The camp sites are bound to have high human activity, material storage facilities, sanitary facilities which will lead to generation of solid and liquid wastes generation which require adequate management and proper disposal.

### **8.3.17 Public Health and HIV/AIDS**

The Establishment of BRT Line 5 may be instrumental in the decline in health of the local population in several ways including:

- Source of noise pollution;
- Source of air pollution;
- Facilitate the transmission of diseases; and
- Pollution of soil and water sources by liquid waste.

Disease transmission will be facilitated by the migration of people, which invariably will accompany the proposed Project Implementation Team during construction. Work crews as well as the relatives and dependants that usually follow them may bring with them a multiple of communicable diseases. The temporary work camps, often characterized by standing water and poor waste management practices, provide the ideal conditions for vermin, and other vectors of disease, to multiply and infect the local human population. At the same time, it is possible that a disease endemic to the Project area will be contracted by the work crew, and then transmitted to a population near the work site.

Presence of construction workers earning above average incomes and often coming without their families may threaten the security of women leading to breaking up of marriages, early and unwanted pregnancies among girls, and the spread of HIV/AIDS and STDs. Irresponsible sexual behaviour may also lead to increase in HIV/AIDS and other Sexually Transmitted Infections (STIs).

### **8.3.18 Asphalt Mixing and Hazardous Materials**

Some sites which will be used to prepare construction materials such as asphalt and cement may contain hazardous chemicals and should be properly sited. Decanting of bitumen into the bitumen tank can be associated with spillage, and hence polluting the nearby environment. Dust from the asphalt plant, especially from the stockpiles for ballast chippings will be associated with dust during haulage procedures.

### **8.3.19 Incidence of Soil Erosion and Sedimentation**

During the construction of the proposed Project, excavation and earthworks are likely to contribute significantly to soil erosion and sedimentation. The occurrence of erosion is determined greatly by the soil type, hydrology, topography as well as the road workmanship, among others. Adequate preventive and mitigation measures should be considered to address the erosion and sedimentation impacts.

### **8.3.20 Fire Risks at the Contractor's Yard**

The Contractor's site will be at an amplified hazard of fire owing to a range of factors that include the presence of combustible waste materials, solvents, welding activities and unfinished electrical systems among others. The Contractor's vehicles are usually repaired at the site is where many hazardous solvents such as gas, oil and lighter fluid are stored. In addition, fuel pumps are usually installed in the yard increasing the likelihood of fire outbreak in case of faulty wiring or even malicious acts. The combustible nature of the materials usually stored in the site pose bigger risks to property and rescue teams, once fire does take hold.

### **8.3.21 Labour Influx**

The Establishment of BRT Line 5 will attract job seekers from surrounding areas and other parts of the Country. In addition, business opportunities created in the proposed Project area may attract businessmen and women from surrounding areas. Consequently, there will be increase in labour that will lead to competition with the locals and also increase in pressure on existing resources including water, food, healthcare, accommodation. This coupled with different lifestyle of the locals may lead to conflicts between in migrants and local communities. The influx of people from different backgrounds and cultural

beliefs as part of the road construction workers is likely to infringe on some of the local culture and religion.

Influx of in-migrants is likely to lead to an increase in communicable and vector borne diseases such as malaria, TB, HIV/AIDS and other sexually transmitted diseases, exacerbated by increased pressure on health care facilities and the possible introduction of new diseases.

### **8.3.22 Gender Based Violence, Sexual Harassment and Sexual Exploitation and Abuse**

The biggest composition of construction workers are younger males who are away from their home on the construction job. Some of the young males usually act outside their normal sphere of social control. This usually leads to inappropriate and criminal behavior, such as SH of women and girls, exploitative sexual relations, and illicit sexual relations with minors from the local community. A large influx of male labourers may also lead to an increase in exploitative sexual relationships and human trafficking whereby women and girls are forced into sex work.

The implementation of the proposed Project is likely to exacerbate any of the various forms of GBV including Rape, SEA, SH and Violence Against Children (VAC) if precautions measures are not put in place. Project staff may also perpetuate GBV by promising jobs or promotion in exchange for sexual favours.

### **8.3.23 Project Impacts on Women**

There is need to promote gender equality in all aspects of economic development and more so in construction. Women roles in construction are usually confined to supply of unskilled labour and vending of foodstuffs to the construction workers.

The proposed Project may provide women with job opportunities which may hinder them from actively performing their normal roles. This may result in confrontation with their spouses and other members of the family and community at large.

### **8.3.24 Impacts Associated with Decommissioning of Warehouses at the Depot Site**

A section of the location site where the Depot for BRT Line 5 will be located is occupied with warehouses. The warehouses will be demolished to allow for the construction of the Depot. The demolition of the warehouses will result to air and noise pollution and waste generation. During the demolition process, a significant amount of dust, debris, and pollutants are released into the air. This can result in increased levels of particulate matter and harmful chemicals, posing a risk to air quality and human health. Demolition of the warehouses will generate a significant amount of waste materials, including concrete, bricks, metals, and glasses.

### **8.3.25 Climate Change Impact**

The implementation of the proposed Project is likely to result to climate change impacts such as flooding, increased temperature levels, and impact on vegetation cover which play a crucial part in fighting against

climate change. Additionally, the BRT System along the Outer Ring Road is likely to be vulnerable to climate change.

### **8.3.26 Non-Compliance with ESMMP and EIA License Conditions**

The ESMMP and EIA License Conditions are not usually adhered to by many Contractors. The ESSMP that is tailored for a project and prepared to ensure the implementation of mitigation measures, responsible parties, monitoring and auditing requirements. Mitigation measures as proposed in ESMMP are usually partially complied with and the effectiveness of the ESSMP on the physical and biological environments cannot be determined. The EIA license conditions as will be provided are not also fully complied with as required by law. This makes it difficult to justify the need for ESIA report and ESMMP if not implemented.

## **8.4 Positive Impacts during Operation Phase**

Just as in the construction phase, there are positive impacts associated with the proposed Project during the operation phase. The following are some of the positive impacts:

### **8.4.1 Reduced Travel Time**

The Establishment of BRT Line 5 will help in reducing the overall travel time along Outer Ring Road. Other vehicles traveling alongside the BRT Line 5 corridor (Outer Ring Road) may also experience changes in travel times. BRT services will effectively offer an alternative to the chaotic and informal PSVs operating along the corridor. BRT services will offer an alternative to the many buses and minibuses jockeying to pick-up passengers at kerbside bus stops to favour high-capacity articulated buses operating on segregated median. This may result to decrease in congestion of vehicles in the general traffic lines resulting in an overall improvement in travel times.

### **8.4.2 High Quality of Public Transport Services**

BRT provides a higher quality of service than traditional PSVs because of reduced travel and waiting times, increased service reliability and an improved user experience. BRT flexibly combines stations, buses, exclusive and segregated bus stations, and ITS elements into an integrated transit system with a strong brand that evokes a unique identity. High quality of public transport services will positively affect the quality of life, productivity, health, and safety of people.

### **8.4.3 Improved Environment Conditions**

The Establishment of BRT Line 5 will have positive environmental impacts by reducing GHG that contribute to global climate change as well as local air pollutants, which lead to citywide air pollution and smog. Reductions in vehicle emissions can be achieved in several ways, including reducing vehicle kilometres travelled and improving the fuel efficiency and technology of the buses. Passengers shifting from single-occupancy vehicles to high occupancy BRT buses reduce overall vehicle kilometres travelled.

Likewise, many BRT systems consolidate informal systems comprised of low-occupancy cars that may use older and more polluting fuels and technologies. New articulated or bi-articulated BRT buses can carry

many more passengers per bus kilometre and many are capable of meeting the most stringent emissions standards.

#### **8.4.4 Improved Public Health**

BRT systems also provide valuable public health benefits to society in three key ways:

- Reduced road fatalities and injuries;
- Reduced personal exposure to harmful air pollutants; and
- Increased activity for BRT users.

#### **8.4.5 Increased Land Value**

The anticipated reductions in travel time and the improvements in quality of public transportation services associated with the Establishment of BRT Line 5 will be capitalized into land values as demand for land adjacent to Outer Ring Road will increase especially near the stations.

#### **8.4.6 Employment Opportunities**

The proposed Project, upon implementation will directly employ supervising engineering team and monitoring and evaluation personnel from KURA. In addition, a Contractor will be awarded the Project to do the routine maintenance jobs and this will involve employment of various personnel by the Contractor to do the routine maintenance hence earn income.

In addition, construction, operation and maintenance of BRT systems will create job opportunities. This may result in a net increase in the number of employed people, or merely a shift of workers from one job or sector to another. In many cases, BRT systems create new jobs in the formal economy that replace informal jobs from the existing traditional transport system.

#### **8.4.7 Improved Security**

By providing well-lit stations staffed with security personnel, security cameras on buses and in stations and pedestrian-scale lighting around stations, Establishment of BRT Line 5 will create a safer environment along Outer Ring Road.

#### **8.4.8 Increased Tax Revenue**

The formalization of BRT buses into the public transportation industry through concession contracts will result in increased tax revenues for the National Government.

#### **8.4.9 Promote Non-Motorized Transport**

The proposed Project is designed to promote the mobility of people by incorporation NMT facilities (walkways and foot bridges). The NMT facilities will ensure enhanced road safety for all the road users especially pedestrians. Provision of NMT facilities is also crucial in combating climate change since many



people may opt to walk instead of using cars to the bus hence reduce vehicular emissions. Walking and exercising on the walkways will also come with great health benefits.

## **8.5 Negative Impacts during Operation Phase**

The following negative impacts are associated with the proposed Project during the operation phase.

### **8.5.1 Solid Waste Generation**

Solid waste generated from the road users and road maintenance works have a potential of polluting the environment if judicial waste collection and disposal interventions are not instituted. The waste if not properly disposed will be an eye sore to the people within the vicinity and some as they decompose will produce bad odour and emit GHG. The waste can also attract rodents, flies and other scavengers hence a nuisance associated with the newly improved roads.

### **8.5.2 Increased Road Accidents**

Establishment of BRT Line 5 will result to reduced PSVs and single occupant vehicles along Outer Ring Road and this may lead to increased speed which will pose a greater risk to road users. However, with proper engineering redesign of Outer Ring Road, the frequency and number of accidents should decrease.

### **8.5.3 Noise Pollution**

The proposed Project will increase the travelling speeds, consequently attracting many motorists. This will increase the noise generated from the Road. Noise associated with the proposed Road works to the neighbourhood will be from four main sources as discussed below:

#### **a. Vehicle Noise**

Vehicle noise will come from the engine, transmission, exhaust, and suspension, and is greatest during acceleration, on upgrades, during engine braking and in stop-and-go traffic conditions. Poor vehicle maintenance is a contributing factor to this noise source.

#### **b. Road Noise**

Frictional noise from the engine revving, contact between tyres and pavement contributes significantly to overall traffic noise. The level depends on the type and condition of tyres and pavement. Frictional noise is generally greatest at high speed and during quick braking.

#### **c. Driver Behavior**

Drivers contribute to road noise by using their vehicles' horns, by playing loud music, by shouting at each other, and by causing their tyres to squeal as a result of sudden braking or acceleration. This is common especially by those driving mini-buses, taxis and buses.

#### **d. Road Maintenance**

Road maintenance generally requires the use of heavy machinery, and although these activities may be intermittent and localized, they nevertheless contribute tremendous amounts of sustained noise during equipment operation. These can degrade the human welfare and disrupt noise sensitive areas like schools and hospitals.

##### **8.5.4 Erosion and Water Quality Degradation**

Poor maintenance of drainage structures may render the road impassable and in the long-run wear out the road. If surface runoff is not properly channelled, it may lead to soil erosion. Water quality especially for the nearby water bodies is also likely to be poor as the water is likely to be polluted by the eroded materials.

##### **8.5.5 Air Pollution**

The possibility of air pollution through vehicular emissions is likely to increase due to combustion of fuels and release of oxides of carbon and sulphur. This is likely to affect air quality especially during peak traffic hours.

##### **8.5.6 Generation of E-Waste**

The Establishment of BRT Line 5 and its complex ITS applications which will mainly comprise of electrical and electronic devices. With time during operational phase, the electrical and electronic devices will be discarded as they will be breaking or become obsolete. The discarded devices will become e-waste and can become a threat to the environment and to human health if they are not treated, disposed of, and recycled appropriately.

Electrical and electronic items contain many different toxic substances. While users are unlikely to have contact with any of these substances when the items are in use, when they become waste, these toxicants can be released into the environment if the devices are managed using environmentally unsound practices and activities. Several unsound practices have been observed at e-waste sites including:

- Scavenging;
- Dumping on land or in water bodies;
- Landfilling along with regular waste;
- Opening burning or heating;
- Acid baths or acid leaching;
- Stripping and shredding plastic coatings; and
- Manual disassembly of equipment.

These activities are considered hazardous to the environment and human health as they release toxic pollutants, contaminating the air, soil, dust, and water. Burning or heating e-waste is considered one of the most hazardous activities due to the toxic fumes created. Once in the environment, toxic pollutants

from e-waste can travel significant distances from the point of pollution, exposing people in faraway areas to health-damaging substances.

### **8.5.7 Labour Impacts to the Matatu Industry Dependents**

The Establishment of BRT Line 5 will have a major impact on large numbers of workers dependent on the matatu industry for their livelihoods. The matatus industry dependents along Outer Ring Road will be at risk of losing their source of livelihood. The matatu industry involves a complex set of employment relationships. Matatu workers' livelihoods depend on informal income from a wide range of sources, including drivers, conductors, customers, informal employers, and SACCOs. The industry employs a wide range of other workers, including conductors, kamagera, callers, vehicle washers, squad drivers, food and drink vendors, painters and artists, mechanics, county officials, stage clerks, SACCOs, "set guys", stage "owners" among others. The Establishment and Operation of BRT Line 5 will result to competition between BRT and the matatu system that would drive down fares, increase insecurity, making it more difficult to survive for the matatu industry dependents.

### **8.6 Impacts during Decommissioning Phase**

The Project Road is expected to be in operation for many years and therefore decommissioning is not anticipated to happen soon but should this happen all the positive impacts mentioned in this report would be reversed to be negative.

Positive impacts that may be realised during decommissioning phase may include:

- Rehabilitation and restoration of the site to its original state;
- Recovery of recyclable material;
- Rehabilitation of the roads; and
- Employment opportunities.

Other negative impacts during decommissioning may include:

- Waste generation;
- Noise pollution;
- Dust and exhaust emissions; and
- Occupational hazards.

## **9. MITIGATION MEASURES FOR NEGATIVE IMPACTS**

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### **9.1 Overview**

This Chapter highlights the mitigation measures for the anticipated negative impacts of the proposed Project. The potential impacts and the possible mitigation measures have been analysed under three categories: construction phase, operational phase and decommissioning phase.

### **9.2 Mitigation Measures during Construction**

The following measures can be considered as mitigation measures of the negative impacts associated with the proposed Project during the construction phase.

#### **9.2.1 Minimization of Degradation of Construction Materials Sourcing Sites**

In order to minimize construction material sourcing impacts, the Proponent through the Contractor shall do the following:

1. Aggregates and rock will be sourced locally from an established quarry within Nairobi City County or the environs instead of starting another quarry for purposes of the proposed Project;
2. Gravel and sub-grade soil-murram will be sourced locally also from an established quarry within Nairobi City County or the environs instead of starting another quarry;
3. Carry out inspection of each of the site's soil stability before excavation;
4. Cordon off the gravel site areas to keep livestock and the general public;
5. The use of burrow pits for material spoil sites may be approved by the RE (and/or with the appropriate consent of the "landowner"). Where this occurs, the materials spoiled in the burrow pit shall be profiled to fit into the surrounding landscape and covered with topsoil;
6. The Contractor is expected to follow the National Sand Harvesting Guidelines published by NEMA in 2007; and
7. In case of blasting:
  - i. The Contractor will be responsible for obtaining a current and valid authorisation from the Department of Mines and Geology prior to any blasting activity. A copy of this authorisation shall be availed to the RE;
  - ii. A qualified and registered blaster by the Department of Mines and Geology shall supervise all blasting and rock-splitting operations at all times;
  - iii. The Contractor shall ensure that appropriate pre-blast monitoring records are in place (i.e. photographic and inspection records of structures in close proximity to the blast area);
  - iv. The Contractor shall ensure that emergency services are notified, in writing, a minimum of 24 hours prior to any blasting activities commencing on Site;
  - v. The Contractor shall take necessary precautions to prevent damage to special features and the general environment, which includes the removal of fly-rock. Environmental damage caused by blasting/drilling shall be repaired at the Contractor's expense to the satisfaction of the RE and the relevant authorities;

- vi. The Contractor shall ensure that adequate warning is provided to the local communities immediately prior to all blasting. All signals shall also be clearly given; and
- vii. The Contractor shall use blast mats for cover material during blasting. Topsoil shall not be used as blast cover.

To reduce the negative impacts on availability and sustainability of the materials, the Contractor will only order for what will be required through accurate budgeting and estimation of actual construction requirements. This will ensure that materials are not extracted or purchased in excessive quantities. Moreover, the Proponent will ensure that wastage, damage or loss (through run-off, wind, etc.) of materials at the construction site is kept minimal, as these would lead to additional demand for and extraction or purchase materials.

In addition to the above measures, the following should be taken into consideration:

- The tender documents should specify required standards and certification of procurement of all materials and appliances including acquisition of independent EIA license by the Contractor for any material site necessitated by the proposed Project;
- As far as possible, environmentally friendly and sustainable materials should be used;
- The Contractor should be instructed in the use of all materials that may have negative environmental and health effects; and
- If any material or substance is at any point in the future deemed to be deleterious to health, then it must be replaced with an acceptable alternative.

### **9.2.2 Minimization of Occupational Safety and Health Risks**

To reduce workplace incidents during the construction phase of the proposed Project, the Proponent shall ensure that the Contractor is committed to adherence to OSH Rules and Regulations as stipulated in OSHA, 2007. In this regard, the Proponent and the Contractor are committed to the establishment and maintenance of safe systems of work at the workplace for optimal levels of safety and health as outlined in the ESMMP. Risk of accidents and ill health as a result of construction activities shall be mitigated by ensuring that appropriate health and safety measures are applied in all activities as guided by a RA including fencing of all dangerous areas, placing warning signs, undertaking toolbox talks prior to commencement of an activity, undertaking Job Safety Analysis (JSA) prior to undertaking a task, implementing PTW system at the workplace for high-risk non-routine activities, consulting with the local community and health workers and enforcing maximum traffic speeds through the road, among other safe systems of work initiatives as guided in the RA. In addition, preparing a contingency plan for accident response, safety education and training shall be emphasized.

### **9.2.3 Minimization of Noise Pollution and Vibration**

The Contractor shall regulate and control noise producing and generating sources with the objective of maintaining the ambient standards in respect of noise and vibration. The ambient noise levels and vibrations measurements shall be undertaken and maintained in compliance with EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and Noise Prevention and Control Rules, 2005.

Significance of noise and vibration impacts depends on whether the Project would increase noise and vibration levels above the existing ambient levels by introducing new sources of noise and vibration. Noise and vibration impacts would be considered significant if the Project would result in the following:

- Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to, or generation of, excessive ground-borne vibration or ground-borne noise levels;
- A substantial permanent increase in ambient noise level [more than five dB(A)] in the project vicinity above levels existing without the project; and
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The Proponent through the Contractor shall use the following noise-suppression techniques to minimize the impact of temporary construction noise and vibration at the proposed Project site:

- Construction shall be carried out in accordance with the standard procedures. All plant and construction equipment shall be fitted with noise control measures and shall strictly conform to the EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and Noise Prevention and Control Rules, 2005;
- On-site power gensets shall be covered with an acoustic enclosure and fitted with muffler and shall conform to EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and Noise Prevention and Control Rules, 2005;
- Prescribe noise reduction measures if appropriate e.g. restricted working hours, transport hours and noise buffering;
- Inform the surrounding community on the permissible noise levels and best working hours;
- Use quiet equipment (i.e. equipment designed with noise control elements) and regular maintenance of machinery to ensure that noise produced from machinery is kept to a practicable minimum;
- Co-ordinate with relevant agencies regarding all construction activities in the Project area;
- Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible;
- Vehicles hired for bringing construction materials at site shall conform to the noise emission standards and shall be operated during non-peak hours;
- All vehicles and plant shall be regularly serviced in accordance with the manufacturer's recommendations to ensure that they operate efficiently; and
- Undertaking noise surveillance at the workplace;
- Full implementation of the recommendations contained in all the noise survey report for the Project.

#### **9.2.4 Minimization of Impact on Air Quality**

The Proponent shall carry out ambient air quality measurements prior to commencement of works with the primary aim of providing a basis for protecting the public from any adverse effects of air pollution and eliminating, or reducing to a minimum, those contaminants of air that are known or likely to be hazardous to human health and well-being. Therefore, ambient air quality measurements shall be undertaken and maintained in compliance with EMC (Air Quality) Regulation, 2014.

The following measures shall be implemented during construction to minimize the exhaust emission:

- The engine size of the construction equipment shall be the minimum practical size;
- The number of construction equipment operating simultaneously shall be minimized through efficient management practices;
- Construction machinery idling time shall be minimized;
- All vehicles and plant shall be regularly serviced in accordance with the manufacturer's recommendations to ensure that they operate efficiently and without excessive noxious emissions;
- The burning of waste, such as vehicle tyres causing noxious emissions shall be prohibited;
- Alternatively, fuelled construction equipment shall be used where feasible equipment shall be properly tuned and maintained;
- Sensitise truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas, and to switch off or keep vehicle engines at these points; and
- Full implementation of the recommendations contained in any of the ambient air quality report for the Project.

This will be achieved through proper planning of transportation of materials to be used during construction of the proposed Project to ensure that vehicle fills are increased in order to reduce the number of trips done or the number of vehicles on the road.

Dust emissions from construction sites can also pose health risk to workers, and sensitive receptors surrounding the site, if not managed properly. It is the responsibility of the Contractor to provide appropriate safety training, information equipment, signage, security and emergency response plans on site.

To mitigate the impact of SPM (dust), the following measures are recommended for implementation:

- All dusty materials shall be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet;
- Cover stockpiles of sand, soil and similar materials or surround them with wind breaks;
- Watering all roads used for any vehicular traffic when necessary;
- Down wash of trucks (especially tyres) prior to departure from site;
- Vehicles delivering loose and fine materials like sand and fine aggregates shall be covered to reduce spills on roads;

- The height from which excavated materials are dropped shall be controlled to a minimum practical height to limit fugitive dust generation from unloading;
- Post signs that limit vehicle speeds onto unpaved roads and over disturbed soils;
- Rapid onsite construction so as to reduce duration of traffic interference and therefore reduce emissions from traffic delays; and
- Suitable PPE to be worn.

### **9.2.5 Interruption of the Existing Installations**

The Project Implementation Committee shall ensure that the affected utility infrastructure relocation is done prior to the commencement of the proposed Project in an efficient and timely manner without causing much inconvenience to the consumers. Further, the Committee shall endeavour to ensure that any accidentally damaged utility infrastructure during the construction works is immediately reinstated.

The following should be done to ensure that the installations that are to be interrupted are managed properly:

- Establish the various service providers whose installations are to be interrupted;
- Identify key interests of each of the stakeholders;
- The Proponent should formally liaise with the stakeholders and communicate the Project details to them with a view of developing a work plan. The work plan to be developed should have clear responsibilities for each of the affected parties with clear key performance indicators (KPIs) set;
- The work plan should then be implemented to ensure smooth execution of the construction works; and
- On completion of works, each property owner should be contacted again to give views and if complains arise the contractor asked to address the same.

### **9.2.6 Minimisation of Clearing of Vegetation**

Clearing of existing vegetation at the median of Outer Ring Road and at the Depot site will be inevitable. The Contractor will ensure proper demarcation of the Project area to be affected by the construction works and the appropriate measures for clearing vegetation taken into consideration. This will be aimed at ensuring that any loss of vegetation is restricted to the designated construction area and avoid spillover effect on any undesignated construction area. The necessary steps to prevent unnecessary destruction or damage of vegetation shall be taken. The Proponent shall endeavour to reserve any vegetation within the road reserve and the Depot site but not affected by the construction works to the extent feasible.

### **9.2.7 Minimization of Solid Waste Generated**

The Contractor shall at all times maintain all sites under his control in a clean and tidy condition and shall provide appropriate and adequate facilities for the temporary storage of all waste prior to disposal. The provisions of EMC (Waste Management) Regulations, 2006 and Sustainable Solid Waste Management Act, 2022 shall be the minimum guidelines in solid waste management at the workplace.



The Proponent through the Contractor shall put in place measures to ensure that construction materials requirements are carefully budgeted and to ensure that the amount of construction materials left on site after construction is kept minimal.

It is further recommended that the construction workers and the Proponent should consider the use of recycled or refurbished construction materials. Purchasing and using once-used or recovered construction materials will lead to financial savings and reduction of the amount of construction debris disposed of as waste.

Additional recommendations for minimization of solid waste include:

- Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time;
- Provision of facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements;
- Use of construction materials that have minimal packaging to avoid the generation of excessive packaging waste;
- Use of construction materials containing recycled content when possible and in accordance with accepted standards; and
- Provision of suitably labelled waste collection facilities at the workplace preferably colour coded to facilitate waste separation and segregation for judicial waste disposal;
- Disposal of waste strictly through NEMA licensed waste disposal company for the waste streams at the workplace; and
- Develop and maintain a sound waste disposal tracking system at the workplace for certainty that the waste collected from the workplace is successfully disposed at a designated site.

#### **9.2.8 Minimization of Increased Water Demand**

The Proponent of the proposed Project shall ensure that water is used efficiently at the site by sensitising construction workers to avoid irresponsible water use.

An assessment and evaluation of the identified water sources should be done against the estimated water demand during construction. These details should be provided to the WRA before a license for abstraction is issued.

#### **9.2.9 Curb Storm Water Run-off from New Impervious Areas**

The Proponent through the Contractor will put in place adequate measures aimed at minimizing soil erosion and associated sediment release from the proposed Project site during construction. These measures will include levelling the proposed Project site to reduce run-off velocity and increase infiltration of rain water into the soil. A storm water management plan that minimises impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structures will be designed.

### **9.2.10 Minimisation of Delays in Transportation**

To avoid delays to road users, the Contractor shall comply to the following traffic management measures to ensure there is minimal disruption of traffic flow that may be associated with the construction works.

- **Routing of Traffic, Speed Limits & Signage**

To ensure minimal interruption of traffic flow, works shall be strictly confined as feasible at the median of Outer Ring Road to ensure that traffic flow on the main carriageway remains uninterrupted.

The most appropriate route and time for large Project vehicles (such as trucks and buses) transporting equipment, materials and/or employees to and from the site shall be determined by the PIT. Any anticipated or scheduled traffic delays occasioned by Project vehicles should be coordinated with the traffic police in advance.

The movement of construction vehicles shall not be undertaken during peak morning and afternoon traffic times so as to avoid causing an impact on commuters. Materials and labour shall, as far as possible, be sourced locally in order to minimize transport related impacts and transport safety risks.

**Speed limit:** All speed limits applicable to public roads shall be strictly adhered to by all drivers operating Project vehicles.

**Signage:** The Contractor shall ensure that signage are conspicuously placed at appropriate locations along the Project Road to indicate the following: Construction works ongoing, loose gravel, appropriate speed limit, turning traffic, routes to be used by construction vehicles, that caution should be taken by motorists or pedestrians, no-go areas for vehicles and any traffic control information which may be relevant in the circumstances. The signage should be visible both during the day and at night.

- **Transportation of Equipment and Materials**

The Contractor shall ensure that:

- i. All equipment and/or materials transported are appropriately secured to, or contained in, vehicles.
- ii. No construction vehicles shall be loaded in excess of its manufacturer-specified weight bearing capacity.
- iii. All vehicles used for transportation shall have the appropriate load-bearing capacity for the materials and/or equipment intended to be transported.
- iv. Drivers shall be appropriately trained in driving techniques applicable to specific loads (e.g. hazardous substances) where necessary.

- **Licensing and Maintenance**

**Licensing:** The Contractor shall ensure that:

- i. All Project vehicles comply with relevant traffic and transport licensing requirements (such as with regard to licensing requirements relating to the transportation of over-sized loads or hazardous materials).
- ii. All drivers of vehicles used during the Project shall have the requisite licenses to operate any vehicle (or machinery) operated by them on site.
- iii. All Project vehicles shall have valid roadworthy certificates and licenses.

**Maintenance:** All vehicles and machinery used in the proposed Project shall be regularly maintained and repaired where necessary. In this regard, all construction and passenger vehicles used shall be inspected by an appropriately qualified mechanic every six months following the commencement of the proposed Project. The Site Agent shall ensure that regular inspections are undertaken of construction and passenger vehicles to ensure that they are in good working order and are not overloaded. Any potential vehicle defect which may render a vehicle or road unsafe for use shall be immediately reported to the Site Agent who shall ensure that the vehicle is not used until the necessary repairs have been undertaken.

- **Emergency Responses and Reporting Hazards**

Prior to the commencement of the proposed Project, the emergency services providers (ambulance & medical services, police and fire & rescue) shall be consulted by the PIT to ensure their service delivery is not impacted during Project Implementation.

In the event there is an emergency, the on-site emergency procedure shall be followed and the services providers shall be given priority of passage through the works to respond to the emergency.

#### **9.2.11 Reduced Pollution of the Nairobi River Basin**

To ensure that further pollution of Mathare River, Nairobi River and Ngong River is minimized, all construction activities at the river crossings shall be guided by EMCA Cap 387 laws of Kenya, EMC (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulation (2009), Water Act (2016), and The Water Resources Regulations, 2021. The Proponent and the Contractor shall also be involved in NRC activities while undertaking the Nairobi River Basin Programme which is a multi-stakeholder initiative. The main objective of the Programme is to rehabilitate, restore and sustainably manage the Nairobi River Basin in order to provide improved livelihoods, enhance environmental quality and values through well regulated economic and recreational ventures.

In addition, the Contractor shall be required to:

- Reduce on plastic consumption and reuse/recycle as much as [possible];
- Ensure properly disposal of chemical cleaners, oil, and nonbiodegradable materials to keep them from going into the rivers;
- Maintain the machineries and vehicles so that they don't leak oil, antifreeze, or coolant on the ground; and
- Remove all the solid waste that has been dumped into the stormwater drainage system of Outer Ring Road.

### **9.2.12 Mitigating against Increased Insecurity**

Every Project staff shall be easily identifiable at all times. The Contractor shall ensure that every Project staff whenever on site, has a branded reflector jacket and at the minimum his or her national identification card. Additionally, unless otherwise approved by the RE and the security providers in the Project area, the construction works shall be strictly carried out during the day. Any person with a criminal record should not be engaged in the proposed Project.

### **9.2.13 Controlling Fuel and Lubricant Spills**

The Contractor shall take all responsible measures, at all sites under his control to prevent spillage and leakage of material likely to cause pollution of soil and water resources. The Contractor shall control the danger of fuel and lubricant spillage at site by strictly ensuring that the servicing/maintenance of machinery is undertaken in approved garage or an equivalent.

The measures to be taken by the Contractor shall include but not be limited to the provisions of bunds around fuel, oil and bitumen storage facilities and provision of oil and grease traps for servicing and fuelling areas. The Contractor shall ensure that all the servicing and fuelling areas under his/her control are duly approved and licensed by the Regulators. The latter notwithstanding, the Contractor should also construct sealed areas for the storage of pollutants so as to avoid any accidental discharge that would pollute soil and water resources; lubricant and fuel shall be stored in storage tanks within a secure compound and shall be stored in accordance with manufacturer's instructions.

### **9.2.14 Minimization of Impact of Wastewater**

The impacts of wastewater will be mitigated as follows:

- No grey water runoff or uncontrolled discharges from the site/working areas (including wash-down areas) to watercourses and/or water bodies shall be permitted;
- Water containing such pollutants as cements, concrete, chemicals and fuels shall be discharged as provided in EMC (Water Quality) Regulations, 2006. This particularly applies to water emanating from concrete swills;
- The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to adjacent watercourses and/or water bodies;
- Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained, and the water table not endangered;
- Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas (including groundwater) are not polluted; and
- The Contractor shall notify the RE of any pollution incidents on site.

### **9.2.15 Impacts on Local Resources**

The impacts on local resources will be mitigated as follows:

1. The Contractor will consult the community on partitioning of access to local resource for construction purposes;
2. The Contractor shall adhere to the provisions of EMC (Water Quality) Regulations, 2006. The Regulations describe the following:
  - Water sources for domestic use;
  - Sewage treatment;
  - Ground water;
  - Water for agricultural use;
  - Water for other uses; and
  - Schedules depicting standards.
3. Abstractions from natural, County Government and/or private water resources (e.g. rivers, boreholes and springs) for potable water and construction water shall be approved by the WRA. The Contractor shall arrange for the necessary approvals/permits from the water authorities under the direction of KURA for abstraction of water.

#### **9.2.16 Impacts from Contractor's Camp Site**

The mitigation measures have been divided according to the different components of the Contractor's camp.

##### **General**

1. The site for the Contractor's camp shall be determined in collaboration with the RE taking into consideration the following:
  - The security situation in the area;
  - The local administration shall be involved in the site location to avoid destruction of any ritual site or any other conflict;
  - The Contractor's camp layout shall take into account availability of access for deliveries and services and any future works; and
  - Decommission the camps and reinstatement of the land to its natural condition by filling excavations and planting suitable saplings.
2. The Contractor shall implement the following as required with the approval by the RE:
  - The Contractor will be required to prepare a waste management plan for the work sites and camps at the start of the Project;
  - A suitable storm water drainage system to prevent soil erosion, protect storage areas and to prevent stagnant ponds forming;
  - A suitable potable water supply;

- Suitable facilities for bathing, washing clothes or vehicles site staff will not be permitted to use open water bodies for such activities;
- Suitable sanitation facilities, adequate for the number of staff on site;
- Facilities for solid waste collection; and
- Facilities for waste water management.

### **Sanitation**

The Contractor shall be responsible for the provision of adequate sanitary facilities for his workforce, and that of his subcontractors at all construction and ancillary sites as discussed below.

1. The Contractor shall comply with all laws and any by-laws relating to public health and sanitation;
2. All temporary/portable toilets or pit latrines shall be secured to the ground to the satisfaction of the RE to prevent them from toppling over;
3. The type and exact location of the toilets shall be approved by the RE prior to establishment. The use of septic tanks may only be considered after appropriate investigations have been made and the option has been approved by the RE;
4. All toilets shall be maintained by the Contractor in a clean sanitary condition to the satisfaction of the RE;
5. The Contractor shall not allow the discharge of any untreated sanitary waste to ground water or any water of ground surface watercourse.
6. A wash basin with adequate clean water and soap shall be provided alongside each toilet. Staff shall be encouraged to wash their hands after use of the toilet, in order to minimise the spread of possible disease;
7. The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from the site to an appropriate location/facility for disposal; and
8. The Contractor shall instruct their staff that they must use toilets provided and not the bush or watercourses.

### **Workshops**

1. Where practical, all maintenance of equipment and vehicles on site shall be performed in the workshop;
2. If it is necessary to do maintenance on site, but outside of the workshop area, the Contractor shall obtain the approval of the RE prior to commencing activities;
3. The Contractor shall ensure that there is no contamination of the soil, vegetation or surface water in his workshop and other plant or emergency maintenance facilities; and
4. The workshop shall be kept tidy at all times and shall have the following as a minimum:
  - A smooth impermeable floor either constructed of concrete or suitable plastic covered with sufficient gravel to protect the plastic from damage;
  - The floor shall be bunded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil);
  - Drip trays shall be used to collect the waste oil and lubricants during servicing and shall also be provided in construction areas for stationary plant (such as compressors);

- The drip trays shall be inspected and emptied daily; and
- Drip trays shall be closely monitored during wet weather to ensure that they do not overflow.

### **General Materials Handling and Storage**

- All materials shall be stored within the workshops yard unless otherwise approved by the RE;
- Stockpile areas shall be approved by the RE;
- All imported fill, soil and/or sand materials shall be free of weeds, litter and contaminants. Sources of imported materials shall be listed and approved by the RE;
- The Contractor shall ensure that delivery drivers are informed of all procedures and restrictions (including 'No go' areas) required;
- Any electrical or petrol driven pumps shall be equipped and positioned so as not to cause any danger of ignition of the stored product;
- Collection containers (e.g. drip trays) shall be placed under all dispensing mechanisms for hydrocarbons or hazardous liquid substances to ensure contamination from any leaks is reduced;
- Regular checks shall be conducted by the Contractor on the dispensing mechanisms for all above ground storage tanks to ensure faulty equipment is identified and replaced in timely manner; and
- Only empty and externally clean tanks may be stored on bare ground. All empty and externally dirty tanks shall be sealed and stored on an area where the ground has been protected.

### **9.2.17 Minimization of Public Health Risks and HIV/AIDS**

To minimise public health and HIV/AIDS the following measures shall be taken into consideration:

- A comprehensive health awareness campaign carried out in conjunction with the Proponent, Contractor and other stakeholders will be done to prevent outbreak of disease. This will include successful preventive measures such as immunizing the vulnerable population, and educating people about diseases and how they are contracted, and how to avoid them by using treated water and keeping living areas cleaner;
- Treating affected local and migrant populations will also be used in controlling the movement of disease vectors (through contaminated water and between people);
- The Contractor shall be responsible for the protection of the public and public property from any dangers associated with construction activities, and for the safe and easy passage of pedestrians and traffic in areas affected by the construction activities;
- All works which may pose hazard to humans and domestic animals are to be protected, fenced, demarcated or cordoned off as instructed by the RE. If appropriate, symbolic warning signs must be erected;
- The HIV/AIDS awareness campaigns should be conducted at the camps as well as in any other public space. The Contractor shall take an active role in civic and public health education to his employees and the community. The campaign shall include the training of facilitators

within the workers, information posters in the workshop and public areas, availability of promotional material (T-shirts and caps), availability of condoms (free), and theatre groups. The Contractor will co-ordinate with NSDCC, Health Officers and NGOs undertaking education and sensitisation programmes;

- The Contractor will provide condoms at appropriate places in the work camps. The campaigns will be continuously done by the relevant Government organisation even during operation phase of BRT Line 5;
- The implementing agency for HIV/AIDS campaign shall monitor activities regularly to assess effectiveness and impact. This should include an initial, interim and final assessment of basic knowledge, attitude and practices taking account of existing data sources and recognising the limitations due to the short timeframe to show behaviour change. The assessment will be supported by qualitative information from focus group discussions;
- Implementation of initiatives which target knowledge, attitude, behaviour, prevention, treatment and care in collaboration with NSDCC at regional and local levels, NGOs and CBOs; and
- Interventions should give attention to high-risk groups, factors perpetuating risk behaviours, female headed households, child headed household, orphans, people living with AIDS, youth, school girls and boys.

### **9.2.18 Controlling Impacts from Asphalt Mixing Plants and Hazardous Sites**

The proposed Project works will require asphalt as well as bitumen for purposes of the Establishment of BRT Line 5. The Contractor may purchase asphalt and bitumen from other existing plants. However, in the event that the Contractor would establish their own facilities, it is the responsibility of the Contractor to ensure that negative environmental impacts from the asphalt and bitumen mixing plant including noise pollution, dust and gaseous emissions, among others are well controlled. For a plant causing or is likely to cause nuisance or health problems to the site staff or the general public, the Contractor shall reduce the emissions of hydro-carbons and particulate to acceptable level within a time-scale agreed with the RE. The Contractor and the Proponent shall collaboratively ensure that the following preventive and mitigation measures are observed:

- All concrete and asphalt plants shall be operated and maintained in accordance with the original manufacturers' specifications and manuals;
- The plant should be located a distance from residential areas with a buffer zone in between;
- Fitting the exhaust with appropriate acoustic design to arrest noise pollution;
- The visual impacts to be controlled by ensuring the design camouflages with the surrounding and the trees are maintained to enhance aesthetics;
- Sprinkle the materials and cover the same to suppress dust;
- The plant to be fitted with dust collectors and operated on venturi principle;
- Waste water from the wet dust collector and cleaning of the equipment to be channelled to dedicated settling tanks and the effluent is dried to form sludge which is recycled;
- Install absorbent mineral aggregates such as limestone for the absorption of sulphur oxides from the combustion of fuels;
- There should be regular maintenance of the burner and optimization of the combustion volume to reduce emission of hydrocarbons;



- Allow for correct air-fuel mixture and appropriate retention time for complete combustion to limit production of carbon oxides;
- Personnel to be provided with appropriate PPE such as ear muffs and face mask to protect their health due to exposure to noise and dust with expectation that the noise and dust levels will be within allowable limits;
- Safety signage should be placed within the site and marked clearly at the entrance and exit;
- MSDS for each chemical product should be made available on site and well displayed;
- First Aid kits in compliance with the provisions of the OSH (First Aid in the Workplace) Regulations, 2023; and
- Workers should be subjected to medical examination in compliance with the provisions of the Medical Examination Rules, 2005.

The hazardous sites will not be experienced in the proposed Project as the sites that will be used for sourcing gravel and the quarry site are existing sites things held constant. However, should the proposed Project warrant establishment of new material site(s), the Contractor shall independently subject the identified material site(s) to the ESIA and EA process as provided in EMCA Cap 387 Section 58 and Section 68 for proposed and existing material site(s) respectively.

#### **9.2.19 Controlling Soil Erosion and Sedimentation**

To ensure soil erosion and sedimentation impacts are well controlled and mitigated against, the Project Proponent shall appropriately select and implement the following preventive and mitigation measures:

- The Contractor should avoid working on very steep alignments;
- Avoid cut-slope creation and embankments greater than the angle of response for the soil type;
- Minimize the ground clearance area;
- The contractor should minimize ground clearance area by working only within the road reserve;
- Balance the cut-and-fill requirements by rightly choosing the route in order to avoid creating excess spoil materials and borrow pits;
- Store and re-use top soil during the initial excavation to be deposited on the slopes to form a superficial layer for seedling establishment;
- Replant cleared areas and slopes with herbaceous plants such as vetiver grass according to the soil type and the desired engineering function so as to reduce erosion and stability problems;
- Construct interception ditches at the top and bottom of the slopes by use of gutters and spill ways to control the flow of water down the slope;
- Construction of riprap, gabions, cribs or other wooden barricades and grid work battered back against the slope;
- Adopt lined side drains to the extent feasible; and
- Construction of retaining walls.

#### **9.2.20 Mitigating against Fire Risks at the Contractor's Site**

Fire safety is the set of practices intended to reduce the destruction or harm caused by fire. Fire safety measures include those that are intended to prevent the ignition of an uncontrolled fire and those that are

used to limit the development and effects of a fire after it starts. The Contractor shall have fire safety and emergency procedures at the workplace that include:

- The Contractor's staff shall undergo fire safety training and must be instructed in the correct use of fire-fighting equipment;
- The site shall have suitable emergency routes and exits, indicated by suitable signs, that must be kept clear and free from obstruction;
- The Contractor shall ensure that fires, except for controlled fires for burning rubbish, do not start within the site or in the environs thereto as a result of the works or from the actions of his employees;
- The Contractor shall have trained firefighting personnel armed with adequate fire-fighting equipment, including up-to date serviced and functional fire extinguisher, to deal with all fires;
- The Contractor to clear away rubbish and waste frequently to the designated burning area and shall not let waste build up around the burning area;
- Electrical systems, comprising of short-term supplies, must only be installed by a qualified electrician and must be frequently maintained;
- High-intensity lights should not be hidden or placed near flammable material;
- The Contractor shall prohibit smoking in areas of high fire risk or and only allow it at designated smoking zones. The matches and cigarette butts to be disposed cautiously;
- The Contractor to ensure any welding activity is undertaken in areas free of flammable materials. Non-removable items must be well covered with heat proof blankets to protect against radiant heat and sparks; and
- The Contractor shall stop all welding activities at least 1 hour before closing the site for the day. Fire checks shall be made in intervals of 30 minutes and at least 1 hour to the end of shift.

### **9.2.21 Labour Influx**

To manage the possible negative impacts as a result of labour influx in the Project area, the Contractor shall:

- Unskilled labour and skilled (if available) labour to be hired from the local population as much as possible to minimize on influx of foreigners into the community;
- Use of manual labour where possible to ensure more employment for the locals;
- Prepare and implement a labour influx plan to manage labour influx;
- Enforce and maintain a code of conduct for his employees;
- Ensure that the community is sensitized on the possible occurrence of GBV and SEA issues and how they should respond; and
- Ensure that the GRM addresses issues related to labour influx.

### **9.2.22 Mitigating against GBV, SH and SEA**

The Contractor shall provide and implement a GBV strategy, which will include:

- Gender mainstreaming in employment at the worksite with opportunities provided for females to work, in consonance with local laws and customs;
- Gender sensitization of workers;

- Provision of gender disaggregated bathing, changing, sanitation facilities;
- GRM that incorporates non-retaliation and specific procedures for GBV;
- Provide and implement an employee code of conduct for workers;
- A “No” SH and Non-Discrimination Policy, in accordance with national law where applicable;
- The Contractor will prepare and enforce a code of conduct that will be signed by all Project workers prohibiting SEA and SH by workers and providing an accountability and response framework including non-retaliation against those who report;
- All workers and nearby communities and stakeholders to be educated on preventing and responding to SEA, SH and GBV ahead of any project related works;
- Popularize /put in place safe, ethical and confidential mechanisms and hotlines for reporting SEA/SH/GBV cases;
- Establish partnerships with relevant government agencies, GBV Service Providers and NGOs to ensure survivors of GBV and sexual offences access survivor centred services such as medical care, psychosocial support, legal redress, safety, etc as and when necessary;
- Provision of gender disaggregated facilities including separate bathing, changing, sanitation facilities for men and women; and
- GRM with specific procedures for GBV including confidential reporting with safe and ethical documenting of GBV cases should be set up for the workers and community.

### **9.2.23 Mitigating against Project Impacts on Women**

To ensure that women are well accommodated in the proposed Project, the Contractor shall:

- Ensure equitable distribution of employment opportunities between men and women;
- Provide toilets and bathrooms for both male and female workers on site; and
- Ensure that women are involved in the periodic consultations with the Contractor and host communities during construction to enable them accommodate their other normal roles in the society while working in the Project.

### **9.2.24 Mitigating against Impacts Associated with Demolition of Warehouses at the Depot Site**

To mitigate against air & noises pollution, and generation of waste during demolition of the warehouses, the Contractor shall ensure that:

- The demolition is carried out in accordance with the standard procedures by ensuring that all plant and construction equipment are be fitted with noise control measures and shall strictly conform to the EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and Noise Prevention and Control Rules, 2005;
- Ambient air quality measurements are undertaken and maintained in compliance with EMC (Air Quality) Regulation, 2014; and,
- The provisions of EMC (Waste Management) Regulations, 2006 and Sustainable Solid Waste Management Act, 2022 are the minimum guidelines in solid waste management.

## **9.2.25 Mitigation Measures against Climate Change**

### **Flooding Risk**

KURA will take the following climate change adaptation measures to reduce the impacts of climate change on the proposed BRT Road infrastructure:

- **Elevated BRT System:** The BRT design team has incorporated the impacts of flooding in the Project design by utilizing the flood risk assessment guide. The BRT System will be elevated in areas where flooding is common. This will constitute the construction of raised BRT infrastructure that is above the predicted flood levels and isn't vulnerable to collecting large pools of rainwater.
- **Rain Barrels:** The BRT Project System will have an option for collecting floodwater before it pools by placing rain barrels on the side of the BRT infrastructure.
- **Clean Streets:** KURA will liaise with the NCCG to ensure regular removal of solid wastes from the existing BRT drainage system;
- **Vegetation:** Trees decrease flooding through high precipitation. In light showers, leaves and branches capture or absorb water on their surfaces, where it can evaporate rather than run to the ground. Water that runs down branches, bark, and roots is channeled to soil and groundwater. Roots also help build the water-holding capacity of soil. Tendrils both big and small create pockets that increase the permeability of soil. Roots also prevent soil erosion by binding it. Greater soil depth means more strata to absorb water. KURA will liaise with KFS and other stakeholders in planting trees to replace any tree that will be harvested during the construction phase of the proposed BRT System;
- **Flood barriers:** Through continuous monitoring and evaluation, KURA to map out the section of its infrastructure prone to flooding and ensure, the installation of flood barriers along the side of the BRT corridor to prevent water from pooling;
- **Natural Infrastructure:** KURA to involve relevant experts on appropriate outfall where stormwater will be channeled, during the operations of the proposed BRT Project.

### **Loss of Vegetation**

- **Urban Greening:** Promotion of urban greening efforts including development of green corridors and roadside vegetation.

### **Increased Temperatures**

- Planting of trees after implementation of the BRT System to provide shade and help to reduce the impact of carbon emissions and restore natural ecosystems;
- Increased investment in BRT System maintenance and repair programs, focusing on the use of heat-resistant road materials;
- Greater use of concrete due to its higher temperature resistance; and
- Cooling the BRT pavements with water.

### **Increased Soil Erosion and Sedimentation**

- **Plant grass and shrubs:** Bare soil is easily swept away by wind and water, the two main causes of erosion. Plant roots hold the soil together, while their leaves block rain and stop it from breaking the soil apart. Shrubs and grass will be planted along the Outer Ring to control soil erosion and sedimentation;
- **Build retaining walls:** Badly eroded slopes will continue to collapse downhill until they are stabilized. Construction of A retaining wall at the base of the slope along the proposed Project will block the soil and slow down the collapse;
- **Pitched Drainage:** Stone pitching of drainage structures along the slopes, embankments, or riverbanks will be done to control erosion and provide stability along the Outer Ring Road;
- **Installation of Gabions;** The construction of gabions along the outer Ring Road will slow the velocity of concentrated runoff or stabilize slopes with seepage problems and/or non-cohesive soils. Gabions can be used at soil-water interfaces, where the soil conditions, water turbulence, water velocity, and expected vegetative cover are such that the soil may erode under the design flow conditions.

### **9.2.26 Mitigation against Non-Compliance with ESMMP and EIA License Conditions**

To ensure that the Contractor complies with ESMMP and EIA License Conditions so as to realize sustainable development, the Proponent should ensure that:

- Provisions for ESMMP implementations are included in the Contract Documents;
- Carryout Monthly Environmental and Social Monitoring to identify and described the environmental and social impacts, propose their respective mitigation measures and the scope of monitoring activities to the Contractor; and
- Collaborate with NEMA in ensuring that the Contractor adheres to all the EIA license conditions.

The Contractor should ensure that:

- The ESMMP and the EIA License Conditions are fully adhered with at all times to ascertain the effectiveness of the proposed mitigation measures in environmental protection;
- Liaise with NEMA in mainstreaming the EIA licensing conditions in the Project; and
- Environmentalists and a Sociologists are part of his staff to address the environmental and social issues that may arise in the Project in a timely and effective manner.

## **9.3 Mitigation of Negative Impacts during Operation Phase**

The negative impacts of the proposed Project arising during the operation phase shall be mitigated as discussed below:

### **9.3.1 Ensuring Efficient Solid Waste Management**

To ensure efficient solid waste management, the Proponent in liaison with NCCG will identify proper sites for solid waste disposal. Waste receptacles will not be installed along the Project Road as wastes will not only end up spilling on the road but also it will be tantamount to establishment of illegal dump sites along Outer Ring Road as is currently the case. The Proponent shall strictly adhere to the provisions of the EMC

(Waste Management) Regulations, 2006 and Sustainable Solid Waste Management Act, 2022 with respect to solid waste management along the Project Road.

### **9.3.2 Road Accidents**

The following measures will be taken to mitigate the road accidents that are likely to occur during operation:

- Proper design of road safety features is a very effective way to prevent accidents. The RE and the Contractor involved with the implementation of the design of the road should:
  - Examine road design standards, safety equipment specifications and training to ensure that design details take account of safety concerns and that specific safety features are correctly designed and installed;
  - Require that road design audits be done, at final design stages, by specialists in road safety and traffic operations;
  - Draft traffic management plans, including details of signs, markings, and intersection layouts, channelization of flows, access restrictions, footpaths, bus stops, and provisions for NMT facilities;
  - Painting of edge lines;
  - Provision of traffic signals;
  - Separation of motorised and NMT;
  - Improvement of visibility;
  - Provision of speed limit signs;
  - Construction of bumps to reduce speeds;
  - Regulations, educations and safety trainings; and
  - Enforcement of traffic rules.
- Road safety and accident prevention campaigns are recommended at the end of construction. To monitor the effectiveness of the road safety information and education campaigns, the following measures are recommended;
- KURA shall monitor traffic accidents through records kept at the local police stations along the Project Road; and
- A report will be required after two years of monitoring and the results used to recommend further mitigation measures, if necessary.

### **9.3.3 Noise Pollution**

To mitigate noise pollution during operation phase:

- Vehicles using the Road should adhere to the Traffic Act Cap 403 where they are supposed to keep the vehicles in roadworthy conditions; and
- Road users to adhere to NEMA Regulations on noise pollution i.e. EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

#### **9.3.4 Erosion and Water Quality Degradation**

Erosion and water quality degradation shall be mitigated as follows:

- Maintenance engineers from KURA shall inspect all culvert structures and outfalls; and
- All the damaged culverts, wing walls and aprons shall be repaired and additional measures for velocity reduction and erosion protection shall be implemented in case of development of erosion.

#### **9.3.5 Controlling Air Pollution**

The challenge of emissions from fuel combustion can be controlled by motorists ensuring they use quality fuels and proper vehicle servicing and maintenance. Use of alternative fuels including alternative vehicle powering technologies e.g. electric powered cars, solar powered cars, etc., which are gaining traction in the Country will go a long way in reducing air pollution by motor vehicles. Vehicles at parking areas should also not be left running.

#### **9.3.6 Ensuring Proper Management of E-Waste**

To ensure proper management of e-waste during the operation phase of BRT Line 5 and its complex ITS applications, the Proponent shall ensure that e-waste is managed in accordance with EMC (Waste Management) Regulations, 2006. In addition, the Proponent shall take the following action:

- Develop and implement e-waste management plan;
- Incorporating health protection measures during Operation Phase of BRT Line 5;
- Monitor e-waste sites and surrounding communities;
- Implement and monitor interventions that improve informal e-waste recycling activities, protect public health and ensure vital sources of community revenue; and,
- Educating workers across all levels on e-waste management and related health issues.

#### **9.3.7 Minimizing Labour Impact to the Matatu Industry Dependents**

Albeit low, the Establishment and Operation of BRT Line 5 will create new formal jobs. The Operators of the BRT buses should maximize on the new opportunities created by the Establishment of BRT Line 5, to increase the number of people to benefit from it. The Proponent to take appropriate measures to minimize job loss in the matatu industry or introduce new opportunities for job creation through reforms and integration of the matatu industry through serious engagement and inclusion of the matatu workforce in the BRT Line 5 planning process. The Proponent should consult and include all stakeholders in the matatu industry in the process of planning and implementation.

Since the matatu industry will continue to play a crucial role in public transport system along Outer Ring Road after the introduction of BRT Line 5, its necessary to provide feeder routes and transport services in areas not served by BRT. Therefore, the matatu industry is a crucial part of the public transport system and there is need to improve and integrate it properly with BRT.

#### **9.4 Mitigation of Negative Impacts during Decommissioning Phase**

The proposed Project is expected to be in operation for many years and therefore decommissioning is not anticipated to happen soon but should this happen all the positive impacts mentioned in this report would be reversed to be negative. Other negative impacts during decommissioning may include:

- Waste generation;
- Noise pollution;
- Dust and exhaust emissions; and
- Occupational risks.

Positive impacts may be realised during decommissioning phase. They may include:

- Rehabilitation and restoration of the site to its original state;
- Recovery of recyclable material;
- Rehabilitation of the road; and
- Employment opportunities.



## 10. ENVIRONMENTAL AND SOCIAL IMPACTS RATING

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This Chapter rates the Environmental and Social Impacts (risks) identified and predicted on different environmental components due to the construction, operation and decommissioning of BRT Line 5 in Nairobi City County through RA.

### 10.1 Risk Assessment and Rating

RA is used to assess the probabilities and consequences of risk events if they were to be realized. The RA output is intended to help determine risk response actions based on the level of risk posed by the threat and risk appetite. Risk Scores are created by multiplying the *Likelihood and Impact*. The scores are then rated using the *Risk Rating Scale*. RA help determine the potential consequences of a threat exploiting a vulnerability.

By evaluating impact in various categories, we ensure a comprehensive assessment of the potential consequences of impacts. Rating impact in various categories provides decision-makers (NEMA, the Proponent and the Contractor) with a more nuanced understanding of the potential consequences.

### 10.2 Derivation of Risks

**Risk:** This is the likelihood of an event that has a potential of impacting on the objectives of an organization/a strategy happening in a given time and the magnitude of the consequences thereof.

**Rating of Risks:** Is based on the assumptions that the management/mitigation measures and plans specified/proposed are implemented and effective in mitigating the risk. Risk Rating is based on the two elements: likelihood and the expected impacts (consequence):

**RISK = LIKELIHOOD X IMPACT or CONSEQUENCE.**

**Likelihood** represents the possibility that a given risk event is expected to occur. The likelihood should be established using the following five ratings:

- *Very unlikely to occur (1);*
- *Not expected to occur (2);*
- *Likely – could occur (3);*
- *Known to occur - almost certain (4); and*
- *Common occurrence (5).*

**Impact (or consequence)** refers to the extent to which a risk event might negatively affect environmental or social receptors. The impact or consequence should be established using the five levels defined below:

- *Negligible (1) - Negligible or no adverse impacts on communities, individuals, and/or on the environment;*

- **Minor (2)** - Adverse impacts of minor magnitude, very small scale (e.g. very small affected area, very low number of people affected) and only short duration, may be easily avoided, managed, mitigated;
- **Medium (3)** - Adverse impacts of medium magnitude, limited in scale (small area and low number of people affected), limited in duration (temporary), impacts are relatively predictable and can be avoided, managed and/or mitigated with known solutions and straight forward measures;
- **Major (4)** - Adverse impacts on people and/or environment of high magnitude, including large scale and/or spatial extent (large geographic area, large number of people, transboundary impacts), of certain duration but still reversible if sufficient effort is provided for mitigation; receptors are considered sensitive; examples are adverse impacts on areas with high biodiversity value; adverse impacts to lands, resources and territories of indigenous peoples; significant levels of displacement or resettlement with temporary consequences on peoples' livelihood; impacts give rise to social conflicts which are expected to be of limited duration; and
- **Severe (5)** - Adverse impacts on people and/or environment of very high magnitude, including very large scale and/or spatial extent (large geographic area, large number of people, transboundary impacts), cumulative, long-term (permanent and irreversible); receptors are considered highly sensitive; examples are severe adverse impacts on areas with high biodiversity value; severe adverse impacts to lands, resources and territories of indigenous peoples; significant levels of displacement or resettlement with long-term consequences on peoples' livelihood; impacts give rise to severe and cumulative social conflicts with long-term consequences.

**Significance of risks** is established by combining likelihood and expected impact (consequence) of a risk event as demonstrated in the table below. The significance rating signals how much attention the risk event will require during project development and implementation and the extent of control actions to be put in place.

Table 56 below shows the assessment matrix for rating the proposed Project's anticipated Environmental and Social Risks.

Table 56 Assessment Matrix of the Anticipated Environmental and Social Risks

|                    |            |   | LIKELIHOOD OF OCCURENCE |                       |                    |                                |                   |
|--------------------|------------|---|-------------------------|-----------------------|--------------------|--------------------------------|-------------------|
|                    |            |   | Very unlikely to occur  | Not expected to occur | Likely-could occur | Known to occur- Almost certain | Common occurrence |
|                    |            |   | 1                       | 2                     | 3                  | 4                              | 5                 |
| IMPACT             | Severe     | 5 | Moderate                | Substantial           | High               | High                           | High              |
|                    | Major      | 4 | Low                     | Moderate              | Substantial        | High                           | High              |
|                    | Medium     | 3 | Low                     | Moderate              | Moderate           | Substantial                    | High              |
|                    | Minor      | 2 | Low                     | Low                   | Moderate           | Moderate                       | Substantial       |
|                    | Negligible | 1 | Low                     | Low                   | Low                | Low                            | Moderate          |
| <b>LEGEND/KEY:</b> |            |   |                         |                       |                    |                                |                   |
| Low                | 1-4        |   |                         | Substantial           | 10-14              |                                |                   |
| Moderate           | 5-9        |   |                         | High                  | 15-25              |                                |                   |

### 10.3 Risk Rating during Construction Phase

#### 10.3.1 Rating of Deterioration of Construction Materials Sourcing Sites

Deterioration of Construction Materials Sourcing Sites during the construction phase is **expected not to occur (2)** with the impact of occurrence being **minor (2)** given the targeted material sourcing sites. Hence, a **low (4)** risk rating.

|        |           | Likelihood                   |
|--------|-----------|------------------------------|
|        |           | Not expected to occur<br>(2) |
| Impact | Minor (2) | Low<br>(4)                   |

#### 10.3.2 Rating of Occupational Safety and Health Risks

Construction site workers are **likely (3)** to be exposed to various types of OSH incidents at the workplace given the Project scope of works. The impact of OSH incidents at the workplace will be task-based and localized therefore, **minor (2)** score. Hence, a **moderate (6)** risk rating.

|        |           | Likelihood                |
|--------|-----------|---------------------------|
|        |           | Likely-could occur<br>(3) |
| Impact | Minor (2) | Moderate<br>(6)           |

#### 10.3.3 Rating of Noise Pollution and Excess Vibrations Risks

The likelihood of noise pollution and excess vibrations out of the Project works is **not expected to occur (2)** with the impact of any occurrence being **minor (2)** since the baseline noise limits already exceed the set limits as per the noise baseline survey done. Hence, **low (4)** risk rating.

|        |           | Likelihood                   |
|--------|-----------|------------------------------|
|        |           | Not expected to occur<br>(2) |
| Impact | Minor (2) | Low<br>(4)                   |

#### 10.3.4 Rating of Reduced Air Quality Risks

It is **almost certain (4)** that the construction works will emit air pollutants to the outside environment. The impact of the emitted air pollutants will be **negligible (1)** since the works will be confined within the median of the highly traffic Outer Ring Road. Hence, a **low (4)** risk rating.

|        |                | Likelihood                             |
|--------|----------------|--|
|        |                | Known to occur - almost certain<br>(4) |
| Impact | Negligible (1) | Low<br>(4)                             |

### 10.3.5 Rating of Interruption of Existing Services

The notable installation within the Outer Ring Road median is street lighting. Removal of the existing street lighting installation is **almost certain (4)** to pave way to for the proposed Project. The impact of removal of the existing street lighting installations within the Outer Ring Road median is **negligible (1)** since they are presently dis-functional owing to vandalism. Hence, a **low (4)** risk rating.

|        |                | Likelihood                             |
|--------|----------------|--|
|        |                | Known to occur - almost certain<br>(4) |
| Impact | Negligible (1) | Low<br>(4)                             |

### 10.3.6 Rating of Clearance of Vegetation

Site clearance of vegetation at the Project site is **almost certain (4)**. From the vegetation inventory made during the ESIA Study, the vegetation likely to be affected support no known sensitive ecosystem and further offer limited environmental benefits, therefore, a **negligible (1)** score for the impact thereof due to their clearance. This therefore, leads to a **low (4)** risk rating.

|        |                | Likelihood                             |
|--------|----------------|--|
|        |                | Known to occur - almost certain<br>(4) |
| Impact | Negligible (1) | Low<br>(4)                             |

### 10.3.7 Rating of Generation and Disposal of Solid Waste

Generation of solid waste is **known to occur (4)** at a construction site especially in the form of construction waste. The impact of generation and disposal of solid waste is **negligible (1)** since it can be managed through EMC (Waste Management) Regulations, 2006 and Sustainable Solid Waste Management Act, 2022 guidelines. Therefore, **low (4)** risk rating.

|        |                | Likelihood                             |
|--------|----------------|--|
|        |                | Known to occur - almost certain<br>(4) |
| Impact | Negligible (1) | Low<br>(4)                             |

### 10.3.8 Rating of Increased Water Demand

Increased water demand is a **common occurrence (5)** for projects of this nature. However, Water Sector Regulators and Project Proponents have in place both compliance and adherence conditions for Contractors leading to a **negligible (1)** score for the impact thereof. This leads to a **moderate (5)** risk rating.

|        |                | Likelihood               |
|--------|----------------|--------------------------|
|        |                | Common occurrence<br>(5) |
| Impact | Negligible (1) | Moderate<br>(5)          |

### 10.3.9 Rating of Increased Storm Water Run-off Risk

Increased stormwater run-off is **likely (3)** because of introduced impervious areas. The impacts thereof are relatively predictable and can be avoided, managed and/or mitigated with known solutions and straight forward measures hence a **medium (3)** score. Hence, **moderate (9)** risk rating.

|        |            | Likelihood                |
|--------|------------|---------------------------|
|        |            | Likely-could occur<br>(3) |
| Impact | Medium (3) | Moderate<br>(9)           |

### 10.3.10 Rating of Delays in Transportation

Delays in transportation due to construction works is **likely (3)** given the chaotic culture deeply entrenched with the public transport sector players in Kenya. The adverse impacts are however temporary and can be avoided, *managed and/or mitigated with known solutions and straight forward measures hence a medium (3) score. This therefore yields a moderate (9) risk rating.*

|        |            | Likelihood                |
|--------|------------|---------------------------|
|        |            | Likely-could occur<br>(3) |
| Impact | Medium (3) | Moderate<br>(9)           |

### 10.3.11 Rating of Impact on Pollution of Rivers

Pollution of the traversed rivers is **not expected to occur (2)**. The Nairobi Basin Rivers traversed by the Project Road are heavily polluted. Therefore, the adverse impact which can be directly attached to the Project works are **negligible (1)**. Hence, a **low (2)** risk rating.

|        |                | Likelihood                   |
|--------|----------------|------------------------------|
|        |                | Not expected to occur<br>(2) |
| Impact | Negligible (1) | Low<br>(2)                   |

### 10.3.12 Rating of Increased Insecurity

The Project activities is **likely (3)** to attract criminals in the area. The site workers will be required to observe measure that will enhance their security and the security of road construction materials and machinery. The impact of increased insecurity will be **negligible (1)** since it can be managed with proper measure. Hence, **low (3)** rating of the significance of increased insecurity in the Project area.

|        |                | Likelihood             |
|--------|----------------|------------------------|
|        |                | Likely to occur<br>(3) |
| Impact | Negligible (1) | Low<br>(3)             |

### 10.3.13 Rating of Fuel and Lubricant Spills Risks

Fuel and Lubricant Spills are **not expected to occur (2)** given the Contractual obligations assigned to the Contractor. The adverse consequences for an occurrence are deemed **minor (2)** for they can be easily avoided, managed, and mitigated. Hence, a **low (2)** risk rating.

|        |           | Likelihood                |
|--------|-----------|---------------------------|
|        |           | Not expected to occur (2) |
| Impact | Minor (2) | Low (4)                   |

### 10.3.14 Rating of Discharge of Waste Water to the Environment

Discharge of waste water to the environment is **not expected to occur (2)** given the Statutory and Contractual obligations bestowed to the Contractor. The adverse consequences that can be directly attached to the proposed Project for an occurrence are deemed **negligible (1)** given the baseline pollution status of the Project area. Hence, a **low (2)** risk rating.

|        |                | Likelihood                |
|--------|----------------|---------------------------|
|        |                | Not expected to occur (2) |
| Impact | Negligible (1) | Low (2)                   |

### 10.3.15 Rating of Impact on Local Resources

Establishment of BRT Line 5 will attract job seekers to the Project area who will come looking for job opportunities in the Project. The Project area is in an urban setting and the increase of job seekers in the area is **not expected (2)** to impact on the local resources. The impact on local resources will be **minor (2)**. Hence, **low (2)** rating of the significance of impact on local resources.

|        |           | Likelihood                |
|--------|-----------|---------------------------|
|        |           | Not expected to occur (2) |
| Impact | Minor (2) | Low (4)                   |

### 10.3.16 Rating of Impacts of Contractor’s Camp Site

The Contractor is expected to set up a campsite that will host various installations during the construction phase of the proposed Project. The camp site with its associated activities is **likely (3)** to have negative impacts to the environment. However, the Contractor will be required to submit the campsite to the EIA process before it is set up. The environmental impact of establishing a Contractor’s Camp Site will be **minor (2)**. Therefore, **moderate (6)** rating of the significance of establishing a Contractor’s Camp Site.

|        |           | Likelihood             |
|--------|-----------|------------------------|
|        |           | Likely to occur<br>(3) |
| Impact | Minor (2) | Moderate<br>(6)        |

### 10.3.17 Rating of Public Health Risks and HIV/AIDS

The Establishment of BRT Line 5 is **likely (3)** to result in public health issues surrounding community. With migrants from other regions and countries, HIV/AIDS prevalence rate is expected to increase in the area because of the social interaction between the site workers and the locals. The Proponent and the Contractor will put various measures in place to curb public health issues and spread of HIV/AIDS as a result of the Project. This will have a **minor (2)** impact because, by nature, it can affect many people. Therefore, **moderate (6)** rating of the significance of Public Health Risks and HIV/AIDS.

|        |           | Likelihood             |
|--------|-----------|------------------------|
|        |           | Likely to occur<br>(3) |
| Impact | Minor (2) | Moderate<br>(6)        |

### 10.3.18 Rating of Asphalt Mixing Plants and Hazardous Sites

Asphalt Mixing Plants and Hazardous Sites are **likely (3)** to cause noise pollution, dust and gaseous emissions, among others. The Contractor shall subject the Asphalt Mixing Plants and Hazardous Sites to the EIA process as provided in EMCA Cap 387 Section 58 and Section 68. The impacts associated with Asphalt Mixing Plants and Hazardous Sites will be **minor (2)**. Hence, **moderate (6)** rating of the significance of establishing Asphalt Mixing Plants and Hazardous Sites.

|        |           | Likelihood             |
|--------|-----------|------------------------|
|        |           | Likely to occur<br>(3) |
| Impact | Minor (2) | Moderate<br>(6)        |

### 10.3.19 Rating of Incidents of Soil Erosion and Sedimentation

The construction activities are **likely (3)** to result to incidents of soil erosion and sedimentation especially at river crossings. Soil erosion control techniques will be applied and the impact expected will be **negligible (1)**. Therefore, **low (3)** rating of the significance of Incidents of Soil Erosion and Sedimentation.

|               |                |                        |
|---------------|----------------|------------------------|
|               |                | <b>Likelihood</b>      |
|               |                | Likely to occur<br>(3) |
| <b>Impact</b> | Negligible (1) | Low<br>(3)             |

### 10.3.20 Rating of Fire Risks at the Contractor's Campsite

Fire incidents are **likely (3)** to occur at the Contractor's Campsite because of the petroleum products stored at the site. The Contractor will take precautionary measure to prevent fire incidents at the site. The impact of fire breakout at the campsite will be **negligible (1)**. Consequently, the risk rating of fire outbreak at the site will be **low (3)**.

|               |                |                        |
|---------------|----------------|------------------------|
|               |                | <b>Likelihood</b>      |
|               |                | Likely to occur<br>(3) |
| <b>Impact</b> | Negligible (1) | Low<br>(3)             |

### 10.3.21 Rating of Labour Influx

It is **common occurrence (5)** for a project of the magnitude of the Establishment of BRT Line 5 to attract both skilled and unskilled labourers. Given the location of the proposed Project: Urban set-up, ready-to-deploy workforce, the adverse of labour influx will be **negligible (1)**. Hence, **moderate (5)** risk rating of the significance of labour influx.

|               |                |                          |
|---------------|----------------|--------------------------|
|               |                | <b>Likelihood</b>        |
|               |                | Common occurrence<br>(5) |
| <b>Impact</b> | Negligible (1) | Moderate<br>(5)          |

### 10.3.22 Rating of GBV Risks

During implementation of the proposed Project, GBV is **not expected to occur (2)** owing to Statutory and Contractual dictates. Adverse impact for an occurrence is rated as **minor (2)** since it can be easily avoided, managed, and mitigated. Hence, a **low (4)** risk rating.

|               |           |                              |
|---------------|-----------|------------------------------|
|               |           | <b>Likelihood</b>            |
|               |           | Not expected to occur<br>(2) |
| <b>Impact</b> | Minor (2) | Low<br>(4)                   |



### 10.3.23 Rating of Project Impact on Women Discrimination

During the proposed Project implementation, discrimination against women is **not expected to occur (2)** owing to Statutory and Contractual obligations. Adverse impact for an occurrence is rated as **minor (2)** since it can be easily avoided, managed, and mitigated. Hence, a **low (4)** risk rating.

|        |           | Likelihood                   |
|--------|-----------|------------------------------|
|        |           | Not expected to occur<br>(2) |
| Impact | Minor (2) | Low<br>(4)                   |

### 10.3.24 Risk Rating of Impacts Associated with Demolition of Warehouses at the Depot Site

Demolition of warehouses is **likely (3)** to result into air & noises pollution, and generation of solid waste. The Contractor will adhere to all the relevant legal frameworks to manage environmental pollution during demolition of the warehouses. The impact of Demolition of warehouses will be **negligible (1)**. Hence, **low (3)** rating of the significance of Impact Associated with Demolition of Warehouses.

|        |                | Likelihood             |
|--------|----------------|------------------------|
|        |                | Likely to occur<br>(3) |
| Impact | Negligible (1) | Low<br>(3)             |

### 10.3.25 Risk Rating of Climate Change Impact

The Establishment of BRT Line 5 is **likely (3)** to result to Climate Change Impacts. However various enablers, mitigation and adaptation measure will be implemented to mitigate against Climate Change Impacts. This is in addition to the positive Climate Change impacts that will be realized by the implementation of the BRT System. The overall impact of climate change will be **minor (2)**. Therefore, moderate (6) rating of the significance of Climate Change Impacts.

|        |           | Likelihood             |
|--------|-----------|------------------------|
|        |           | Likely to occur<br>(3) |
| Impact | Minor (2) | Moderate<br>(6)        |

### 10.3.26 Risk Rating of Non-Compliance with ESMMP and EIA License Conditions

Non-Compliance with ESMMP and EIA license conditions is **likely (3)** to occur if the Contractor is not strictly supervised. KURA will have a supervision team that will include an environmentalist and a sociologist who will ensure that the Contractor is in compliance with the ESMMP, EIA License conditions and funds allocated for environmental and social functions are strictly utilized for such. The impact for an occurrence will be **major (4)**. Hence, a **substantial (12)** risk rating.

|        |           | Likelihood             |
|--------|-----------|------------------------|
|        |           | Likely-could occur (3) |
| Impact | Major (4) | Substantial (12)       |

## 10.4 Risks Rating during Operation Phase

### 10.4.1 Risk of Poor Solid Waste Management

Poor management of solid waste generated during the operational phase of BRT Line 5 will be **likely (3)**. The Proponent shall strictly adhere to the provisions of the EMC (Waste Management) Regulations, 2006 and Sustainable Solid Waste Management Act, 2022 with respect to solid waste management during the operational phase. The impact of poor solid waste management will be **negligible (1)**. Hence, **low (3)** rating of the significance of Poor Solid Waste Management.

|        |                | Likelihood          |
|--------|----------------|---------------------|
|        |                | Likely to occur (3) |
| Impact | Negligible (1) | Low (3)             |

### 10.4.2 Risk Rating of Increased Accidents

Reduced number of vehicles on the main carriageway and on the BRT 5 Line increase the speed vehicles which is **likely (3)** to increase accidents. The Proponent will ensure that the road is well designed and road furniture provided. All motorists and vehicles shall adhere to the Traffic Act Cap 403. The impact of increased road accidents will be **negligible (1)**. Consequently, **low (3)** rating of the significance of Increased Accidents.

|        |                | Likelihood          |
|--------|----------------|---------------------|
|        |                | Likely to occur (3) |
| Impact | Negligible (1) | Low (3)             |

### 10.4.3 Risk Rating of Noise Pollution

Noise level is **very unlikely (1)** to be increased by the operation of BRT Line 5 since Outer Ring Road is already a busy road. Nonetheless, vehicles shall be required to adhere to the Traffic Act Cap 403 and road users to adhere to EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. The impact of increased noise pollution will be **negligible (1)**. Hence, **low (1)** rating of the significance of noise pollution.

|        |                | Likelihood                    |
|--------|----------------|-------------------------------|
|        |                | Very unlikely to occur<br>(1) |
| Impact | Negligible (1) | Low<br>(1)                    |

### 10.4.4 Risk Rating of Erosion and Water Quality Degradation

Erosion and Water Quality Degradation is **very unlikely (1)** to occur as a result of operation of BRT Line 5 since intrinsic design provisions have been provided for to curb soil erosion and water quality degradation. The adverse impact for an occurrence will be of medium magnitude, limited in duration, relatively predictable and can be avoided, managed and/or mitigated with known solutions and straight forward solutions, hence a **medium (3)** score. This therefore, leads to a **low (3)** risk rating.

|        |            | Likelihood                    |
|--------|------------|-------------------------------|
|        |            | Very unlikely to occur<br>(1) |
| Impact | Medium (3) | Low<br>(3)                    |

### 10.4.5 Risk Rating of Poor Air Quality

The BRT concept for Nairobi was anchored on reduced vehicular air emission among others. This therefore mean contribution of the BRT Line 5 operations to poor air quality is **very unlikely to occur (1)**. The impact from an occurrence will be **minor (2)** since it can be easily avoided, managed, and mitigated. Hence, a **low (2)** risk rating.

|        |           | Likelihood                    |
|--------|-----------|-------------------------------|
|        |           | Very unlikely to occur<br>(1) |
| Impact | Minor (2) | Low<br>(2)                    |

#### 10.4.6 Risk Rating of Improper Management of E-Waste

Operation of the BRT buses together with the ITS component is **likely (3)** to result in the generation of e-waste. The Proponent shall adhere to EMC (Waste Management) Regulations 2006 to ensure proper management of e-waste. The impact of improper e-waste management will be **negligible (1)**. Hence, **low (3)** rating of the significance of Improper Management of E-Waste.

|        |                | Likelihood             |
|--------|----------------|------------------------|
|        |                | Likely to occur<br>(3) |
| Impact | Negligible (1) | Low<br>(3)             |

#### 10.4.7 Risk Rating of Labour Impacts on the Matatu Industry Dependents

Establishment and Operation of BRT Line 5 is **likely (3)** to result to loss of livelihood of majority of the matatu industry dependents. The Proponent shall take appropriate measures to minimize job loss in the matatu industry or introduce new opportunities for job creation. In addition, the matatu industry players shall be widely consulted and included in planning and implementation. The adverse impact from an occurrence will be **medium (3)** owing to the predictability and can be avoided, managed and/or mitigated with known solutions and straight forward measures. Hence, a **moderate (9)** risk rating.

|        |            | Likelihood             |
|--------|------------|------------------------|
|        |            | Likely to occur<br>(3) |
| Impact | Medium (3) | Moderate<br>(9)        |

#### 10.5 Significance of Risks (Risk Rating) Summary of the proposed Project

The Significance of Risks (Risk Rating) for the proposed Establishment of BRT Line 5 in Nairobi City County is as summarized in **Table 57** overleaf.

**Table 57: Significance of Risk Summary of the proposed Project**

| SN                                  | Risk   | Mitigation Measures   | Likelihood | Impact | Significance and Assigned Color Code |
|-------------------------------------|--|---|------------|--------|--------------------------------------|
| <b>I. During Construction Phase</b> |  |   |            |        |                                      |
| 1.                                  | Deterioration of Construction Materials Sourcing Sites | <p>Aggregates and rock will be sourced locally from an established quarry in Nairobi City County and the environs instead of starting another quarry for purposes of the proposed Project.</p> <p>Purchase gravel and sub grade soil-murram from an established quarry in Nairobi City County and the environs instead of starting another quarry.</p> <p>Carry out inspection of each of the site's soil stability before excavation.</p> <p>Cordon off the gravel site areas to keep livestock and children off.</p> <p>Maintain fences and “make good” of the sites afterwards.</p> <p>The use of borrow pits for material spoil sites may be approved by the RE (and/or with the appropriate consent of the “landowner”). Where this occurs, the materials spoiled in the borrow pit shall be profiled to fit into the surrounding landscape and covered with topsoil.</p> <p>In case of blasting:</p> <ol style="list-style-type: none"> <li>i. The Contractor will be responsible for obtaining a current and valid authorisation from the Department of Mines and Geology prior to any blasting activity. A copy of this authorisation shall be given to the RE;</li> <li>ii. A qualified and registered blaster by the Department of Mines and Geology shall supervise all blasting and rock-splitting operations at all times;</li> <li>iii. The Contractor shall ensure that appropriate pre blast monitoring records are in place (i.e. photographic and inspection records of structures in close proximity to the blast area);</li> <li>iv. The Contractor shall ensure that emergency services are notified, in writing, a minimum of 24 hours prior to any blasting activities commencing on Site;</li> <li>v. The Contractor shall take necessary precautions to prevent damage to special features and the general environment, which includes the removal of fly-rock. Environmental damage caused by blasting/drilling; shall be repaired at the Contractor's expense to the satisfaction of the RE and the relevant authorities;</li> </ol> | 2          | 2      | Low<br>(4)                           |

| SN | Risk                      | Mitigation Measures  | Likelihood | Impact | Significance and Assigned Color Code |
|----|---------------------------|--|------------|--------|--------------------------------------|
| 2. | Occupational Health Risks | <p>Safety and</p> <p>Adherence to the provisions of OSHA, 2007.<br/>Provision and maintenance of safe systems and procedures of work at the workplace that are safe and without risks to health including:</p> <ul style="list-style-type: none"> <li>i. SOPs.</li> <li>ii. JSA for low-risk activities.</li> <li>iii. RA for medium and high-risk activities.</li> <li>iv. PTW system for high risk non-routine activities.</li> </ul> <p>Provision of appropriate PPE and ensuring that workers while at work always use the provided PPE as the last line of defence in risk control at the workplace after the other levels: Elimination, Substitution, Engineering Controls and Administrative Controls in the risk control hierarchy.</p> <p>Proactive risk management of safety at the workplace centred at identifying precursors that lead to risk, identifying threats before they become dangerous, and understanding what behaviours and attitudes are influencing safety performance e.g. fencing of all dangerous areas, placing warning signs, enforcing maximum traffic speeds through the road, safety education and training.</p> <p>To prevent bitumen burns it will be compulsory for the workers handling hot bitumen</p> | 3          | 2      | <p>Moderate (6)</p>                  |

| SN | Risk                          | Mitigation Measures   | Likelihood | Impact | Significance and Assigned Color Code |
|----|-------------------------------|---|------------|--------|--------------------------------------|
| 3. | Noise Pollution and Vibration | <p>to wear full body protection.</p> <p>All transportation, handling and storage of bitumen will be handled safely by experienced personnel.</p> <p>The MSDS for each chemical product will be made accessible on site and displayed.</p> <p>Worker to be subjected to medical examinations as provided in the Medical Examination Rules, 2005.</p> <p>Ambient Noise Levels and Vibrations Levels measurements shall be undertaken and maintained.</p> <p>Construction shall be carried out in accordance with the standard procedures. All plant and construction equipment shall be fitted with noise control measures and shall strictly conform to EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and the Noise Prevention and Control Rules, 2005.</p> <p>On-site power gensets shall be covered with an acoustic enclosure and fitted with muffler and shall conform to EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and the Noise Prevention and Control Rules, 2005.</p> <p>Prescribe noise reduction measures if appropriate e.g. restricted working hours, transport hours and noise buffering.</p> <p>Inform the surrounding community on the permissible noise levels and best working hours.</p> <p>Use quiet equipment (i.e. equipment designed with noise control elements) and regular maintenance of machinery to ensure that noise produced from machinery is kept to a practicable minimum.</p> <p>Co-ordinate with relevant agencies regarding all construction activities in the Project area.</p> <p>Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.</p> <p>Vehicles hired for bringing construction materials at site shall conform to the noise emission standards and shall be operated during non-peak hours.</p> | 2          | 2      | Low (4)                              |
| 4. | Reduced Air Quality           | <p>Ambient Air Quality measurements shall be undertaken and maintained</p> <p>All dusty materials shall be sprayed with water prior to any loading, unloading or</p>  |            |        |                                      |

| SN | Risk                              | Mitigation Measures  | Likelihood | Impact | Significance and Assigned Color Code |
|----|-----------------------------------|--|------------|--------|--------------------------------------|
|    |                                   | <p>transfer operation so as to maintain the dusty materials wet.</p> <p>Cover stockpiles of sand, soil and similar materials or surround them with wind breaks.</p> <p>Watering all roads used for any vehicular traffic at least twice per day of active operations or road used for any vehicular traffic once daily and restrict vehicle speed to 15 mph.</p> <p>Down wash of trucks (especially tyres) prior to departure from site.</p> <p>Vehicles delivering loose and fine materials like sand and fine aggregates shall be covered to reduce spills on roads.</p> <p>The height from which excavated materials are dropped shall be controlled to a minimum practical height to limit fugitive dust generation from unloading.</p> <p>Post signs that limit vehicle speeds onto unpaved roads and over disturbed soils.</p> <p>Rapid onsite construction so as to reduce duration of traffic interference and therefore reduce emissions from traffic delays.</p> <p>PPE to be worn.</p> <p>The engine size of the construction equipment shall be the minimum practical size.</p> <p>The number of construction equipment operating simultaneously shall be minimized through efficient management practices.</p> <p>Construction machinery idling time shall be minimized.</p> <p>Equipment shall be properly calibrated and maintained as per the Manufacturers specification.</p> <p>Alternatively fuelled construction equipment shall be used where feasible equipment shall be properly tuned and maintained.</p> <p>Sensitise truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas, and to switch off or keep vehicle engines at these points.</p> | 4          | 1      | Low<br>(4)                           |
| 5. | Interruption of Existing Services | <p>Establish the various service providers whose installations are likely to be interrupted.</p> <p>Identify key interests of each of the stakeholders.</p> <p>The Proponent should formally liaise with the stakeholders and communicate the project details to them with a view of developing a work plan. The work plan to be developed should have clear responsibilities for each of the affected parties.</p> <p>The work plan should then be implemented to ensure smooth execution of the</p>  | 4          | 1      | Low                                  |



| SN | Risk                                   | Mitigation Measures  | Likelihood | Impact | Significance and Assigned Color Code |
|----|--|--|------------|--------|--------------------------------------|
| 6. | Clearance of Vegetation                | <p>construction.</p> <p>On completion of works, each property owner should be contacted again to give views and if complains arise the Contractor asked to address the same.</p> <p>Ensure proper demarcation of the Project area to be affected by the construction works. This will aim at ensuring that any loss of vegetation is restricted to the actual Project area and avoid spillover effect on the neighbouring areas.</p> <p>Clearing of work sites and roadside vegetation will be done to an acceptable minimum. Where possible, trees should be translocated to a new site to ensure vegetation loss is minimized as much as possible.</p> <p>Landscaping and planting of new trees after completion of the Project.</p> <p>Preservation of existing plant communities and re-establishment of native plant communities.</p>   | 4          | 1      | (4)<br>Low<br>(4)                    |
| 7. | Generation and Disposal of Solid Waste | <p>Protection of endangered and/or threatened plant species.</p> <p>Carefully budget to ensure that the amount of construction materials left on site after construction is kept minimal.</p> <p>Consider the use of recycled or refurbished construction materials.</p> <p>Purchase and use once-used or recovered construction materials. This will lead to financial savings and reduction of the amount of construction debris disposed of as waste.</p> <p>Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time.</p> <p>Provision of facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements.</p> <p>Use of construction materials that have minimal packaging to avoid the generation of excessive packaging waste.</p> <p>Use of construction materials containing recycled content when possible and in accordance with accepted standards.</p> <p>Adequate collection and storage of waste on site and safe transportation to the disposal sites and disposal methods at designated area shall be provided.</p> | 4          | 1      | Low<br>(4)                           |
| 8. | Increased Water Demand                 | <p>Ensure that the construction wastes generated are disposed to the approved dump site.</p> <p>Ensure that water is used efficiently at the site by sensitizing construction workers to</p>   | 5          | 1      | Moderate                             |

| SN  | Risk                         | Mitigation Measures  | Likelihood | Impact | Significance and Assigned Color Code |
|-----|------------------------------|--|------------|--------|--------------------------------------|
| 9.  | Increased Stormwater Run-Off | <p>avoid irresponsible water use.</p> <p>An assessment and evaluation of the identified water sources should be done against the estimated water demand during construction. These details should be provided to the Water Resource Management Authority before a license for abstraction is issued.</p> <p>Put in place adequate measures aimed at minimizing soil erosion and associated sediment release from the proposed Project site including:</p> <ul style="list-style-type: none"> <li>▪ Levelling the Project site to reduce run-off velocity and increase infiltration of rain water into the soil; and</li> <li>▪ Design and implement a storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structures.</li> </ul>  | 3          | 3      | (5)<br><br>Moderate (9)              |
| 10. | Delays in Transportation     | <p>Works to be restricted at the median of Outer Ring Road, as much as possible, without interfering with traffic flow on the carriageway.</p> <p>Plan itineraries for site traffic on a daily basis.</p> <p>Mandatory traffic management and control throughout the construction period.</p> <p>Erect temporary road signs that are visible both during the day and at night indicating road works and restrictions.</p> <p>Designate footpaths and parking areas.</p> <p>Areas where construction is taking place should have clearly marked speed reduction signage.</p> <p>All Project vehicles comply with relevant traffic and transport licensing requirements and are road worthy.</p> <p>All vehicles and machinery used during the Project shall be regularly maintained and repaired where necessary. Any vehicle defect which may render a vehicle unsafe shall not be used until the necessary repairs have been undertaken.</p> <p>All equipment and/or materials transported to or from site shall be appropriately secured and the drivers must be appropriately trained in driving techniques applicable to specific loads.</p> <p>No emergency provider vehicle shall be kept waiting to pass through the works when responding to an emergency.</p> | 3          | 3      | Moderate (9)                         |

| SN  | Risk                                    | Mitigation Measures  | Likelihood | Impact | Significance and Assigned Color Code |
|-----|---|--|------------|--------|--------------------------------------|
| 11. | Pollution of Rivers                     | <p>Adherence to EMCA Cap 387 laws of Kenya, EMC (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulation (2009), Water Act (2016), and The Water Resources Regulations, 2021.</p> <p>Rehabilitate, restore and sustainably manage the Nairobi River Basin:</p> <ul style="list-style-type: none"> <li>▪ Reduce on plastic consumption and reuse/recycle as much as possible;</li> <li>▪ Properly disposal of chemical cleaners, oil, and nonbiodegradable materials to keep them from going into the rivers;</li> <li>▪ Maintain machineries and vehicles so that they don't leak oil, antifreeze, or coolant on the ground; and</li> </ul> <p>Remove all the solid waste that has been dumped into the stormwater drainage system of Outer Ring Road.</p>   | 2          | 1      | Low (3)                              |
| 12. | Increased Insecurity                    | <p>No worker with criminal records will be engaged in the Project.</p> <p>Every worker to be easily identifiable when on site.</p> <p>Works to be strictly carried out during the day unless approved by the RE and security services providers in the area.</p>   | 3          | 1      | Low (3)                              |
| 13. | Fuel and Lubricant Spills               | <p>Control dangers of fuel and lubricant spills by strictly ensuring that the servicing/maintenance of machinery is undertaken in approved garage or an equivalent.</p> <p>Provide for bunds around fuel, oil and bitumen storage facilities.</p> <p>Provision oil and grease traps at servicing and fuelling areas.</p> <p>Ensure that all the servicing and fuelling areas established for the Project are dully approved and licensed by the Regulators.</p> <p>Prompt cleaning of oil and fuel spills, and proper disposal of clothing and rags contaminated with oil.</p> <p>Construct sealed areas for the storage of pollutants so as to avoid any accidental discharge that would pollute water resources.</p> <p>Oil and fuel shall be stored in storage tanks within a secure compound and shall be stored in accordance with manufacturer's instructions.</p> | 2          | 2      | Low (4)                              |
| 14. | Discharge of Waste Water to Environment | <p>No grey water runoff or uncontrolled discharges from the site/working areas (including wash-down areas) to watercourses and/or water bodies shall be permitted.</p> <p>Wastewater containing such pollutants as cements, concrete, chemicals and fuels shall</p>  |            |        |                                      |

| SN  | Risk                             | Mitigation Measures   | Likelihood | Impact | Significance and Assigned Color Code |
|-----|----------------------------------|---|------------|--------|--------------------------------------|
| 15. | Impact on Local Resources        | <p>be disposed in compliance with Water Quality Regulations, 2006. This particularly applies to water emanating from concrete swills.</p> <p>Prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to watercourses and/or water bodies.</p> <p>Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered.</p> <p>Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas (including groundwater) are not polluted.</p> <p>The Contractor shall notify the RE of any pollution incidents on site.</p> <p>Consult the community on partitioning of access to local resource for construction purposes.</p> <p>Abstractions from natural, County and or private water resources (e.g. rivers, boreholes and springs) for potable water and construction water shall be approved by WRA. The Contractor shall arrange for the necessary approvals/permits from the water authorities under the direction of KURA for the abstraction of water.</p> <p>Adhere to EMC (Water Quality) Regulations, 2006. These Regulations describe the following:</p> <ul style="list-style-type: none"> <li>▪ Water sources for domestic use;</li> <li>▪ Sewage treatment;</li> <li>▪ Ground water;</li> <li>▪ Water for agricultural use;</li> <li>▪ Water for other uses; and</li> <li>▪ Schedules depicting standards.</li> </ul> | 2          | 1      | Low (2)                              |
| 16. | Impacts of Contractor's Campsite | <p>The Contractor's Camp site shall be determined in collaboration with the RE taking into consideration the following:</p> <ul style="list-style-type: none"> <li>▪ The security situation in the area;</li> <li>▪ The local administration shall be involved in the site location to avoid destruction of any ritual site or any other conflict;</li> <li>▪ The Contractor's Camp layout shall take into account availability of access for</li> </ul>  | 2          | 2      | Low (4)                              |

| SN | Risk | Mitigation Measures   | Likelihood | Impact | Significance and Assigned Color Code |
|----|------|---|------------|--------|--------------------------------------|
|    |      | <p>deliveries and services and any future works; and</p> <ul style="list-style-type: none"> <li>▪ Decommission the camps and reinstatement of the land to its natural condition by filling excavations and planting suitable saplings.</li> </ul> <p>Where practical, all maintenance of equipment and vehicles on site shall be performed in the workshop.</p> <p>If it is necessary to do maintenance on site, but outside of the workshop area, the Contractor shall obtain the approval of the RE prior to commencing activities.</p> <p>The Contractor shall ensure that there is no contamination of the soil, vegetation or surface water in his workshop and other plant or emergency maintenance facilities.</p> <p>The workshop shall be kept tidy at all times and shall have the following as a minimum:</p> <ul style="list-style-type: none"> <li>▪ A smooth impermeable floor either constructed of concrete or suitable plastic covered with sufficient gravel to protect the plastic from damage;</li> <li>▪ The floor shall be bunded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil);</li> <li>▪ Drip trays shall be used to collect the waste oil and lubricants during servicing and shall also be provided in construction areas for stationary plant (such as compressors);</li> <li>▪ The drip trays shall be inspected and emptied daily; and</li> <li>▪ Drip trays shall be closely monitored during wet weather to ensure that they do not overflow.</li> </ul> <p>All materials shall be stored within the workshops yard unless otherwise approved by the RE.</p> <p>Stockpile areas shall be approved by the RE.</p> <p>All imported fill, soil and/or sand materials shall be free of weeds, litter and contaminants. Sources of imported materials shall be listed and approved by the RE.</p> <p>The Contractor shall ensure that delivery drivers are informed of all procedures and restrictions (including ‘No go’ areas) required.</p> <p>Any electrical or petrol driven pumps shall be equipped and positioned so as not to cause any danger of ignition of the stored product.</p> <p>Collection containers (e.g. drip trays) shall be placed under all dispensing mechanisms for hydrocarbons or hazardous liquid substances to ensure contamination from any</p> | 3          | 2      | Moderate (6)                         |

| SN  | Risk                       | Mitigation Measures  | Likelihood | Impact | Significance and Assigned Color Code |
|-----|----------------------------|--|------------|--------|--------------------------------------|
| 17. | Public Health and HIV/AIDS | <p>leaks is reduced.</p> <p>Regular checks shall be conducted by the Contractor on the dispensing mechanisms for all above ground storage tanks to ensure faulty equipment is identified and replaced in timely manner.</p> <p>Only empty and externally clean tanks may be stored on bare ground. All empty and externally dirty tanks shall be sealed and stored on an area where the ground has been protected.</p> <p>The Contractor will not have a labour camp for the construction workers as most of the Contractor's staff will come from the community.</p> <p>A comprehensive health awareness campaign, carried out in conjunction with the Proponent, Contractor and other stakeholders will be done to prevent outbreak of disease. This will include successful preventive measures such as immunizing the vulnerable population, and educating people about diseases and how they are contracted, and how to avoid them by using treated water and keeping living areas cleaner.</p> <p>Treating affected local and migrant populations will also be used in controlling the movement of disease vectors (through contaminated water and between people).</p> <p>The Contractor shall be responsible for the protection of the public and public property from any dangers associated with construction activities, and for the safe and easy passage of pedestrians and traffic in areas affected by the construction activities.</p> <p>All works which may pose a hazard to humans and domestic animals are to be protected, fenced, demarcated or cordoned off as instructed by the RE. If appropriate, symbolic warning signs must be erected.</p> <p>The HIV/AIDS awareness campaigns should be conducted at the camps as well as in the town centres. The Contractor shall take an active role in civic and public health education to his employees and the community. The campaign shall include the training of facilitators within the workers, information posters in the workshop and public areas, availability of promotional material (T-shirts and caps), availability of condoms (free), and theatre groups. The Contractor will co-ordinate with NSDCC and Health Officers and the NGOs undertaking education and sensitisation programmes.</p> <p>The Contractor will provide condoms at appropriate places in the work camps. The</p> | 3          | 2      | Moderate (6)                         |

| SN  | Risk                               | Mitigation Measures   | Likelihood | Impact | Significance and Assigned Color Code |
|-----|------------------------------------|---|------------|--------|--------------------------------------|
| 18. | Asphalt Plants and Hazardous Sites | <p>campaigns will be continuously done by the relevant Government organisation even during operation phase of the road.</p> <p>The implementing agency for HIV/AIDS campaign shall monitor activities regularly to assess effectiveness and impact. This should include an initial, interim and final assessment of basic knowledge, attitude and practices taking account of existing data sources and recognising the limitations due to the short timeframe to show behaviour change. The assessment will be supported by qualitative information from focus group discussions.</p> <p>Implementation of initiatives which target knowledge, attitude, behaviour, prevention, treatment and care in collaboration with NSDCC at regional and local levels, NGOs and CBOs.</p> <p>Interventions should give attention to high-risk groups, factors perpetuating risk behaviours, female headed households, child headed household, orphans, people living with AIDS, youth, school girls and boys.</p> <p>Abatement measures to regulate dust and air emissions from the AC plant include:</p> <ul style="list-style-type: none"> <li>▪ Well-designed sprinklers to be located at all points to contain dust pollution, using preferably collected rain water;</li> <li>▪ Use of water to wet all processes and sources from which dust emanates;</li> <li>▪ The premises and access roads should be kept clean and free of dust at all times; and</li> <li>▪ Monitoring of dust emissions, notably particulate matter will be carried out on a regular basis.</li> </ul> <p>Odour controlling equipment such as scrubbers and filters to be incorporated.</p> <p>Necessary precautions shall be taken to ensure noise emitted from the plant is within permissible limits as per the Environmental and Occupational Standards for noise emission. Mitigation measures include:</p> <ul style="list-style-type: none"> <li>▪ Noise generating equipment such as generators, compressors should be provided with appropriate noise attenuating materials/structures;</li> <li>▪ Proper and regular maintenance of equipment should be carried out;</li> <li>▪ Appropriate noise abatement measures to prevent noise nuisance to the surrounding environment;</li> <li>▪ Provision of appropriate PPE and regular medical screening for staff to the</li> </ul> | 3          | 2      | Moderate (6)                         |

| SN  | Risk  | Mitigation Measures  | Likelihood | Impact | Significance and Assigned Color Code |
|-----|---|--|------------|--------|--------------------------------------|
| 19. | Incidents of Soil Erosion and Sedimentation | <p>satisfaction of DOSHS; and</p> <ul style="list-style-type: none"> <li>Noise monitoring using calibrated noise meter will be carried out on a regular basis.</li> </ul> <p>Provide erosion protection works in the form of bed flooring and curtain or cut-off walls at the upstream and downstream ends of the new as well as the existing box/pipe culverts.</p> <p>The Contractor shall take all reasonable precautions in connection with any rivers, streams, waterways, drains, water courses, lakes and the like to prevent as a consequence of the works, silting, erosion of beds and banks and pollution of the water that may adversely affect the quality or appearance thereof or cause injury or death to human, animal or plant life.</p> <p>Soil erosion and sedimentation due to the surface runoff or water from culverts or other drainage structures should be avoided by putting in place proper erosion control measures.</p> <p>The erosion protection works shall consist of dry rubble stone bed flooring and random rubble masonry curtain (cut-off) wall at the upstream and downstream ends of box/pipe culverts.</p> <p>Keep vegetation clearing to a minimum.</p> <p>Encourage re-vegetation as soon as the construction activities are complete, or plan to immediately rehabilitate the disturbed sites after use.</p> | 3          | 1      | Low (3)                              |
| 20. | Fire Risks at the Contractor's Campsite     | <p>The Contractor's staff shall undergo fire safety training and must be instructed in the correct use of fire-fighting equipment.</p> <p>The campsite shall have suitable emergency routes and exits with clear signs and no obstruction.</p> <p>The Contractor shall provide a designated area for burning waste.</p> <p>The Contractor shall have trained firefighting personnel armed with adequate fire-fighting equipment, including up-to date serviced and functional fire extinguisher, to deal with all fires.</p> <p>Electrical system in the site to be installed and regularly maintained by a qualified electrician.</p> <p>High-intensity lights should not be hidden or placed near flammable material.</p> <p>The Contractor shall prohibit smoking in areas of high fire risk and only allow it at</p>   | 3          | 1      | Low (3)                              |



| SN  | Risk            | Mitigation Measures   | Likelihood | Impact | Significance and Assigned Color Code |
|-----|-----------------|---|------------|--------|--------------------------------------|
| 21. | Labour Influx   | <p>designated “smoking areas”.</p> <p>The Contractor to ensure any welding activity is undertaken in areas free of flammable materials.</p> <p>The Contractor shall stop all welding activities at least 1 hour before closing the site for the day. Fire checks shall be made in intervals of 30 minutes and at least 1 hour to the end of shift.</p> <p>Prepare a labour influx plan to manage labour influx.</p> <p>Casuals and skilled (if available) labour to be sourced from the local population as far as possible to minimize on influx of foreigners into the community.</p> <p>Use of manual labour where possible to ensure more employment of locals and hence ensure support of the Project throughout the construction phase.</p> <p>Sensitize workers on the different cultures and inculcate tolerance.</p> <p>Monitor potential occurrence of annoyance and conflicts that may arise from differences in lifestyle and culture between community and in-migrants.</p>  | 5          | 1      | Moderate (5)                         |
| 22. | GBV, SH and SEA | <p>The Contractor shall ensure that the GRM addresses issues related to labour influx.</p> <p>Gender mainstreaming in the Project with opportunities provided for females to work, in consonance with local laws and customs.</p> <p>Liaise with KURA to ensure NGOs concerned with GBV issues to be engaged as early as possible before construction commences since GBV, SH and SEA will arise early in the Project.</p> <p>GRM that incorporates non-retaliation and specific procedures for GBV.</p> <p>Prepare and enforce a “No Sexual Harassment” and “Non-Discrimination Policy”.</p> <p>Prepare and enforce a code of conduct that will be signed by all project workers prohibiting GBV, SEA and SH by workers and providing an accountability and response framework including nonretaliation against those who report.</p> <p>Establish partnerships with relevant government agencies, GBV Service Providers and NGOs to ensure survivors of GBV and sexual offences access survivor centred services such as medical care, psychosocial support, legal redress, safety, etc as and when necessary.</p> <p>Provision of gender disaggregated facilities-separate bathing, changing, sanitation facilities for men and women.</p> | 2          | 2      | Low (4)                              |

| SN  | Risk   | Mitigation Measures  | Likelihood   | Impact  | Significance and Assigned Color Code                           |   |  |   |               |   |                                       |   |   |   |              |
|---|--|--|--|---|--|---|--|---|---------------|---|---------------------------------------|---|---|---|--------------|
| 23.   | Project Impact on Women                              | Prepare GRM with specific procedures for GBV including confidential reporting with safe, and ethical documenting of GBV cases should be set up for the workers and community.<br>Ensure equitable distribution of employment opportunities between men and women.<br>Provide toilets and bathrooms for both male and female workers on site.   | 2  | 2   | Low (4)  |   |  |   |               |   |                                       |   |   |   |              |
| 24.   | Impacts Associated with Demolition of Warehouses     | Involve women in periodic dialogues/consultations with the Contractor and host communities to enable them handle their other roles while working in the Project.<br>Adherence to EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and Noise Prevention and Control Rules, 2005.<br>Ambient air quality measurements are undertaken and maintained in compliance with EMC (Air Quality) Regulation, 2014.  | 3  | 1   | Low (3)  |   |  |   |               |   |                                       |   |   |   |              |
| 25.   | Non-Compliance with ESMMP and EIA License Conditions | Adherence to EMC (Waste Management) Regulations, 2006 and Sustainable Solid Waste Management Act, 2022 are the minimum guidelines in solid waste management.<br>Provisions for ESMMP implementations to be included in the Contract Documents.<br>Monthly Environmental and Social Monitoring to identify and described the environmental and social impacts, propose their respective mitigation measures and the scope of monitoring activities to the Contractor.<br>Adheres to all the EIA license conditions.   | 3  | 4   | Substantial (12)   |   |  |   |               |   |                                       |   |   |   |              |
| 26.   | Climate Change Impacts                               | <table border="1"> <tr> <td>The BRT design to utilize assessment guide by ensuring the BRT System is elevated in areas where flooding is common.</td> </tr> <tr> <td>The BRT Project System to have an option for collecting floodwater before it pools by placing rain barrels on the side of the BRT infrastructure.</td> </tr> <tr> <td>Removal of solid wastes from the existing BRT drainage system.</td> </tr> <tr> <td>Mapping out the section of Outer Ring Road prone to flooding and installation of flood barriers along the side of the BRT corridor to prevent water from pooling.</td> </tr> <tr> <td>Involve relevant experts on appropriate outfall where stormwater will be channeled</td> </tr> <tr> <td>Development of green corridors and roadside vegetation.</td> </tr> <tr> <td>Tree planting</td> </tr> <tr> <td>Implement resource use efficiency [energy, petroleum products, water etc.].</td> </tr> <tr> <td>Use of heat-resistant road materials.</td> </tr> <tr> <td>Greater use of concrete due to its higher temperature resistance.</td> </tr> </table> | The BRT design to utilize assessment guide by ensuring the BRT System is elevated in areas where flooding is common. | The BRT Project System to have an option for collecting floodwater before it pools by placing rain barrels on the side of the BRT infrastructure. | Removal of solid wastes from the existing BRT drainage system. | Mapping out the section of Outer Ring Road prone to flooding and installation of flood barriers along the side of the BRT corridor to prevent water from pooling. | Involve relevant experts on appropriate outfall where stormwater will be channeled | Development of green corridors and roadside vegetation. | Tree planting | Implement resource use efficiency [energy, petroleum products, water etc.]. | Use of heat-resistant road materials. | Greater use of concrete due to its higher temperature resistance. | 3 | 2 | Moderate (6) |
| The BRT design to utilize assessment guide by ensuring the BRT System is elevated in areas where flooding is common.  |  |  |  |   |  |   |  |   |               |   |                                       |   |   |   |              |
| The BRT Project System to have an option for collecting floodwater before it pools by placing rain barrels on the side of the BRT infrastructure.                 |  |  |  |   |  |   |  |   |               |   |                                       |   |   |   |              |
| Removal of solid wastes from the existing BRT drainage system.  |  |  |  |   |  |   |  |   |               |   |                                       |   |   |   |              |
| Mapping out the section of Outer Ring Road prone to flooding and installation of flood barriers along the side of the BRT corridor to prevent water from pooling. |  |  |  |   |  |   |  |   |               |   |                                       |   |   |   |              |
| Involve relevant experts on appropriate outfall where stormwater will be channeled  |  |  |  |   |  |   |  |   |               |   |                                       |   |   |   |              |
| Development of green corridors and roadside vegetation.   |  |  |  |   |  |   |  |   |               |   |                                       |   |   |   |              |
| Tree planting   |  |  |  |   |  |   |  |   |               |   |                                       |   |   |   |              |
| Implement resource use efficiency [energy, petroleum products, water etc.].   |  |  |  |   |  |   |  |   |               |   |                                       |   |   |   |              |
| Use of heat-resistant road materials.   |  |  |  |   |  |   |  |   |               |   |                                       |   |   |   |              |
| Greater use of concrete due to its higher temperature resistance.   |  |  |  |   |  |   |  |   |               |   |                                       |   |   |   |              |

| SN  | Risk                        | Mitigation Measures   | Likelihood | Impact | Significance and Assigned Color Code |
|---|-----------------------------|---|------------|--------|--------------------------------------|
|   |                             | Cooling the BRT pavements with water.   |            |        |                                      |
|   |                             | Planting grass and shrubs on bare soil.   |            |        |                                      |
|   |                             | Constructing retaining walls to support loose soil and unstable ground.   |            |        |                                      |
|   |                             | Stone pitching of drainage structures along the slopes, embankments, or riverbanks.   |            |        |                                      |
|   |                             | Construction of gabions.  |            |        |                                      |
| <b>Overall Rating During Construction Phase</b> |                             |   |            |        | Low<br>(4)                           |
| <b>II. During Operation Phase</b>               |                             |   |            |        |                                      |
| 1.  | Poor Solid Waste Management | Identify proper sites for solid waste disposal.<br>Abide by the provisions of EMC (Waste Management) Regulations, 2006 for sound solid waste management, and Sustainable Solid Waste Management Act, 2022.  | 3          | 1      | Low<br>(3)                           |
| 2.  | Increased Accidents         | Examine road design standards, safety equipment specifications and training to ensure that design details take account of safety concerns and that specific safety features are correctly designed and installed.<br>Road design audits to be done at final design stages, by specialists in road safety and traffic operations.<br>Draft traffic management plans, including details of signs, markings, and intersection layouts, channelization of flows, access restrictions, footpaths, bus stops, and provisions for NMT.<br>Painting of edge lines in order to separate shoulders.<br>Provision of traffic signals with phases for bicyclists.<br>Establishment of non-motorised vehicle waiting area.<br>Separation of motorised and NMT.<br>Improvement of visibility.<br>Provision of speed limit signs.<br>Construction of bumps to reduce speeds.<br>Improvement of crossing sites paintings of zebra crossings.<br>Regulations, educations and safety trainings. | 3          | 1      | Low<br>(3)                           |

| SN | Risk   | Mitigation Measures   | Likelihood | Impact | Significance and Assigned Color Code |
|----|--|---|------------|--------|--------------------------------------|
|    |  | Road safety and accident prevention campaigns are recommended at the end of construction.<br>To monitor the effectiveness of the road safety information and education campaigns, the following measures are recommended:   |            |        |                                      |
| 3. | Noise Pollution                              | <ul style="list-style-type: none"> <li>▪ Monitor traffic accidents through records kept at the local police stations along the Project Road; and</li> <li>▪ A report will be required after two years of monitoring and the results used to recommend further mitigation measures, if necessary.</li> </ul> Vehicles using the road should adhere to the Traffic Act Cap 403 where they are supposed to keep the vehicles in roadworthy conditions.<br>Road users to adhere to EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. | 1          | 1      | Low (1)                              |
| 4. | Erosion and Water Quality Degradation        | Maintenance Engineers from KURA shall inspect all drainage structures and outfalls.<br>All the damaged culverts, wing walls and aprons shall be repaired and additional measures for velocity reduction and erosion protection shall be implemented in case of development of erosion.  | 1          | 3      | Low (3)                              |
| 5. | Reduced Air Quality                          | Use of alternative fuels preferably lead free-fuels.<br>Proper vehicle maintenance and servicing.<br>Vehicles at the parking bays should not be left running.   | 1          | 2      | Low (3)                              |
| 6. | Improper Management of E-Waste               | Adherence with EMC (Waste Management) Regulations, 2006.<br>Develop and implement e-waste management plan.<br>Incorporating health protection measures during Operation Phase of BRT Line 5.<br>Monitor e-waste sites and surrounding communities.<br>Implement and monitor interventions that improve informal e-waste recycling activities, protect public health and ensure vital sources of community revenue.<br>Educating workers across all levels on e-waste management and related health issues.  | 3          | 1      | Low (3)                              |
| 7. | Labour Impacts on Matatu Industry Dependents | Initiate appropriate measures to minimize job loss in the matatu industry or introduce new opportunities for job creation through reforms and integration of the matatu industry through serious engagement and inclusion of the matatu workforce in the BRT Line 5 planning process.   | 3          | 3      | Moderate (9)                         |

| SN   | Risk | Mitigation Measures  | Likelihood | Impact | Significance and Assigned Color Code |
|--|------|--|------------|--------|--------------------------------------|
|  |      | Provide and improve feeder routes and transport services along Outer Ring Road to integrate them properly with BRT Line 5. |            |        |                                      |
| <b>Overall Rating During Operation Phase</b> |      |  |            |        | Low<br>(3)                           |

## 11. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

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### 11.1 Significance of an ESMMP

As a requirement in EMCA Cap 387, ESIA Study Report should provide for a comprehensive ESMMP. This Chapter therefore complies with the legal requirements and takes into consideration the applicable local and international standards and best practices.

There is no universally accepted standard format for ESMMPs. The format needs to fit the circumstances in which the ESMMP is being developed and the requirements which it is designed to meet. The ESMMPs should contain the following which are in line with the NEMA requirements:

- **Summary of impacts:** The predicted negative environmental impacts for which mitigation is required should be summarized;
- **Description of mitigation measures:** The ESMMP identifies feasible and cost-effective mitigation measures to reduce significant negative environmental and social impacts to acceptable and legal levels;
- **Description of monitoring programme:** Environmental and social performance monitoring should be designed to ensure that mitigation measures are implemented. The monitoring programme should clearly indicate the linkages between impacts, indicators to be measured, measurement methods and definition of thresholds that will signal the need for corrective actions;
- **Institutional arrangements:** Responsibilities for mitigation and monitoring actions should be clearly defined;
- **Legal enforceability:** The key legal considerations with respect to ESMMPs are:
  - Legal framework for environmental protection; and
  - Legal basis for mitigation.
- **Implementation schedule and reporting procedures:** The timing, frequency, and duration of mitigation measures should be specified; and
- **Cost estimates:** Costs should be calculated for both the initial investment and recurring expenses for implementing the mitigation measures.

The benefits of including the ESMMP as part of the ESIA are:

- Encouraging applicants to be more systematic and explicit in the design and development of mitigation measures and the intended means of implementation;
- Encouraging authorities to check the practicality and likelihood of implementation of mitigation and monitoring measures;

- Ensuring that the mitigation measures are properly incorporated into the project design and contract documentation after authorisation is granted;
- Encouraging the project proponent to meet the requirements of the ESMMP which now form the basis for the conditions attached to authorisation of the project; and
- Forcing the project proponent to internalise environmental impacts that would otherwise become a social cost.

The ESMMPs presented in this Chapter therefore summarises the key impact elements identified and the remedial measures, the actions to be taken by various parties and the monitoring activities. An indication of the time scale for implementation and cost involved is also provided. The ESMMP tables can be further expanded with documented procedures and guidelines for work practices to be as responsive to the situations that various contract parties will encounter. The parties should formulate procedures and practices and maintain records as required by EMCA Cap 387.

The implementation of the ESMMP should be done within the provisions of the law and for the ultimate benefit of the stakeholders in the Project area. The effectiveness of the ESMMP shall be monitored and assessed during spot checks, formal inspections and at the end of the Project when an overall audit of the works shall be carried out.

### **11.2 Objectives of the ESMMP**

The objectives of the ESMMP are to:

- Place the proposed/existing activity in the context of the local and regional environment;
- Adequately describe all components of the proposed/existing activity, so that the Authority can consider approval of a well-defined project;
- Identify the environmental issues/risks associated with the proposed/existing activity;
- Provide the basis of the Proponent's environmental management programme, which shows that the environmental impacts resulting from the proposed/existing activity, including cumulative impact, can be acceptably managed, and
- Provide a document that clearly sets out the reasons why the proposed/existing activity should be judged by the Authority to be environmentally acceptable.

### **11.3 Types of ESMMPs**

There are three broad categories of ESMMPs in a project lifecycle: The construction ESMMP, the operation ESMMP and the decommissioning ESMMP.

#### **11.4 Construction Phase ESMMP**

A construction ESMMP is a practical and achievable plan of management to ensure that any environmental impact during construction phase is minimized. Construction ESMMP provides specific environmental and social guidance for the implementation and construction phase of a project. It is intended to enable the management and mitigation of construction activities so that environmental and social impacts are avoided or reduced. These impacts range from those incurred during planning and design up to construction activities.

**Table 58** overleaf shows the construction ESMMP for the proposed Project.



Table 58: Environmental & Social Management and Monitoring Plan during Construction Phase

| Risk Rating Color Code Legend/Key   |   | High              | Substantial            | Moderate         | Low                           |               |
|---|---|-------------------|------------------------|------------------|-------------------------------|---------------|
|   |   |                   |                        |                  |                               |               |
| Expected Negative Impacts   | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters  | Monitoring Means | Time Frame                    | Cost (Ksh)    |
| <b>Objective 1: To Minimise Extraction Site impacts and Ensure Efficient Use of Raw Materials in Construction</b> |   |                   |                        |                  |                               |               |
| <b>Deterioration of Construction Materials Sourcing Sites</b>   | Aggregates and rock will be sourced locally from an established quarry in Nairobi City County and the environs instead of starting another quarry for purposes of the proposed Project. | Contractor        | Location of the Quarry | Inspection       | Throughout Construction Phase | No added cost |
|   | Purchase gravel and sub grade soil-murram from an established quarry in Nairobi City County and the environs instead of starting another quarry.  | Contractor        | Location of the Quarry | Inspection       | Throughout Construction Phase | No added cost |
|   | Carry out inspection of each of the site's soil stability before excavation.  | Contractor        | Soil testing           | Inspection       | Throughout Construction Phase | 350,000.00    |
|   | Cordon off the gravel site areas to keep livestock and children off.  | Contractor        | Fencing                | Inspection       | One-off                       | 1000,000.00   |
|   | Maintain fences and "make good" of the sites  | Contractor        | Fencing                | Inspection       | One-off                       | ~             |

| Risk Rating Color Code Legend/Key |  | High              | Substantial  | Moderate         | Low        |               |
|-----------------------------------|--|-------------------|--|------------------|------------|---------------|
| Expected Negative Impacts         | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters                                  | Monitoring Means | Time Frame | Cost (Ksh)    |
|                                   | afterwards.  |                   |  |                  |            |               |
|                                   | The use of borrow pits for material spoil sites may be approved by the RE (and/or with the appropriate consent of the “landowner”). Where this occurs, the materials spoiled in the borrow pit shall be profiled to fit into the surrounding landscape and covered with topsoil. | Contractor        | Soil testing   | Inspection       | One-off    | No added cost |
|                                   | In case of blasting:<br><br>i. The Contractor will be responsible for obtaining a current and valid authorisation from the Department of Mines and Geology prior to any blasting activity. A copy of this authorisation shall be given to the RE;                                | Contractor        | Blasting licence, monitoring records of the blast area | Inspection       | One-off    | 150,000.00    |
|                                   |  | Contractor        | Notices  | Inspection       | One-off    | No added cost |

| Risk Rating Color Code Legend/Key |   | High              | Substantial           | Moderate         | Low        |               |
|-----------------------------------|---|-------------------|-----------------------|------------------|------------|---------------|
|                                   |   |                   |                       |                  |            |               |
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters | Monitoring Means | Time Frame | Cost (Ksh)    |
|                                   | ii. A qualified and registered blaster by the Department of Mines and Geology shall supervise all blasting and rock-splitting operations at all times;<br>iii. The Contractor shall ensure that appropriate pre blast monitoring records are in place (i.e. photographic and inspection records of structures in close proximity to the blast area);<br>iv. The Contractor shall ensure that emergency services are notified, in writing, a minimum of 24 hours prior to any blasting activities commencing on Site;<br>v. The Contractor shall | Contractor        | Notices               | Inspection       | One-off    | No added cost |

| Risk Rating Color Code Legend/Key |   | High              | Substantial           | Moderate         | Low        |               |
|-----------------------------------|---|-------------------|-----------------------|------------------|------------|---------------|
|                                   |   |                   |                       |                  |            |               |
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters | Monitoring Means | Time Frame | Cost (Ksh)    |
|                                   | <p>take necessary precautions to prevent damage to special features and the general environment, which includes the removal of fly-rock. Environmental damage caused by blasting/drilling shall be repaired at the Contractor's expense to the satisfaction of the RE and the relevant authorities;</p> <p>vi. The Contractor shall ensure that adequate warning is provided to the local communities immediately prior to all blasting. All signals shall also be clearly given;</p> <p>vii. The Contractor shall use blast mats for</p> | Contractor        | Notices               | Inspection       | One-off    | No added cost |

| Risk Rating Color Code Legend/Key |   | High              | Substantial   | Moderate         | Low                           |               |
|-----------------------------------|---|-------------------|---|------------------|-------------------------------|---------------|
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters   | Monitoring Means | Time Frame                    | Cost (Ksh)    |
|                                   | cover material during blasting. Topsoil shall not be used as blast cover.   |                   |   |                  |                               |               |
|                                   | Follow the sand harvesting regulations published by NEMA.   | Contractor        | Compliance with the National Sand Harvesting Guidelines, 2007 | Inspection       | Throughout Construction Phase | No added cost |
|                                   | Order for what will be required through accurate budgeting and estimation of actual construction requirements. This will ensure that materials are not extracted or purchased in excessive quantities. Moreover, the Proponent will ensure that wastage, damage or loss (through run-off, wind etc.) of materials at the construction site is kept minimal, as these would lead to additional demand for and extraction | Contractor        | Purchase records and storage facilities                       | One-off          | One-off                       | No added cost |

| Risk Rating Color Code Legend/Key                                    |  | High              | Substantial               | Moderate                   | Low                           |               |
|--|--|-------------------|---------------------------|----------------------------|-------------------------------|---------------|
| Expected Negative Impacts  | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters     | Monitoring Means           | Time Frame                    | Cost (Ksh)    |
|  | or purchase materials.   |                   |                           |                            |                               |               |
| <b>Objective 2: To Minimise Occupational Safety and Health Risks</b> |  |                   |                           |                            |                               |               |
| Workplace Incidents and Agents                                       | Adherence to the provisions of OSHA, 2007.   | Contractor        | Compliance with OSH Rules | Observation and Inspection | Throughout Construction Phase | No added cost |
|  | Provision and maintenance of safe systems and procedures of work at the workplace that are safe and without risks to health including:<br>i. SOPs.<br>ii. JSA for low-risk activities.<br>iii. RA for medium and high-risk activities.<br>iv. PTW system for high risk non-routine activities. | Contractor        | Compliance with OSH Rules | Observation and Inspection | Throughout Construction Phase | No added cost |

| Risk Rating Color Code Legend/Key |   | High              | Substantial                                 | Moderate                           | Low                           |              |
|-----------------------------------|---|-------------------|---|------------------------------------|-------------------------------|--------------|
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters                       | Monitoring Means                   | Time Frame                    | Cost (Ksh)   |
|                                   | Provision of appropriate PPE and ensuring that workers while at work always use the provided PPE as the last line of defence in risk control at the workplace after the other levels: Elimination, Substitution, Engineering Controls and Administrative Controls in the risk control hierarchy.  | Contractor        | Adequate and appropriate PPE                | Inspection and Observation         | Throughout Construction Phase | 1,000,000.00 |
|                                   | Proactive risk management of safety at the workplace centred at identifying precursors that lead to risk, identifying threats before they become dangerous, and understanding what behaviours and attitudes are influencing safety performance e.g. fencing of all dangerous areas, placing warning signs, enforcing maximum traffic speeds | Contractor        | Safety Climate i.e. workplace safety 'mood' | Survey, Inspection and Observation | Throughout Construction Phase | 1,500,000.00 |

| Risk Rating Color Code Legend/Key                                     |   | High              | Substantial   | Moderate                   | Low                           |               |
|---|---|-------------------|---|----------------------------|-------------------------------|---------------|
| Expected Negative Impacts   | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters   | Monitoring Means           | Time Frame                    | Cost (Ksh)    |
|   | through the road, safety education and training.  |                   |   |                            |                               |               |
|   | To prevent bitumen burns it will be compulsory for the workers handling hot bitumen to wear full body protection. | Proponent         | Appropriate PPE   | Inspection and Observation | Throughout Construction Phase | No added cost |
|   | All transportation, handling and storage of bitumen will be handled safely by experienced personnel.              | Proponent         | Presence of qualified personnel   | Inspection and Observation | Throughout Operation Phase    | No added cost |
|   | The MSDS for each chemical product will be made accessible on site and displayed.                                 | Proponent         | Records on chemical products  | Inspection and Observation | Throughout Construction Phase | No added cost |
|   | Worker to be subjected to medical examinations as provided in the Medical Examination Rules, 2005.                | Proponent         | Medical examination records   | Inspection and Observation | Throughout Construction Phase | 100,000.00    |
| <b>Objective 3: To Minimise Noise Pollution and Vibration Impacts</b> |   |                   |   |                            |                               |               |
| <b>Noise Pollution and Vibration</b>                                  | Ambient Noise Levels and Vibrations Levels measurements shall be undertaken and maintained.                       | Proponent         | Compliance with EMC (Noise and Excessive Vibration Pollution) (Control) | Measurements               | Construction Phase            | 2,000,000.00  |



| Risk Rating Color Code Legend/Key   |  | High              | Substantial  | Moderate                   | Low                           |               |
|---|--|-------------------|--|----------------------------|-------------------------------|---------------|
| Expected Negative Impacts   | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters  | Monitoring Means           | Time Frame                    | Cost (Ksh)    |
|   |  |                   | Regulations, 2009 and Noise Prevention and Control Rules, 2005.  |                            |                               |               |
|   | Construction shall be carried out in accordance with the standard procedures. All plant and construction equipment shall be fitted with noise control measures and shall strictly conform to EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and the Noise Prevention and Control Rules, 2005. | Contractor        | Compliance with EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and Noise Prevention and Control Rules, 2005 | Inspection and Observation | Throughout Construction Phase | No added cost |
| On-site power gensets shall be covered with an acoustic enclosure and fitted with muffler and shall conform to EMC (Noise and Excessive | Contractor   |                   | Inspection   | One-off                    | 600,000.00                    |               |

| Risk Rating Color Code Legend/Key |   | High              | Substantial   | Moderate                | Low                           |               |
|-----------------------------------|---|-------------------|---|-------------------------|-------------------------------|---------------|
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters   | Monitoring Means        | Time Frame                    | Cost (Ksh)    |
|                                   | Vibration (Control) Regulations, 2009 and Pollution (Control) Regulations, 2009 and the Noise Prevention and Control Rules, 2005.   |                   |   |                         |                               |               |
|                                   | Prescribe noise reduction measures if appropriate e.g. restricted working hours, transport hours and noise buffering.   | Contractor        |   | Inspection              | One-off                       | No added cost |
|                                   | Inform the surrounding community on the permissible noise levels and best working hours.  | Contractor        | Notices   | Inspection              | One-off                       | No added cost |
|                                   | Use quiet equipment (i.e. equipment designed with noise control elements) and regular maintenance of machinery to ensure that noise produced from machinery is kept to a practicable minimum. | Contractor        | Compliance with Noise and Excessive Vibration Pollution (Control) Regulations, 2009 | Inspection              | Throughout Construction Phase | No added cost |
|                                   | Co-ordinate with relevant agencies regarding all construction activities in the   | Contractor        | Liaison with the relevant agencies  | Inspection and Meetings | Throughout Construction Phase | No added cost |

| Risk Rating Color Code Legend/Key                      |   | High              | Substantial   | Moderate                   | Low                           |                      |
|--|---|-------------------|---|----------------------------|-------------------------------|----------------------|
| Expected Negative Impacts                              | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters   | Monitoring Means           | Time Frame                    | Cost (Ksh)           |
|  | Project area.   |                   |   |                            |                               |                      |
|  | Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible. | Contractor        | Compliance with EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 | Inspection                 | Throughout Construction Phase | No added cost        |
|  | Vehicles hired for bringing construction materials at site shall conform to the noise emission standards and shall be operated during non-peak hours.   | Contractor        | Compliance with EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 | Inspection                 | Throughout Construction Phase | No added cost        |
| <b>Objective 4: To Minimise Impacts on Air Quality</b> |   |                   |   |                            |                               |                      |
| <b>Dust Pollution</b>                                  | Ambient Air Quality measurements shall be undertaken and maintained   | Proponent         | Compliance with EMC (Air Quality) Regulation, 2014.                                       | Measurements               | Construction Phase            | 1,000,000.00         |
|  | All dusty materials shall be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials   | Contractor        | Compliance with EMC (Air Quality) Regulations, 2014                                       | Observation and Inspection | Throughout Construction Phase | 100,000.00 per month |

| Risk Rating Color Code Legend/Key  |   | High  | Substantial   | Moderate                      | Low                           |               |
|--|---|---|---|-------------------------------|-------------------------------|---------------|
| Expected Negative Impacts  | Recommended Mitigation Measures   | Responsible Party                                   | Monitoring Parameters                               | Monitoring Means              | Time Frame                    | Cost (Ksh)    |
|  | wet.  |   |   |                               |                               |               |
|  | Cover stockpiles of sand, soil and similar materials or surround them with wind breaks.   | Contractor  | Compliance with EMC (Air Quality) Regulations, 2014 | Observation and Inspection    | Throughout Construction Phase |               |
|  | Watering all roads used for any vehicular traffic at least twice per day of active operations or road used for any vehicular traffic once daily and restrict vehicle speed to 15 mph. | Contractor  | Compliance with EMC (Air Quality) Regulations, 2014 | Inspection and Observation    | When necessary                |               |
|  | Down wash of trucks (especially tyres) prior to departure from site.  | Contractor  | Compliance with EMC (Air Quality) Regulations, 2014 | Observation                   | Throughout Construction Phase | No added cost |
|  | Vehicles delivering loose and fine materials like sand and fine aggregates shall be covered to reduce spills on roads.  | Contractor  | Compliance with EMC (Air Quality) Regulations, 2014 | Inspection and Observation    | Throughout Construction Phase | No added cost |
| The height from which excavated materials are dropped shall be controlled to a minimum practical | Contractor  | Compliance with EMC (Air Quality) Regulations, 2014 | Inspection and Observation                          | Throughout Construction Phase | No added cost                 |               |

| Risk Rating Color Code Legend/Key |  | High              | Substantial   | Moderate   | Low                           |               |
|-----------------------------------|--|-------------------|---|--|-------------------------------|---------------|
| Expected Negative Impacts         | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters                               | Monitoring Means                                     | Time Frame                    | Cost (Ksh)    |
|                                   | height to limit fugitive dust generation from unloading.   |                   |   |  |                               |               |
|                                   | Post signs that limit vehicle speeds onto unpaved roads and over disturbed soils.  | Contractor        | Adequate Signage                                    | Inspection and Observation                           | Throughout Construction Phase | No added cost |
|                                   | Rapid onsite construction so as to reduce duration of traffic interference and therefore reduce emissions from traffic delays. | Contractor        | Contractor's work plan                              | Inspection and Observation                           | One-off                       | No added cost |
|                                   | PPE to be worn.  | Contractor        | Adequate PPE  | Observation  | Throughout Construction Phase | 2,000,000.00  |
| Exhaust Emission                  | The engine size of the construction equipment shall be the minimum practical size.   | Contractor        | Compliance with EMC (Air Quality) Regulations, 2014 | Observation<br>Inspection and Exhaust Emission Tests | Construction Phase            | No added cost |
|                                   | The number of construction equipment operating simultaneously shall be minimized through efficient management practices.       | Contractor        | Compliance with EMC (Air Quality) Regulations, 2014 | Inspection   | Throughout Construction Phase | No added cost |
|                                   | Construction machinery idling time shall be  | Contractor        | Compliance with EMC (Air                            | Inspection   | One-off                       | No added cost |

| Risk Rating Color Code Legend/Key  |   | High              | Substantial   | Moderate         | Low                           |                          |
|--|---|-------------------|---|------------------|-------------------------------|--------------------------|
| Expected Negative Impacts  | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters                               | Monitoring Means | Time Frame                    | Cost (Ksh)               |
|  | minimized.  |                   | Quality) Regulations, 2014                          |                  |                               |                          |
|  | Equipment shall be properly calibrated and maintained as per the Manufacturers specification.   | Contractor        | Compliance with EMC (Air Quality) Regulations, 2014 | Inspection       | Throughout Construction Phase | 500,000.00 per equipment |
|  | Alternatively fuelled construction equipment shall be used where feasible equipment shall be properly tuned and maintained.   | Contractor        | Compliance with EMC (Air Quality) Regulations, 2014 | Observation      | Throughout Construction Phase | No added cost            |
|  | Sensitise truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas, and to switch off or keep vehicle engines at these points. | Contractor        | Compliance with EMC (Air Quality) Regulations, 2014 | Meeting          | Throughout Construction Phase | No added cost            |
| <b>Objective 5: To Minimise Impacts on Interruption of the Existing Installation</b> |   |                   |   |                  |                               |                          |
| Interruption of the Existing Services/   | Establish the various service providers whose installations are likely to be  | Contractor        | Liaisons with service providers                     | Inspection       | One-off                       | No added cost            |

| Risk Rating Color Code Legend/Key |  | High              | Substantial  | Moderate         | Low                           |               |
|-----------------------------------|--|-------------------|--|------------------|-------------------------------|---------------|
| Expected Negative Impacts         | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters  | Monitoring Means | Time Frame                    | Cost (Ksh)    |
| Installations                     | interrupted.   |                   |  |                  |                               |               |
|                                   | Identify key interests of each of the stakeholders.  | Contractor        | Stakeholders' consultation.<br>Liaisons with service providers | Inspection       | One-off                       | No added cost |
|                                   | The proponent should formally liaise with the stakeholders and communicate the project details to them with a view of developing a work plan. The work plan to be developed should have clear responsibilities for each of the affected parties. | Contractor        | Stakeholders' consultation                                     | Meeting          | One-off                       | 500,000.00    |
|                                   | The work plan should then be implemented to ensure smooth execution of the construction.   | Contractor        | Adherence to work plan   | Meeting          | Throughout Construction Phase | No added cost |
|                                   | On completion of works, each property owner should be contacted again to give views and if complains arise the   | Contractor        | Stakeholders' consultation                                     | Meeting          | One-off                       | No added cost |

| Risk Rating Color Code Legend/Key                              |  | High                | Substantial  | Moderate         | Low                             |               |
|--|--|---------------------|--|------------------|---------------------------------|---------------|
| Expected Negative Impacts                                      | Recommended Mitigation Measures  | Responsible Party   | Monitoring Parameters  | Monitoring Means | Time Frame                      | Cost (Ksh)    |
|  | Contractor asked to address the same.  |                     |  |                  |                                 |               |
| <b>Objective 6: To Minimise Clearing of Vegetation Impacts</b> |  |                     |  |                  |                                 |               |
| Clearing of vegetation   | Ensure proper demarcation of the Project area to be affected by the construction works. This will aim at ensuring that any loss of vegetation is restricted to the actual Project area and avoid spillover effect on the neighbouring areas. | Contractor          | Edge marking   | Inspection       | One-off                         | No added cost |
|  | Clearing of work sites and roadside vegetation will be done to an acceptable minimum.  | Contractor          | Preservation of vegetation                                   | Inspection       | Throughout Construction Phase   | No added cost |
|  | Where possible, trees should be translocated to a new site to ensure vegetation loss is minimized as much as possible.   | Contractor and KURA | Determining the successfulness of the translocation exercise | Inspection       | One-off                         | 500,000.00    |
|  | Landscaping and planting of new trees after completion of the Project.   | KURA                | Compensation of lost vegetation                              | Inspection       | After Completion of the Project | 2,000,000.00  |



| Risk Rating Color Code Legend/Key  |   | High              | Substantial   | Moderate                   | Low                             |               |
|--|---|-------------------|---|----------------------------|---------------------------------|---------------|
| Expected Negative Impacts  | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters   | Monitoring Means           | Time Frame                      | Cost (Ksh)    |
|  | Preservation of existing plant communities and re-establishment of native plant communities.                          | KURA              | Vegetation inventory  | Inspection                 | After Completion of the Project | 100,000.00    |
|  | Protection of endangered and/or threatened plant species.   | Contractor & KURA | List of endangered and/or threatened plant species                                  | Inspection and observation | Construction Phase              | 100,000.00    |
| <b>Objective 7: To Minimize Solid Waste Generation and Ensure Efficient Solid Waste Management during Construction</b> |   |                   |   |                            |                                 |               |
| Solid Waste Generation   | Carefully budget to ensure that the amount of construction materials left on site after construction is kept minimal. | Contractor        | Work budget   | Inspection                 | One-off                         | No added cost |
|  | Consider the use of recycled or refurbished construction materials.   | Contractor        | Waste management plan and compliance with EMC (Waste Management) Regulations, 2006. | Inspection                 | One-off                         | No added cost |
|  | Purchase and use once-used or recovered construction  | Contractor        | Compliance with EMC   | Inspection                 | One-off                         | No added cost |

| Risk Rating Color Code Legend/Key |   | High              | Substantial                           | Moderate         | Low                           |               |
|-----------------------------------|---|-------------------|---------------------------------------|------------------|-------------------------------|---------------|
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters                 | Monitoring Means | Time Frame                    | Cost (Ksh)    |
|                                   | materials. This will lead to financial savings and reduction of the amount of construction debris disposed of as waste.                                       |                   | (Waste Management) Regulations, 2006. |                  |                               |               |
|                                   | Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time.     | Contractor        | Material quality testing              | Inspection       | One-off                       | No added cost |
|                                   | Provision of facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements. | Contractor        | Storage facilities                    | Inspection       | Throughout Construction Phase | No added cost |
|                                   | Use of construction materials that have minimal packaging to avoid the generation of excessive packaging waste.   | Contractor        | Waste management plan                 | Inspection       | Throughout Construction Phase | No added cost |
|                                   | Use of construction materials containing  | Contractor        | Waste management plan                 | Inspection       | Throughout Construction       | No added cost |

| Risk Rating Color Code Legend/Key                      |   | High              | Substantial  | Moderate                   | Low                           |               |
|--|---|-------------------|--|----------------------------|-------------------------------|---------------|
| Expected Negative Impacts                              | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters  | Monitoring Means           | Time Frame                    | Cost (Ksh)    |
|  | recycled content when possible and in accordance with accepted standards.   |                   | and compliance with EMC (Waste Management) Regulations, 2006                       |                            | Phase                         |               |
|  | Adequate collection and storage of waste on site and safe transportation to the disposal sites and disposal methods at designated area shall be provided. | Contractor        | Waste management plan and compliance with EMC (Waste Management) Regulations, 2006 | Inspection and Observation | Throughout Construction Phase | No added cost |
|  | Ensure that the construction wastes generated are disposed to the approved dump site.   | Contractor        | Location of the Dumpsite   | Inspection and Observation | Throughout Construction Phase | 600,000.00    |
| <b>Objective 8: To Minimise Increased Water Demand</b> |   |                   |  |                            |                               |               |
| Increased Water Demand                                 | Ensure that water is used efficiently at the site by sensitizing construction workers to avoid irresponsible water use.                                   | Contractor        | Water management plan and compliance with Water Act, 2016.                         | Inspection                 | One-off                       | No added cost |
|  | An assessment and evaluation of the identified water sources should be done against the estimated   | Contractor        | Water management plan and Compliance with Water Act,                               | Inspection                 | One- off                      | No added cost |

| Risk Rating Color Code Legend/Key  |   | High              | Substantial                 | Moderate                   | Low        |            |
|--|---|-------------------|-----------------------------|----------------------------|------------|------------|
| Expected Negative Impacts  | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters       | Monitoring Means           | Time Frame | Cost (Ksh) |
|  | water demand during construction. These details should be provided to the Water Resource Management Authority before a license for abstraction is issued.   |                   | 2016                        |                            |            |            |
| <b>Objective 9: To Ensure Reduction of Increased Storm Water Run-off from New Impervious Areas</b> |   |                   |                             |                            |            |            |
| <b>Storm Water Run-off from New Impervious Areas</b>   | Put in place adequate measures aimed at minimizing soil erosion and associated sediment release from the proposed Project site including: <ul style="list-style-type: none"> <li>▪ Levelling the Project site to reduce run-off velocity and increase infiltration of rain water into the soil; and</li> <li>▪ Design and implement a storm water management plan that minimizes impervious area</li> </ul> | Contractor        | Storm water management plan | Inspection and Observation | One-off    | 900,000.00 |

| Risk Rating Color Code Legend/Key                         |   | High              | Substantial                                  | Moderate                   | Low                           |               |
|---|---|-------------------|--|----------------------------|-------------------------------|---------------|
| Expected Negative Impacts                                 | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters                        | Monitoring Means           | Time Frame                    | Cost (Ksh)    |
|   | infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structures.                   |                   |  |                            |                               |               |
| <b>Objective 10: To Minimise Delays in Transportation</b> |   |                   |  |                            |                               |               |
| Delays in Transportation                                  | Works to be restricted at the median of Outer Ring Road, as much as possible, without interfering with traffic flow on the carriageway. | Contractor        | Traffic Management Plan                      | Inspection and Observation | Throughout Construction Phase | 2,000,000.00  |
|   | Plan itineraries for site traffic on a daily basis.   | Contractor        | Traffic Management Plan                      | Inspection                 | Throughout Construction Phase | No added cost |
|   | Mandatory traffic management and control throughout the construction period.  | Contractor        | Traffic Management plan                      | Inspection and Observation | Throughout Construction Phase | 1,000,000.00  |
|   | Erect temporary road signs that are visible both during the day and at night indicating road works and restrictions.                    | Contractor        | Adequate road warning and inforamatory signs | Inspection and Observation | One-off                       | 800,000.00    |

| Risk Rating Color Code Legend/Key |   | High              | Substantial  | Moderate                   | Low                           |               |
|-----------------------------------|---|-------------------|--|----------------------------|-------------------------------|---------------|
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters  | Monitoring Means           | Time Frame                    | Cost (Ksh)    |
|                                   | Designate footpaths and parking areas.  | Contractor        | Traffic management plan  | Inspection                 | One-off                       | 600,000.00    |
|                                   | Areas where construction is taking place should have clearly marked speed reduction signage.  | Contractor        | Adequate signage   | Inspection and Observation | One-off                       | No added cost |
|                                   | All Project vehicles comply with relevant traffic and transport licensing requirements and are road worthy.   | Contractor        | License validity and requirements                                  | Inspection                 | Throughout Construction Phase | No added cost |
|                                   | All vehicles and machinery used during the Project shall be regularly maintained and repaired where necessary. Any vehicle defect which may render a vehicle unsafe shall not be used until the necessary repairs have been undertaken. | Contractor        | Service records  | Inspection                 | Throughout Construction Phase | No added cost |
|                                   | All equipment and/or materials transported to or from site shall be appropriately secured and   | Contractor        | Driving License (Class of vehicles and machines licensed to drive) | Inspection                 | Once                          | No added cost |

| Risk Rating Color Code Legend/Key                         |  | High              | Substantial  | Moderate                   | Low                           |               |
|---|--|-------------------|--|----------------------------|-------------------------------|---------------|
| Expected Negative Impacts                                 | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters  | Monitoring Means           | Time Frame                    | Cost (Ksh)    |
|   | the drivers must be appropriately trained in driving techniques applicable to specific loads.  |                   |  |                            |                               |               |
|   | No emergency provider vehicle shall be kept waiting to pass through the works when responding to an emergency  | Contractor        | Siren wailing  | Hearing                    | Throughout Construction Phase | No added cost |
| <b>Objective 11: To Control Fuel and Lubricant Spills</b> |  |                   |  |                            |                               |               |
| <b>Fuel and Lubricant Spills</b>                          | Control dangers of fuel and lubricant spills by strictly ensuring that the servicing/maintenance of machinery is undertaken in approved garage or an equivalent. | Contractor        | Provision of designated area for construction machinery            | Inspection and Observation | Throughout Construction Phase | 1,00,000.00   |
|   | Provide for bunds around fuel, oil and bitumen storage facilities.   | Contractor        | Presence of bunds around fuel, oil and bitumen storage facilities. | Inspection and Observation | Throughout Construction Phase | 800,000.00    |

| Risk Rating Color Code Legend/Key |  | High              | Substantial   | Moderate                   | Low                           |               |
|-----------------------------------|--|-------------------|---|----------------------------|-------------------------------|---------------|
| Expected Negative Impacts         | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters   | Monitoring Means           | Time Frame                    | Cost (Ksh)    |
|                                   | Provision oil and grease traps at servicing and fuelling areas.  | Contractor        | Presence of oil and grease traps at servicing and fuelling areas. | Inspection and Observation | Throughout Construction Phase | 800,000.00    |
|                                   | Ensure that all the servicing and fuelling areas established for the Project are dully approved and licensed by the Regulators             | Contractor        | Availability of operating license/permit from the Regulators.     | Inspection and Observation | Throughout Construction Phase | 500,000.00    |
|                                   | Prompt cleaning of oil and fuel spills, and proper disposal of clothing and rags contaminated with oil.                                    | Contractor        | Provision and proper disposal of oil and fuel absorbents          | Inspection and Observation | Throughout Construction Phase | No added cost |
|                                   | Construct sealed areas for the storage of pollutants so as to avoid any accidental discharge that would pollute water resources.           | Contractor        | Provision of Seal area for storage of pollutants                  | Inspection                 | One-off                       | 650,000       |
|                                   | Oil and fuel shall be stored in storage tanks within a secure compound and shall be stored in accordance with manufacturer's instructions. | Contractor        | Storage in accordance to manufactures instructions                | Inspection                 | Throughout Construction Phase | 500,000.00    |



| Risk Rating Color Code Legend/Key                  |  | High              | Substantial   | Moderate         | Low                           |               |
|--|--|-------------------|---|------------------|-------------------------------|---------------|
| Expected Negative Impacts                          | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters   | Monitoring Means | Time Frame                    | Cost (Ksh)    |
| <b>Objective 12: To Minimise Wastewater Impact</b> |  |                   |   |                  |                               |               |
| Impacts of Waste Water                             | No grey water runoff or uncontrolled discharges from the site/working areas (including wash-down areas) to watercourses and/or water bodies shall be permitted.  | Contractor        | Wastewater management plan anchored on the provisions of the Water Quality Regulations, 2006. | Inspection       | Throughout Construction Phase | No added cost |
|  | Wastewater containing such pollutants as cements, concrete, chemicals and fuels shall be disposed in compliance with Water Quality Regulations, 2006. This particularly applies to water emanating from concrete swills. | Contractor        | Water quality tests as provided in Water Quality Regulations, 2006.                           | Inspection       | Throughout Construction Phase | No added cost |
|  | Prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to watercourses and/or water bodies.  | Contractor        | Water quality tests as provided in Water Quality Regulations, 2006.                           | Inspection       | Throughout Construction Phase | No added cost |
|  | Potential pollutants of any  | Contractor        | Storage facilities  | Inspection       | Throughout                    | No added      |

| Risk Rating Color Code Legend/Key                           |  | High                     | Substantial   | Moderate         | Low                           |               |
|---|--|--------------------------|---|------------------|-------------------------------|---------------|
| Expected Negative Impacts                                   | Recommended Mitigation Measures  | Responsible Party        | Monitoring Parameters   | Monitoring Means | Time Frame                    | Cost (Ksh)    |
|   | kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered.        |                          |   |                  | Construction Phase            | cost          |
|   | Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas (including groundwater) are not polluted. | Contractor               | Wastewater management plan anchored on the provisions of the Water Quality Regulations, 2006. | Inspection       | Throughout Construction Phase | No added cost |
|   | The Contractor shall notify the RE of any pollution incidents on site.   | Contractor               | Incident Logs, Site Visits and Monitoring reports   | Inspection       | Throughout Construction Phase | No added cost |
| <b>Objective 13: To Minimise Impacts on Local Resources</b> |  |                          |   |                  |                               |               |
| Impacts on Local Resources                                  | Consult the community on partitioning of access to local resource for construction purposes.   | Contractor               | Stakeholders' consultation  | Meeting          | One-off                       | No added cost |
|   | Abstractions from natural, County and or private water resources (e.g. rivers,   | Contractor and Proponent | Abstraction permits from WRA and  | Inspection       | One-off                       | 600,000       |

| Risk Rating Color Code Legend/Key |  | High              | Substantial   | Moderate         | Low        |               |
|-----------------------------------|--|-------------------|---|------------------|------------|---------------|
| Expected Negative Impacts         | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters                                 | Monitoring Means | Time Frame | Cost (Ksh)    |
|                                   | boreholes and springs) for potable water and construction water shall be approved by WRA. The Contractor shall arrange for the necessary approvals / permits from the water authorities under the direction of KURA for the abstraction of water.  |                   | compliance with Water Act, 2016                       |                  |            |               |
|                                   | <p>Adhere to EMC (Water Quality) Regulations, 2006. These Regulations describe the following:</p> <ul style="list-style-type: none"> <li>▪ Water sources for domestic use;</li> <li>▪ Sewage treatment;</li> <li>▪ Ground water;</li> <li>▪ Water for agricultural use;</li> <li>▪ Water for other uses; and</li> <li>▪ Schedules depicting</li> </ul> | Contractor        | Compliance with EMC (Water Quality) Regulations, 2006 | Inspection       | One-off    | No added cost |

| Risk Rating Color Code Legend/Key                                   |   | High              | Substantial   | Moderate                   | Low        |            |
|---|---|-------------------|---|----------------------------|------------|------------|
| Expected Negative Impacts   | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters   | Monitoring Means           | Time Frame | Cost (Ksh) |
|   | standards.  |                   |   |                            |            |            |
| <b>Objective 14: To Minimise Impacts from the Contractors Camps</b> |   |                   |   |                            |            |            |
| <b>General</b>  | <p>The Contractor's Camp site shall be determined in collaboration with the RE taking into consideration the following:</p> <ul style="list-style-type: none"> <li>▪ The security situation in the area;</li> <li>▪ The local administration shall be involved in the site location to avoid destruction of any ritual site or any other conflict;</li> <li>▪ The Contractor's Camp layout shall take into account availability of access for deliveries and</li> </ul> | Contractor        | Compliance with the stipulated consideration for determining a Campsite | Inspection and Observation | One-off    | 500,000.00 |

| Risk Rating Color Code Legend/Key |   | High              | Substantial   | Moderate                   | Low        |            |
|-----------------------------------|---|-------------------|---|----------------------------|------------|------------|
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters   | Monitoring Means           | Time Frame | Cost (Ksh) |
|                                   | <p>services and any future works; and</p> <ul style="list-style-type: none"> <li>Decommission the camps and reinstatement of the land to its natural condition by filling excavations and planting suitable saplings.</li> </ul>  |                   |   |                            |            |            |
|                                   | <p>The Contractor shall implement the following as required with the approval by the RE:</p> <ul style="list-style-type: none"> <li>The Contractor will be required to prepare a waste management plan for the work sites and camps at the start of the Project;</li> <li>A suitable storm</li> </ul> | Contractor        | Waste management plan, drainage system, water supply, and sanitation facilities | Inspection and Observation | One-off    | 250,000.00 |

| Risk Rating Color Code Legend/Key |  | High              | Substantial           | Moderate         | Low        |            |
|-----------------------------------|--|-------------------|-----------------------|------------------|------------|------------|
|                                   |  |                   |                       |                  |            |            |
| Expected Negative Impacts         | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters | Monitoring Means | Time Frame | Cost (Ksh) |
|                                   | water drainage system to prevent soil erosion, protect storage areas and to prevent stagnant ponds forming; <ul style="list-style-type: none"> <li>▪ A suitable potable water supply;</li> <li>▪ Suitable facilities for bathing, washing clothes or vehicles – site staff will not be permitted to use open water bodies for such activities;</li> <li>▪ Suitable sanitation facilities, adequate for the number of staff on site;</li> <li>▪ Facilities for solid waste collection; and</li> <li>▪ Facilities for waste water management.</li> </ul> |                   |                       |                  |            |            |

| Risk Rating Color Code Legend/Key |   | High              | Substantial  | Moderate         | Low                           |              |
|-----------------------------------|---|-------------------|--|------------------|-------------------------------|--------------|
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters                                    | Monitoring Means | Time Frame                    | Cost (Ksh)   |
| Sanitation                        | <ul style="list-style-type: none"> <li>▪ The Contractor shall comply with all laws and any by-laws relating to public health and sanitation;</li> <li>▪ All temporary/portable toilets or pit latrines shall be secured to the ground to the satisfaction of the RE to prevent them from toppling over;</li> <li>▪ The type and exact location of the toilets shall be approved by the RE prior to establishment. The use of septic tanks may only be used after appropriate investigations have</li> </ul> | Contractor        | Location, number and installation of sanitary facilities | Inspection       | Throughout Construction Phase | 1,000,000.00 |

| Risk Rating Color Code Legend/Key |   | High              | Substantial           | Moderate         | Low        |            |
|-----------------------------------|---|-------------------|-----------------------|------------------|------------|------------|
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters | Monitoring Means | Time Frame | Cost (Ksh) |
|                                   | <p>been made and the option has been approved by the RE;</p> <ul style="list-style-type: none"> <li>▪ All toilets shall be maintained by the Contractor in a clean sanitary condition to the satisfaction of the RE;</li> <li>▪ A wash basin with adequate clean water and soap shall be provided alongside each toilet. Staff shall be encouraged to wash their hands after use of the toilet, in order to minimise the spread of possible disease;</li> <li>▪ The Contractor shall</li> </ul> |                   |                       |                  |            |            |



| Risk Rating Color Code Legend/Key |   | High              | Substantial                           | Moderate         | Low                           |               |
|-----------------------------------|---|-------------------|---------------------------------------|------------------|-------------------------------|---------------|
|                                   |   |                   |                                       |                  |                               |               |
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters                 | Monitoring Means | Time Frame                    | Cost (Ksh)    |
|                                   | <p>ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from the site to an appropriate location/facility for disposal; and</p> <ul style="list-style-type: none"> <li>▪ The Contractor shall instruct their staff that they must use toilets provided and not the bush or watercourses.</li> </ul> |                   |                                       |                  |                               |               |
| <b>Workshop</b>                   | <ul style="list-style-type: none"> <li>▪ Where practical, all maintenance of equipment and vehicles on site shall be performed in the workshop.</li> <li>▪ If it is necessary to do</li> </ul>  | Contractor        | Housekeeping and workshop maintenance | Inspection       | Throughout Construction Phase | No added cost |

| Risk Rating Color Code Legend/Key |  | High              | Substantial           | Moderate         | Low        |            |
|-----------------------------------|--|-------------------|-----------------------|------------------|------------|------------|
| Expected Negative Impacts         | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters | Monitoring Means | Time Frame | Cost (Ksh) |
|                                   | <p>maintenance on site, but outside of the workshop area, the Contractor shall obtain the approval of the RE prior to commencing activities;</p> <ul style="list-style-type: none"> <li>▪ The Contractor shall ensure that there is no contamination of the soil, vegetation or surface water in his workshop and other plant or emergency maintenance facilities.</li> <li>▪ The workshop shall be kept tidy at all times and shall have the following as a minimum:</li> </ul> |                   |                       |                  |            |            |

| Risk Rating Color Code Legend/Key |  | High              | Substantial           | Moderate         | Low        |            |
|-----------------------------------|--|-------------------|-----------------------|------------------|------------|------------|
|                                   |  |                   |                       |                  |            |            |
| Expected Negative Impacts         | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters | Monitoring Means | Time Frame | Cost (Ksh) |
|                                   | <ul style="list-style-type: none"> <li>▪ A smooth impermeable floor either constructed of concrete or suitable plastic covered with sufficient gravel to protect the plastic from damage;</li> <li>▪ The floor shall be bunded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil);</li> <li>▪ Drip trays shall be used to collect the waste oil and lubricants during servicing and shall also be provided in construction areas for stationary plant</li> </ul> |                   |                       |                  |            |            |

| Risk Rating Color Code Legend/Key     |   | High              | Substantial           | Moderate         | Low                           |               |
|---------------------------------------|---|-------------------|-----------------------|------------------|-------------------------------|---------------|
| Expected Negative Impacts             | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters | Monitoring Means | Time Frame                    | Cost (Ksh)    |
|                                       | (such as compressors); <ul style="list-style-type: none"> <li>▪ The drip trays shall be inspected and emptied daily; and</li> <li>▪ Drip trays shall be closely monitored during wet weather to ensure that they do not overflow.</li> </ul>  |                   |                       |                  |                               |               |
| <b>Materials Handling and Storage</b> | <ul style="list-style-type: none"> <li>▪ All materials shall be stored within the workshops yard unless otherwise approved by the RE;</li> <li>▪ Stockpile areas shall be approved by the RE;</li> <li>▪ All imported fill, soil and/or sand materials shall be free of weeds, litter and contaminants. Sources of</li> </ul> | Contractor        | Material storage      | Inspection       | Throughout Construction Phase | No added cost |

| Risk Rating Color Code Legend/Key |  | High              | Substantial           | Moderate         | Low        |            |
|-----------------------------------|--|-------------------|-----------------------|------------------|------------|------------|
|                                   |  |                   |                       |                  |            |            |
| Expected Negative Impacts         | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters | Monitoring Means | Time Frame | Cost (Ksh) |
|                                   | <p>imported materials shall be listed and approved by the RE;</p> <ul style="list-style-type: none"> <li>▪ The Contractor shall ensure that delivery drivers are informed of all procedures and restrictions (including 'No go' areas) required;</li> <li>▪ Any electrical or petrol driven pumps shall be equipped and positioned so as not to cause any danger of ignition of the stored product;</li> <li>▪ Collection containers (e.g. drip trays) shall be placed under all dispensing</li> </ul> |                   |                       |                  |            |            |

| Risk Rating Color Code Legend/Key |   | High              | Substantial           | Moderate         | Low        |            |
|-----------------------------------|---|-------------------|-----------------------|------------------|------------|------------|
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters | Monitoring Means | Time Frame | Cost (Ksh) |
|                                   | <p>mechanisms for hydrocarbons or hazardous liquid substances to ensure contamination from any leaks is reduced;</p> <ul style="list-style-type: none"> <li>Regular checks shall be conducted by the Contractor on the dispensing mechanisms for all above ground storage tanks to ensure faulty equipment is identified and replaced in timely manner;</li> <li>Only empty and externally clean tanks may be stored on bare ground. All</li> </ul> |                   |                       |                  |            |            |

| Risk Rating Color Code Legend/Key                                   |  | High                                   | Substantial                               | Moderate                | Low                           |              |
|---|--|--|---|-------------------------|-------------------------------|--------------|
| Expected Negative Impacts   | Recommended Mitigation Measures  | Responsible Party                      | Monitoring Parameters                     | Monitoring Means        | Time Frame                    | Cost (Ksh)   |
|   | <p>empty and externally dirty tanks shall be sealed and stored on an area where the ground has been protected.</p> <ul style="list-style-type: none"> <li>The Contractor will not have a labour camp for the construction workers as most of the Contractor's staff will come from the community.</li> </ul> |  |   |                         |                               |              |
| <b>Objective 15: To Minimise Public Health and HIV/AIDS Impacts</b> |  |  |   |                         |                               |              |
| <b>Public Health and HIV/AIDS Impacts</b>                           | A comprehensive health awareness campaign, carried out in conjunction with the Proponent, Contractor and other stakeholders will be done to  | Contractor, Proponent and Stakeholders | HIV/AIDS awareness and prevention reports | Inspection and Meetings | Throughout Construction Phase | 2,000,000.00 |

| Risk Rating Color Code Legend/Key |   | High                                  | Substantial                               | Moderate                            | Low                           |            |
|-----------------------------------|---|---------------------------------------|---|-------------------------------------|-------------------------------|------------|
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party                     | Monitoring Parameters                     | Monitoring Means                    | Time Frame                    | Cost (Ksh) |
|                                   | prevent outbreak of disease. This will include successful preventive measures such as immunizing the vulnerable population, and educating people about diseases and how they are contracted, and how to avoid them by using treated water and keeping living areas cleaner. |                                       |   |                                     |                               |            |
|                                   | Treating affected local and migrant populations will also be used in controlling the movement of disease vectors (through contaminated water and between people).   | Contractor Proponent and Stakeholders | HIV/AIDS awareness and prevention reports | Inspection, Observation and Meeting | Throughout Construction Phase |            |
|                                   | The Contractor shall be responsible for the protection of the public and public property from any dangers associated with construction activities, and for the safe and easy passage  | Contractor                            | Adequate safety measures such as signage  | Inspection                          | Throughout Construction Phase |            |



| Risk Rating Color Code Legend/Key |   | High                                   | Substantial                               | Moderate                             | Low                           |              |
|-----------------------------------|---|--|---|--------------------------------------|-------------------------------|--------------|
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party                      | Monitoring Parameters                     | Monitoring Means                     | Time Frame                    | Cost (Ksh)   |
|                                   | of pedestrians and traffic in areas affected by the construction activities.  |  |   |                                      |                               |              |
|                                   | All works which may pose a hazard to humans and domestic animals are to be protected, fenced, demarcated or cordoned off as instructed by the RE. If appropriate, symbolic warning signs must be erected.   | Contractor and Proponent               | Proper fencing and demarcation            | Inspection                           | Throughout Construction Phase | 2,000,000.00 |
|                                   | The HIV/AIDS awareness campaigns should be conducted at the camps as well as in the town centres. The Contractor shall take an active role in civic and public health education to his employees and the community. The campaign shall include the training of facilitators within the workers, information | Contractor, Proponent and Stakeholders | HIV/AIDS awareness and prevention reports | Inspection, Observation and Meetings | Throughout Construction Phase |              |

| Risk Rating Color Code Legend/Key |   | High                                   | Substantial   | Moderate                | Low                           |            |
|-----------------------------------|---|--|---|-------------------------|-------------------------------|------------|
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party                      | Monitoring Parameters                                       | Monitoring Means        | Time Frame                    | Cost (Ksh) |
|                                   | posters in the workshop and public areas, availability of promotional material (T-shirts and caps), availability of condoms (free), and theatre groups. The Contractor will co-ordinate with NSDCC and Health Officers and the NGOs undertaking education and sensitisation programmes. |  |   |                         |                               |            |
|                                   | The Contractor will provide condoms at appropriate places in the work camps. The campaigns will be continuously done by the relevant Government organisation even during operation phase of the road.   | Contractor                             | Presence of well stocked condom dispensers                  | Inspection              | Throughout Construction Phase |            |
|                                   | The implementing agency for HIV/AIDS campaign shall monitor activities regularly to assess effectiveness and impact.  | Contractor, Proponent and Stakeholders | Presence of well stocked dispensers and Public consultation | Inspection and Meetings | Quarterly Basis               | 850,000    |

| Risk Rating Color Code Legend/Key |  | High                                   | Substantial                               | Moderate                | Low                           |            |
|-----------------------------------|--|--|---|-------------------------|-------------------------------|------------|
| Expected Negative Impacts         | Recommended Mitigation Measures  | Responsible Party                      | Monitoring Parameters                     | Monitoring Means        | Time Frame                    | Cost (Ksh) |
|                                   | This should include an initial, interim and final assessment of basic knowledge, attitude and practices taking account of existing data sources and recognising the limitations due to the short timeframe to show behaviour change. The assessment will be supported by qualitative information from focus group discussions. |  |   |                         |                               |            |
|                                   | Implementation of initiatives which target knowledge, attitude, behaviour, prevention, treatment and care in collaboration with NSDCC at regional and local levels, NGOs and CBOs.   | Contractor, Proponent and Stakeholders | HIV/AIDS awareness and prevention reports | Inspection and Meetings | Throughout Construction Phase |            |

| Risk Rating Color Code Legend/Key  |  | High                                   | Substantial  | Moderate                | Low                           |              |
|--|--|--|--|-------------------------|-------------------------------|--------------|
| Expected Negative Impacts  | Recommended Mitigation Measures  | Responsible Party                      | Monitoring Parameters  | Monitoring Means        | Time Frame                    | Cost (Ksh)   |
|  | Interventions should give attention to high-risk groups, factors perpetuating risk behaviours, female headed households, child headed household, orphans, people living with AIDS, youth, school girls and boys.   | Contractor, Proponent and Stakeholders | Consideration of high-risk groups  | Inspection and Meetings | One-off                       |              |
| <b>Objective 16: To Reduce Pollution at Asphalt Plants and Hazardous Sites</b> |  |  |  |                         |                               |              |
| <b>Pollution at Asphalt Plants and Hazardous Sites</b>                         | <p>1. Abatement measures to regulate dust and air emissions from the AC plant include:</p> <ul style="list-style-type: none"> <li>▪ Well-designed sprinklers to be located at all points to contain dust pollution, using preferably collected rain water;</li> <li>▪ Use of water to wet all processes and</li> </ul> | Contractor                             | <ul style="list-style-type: none"> <li>▪ Compliance with EMC (Air Quality) Regulations, 2014;</li> <li>▪ Compliance with EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009;</li> </ul> | Inspection              | Throughout Construction Phase | 2,000,000.00 |

| Risk Rating Color Code Legend/Key |   | High              | Substantial  | Moderate         | Low        |            |
|-----------------------------------|---|-------------------|--|------------------|------------|------------|
|                                   |   |                   |  |                  |            |            |
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters  | Monitoring Means | Time Frame | Cost (Ksh) |
|                                   | <p>sources from which dust emanates;</p> <ul style="list-style-type: none"> <li>▪ The premises and access roads should be kept clean and free of dust at all times; and</li> <li>▪ Monitoring of dust emissions, notably particulate matter will be carried out on a regular basis.</li> </ul> <p>2. Odour controlling equipment such as scrubbers and filters to be incorporated.</p> <p>3. Necessary precautions shall be taken to ensure noise emitted from the plant is within permissible limits as per the Environmental and Occupational Standards for noise emission.</p> |                   | <ul style="list-style-type: none"> <li>▪ Compliance with Hazardous Substances Rules, 2007; and</li> <li>Compliance with Noise Prevention and Control Rules, 2005.</li> </ul> |                  |            |            |

| Risk Rating Color Code Legend/Key | High   | Substantial       | Moderate              | Low              |            |            |
|-----------------------------------|--|-------------------|-----------------------|------------------|------------|------------|
|                                   |  |                   |                       |                  |            |            |
| Expected Negative Impacts         | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters | Monitoring Means | Time Frame | Cost (Ksh) |
|                                   | <p>Mitigation measures include:</p> <ul style="list-style-type: none"> <li>▪ Noise generating equipment such as generators, compressors should be provided with appropriate noise attenuating materials/structures;</li> <li>▪ Proper and regular maintenance of equipment should be carried out;</li> <li>▪ Appropriate noise abatement measures to prevent noise nuisance to the surrounding environment;</li> <li>▪ Provision of</li> </ul> |                   |                       |                  |            |            |

| Risk Rating Color Code Legend/Key                    |  | High              | Substantial  | Moderate                    | Low                           |               |
|--|--|-------------------|--|-----------------------------|-------------------------------|---------------|
| Expected Negative Impacts                            | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters  | Monitoring Means            | Time Frame                    | Cost (Ksh)    |
|  | <p>appropriate PPE and regular medical screening for staff to the satisfaction of DOSHS; and</p> <ul style="list-style-type: none"> <li>Noise monitoring using calibrated noise meter will be carried out on a regular basis.</li> </ul> |                   |  |                             |                               |               |
| <b>Objective 17: To Minimize Pollution of Rivers</b> |  |                   |  |                             |                               |               |
| Pollution of Rivers                                  | Adherence to EMCA Cap 387 laws of Kenya, EMC (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulation (2009), Water Act (2016), and The Water Resources Regulations, 2021.   | Contractor        | Compliance to EMCA Cap 387 laws of Kenya, EMC (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulation (2009), Water Act (2016), and The Water | Observation and Inspections | Throughout Construction Phase | No added cost |

| Risk Rating Color Code Legend/Key |  | High                                   | Substantial                            | Moderate         | Low                               |               |
|-----------------------------------|--|--|--|------------------|-----------------------------------|---------------|
| Expected Negative Impacts         | Recommended Mitigation Measures                                      | Responsible Party                      | Monitoring Parameters                  | Monitoring Means | Time Frame                        | Cost (Ksh)    |
|                                   |  |  | Resources Regulations, 2021.           |                  |                                   |               |
|                                   | Rehabilitate, restore and sustainably manage the Nairobi River Basin | NRC, the Proponent, and the Contractor | Nairobi Basin Rehabilitation Programme | Observation      | Throughout the Construction Phase | No added cost |



| Risk Rating Color Code Legend/Key                     |   | High                             | Substantial           | Moderate         | Low                               |               |
|---|---|----------------------------------|-----------------------|------------------|-----------------------------------|---------------|
| Expected Negative Impacts                             | Recommended Mitigation Measures   | Responsible Party                | Monitoring Parameters | Monitoring Means | Time Frame                        | Cost (Ksh)    |
|   | <ul style="list-style-type: none"> <li>▪ Reduce on plastic consumption and reuse/recycle as much as possible;</li> <li>▪ Properly disposal of chemical cleaners, oil, and nonbiodegradable materials to keep them from going into the rivers;</li> <li>▪ Maintain machineries and vehicles so that they don't leak oil, antifreeze, or coolant on the ground; and</li> <li>▪ Remove all the solid waste that has been dumped into the stormwater drainage system of Outer Ring Road.</li> </ul> | The Contractor and the Proponent | Waste Management Plan | Observation      | Throughout the Construction Phase | No added cost |
| <b>Objective 18: To Minimise Soil Erosion Impacts</b> |   |                                  |                       |                  |                                   |               |

| Risk Rating Color Code Legend/Key |  | High                     | Substantial                   | Moderate                   | Low                           |               |
|-----------------------------------|--|--------------------------|-------------------------------|----------------------------|-------------------------------|---------------|
| Expected Negative Impacts         | Recommended Mitigation Measures  | Responsible Party        | Monitoring Parameters         | Monitoring Means           | Time Frame                    | Cost (Ksh)    |
| Controlling soil erosion          | Provide erosion protection works in the form of bed flooring and curtain or cut-off walls at the upstream and downstream ends of the new as well as the existing box/pipe culverts.  | Proponent and Contractor | Soil erosion control measures | Inspection and Observation | Throughout construction phase | No added cost |
|                                   | The Contractor shall take all reasonable precautions in connection with any rivers, streams, waterways, drains, water courses, lakes and the like to prevent as a consequence of the works, silting, erosion of beds and banks and pollution of the water that may adversely affect the quality or appearance thereof or cause injury or death to human, animal or plant life. | Proponent and Contractor | Soil erosion control measures | Inspection and Observation | Throughout construction Phase | No added cost |
|                                   | Soil erosion and sedimentation due to the surface runoff or water from   | Proponent and Contractor | Soil erosion control measures | Inspection and Observation | Throughout construction Phase | No added cost |

| Risk Rating Color Code Legend/Key                     |  | High                     | Substantial                   | Moderate                    | Low                           |               |
|---|--|--------------------------|-------------------------------|-----------------------------|-------------------------------|---------------|
| Expected Negative Impacts                             | Recommended Mitigation Measures  | Responsible Party        | Monitoring Parameters         | Monitoring Means            | Time Frame                    | Cost (Ksh)    |
|   | culverts or other drainage structures should be avoided by putting in place proper erosion control measures.   |                          |                               |                             |                               |               |
|   | The erosion protection works shall consist of dry rubble stone bed flooring and random rubble masonry curtain (cut-off) wall at the upstream and downstream ends of box/pipe culverts. | Proponent and Contractor | Soil erosion control measures | Inspection and Observation  | Throughout construction Phase | No added cost |
|   | Keep vegetation clearing to a minimum.   | Proponent and Contractor | Vegetation cover              | Inspection and Observation  | Throughout construction Phase | No added cost |
|   | Encourage re-vegetation as soon as the construction activities are complete, or plan to immediately rehabilitate the disturbed sites after use.  | Proponent and Contractor | Vegetation cover              | Inspection and Observation  | Throughout construction Phase | No added cost |
| <b>Objective 19: To Enhance Workplace Fire Safety</b> |  |                          |                               |                             |                               |               |
| <b>Fire Outbreak Risks</b>                            | ▪ The Contractor's staff shall undergo fire safety   | The Contractor           | Compliance with the Fire Risk | Inspection, and Fire Drills | Throughout the                | 500,000.00    |

| Risk Rating Color Code Legend/Key |   | High              | Substantial           | Moderate         | Low                |            |
|-----------------------------------|---|-------------------|-----------------------|------------------|--------------------|------------|
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters | Monitoring Means | Time Frame         | Cost (Ksh) |
|                                   | training and must be instructed in the correct use of fire-fighting equipment; <ul style="list-style-type: none"> <li>▪ The campsite shall have suitable emergency routes and exits with clear signs and no obstruction;</li> <li>▪ The Contractor shall provide a designated area for burning waste;</li> <li>▪ The Contractor shall have trained firefighting personnel armed with adequate fire-fighting equipment, including up-to date serviced and functional fire extinguisher, to deal with all fires;</li> <li>▪ Electrical system in the site to be installed and regularly maintained by a qualified electrician;</li> </ul> |                   | Reduction Rules, 2007 |                  | Construction Phase |            |

| Risk Rating Color Code Legend/Key   |  | High              | Substantial           | Moderate         | Low        |            |
|---|--|-------------------|-----------------------|------------------|------------|------------|
| Expected Negative Impacts   | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters | Monitoring Means | Time Frame | Cost (Ksh) |
|   | <ul style="list-style-type: none"> <li>▪ High-intensity lights should not be hidden or placed near flammable material;</li> <li>▪ The Contractor shall prohibit smoking in areas of high fire risk and only allow it at designated “smoking areas”;</li> <li>▪ The Contractor to ensure any welding activity is undertaken in areas free of flammable materials; and</li> <li>▪ The Contractor shall stop all welding activities at least 1 hour before closing the site for the day. Fire checks shall be made in intervals of 30 minutes and at least 1 hour to the end of shift.</li> </ul> |                   |                       |                  |            |            |
| <b>Objective 20: To Mitigate against Impacts Associated with Demolition of Warehouses at the Depot Site</b> |  |                   |                       |                  |            |            |

| Risk Rating Color Code Legend/Key                                      |  | High              | Substantial   | Moderate   | Low                             |               |
|--|--|-------------------|---|--|---------------------------------|---------------|
|  |  |                   |   |  |                                 |               |
| Expected Negative Impacts  | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters   | Monitoring Means   | Time Frame                      | Cost (Ksh)    |
| <b>Air &amp; Noise Pollution, and Generation of Solid Waste</b>        | <ul style="list-style-type: none"> <li>Adherence to EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 and Noise Prevention and Control Rules, 2005.</li> </ul>                         | Contractor        | Noise and Vibration levels measurements                               | Observation and Inspection   | During Demolition of Warehouses | 100,000.00    |
|  | <ul style="list-style-type: none"> <li>Ambient air quality measurements are undertaken and maintained in compliance with EMC (Air Quality) Regulation, 2014.</li> </ul>  |                   | Ambient air quality measurement                                       |  |                                 | 100,000.00    |
|  | <ul style="list-style-type: none"> <li>Adherence to EMC (Waste Management) Regulations, 2006 and Sustainable Solid Waste Management Act, 2022 are the minimum guidelines in solid waste management.</li> </ul> |                   | Solid Waste Management Plan   |  |                                 | No added Cost |
| <b>Objective 21: To Protect the Locals from Expected Labour Influx</b> |  |                   |   |  |                                 |               |
| <b>Labour Influx Impact</b>  | <ul style="list-style-type: none"> <li>Prepare a labour influx plan to manage labour</li> </ul>  | Contractor        | <ul style="list-style-type: none"> <li>Compliance with the</li> </ul> | <ul style="list-style-type: none"> <li>Monitoring of the labour</li> </ul> | Throughout the Construction     | 200,000.00    |

| Risk Rating Color Code Legend/Key |   | High              | Substantial   | Moderate  | Low        |            |
|-----------------------------------|---|-------------------|---|---|------------|------------|
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters   | Monitoring Means  | Time Frame | Cost (Ksh) |
|                                   | influx;<br><ul style="list-style-type: none"> <li>▪ Casuals and skilled (if available) labour to be sourced from the local population as far as possible to minimize on influx of foreigners into the community;</li> <li>▪ Use of manual labour where possible to ensure more employment of locals and hence ensure support of the Project throughout the construction phase;</li> <li>▪ Sensitize workers on the different cultures and inculcate tolerance;</li> <li>▪ Monitor potential occurrence of annoyance and conflicts that may arise from differences in lifestyle and culture between community and</li> </ul> |                   | Kenya's labour laws as provided in the Employment Act Cap 226;<br><ul style="list-style-type: none"> <li>▪ Effectiveness of the labour influx plan; and</li> <li>▪ Incidences of conflicts</li> </ul> | standards;<br>and<br><ul style="list-style-type: none"> <li>▪ Regular inspection of Contractor's workforce composition in terms of area of origin.</li> </ul> | Phase      |            |

| Risk Rating Color Code Legend/Key  |  | High                | Substantial  | Moderate   | Low                               |            |
|--|--|---------------------|--|--|-----------------------------------|------------|
| Expected Negative Impacts  | Recommended Mitigation Measures  | Responsible Party   | Monitoring Parameters  | Monitoring Means   | Time Frame                        | Cost (Ksh) |
|  | in-migrants; and <ul style="list-style-type: none"> <li>The Contractor shall ensure that the GRM addresses issues related to labour influx.</li> </ul>   |                     |  |  |                                   |            |
| <b>Objective 22: To Protect against Gender Based Violence, Sexual Harassment and Sexual Exploitation and Abuse</b> |  |                     |  |  |                                   |            |
| Increased GBV, SH and SEA  | Implementation of a GBV strategy, which will include: <ul style="list-style-type: none"> <li>Gender mainstreaming in the Project with opportunities provided for females to work, in consonance with local laws and customs;</li> <li>Liaise with KURA to ensure NGOs concerned with GBV issues to be engaged as early as possible before construction commences since GBV, SH and SEA will arise early in the Project;</li> </ul> | Contractor and KURA | <ul style="list-style-type: none"> <li>Tracking of GBV, SH and SEA related incidents in the Project;</li> <li>Review of grievance redress forms; and</li> <li>Number of complaints.</li> </ul> | <ul style="list-style-type: none"> <li>Reviewing how recorded and reported incidents are handled; and</li> <li>Interviews with staff and local community.</li> </ul> | Throughout the Construction Phase | 500,000.00 |



| Risk Rating Color Code Legend/Key |  | High              | Substantial           | Moderate         | Low        |            |
|-----------------------------------|--|-------------------|-----------------------|------------------|------------|------------|
|                                   |  |                   |                       |                  |            |            |
| Expected Negative Impacts         | Recommended Mitigation Measures  | Responsible Party | Monitoring Parameters | Monitoring Means | Time Frame | Cost (Ksh) |
|                                   | <ul style="list-style-type: none"> <li>▪ GRM that incorporates non-retaliation and specific procedures for GBV;</li> <li>▪ Prepare and enforce a “No Sexual Harassment” and “Non-Discrimination Policy”;</li> <li>▪ Prepare and enforce a code of conduct that will be signed by all project workers prohibiting GBV, SEA and SH by workers and providing an accountability and response framework including nonretaliation against those who report;</li> <li>▪ Establish partnerships with relevant government agencies, GBV Service Providers and NGOs to ensure</li> </ul> |                   |                       |                  |            |            |

| Risk Rating Color Code Legend/Key                             |   | High              | Substantial           | Moderate         | Low        |            |
|---|---|-------------------|-----------------------|------------------|------------|------------|
|   |   |                   |                       |                  |            |            |
| Expected Negative Impacts                                     | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters | Monitoring Means | Time Frame | Cost (Ksh) |
|   | <p>survivors of GBV and sexual offences access survivor centred services such as medical care, psychosocial support, legal redress, safety, etc as and when necessary;</p> <ul style="list-style-type: none"> <li>▪ Provision of gender disaggregated facilities - separate bathing, changing, sanitation facilities for men and women; and</li> <li>▪ Prepare GRM with specific procedures for GBV including confidential reporting with safe, and ethical documenting of GBV cases should be set up for the workers and community.</li> </ul> |                   |                       |                  |            |            |
| <b>Objective 23: Mitigate against Project Impact on Women</b> |   |                   |                       |                  |            |            |

| Risk Rating Color Code Legend/Key                          |   | High              | Substantial   | Moderate   | Low                               |               |
|--|---|-------------------|---|--|-----------------------------------|---------------|
| Expected Negative Impacts                                  | Recommended Mitigation Measures   | Responsible Party | Monitoring Parameters   | Monitoring Means   | Time Frame                        | Cost (Ksh)    |
| <b>Adverse Impact on Women</b>                             | <ul style="list-style-type: none"> <li>▪ Ensure equitable distribution of employment opportunities between men and women;</li> <li>▪ Provide toilets and bathrooms for both male and female workers on site; and</li> <li>▪ Involve women in periodic dialogues/consultations with the Contractor and host communities to enable them handle their other roles while working in the Project.</li> </ul> | Constructor       | <ul style="list-style-type: none"> <li>▪ Compliance with the one third gender rule as provided in the Constitution of Kenya 2010;</li> <li>▪ Number of female employees; and</li> <li>▪ Number of male and female toilets.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Physical Inspection;</li> <li>▪ Review of company staff records; and</li> <li>▪ Physical Inspection.</li> </ul> | Throughout the Construction Phase | 100,000.00    |
| <b>Objective 24: Mitigate against Increased Insecurity</b> |   |                   |   |  |                                   |               |
| <b>Adverse impact on security</b>                          | No worker with criminal records will be engaged in the Project.   | Contractor        | Police Good Conduct Certificate   | Verification   | Annually                          | No added cost |

| Risk Rating Color Code Legend/Key                               |   | High                      | Substantial  | Moderate         | Low                            |               |
|---|---|---------------------------|--|------------------|--------------------------------|---------------|
| Expected Negative Impacts                                       | Recommended Mitigation Measures   | Responsible Party         | Monitoring Parameters                                      | Monitoring Means | Time Frame                     | Cost (Ksh)    |
|   | Every worker to be easily identifiable when on site   | Contractor and Proponent  | Contractor's or KURA's clearly branded reflective jackets. | Observation      | Throughout the Contract Period | 1,000,000.00  |
|   | Works to be strictly carried out during the day unless approved by the RE and security services providers in the area.                            | Contractor                | Approval from the RE and security services providers       | Verification     | Throughout the Contract Period | 500,000.00    |
| <b>Objective 25: To Mitigate against Climate Change Impacts</b> |   |                           |  |                  |                                |               |
| Flooding Risk   | The BRT design to utilize assessment guide by ensuring the BRT System is elevated in areas where flooding is common.                              | Contractor, and Proponent | Use of assessment guide                                    | Observation      | During Construction Phase      | No added cost |
|   | The BRT Project System to have an option for collecting floodwater before it pools by placing rain barrels on the side of the BRT infrastructure. | Proponent and Contractor  | Flood water system   | Observation      | During Construction Phase      | 1,000,000.00  |

| Risk Rating Color Code Legend/Key |   | High                   | Substantial   | Moderate                   | Low                                  |               |
|-----------------------------------|---|------------------------|---|----------------------------|--------------------------------------|---------------|
| Expected Negative Impacts         | Recommended Mitigation Measures   | Responsible Party      | Monitoring Parameters                               | Monitoring Means           | Time Frame                           | Cost (Ksh)    |
|                                   | Removal of solid wastes from the existing BRT drainage system.  | The Proponent and NCCG | Solid Waste Management Plan                         | Observation and Inspection | Throughout the Construction Phase    | No added cost |
|                                   | Mapping out the section of Outer Ring Road prone to flooding and installation of flood barriers along the side of the BRT corridor to prevent water from pooling. | The Proponent          | Flood Barrers                                       | Observation                | During Desing and Construction Phase | 500,000.00    |
|                                   | Involve relevant experts on appropriate outfall where stormwater will be channeled  | The Proponent          | Provision of Outfalls                               | Observation                | During Construction Phase            | 200,000.00    |
| <b>Impact on Vegetation</b>       | Development of green corridors and roadside vegetation.   | The Proponent          | Tree planting and Landscaping                       | Observation                | Throughout the Project Cycle         | No added cost |
| <b>Increased Temperatures</b>     | Tree planting   | The Proponent          |   |                            |                                      |               |
|                                   | Implement resource use efficiency [energy, petroleum products, water etc.].   | Contractor             | Compliance with EMC (Air Quality) Regulations, 2014 | Inspection                 | One-off                              | No added cost |

| Risk Rating Color Code Legend/Key  |   | High                         | Substantial                 | Moderate         | Low                         |               |
|--|---|------------------------------|-----------------------------|------------------|-----------------------------|---------------|
| Expected Negative Impacts  | Recommended Mitigation Measures   | Responsible Party            | Monitoring Parameters       | Monitoring Means | Time Frame                  | Cost (Ksh)    |
|  | Use of heat-resistant road materials.   | The Contractor               | Material testing            | Observation      | During Construction Phase   | 500,000.00    |
|  | Greater use of concrete due to its higher temperature resistance.                   |                              | Use of Concrete             |                  |                             | No added cost |
|  | Cooling the BRT pavements with water.   |                              | Regular sprinkling of water |                  |                             |               |
| Soil erosion and sedimentation   | Planting grass and shrubs on bare soil.   | The Proponent                | Grass and shrubs            | Observation      | During Construction Phase   | 300,000.00    |
|  | Constructing retaining walls to support loose soil and unstable ground.             | The Contractor               | Retaining walls             |                  |                             | 10,000,000.00 |
|  | Stone pitching of drainage structures along the slopes, embankments, or riverbanks. |                              | Stone pitching              |                  |                             |               |
|  | Construction of gabions.  |                              | Gabions                     |                  |                             |               |
| <b>Objective 26: Mitigate against Non-Compliance with ESMMP and EIA License Conditions</b> |   |                              |                             |                  |                             |               |
| Violation of Statutory and Contractual provisions  | Provisions for ESMMP implementations to be included in the Contract Documents.      | The Proponent through the DG | The Contract Documents      | Verification     | During Contract Preparation | No added Cost |

| Risk Rating Color Code Legend/Key |  | High                             | Substantial            | Moderate                   | Low                            |               |
|-----------------------------------|--|----------------------------------|------------------------|----------------------------|--------------------------------|---------------|
| Expected Negative Impacts         | Recommended Mitigation Measures  | Responsible Party                | Monitoring Parameters  | Monitoring Means           | Time Frame                     | Cost (Ksh)    |
|                                   | Monthly Environmental and Social Monitoring to identify and described the environmental and social impacts, propose their respective mitigation measures and the scope of monitoring activities to the Contractor. | Environmentalist and Sociologist | Monthly Reports        | Observation and Inspection | Throughout the Contract Period | No added Cost |
|                                   | Adheres to all the EIA license conditions  | Contractor and DD-ESS            | EIA License Conditions | Observation and Inspection | Throughout the Contract Period | No added Cost |

#### **11.4.1 Operational Phase ESMMP**

An operational phase ESMMP provides specific guidance related to the operational activities associated with a particular Project. It is focused on sound environmental management practices that will be undertaken to minimise adverse impacts on the environment through normal operation of a facility. The operational management plan further identifies what measures should be taken in the event of emergencies or incidents during the operation of the proposed Project. The roles and responsibilities for mitigation, monitoring and performance assessment for the operational life of the development are specified in the ESMMP. **Table 59** overleaf shows the operation phase of the proposed Project.



Table 59: Environmental and Social Management and Monitoring Plan for the Operational Phase

| Risk Rating Color Code:<br>Legend/Key   |   | High                   | Substantial           | Moderate                   | Low                        |               |
|---|---|------------------------|-----------------------|----------------------------|----------------------------|---------------|
| Expected Negative Impacts   | Recommended Mitigation Measures   | Responsible Party      | Monitoring Parameters | Monitoring Means           | Time Frame                 | Cost (Ksh)    |
| <b>Objective 1: To Minimise Solid Waste Generation and Ensuring More Efficient Solid Waste Management</b> |   |                        |                       |                            |                            |               |
| Poor Solid Waste Management   | Identify proper sites for solid waste disposal.   | NCCG and the Proponent | Waste management plan | Inspection and Observation | Throughout Operation Phase | No added cost |
|   | Abide by the provisions of EMC (Waste Management) Regulations, 2006 for sound solid waste management, and Sustainable Solid Waste Management Act, 2022  | Proponent, NCCG, NEMA  | Waste management plan | Inspection                 | Throughout Operation Phase | No added cost |
| <b>Objective 2: To Minimise Road Accidents</b>  |   |                        |                       |                            |                            |               |
| Road Accidents  | Examine road design standards, safety equipment specifications and training to ensure that design details take account of safety concerns and that specific safety features are correctly designed and installed. | Proponent              | Road designs          | Inspection                 | One-off                    | No added cost |
|   | Road design audits to be done at final design stages, by specialists in road safety and traffic operations.   | Proponent              | Road safety audit     | Inspection and Observation | Throughout operation phase | No added cost |
|   | Draft traffic management plans, including   | Proponent              | Traffic               | Inspection and             | Throughout                 | No added      |

| Risk Rating Color Code:<br>Legend/Key |   | High                     | Substantial                     | Moderate                   | Low                        |               |
|---------------------------------------|---|--------------------------|---------------------------------|----------------------------|----------------------------|---------------|
| Expected Negative Impacts             | Recommended Mitigation Measures   | Responsible Party        | Monitoring Parameters           | Monitoring Means           | Time Frame                 | Cost (Ksh)    |
|                                       | details of signs, markings, and intersection layouts, channelization of flows, access restrictions, footpaths, bus stops, and provisions for NMT. | and Contractor           | management plan                 | Observation                | operation phase            | cost          |
|                                       | Painting of edge lines in order to separate shoulders.  | Proponent and Contractor | Road marking                    | Inspection and Observation | One-off                    | No added cost |
|                                       | Provision of traffic signals with phases for bicyclists.  | Proponent                | Traffic signs and signals       | Inspection and Observation | One-off                    | No added cost |
|                                       | Establishment of non-motorised vehicle waiting area.  | Proponent and Contractor | Road design                     | Inspection and Observation | Throughout operation phase | No added cost |
|                                       | Separation of motorised and NMT.  | Proponent and Contractor | Road designs                    | Inspection and Observation | Throughout operation phase | No added cost |
|                                       | Improvement of visibility.  | Proponent and NCCG       | Road design                     | Inspection and Observation | One-off                    | No added cost |
|                                       | Provision of speed limit signs.   | Proponent and Contractor | Presence of speed limit signage | Inspection and Observation | One-off                    | No added cost |

| Risk Rating Color Code:<br>Legend/Key |   | High   | Substantial                        | Moderate         | Low                       |               |
|---------------------------------------|---|--|------------------------------------|------------------|---------------------------|---------------|
| Expected Negative Impacts             | Recommended Mitigation Measures   | Responsible Party                                      | Monitoring Parameters              | Monitoring Means | Time Frame                | Cost (Ksh)    |
|                                       | Construction of bumps to reduce speeds.   | Contractor   | Presence of speed calming measures | Inspection       | One-off                   | No added cost |
|                                       | Improvement of crossing sites paintings of zebra crossings.   | Contractor   | Road marking                       | Inspection       | One-off                   | No added cost |
|                                       | Regulations, educations and safety trainings.   | Proponent, Traffic Police, NTSA and Stakeholders       | Road safety campaigns              | Inspection       | Periodically              | No added cost |
|                                       | Road safety and accident prevention campaigns are recommended at the end of construction.   | Proponent, Traffic Police, NTSA and other Stakeholders | Road safety campaigns              | Inspection       | One-off                   | No added cost |
|                                       | To monitor the effectiveness of the road safety information and education campaigns, the following measures are recommended:<br><br><ul style="list-style-type: none"> <li>▪ Monitor traffic accidents through records kept at the local police stations along the Project Road; and</li> </ul> | Proponent  | Traffic records                    | Inspection       | Two Years from end of DLP | No added cost |

| Risk Rating Color Code:<br>Legend/Key                                 |  | High                    | Substantial  | Moderate                   | Low                        |               |
|---|--|-------------------------|--|----------------------------|----------------------------|---------------|
| Expected Negative Impacts   | Recommended Mitigation Measures  | Responsible Party       | Monitoring Parameters                                    | Monitoring Means           | Time Frame                 | Cost (Ksh)    |
|   | <ul style="list-style-type: none"> <li>A report will be required after two years of monitoring and the results used to recommend further mitigation measures, if necessary.</li> </ul> |                         |  |                            |                            |               |
| <b>Objective 3: To Minimise Noise Pollution Impacts</b>               |  |                         |  |                            |                            |               |
| Noise Pollution   | Vehicles using the road should adhere to the Traffic Act Cap 403 where they are supposed to keep the vehicles in roadworthy conditions.  | Traffic Police & NTSA   | Adherence with Traffic Act Cap 403                       | Inspection                 | One-off                    | No added cost |
|   | Road users to adhere to EMC (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.   | Traffic Police and NEMA | Adherence with Noise and Excessive Vibration Regulations | Inspection                 | Throughout operation phase | No added cost |
| <b>Objective 4: To Control Air Pollution Impacts</b>                  |  |                         |  |                            |                            |               |
| Air Pollution from Fuel Combustion                                    | Use of alternative fuels preferably lead free-fuels.   | Motorists               | Compliance with EMC (Air Quality) Regulations, 2014      | Point source sampling      | Periodically               | No added cost |
|   | Proper vehicle maintenance and servicing   | Motorists               |  | Observation and inspection | Periodically               | No added cost |
|   | Vehicles at the parking bays should not be left running.   | Motorists and NCCG      |  | Inspection                 | Continuous                 | No added cost |
| <b>Objective 5: To Minimise Erosion and Water Quality Degradation</b> |  |                         |  |                            |                            |               |

| Risk Rating Color Code:<br>Legend/Key                               |   | High                     | Substantial                              | Moderate                   | Low                              |               |
|---|---|--------------------------|--|----------------------------|----------------------------------|---------------|
| Expected Negative Impacts   | Recommended Mitigation Measures   | Responsible Party        | Monitoring Parameters                    | Monitoring Means           | Time Frame                       | Cost (Ksh)    |
| Erosion and Water Quality Degradation                               | Maintenance Engineers from KURA shall inspect all drainage structures and outfalls.   | Proponent                | Road maintenance                         | Inspection                 | One-off                          | No added cost |
|   | All the damaged culverts, wing walls and aprons shall be repaired and additional measures for velocity reduction and erosion protection shall be implemented in case of development of erosion.   | Proponent and Contractor | Road maintenance                         | Inspection                 | One-off                          | 850,000.00    |
| <b>Objective 6: To Mitigate against Improper E-Waste Management</b> |   |                          |  |                            |                                  |               |
| Generation of E-Waste   | Adherence with EMC (Waste Management) Regulations, 2006.  | Proponent                | EMC (Waste Management) Regulations, 2006 | Inspection and Observation | Periodically                     | No added cost |
|   | <ul style="list-style-type: none"> <li>▪ Develop and implement e-waste management plan;</li> <li>▪ Incorporating health protection measures during Operation Phase of BRT Line 5;</li> <li>▪ Monitor e-waste sites and surrounding communities;</li> <li>▪ Implement and monitor interventions that improve informal e-waste</li> </ul> | Proponent                | E-Waste Management Plan                  | Inspection and Observation | Throughout the Operational Phase | 300,000.00    |

| Risk Rating Color Code:<br>Legend/Key   |   | High                                     | Substantial                          | Moderate                    | Low                           |              |
|---|---|--|--------------------------------------|-----------------------------|-------------------------------|--------------|
| Expected Negative Impacts   | Recommended Mitigation Measures   | Responsible Party                        | Monitoring Parameters                | Monitoring Means            | Time Frame                    | Cost (Ksh)   |
|   | recycling activities, protect public health and ensure vital sources of community revenue; and, <ul style="list-style-type: none"> <li>▪ Educating workers across all levels on e-waste management and related health issues.</li> </ul>  |  |                                      |                             |                               |              |
| <b>Objective 7: To Minimize on Labour Impacts to the Matatu Industry Dependents</b> |   |  |                                      |                             |                               |              |
| Labour Impacts on Matatu Industry Dependents  | <ul style="list-style-type: none"> <li>▪ Initiate appropriate measures to minimize job loss in the matatu industry or introduce new opportunities for job creation through reforms and integration of the matatu industry through serious engagement and inclusion of the matatu workforce in the BRT Line 5 planning process.</li> </ul> | Proponent and Consultant                 | Minutes and Attendance Registers     | Audits                      | Throughout the Planning Phase | 500,000.00   |
|   | <ul style="list-style-type: none"> <li>▪ Provide and improve feeder routes and transport services along Outer Ring Road to integrate them properly with BRT Line 5.</li> </ul>  | The Proponent, Consultant and Contractor | Feeder routes serving the BRT Line 5 | Observation and inspections | One-off                       | 2,000,000.00 |

### **11.4.2 Decommissioning Strategy**

Decommissioning refers to the formal process of removing something from the operational status. It requires time in order to properly deal with potentially hazardous materials that may be encountered.

Decommissioning a road or a section of the road (as may be applicable to roads in Kenya) means to set up an “unneeded-for-now” road so that it does not require maintenance and its potential sediment yield, both chronic and catastrophic, is eliminated or greatly reduced. For most roads, most of the construction investment is preserved, and should we wish to reconstruct, the cost is minimal.

A typical decommissioning treatment involves removing culverts, ripping the road surface, removal of unstable fills, and configuration for long-term drainage, which includes measures such as out-sloping, water-barring, ditch removal, and a variety of other site-specific drainage solutions. It does not include full out-sloping/re-contouring of road sections, unless this is clearly necessary for sediment yield reduction, which is unusual. A decommissioned road is "storm-proofed" or - "hydrologically obliterated," even though the landscape is not restored to near-original shapes.

In order to achieve proper operational controls for the road decommissioning, **Figure 4** overleaf provides a flow chart with key steps that should be followed:

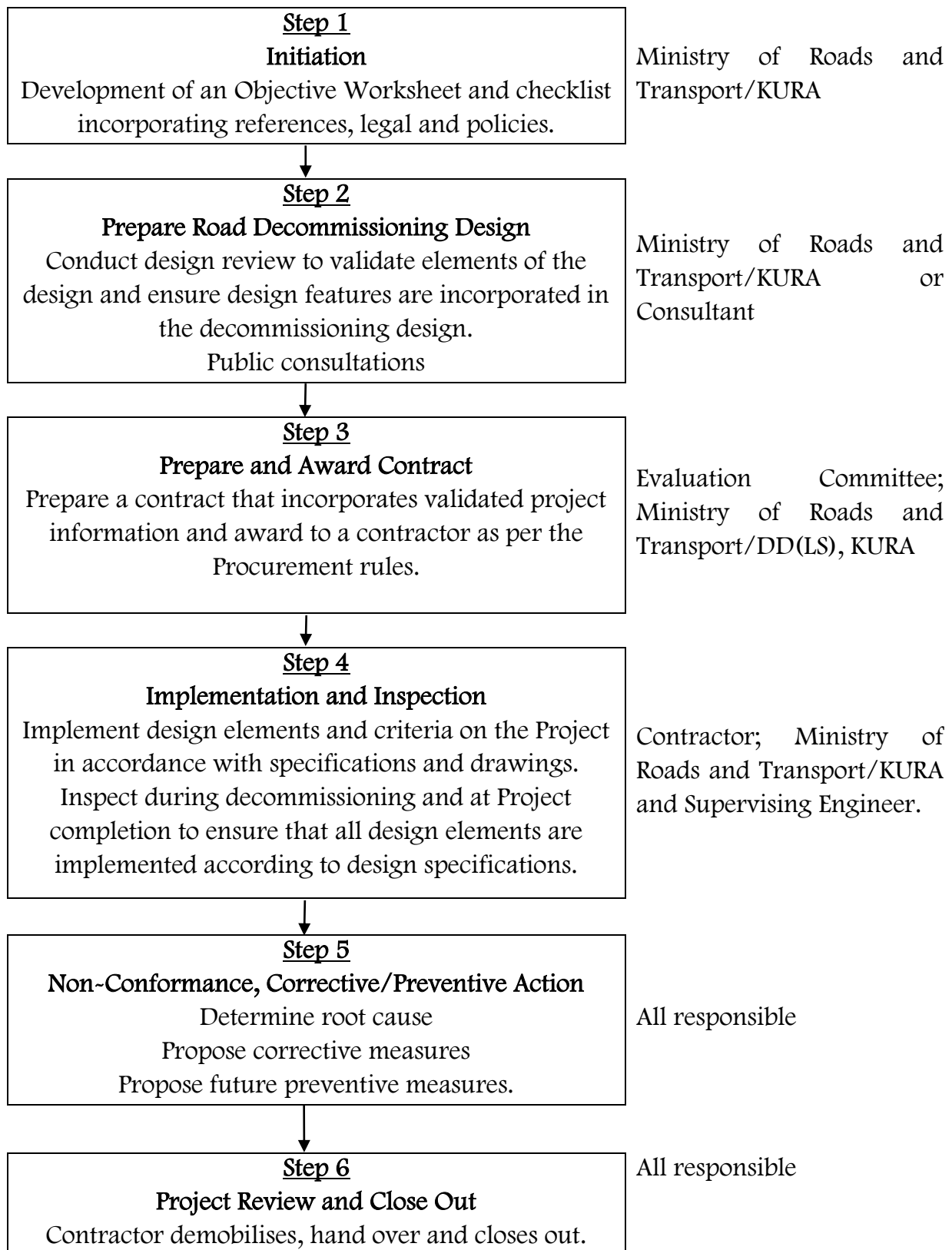


Figure 4: Flow Chart for Decommissioning



## 12. CONCLUSION AND RECOMMENDATIONS

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The proposed Establishment of BRT Line 5 along Outer Ring Road in Nairobi City County is positive in the overall and hereby recommended for approval by means of an EIA licence and be allowed to proceed, on condition that strict adherence to the proposed ESMP shall be observed. Further to this, the following specific recommendations are made with respect to the proposed Project:

- The Proponent and Contractor should ensure that all-natural resources including water, flora and fauna are protected and conserved during design, construction and operation and lost flora caused by the activities of the Project are replaced;
- The Contractor should ensure that construction of all components in the proposed Project is carried out in accordance with the Designs;
- The Contractor and the Proponent should ensure that the Stakeholders' views are fully incorporated and that any unforeseen impacts are immediately notified to KURA's DD-ESS to ensure that they are immediately addressed and mitigated;
- The Contractor and the Proponent should ensure that relocation of services is carried out in liaison with the various service providers to ensure minimal disruption;
- The Proponent should ensure that the relocation of PAPs is carried out in adherence to the mitigation measures herein proposed and in liaison with the relevant institutions;
- The Contractor should ensure that the proposed mitigation measures are put in place to ensure that noise, vibrations and dust are managed to acceptable levels;
- Noise mitigation measures will be necessary during the implementation of the BRT Line 5 project to address these elevated noise levels along Outer Ring Road;
- The Contractor should implement appropriate measures to enhance safety and health at the various sites in relation to the proposed Project;
- The Contractor should implement a traffic management plan acceptable to the Proponent;
- The Proponent to ensure that the BRT system is effectively implemented for it to be a key component strategy in combating climate change and building a more resilient and livable city;
- The Contractor should put in place appropriate measures to manage waste emanating from Project construction activities;
- The Contractor should ensure maintenance of road safety throughout construction of the proposed Project;
- Land contamination and erosion should be mitigated accordingly, and measures should be put in place by the Contractor to prevent the occurrence of such incidences;
- The Contractor will implement measures as proposed in this report and others in the field to ensure that fire incidents are prevented, minimised or managed;
- During construction and operations, the Contractor and Proponent should ensure that trainings and campaigns on key issues including HIV/AIDS, STDs, road safety

awareness, capacity assistance to project monitoring units, tool box talks for site labour and livelihood change appraisals are undertaken;

- The Proponent should institute surveillance measures to control developments along the Project Road's corridor; and
- The Proponent and the Contractor should engage the Stakeholders in developing GRM for the proposed Project to ensure timely resolution of issues and problems that might be triggered by the proposed Project.

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