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Ministry of Works, Transport and Communication
Tanzania National Roads Agency



Economic Evaluation, Detailed Engineering Design, Detailed Environmental and Social Impact Assessment, Preparation of Bidding Documents for Port Access Section and The Dar es Salaam Bus Rapid Transit (BRT) Infrastructure – Phase 5

(Contract No. TRD/HQ/1009/2017/18)

(FINAL DETAIL DESIGN REPORT)

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT(ESIA) REPORT

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KUNHWA Engineering & Consulting Co., LTD.



AQGOLA Engineering & Management Services LTD.

BUS RAPID TRANSIT

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ABBREVIATIONS & ACRONYMS

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
AC	Asphalt Concrete
AFCS	Automatic Fare Collection System
AFD	French Agency for Development
Aol	Area of Influence
ATS	Anti-Trafficking Secretariat
BAP	Biodiversity Action Plan
BATNEEC	Best Available Technology Not Entailing Excess Cost
BMP	Blasting Management Plan
BOD	Biochemical Oxygen Demand
BOQ	Bill of Quantities
BPOCP	Borrow Pits Operation and Closure Management Plan
BPQORP	Borrow Pits and Quarry Operation and Reinstatement Plan
BRT	Bus Rapid Transit
CAPP	Child Abuse Protection Plan
CBA	Cost Benefit Analysis
CBD	Central Business District
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CEDAW	Committee on the Elimination of Discrimination Against Women
CFC's	Chlorofluorocarbons
CITES	Convention on International Trade in Endangered Species
COD	Chemical Oxygen Demand
CPC	Project Continuity Plan
CPI	Corruption Perceptions Index
CRP	COVID-19 Response Plan
CSOs	Civil society organizations

CTI	Confederation of Tanzania Industries
CWCA	Centre for Widows and Children Assistance
DARCOBOA	Dar es Salaam Commuter Bus Owners Association
DART	Dar Rapid Transit Agency
DAWASA	Dar es Salaam Water and Sewerage Authority
DDT	Defensive Driving Techniques
DED	Detailed Engineering Design
DIA	Direct Impact Area
DLP	Defects Liability Period
DMPD	Dar es Salaam Metropolitan Development Project
DMRS	Dar es Salaam Marine Reserves System
DUTMP	Dar es Salaam Urban Transport Master Plan
DUTP	Dar es Salaam Urban Transport Improvement Project
EBRD	European Bank for Reconstruction and Development
EHSGs	Environmental, Health, and Safety (EHS) Guidelines
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMA	Environmental Management Act
EMP	Environmental Monitoring Plans
ERP	Emergency Response Plan
ESCP	Environmental and Social Commitment Plan
ESIA	Environmental & Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESS	Environmental and Social Standards
EWURA	Energy and Water Utilities Regulatory Authority
FBOs	Faith-Based Organizations
FDCs	Folk Development Colleges
FGDs	Focus Group Discussions
FGM	Female Genital Mutilation
FR	Forest Reserve
FYDP	Five Year Development Plan
GAP	Gender Action Plan

GBV	Gender-Based Violence
GBVAP	Gender Based Violence Action Plan
GCLA	Government Chemist Laboratory Authority
GDI	Gender Development Index
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GII	Gender Inequality Index
GPI	Global Peace Index
GRM	Grievance Redress Mechanism
HDI	Human Development Index
HDM	Design and Maintenance Model
HDRO	Human Development Report Office
HSMP	Health and Safety Management Plan
IBA	Important Birds Area
ICP	Informed Consultation and Participation
IDA	International Development Association
IFC	International Finance Corporation
IFC PS	International Finance Corporation Performance Standards
IIA	Indirect Influence Area/ SIA Secondary Impact Area
IMF	International Monetary Fund
IMP	Influx Management Plan
IOM	International Organization for Migration
IRR	Internal Rate Return
ISO	International Organization for Standardization
ITCS	Intermodal Transport and Control System
ITS	Intelligent Transportation System
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
KBAs	Key Biodiversity Areas
Kg	Kilograms
KII	Key Informant Interviews
KIWOHEDE	Kiota Women's Health and Development
KV	Kilovolt

LATRA	Land Transport Regulatory Authority
LGA	Local Government Authority
LHRC	Legal and Human Rights Centre
LHS	Left Hand Side
LRMP	Labour Recruitment and Management Plan
MDAs	Ministries, Departments and Agencies
MEMO	Municipal Environmental Officer
MOH	Ministry of Health
MoHA	Ministry of Home Affairs
MoW RGDM	Ministry of Works Road Geometric Design Manual
MPI	Multi-dimensional Poverty Index
MPRU	Marine Parks and Reserves Unit
NAPVAWC	National Action Plan for Violence Against Women and Children
NEMC	National Environment Management Council
NGOs	Non-Government Organizations
NICTBB	National ICT Broadband Backbone
NMT	Non-Motorized Transport
NOLA	National Organization for Legal Assistance
NPV	Net Present Values
NSGRP	National Strategy for Growth and Reduction of Poverty
NSSF	National Social Security Fund
OHSMP	Occupational Health and Safety Management Plan
OSC	One Stop Centre
OSHA	Occupational Safety and Health Authority
PAHs	Project-Affected Households
PAPs	Project Affected Persons
PCC	Portland Cement Concrete
PGCD	Police Gender and Children Desk
PIA	Primary Impact Area
PLHIV	People Living With HIV/AIDS
PO-RALG	President's Office Regional Administration and Local Governments

PPE	Personal Protective Equipment
PPV	Peak Particle Velocity
PRUS	Project Road User Survey
PS	Performance Standards
PSEA	Protection Against Sexual Exploitation and Abuse
PTR	Pneumatic Tired Roller
PWA	Persons with Albinism
QSOCP	Quarry Site Operation and Closure Plan
RAP	Resettlement Action Plan
RHS	Right Hand Side
RoW	Right of Way
RPF	Resettlement Policy Framework
RTPIS	Real Time Passengers Information System
SAGETA	Save your Generation Tanzania
SEP	Stakeholder Engagement Plan
SGR	Standard Gauge Railway
SIA	Secondary Impact Area
SMS	Surveillance and Monitoring Systems
SPCP	Spill Prevention and Contingency Plan
SPPS	Statistical Package for Social Science
STIs/STDs	Sexually transmitted infections/ Sexually Transmitted Diseases
TAC	Technical Advisory Committee
TACAIDS	Tanzania Commission for AIDS
TANESCO	Tanzania Electric Supply Company Limited
TANROADS	Tanzania National Roads Agency
TARURA	Tanzania Rural and Urban Roads Agency
TATOA	Tanzania Truck Owners Association
TAZARA	Tanzania Zambia Railway Authority
TBS	Tanzania Bureau of Standards
TCRA	Tanzania Communications Regulatory Authority
TDV	Tanzania Development Vision
TFS	Tanzania Forestry Services Agency

TGNP	Tanzania Gender Network Program
TIP	Trafficking in Persons
TMP	Traffic Management Plan
ToR	Terms of Reference
TPA	Tanzania Ports Authority
TPDC	Tanzania Petroleum Development Corporation
TRA	Tanzania Revenue authority
TRC	Tanzania Railways Corporation
TRRL	Transport and Road Research Laboratory
TSIP	Transport Sector Investment Programme
TVOC	Total Volatile Organic Compounds
TZS	Tanzanian Shilling
UN	United Nations
UNDP	United Nations Development Program
UNFCC	United Nations Framework Convention on Climate Change
URP	Utility Relocation Plan
VAC	Violence Against Children
VEC	Valued Ecosystem Component
VICOPA	Village Community Bank
VPO	Vice President's Office
VPO-DoE	Vice President's Office - Division of Environment
VTCs	Vocational Training Centres
WB's OP/BP	World Bank's Operational Policy/Bank Procedures
WHO	World Health Organization
WIA	Wider Influence Area
WISE	Women in Social Entrepreneurship
WMP	Waste Management Plan
WRBWB	Wami/Ruvu Basin Water Board

EXECUTIVE SUMMARY

a. Title and Location of the Proposed Undertaking

Consulting Services for Feasibility Study, Detailed Engineering Design, Detailed Environmental and Social Impact Assessment, and Preparation of Bidding Documents for the Dar es Salaam Bus Rapid Transit (BRT) Infrastructure - Phase 5 (26.5km) and Upgrading of the Port Access Road (3.2km) in Tanzania.

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Dar es Salaam

d. Project Background and Justification

Dar es Salaam, the largest city in Tanzania, is the country's principal centre of commerce and industry with approximately 5Ml inhabitants (projected to be 10Ml by 2030) accounting for around 40% of the urban population. The city is also an important terminal for air, sea, and road transport. The high increase in population in Dar es Salaam has led to an increase in transportation demand and hence high congestion and poor environmental and safety conditions. The imposition of large-scale rise in private cars on walking and living spaces has

developed undesirable living environment and increase demand of necessary infrastructure which is beyond city's capacity. The high level of traffic congestion, mainly during peak hours has forced the government to initiate several measures aimed at solving this problem.

The city embarked into development of BRT system Phases 1 to 6 covering a total of 141.1km. The entire system is incorporated in the Dar es Salaam Urban Transport Master Plan of 2008 which guides developments up to 2030 and the recently updated Master Plan with support from Japan International Cooperation Agency (JICA). The establishment of an efficient transit system, that is, BRT and the improvement of critical priority intersections have been pointed as key priorities for addressing traffic congestion and improving urban mobility in Dar es Salaam city.

The main objective of the BRT Phase 5 and Port Access Road project is to improve the transport infrastructure in Dar es Salaam. The expected output is the enhanced transport facilities that are reliable and cost effective with increased level of mobility, reduced congestion, improved connectivity, accessibility, promoted use of non-motorised transport such as bicycles and increased comfort and quality of life and urban development.

The BRT Phase 5 will serve the high-density areas of Buguruni, Tabata, Kigogo and Temeke along Mandela road; Tabata, Kigogo and Mbagala roads respectively which are concentrated with residential and commercial activities. The direct beneficiaries of this project include all public transport commuters, pedestrians and cyclists along the corridors and its environs.

Subsequently, this ESIA has been undertaken in accordance with the national legislative requirements, National Environment Management Council (NEMC) guidelines, and international requirements and standards specifically International Finance Corporation (IFC) Performance Standards (1-8), and World Bank Environmental and Social Standards (ESSs) 1-10.

e. Brief Project Description

The BRT Phase 5 project will involve upgrading of the Port Access Road (3.2 Km) corridor and the construction of the BRT infrastructure - Phase 5 (26.5km). The upgrading of the existing Dar es Salaam Port Access Road is part of the project since the BRT Phase 5 connects to the road. The project road sections are listed below:

- Nelson Mandela Road corridor (Ubungo-Buguruni- Tanzania Zambia Railway Authority (TAZARA) Junction-Kilwa Road/Uhasibu Junction-Kigamboni bridge) 13.1km;
- Temeke corridor (Veterinary along Mandela road-Sudani-Aziz Ally junction at Kilwa road) 3.4km;
- Tabata Segerea-Relini-Kigogo roundabout corridor at Kawawa road junction (9.9km); and
- Port Access Road section from Kigamboni Bridge to Dar es Salaam port roundabout at Kilwa road (3.2km).

The design covers three main areas being the infrastructure design (in the physical location), the network plans (the service plans) and the organizational and institutional management plan so as to prioritize and produce recommendations of interventions including design of junction or interchanges in view of the currently perceived issues, opportunities and constraints. The design of BRT corridor in this project is a road-within-a-road, typically introducing a two-lane road within the right-of-way of a larger road. As such, the geometry of the busway will almost always follow the geometry of the existing road, except where there is some very specific need for a separate layout. The geometric design of the BRT Phase 5 roads will be six lanes along Mandela road corridor (2 BRT lanes and 4 lanes for mixed traffic including sidewalk both sides, bike lane and existing service road), while Tabata-Kigogo and Temeke corridors will be 4 lanes (2 BRT lanes and 2 lanes for mixed traffic with provision of sidewalks both sides).

Further, a total of 37 bus stations, 6 feeder stands, 3 bus terminals, and 3 depots have been designed along the corridor for construction. The operational design will account for an articulated fleet of 277 buses (140 passenger

capacity vehicles), 50 feeder buses (50 passenger capacity vehicle) and 40 feeder buses (35 passenger capacity vehicle). An average of 2,000 passengers will be transported per bus daily.

f. Project Environment in Brief

The project corridor is geographically located in Temeke, Ilala, Kinondoni, and Ubungu municipalities across thirteen (13) administrative Wards in Dar es Salaam city. The BRT Phase 5 corridor is a brownfield site located in a highly urbanized, built-up urban settings dominated by residential, industrial and commercial premises and institutional establishments. The proposed corridor is also dominated by myriad forms of informal livelihood activities and other infrastructure (utilities) within and/or adjacent to the Right of Way (RoW). The project corridor is located within two main catchment areas (Kizinga and Msimbazi) characterized by bi-modal precipitation regime; whereby three major rivers (Msimbazi, Tenge and Ubungo/Kibangu) drains the corridor. The rivers are highly contaminated with organic matter especially downstream Msimbazi river, excessively high faecal and total coliforms levels, turbidity and high concentration of nutrients.

The hydraulic investigations and stakeholder comments indicate that the bridges of Matumbi and TIOT (overpassing the tributaries of Msimbazi River along Mandela road corridor), and Luhanga bridge on Tenge river at Kigogo area have been overtopped by discharge during heavy rains (heavy rains and debris clogging at bridge openings). Other potentially susceptible areas to be taken into consideration are Sandali, Temeke and Buguruni.

Ecologically, the core project area is situated in the ecologically highly disturbed area due to anthropogenic activities over many years that resulted into habitat fragmentation, loss and declined species abundance and diversity. The biotic environment within the project's primary impact area exhibits a continuum of modified habitats, given the predominance of non-native floral species, low species diversity and the footprint of the urban land use dominated by residential and commercial establishments. No IFC-recognized critical habitats or IUCN-designated Key Biodiversity Areas (KBAs) exist within the project's

primary and secondary impact areas. None of the recorded and/or reported species within project footprint area is listed in the IUCN Red List or CITES Appendices.

The bird species reported to exist adjacent and/or within the project area of influence revealed presence of some species in the fragmented habitats that falls under Least concern as per IUCN conservation status (Red List ver 3.1 of 2019). In terms of coastal harbour mangrove habitats nearby Port Access Road section, the mangrove habitats along Dar es Salaam port (harbour stretch) is characterized by the intact fringe at Kurasini and the highly degraded and fragmented remnants of a fringing mangrove strip on the eastern shoreline. The fringe is narrow throughout its length, and is composed mainly of ornamental, exotic trees, and shrubs.

g. Approach and Methodology

National and international standard methods (e.g. IFC and World Bank guidelines) for conducting ESIA were used whereby both qualitative and quantitative methodologies were employed in collecting and analysing data for this ESIA. The main approaches included field visit and inspections, stakeholder consultations, specialised baseline studies, desk surveys and identification and evaluation of any possible impacts.

h. Policy and Legal Framework

Various national and international policies, legislation, regulations and environmental standards relevant to the project have been identified and reviewed to ensure that the project complies with their requirements. The requirements aim at ensuring project sustainability through appropriate consideration and integration of environmental and social parameters.

i. Stakeholder Engagement and Public Consultations

Issues pertaining to the project construction and operation were discussed first with representatives of the key stakeholders. The regional secretariat, municipal councils, Wards Executive Officers and the Wards Counsellors of the wards along the project corridor. The meetings included the offices of the wards of

Ubungu, Makuburi, Buguruni, Mnyamani, Tabata, Liwiti, Segerea, Miburani, Sandali, Temeke, Azimio, Kurasini, and Kigogo.

During development of the Resettlement Action Plan (RAP), consultations at the community level, public meetings and Focus Group Discussions (FGDs) were held with directly affected communities whereby seven (7) meetings were held between September to December 2018, and eight (8) meetings April-June 2019.

j. Results of Public Consultations

The following were the main issues received during the public participation process:

- Compensation for land, commercial activities and buildings at market price;
- Clarification on the width and alignment of the proposed BRT road;
- Time frame for the project and time for moving the properties from the road reserve;
- Employment to local communities especially during construction;
- Safety while crossing the road especially students/pupils;
- Contractors should be familiar and respect community's views;
- Transparency in the valuation exercise;
- Utilization of the existing empty spaces along the project route instead of built ones;
- Use of peaceful means in addressing RAP related issues than force; and
- Construction of service parks.

k. Project Alternatives Considered

Several project alternatives were considered and analyzed. These were 'no' project alternative, alternative project route/alignment alternatives (horizontal), pavement types and design options, alternative sources of construction materials, and fare collection systems in BRT buses. Impacts identification,

analysis and development of the management and monitoring plans are based on the preferred project alternatives.

I. Major/Significant Impacts of Concern

The key impacts include:

Negatives (to be managed to accepted levels through implementation of the proposed mitigation measures)

- displacement of people, loss of properties and livelihoods disruption;
- potential relocation of the graves/graveyard (impact to be reconfirmed by further ground truthing);
- utilities relocation/damage and service disruption during construction;
- occupational health and safety risks and hazards related to construction, operation and maintenance activities;
- air emissions from dust and exhaust fumes during construction;
- elevated noise and vibration levels during construction;
- potential/accidental contamination of water and soil resources from construction, BRT operations and maintenance activities;
- traffic flow interference & traffic accidents along BRT 5 corridor during construction;
- exposure to HIV/AIDS, STDs and potentially new transmissions;
- sexual harassment and violence against women & vulnerable segments during construction; and
- community health and safety risks related to operation and maintenance of the BRT infrastructure.

Long-term beneficial impacts (to be promoted through enhancement measures proposed in the study)

- creation of the local employment opportunities and benefits to communities during construction and operation phases of the BRT Phase 5;
- income generation opportunities to material/equipment suppliers and local contractors;
- skills development and technology transfer;

- improved urban mobility, reduced travel time and congestion;
- improved productivity, access to livelihood activities and welfare of vulnerable groups;
- increased safety and security of urban public transport sector;
- improved mobility access to women and disadvantaged groups;
- reduction of national carbon footprint & augmentation of climate-resilient and low-carbon urban infrastructure; and
- income/revenue generation to local government and agencies.
-

m. Environmental and Social Management Plan (ESMP)

Mitigation and enhancement measures have been proposed to address the identified major and minor negative and positive impacts. These have been used to develop BRT Phase 5 ESMP and other sub-plans. The ESMP is presented as a detailed plan and schedule of measures designed to mitigate, or to eliminate, or to offset, or to reduce identified environmental and social impacts of the project. These measures/actions outlined in the ESMP will be implemented collaboratively and mainly coordinated by TANROADS (during construction) and DART (during operation of BRT buses). TANROADS will be responsible for monitoring the implementation of the ESMP and preparing semi-annual and annual environmental monitoring reports as appropriate.

n. Environmental Monitoring and Auditing

Programs for both internal and periodic external environmental monitoring have been proposed with an overall objective of ensuring that mitigation and enhancement measures are implemented effectively. Environmental monitoring will be carried out to ensure that all operation activities comply and adhere to environmental provisions and standard specifications. The activities and indicators that have been recommended for monitoring are presented in an Environmental Monitoring Plan (EMP) in Chapter 9. The EMP consists of a set of mitigation measures, parameters to be monitored, frequency, sampling and desired target level to be undertaken during monitoring and at different phases of the proposed project.

It will be the responsibility of TANROADS and DART to implement and monitor the EMP. Environmental monitoring will also require the engagement of a specialist (third-party professional) to provide an objective evaluation of the implementation of impact management measures and any residual impacts in line with local and international requirements. The monitoring programme also establishes effective feedback mechanisms so that the performance and effectiveness of the various elements of the EMP can be evaluated and, if necessary, corrective actions can be implemented. It is also recommended that internal and external environmental audits should be done to determine the long-term effects of adopted mitigation and enhancement measures. Audits should be carried out annually as required by EIA and Audit Regulations. The audits will unveil the actual performance of the proposed mitigation and enhancement measures.

o. Cost-Benefit Analysis

Financial analysis considered analysis of the financial return of the DART as an operator and owner of the BRT system. Total infrastructure project financing of TZS 410,312,128,831 and TZS 71,641,785,910.12 for the implementation of the Resettlement Action Plan (RAP) for the 1,081 identified Project Affected Persons (PAPs) out of which about TZS 32,127,411,718.92 is for relocation of existing utilities (e.g. water supply, telecommunication, gas pipelines, electricity, and sewerage network) within the project corridor.

In addition, the cost of implementing proposed ESMP is estimated to be TZS 585,000,000, while the cost for implementing the proposed EMP is about TZS 139,000,000.

This ESIA report presents an assessment of the proposed project, in terms of negative impacts, compared to the socio-economic benefits and what would not happen if the project was not implemented. Environmental cost-benefit analysis is assessed in terms of the negative versus positive impacts. The potential benefits of the project, in terms of financial and social benefits are promising and substantial. Most importantly, all identified environmental impacts can be

reasonably mitigated or managed, and the financial resources needed to mitigate negative impacts, when compared to the required investment, are relatively small, or cost effective. The proposed BRT Phase 5 and Port Access Roads project poses relatively lower environmental and social costs in value and are thus outweighed by the benefits to be realised from the project.

p. Conclusion and Recommendations

Findings indicate that the proposed BRT Phase 5 project has been accepted and welcomed by the community and other stakeholders based on its long-term desirable outcomes in improving urban mobility within the city. Network connection and physical integration with other BRT Phases will significantly contribute in the improvement of urban mobility, access to basic services, transportation within the city and facilitating accessibility and connectivity to various livelihoods activities, and overall productivity. Comprehensive stakeholder engagements should be implemented in a continuous and transparent manner along the corridor throughout the project life cycle.

In view of the above findings, it can be concluded that the BRT Phase 5 project activities from design, construction to operations and maintenance will have manageable negative impacts on the biological, physical and social-economic and cultural environments, provided that the proposed mitigation measures are appropriately implemented. In this way, the BRT Phase 5 project will have minimal impacts of environmental, socio-economic and cultural concern that would inhibit its implementation and development. In the long term, it is anticipated that the project will potentially result into more positive than negative impacts for community and environment.

The findings of this ESIA report support the development and operation of the proposed project provided that the recommended mitigation and enhancement measures in the form of ESMP, EMP, RAP, LRP, and any further conditions that may be imposed by the NEMC following consultations with lead agencies and other stakeholders are appropriately implemented by TANROADS, DART, Contractor, Sub-contractors and other responsible parties in order to minimize and/or avoid footprints on the biophysical and social-economic receptors.

TANROADS and DART have the overall responsibility of ensuring effective implementation of the RAP, LRP, ESMP and EMP as well as conducting periodic environmental monitoring and audits.

Further it is strongly recommended to:

- develop and implement a comprehensive project's Environmental and Social Management System (ESMS) during pre-construction phase. The overall ESMS framework has been presented in this ESIA reported.
- undertake climate change dynamics and resilience studies along BRT Phase 5 corridor especially floods and unpredicted weather patterns. This entails undertaking a comprehensive flood risk assessment mapping and modelling along BRT corridor to inform and optimize design and construction of the climate-resilient infrastructure by incorporating experience from BRT Phase 1. The suitability of the sites selected for stations, depots and terminals should be comprehensively assessed including flooding risks.

1.0 INTRODUCTION

1.1 Project Background and Context

The Government of the United Republic of Tanzania has received a loan from the International Development Association (IDA) to finance Dar es Salaam Urban Transport Improvement Project (DUTP) and intends to apply a portion of the proceeds of the loan for acquiring out consulting services for the feasibility study, detailed engineering design, Environmental & Social Impact Assessment (ESIA), and preparation of bidding documents for the upgrading of the Port Access Road corridor and the Dar es Salaam Bus Rapid Transit (BRT) infrastructure – Phase 5 (26.5km).

The establishment of an efficient transit system, that is, BRT and the improvement of critical priority intersections have been pointed out as key priorities for addressing traffic congestion and improving urban mobility in Dar es Salaam City. Following its rapid urban, population and economic development and the need for an efficient and integrated transport system, the city embarked on the development of the BRT system (phases 1 to 6) covering a total of 141.1km. The entire system is incorporated into the Dar es Salaam Urban Transport Master Plan (DUTMP) of 2008 which guides developments up to 2030 and the recently updated master plan with support from Japan International Cooperation Agency (JICA). The current status of the BRT network development in Dar es Salaam is depicted in Figure 1-1 overleaf; Phase I (Morogoro road corridor) is currently operating, Phase 2 (Kilwa road corridor) is under construction, Phase 3 (Nyerere road corridor) is in the design review stage, Phase 4 (Bagamoyo road and & Sam Nujoma road corridors) is awaiting commencement after signing, Phase 5 (Kilwa road corridor) is in the detailed design finalization stage and Phase 6 (Mwaki Kibaki road corridor) is in the early planning stages.

The Dar es Salaam Rapid Transit Agency (DART) was established in May 2007 under the Executive Agencies Act No. 30 Of 1997. The Agency is responsible for the establishment and operation of the BRT system for Dar es Salaam. Specifically, the DART is responsible for the procurement of services of bus operators, fare collection system, and Intelligent Transport System (ITS) as well as the oversight of the operation of the BRT system.

The overall objective of DART is to increase the level of mass mobility, promote the use of non-motorized transport and meet the ever-increasing travel demand of the city's residents with the ultimate aim of increasing comfort and quality of life and urban development.

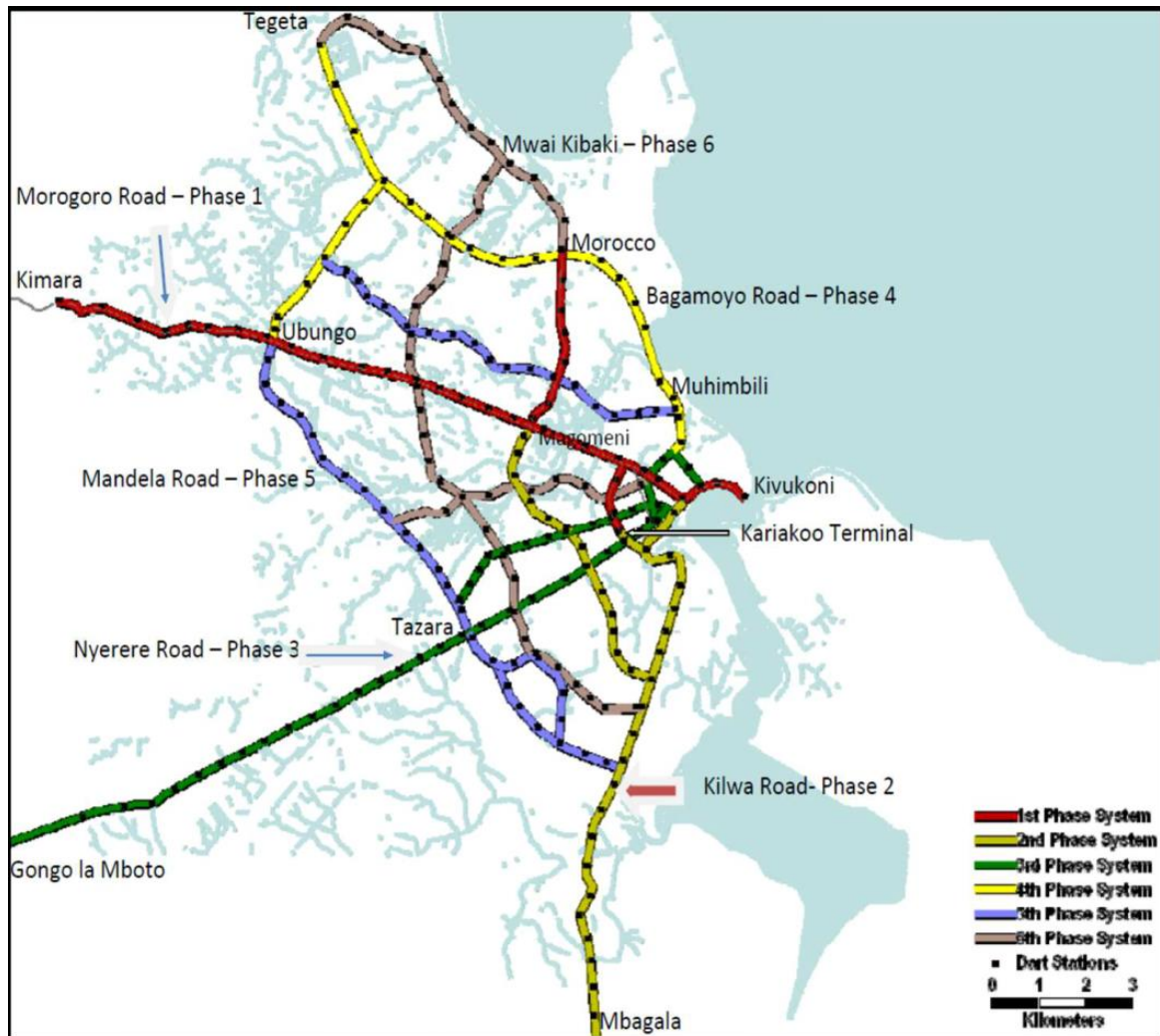


Figure 1-1: BRT Dar es Salaam development network

Source: Detailed Engineering Design (DED) report, Dec. 2019

The Tanzania National Roads Agency (TANROADS), hereafter referred to as the project proponent, is a semi-autonomous executive agency under the Ministry of Works, Transport and Communications established under Section 3(1) of the Executive Agencies Act No. 3 of 1997. It came into operation in July 2000. TANROADS is responsible for the development and maintenance of the trunk and regional road network in an efficient manner for a sustainable and safe network within mainland Tanzania to support economic and social development consistent with the poverty reduction strategy and other government policies. As such,

TANROADS has been entrusted to develop the BRT infrastructure in Dar es Salaam. It will be responsible for overseeing proper construction, operation and maintenance of the proposed BRT Phase 5 network.

Dar es Salaam, the largest city in Tanzania, is the country's principal centre of commerce and industry with approximately 5 million (MI) inhabitants (projected to be 10MI by 2030) accounting for around 40% of the urban population. The city is also an important terminal for air, sea, and road transport. Due to the fast increase in population and economic activities within the city, the number of vehicles has increased substantially hence putting pressure on the responsible authorities to provide more road space. The high level of traffic congestion, mainly during peak hours has forced the government to initiate several measures aimed at solving this problem. One such initiative is the implementation of BRT Phase 5 including upgrading of the existing Dar es Salaam Port Access Road.

1.2 Project Objectives and Rationale

The main objective of the BRT Phase 5 and Port Access Road project is to improve the transport infrastructure in Dar es Salaam. The expected output is enhanced transport facilities that are reliable and cost effective, with an increased level of mobility, reduced congestion, improved connectivity, accessibility, promoted use of non-motorised transport such as bicycles and increased comfort and quality of life and urban development.

The exponential increase in population in Dar es Salaam has led to an increase in transportation demand and hence high congestion and poor environmental and traffic safety conditions. The imposition of the large-scale rise in private transport on walking and living spaces has developed an undesirable living environment and increase demand of necessary infrastructure which is beyond the city's capacity.

The 2008 Dar es Salaam Master Plan study indicated that the public transport (e.g. *daladala*) and non-motorized transport played a dominant role with 41% and 56% of daily trips respectively, while 3% of the population relies on motorized three-wheelers (*bajaji*), two-wheelers (*bodaboda*) and private cars (BRT Phase 5

Detailed Engineering Design Report, Nov. 2019). The public transport system has not been able to increase its supply adequately. The establishment of an efficient BRT system and the improvement of critical priority intersections are among the key priorities for addressing traffic congestion and improving urban mobility in the city (BRT Phase 5 Proposal, April 2020).

In detail, following the rapid urban population and economic development of Dar es Salaam and the need for an efficient and integrated transport system for the city, DART is implementing the BRT as bus-based mass transit system that delivers fast, comfortable and cost-effective urban mobility. The upgrading of the existing Dar es Salaam Port Access Road is aimed at allowing hinterland trucks to smoothly access the port while reducing the level of congestion along the road.

BRT Phase 5 will serve the high-density areas of Buguruni, Tabata, Kigogo and Temeke, which are concentrated with residential and commercial activities. The direct beneficiaries of this project include all public transport commuters, pedestrians and cyclists along the corridor and its environs.

Therefore, the specific objectives of the BRT Phase 5 are:

- To increase the level of mobility for most residents and thereby enhancing their participation in a wide range of economic and social activities
- To facilitate the use of Non-Motorized Transport (NMT) by improving service roads and implementing parallel bicycle routes allowing for integration of bicycles and the bus system and for reduction of congestion in the carriage way
- To increase the level of efficiency at the port by improving its access corridors
- To meet the continuous increase of travel demand of the city
- To provide a comfortable public transport system at reasonable cost to the users and yet profitable to the operators, using quality high capacity buses which meet international service standards, environmentally friendly operating on exclusive lanes at less travelling time.

1.3 Nature of the Project

The Environmental Management Act of 2004 of Tanzania requires project developers to carry out an Environmental Impact Assessment (EIA) prior to implementation. The EIA and Audit Regulations of 2005 guide the EIA process and administration in Tanzania. The Regulations give mandate to the National Environment Management Council (NEMC) to oversee the EIA process, which culminates with an award of the EIA certificate by the Ministry responsible for Environment. The certificate is among the prerequisite approvals required before project execution. This project will need this approval before it is implemented.

According to the World Bank Environmental and Social Framework (Environmental and Social Standard 1, paragraph 23), a project of this nature requires a detailed Environmental and Social Impact Assessment (ESIA). Similarly, according to the Third Schedule to the Environmental Management Act (2004) and First Schedule to the Environmental Impact Assessment and Audit Regulations (2005) and EIA and Audit Regulations (Amendment) 2018, this kind of project is categorized as Type A, whereby a detailed EIA is mandatory. Under the First Schedule of the EIA and Audit Regulation (Amended) 2018, the BRT Phase 5 falls under item 9 (a) Transport and Infrastructure, construction and/or expansion of trunk roads.

In this regard, TANROADS, appointed M/s Kunhwa Engineering & Consulting Co. Ltd, Seoul, Korea in association with M/s Aqgola Engineering & Management Services Ltd of Tanzania to carry out the design, ESIA and Resettlement Action Plan (RAP) for the development of the Bus Rapid Transit System Phase 5 (26.5 km) in and upgrading of Port Access Road in Dar es Salaam City.

The proposed project has been registered with NEMC and assigned the registration number ARN 9911. The scoping study was undertaken and approved by NEMC, with the Terms of Reference (ToR) presented in Appendix I. Therefore, this ESIA report serves as the third and final stage in the approval process.

1.4 Purpose of the ESIA

The Environmental Management Act (EMA) No. 20 of 2004 requires that the large-scale projects that pose potential environmental and social impacts undergo full ESIA prior to their implementation. The ESIA provides the basis for better decision-making, to the extent that the implications of the BRT Phase 5 project are thoroughly analysed and mitigated against based on adequate information. The conduct of the ESIA is in line with government, International Finance Corporation (IFC) and World Bank safeguards to ensure protection of the environment and an increase of net social benefits from development project. The ESIA is therefore designed to incorporate environmental and social issues into the 'up-stream' stages of project identification and planning as well as the later stages of site selection, design, implementation and operation. The principal objectives and purpose of the BRT Phase 5 ESIA study include:

- to identify and investigate in detail the most significant environmental and social impacts likely to result from the design, construction and use of the BRT Phase 5 corridor and Port Access Road;
- to propose mitigation and enhancement measures for negative and positive impacts respectively;
- development of the Environmental and Social Management Plan (ESMP) and Environmental Monitoring Plans (EMP) to provide mitigation plans to prevent or minimize adverse environmental and social impacts arising from the development of the road.
- to ascertain and update the socio-economic implications likely to result from the proposed BRT Phase 5 and Port Access Roads project including:
 - Improving the understanding of the identification, assessment and analysis of potential effects of the BRT Phase 5 and Port Access Road project on communities along the project area such as trade and commerce, traffic flow and residential settlements;
 - Identifying local communities' concerns and mitigation and enhancement measures to optimize the positive impacts and minimize the negative impacts;
 - Identifying contentious issues;
 - Analyzing gender issues associated with the entire project cycle and planning for women's empowerment

- Planning for resettlement and compensation in connection with land-acquisition at the implementation stage;
- Effecting and creating a sense of local participation and ownership in the project design and implementation process;
- Identifying institutional capacities to implement HIV/AIDS education and information in the project area.

1.5 Scope of the ESIA

This ESIA has been undertaken in accordance with the NEMC approved Scoping Report and ToR (see Appendix I), and in accordance with the requirements of the applicable international standards and national legislative guidelines (Environmental Management Act No. 20 of 2004 (Sections 7(f)), 81(1), Third Schedule), EIA and Audit Regulations (2005) and EIA and Audit (Amendment) Regulations, 2018.

Further, the applicable international guidelines include:

- International Finance Corporation (IFC) Performance Standards (1-8), 2012 for Environmental and Social Sustainability;
- World Bank Environmental and Social Standards (ESSs) 1-10; and
- IFC Environmental, Health and Safety (EHS) Guidelines (including sector-specific guidelines).

Consequently, the scope of this ESIA covers:

- Description of the proposed BRT Phase 5 project including project location, design, components and activities throughout all project phases;
- Description of the pertinent national policies, legislative and institutional framework, including international standards applicable to the proposed BRT Phase 5 project;
- Assemble, evaluate, and present baseline information on the relevant environmental and social-economic and cultural conditions of the project area of influence;
- Conduct public consultations with relevant authorities, organizations, communities along the project corridor, private sector operating in or near the project area, and any other interested party that may be affected and/or

affect the proposed project;

- Identification and assessment of the potential environmental and social impacts resulting from the BRT Phase 5 and Port Access Roads project, especially within the zone of influence of the project;
- Description of the alternatives that were examined while developing the proposed project and identification of other alternatives, which would achieve the same objectives;
- Proposing mitigation and management options to avoid, minimize or offset any adverse significant biophysical and socio-economic impacts; and
- Developing an ESMP and EMP detailing actions and responsibilities for impacts mitigation and monitoring.

1.6 Approach and Methodology

Recommended standard methods for conducting ESIA studies (in compliance with EIA and Audit Regulations (2005); EIA and Audit (Amendment) Regulations 2018 and World Bank ESSs) were used in this study whereby both qualitative and quantitative methodologies were employed in collecting and analysing data for this ESIA.

1.6.1 Scoping

The initial stage of the ESIA study is project registration followed by the scoping exercise, with a major intention of identifying key stakeholders and potential social and environmental impacts (positive and negative). The results of the scoping exercise reinforce the drafting of the Terms of Reference (ToR) before their finalization. The scoping exercise identified key stakeholders for the project and main issues of concern. It was conducted mainly through consultation with key stakeholders, and the review of various reports, studies and literature relevant to environment and construction projects in Tanzania.

1.6.2 Field Visits

The Consultant undertook detailed visits in the project area between June 2018 and April 2019 in order to observe, record and analyse the pertinent socio-economic and biophysical characteristics within and adjacent to the BRT Phase 5 road corridor and the Port Access Road. The field visits were essential to fully

realize the scope of the project and understanding the existing biophysical and socio-economic conditions within the project corridor. Field observation and assessments included, but were not limited to, the existing habitats, major river crossings, settlements, infrastructures, utilities, accessibility, land use and cover patterns, livelihood activities, community and cultural settings along the proposed corridors.

The ESIA team used the fieldwork to conduct stakeholders consultations, specialized baseline studies, and also collection of secondary information and other documents/reports available from different institutions on issues such as land use, demography, cultural heritage, water supply, sensitive biodiversity areas, and other indicators related to environmental and socio-economic trends of Temeke, Ilala, Ubungu and Kinondoni Municipal councils where the project corridor is located.

In addition, during fieldwork, ambient air quality, dust acoustics measurements were recorded from eleven (11) sampled locations along the project corridor. Water quality tests were also performed, whereby samples from Msimbazi, Tenge and Ubungu/Kibangu rivers were collected and analysed in a laboratory. Results from all sampled and measured locations were analysed and compared against thresholds set in the national environmental regulations, standards, and international standards.

1.6.3 Desk Surveys

The baseline assessment for different biophysical and socio-economic thematic areas included extensive desk survey in order to solicit relevant information applicable for the proposed project. Documents, reports and records were reviewed in order to obtain existing secondary data and information pertinent to the study. The major sources of information included the BRT Phase 5 detailed engineering design report/feasibility report, ESIA and RAP reports for BRT Phases I, II, III, reports for other infrastructure projects across/along the BRT Phase 5 corridor (e.g. TAZARA/Mfugale Flyover, Kigamboni Nyerere Bridge, Dar-Morogoro standard gauge railway, Ubungo flyover etc.). Other sources of information included municipal socio-economic profiles (Ilala, Temeke, Kinondoni

and Ubungu), development plans, reports from various national agencies, biodiversity databases, national policies and legislations, national strategies and plans; applicable WB operational policies, IFC standards, international Conventions; and agreements.

1.6.4 Stakeholders Engagements

Different stakeholders at different levels were identified and consulted in order to solicit their concerns, views, opinions and suggestions about the project. Consultative meetings, Key Informant Interviews (KII), Focus Group Discussions (FGDs) and community meetings were held with relevant personnel, representatives and communities at large along the BRT Phase 5 corridor and Port Access Road. Stakeholder consultation is a continuous activity that will be undertaken in all phases of the project as guided in the Stakeholder Engagement Plan (SEP). The Consultant used both snowball and purposive sampling techniques in identifying the relevant stakeholders.

Stakeholders included Ministries, Departments and Agencies (MDAs), international agencies based in Dar es Salaam, regional, municipal and local authorities, private sector, Non-Government Organizations (NGOs) in the project area, communities and potential Project Affected Persons (PAPs), among others. The methods for consultation, information sharing and gathering was highly participatory in nature whereby stakeholders were given the opportunity to be actively involved in the ESIA study and decision making process through dialogue and discussions on various issues and concerns related to the project formulation, design, construction and operation.

In addition, consultations with various stakeholders were conducted along the project corridor for the purpose of;

- Gathering requisite information for the development of the Social and Poverty Profile / basic information for the Gender Analysis
- Provide non-recorded or anecdotal data to form part of the baseline for the ESIA
- Provide information on available skills and labour within the community, and on the possibility of undertaking part of the construction works using

community-based contracting techniques

- Provide, based on local knowledge, details of potential problem areas, localized flooding, periodic congestion, accident black spots etc. which can be fed back into the engineering design process
- Disseminate amongst community members overall project objectives, likely timetables and the need to cooperate with the consultant team to obtain optimum results
- Disseminate amongst community members draft design concepts, design standards and service levels to obtain approval / comment
- Provide feedback from the community to the consultants on design concepts, strategies and plans

1.6.5 Biodiversity Assessment

In line with the Consultant's experiential approach and IFC-endorsed benchmarks including (i) Performance Standard 6 (Biodiversity Conservation and Sustainable Management of Living Natural Resources), (ii) Good Practices for the Collection of Biodiversity Baseline Data, and (iii) the IFC EHS Guidelines, baseline ecological survey was carried out to define the ecological landscape of the delineated brownfield project footprint, and associated sensitivities with respect to the proposed development and operation of BRT Phase 5 in Dar es Salaam City. The survey was conducted using transect walks, opportunistic observation and extensive desk survey including national and international database queries.

The terrestrial biodiversity (mainly flora, fauna and avifauna) survey involved investigation of the sensitive habitats and species of conservation concern along the project corridor, with particular emphasis on resident macroflora (vegetation assemblages or taxa) of unique or highly localized distribution; and resident mammals and herptiles, which are either endemic or highly disjunctive. The principal habitats present within the project site were identified and classified. Identified species were referenced against the International Union for Conservation of Nature (IUCN) Red List and/or those on the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendices.

The principal habitats and flora identification within the site were identified, classified and described basing on the Field Guide to Common Trees and Shrubs of East Africa, Dharani, (2002) and Mbuya *et al.*, (1994). The supplementary qualitative assessment was based on opportunistic observations of trees, shrubs, herbs, and grasses along the project corridor.

The avifauna (birds) assessment focused on the coastal Important Birds Area (IBA) and habitats to obtain a comprehensive picture of the presence, activity patterns and habitat usage of avifauna within the project footprint area and secondary influence area. The Consultant drew on local and international databases to identify and delineate potentially impacted modified and internationally recognized habitats situated within the project area.

1.6.6 Ambient Acoustics, Air Quality and Vibration

A total of 11 sampled stations along BRT Phase 5 corridor were established in which data on ambient dust, gaseous emission, noise levels were measured and recorded. The sampled areas were selected based on national and international criteria such as presence of nearest sensitive receptors within and/or adjacent to the Right of Way (RoW) e.g. settlement, institutions, major junctions/intersections, water bodies, economic activities, settlements and community infrastructure (i.e., schools, health facilities, churches, mosques etc.). Other criteria were presence of nearby emission sources, future development plans, siting, predominant wind direction (leeward and windward) as well as areas that pollutants from the BRT project construction and operation activities are likely to disperse towards.

Construction noise assessment was conducted to comply with national standard Environmental Management (Standards for the control of noise and vibration pollution) Regulations, 2011, Tanzanian Standard TZS 932:2007 'Acoustic – General Tolerance Limits for Environmental Noise and Occupational Noise', international mainly WHO Guidelines for Community Noise, and Section 1.7 of the IFC EHS Guidelines 'General EHS Guidelines: Environmental.

1.6.6.1 Dust and Emissions

The overall approach taken for assessing the potential air quality impacts of the proposed development may be summarised as follows:

- Baseline characterisation of local air quality (11 sampled locations). The parameters measured and monitored for a short period (approximately 4 hours) are Particulate Matter PM₁₀, PM_{2.5}, Carbon monoxide (CO), Carbon dioxide (CO₂), Oxygen (O₂), Hydrogen sulphide (H₂S), Formaldehyde (HCHO), Benzene (C₆H₆) and Total Volatile organic compound (TVOC);
- Qualitative assessment of the construction phase of the development using the 2014 IAQM 2014¹ guidance. This entailed:
 - demolition and construction works dust and particulate matter assessment at sensitive receptors by categorizing construction activities into four main types: demolition, earthworks, construction and trackout². Dust emission magnitude associated with each of these activities were combined with the sensitivity of receptors (human or ecological), to determine the overall dust risk
 - exhaust emissions to air from construction traffic and plant impact on local air quality adjacent to the routes and vicinity. Due to the absence of the detailed information at this stage on the number of vehicles and plant associated with construction a qualitative assessment has been undertaken based on professional judgement.
- Qualitative assessment of air quality during the operational phase of the proposed project composed mainly of traffic emissions to air along BRT Phase 5 road links/corridor;
- Recommendation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised.

During baseline characterization, dust levels were measured using a portable device known as air quality tester Eco five model ECO-12, the device was used in the measurement of dust with 2.5µm and 10µm sieve size. The equipment operates on the principle of scattered light and the device has been tested according to the standard delivery schedule and has a resolution of 0.001mg/m³

¹ Institute of Air Quality Management

² Trackout is defined as the transport of dust and dirt from the construction / demolition sites onto public road network, where it may be deposited and then re-suspended by vehicles using the network.

and measures particulate concentrations (ranging from 0.01 to 2500mg/m³). During measurements, the device was placed at a breathing height of approximately 1.5m above the ground for a period of four hours. This position is assumed to be equivalent to the breathing zone of the workers at their respective working stations.

Levels of ambient gases were measured using a Multigas Monitor type "TA8421". Parameters measured were: Carbon monoxide (CO) in mg/m³, Carbon dioxide (CO₂) in %, Volatile organic compound (TVOC) in mg/m³, formaldehyde (HCHO) in mg/m³, Benzene (C₆H₆) in mg/m³ and Hydrogen sulphide (H₂S) in mg/m³. The results were compared with Local and International Standard. The equipment was held 1.5m above the ground during measurement in which five readings were recorded at each point and mean value used as a representative value of that particular point.

1.6.6.2 Acoustics and Vibration

The measurements and assessment of environmental noise levels were determined in accordance with ISO standards using a digital sound level meter TA8152 with Sound (CEL-633C1/K1 Logging Environmental 1/3 Octave Band Sound Level Meter (Class 1)). On taking the measurements, the device-meter scale was set to the "A" weighed measurement scale which enables the device to respond in the same manner as the human ear. The device was held approximately 1.5m above the surface and at least 3m away from hard reflecting surfaces. A suitable windshield was used on the microphone for all measurements in order to minimize wind interference. Sampling was undertaken on 3 cycles per location and the instrument was checked and calibrated prior to use. Each individual measurement was taken over a representative period of time to ensure that all possible variations in noise generation in the area, i.e. all possible noise sources are included in the measurement.

Based on the baseline measurements recorded at the sampling stations, the thresholds presented have been adopted to identify potentially significant noise effects. The BS 5228-2:2009+A1:2014 Standard has been used to assess the likely impacts of vibration levels from construction activities. Annex E of the

standard gives empirical formulae for the prediction of the resultant peak particle velocity (PPV) vibration levels for various types of work, including vibratory compaction, percussive piling and vibratory piling. Annex B of the standard has been used as guidance on the significance of vibration effects in terms of human response to vibration.

The exact working methodology and plan to be employed during the construction phase has not been established at this stage of the design. However, following best practice, an initial estimate of the expected noise and vibration levels over a representative period has been provided using assumed plant items and the associated noise emission data from BS 5228:2009+A1:2014.

For the purposes of this assessment the temporal scope has been classified as short-term/transient (period of the site construction works), and long-term (throughout the duration of the operational phase).

1.6.7 Social Survey

An interviewer-administered questionnaire was developed with both open-ended and closed-ended questions for gathering information on socio-economic conditions of the people in the project area. 20-50% samples of the households in the directly affected wards were randomly selected for inclusion in the interviews. The sample size was determined based on the number of households in a given ward. Research assistants with the knowledge of the local language were recruited, trained (including pilot study), and deployed in the project area to carry out the exercise. The collected data was analyzed using the Statistical Package for Social Science (SPSS) software.

Household interviews were conducted in order to obtain socio-economic baseline data for the project area of influence. The exercise involved 125 households (respondents) and the questionnaire was structured to capture various aspects and issues related to the socio-economic situation of the subproject areas in the four municipal councils (Temeke, Ilala, Ubungu and Kinondoni) traversed by the BRT Phase 5 project. Data were also collected using FGDs with women and

youth and discussions with key informants from TANROADS, BRT and counsel leaders.

1.6.8 Social Development and Poverty Analysis

The social team conducted a Project Road User Survey (PRUS) for the purpose of collecting disaggregated socio-economic data and a breakdown of various users and their means of transport (private cars taxes, public transport i.e. *daladala*, three-wheelers (*bajaji*), motorcycle (*bodaboda*), bicycle and on foot. The demography of the project area was also surveyed to capture information such as household expenditure levels, household size, ethnicity, occupation, education levels and access to infrastructure such as water and electricity. The survey also explored beneficiaries' perceptions of how they would benefit from the project and what complementary actions would best help increase these benefits. The Poverty Impact Analysis and Social Development Analysis of Net Benefits were conducted in accordance with WB's Handbook on Poverty and Social Analysis and Handbook for Integrating Poverty Impact in Economic Analysis of Projects.

1.6.9 Identification and Evaluation of Project Impacts

The project activities and components were superimposed onto the existing social and environmental conditions, which facilitated identification of the potential impacts of the proposed BRT Phase 5 and Port Access Roads. These potential direct and/or indirect environmental and social impacts are a result of interactions between sub-projects' activities with the relevant baseline aspects (valued receptors).

The potential impacts were identified in three main steps:

- Identification of the project activities /aspects causing impacts (see Sections 2.4 and 2.5 below for further details)
- Establishing affected environmental and human components (valued receptors). These were determined to include: vegetation, wetlands (rivers, lakes, etc.), soil, land stability, water quality and quantity, ambient air quality, employment and livelihoods, vulnerable groups, infrastructure, public safety and occupational health and safety

- Determining potential environmental and social impacts in an Impact Identification Matrix (Leopold's Matrix) as presented in Section 6.2 below.

The impacts were categorised as direct versus indirect and positive or negative.

The evaluation of each of the impacts was based on the following criteria:

- Extent - the spatial boundary within which impacts will occur i.e. within the project's primary corridor of impact, secondary impact area or general project area of influence
- Duration - whether the impacts will be temporary or permanent; and
- Magnitude - the extent to which the impact will alter the natural or social systems and baseline conditions.

A key guiding assumption in this study is that the project will be designed, constructed and operated with due care for safety, social and environmental matters using current and practical engineering practices and/or Best Available Technology Not Entailing Excess Cost (BATNEEC). Prediction of the impacts was done by using "best estimate" professional judgement of the experts and case studies as analogies or references. The prediction of impacts specified the impact's causes and effects and its secondary and tertiary consequences for the environment and social aspects. In addition, the level of public concern, scientific and professional evidence concerning resource loss, ecological damage and resource use options were integrated.

1.7 Report Structure

The structure of the report has been aligned with the format required by Regulation 18(1), (2)(a), (b) of the EIA and Audit Regulations 2005; IFC PS1 (Assessment and Management of Environmental and Social Risks and Impacts), and the World Bank ESS1 (Annex 1 Environmental and social assessment, part D) on the indicative outline of an ESIA report for a Category 'A' Project. Thus, the report is composed of thirteen substantive chapters, and appendices as follows:

- Chapter 1: Introduction;
- Chapter 2: Project Description;
- Chapter 3: Policy, Legislative and Institutional Framework;
- Chapter 4: Baseline and Existing Conditions;

-
- Chapter 5: Stakeholders Engagement and Public Consultations;
 - Chapter 6: Project Alternatives, Identification and Assessment Impacts;
 - Chapter 7: Impacts Mitigation and Enhancement Measures;
 - Chapter 8: Environmental and Social Management Plan (ESMP);
 - Chapter 9: Environmental and Social Monitoring Plan (EMP);
 - Chapter 10: Cost-Benefit Analysis;
 - Chapter 11: Decommissioning;
 - Chapter 12: Conclusion and Recommendations;
 - Chapter 13: References; and
 - Appendices.

2.0 PROJECT DESCRIPTION

2.1 Project Location and Accessibility

The proposed project corridor for the upgrade of the existing Port Access Road (3.2km) and construction of BRT Phase 5 infrastructure (26.5km) is geographically located in the municipalities of Temeke, Ilala, Kinondoni, and Ubungu. The project roads connect various parts of the city and therefore can be accessed from main roads of Ally Hassan Mwinyi, Morogoro, Kilwa and Nyerere. Further, the project corridor traverses thirteen (13) Wards as presented in Table 2-1 whereby the largest section of this project covers Temeke and Ilala municipalities. Temeke Municipal Council is located in the south of the city bordering Coast Region, Ilala Municipality in the north-west while in the east it stretches by the coastal line of the Indian Ocean. The locations of project roads are shown in Figures 2-1 and 2-2.

Table 2-1: Wards traversed by the BRT Phase 5 project

Municipality	Wards
Ubungu	Ubungu, Makuburi
Ilala	Buguruni, Mnyamani, Tabata, Segerea, Liwiti,
Temeke	Miburani Sandali, Temeke Azimio, Kurasini
Kinondoni	Kigogo

Source: DED Report, Dec. 2019



Figure 2- 1: Wards traversed by the proposed project corridor

Source: Consultant, July 2020

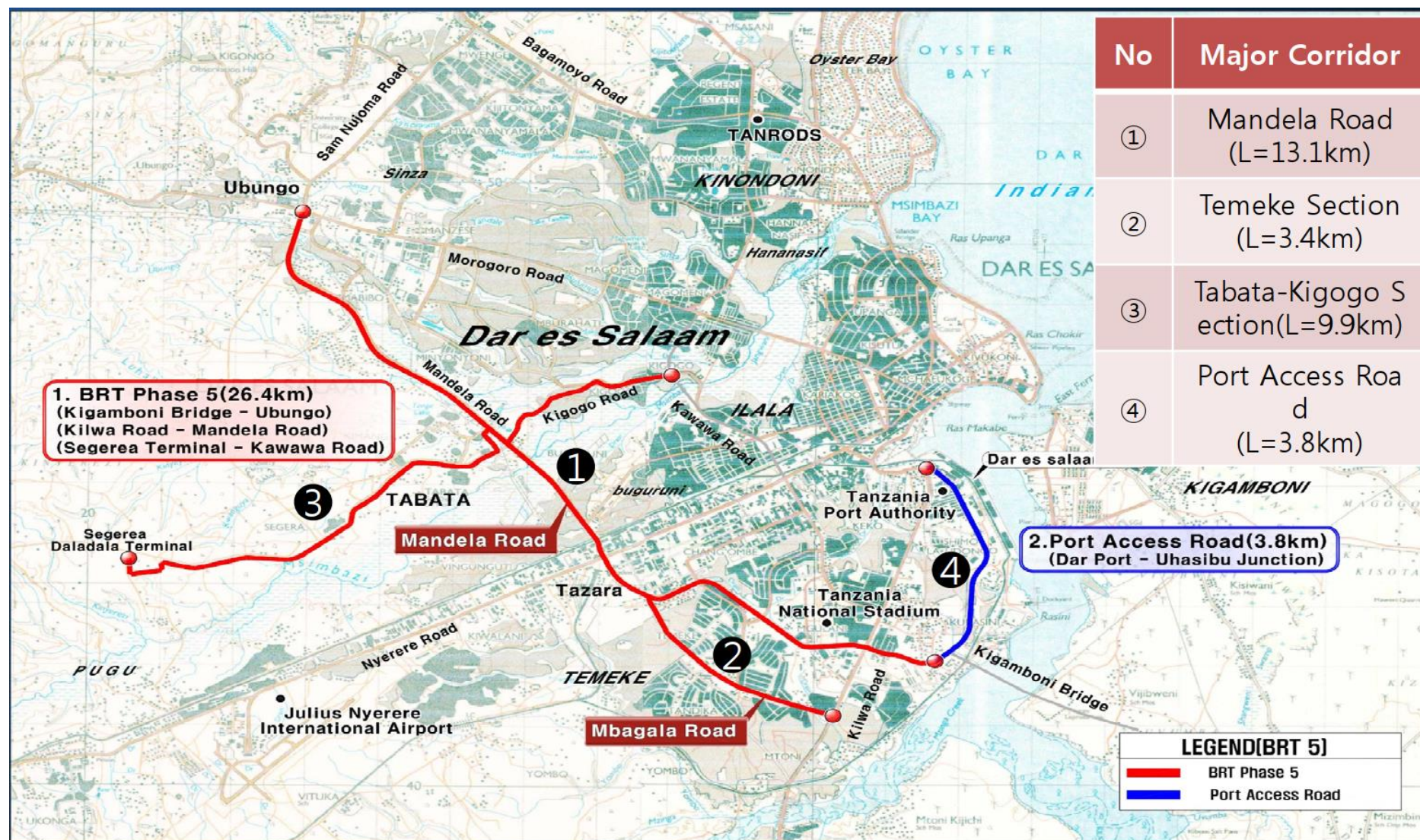


Figure 2-2: Map of Dar es Salaam showing proposed project road sections.

Source: DED Report, Dec. 2019

2.2 Project Area of Influence and Boundaries

In line with IFC Performance Standard 1 (Assessment and Management of Environmental and Social Risks) paragraph 8, the proposed BRT Phase 5 linear infrastructure project encompasses specifically identified physical elements, aspects, and facilities that are likely to generate potential significant environmental or social impacts, hence these impacts/risks, will be identified in the context of the project's Area of Influence (Aoi). Project boundaries help to determine and evaluate the extent of the identified environmental and social impacts of any given or proposed development. The boundaries include spatial, temporal and institutional boundaries as described below.

2.2.1 Spatial Boundaries

Based on IFC PS1, the Project's Aoi comprises

- Direct Impact Area (DIA) or Primary Impact Area (PIA);
- Indirect Influence Area (IIA) or Secondary Impact Area (SIA); and
- Wider Influence Area (WIA).

The DIA is the area where direct impacts from planned and unplanned project activities could occur. The DIA also considers areas where impacts from unplanned but predictable developments caused by the project that may occur later or at a different location; or indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent. The DIA is the area that is likely to be affected by the BRT Phase 5 project activities and facilities that are directly owned, operated or managed (including by contractors, sub-contractors, suppliers etc.) such as at the project's site, immediate airshed, watershed, transport corridors, rivers, canals, relocation, access roads/pathways, borrow pits and disposal areas, and construction camp.

The primary boundaries (DIA) for the BRT Phase 5 will specifically include:

- activities associated with development of *in situ* operations and related road infrastructure within the corridor and Right of Way (RoW): Mandela road (Ubungu-Kigamboni Bridge 13.1km), Mbagala road/Temeke corridor (3.4km); Tabata Segerea-Kigogo corridor (9.9km), and Port Access Road (Kigamboni Bridge-Dar port roundabout 3.8km);

- existing structures, facilities and utilities within the corridor's RoW;
- at least 100m radius buffer from the RoW;
- access roads, service roads and pedestrian walkways across/along the corridor;
- the existing rivers and tributaries across and along the corridor: Kibangu, Tenge and Msimbazi Rivers; and
- existing communities along the corridor – *Mitaa* traversed by the project corridor.

The IIA is where associated facilities, infrastructure or utilities are located, which are neither funded, constructed or expanded by the project but are required for the project to function. These are areas where indirect impacts from the proposed project activities could take place but outside DIA embracing the impact areas beyond the immediate stretches adjoining the zones of project works. The IIA in this project includes:

- transportation & haulage routes (construction materials, imported equipment, other supplies etc.);
- licensed borrow pits and quarries (Lugoba, Msolwa and Mkuranga) and licensed sand extraction sites;
- downstream settlements and/or river users (Msimbazi, Tenge and Kibangu rivers);
- source markets, service areas associated with supporting utilities and distant beneficiary communities; and
- waste disposal site that will be potentially used by the contractor e.g. Pugu Kinyamwezi landfill.

The WIA covering the four municipalities (Ubungo, Kinondoni, Ilala and Temeke), Dar es Salaam city and areas resulting from cumulative/incremental impact on resources used or land directly impacted by this project and from other existing or planned developments that overlap in temporary or physical boundaries.

2.2.2 Temporal Boundaries

Time horizons of the project constitute what is referred to as temporal boundaries. This entails the life span of the project and the duration of associated impacts. The project is divided into different phases, that is, pre-construction, construction, demobilization, operation and decommissioning. The project construction phase will take approximately thirty-six (36) months plus twelve (12) months for the Defects Liability Period (DLP). Further, as described in Section 6.2 of this report, the temporal boundaries of each of the identified positive and negative impact from the proposed project have been characterized in terms of their nature of occurrence as either direct or indirect; duration i.e. long-term or short-term; reversible or irreversible; localized impact or regionalized impact; and time of their time of occurrence i.e. mobilization phase; construction phase; operation phase; and/or decommissioning phase.

2.2.3 Institutional Boundaries

Institutional boundaries refer to those institutions and sectoral boundaries in which the project is located or mandated. Primarily this entails institutional and sectoral margins associated with the administration of the project area and activities. These institutions have been determined from political boundaries (Dar es Salaam city/municipalities), legislations, regulations and institutional mandates and administrative structures in central and local government levels. They can influence or be influenced by the proposed BRT Phase 5 project legally, economically, technically, and/or socially. These include, but are not limited to the NEMC, Vice President's Office-Division of Environment (VPO-DoE), President's Office-Regional and Local Governments Authorities (PO-RALG), Ministry of Works, Transport and Communications, national agencies and/or authorities, communities, private sector such as transporters, and various civil society organizations within the project area. The role and involvement of each institution is described in Section 3.5 of this report.

2.3 Project Components and Design

The BRT Phase 5 project will involve the upgrade of the Port Access Road (3.2 Km) corridor and the construction of the BRT infrastructure – Phase 5 (26.5km). The upgrading of the existing Dar es Salaam Port Access Road is part of the

project since the BRT Phase 5 connects the road, and the sections are listed hereunder and summarized in Table 2-2.

- Mandela corridor (Ubungo-Buguruni-TAZARA Junction-Kilwa/Uhasibu Junction-Kigamboni Bridge-Port Access Road). Links with BRT Phase I at Ubungo, BRT Phase 3 at TAZARA junction, and BRT Phase II at Uhasibu/Kilwa junction);
- Temeke corridor and Aziz Ally – Sudani – Veterinary Mandela junction stretch connecting to BRT Phase II along Kilwa road, and BRT Phase 5 at Mandela road;
- The route that connects Mandela Road to Tabata from Relini Junction to Segerea *Daladala* Bus terminal and route to be extended from Tabata through Kigogo until Kawawa Road to connect with BRT Phase 2 Corridor (Tabata Segerea *daladala* terminal-Tabata BIMA junction-Mandela road junction at Tabata Dampo-Kigogo-Kawawa junction) connecting with BRT Phase 4 along Kawawa road; and
- The Port Access Road Section (3.2 km) from Kigamboni Bridge to Dar es Salaam port roundabout at Kilwa road connecting to BRT Phase 2 along Kilwa road. NO BRT lanes/service from the bridge to the port, the road will be upgraded to bitumen standard to allow smooth traffic flow to and from the port.

Table 2-2: BRT Phase 5 Project roads details

SN	Traffic/Homogenous Section	Length (Km)
A	Port Access Road sections	
A1	Bendera Tatu (Mbagala roundabout) to Mivinjeni Junction	1.2
A2	Mivinjeni Junction to Kigamboni bridge approach road	2.0
B	BRT Phase 5 corridor network	
B1	Mtoni Kwa Azizi Ally – Mwembeyanga-Veterinary	3.5
B2	Kigamboni bridge – Ubungo Traffic lights	13.1
B3	Kigogo roundabout- Tabata Relini-Tabata Segerea Bus stand	9.9

Source: DED Report, Dec. 2019

The project will involve various road works including widening road sections to a dual carriage way set-up and upgrading various sections to bitumen standard. The system comprises characteristics of fully dedicated bus lanes aligned in the center of the road that allows buses to bypass peak-hour congestion as well as achieve

practical speeds, high capacity buses, off-board fare collection, station platforms level with the bus floor to reduce boarding and alighting delay and redesigned intersections to avoid intersection signal delay. The system also caters to the needs of bus users and non-motorized commuters by providing safe and dedicated access by pedestrians and cyclists.

The design covers three main areas being the infrastructure design (in the physical location), the network plans (the service plans) and the organizational and institutional management plan so as to prioritize and produce recommendations of interventions including design of junction or interchanges in view of the currently perceived issues, opportunities and constraints. Detailed descriptions of the design components, specifications and guidelines used are found in the Engineering Design Report (Nov. 2019). The design of BRT corridor in this project is a road-within-a-road set-up, typically introducing a two-lane road within the right-of-way of a larger road. As such, the geometry of the busway will almost always follow the geometry of the existing road, except where there is some

very specific need for a separate layout. Table 2-3 below presents the general minimum values for the parameters of the infrastructure's components.

Table 2-3: BRT Planning Guide (ITDP 2007)

Component	Parameter value
At grade normal width	3.5m per lane per direction plus 0.5m of lane separation on each side
BRT lane width	3.5m per lane per direction
BRT passing lane width at stations	3.5m per lane per direction
Minimum BRT separation width at normal corridor	0.5m
Minimum turning radius	Turning radius on BRT corridor, stations and bus depots considers 18m buses and 12m buses (Auto turn simulations have been used for designing). In general, a turning radius of 15 meters for the 12m buses, and 14,5 meters for the 18m articulated.
Minimum sidewalk	2,0 meters for separate one-way bikeways
Minimum cycle lane	2,0 meters for separate one-way bikeways
Height clearance over mixed traffic	5.5m
Max bus width	2.6m (bus body) + 2 x 0.25 (side mirrors)

Source: DED Report, Dec. 2019

Regarding the corridor's RoW, the BRT Phase 5 passes through two types of corridors; the wider RoW 60m (along trunk roads) in which the BRT corridor will be constructed with few limitations in terms of space, direct routes to the desired destinations, and require few if any expropriations. The second type of corridor, a "constrained corridor RoW 30m (mostly along feeder routes, Temeke corridor, Segerea-Kigogo corridor) uses routes that are limited in width, located along routes that are not entirely direct and/or are constructed adjacent to or within developed areas.

In this case the geometric elements in the horizontal alignment have been considered to provide safe and continuous operation under normal conditions, as the maximum super elevation and the minimum radius for the horizontal curves. The BRT Phase 5 corridor alignments have been designed to maintain and fit within existing road corridors to minimize resettlement related impacts and associated compensation costs. However, in some instances especially in the critical intersections and junctions (e.g. Kigogo-Tabata viaduct, feeders), sharp curves and bends the road geometry standards have been modified/deviated to make the BRT operations comfortable and functional in meeting design requirements.

These elements are defined based on the operational design speed. Since the corridor is located within the city, the suggested operational speed will be limited to 50km/h and 60km/h inside and outside the Central Business District (CBD) respectively. As recommended by the AASHTO Guide, the maximum super elevation should be 4.0% in urban areas, due to safety issues. Table 2-4 overleaf presents a summary of the design criteria for the BRT Phase 5 routes.

Table 2-4: Summary of design criteria for BRT Phase 5 routes

Criteria	Recommended value
Minimum design speed, mainline	80 km/h
Minimum design speed, station and CBD areas	60 km/h
Minimum design speed, arterial ramps and access roads	40 km/h
Minimum stopping sight distance	MOW RGDM 2011 (156m)
Minimum stopping sight distance at station areas (passenger comfort)	85m
Maximum super-elevation, separate busway	2.5
Maximum super-elevation, arterial/expressway facility	6%
Maximum super-elevation at stations	2.5% (fall away from platform)
Maximum super-elevation runout, main busway	1:400
Maximum super-elevation runout, stations	1:200
Minimum horizontal curve radius, mainline	Based on minimum design speed
Minimum horizontal curve radius, stations and CBD areas	120m
Minimum horizontal curve radius, absolute minimum	80m
Minimum horizontal curve radius, ramps and access	45m
Spirals, all curves less than (1350m) radius (when potential convertibility to LRT)	MoW RGDM 2011 requirement based on design speed (80km/h)
Maximum intersection skew angle	20°
Minimum turning radius at intersections	Dependent on vehicle type, typically absolute minimum 7m
Minimum grade, urban section	0.3%
Maximum grade, mainline	5% up to 8% for short runs – (120 – 150m)

Source: DED Report, Dec. 2019

Therefore, the geometric design of the BRT Phase 5 roads will be six lanes along Mandela road corridor (2 BRT lanes and 4 lanes for mixed traffic including sidewalk both sides, bike lane and existing service road), while Tabata-Kigogo and Temeke corridors will be 4 lanes (2 BRT lanes and 2 lanes for mixed traffic with provision of sidewalks both sides) as presented in Figures 2-3, 2-4 and 2-5 overleaf.

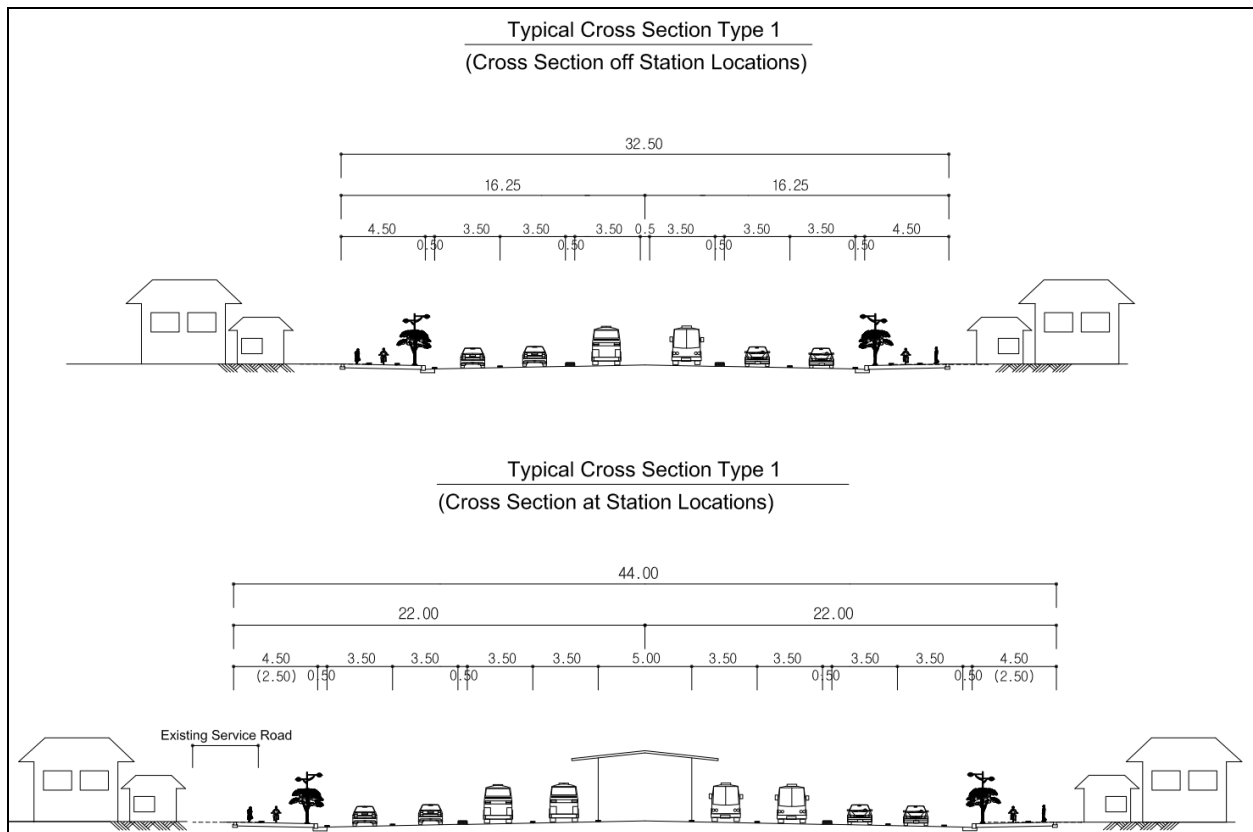


Figure 2- 3: Proposed typical cross-section for Mandela corridor (off station & at station locations)

Source: DED Report, Dec. 2019

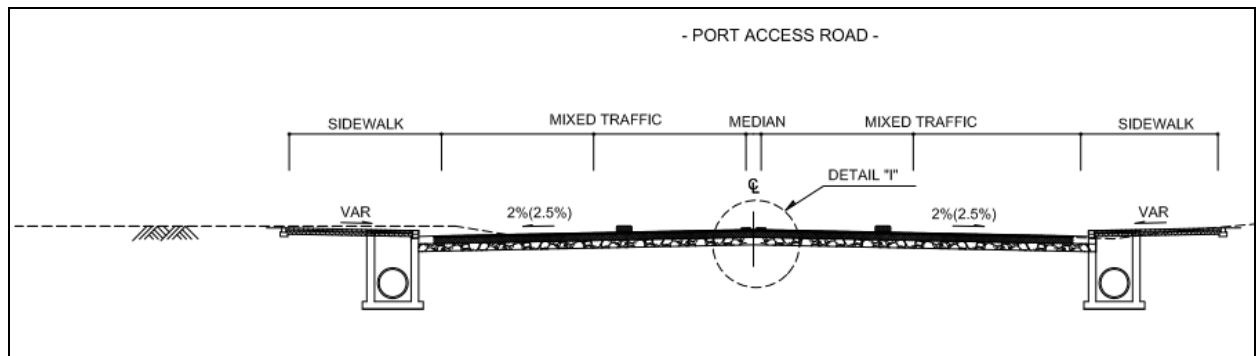


Figure 2-4: Proposed typical cross-section for Port Access Road

Source: DED Report, Dec. 2019

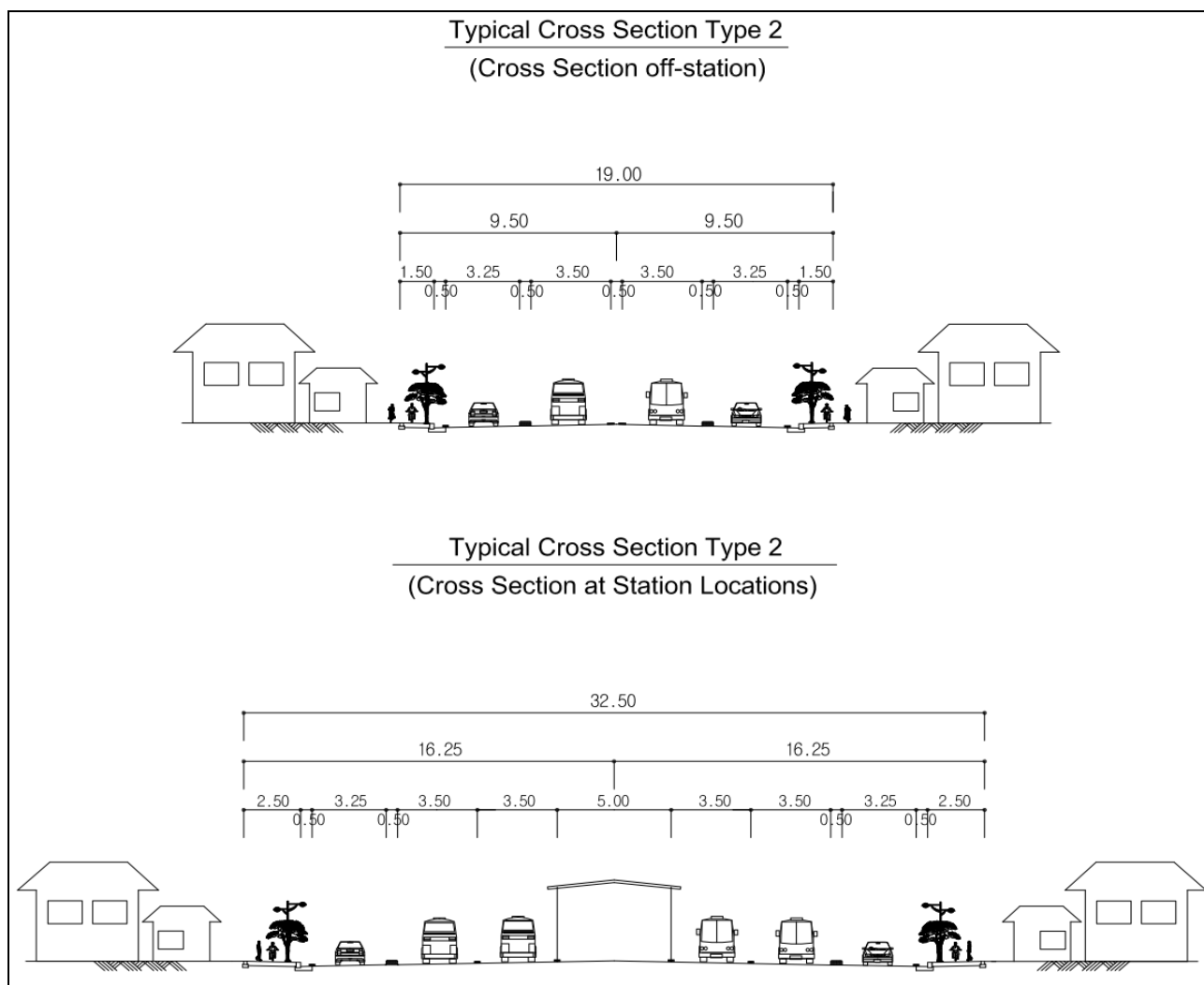


Figure 2- 5: Proposed typical cross-section for Tabata-Kigogo and Temeke corridors

Source: DED Report, Dec. 2019

Regarding other infrastructure/facilities, the BRT Phase 5 will accommodate terminals, stations, feeder stations and depots as presented in the sections below. A total of 37 bus stations, 6 feeder stands, 3 bus terminals, and 3 depots have been designed (Architectural Design Report, Nov. 2019). Terminals and stations are strategically placed at points where a potentially higher passenger movement would take place. The station positioning process also considered the existing bus stops along the designed corridor since they represent an existing landmark for what transportation concerns along the BRT 5 corridor.

2.3.1 Terminals

There will be four bus terminals, namely; Temeke Mwisho, Tabata Segerea, Ubungu and Kigamboni bridge (Malawi cargo) bus terminals. Temeke Mwisho, Ubungu, and Kigamboni bridge (Malawi cargo) bus terminals will consist of terminal ticketing building, bus terminal, guard house and parking for four (4) articulated buses, while Tabata Segerea will consist of the same provision but with bigger parking for ten (10) buses. The terminals have been designed to accommodate both the BRT 5 buses and the feeder buses. Thus, the terminals are a combination of terminal and Feeder stands/stations. These terminals will host several ticketing booths to cater for the big number of passengers transferring from one mode of transport to another. In addition, an ablution block has been provided to cater for the sanitary needs of the passengers.



Figure 2-6: Tabata Segerea terminal overview

Source: Architectural Design Report, Nov. 2019

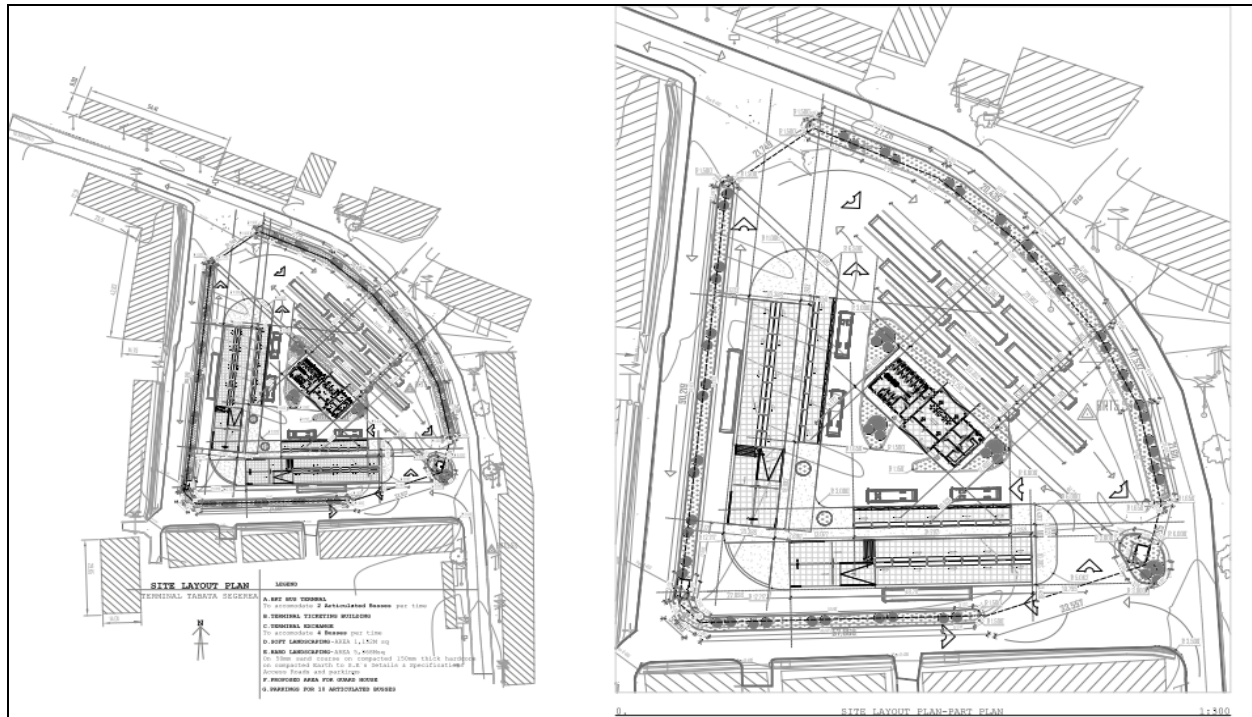


Figure 2-7: Tabata Segerea terminal site layout plan
Source: Architectural Design Report, Nov. 2019



Figure 2-8: Temeke Mwisho terminal overview
Source: Architectural Design Report, Nov. 2019

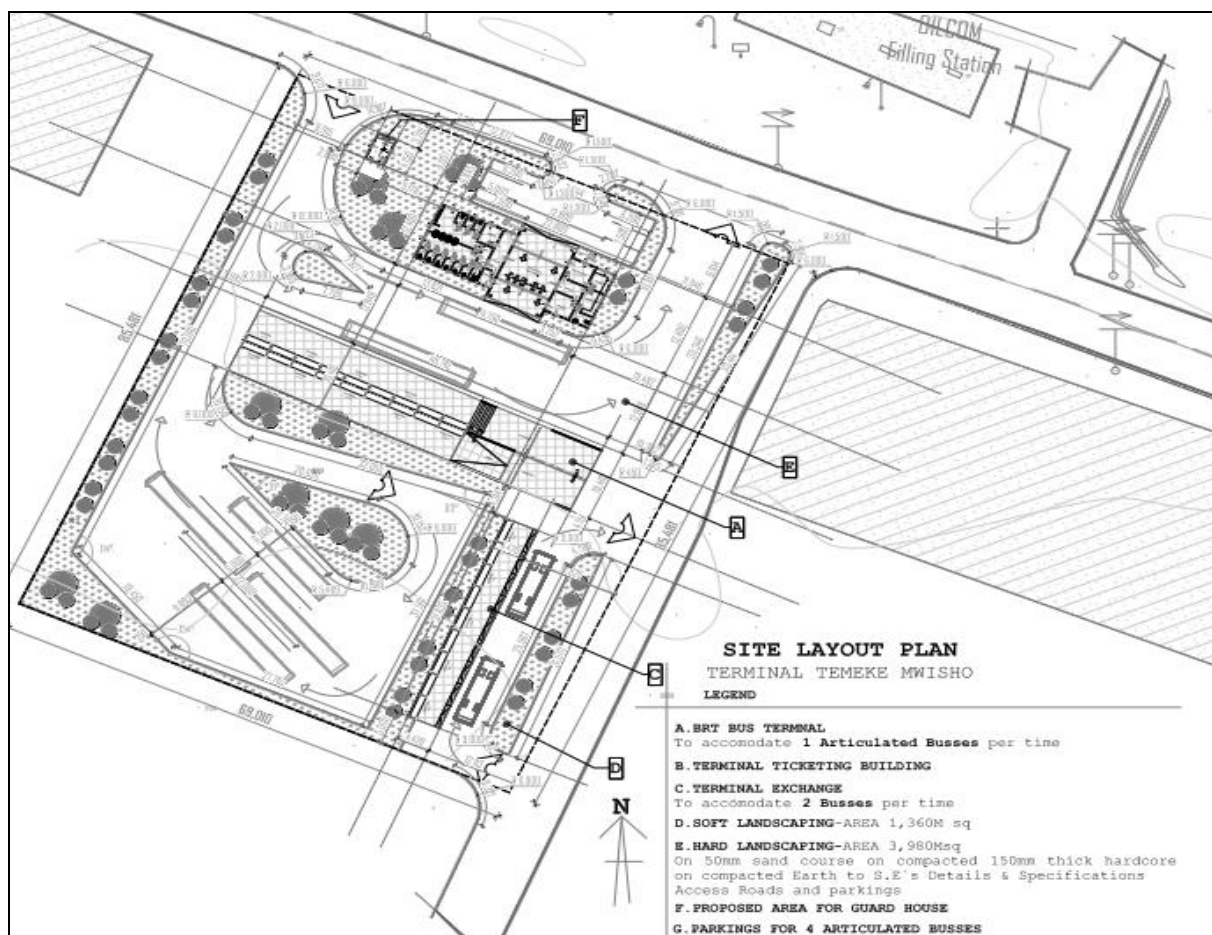


Figure 2-9: Temeke Mwisho terminal site layout plan

Source: Architectural Design Report, Nov. 2019

2.3.2 Depot

There will be three depots at Temeke Mwisho (Figure 2-10) along Tandika road (Temeke corridor), Tabata Sigara-Barakuda (Segerea-Kigogo corridor) and National Stadium which will accommodate service bay for 20 buses, filling station, guard house, powerhouse and visual inspection point. The depots have been designed to accommodate office facilities for the employees and other necessary support facilities. The Temeke depot is planned to also serve buses plying the BRT 2 and route from city center to Mbagala on Kurasini Road from the City Centre. The depots are typical in design, with same functions of storage (parking) of buses, storage of parts and equipment, cleaning, fueling, repairs and general maintenance of the buses. The Depots will also serve as administration and control hubs for the BRT 5 transport system. The depot main building (3629.52m² built up area) will be a three-storey building comprising of two wings (left and right,

each 766.8m²) with a connecting Maintenance Shade measuring 49.2mx42.6m (2095.92m²).



Figure 2-10: Temeke depot overview (top) and site layout plan (bottom)
Source: Architectural Design Report, Nov. 2019

2.3.3 Stations

Since the stations will be located in the middle of the road, the bus lanes and the mixed traffic lanes will be realigned to the outside to provide adequate space for the station. This may trigger the need for more space at the stations both laterally and longitudinally. Table 2-5 below presents a comprehensive summary of the most critical features of the station design consideration.

Table 2-5: Key design parameters for the stations

Assumptions	Features
Station width	3m for staggered stations; 5m for bi-directional stations; 5meters or more for intermediary terminal stations with operational return
Station height	Considered at level boarding, with a high platform 90cm above the corridor surface level, for higher capacity and better accessibility
Ramp area	- At grade pedestrian crossing: 9,6 m, allowing a ramp of 8,33% (considering the height of 90cm minus 15 cm of the median) - Pedestrian bridges crossing: access on the connection between platforms - Ramps are indispensable for people in wheelchairs and must be wide enough so they can comfortably use the ramps - People with carts, bicycles and strollers, as examples, also use them. Therefore, it is considered that the minimum effective width of ramps must be 1.5 meter
Sub-stop/modules length	Considered 20.4m for single (one docking position) and 40.8m for double sub-stops (2 sub-stops), to serve 18,6 m articulated buses. These are considered as modules, because the stations might have from one to three of these structures depending on the demand
Fare collection area	- Considers off-board fare collection. Passengers buy and validate tickets before boarding the buses - At stations with at grade crossing, 9,6 meters of length was considered for fare collection areas, enough for a ticket booth, auto-service equipment, user information and turnstiles. These access control areas were considered on both sides of staggered and bi-directional stations, except for stations with length of 60m - At stations with pedestrian bridges (such as Mwenge and Morocco Terminals), fare collection is installed on the top of bridge, before the ramp, escalator and stairs to the platform. In other cases, the fare collections at the entrance of the station, just before the platform
Number of sub-stops and docking positions per direction	The number of sub-stops and docking positions per direction were defined based on the demand study and service plan, which indicated the level of saturation of each station
Connection length between platforms	36m, allowing good docking movement for independent sub-stop operation, and space for one bus to wait to dock at the next sub-stop without blocking the previous sub-stop
Pedestrian bridge width	Equal or wider than 5m
Pedestrian bridge access ramps width	3m considering 1.5m per direction
Pedestrian crossing	Elevated zebra crossing in most of the stations, signalized crossing where there are traffic lights for vehicles
Fences/barriers	Not considered but could be proposed in locations with pedestrian bridges

Assumptions	Features
to avoid pedestrians crossing away from crosswalks	and other
Toilets	Have been proposed only at terminals
Distance between stations	600m were considered as a base, but distances were adjusted to be close to intersections to improve access, ranging from 500m to 900m in urban areas and higher along non-urban roads

Source: Architecture Design Report, Nov. 2019

2.3.3.1 Feeder Stations

There will be four feeder stations feeding into BRT Phase 5 from other parts of the network to allow passengers to transfer from one or more feeder routes to the trunk lines. A total of five feeder roads stations are proposed to the project as detailed below. The feeder stations' designs depend on the operation characteristics and demand of the routes that integrate with the BRT in each location. Where the feeder demand and number of transfers to the BRT were higher, feeder terminals are proposed. All feeder stations will use the standard feeder bus size of 12 meters.

- Ubungu Darajani/Riverside connecting passengers to Kibangu, Mzee wa Upako and Makoka area along Mandela road;
- External (Mabibo EPZA) connecting passengers to Tabata Kisukuru and Kimanga areas;
- Mnyamani (Buguruni) connecting passengers to Vingunguti and Tabata areas (feeder station will be constructed as part of BRT Phase 3). This station transfers passengers to Chama DART station;
- Mwembeyanga (Temeke) to be located at intersection of Kipungo street and Mbagala road connecting passengers to Chang'ombe, Tandika and Buza; and
- Tabata Bima connecting passengers to/from Tabata Kimanga.

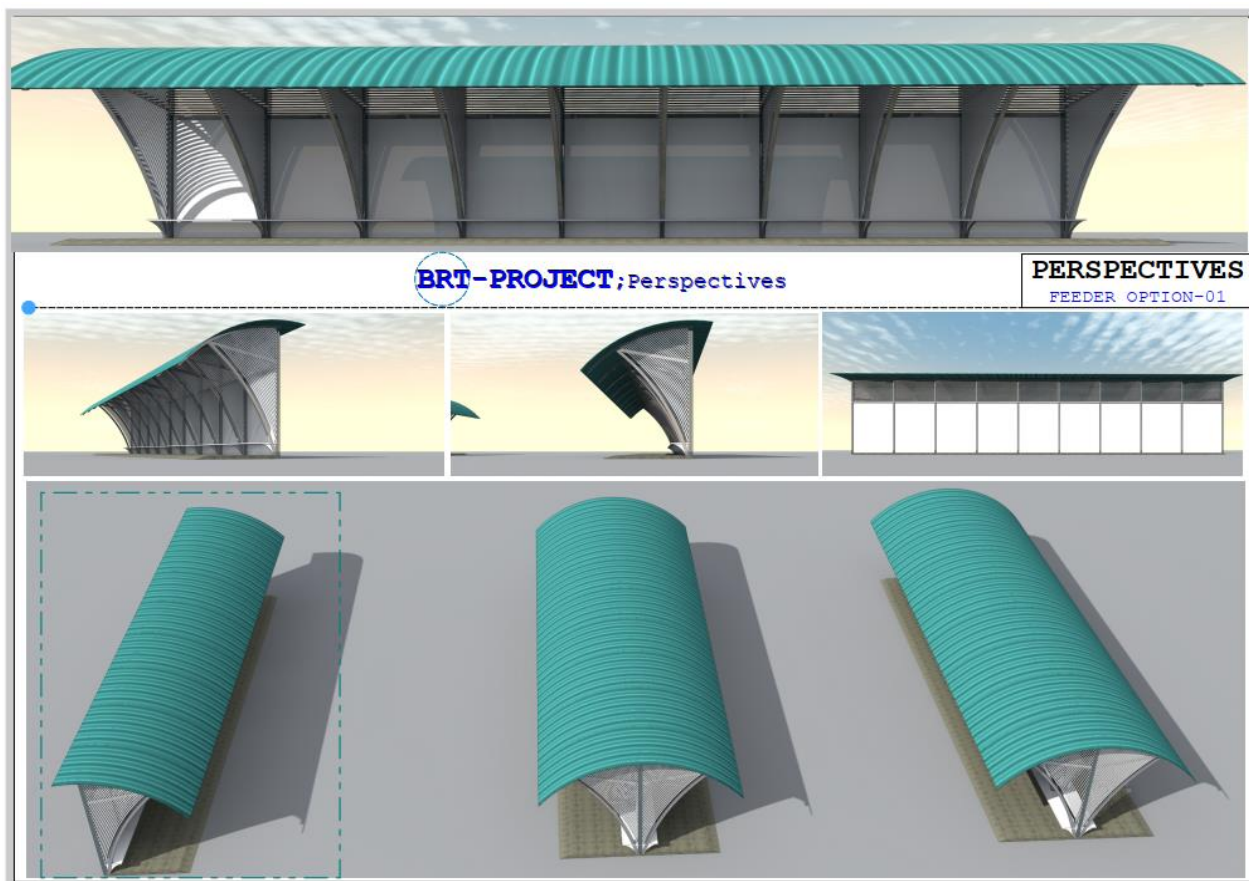


Figure 2-11: Feeder stations overview
Source: Architectural Design Report, Nov. 2019

2.3.3.2 Conventional Stations

BRT Phase 5 will also have a number of stations located at strategic locations as detailed in Table 2-6 and Figure 2-14. These conventional stations will allow pre-paid passenger boarding and alighting along the trunk lines. There is a total of 37 Conventional stations in BRT Phase 5 with Nelson Mandela Road having 20 stations, Temeke corridor (Mbagala road) 4 stations, Segerea-Mandela road corridor 9 stations, and Tabata-Kigogo Road 4 stations. Further, right turn provisions for the mixed traffic lane have been provided at ten (10) different locations. These U-turn provisions will be signalized intersections. Solar panels shall be used to at the stations/depots/terminals for used for lighting at night hours in case Tanzania National Electric Supply Company Ltd. (TANESCO) power is out. The BRT Phase 5 conventional stations are categorized into three prototypes; Type I, II and III as detailed in Figures 2-12 and 2-13 below highlight on key features:

- Type I stations will have 3 modules, and 224m in length;

- Type II stations will have 2 modules, and 152m in length; and
- Type III stations will have 1 module, and 80m in length.

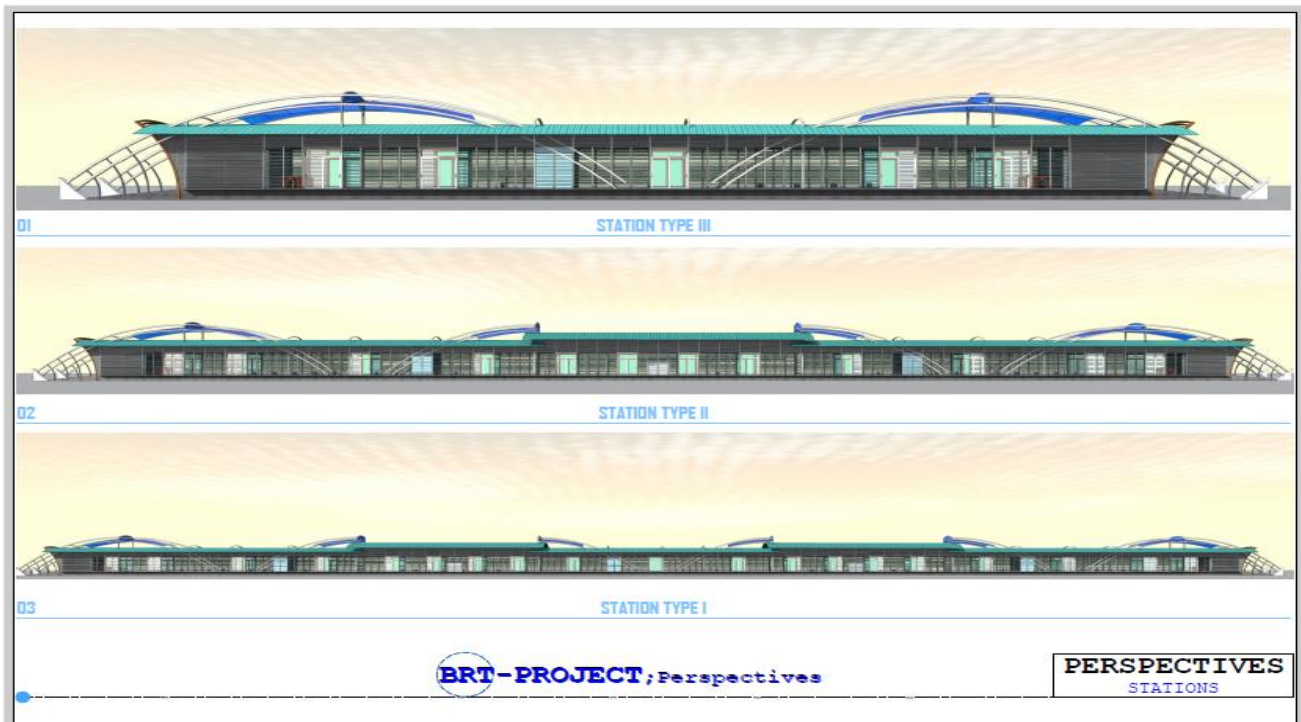


Figure 2-12: BRT Phase 5 Stations typical elevation details

Source: Architectural Design Report, Nov. 2019

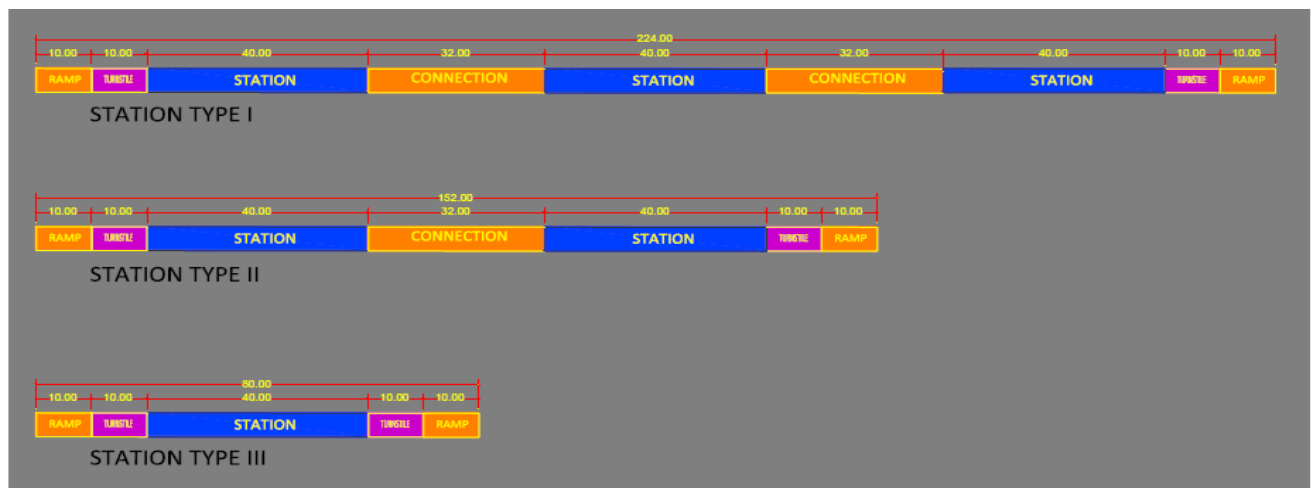


Figure 2-13: BRT Phase 5 Station Cross section details

Source: Architectural Design Report, Nov. 2019

Table 2-6: BRT Phase 5 stations details

S/No	Station Name	Total Station Flow	Feeder Line Connection	Number of Modules	Type of Station	Length of (M)
Mandela road corridor						
1	Darajani	539	Physical Integrated Feeder	2	II	152
2	Riverside	348	Virtual Integrated Feeder	2	II	152
3	Mabibo Hostel	183	Nil	1	III	80
4	External	195	Virtual Integrated Feeder	1	III	80
5	Garage	127	Nil	1	III	80
6	Mwananchi	354	Nil	2	II	152
7	TIOT	185	Nil	1	III	80
8	Tabata	493	Nil	2	II	152
9	Matumbi	261	Nil	1	III	80
10	Al-Hamza	0	Nil	1	III	80
11	Chama	1667	Virtual Integrated Feeder	3	I	224
12	TAZARA	367	Nil	2	II	152
13	Sokoni	193	Nil	1	III	80
14	Veterinary	188	Nil	1	III	80
15	Mbozi	42	Nil	1	III	80
16	Kwa Sokota	112	Nil	1	III	80
17	Serengeti	128	Nil	1	III	80
18	Manispaa	0	Nil	1	III	80
19	Taifa	44	Nil	1	III	80
20	GBP	0	Nil	1	III	80
Mandela Road - Temeke corridor						
1	Magorofani		Nil	1	III	80
2	Msikitini		Nil	1	III	80
3	Mwembe Yanga		Virtual Integrated Feeder	2	II	152
4	Sudani		Nil	1	III	80
Segerea-Mandela road junction corridor						
1	Kwa Bibi		Nil	1	III	80
2	Chama		Nil	1	III	80
3	Mangumi		Nil	1	III	80
4	Sigala		Nil	1	III	80
5	Magengeni		Nil	1	III	80
6	BIMA		Virtual Integrated Feeder	2	II	152
7	Muslim		Nil	1	III	80
8	Shule		Nil	1	III	80
9	Aroma		Nil	1	III	80
Kigogo-Mandela Road corridor						
10	Kigogo Dampo		Nil	1	III	80
11	Kigogo		Nil	1	III	80
12	Kigogo Police		Nil	1	III	80
13	Kigogo Shule		Nil	1	III	80

Source: Architectural Design Report, Nov. 2019

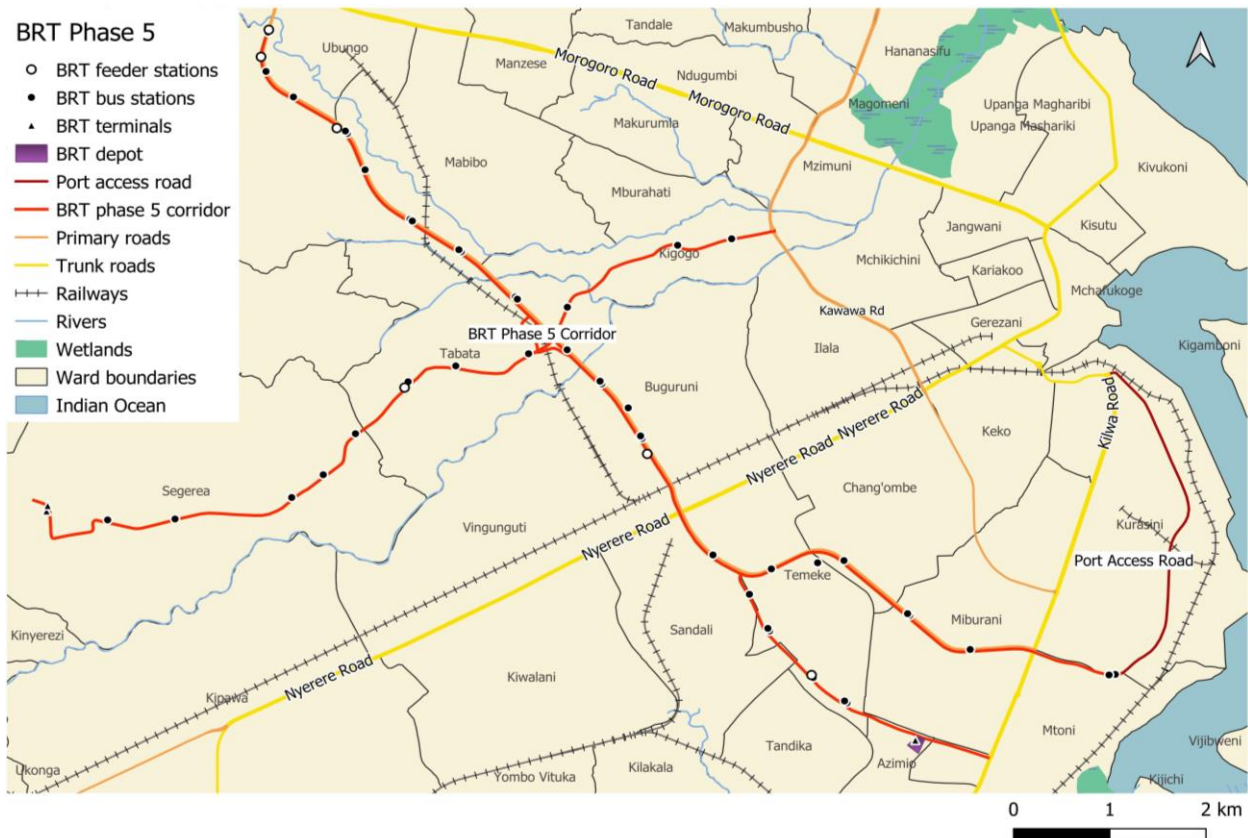


Figure 2-14: BRT stations, terminals and depots locations

Source: Consultant, June 2020

2.3.4 Routing Trunk and Feeder Services/Service Plan

With the purpose of reaching an optimum load factor in trunk services different types of services will be set up in accordance with potential DART users' travel preferences. The design then is focused on arranging services in a way that will serve the demand by zones searching for the highest occupation index along the route and service optimization minimizing the number of stops hence, increasing the system's commercial speeds. The physical design proposed for the DART system includes overtaking lanes featured at stations. This enables the opportunity to implement express services and expand the system's transportation capacity. With this characteristic the implemented services vary between three types:

- Regular/local services: stops at every single station along its path;
- Semi-express services: stops only at determined groups of stations (smaller demand stations and connecting to main origins and destinations) defined by origin and destination concentration criteria, missing some stations on their path, increasing operational speeds; and

- express services: runs straight from origin to destination without stopping on intermediate station, stopping mostly in terminals.

All services were designed based on a maximum frequency on AM peak hour of 40 buses/hour (1.5-minute headway) and a 10 buses/hour minimum frequency (6 minutes headway). Whenever running services have demand levels outside the limits, an operational revision would have to be performed to update the plan and service programming. The operational speed considered for trunk services was set at 22km/hr. The operational design bears in mind a selected fare for the financial model of per km fare structure as assumed in DART conceptual plan. A trunk fare of TZS 40 per travelled kilometer with a base fare of TZS 450 is adopted (i.e. TZS 450 + TZS 40/km). For feeder services, a TZS 500 flat fare is assumed. The results presented include demand, fleet, cycle time and length for the aforementioned scenario (selected fare) in the peak morning hour.

2.3.5 Critical Intersections

The critical intersections in the designed phases are those with flyovers proposed in the Urban Transport Master Plan 2018, which are being studied by TANROADS. Four of them are located at intersections where turning movements of the BRT are required which are:

- Mandela and Nyerere roads junction (TAZARA/Mfugale Flyover);
- Mandela and Uhuru roads junction (Buguruni); and
- Mandela and Tabata roads junction (Tabata Dampo); and Mandela and Morogoro roads junction (Ubungu).

For this reason, special solutions with flyovers have been proposed for them. Ubungu and TAZARA junctions have been treated by providing interchange and flyover respectively while Tabata Dampo and Buguruni junctions will be implemented under BRT 5 project. Intersections have been designed with an underlying motive of provision of a good level of service both for the BRT and other vehicles but prioritizing the highest flows of people.

Further, designs including traffic flow have been carried in 34 junctions or intersections and U-turns along the entire BRT Phase 5 corridor (see Figure 2-

15). All traffic and geometric proposals were simulated to assure operational feasibility and checked using microscopic level operational details that could impact intersection performance (Traffic and Transportation Engineering Report, Nov. 2019).

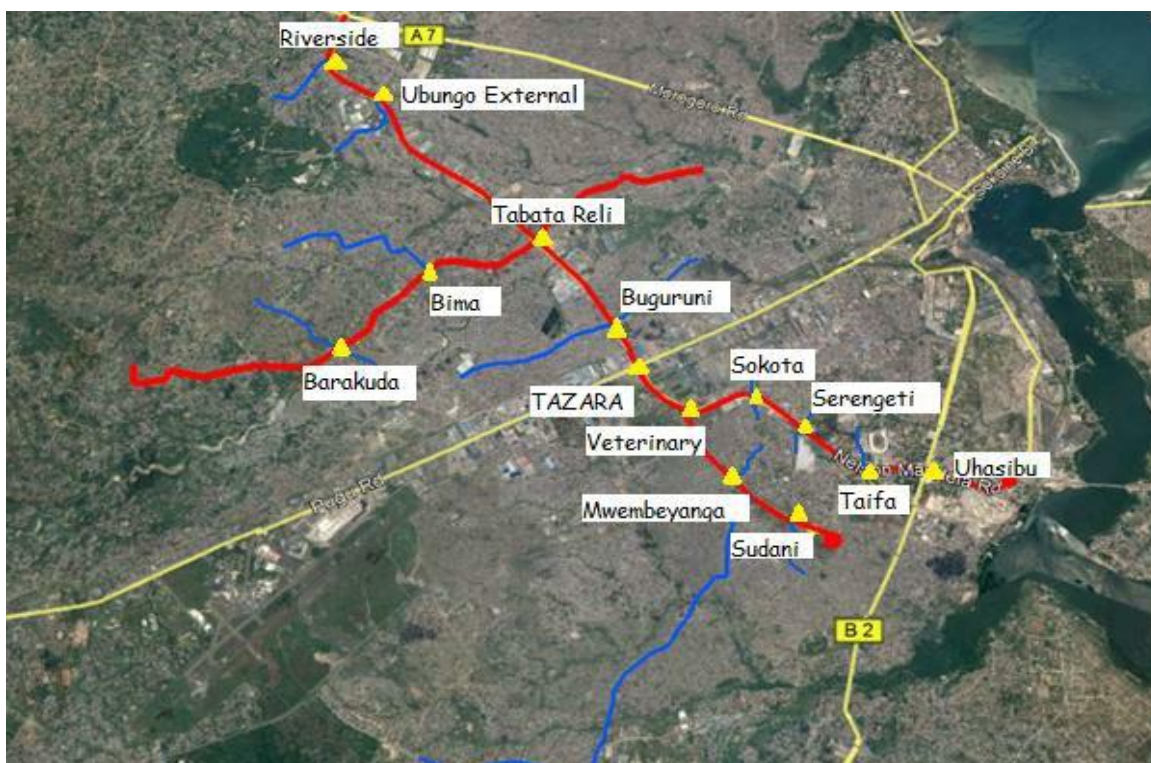


Figure 2-15: Satellite map showing existing junction locations along BRT5 routes

Source: Traffic and Transportation Engineering Report, Nov. 2019).

2.3.6 Operation & Fleet

The operational design will account for an articulated fleet of 277 buses (140 passenger capacity vehicles), 50 feeder buses (50 passenger capacity vehicles) and 40 feeder buses (35 passenger capacity vehicles). An average of 2,000 passengers are going to be transported per bus daily. It is estimated that the number of passengers for the line is 500,000 daily with varying utilization rate, starting at 65% in year 1 and 90% in year 5. The design process is based on morning peak hour demand information, as it represents the most critical public transportation behavior scenario throughout the day (Bus Operation Design Report, June 2019).

Regarding fare collection, the Automatic Fare Collection System (AFCS) will be introduced in order to control and monitor fare collection on trunk and feeder buses and other utility services including the Data Centre. Off-board and on-board (on-board electronic validator) fare collection processes will be applied.

Further, an Intelligent Transportation System (ITS) will be installed and commissioned as an information technology platform that will be used to control and monitor all stations, depots, buses, intersections and the Data Centre. The ITS will comprise mainly of the Intermodal Transport and Control System (ITCS), Real Time Passengers Information System (RTPIS), and Surveillance and Monitoring Systems (SMS). In terms of maintenance, only minor maintenance to the bus stations and terminals are considered from year 4 of the operation of the system.

2.3.7 Port Access Road

The BRT along Nelson Mandela corridor will terminate at Kigamboni (Nyerere) Bridge along the Port Access Road. Cargo clearance at the port is by rail and road whereby road clearance accounts for 93% while the rest 7% is by rail (Economic Evaluation Report, Nov. 2019). With the recent improvement and modernization of the Dar es Salaam port operations, a substantial increase in the fleet of trucks to and from the harbor has arisen and also increased the traffic volume along the arterial access roads to the port. The high level of traffic congestion, mainly during peak hours has forced the government to initiate several measures aimed at solving this problem. One such initiative is the proposal to upgrade the existing Dar es Salaam Port Access Road is to allow trucks/containers to have dedicated lanes along these roads hence reducing the level of congestion along the existing major roads/street leading toward the city Centre and decongestion of the Dar es Salaam port.

2.4 Project Activities

As per the EIA and Audit Regulations of 2005, and its Amended Regulations (2018), the BRT Phase 5 activities will be grouped into different phases from planning, designing, construction, and operation. Each specific phase will have its own activities as elaborated in the following sub-sections.

2.4.1 Pre-construction Phase

During project design Phase mainly paper and field works are involved including the following tasks:

- Evaluation of project concepts and alternatives selection;
 - Field surveys and investigations
 - road alignment and condition survey and route selection
 - topographic, climatic, soils and materials, hydrological and hydraulics surveys, economic evaluation, transport and traffic
- Carrying out ESIA, valuation approvals and the development of the RAP for the project;
- Detailed engineering design including horizontal and vertical alignment, earthworks and pavement, drainage structures, geometric and volume computations, traffic safety and drawings;
- Tendering for construction works, procurement and contractors and other service providers; and
- Compensation payments, land acquisition, grievances redress and site preparations.

2.4.2 Mobilization Phase

This phase is mainly for the Contractor to prepare for construction works, which include the below activities. The duration of this sub-phase is expected to be two (2) months:

- Demolition of existing structures such as bus stand, storm drainage channels etc.;
- Utilities mapping and relocation plan;
- Preparation of construction Environmental and Social Management System (ESMS);

- Construction of campsite, offices, workshop, material storage and material preparation yards;
- Mobilization of labour force, and equipment;
- Topographical survey (Contractor);
- Geotechnical investigation (Contractor);
- Soils and materials investigation (Contractor);
- Identification of borrow pits, quarry sites, and sources of water;
- Materials transportation, storage and preparations; and
- Acquisition of various permits/certificates (e.g. occupational health and safety, fire, working permits for foreigners, water use etc.).

2.4.3 Construction Phase

Construction work is essentially civil and building works in nature. The duration of this Phase is expected to be thirty-six (36) months plus twelve (12) months for Defects Liability Period (DLP). Construction will be implemented in two packages i.e. Package 1: Roadwork (bus stations and terminal within the road corridor); and Package 2: (depots, terminals and feeder stations outside the road corridor). The construction road will be divided into Lot I and Lot II. The construction schedule was not available during the study period. However, the report will be updated once details are available before commencement of actual construction works.

The main activities to be executed includes:

- Relocation of utilities;
- Earthworks to facilitate construction of the road which entail the following activities;
 - Clearing of vegetation, including trees
 - Removal of topsoil, dredging (where necessary)
 - Cutting and filling
 - Road widening and re-alignment and compaction
 - Excavation to facilitate construction of stormwater drainage system such as side drains, cross drains, culverts etc.
 - Construction of diversions and access roads to sources of construction

materials

- Collection and disposal of dredges, spoilt, demolition materials from the affected properties and its furniture, buildings, and excavated earth materials
- Extraction and transportation of construction materials;
 - Excavation and transport of natural sand, gravel, and sub-base materials to the construction sites
 - Stone blasting, quarrying, crushing and transport of crushed aggregates to the construction sites
 - Transport and handling of fuel, lubricants etc. from sources to the project sites/camps/storage depots
- Construction of BRT exclusive lanes;
- Construction of new bridges, storm water drainage channels, relief culverts including activities such as welding works, concrete works, metal works, bridge protection works;
- Construction of the bus terminals, depots, stations (all types), viaducts, flyover at Tabata junction;
- Construction of the terminal buildings, U-turns, walkways;
- Laying a bitumen prime coat and bituminous concrete surface treatment for the Port Access Road section;
- Installation of road furniture, signboards, thermo-plastic road marking etc.;
- Installation of the Intelligent Transport System (ITS) and set-up of the Data Centre infrastructure;
- Restoration of the borrow pits, water ponds and temporary quarry sites to a natural and useable condition;
- Landscaping (reclaiming, re-contouring and restoring of disturbed areas); and
- Implementation and monitoring of the environmental and social safeguards (ESMP, EMP, ESMS, RAP etc.).

2.4.4 Contractor's Demobilization Phase

After completion of all construction activities, contractor has to demobilize. This will involve landscaping, restoration, clearing of all site activities in terms of tying up of all site facilities and demobilization of all construction equipment. Disposal

off any remaining unwanted material and wastes, closure of the camps, landscaping and borrow/quarries reinstatement, labour demobilization. After the demobilization, the contractor will hand over the works to the project Proponent for the operation and maintenance phase.

2.4.5 Operation and Maintenance Phase

In this phase, the roads will start to operate to serve the intended purposes. The expected activities include transportation of cargo and passengers, management of the traffic, maintenance of spoiled/damaged road sections, reinforcement and replacement of road furniture, maintenance and rehabilitation of the project road, facilities maintenance, and occupational health and safety management. Due to wear and tear as a result of use, the roads and other accessories will require periodical maintenance. Among others, the maintenance works will include repainting or road marks and signs, repairing cracks on the structures (culverts and bridges), and routine maintenance of traffic lights.

2.4.6 Decommissioning Phase

Decommissioning would involve the closure of the project for a new purpose. However, it is expected that the design life span of the road will be approximately 20 years and it will not be decommissioned thereafter. Periodic maintenance and rehabilitation will be performed.

2.5 Potential Project Construction Materials

2.5.1 Construction Materials

For the ease of the maintenance and lessons learnt from BRT Phase 1, materials have been carefully chosen, ensuring they are available in-country. Similarly, the construction technology adopted is available in the country. Thus, the materials have been chosen for durability, low maintenance, environmental considerations, and resistance to adverse weather conditions.

Table 2-7: Types and estimated quantities of construction materials

S/N	Construction Materials	Estimated ³ Quantity & Units	Sources
1.	Sand	Over 300 m ³	Bagamoyo- Coast Region
2.	Gravel materials	Over 300 m ³	Kisarawe, Kibaha
3.	Cement	Over 500 Tonnes	Local suppliers in Dar es Salaam
4.	Stones/aggregates	Over 200 m ³	Bagamoyo- Coast Region
5.	Water	About 200 m ³	Mtoni river, Mzinga river and Ruvu river
6.	Timber	About 100 Tonnes	Local suppliers in Dar es Salaam
7.	Steel Bars and metal materials	Over 200 Tonnes	Local suppliers in Dar es Salaam
8.	Nails	Over 50 Tonnes	Local suppliers in Dar es Salaam
9.	Fuel (petrol, diesel and kerosene)	Varies	Local suppliers in Dar es Salaam
10.	Bitumen	Varies	To be exported (to be specified)
11.	Thermoplastic paints	Varies	To be exported (to be specified)
12.	Geo-textile fabrics	Varies	To be exported (to be specified)
13.	Floor tiles (200 x 200 x 14mm heavy duty anti-skid Porcelain Tiles Ex Spain or other equally approved)	Varies	To be exported (to be specified)

Source: Consultant, 2020

2.5.2 Borrow Material Sources

Three borrow pits for material sources were investigated for their suitability and quantity estimation of the available material as per Table 2-8 below. The borrow sources were found to be previously explored by TANROADS or municipal authorities for the various gravelling projects in Dar es Salaam and Pwani Regions, therefore the same will be used as detailed in Table 2-8. However, due to erosion, flooding and other associated impacts from borrow operations within Dar es Salaam city, authorities have closed all borrow pits which were developed within the vicinity of the city.

The available source of the gravel materials is Kisarawe hills located about 31km from TAZARA/Mfugale flyover. The detailed description, analysis and quantification of all identified and studied materials sources and sites is presented in a separate report (*Soil and Materials Investigation Report, Nov. 2019*). If the selected Contractor will opt to utilize these existing borrows, a

³ The actual quantities and sources to be determined later

Borrow Pit Operation and Closure Management Plan (BPOCP) shall be developed and implemented in the selected borrow sites. The Plan shall be reviewed and approved by TANROADS and all other relevant partners and authorities before commencement of civil works.

Table 2-8: Sources of borrow materials

SN	Borrow name	Available Quantity to be excavated m ³	Estimated depth of excavation (m)	Remarks
1	Vigungu kwa Pazi	71,880	2.50	Source of coral gravels
2	Mabwe Vidunda	174,012	2.50	Source of coral gravels
3	Ngugu/Dalu	26,518	2.50	Source of coral gravels

Source: Materials Report, Nov. 2019

2.5.3 Quarry Sources

Lugoba site was identified as the main source of stone quarry for production of aggregates. Rock samples were collected from two existing sources named Lugoba-I and Lugoba-II (Bagamoyo District, about 120km from Dar es Salaam) for laboratory testing and evaluation. The characteristics of Lugoba site are summarized in Table 2-9. The gravel is used for the structural layers of the road, whilst the rock is crushed and used for the road base on heavily trafficked sections of the road, or as a constituent in concrete and the road surface layer. If the selected Contractor will opt to utilize these existing borrows, a *Quarry Site Operation and Closure Plan (QSOCP)* for the selected borrow sites will be developed and implemented. The Plan shall be reviewed and approved TANROADS and all other relevant partners and authorities before commencement of civil works.

Table 2-9: Locations and quantity of quarried stone sources

S N	Quarry ID	Distance from project area	Estimated Quantity (M3)	Lithology
1	Lugoba	140 km	>250,000	Unweathered gneiss

Source: Materials Report, Nov. 2019

The existing sources of construction materials presented above will be used for construction unless they have been depleted. In case there will be a need to open new borrow pits or quarries, the Contractor will have to make all necessary arrangements for environmental clearance, land acquisition and compensations

in accordance with the national laws and regulations, and applicable World Bank's standards for acquisition and compensations.

2.5.4 Sand and Water Sources

Two sources of sand pits were investigated with regards to their suitability for concrete works. These sources include Mbande and Mwanadilato as they were all suitable for construction purposes. Water sources were found to be within acceptable limits for construction works. The water and sand samples were sampled from the following sources as depicted in Table 2-10 and 2-11.

Table 2-10: Sources of water

Source	Location road	Location District	Date of Sampling
Mtoni Rive rnear KTM factory	Kilwa road	Temeke	09/10/2018
Mzinga River	Kilwa road	Ilala/Mkuranga	09/10/2018
Msimbazi River	Mandela road	Ilala	09/10/2018
Ruvu river (DAWASA's source)	Nyerere road	Ilala	09/10/2018

Source: Materials Report, Nov. 2019

Table 2-11: Sources of sand

Source	Location road	Location District	Date of Sampling
Mbande	Rangitatu-Chanika road	Temeke	09/10/2018
Mwanadilato	Rangitatu-Chanika road	Ilala/Mkuranga	09/10/2018

Source: Materials Report, Nov. 2019

2.6 Other Project Requirements

2.6.1 Equipment and Machinery

The tentative list of equipment and machinery to be used during construction period is summarized in Table 2-12.

Table 2-12: Types of equipment and machinery to be used during construction

No	Machinery/Equipment	Activity
Construction Equipment: Type and Characteristics		
1.	Backhoe excavator	General earth works, e.g. excavation of drains and river dredging
2.	Bulldozer with ripper	General earth works
3.	Wheeled loader	General earth works and transport of concrete
4.	Motor grader	General grading works, including earth works
5.	Vibrating/sheep foot roller compactor	Compaction works
6.	Vibrating steel drum roller compactor	Compaction works
7.	Tandem roller compactor: 8 – 10 ton	Compaction works
8.	Pneumatic Tired Roller (PTR) compactor	Compaction works
9.	Hydraulic hammer	Piling works
10.	Truck mounted crane	Lifting of construction materials e.g. pre-cast culverts
Construction Machines		
1.	Concrete batching plant	Preparation of concrete (batch concrete mixing)
2.	Concrete truck mixer (mobile concrete mixer)	Concrete mixing
3.	Concrete mixer	Concrete mixing
4.	Small site dumper	Transport of construction and waste materials
5.	Bitumen distributor	Distribution of bitumen
6.	Mechanical broom	Cleaning of runways surface
7.	Stone crushing plant	Production of chipping (aggregates) from hard stones)
8.	Screening plant	Sorting of different sizes of aggregates
9.	Quarry dump trucks	Transport of stones and aggregates
10.	Dump trucks	Transport of construction materials and wastes
11.	Power bloom and blower	Blowing of surfaces before paving
12.	Asphalt plant	Manufacture of asphalt
13.	Finisher for asphalt concrete pavement	Surface paving
14.	Concrete batch plant	
15.	Equipment for geotechnical investigations	Geotechnical investigation works
16.	Concrete vibrator and poker	Vibrating concrete
17.	Dewatering pump	Dewatering to allow for waterless construction
18.	Air compressor and wagon drill	To create pressurised air during drilling and cleaning during road surfacing etc.
19.	All essential supporting units such as generators, mobile workshop, tyre repair shops, welding facilities, services trucks, low-bed trailer (low-loader) units etc.	Repair and maintenance of machinery and equipment
Transport Facilities		
1.	Light duty vehicles	Transport of light construction materials, stationery machines, and staff
2.	Water and fuel tankers tanker truck	Dewatering of earth surfaces to attain effective compaction, minimizing generation of dust, and transport of fuel
3.	Dumps trucks	Transport of construction materials (sand, gravel, aggregated, cement etc.)

Source: Consultant, June 2020

2.6.2 Diversion Roads and Detours

During construction, some sections of the corridor may always require diversions to ensure continued traffic flow and at the same time allow for construction activities to take place. Wherever practicable, the existing service roads mostly along trunk roads and alternative local roads along BRT Phase 5 corridors will be assessed and used. Selection of the route will be on a case-by-case basis, consideration of the potential/minimum environmental and social impacts including further involuntary resettlement. The development of the project's Resettlement Action Plan (RAP) is underway. The RAP will be used a guideline in case of impacts on private properties. The Contractor shall be required to develop and effectively implement a dynamic *Traffic Management Plan (TMP)* to guide flow of traffic and smooth mobility during construction of the project road. The diversion/detour and entire traffic plan has been presented in the Detailed Engineering Design Report (Nov. 2019).

2.6.3 Worker Accommodation

The project is in an urban setting whereby it is expected that majority of the labour will be recruited from within the project area. The labour will be coming directly from their households hence setting up of the Labour Camp may not be necessary. The few expats will be accommodated in the existing accommodation facilities (e.g. hotels, hostels, lodges etc.) in the project area. This will minimize the need for additional land acquisition and associated resettlement impacts. However, the worker accommodation to be provided will be in accordance with the IFC and European Bank for Reconstruction and Development (EBRD) requirements.

2.6.4 Materials/Equipment Storage Yard

At this stage, the exact number and exact locations for establishing laydown areas for construction purposes has not been identified. Potential site locations will largely depend on the number, size and location of construction lots (Lot I & II for the BRT Phase 5), size of the required land, available space especially within Dar es Salaam city, accessibility to the site, haulage distances for transferring construction equipment, and sensitive environmental and social receptors.,. It is

likely that existing facilities and/or sites that have been used in previous construction activities (especially on-going BRT2 project) can be re-used as laydown areas for materials and equipment storage, maintenance workshops with few personnel such as guards etc. In this case, further land acquisition and other environmental and social impacts will be highly minimized.

Further, as provided in the Environmental Code of Practice for Road Works (URT, 2009), the laydown sites must be adequately located to avoid or minimize environmental disturbance. Previously cleared or disturbed areas should be utilized to the extent possible. Alternatively, sites that will need to be cleared in the future for other purposes. The Contractor must observe the following conditions:

- i. Use of existing facilities/campsites to the extent possible;
- ii. The construction site's access paths, storage and parking facilities, workers' camp, site offices, and other temporary installations must be located at least 60m from permanent watercourses (including irrigation and drainage canals) or lakes and more than 30m from intermittent watercourses;
- iii. Workers' camps must be located at least 150m from the road reserve of a main road to reduce the harmful effects of noise and more than 500m from inhabited zones (including sensitive social receptors such as learning institutions, villages, hospitals etc.);
- iv. Sites of exceptional interest (e.g. wildlife corridors, livestock crossing areas, ecological or archaeological) must be avoided;
- v. The workers' camp must be located at least 10km from classified forests to avoid the illegal harvest of wood for domestic purposes; and
- vi. The operation of the construction campsite must not lead to conflicts with the local population over the use of local resources for domestic purposes.

It is anticipated that the Contractor will be involved in determining the number, locations, size, capacity and type of the laydown sites to be used based on contractual agreements between TANROADS and Contractor(s). The camp(s) is/are expected to have staff accommodation, office space, sanitation facilities, materials laboratory batching and asphalt plant, machinery yard, workshop, fuel pump, first aid clinic, etc. Given the nature of the project and its implementation

within the city settings, it is advisable that the Resident Engineer will be in the same compound as the Contractor.

2.6.5 Labour and Staffing Requirements

During the construction Phase, the project is anticipated to employ about 300 people, of which 100 will be skilled labourers, and 200 will be unskilled. The Project Affected Persons (PAPs) and communities along the BRT Phase 5 corridor will be given priority in employment during construction. The skilled labour will involve different engineers, supervisors, technicians etc. For the purpose of optimizing local content and observing policy requirements, it is expected that of the 100 skilled employees, about 10% will be expatriates; 30% to 40% will be national staff but from other areas of Tanzania and not the immediate project area; and about 70% will come from the project area.

During recruitment of the unskilled labour, Ward and *mtaa* local leaders shall be consulted and involved in recruitment of recommendable labourers required by the Contractor and records of the community members employed by the project will be kept. Their involvement will also help to control the security of the project inventory (especially materials and equipment). Food for the construction camp will be obtained from local suppliers among the local community members.

Employment will be undertaken on an equal opportunity basis for both genders. Women will be hired to perform suitable project duties. No underage workers will be employed to prevent child labour along the project corridor. This will be part and parcel of the *Child Abuse and Protection Plan* (CAPP) to be developed and implemented by the Contractor.

2.6.6 Energy Requirements

Fuels of all types needed for the project, including diesel and petrol, are readily available from various privately-operated depots around Kurasini area. Bulk supplies of all the fuels can be obtained directly from depots during mobilization and construction activities. Tanzania Electric Supply Company Ltd (TANESCO) power supply, which is available alongside the BRT Phase 5 corridor, will be used in the campsites and workshops. Power transformers shall be installed to

maintain reliable power supply. Moreover, standby generators with high capacity (500KV) will be installed as alternative source of power in case of TANESCO power cut. In addition, the Contractor shall consider installation of the renewable sources of energy especially solar for lighting, heating water and other uses at the camps and along construction footprint areas. Fuel and oils for vehicles, generators and machines operations will be obtained from registered and licenced suppliers in Dar es Salaam.

2.6.7 Land Requirements and Acquisition

The proposed project used available RoW to minimize extra land acquisition and relocation of people and properties. In order to minimize impacts arising from involuntary resettlement (physical and economic displacement), the construction corridor was re-adjusted in some sections. In the same context, the existing project corridor will be used as much as possible except where horizontal realignment outside existing corridor is unavoidable. All the affected properties within the RoW will be compensated according to national requirements and World Bank ESS5 on Involuntary Resettlement.

Additional land will be required for construction of bus depots, terminals, feeder stations, utilities, viaduct and materials sourcing areas such as borrows and quarries. Given that the project is in an urban area, it is anticipated that existing accommodation facilities will be utilized for housing construction labour (expatriates), and existing infrastructure will be used e.g. for materials/equipment storage yards, offices etc. so as to avoid further land acquisition and associated resettlement issues in a highly urbanized project footprint area. In this regard, there will be compensation to the affected properties outside RoW.

TANROADS will make sure that all procedures for acquiring land for the proposed project are followed to avoid land disputes related to all land that is outside the road reserve. Affected Persons will fairly and promptly be compensated in accordance with the national laws, guidelines and World Banks ESS5 (Land Acquisition, Restrictions on Land Use and Involuntary Resettlement). The project's RPF details all procedures and guidelines to be complied with during land acquisition for both the road corridor, campsites and

materials extraction areas (in case of new quarries/borrows/sand mines). In line with the requirements of the project, a separate RAP report has been developed to address involuntary resettlement issues for the BRT Phase 5.

2.7 Waste Generation and Management

2.7.1 Construction Phase

Major wastes generation associated with the project construction and their treatment/ disposal methods are described in Table 2-13. Domestic wastes will include liquid wastes and general refuse which will result from food remains and wastewater from toilets. During construction the main sources of the wastes will be construction sites, campsites, and borrow pit and quarry sites. The types of wastes that are expected to be generated at different phases include solid, liquid, gaseous and semi-solid (sludge) wastes. The following solid wastes will be generated during the construction phase, i.e. wood, metal materials, tins, paper, plastic materials, drums, containers and other packaging materials, waste/overburden soils and other wastes debris around the project site. Dust bins and collection stations will be provided at the project campsite and workshops during construction for collection of garbage and other solid wastes generated. Hazardous solid waste materials such as scrappers, used batteries, filters debris during construction phases shall be collected by the authorised waste dealers for disposal according to the applicable procedures and regulations.

The largest quantity of solid waste is anticipated to be spoil from the excavation sites (approximately 40,000m³). The waste will result from earthworks associated with road formation and creation of borrow pits plus overburden removed from quarry sites. Spoil will be stockpiled near the original source. A comprehensive *Waste Management Plan (WMP)* for the construction phase will be developed by the Contractor before actual mobilization. The Contractor will be in charge will have to manage the waste generated on site and facilitate the disposal in accordance with the national legislations, international guidelines (IFC and World Bank) and good contractor practice.

Table 2-13: Waste generation and treatment during construction phase

Activity	Waste type	Amount	Treatment/ Disposal Method(s)
Clearing of topsoil	Spoil Soil	Above 500 m ³	This soil shall be stock piled along the foundation trenches for all structures and backfilled for pipes laying. The soils shall be used to reinstatement site at the end of the project, the spoiled materials shall be disposed to designated disposal sites
Actual Construction	Rubbles	Not Significant	Will be stockpiled and used to fill cut sections
	Scrap metals	Not Significant	Sell to recyclers
	Timber	Not Significant	Sell to recyclers
	Cement bags	Not Significant	Sell to recyclers

Source: Consultant, 2019

For the domestic solid wastes, domestic refuse will be generated at the works site and campsites by workers. A local solid waste bay shall be designated by the contractor to store domestic refuse and other types of solid waste in appropriate receptacles for waste collection integrating into the existing waste management scheme of each municipal council.

In Dar es Salaam, the collection and transit of solid waste from registered waste collection points to transfer stations and/or designated disposal sites is typically carried out by licensed contractors operating under the municipal councils. The contractors are equipped with a limited collection of haulage machinery including tipper trucks, compactor trucks, skip loaders, skip containers, tractors and trailers, and perform services such as waste collection and transportation, as well as the sorting of different waste streams for appropriate treatment, recycling or disposal. The routine waste collection services carry a fee payable to the contractor and the relevant municipal council. However, resident waste management contractors lack the capacity to adequately manage the quantities of waste estimated for project's construction phase. Therefore, the construction contractor, in consultation with relevant municipal authorities and resident waste collection contractors, will establish a dedicated and well-coordinated Waste Management System (WMS) that will involve the transfer of solid construction waste to designated transfer stations, dumpsites or recycling facilities as required. The system is to be implemented in accord with the Environmental

Management (Solid Waste) Regulations (2009), Environmental Management (Hazardous Waste Control and Management) Regulations (2009), and applicable by-laws. Potential areas for the disposal of non-hazardous waste close to the project area include Pugu Dumpsite in Pugu Kinyamwezi, and two composting facilities in Gongo la Mboto and Kisiwani Buguruni.

Liquid waste will include wastewater from campsite and operations, hazardous waste like bituminous materials, lubricants, used oils and grease to be generated during construction shall be collected by the authorized waste dealers for disposal according to the applicable procedures and regulations. Septic tanks, soak away pits, and Asian types of toilets will be constructed at the sports complex building and at temporary campsite to be used during mobilization, construction and operation phases.

Gaseous wastes will include the following main categories: exhaust fumes containing mainly exhaust gases and particulate materials emitted by vehicles, plant, and machinery operating in the project area; and dust generated by construction activities.

Regarding liquid waste, all wastewater generated during construction Phase will be collected and disposed using best available onsite sanitation options/ septic tank and soak away pit.

Assuming that,

- There will be 300 workers (Worst Case Scenario)
- Water consumption = 40l/capita/day
- 80% of the water consumed become wastewater
- 100% of the workers shall use the site toilets
- Wastewater generation per day = $300 \times 40 \times 0.8$

Therefore about 9.6m³ per day of liquid waste will be produced from the site during construction period. The wastewater will be collected and treated using onsite system (septic tanks and soak away pits), the design will accommodate

entire construction period, however, if the sludge will accumulate, emptier trucks will be used for emptying.

2.7.2 Operation and Maintenance Phase

There will be no significant amount of solid waste generated during operation phase along the roads. However, at the terminals, depot and bus stations there will be a significant amount of solid waste generated. Waste generated will be collected by designated contractors and disposed in respective dump sites.

Liquid wastes mainly wastewater will be managed using onsite sanitation facilities, unless the permit is granted by Dar es Salaam Water Supply Authority (DAWASA) to connect to existing sewerage system for those stations closer to sewerage system, and/or disposal at the municipal oxidation ponds located in Kurasini and Vingunguti ponds that are nearby the project corridor. Storm water will be collected using gutters and conveyed by roadside drains to the receiving environment. Used oil will be collected and disposed or reused by registered collectors.

Table 2-14: Indicative types and sources of wastes to be generated

Activity / Source	Solid Waste	Liquid Waste	Gaseous Waste
Mobilization Phase			
Site clearing and excavation, construction of campsite, construction of septic tank and soak away for wastewater from toilets, removal of spoil materials. Demolishment of existing structures such as buildings	Earth, green cuttings (vegetation wastes), removed spoil materials, debris	Water slurry, wash-down water	Emission of air pollutants from operating machinery (dusts, HC, NOx, CO)
Installation of water infrastructure on campsite	PVC and GS pipes	None	Emission of air pollutants from operating machinery (dusts, HC, CO)
Construction of foundation(s): block/concrete works	Concrete, blocks, hessian cement bags	waste concrete slurry, wastewater	Dust from open cement bags

Construction of the main structures	Cement bags, mortar, metal (reinforcements, nails, timber, iron sheet)	waste concrete slurry, general wastewater residual	Scent from Paint spray
Installation of electrical infrastructure at camp Site	conduit pipes, cables	None	None
Labour force	Food wastes, aluminium cans, plastic bags and bottles	Sanitary wastes	None
Construction Phase			
Earthworks	Green cutting, dredges, earth, demolition wastes (earth, concrete, timber, iron sheets)	None	None
Construction of road project, structures and access road,	Bitumen, gravel, concrete, sand, dredges, aggregates, spoil materials. Concrete, blocks, hessian cement bags, metal cans, steel	Bitumen, Water slurry	Emission of air pollutants from operating machinery (dusts, HC, Nox, CO)
Construction of foundation(s): block/concrete works	Concrete, blocks, hessian cement bags	Water slurry, wash-down water	Emission of air pollutants from operating machinery (dusts, HC, Nox, CO)
Construction of the main structures e.g. bridges	Cement bags, mortar, metal (reinforcements, nails, timber, iron sheet, bitumen drums	Water slurry, cement slurry	None
Labour force operation	Food wastes	Sanitary wastes	None
Operation Phase			
Passengers and communities (road users)	Food waster, packaging waste	Sanitary wastes	Emission of air pollutants from operating machinery (dusts, HC, CO)
Structures Maintenances activities	Cement bags, mortar, metal (reinforcements, nails, timber, iron sheet, bitumen drums	Water slurry, cement slurry	Emission of air pollutants from operating machinery (dusts, HC, Nox, CO)

Source: Consultant, 2019

2.8 Occupational Health and Safety Management

2.8.1 Health and Safety

Before starting the construction, the Contractor should prepare and submit for approval the site-specific *Occupational Health and Safety Management Plan (OHSMP)* that shall describe the measures that will be taken to achieve safe working environment, good housekeeping and occupational health and safety standards at the workplace. The Contractor shall frequently provide training on occupational safety and health to the workers and information relevant to the

health risk (including toolbox meeting, proper use of First Aid Kit, Personal Protective Equipment (PPE) and designated location for assembly point). During the construction period, the Contractor shall provide, equip and maintain adequate first-aid stations and stand by ambulance and first aiders to be used in case of emergency. The contractor shall outsource qualified and registered nurses and doctors from nearby dispensaries, health centers and/or hospitals. The Contractor shall also prepare an emergency preparedness plan setting out emergency protocols and facilities, and organize induction and refresher trainings for project staff, the latter of which will involve practice under programmed emergency tests including COVID-19 requirements (see Sections 7.2.2.17 and Appendix X).

Further, the civil works contract shall include the requirement of the Contractor to conduct environmental, Social, Health and Safety awareness programme around project site using audiovisual presentation, questions and answers session and provide handouts (pamphlets and reflective stickers).

2.8.2 HIV/AIDS and STDs

TANROADS supports the government's efforts to alleviate the spread and burden of STDs including HIV/AIDS. Thus, the Contractor shall develop and implement an *HIV/AIDS Prevention and Awareness Programme* along the corridor. Further, during the mobilization phase the following measures shall be observed:

- Raise awareness to all site staff and labour of the danger and impacts of unprotected sexual interactions including spread of STDs and HIV/AIDS. A sub-Contractor (NGO, local health facilities HIV/AIDS experts) will be nominated to educate and conduct public awareness raising campaigns on HIV/AIDS preventions at least every two (2) months including supplies of educational materials;
- Awareness campaigns and training will be raised to the immediate local communities and project staff;
- Operate STD and HIV/AIDS clinic at the project site or an existing qualified and equipped local clinic throughout the project implementation period. The clinic will undertake professional screening, diagnosis, counselling and

treatment of the STDs affected people. Serious HIV/AIDS cases shall be referred to the National HIV/AIDS program coordinated by the Ministry of Health;

- Periodic provisioning of condoms for site staff and labour. Condoms will be made available in worker health facilities and washrooms;
- Liaise with the Ministry of Health and their designated local representatives or agents and contacting NGOs experienced in the field of STD and HIV/AIDS alleviation program;
- Evaluate and explore other opportunities for enhancing STD and HIV/AIDS related behavioural change; and
- Liaise with Regional or District Medical Officer and their designated local representatives or agents to report progress and coordinate the STD and HIV/AIDS alleviation measures on site with the Ministry of Health's National Program.

2.8.3 Traffic Management

As part road safety management, the indicative *Traffic Management Plan (TMP)* has been prepared for the construction purposes (refer Traffic Management Report, Nov. 2019). The Construction TMP for each specific sub-corridor of the BRT Phase 5 has been designed and intended to specify different techniques, adequate safety measures in advance against identified hazards and specify implementation of the said safety measures to ensure safe movement of traffic during the construction operations.

Temporary traffic-control facilities will be used to manage traffic during construction. The Contractor will build an access road around the project site to ensure the smooth flow of traffic during the construction phase. An adequate number of flag-persons, traffic control signboards and warning devices will be deployed. The access road will be maintained regularly. For the existing BRT Phase 5 corridor, the Contractor will regularly maintain the existing road ahead of the construction works. The existing road shall be in a safe trafficable condition. The Contractor will always ensure availability of adequate resources continually available to carry out repairs, provide a smooth riding surface, and to ensure that the road is always safe for traffic.

2.8.4 Blasting, Explosive and Drilling Operations

The proposed road project will involve drilling and blasting activities during construction. The Contractor will be instructed to prepare a *Blasting Management Plan (BMP)* to undertake good handling of explosives and blasting during construction as well to prepare storage facilities away from construction activities to be used for explosive storage. The Contractor shall employ persons who are in possession of approved and current blasting certificates recognized by relevant authorities in Tanzania. Prior to construction, the Contractor shall liaise with relevant authorities regarding the extent of explosion, blasting and explosive materials.

Further, based on the nature of the project area, the proposed project will involve the activities of drilling and blasting of rocks for levelling and foundation setup hence this will cause noise and vibration transmission to the surrounding communities. Drilling will involve boreholes for water use during mobilization and construction phases. Drilling equipment/machines will be used for drilling activities and blasting will use the recommended abrasives as per the nature of rocks.

3.0 POLICY, LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

This chapter presents the policies, legislation, regulations, international agreements, international standards, and institutional arrangements that are relevant to the proposed BRT Phase 5 development. Policy statements, statutory and regulatory provisions as well as guidelines pertaining to the proposed project were examined to ensure the compliance of the project design and activities with the legal and administrative framework in all project phases.

3.1 Pertinent National Policies

Table 3-1: Applicable national policies to BRT Phase 5 project

National Policies		Summary of the most relevant requirements
1.	National Environmental Policy, 1997	The policy requires that development projects be done in a way that does not compromise environmental integrity. It is mandatory to undertake EIA before any development project likely to have significant environmental impacts is given the go-ahead. This is to ensure that development projects are implemented in an economically viable, socially acceptable and environmentally acceptable manner. Section 28 and 29, which states that in all projects, environmentally sound technologies (that is, those that generate no or low waste or protect environment) should be used. Section 56 (f), requires that workers' health shall be adequately protected from environmental health hazard. Further, Section 51 of the policy focuses on the improvement in mass transport systems to reduce fuel consumption, traffic congestion and pollution; control and minimization of transport emission gases, noise, dust and particulates; disaster/spill prevention and response plans and standards shall be formulated for transporting hazardous materials. The proposed project shall ensure mitigation of the adverse impacts during project implementation.
2.	National Transport Policy, 2003	The main policy objective is to enhance transport and promote environmental protection. The mission is to develop safe, reliable, effective, efficient and fully integrated transport infrastructure and operations that will best meet the needs of travel and transport at improving levels of services at lower costs. The policy is relevant to this project because the road infrastructure project, which is, addressed in the policy as one of the important transport infrastructures in facilitating regional and national economic growth. Hence upgrading of the road is in support of policy's objectives.
3.	National Land Policy of 1997	The policy recognizes the need for protecting environmentally sensitive areas. It stresses protecting the environment and natural ecosystem from pollution; degradation and physical destruction. Important sections of the policy relevant to the proposed BRT-Phase 5 project are section 2.4 (on use of land to promote socio-economic development; section 2.8 (on protection of land resources), section 3 (iii) and section 4 (on land tenure). For instance, section 3 (iii) states that "the Owner has the right to subdivide or lease the land etc. so long as these actions do not violate land use policies as stipulated by zoning regulations and local by-laws". This sub-section is relevant and provides guidance to the proponent's terms of occupancy, land use and land use change along the project corridor. The proposed road project shall involve land acquisition and therefore the compensation shall be affected prior to the project implementation.
4.	National	The policy recognizes that infrastructure like roads and associated services

National Policies		Summary of the most relevant requirements
	Human Settlements Development Policy, 2000	constitute the backbone of urban and rural economic activities. A reliable and efficient road transport system is essential in increasing productivity and the establishment of manufacturing industries. All weather roads, reliable and efficient transport systems are essential to the increase in productivity, planned settlement and establishment of manufacturing industries. The construction of the BRT-phase 5 would thus contribute to effective implementation of the policy. In addition, the road project will result in relocation of affected properties within the RoW hence may result into new settlement development. The project shall implement the mitigation measures recommended by this ESIA study particularly the RAP.
5.	Agriculture and Livestock Policy, 1997	The communities do practise some urban agricultural activities such as horticulture and indoor livestock keeping. The construction of the BRT Phase 5 and the upgrade of the Port Access Road will serve to improve the economic potential of agriculture for the communities providing access to better markets of the agricultural produce, livestock and livestock products by providing reliable and cost-effective means of transport.
6.	National Water Policy of 2002	The policy stresses on the sustainable use of water to maintain environmental flow which is essential for riparian biodiversity, wetland systems, and the freshwater-seawater balance in deltas and estuaries. This can be accomplished by controlled exploitation of water and treatment of wastewater (effluent) before emptying it into the environment. Section 5 (v) of the policy is relevant as well in the upgrading of existing railway with regard to water extraction from various sources along the corridor during construction and operation. The proponent is to abide by the regulatory instruments and procedures at all administrative levels in order to ensure there is no potential or actual water conflict among users and/or uses. Water policy issues particularly in water resources management underscore the disaster management from accidental pollution of water sources (Clause 4.8.4). If polluting project activities are not mitigated against, they can result in water pollution around the vicinity, and so the project shall implement the measures recommended by this policy to ensure sustainability of the water resources.
7.	National Employment Policy of 2003	The most relevant sections of this policy are (ii) 10.6 that stresses the employment of special groups, i.e. women, youth, persons with disabilities, and (iii) 10.8, which discourages the tendency of contractors to employ expatriates, when there are equally competent nationals. The contractor and operator shall abide by the employment policy and ensure that all qualified nationals are afforded equal opportunities for employment. Further, The Project Proponent intends to supplement these efforts by providing employments during the project implementation. During this period, transfer of technology can be attained among those who will be employed and after their contract terms they can engage in self-employment activities in the informal sector, especially in construction sector.
8.	National Health Policy of 2003	The policy puts more emphasis on protecting workers from all health hazards that occur in industries, estates and plantations. It is the responsibility of the employers or developers to offer medical and preventive health services to their employees according to guidelines given by the respective Ministry.
9.	National HIV and AIDS Policy of 2001	The policy recognises HIV/AIDS as an impediment to development in all sectors, in terms of social and economic development with serious and direct implications for social services and welfare. Relevant objectives of the policy in relation to upgrading of the Port Access Road and the BRT phase 5 are: prevention of transmission of HIV/AIDS, enhancement of sectoral roles through participation and financial support; promotion and participation in the research on HIV/AIDS, including dissemination of scientific information and development of a vaccine. Further, all stakeholders have to be actively involved in the fight against HIV/AIDS. The proposed project will result into population influx during the implementation. In

National Policies		Summary of the most relevant requirements
		this regards the contractor shall be required to prepare the HIV/AIDs awareness programme aimed at promoting awareness of HIV/AIDs among its service providers, communities and its employees.
10.	National Investment Promotion Policy, 1996	The policy, among other things, seeks to promote the development of industries, minerals and energy as a means of attracting potential investors. The policy recognizes that adequate and reliable transport infrastructure contributes significantly to catalysing the development of the country. Section 3.4, d, iii-v entails the improvement of the quality and competitiveness of transport services and facilities; regular maintenance of the transport infrastructures; and promotion of an integrated and linked national, regional and international road, railway and air transport network.
11.	National Women and Gender Development Policy, 2000	The key objective of this policy is to provide guidelines that will ensure that gender sensitive plans and strategies in all sectors and institutions are developed. While the policy aims at establishing strategies to eradicate poverty, it puts emphasis on gender quality and equal opportunity of both men and women to participate in development undertakings and to value the role-played by each member of the society. On employment strategies for women, Section 30 of the Policy requires presence of equal employment opportunities between men and women depending on required qualifications at all levels. In addition, there should be records of exact number of women and men at levels in order to assist monitoring and follow-ups, and presence of less bureaucratic special system in the provision of business licences especially to women working in the informal sector. During implementation of the project, the contractor in collaboration with DART/TANROADS shall be advised to endure that as much as possible that men and women are given equal opportunities during implementation of the project, especially in recruitment of construction workers
12.	Construction Industry Policy, 2003	The policy recognizes the importance of involving various organizations and persons including companies, firms and individuals working as consultants, main contractors and sub-contractors, materials and equipment producers, plant and equipment suppliers, builders and merchants. With respect to environmental protection and conservation, section 8.2.2 of the National Construction Industry Policy addresses a number of issues regarding the environment. The construction industry is generally said to be a major source of environmental damage and occupational health problems. The project construction activities will affect the environment in many ways such as resource deterioration, physical disruption, earth grabbing and pollution as well as cement, lime and bitumen production will pollutes the atmosphere. The project shall implement the mitigation measures recommended by this ESIA study.
13.	Cultural Property Policy of 1997	This policy covers a wide range of topics relating to both living cultural heritage and historical and archaeological remains ("cultural property"). The policy requires that "all land development shall be preceded by Cultural Resource Impact Studies". So far, no cultural property was noted to exist within road corridor RoW. However, during execution of the works, the Port Access Road BRT Phase 5 roads will have to observe the said requirements through sensitization of his workmen particularly those involved in operation of the road construction equipment. This is because, the project involves soil excavation hence may result into excavation of archeological artifacts. During the execution of the proposed project the contractor shall be required to observe the archaeological remains ("cultural property") and report immediately any if found to the relevant authority and shall be required to sensitize his workmen on the matter particularly those involved in the road construction.
14.	Mineral Policy	Section 6 of the policy provides for the environmental management, health and

National Policies		Summary of the most relevant requirements
	of Tanzania, 2009	safety measures in extractive and mining operations. With specific regard to the infrastructure development sector, the policy stresses on the creation and maintaining of reliable social and economic infrastructure facilities such as transport; water supply, power supply; communications; education and health services; and recreation are vital for the mineral sector's development. The proposed road project will involve extraction of mineral materials such as borrow pits and quarry during implementation and therefore shall implement the mitigation measures recommended by this ESIA study.
15.	Local Content Policy of Tanzania for Oil and Gas Industry, 2014	The policy encourages the generation and promotion of Local workforce supply with the necessary knowledge and skills. It aims to facilitate investments in supplier development by acquiring services locally. In order to reinforce effective and transparent implementation of this policy, the sub-contractor, contractor or operator should prioritize and advertise employment of Tanzanians who are qualified, experienced and competent to do the work.

3.2 Pertinent National Legislations and Regulations

Table 3-2: Applicable national legislations and regulations to BRT Phase 5 project

Thematic area	Legislations & Regulations	Summary of most relevant requirement
Environmental management	Environmental Management Act (EMA) No. 20 of 2004	This is a principal law that governs all environmental matters in the country. Section 81 of the Act refers to the obligation to undertake EIA by the project Proponent at his/her own cost prior to commencement or financing of a project or undertaking. The Act prohibits any development to be initiated without an EIA Certificate. The road upgrading project falls under category of EIA mandatory list. The Act is relevant to the project because the project is expected to have some impacts (noise and air pollution) to the environment.
EIA & Audits	EIA and Audit Regulations No. 349 of 2005	The regulations form the basis on which EIAs and Environmental Audits for various types of development projects with significant environmental impacts are undertaken, as complied during this EIA study. The regulations prohibit the project proponent from undertaking any construction project without carrying out an environmental impact assessment study required under the Environmental Management Act. The regulations also define the content and format of an EIA report to be presented to the authorities for environmental clearance certificate.
	Environmental Management (EIA and Audit Regulations) (Amendment), 2018	These Regulations state out the regulatory requirements for the conduct of EIA and identify projects for which environmental assessment is mandatory (Type A projects). This project falls under the seventh category of the Type A projects listed in the first schedule of the Regulations, which includes the development of large-scale renewable and non-renewable sources of energy. The administrative and technical procedures for the preparation of several output documents in the EIA process are thoroughly presented in the Regulations. The Regulations require EIA studies to be led by registered EIA experts and necessitate public participation. These requirements have been met in the execution of this ESIA.

Thematic area	Legislations & Regulations	Summary of most relevant requirement
Waste management, pollution prevention and control	Environmental Management (Solid Waste Management) Regulations, 2009	These Regulations provide guide for waste management in Tanzania. It requires waste disposal and management to be guided by Precautionary principle, Polluter pays principle and the producer extended responsibility principle. Schedule 1 of the Regulations highlights the types of waste and recommended modes of treatment for the same. To mention a few, Schedule 1 suggests that plastic waste should be recycled, and any chemical industrial solid waste should be incinerated at high temperatures. The contractor and the Client will comply with these Regulations when dealing with solid waste.
	Environmental Management (Hazardous Waste Management) Regulations, 2009	The first schedule of the regulations provides categories of wastes controlled by these regulations and schedule two provides a list of hazardous and non-hazardous wastes. The third schedule in the regulations is a list of hazardous characteristics. In relation to the proposed road upgrading project, hazardous wastes are associated with the project during the construction and operation phase. During any transportation and/or management of hazardous waste, the Client will oblige to the requirements of the Regulations.
	The Environmental Management (Water Quality Standards) Regulations, 2007	The applicant for a water right is obliged to indicate the likely impact on the environment and comply with prescribed effluent or receiving water standards, which are not below the standards specified in the regulations if the water right or permit is granted. Other sections of this Regulation relevant to the BRT Phase 5 construction works is 18 (1) that relates to "duty to comply with environmental quality standards" which stressed the importance of complying to the standards outlined in these regulations such as the prohibition of the discharge of hazardous substances, and any other harmful materials. The Proponent henceforth shall comply with the provisions of these regulations to minimise potential negative impacts of the project activities on groundwater and nearby surface water sources.
	Environmental Management (Air Quality Standards) Regulations, 2007	Section 8 (1) of the regulations clearly prohibits release of hazardous substances, chemical, gas or mixture containing gaseous and hazardous substances into the environment unless the release or emission is permitted under these regulations. The Regulations have four schedules that address tolerance limits that are relevant to the BRT phase 5 roads upgrading activities (Schedules 1-3) and emission limits for motor vehicles (Schedule 4).
	Environmental Management (Standards for the Control of Noise and Vibration Pollution) Regulations, 2015	These regulations are set to provide for the implementation of sections of the EMA (2004) related to noise and vibration pollution. The maximum permissible noise levels for some activities are specified in the First Schedule of the regulations. And specific to construction sites is 75 dBA and 65 dBA during the day and night, respectively
	Environmental Management (Soil Quality	The contractor shall abide by the directives stipulated in these Regulations as they call for the maintenance of prescribed soil quality standards as well as the monitoring and control of pollution

Thematic area	Legislations & Regulations	Summary of most relevant requirement
	Standards) Regulations, 2007	of soils. Specifically, Regulation 16 (4) prohibits soil pollution and requires all organizations that produce, transport, trade, use, store or dispose of chemicals, toxic substances and inflammable substances to comply with the Regulations concerning the safety of humans and other living organisms to avoid soil degradation.
	Environmental Management (Prohibition of Plastic Carrier Bags) Regulations, 2019	These Regulations impose a total ban on the import, export, manufacturing, sale, supply, storage and use of plastic carrier bags within Mainland Tanzania regardless of their thickness. The main objective is to protect environment including human and animals' health from likely adverse effects of utilization of plastic carrier bags. The project contractor shall adhere to all stipulations and requirements of the Regulations.
Health and safety	The Occupational Health and Safety Act No. 5 of 2003	Section 43 (1) provides for safe access to and a safe workplace. In view of these specific provisions and the Act in general the contractor and Proponent are obliged to ensure a safe working environment for all its workers, provide clean and safe water, as well sanitary and first aid services. The Act also provides for the protection of persons other than those at work against hazards to health and safety arising out of or in connection with activities of persons at work. The contractor and proponent for the road rehabilitation project will adhere to the safety standards laid out in the legislation and guidelines in addition to their own company policies which need to be presented to the Occupational Health and Safety Authority (OSHA)
	Public Health Act, 2009	The central theme of this Act is to provide for the promotion, preservation and maintenance of public health with a view to ensuring the provisions of comprehensive, functional and sustainable public health services to the general public and to provide for other related matters. Major issues addressed in this Act include operation of housing and hygiene, human settlements, solid and liquid waste, food and nutrition, control of diseases and workers' health. The Act specifies that a person shall not dispose hazardous waste on land or in a water body unless the Environmental Health Impact Assessment is carried out in accordance with the Environmental Management Act
	Industrial and Consumer Chemicals (Management and Control) Act No. 3 of 2003	Should the project intend to import or use chemicals for its activities, the Proponent shall then need to declare and obtain authorization from the relevant authorities. Similarly, the Proponent shall have to comply with other Act requirements, particularly regarding the importation, storage, use and disposal of waste from those chemicals.
	The HIV and AIDS (Prevention and Control) Act No.28 of 2008	This Act requires the employer, in consultation with the responsible Ministry, to establish and coordinate a workplace program on HIV and AIDS for employees under the proponent's control and such programme shall include the provision of gender-responsive HIV and AIDS education, the distribution of condoms and support for people living with HIV and AIDS. The proponent, therefore, shall be responsible for raising the awareness of its workers of the causes, modes of transmission, the consequences, prevention and control of HIV and AIDS. The construction workers are likely to interact with the local communities, hence increasing chances or risks of HIV/ AIDS and STIs. Thus, the contractor will be required to develop and implement HIV/ AIDS prevention and control programme during construction.

Thematic area	Legislations & Regulations	Summary of most relevant requirement
Water supply and sanitation	The Water Supply and Sanitation Act of 2009	The Act provides for sustainable management and adequate operation and transparent regulation of water supply and sanitation services to community owned water supply organizations and other service providers in relation to Water Policy of 2002. Section 52 ensures that one is liable to a fine of at least 1 million Tanzanian shillings or jail time for a period of 12 months or both, if deposits of any earth, material or liquid used are permitted to wash away and carried into the waterworks.
	Water Resources Management Act No.11 of 2009	Section 9 requires Environmental Impact Assessment to be carried out for any proposed development in a water resource area or watershed to which this Act applies, whether that development is proposed by or is to be implemented by a person or organization in the public or private sector in accordance with the provisions of the Environmental Management Act Cap 191 of 2004. Therefore, the project has to sustainably use available water resources and comply with this Act. The road project could result in the degradation of water sources if not carried out properly. In this case project management is required to ensure that pollution of water sources is avoided or minimized during road construction
Infrastructure	Road Act No. 13 of 2007	The Act provides for road financing, development, maintenance, management and other related matters on finance, offences, penalties and recovery. It set out the categories of road and prescribes the road reserve area and utilisation. Furthermore, it allows road authorities to prohibit any particular class of traffic on a road of access in public interest. Part V of the Act stipulates safety measures such as speed limits, erection of the road furniture and safety of the road users in the daily road operations. Section 16 of the Act addressed the issue of compensation for any acquired land for road development. The Section emphasizes that, where it become necessary for the road authority to acquire a land owned by any person for the purpose of this act, the owners of such land shall be entitled to compensation for any development on such land in accordance with the Land Acquisition Act (1967), Land and Village Land Acts (1999) and any other written law. The public water supply is within the road reserve, hence likely to be affected. In regards the relevant water authority will be required to remove and relocate the water supply pipeline before commencement of construction works
	Railway Act, 2017	The BRT Phase 5 will cross existing railways at a number of locations mainly Tabata Relini, Buguruni and TAZARA junction (Dar-Moro SGR). The Act make provisions for the development, maintenance and promotion of rail infrastructure, rail transport services and provision of other related matters. Development of the BRT lanes in the key intersection including the railway crossings will be designed and implemented in an integrated manner with the Act's provision (Section 5) and overall transport master plan of the city.
	Electricity Act, 2008	The project will directly affect TANESCO's electricity transmission utility along the corridor, and at the same time power will be required during construction activities. TANROADS in collaboration with TANESCO shall abide to the requirements of

Thematic area	Legislations & Regulations	Summary of most relevant requirement
		the Act including the Electricity (System Operation Services) Rules, 2016 regarding service disruption. Part V No.40 Section (1) of the Rules obligates the Contractor to notify the respective Authority and give public notice thereof, two days before undertaking such activities. Such notice should contain date and hour of both service interruption and restoration
	Environmental Assessment and Management Guidelines in the Road Sector of 2011	The Environmental Assessment and Management Guidelines in the Road Sector of 2009 can be said to be a translation of relevant aspects of the Environmental Impact Assessment and Audit Regulations of 2005 in the context of the road sector needs. The Guidelines cover similar grounds, have the same proactive perspective on environmental management as the environmental impact assessment, and audit regulations of 2005. However, they are more responsive to road sector needs.
	The Road Management Regulations, 2009	The Road Management Regulations detail the legal requirements and administrative set-up for the control and management of all road types. The Regulations charge road authorities with the upkeep of jurisdictional roads with up-to-date maintenance management systems and dictate that any new construction and reconstruction are to comply with the Tanzania Road Standards and Specifications (2000) in tandem with good engineering practices. The extraction of soil and construction materials and the dumping of waste on road reserves is subject to written approval from the concerned road authority, as stated in Regulation 31. These requirements will thus be factored into planning and observed by contractors during the execution of any roadworks.
	Environmental Code of Practice for Road Works, 2009	The Environmental Code of Practice for Road Works defines environmental criteria to be applied in Tanzania during the feasibility, design, construction and operation of road infrastructure. The focus of the code is to serve as a tool, which integrates all identified environmental aspects for project managers, road engineers, contractors, environmental assessment consultants etc. This ESIA report has, largely, observed the provisions of the Environmental Code of Practice for Road Works as reflected almost in all chapters. The mitigation measures recommended in this ESIA shall be integrated in the technical specifications and Bill of Quantities (BOQ) to ensure that the road contractor can include them in the construction costs so as to achieve sustainable environmental protection.
Land Use Planning & Land Acquisition	Land Acquisition Act, No 47 of 1967	This Act governs compensation and acquisition for public purposes in Tanzania. Sections 4 to 10 provide conditions to be considered, specifying requirements prior to the acquisition of the land such as preliminary investigation for the land to be taken, issuing notice of intention to take land and the mode in which notices will be made. The Act requires that the developer of this project to abide with procedures in acquiring extra land that will take place during resettlement process for the affected communities as well as compensating those people whom their land is acquired.
	Valuation and Valuers	This is the main Act that is used in governing all matters related to valuation practices and Valuers conduct in the country. It is the

Thematic area	Legislations & Regulations	Summary of most relevant requirement
	Registration Act No. 7 of 2016	procedural law in valuation issues. The Act provides regulation and control of valuation profession and practices, powers and functions of the Chief Valuer, establishes Valuers Registration Board and its functions, and other related matters in valuation within Mainland Tanzania. Specifically, Part V, Sections 47-57 stipulates and provides guidance on how various types of valuations should be conducted. The mandate, functions and powers of the Chief Valuer are stipulated in Part II, Sections 4-11.
	Land Act No. 4 of 1999	The Land Act No. 4 of 1999 is the principal law with regard to all land matters such as the management of land, settlement of disputes and related aspects other than the Village Land Act No. 5 of 1999 that specifically deals with "village land" matters. The road infrastructure project may involve destruction of properties or land acquisition hence requiring compensation to be affected according to existing legislation. However, since the compensation is being paid by WB, the compensation will not be made in accordance with The Land Act (1999). Compensation will be in accordance with OP 4.12, which requires the use of replacement values.
	The Land Use Planning Act No. 6 of 2007	This Act governs matters that are related to the preparation, administration and enforcement of land use plans. It provides for the procedures for preparation, administration and enforcement of land use plans; to facilitate an orderly management of land use, empower land occupiers and users to make better and more productive use of lands, to enhance security and equity in accessing land and its resources. The Act will require: • Selections of road alignment, location of borrow pits, quarry sites and other road infrastructure to avoid hazard lands. • Prompt compensation to be paid for acquired land or damaged properties. Compensation will be in accordance with OP 4.12, which requires the use of replacement values.
	The Urban Planning Act No. 8 of 2007	The Act provide for the orderly and sustainable development of land in urban areas, to preserve and improve amenities; to provide for the grant of consent to develop land and powers of control over the use of land to provide for the other related matters. The Act provides for procedures for enforcement of Urban Planning; address different issues related to urban planning and to enhance conservation and environmental protection to enhance social justice in the acquisition of land for planning purposes. The activities of the proposed project are observing the requirements of land use planning and will abide to all such other development as it may be guided from time to time during the course of the project execution.
	Land (Assessment of the Value of Land for Compensation) Regulations, 2001	Applies any application or claims for compensation by any person occupying land. The Act will require: • Selections of road alignment, location of borrow pits, quarry sites and other road infrastructure to avoid hazard lands. • Prompt compensation to be paid for acquired land or damaged properties. Compensation will be in accordance with OP 4.12, which requires the use of replacement values. • Project to involve Qualified Valuation Officer and follow all procedures as outlined in The Land (Compensation Claims) Regulations (2001) and The Land (Assessment of Value for

Thematic area	Legislations & Regulations	Summary of most relevant requirement
		Compensation) Regulations (2001), however, Since the compensation is being paid by WB, the compensation will not be made in accordance with the procedures of the regulations cited. Compensation will be in accordance with OP 4.12, which requires the use of replacement values
	Valuation and Valuers (General) Regulations, 2018	The Regulations are mainly used in guiding, regulating specific issues related to valuation practices, and Valuers conduct. As per the regulations, it is mandatory for any valuation activity to be performed by a registered and certified Valuer under the Valuers Registration Board. In respect to the proposed BRT Phase 5 project, the Regulations provides for the: - assessment of value for land for compensations (Regulations 8-16); - procedures for the management of complaints and appeals (Regulations 25-50); - procedures for verification of valuation (Regulation 51); - manner of assessing crop value rates and preparation of crops value schedules (Regulation 52); - manner of assessing land value rates and preparation of land values schedules (Regulation 53); - assessing of compensable items (Regulations 54-55); and - procedures for undertaking valuation for compensation (Regulation 64).
Materials extraction & explosives	Mining Act, 2010	Part II Section 95 (1) of the Act allows any person engaged in construction works related to roads, dams, tunnels, aerodromes and similar public acts to use minerals as building materials provided an approval is obtained in writing from the Minister. The Act also puts forward the procedures for granting, renewing and terminating mineral rights, payment of royalties, fees and charges. The project may involve search for and extraction of gravel from borrow pits and stone aggregates from quarry sites. Thus, the contractor will be required to obtain Mineral Grant as prescribed in the Act.
	Explosive Act No. 56 of 1963	This Act was set to allow for better provision of control measures for the manufacture, import export, purchase, sale, possession, use and disposal of explosives. Of relevance to the construction activities of the BRT Phase 5 upgrading project are sections 40 to 43 under Part VIII on use of explosives. These sections require any person supervising or carrying out any blasting activities to be in possession of a blasting certificate. It is preferred that the experienced person at the blasting operations to be the holder of this certificate and in cases where he/she is not directly doing the blasting, he/she still is required by this act to supervise the operations.
Antiquities & Cultural Heritage	Antiquities principal Act, 1964 and (Amendment 1979)	The legal protection of Tanzania cultural heritage resources is affected through Antiquities Act of 1964 (Act No. 10 Of 1964 Cap 550) which is the principal legislation and the Antiquities (Amendment) Act of 1979 (Act No. 20 of 1979) as well as Rules and Regulations of 1981, 1991, 1995 and 2002. This act offers general protection to objects or structures, which are of archaeological, palaeontological, historic, architectural, artistic, ethnological or scientific interest. It serves to protect and preserve the Antiquities of this country.

Thematic area	Legislations & Regulations	Summary of most relevant requirement
	Grave (Removal) Act. No 9 f 1969	Article 8 of the Act gives the Minister power to approve places to which the graves may be removed in consultation with other responsible authorities. Where the removal of graves is undertaken the compensation may be paid as it will be determined in accordance with the provisions (Article 9). It stipulates steps required or measures to be taken to reinstate the grave and the reinternment of the body. It also covers aspects including the requirement for notice to be given for the intention to remove the graves, the contents of such notice, the right for the Minister to authorise the removal of graves, the conditions under which the graves must be removed and the requirements for approval of the location of the place to which the grave will be moved. If the BRT Phase 5 and Port Access project roads and its activities are likely to involve interfering grave sites, the provisions made under this Act will be followed very closely.
Social & Welfare Issues	The Employment and Labour Relations Act No. 6 of 2004	This Act guarantees fundamental labour rights and establishes basic employment standards. The Act provides broad protection against discrimination. Specifically, the Act mandates that employers "promote equal opportunity in employment and strive to eliminate discrimination in any employment policy or practice". The Act prohibits direct or indirect discrimination by employers, trade unions and employers' associations on a number of grounds, including gender, pregnancy, marital status or family responsibility, disability, HIV/AIDS and age. Harassment of an employee on any of these grounds is equally prohibited. The contractor must comply with the provisions of the by avoiding employment of children less than 14 years or under 18 years of age. The contractor is also required to pay minimum wages and salaries as prescribed by the Government of Tanzania.
	Workers Compensation Act, 2008	The Act governs adequate and equitable compensation for all employees on grounds of injury, rehabilitation for occupational illnesses or injury and compensation to dependents and relatives upon fatality. The Act subsumes international standards and frameworks for compensation and promotion for prevention of accidents and occupational diseases. Employment contracts for all labour engaged in the subsequent stages of the Project must stipulate compensation arrangements for incidental work-related injury or sickness.
	The Persons with Disability Act, 2010	The basic principles of this act are: • Respect for human dignity, individual's freedom to make own choices and independency of persons with disabilities, • Non-discrimination, • Full and effective participation and inclusion of persons with disabilities in all aspects in the society, • Equality of opportunity, • Accessibility, • Equality between men and women with disabilities and recognition of their rights and needs, and • Provide basic standard of living and social protection. Therefore, the proposed project will fulfil this legal requirement in all project Phases, design, construction and operation.
Local content	Petroleum (Local	The Regulations require a contractor, subcontractor, licensee or

Thematic area	Legislations & Regulations	Summary of most relevant requirement
	Content) Regulations, 2017	any other person shall ensure that preference is given to works and goods and that the services are provided and manufactured locally in Tanzania following the provisions of the Act and these Regulations. Contractor shall also employ only Tanzanians who are skilled and semi-skilled.
	Mining (Local Content) Regulations, 2018	The Regulations require a contractor shall ensure that that the local content is a main component of all project related activities and that they support and follow the national technology transfer plan by attaining all financial, legal and labour services locally.
Construction industry	The Contractors Registration Act No. 17 of 1997, R.E 2002	The Act provides for registration of contractors and also establishment of the Contractors Registration Board, the body responsible for regulating the conduct of contractors in Tanzania. The project proponent will equally abide by all requirements of this Act in terms of supporting the activities of the board during inspection of any site for road construction, installation works for the purpose of verifying and ensuring that the works are being undertaken by registered contractors; and that the works comply with all governing regulations and laws of the country.
	The Engineers Registration Act No. 15 of 1997 R.E. 2002	This is an Act, which formed the Engineers Registration Board, a statutory body with the responsibility of monitoring and regulating engineering activities and the conduct of engineers and engineering consulting firms in Tanzania through registration of engineers and engineering consulting firms. The road project is an engineering assignment and the project proponent is observing all the requirement of this act through engaging the services of personnel and firms that are registered with the Engineers Registration Board.
	The Architects and Quantity Surveyors Act No. 16 of 1997 R.E. 2002	This act provides for establishment of the Board of Architects and Quantity Surveyors responsible for registering and regulating the conduct of the Architects, Quantity Surveyors and Architectural and Quantity Surveyors Consulting Firms. The road project proponent is observing the requirements of this act and is ready to assist the board during inspections of the project works

3.3 National Plans and Strategies

3.3.1 Tanzania Development Vision (TDV) 2025

The national Development Vision is intended to guide economic and social development efforts in Tanzania up to the year 2025 for the country to undergo an unprecedented economic transformation and development to achieve middle income status, characterized by high levels of industrialization, competitiveness, quality livelihood, rule of law; and having in place an educated and pro-learning society. The TDV 2025 has identified an enabling environment that is essential for the country to flourish economically, socially, politically and culturally. The Vision clearly states that the 21st Century will be one dominated by those with advanced technological capacity, high productivity, modern and efficient

transport and communication infrastructures. The BRT Phase 5 road project supports the Vision by aiming to unlock socio-economic growth potentials of the communities and nation at large through good roads network as the key for other socio-economic development in the country.

3.3.2 National Five-Year Development Plan 2016-2021

The Second Five Year Development Plan (FYDP II), 2016/17 – 2020/21, has integrated frameworks of the first Five Year Development Plan (FYDP I, 2011-2015) and the National Strategy for Growth and Reduction of Poverty (NSGRP II, 2010-2015). FYDP II outlines new interventions to enable Tanzania to industrialize in a way that will transform its economy and its society. It also incorporates unfinished interventions from the predecessor Plan and Strategy, respectively, deemed critical for realization of the aspirations of FYDP II. The FYDP II also implements aspects of TDV 2025, which aspires to have Tanzania transformed into a middle income, and semi industrialized nation by 2025. Construction of the BRT Phase 5 road is one of the identified projects in the FYDP II with expected results on increasing revenue from the tourism sector growth.

3.3.3 The 10-Year Transport Sector Investment Programme (TSIP)

With a view of attaining national strategic goals, the Government of Tanzania has prepared a Ten-Year Transport Sector Investment Programme (TSIP) as a roadmap towards achieving the goals. The TSIP is to be implemented in two phases of 5 years each from financial year 2007/08 to 2016/17. The first phase of the TSIP has been below expectation thereby slowing progress of implementation. The proposed BRT Phase 5 road project development is among the national covered a period of 5 years *from* 2007/08 to 2011/12 while the second phase commenced in the FY 2012/13 and in progress. However, the funding of the strategies to achieve the infrastructure development through good roads network as the key for other social-economic development in the country.

3.3.4 National Plan of Action to End Violence Against Women and Children in Tanzania 2017/18 – 2021/22

The mission of the plan is to prevent and respond to all forms of violence against women and children through comprehensive multi-sectoral collaboration at all levels. The mission is therefore aimed at eliminating violence against women and children in Tanzania and improve their welfare. The proposed project has to comply/ effect the plan through prevention of gender-based violence, promote more women to be employed and avoid employment of children.

3.4 Applicable International Standards and Conventions

3.4.1 World Bank Environmental and Social Standards (ESSs), 2018

The Word Bank ESSs establish and guide the project's compliance to good international practices with relation to environmental and social sustainability throughout the project life cycle. Applicability of each ESS is summarized in Table 3-3 below.

Table 3-3: Relevance of World Bank's ESSs to BRT Phase 5 project

Environmental and Social Standards	Key Requirements & Applicability to BRT Phase 5
ESS1 Assessment and Management of Environmental and Social Risks and Impacts	- The ESS1 calls for TANROADS to undertake ESIA study for the BRT Phase 5 to establish a mechanism to determine and assess future potential environmental and social risks and impacts during implementation of the project. - Application of the relevant requirements of the Environmental Health and Safety Guidelines (EHSGs). - Avoid performing any activities within that may result to material adverse environmental or social risks or impacts until completion of relevant plans, measures or actions according to the Environmental and Social Commitment Plan (ESCP).
ESS2 Labor and Working Conditions	- Develop and implement written labour management procedures applicable to the project. - BRT Phase 5 Project workers to be paid as required by national law and labour management procedures. - Written notice of termination of employment and details of severance payments to be given in a timely manner. - Ensure equal opportunity and fair treatment to workers. - Provision of appropriate measures of protection and to vulnerable groups of project workers, such as women, people with disabilities, migrant workers and children (of working age in according to the ESS). - Forced and child labour must not be used in the project.

Environmental and Social Standards	Key Requirements & Applicability to BRT Phase 5
ESS3 Resource Efficiency and Pollution Prevention	- Construction and operation activities implement measures for improving efficient consumption of energy, water and raw materials. - Adopt measures, that avoid or minimize water usage so that the project's water use does not have significant adverse impacts on communities, other users and the environment. - Project to assess the potential cumulative impacts of water use upon communities and apply proper mitigation measures. - Construction and operation activities to avoid, minimize and control the release of pollutants by applying measures in EHSGs or in national law - Project to address potential adverse project impacts on human health and the environment - Generation of hazardous and non-hazardous wastes should be avoided/minimized
ESS4 Community Health and Safety	- Identification, evaluation and monitoring of the potential traffic and road safety risks to workers, affected communities and road users throughout the project life cycle. - Enforcement of the procedures such as driver training, to improve driver and vehicle safety. - To enforce safety measures to avoid occurring of incidents and injuries to members of the public - To consider risks associated to the exposure of the public to operational accidents or natural hazards, including extreme weather events. - Identification and implementation of measures to address emergency event. - Implementation of measures to avoid or minimize transmission of communicable diseases. - For any direct or contracted workers hired to provide security to safeguard its personnel and property, should be assessment of risks brought to those within and outside the project site.
ESS5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement.	- PAPs to be compensated at replacement cost, and other measures necessary to help improve/restore them back to living standards and livelihoods. - TANROADS shall take possession of acquired land and related assets only after compensation in accordance with this ESS. - Undertaking of a census to identify who will be affected by the project and establish an inventory of land and assets that will be affected. - Assessment of the resettlement impacts and addressing in a manner that complies with the objectives of this ESS. - Forced evictions of the affected persons shall not be done.
ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources	- Consideration of the direct, indirect and cumulative project-related impacts on habitats and biodiversity in project area. - Project implementation to avoid adverse impacts on biodiversity and habitats. - Undertake baseline conditions assessment to a degree that is proportional and specific to the anticipated risk and significance of impacts.
ESS7 Indigenous People/Sub-Saharan African Historically Undeserved Traditional Local communities	- Ensure that the indigenous people at project area are fully consulted about. - Assess the expected direct and indirect economic, social, cultural (including cultural heritage), and environmental impacts on Indigenous Peoples living or connected to the project area. - Adverse impacts to be avoided where possible.

Environmental and Social Standards	Key Requirements & Applicability to BRT Phase 5
ESS8 Cultural Heritage	- Examine the direct, indirect and cumulative related risks and impacts on cultural heritage. - Chance Finds Procedures to be followed if unknown cultural heritage is encountered during the project construction. - Project to recognize the presence of all listed legally protected cultural heritage areas affected by the project. - Implementation of the accurate mitigation measures to address the impacts on Built Heritage.
ESS9 Financial Intermediaries (FIs)	- FIs to set up and control ESMS to identify - assess, manage, and monitor all the environmental and social risks and impacts. - Compliance with any exclusions in the legal agreement and apply relevant national law for all FI subprojects. - FIs to provide a safe and healthy working environment. - Ensure the requirements of the ESS1 and ESS2 are communicated to all FI personnel.
ESS10 Stakeholder Engagement and Information Disclosure	- Undertake relevant consultations with all stakeholders throughout the project. - Keep a documented record of stakeholder engagement. - Develop and implement a Stakeholder Engagement Plan (SEP), which describes the timing and methods of engagement with stakeholders throughout the project. - Disclose project information to allow stakeholders to understand the risks and impacts of the project.

Source: Adapted from World Bank Environmental and Social Framework, 2017.

3.4.2 IFC Performance Standards

The International Finance Corporation (IFC) Performance Standards 1-8 provides guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage environmental and social risks and impacts. The pertinent applicability of each PS for the BRT Phase 5 is summarized in Table 3-4 below

Table 3- 4: IFC Performance Standards and relevance to BRT Phase 5 project

	Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts - Defining Project Area of Influence along the project corridor including supportive infrastructure and facilities such as depots, terminals, utilities, materials sourcing areas etc. - Defining and analysing different alternatives considered for design, sitting and operational basis

	- Establishing and/or proposing development an Environmental and Social Management System for the BRT Phase 5 - Continuous and documented stakeholder engagement throughout the ESIA as well as developing an external communication and grievance procedures - Stakeholder engagement plan - Grievances mechanism - Incorporating cumulative impacts and impacts from unplanned events - Identifying capacity building needs - Potential environmental and social impacts and risks should be assessed. - Negative impacts should be avoided, minimised or compensated. - Stakeholders should be engaged on issues that affect them. - Environmental and Social Management Systems (ESMS) should be used to improve performance. - Establishment of external communications and grievance mechanism - Establishment of emergency preparedness and response system in the project
	Performance Standard 2: Labor and Working Conditions - Legislative review of labour laws, worker's protection and avoidance of forced labour - Assessment of the occupational health and risks - Incorporating Client's commitments to worker's occupational health and safety - Labour accommodation and welfare issues - Supply chain and primary service providers - Workers should have fair treatment, non-discrimination and equal opportunities. - Compliance with national labour laws - There should be no child labour or forced labour. - Working conditions should be healthy and safe (Occupational Health and Safety). - Protection of workers including the vulnerable ones such as migrants - Monitoring of supply chain, contractors, and workers engaged by third parties.
	Performance Standard 3: Resource Efficiency and Pollution Prevention - Perform a hydrological assessment to determine the optimal use of the water resource for power generation whilst maintaining adequate environmental flows; and - Evaluating pollution & contamination prevention and control - Evaluating the generation and management of waste during the project phases and preparation of a Pollution and Waste Management Plan (wastes management) - Climate change mitigations and/or adaptation - Impacts on human health and the environment should be avoided by minimising pollution. - The sustainable use of resources (including energy and water) should be promoted. - Greenhouse gas emissions should be reduced. - Wastes generation and management needs to be well addressed
	Performance Standard 4: Community Health and Safety - Incorporating Client's commitments to community and occupational health and safety with respect to the infrastructure's design, exposure to diseases and materials management and safety procedures - Identifying the ecosystem services that project's activities may impact and how to minimize risks; and illustrate Client's emergency preparedness and response protects the surrounding community - Assessing traffic and road-related safety issues - Assessment of the community's exposure to diseases and other health issues - Impacts on the health and safety of the nearby local communities should be

	minimised. Personnel and property should be safeguarded in a way that avoids risks to the community's security.
	Performance Standard 5: Land Acquisition and Involuntary Resettlement: - Confirming the land tenure on the proposed project road corridor, location to confirm that physical and/or displacement is not a direct impact - Verification of the resettlement (physical and economic displacement) along the project corridor, depots and terminals locations, stations and other supportive facilities - RAP, compensations and livelihoods restoration - Physical and/or economic displacement should be minimized and avoided where possible. - Where avoidance is impossible, minimize undesirable socio-economic impacts from land acquisition by provision of compensation at full replacement cost (market value of the assets plus transaction costs). - Resettlement process should be conducted transparently with full engagement of all key affected persons
	Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources - Assessment of Risks and Impacts on habitats and biodiversity - Identifying key ecosystem services, potential risks on these services and measures to reduce those risks - Establishing the present terrestrial, aquatic and riparian biodiversity near the project area to determine sensitivity to the project, any species of conservation significance - Preparation of a Biodiversity Plan if concluded as necessary (during ESMS development) - Primary suppliers and supply chains - Protection and conservation of biodiversity; maintaining the benefits from ecosystem services - Promoting the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.
	Performance Standard 7: Indigenous People - Have documented confirmation of the presence or absence of any such social communities in the project direct area of influence - After which determine the need of any additional management measures. - Ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples - Anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts - Promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner - Establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP)
	Performance Standard 8 on Cultural Heritage Have documented confirmation of the presence or absence of cultural heritage within the defined area of influence: illegally protected and critical cultural heritage areas, archaeological sites

	• After which determine the need of any additional management measures and preparation of a Chance Find Procedure • Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that Clients protect cultural heritage in the course of their project activities. • Protection of cultural heritage from the adverse impacts of project activities and support its preservation and promoting the equitable sharing of benefits from the use of cultural heritage.

Source: IFC, 2007

3.4.3 IFC/World Bank EHS Guidelines

For BRT Phase 5 project, the most relevant EHS Guidelines that would apply are summarized in the Table 3-5.

Table 3-5: Relevant IFC and World Bank Group EHS Guidelines to BRT Phase 5 project

EHS Guideline	Content & Relevance to BRT Phase 5 Project
IFC EHS Guidelines for Toll Roads, 2007	The Guidelines address relevant environmental and social compliance issues applicable during construction, operation and maintenance of large, sealed road projects including associated bridges and overpasses. These are mainly: community health and safety issues, occupational health and safety, biophysical environmental receptors and respective mitigation measures. Recommendations from the Guidelines are fully integrated in the project's impacts and mitigations in all phases.
IFC EHS Guidelines for - Air Emissions and Ambient Air Quality, 2007	Requirements of the Guidelines have been incorporated in the analysis and management measures for emissions management during construction and operation phases of the BRT Phase 5. This guideline provides an approach to the management of significant sources of emissions, including specific guidance for assessment and monitoring of impacts.
IFC General EHS Guidelines (2007)	These Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them.
IFC EHS Guidelines: Waste Management Facilities (2007)	If significant waste management activity such as incineration is included in the project scope/design basis, leading to the creation of a separate waste management facility, the IFC guidelines for dedicated waste management facilities could apply.
IFC General EHS Guidelines 1 Environmental (2007)	Covers a range of environmental aspects that apply to most industrial development projects. The subsections are air emissions and ambient air quality, energy conservation, wastewater and ambient water quality, water conservation, hazardous materials management, waste management, noise and contaminated land.
IFC General EHS Guidelines 3 Community Health and Safety (2007)	These address project activities taking place outside of the traditional project boundaries, but that are nonetheless related to the project operations, including water quality and availability, traffic safety, transport of hazardous materials, disease prevention, and emergency preparedness and response.
WHO Ambient Air Standards	The ambient air quality guidelines specified in the Standard have been incorporated in the analysis and development of management measures to avoid or minimize human health risks.

3.4.4 International Treaties/Conventions

Table 3-6: Applicable international treaties and conventions

Convention/Treaty	Relevance to BRT Phase 5 project
UNFCC	The final objective of the UNFCC is to stabilise greenhouse gas concentrations at minimum levels that would prevent dangerous human-induced interference with the climate system. The Convention realises vulnerability of all countries to the effects of climate change and calls for special efforts to ease the consequences, especially in developing countries where resources to deal with impacts are scarce.
Kyoto protocol to the UNFCC	The protocol sets binding obligations and other mechanisms to the parties toward reducing greenhouse gas emissions to the atmosphere in order to mitigate climate change and/or adapt to the impacts. The project will prevent the leakage of greenhouse gases into the atmosphere through regular maintenance of construction equipment.
Convention on Biological Diversity (CBD), 1996	Project activities will involve clearing of vegetations from borrow sites, quarry sites and camp sites. Re-vegetation will be carried out upon completion of the works. The project will also work with the respective communities in the conservation of available organisms. Since Tanzania is a party to the 1996 Convention on Biological Diversity, the contractor and TANROADS shall cooperate with associated contracting parties to ensure environmental conservation and sustainable use of biological diversity.
ILO Occupational Safety and Health Convention, 1981	The convention sets up a framework for securing labourers' working conditions whilst recognising national mandates and legislation for the same. The policy is to ensure prevention of accidents and injury to health arising out of, linked with or occurring in the course of work, by minimising, so far as is reasonably practicable, the causes of hazards inherent in the working environment.
ILO Minimum Age Convention (C138), 1973	The Convention establishes the minimum age for admission to employment. The minimum age stated in Article 2 (3) of the Convention is not less than 15 years or 18 years dependent on the nature of the work. It prohibits child labour with a view to achieving the total abolition of child labour worldwide. BRT Phase 5 shall prohibit use of force and child labour and discrimination in the project cycle.
Working Environment (Air Pollution, Noise and Vibration) Convention (No. 148), 1971	The Convention concerns protection of workers against occupational hazards in the working environmental due to air pollution, noise and vibration came into force in 1979. In 1984, Tanzania acceded to the provisions regulating air pollution and these provisions apply to the project. Therefore, the Contractor is to comply with this convention by meeting the requirements prescribed in the Occupational Health and Safety Act of 2008.
Stockholm Convention on Prior Informed Organic Pollutants Vienna Convention on protection of O-zone Layer Montreal protocol on substances that deplete the ozone layer, Montreal, 1987	Cooling facilities (fridges) to be used by the project will not be using chlorofluorocarbons (CFC's)
Nairobi Convention for the protection, management and development of the Marine and Coastal environment of Eastern	The BRT Phase 5 especially construction and operation of the Port Access Road will involve generation of liquid and solid wastes from camps, concrete works, etc. Such wastes shall not be discharged in the coastal marine environment.

Convention/Treaty	Relevance to BRT Phase 5 project
African Region, 1985 and the related protocols The convention on the prevention of Marine Pollution by dumping of Wastes and Other Wastes, London, (1972)	

3.5 Institutional and Administrative Framework for this ESIA

Administratively, the institutional and legal framework for environmental management is comprised of the National Environmental Advisory Committee, the Minister for Environment, Director of Environment, National Environment Management Council (NEMC), Sector Ministries, Regional Secretariat and Local Government Authorities. Institutional framework for this ESIA refers to administrative and institutional domains with which the project interacts and guided through. The administrative framework for environmental management in Tanzania is well articulated and structured in Environmental Management Act no. 4 of 2004.

All environmental issues in Tanzania are regulated, controlled and guided through the Minister for Environment and Union Affairs under the Vice President's Office (VPO). Under the Ministers' command is the Division of the Environment (DoE), which is the authority that issues all environmental guidelines, policies and certificates based on advice from the Technical Advisory Committee (TAC) at NEMC.

The EIA procedure and reports are reviewed by NEMC as are the management plans. Other ministries' sectors and departments are also involved as stakeholders in EIA reports such as central and local government, district and village authorities, NGOs, private and non-private institutions. Administratively, the key institutions involved in the implementation of this ESIA are summarised in Table 3-7 below.

A clean and safe environment is the constitutional right of every Tanzanian citizen. Regulation on environmental management in the country is mainly vested on two

public institutions, the National Environment Management Council (NEMC) and the Division of Environment (DoE) in the office of the Vice President. The NEMC undertakes enforcement, compliance, and review of environmental impact statements whereas the DoE provides the policy formulations and technical back-up and executes the overall mandate for environmental management in the country. The ESIA certificate is issued by the minister responsible for environment. The institutional framework for the project is briefly discussed below.

Table 3-7: Main administrative framework for the EIA for the BRT Phase 5 project

Category	Institution/Authority	Roles and Responsibility
Ministries, Departments and Agencies (MDAs)	President's Office Regional Administration and Local Governments (PO-RALG)	Facilitating implementation and accountability of the BRT project through Dar es Salaam regional secretariat and respective municipal councils
	Vice President's Office - Division of Environment (VPO-DoE)	- Approval and signing of EIA certificate, - To co-ordinate Environmental Management Policy, Environment Management Act and EIA guidelines. - To approve, sign and issue Environmental Certificate. - To advise Government on all environmental matters. - To enforces and ensures compliance with the national environmental quality standards. - To provide policy direction and leadership in all matters, particularly those pertaining to hazardous waste management under the Environmental Management Act
	Ministry of Transport, Works and Communications	- The Ministry of Works is the parent ministry of TANROADS and as such it is the highest government institution with respect to all the aspects pertinent to the planning, execution, and post-execution operation and maintenance of the project road - The ministry is charged with development of policies for road construction project and maintenances.
	Ministry of Finance and Planning	- Facilitating project financing (liaison with donors/development partners) - supervises Tanzania Revenue authority (TRA) activities, an institution responsible for collection of all forms of revenues on behalf of the government including income tax from bus operators, drivers and also vehicle licensed revenues.
	Ministry of Lands, Housing and Human Settlements Development	Land use planning, advising government on land related matters

Category	Institution/Authority	Roles and Responsibility
	Chief Government Valuer	Review and approval of the Compensation Schedule (Valuation Report)
	National Environment Management Council (NEMC)	- Project registration, approval of ToR, and EIA review - Environmental Monitoring and Compliance Auditing Advise Government on all environmental matters. - Concerning this project NEMC is responsible to Register this ESIA, Determines the scope of the ESIA to be conducted, Set-ups cross-sectoral TAC to advise on ESIA reviews, recommends to the Minister to approve, reject, or approve with conditions specific EIS and Controls the implementation of the Environmental Management Plan (EMP) for this project.
	Occupational Health and Safety Authority (OSHA) –	Registration of the construction site, registration of workplace and inspection
	Ruvu Water Basin Authority	- Issuing water use permit - Boreholes exploration and drilling/water extraction permit
	Land Transport Regulatory Authority (LATRA)	It sets to regulate land transport sectors, these are, Road transport services for goods and passengers (commuter buses, intercity buses, goods carrying vehicles, taxi, motorcycles and try cycles); Railway transport services; and other forms of land transport
	Tanzania Communications Regulatory Authority (TCRA)	- To promote efficient, reliable and secure communications infrastructure and applications - To monitor performance of regulated services and enforce compliance to legislation, regulations and standards
Project Proponent & Operator	TANROADS	- BRT infrastructure construction - Project investment and project cycle implementation, monitoring and auditing; Conducting EIA study and follow-up on EIA certificate - Land acquisition and payment of compensations - Paying of applicable taxes and charges - Infrastructure maintenance and decommissioning
	DART	- Responsible for overall management of the BRT system. The service provider will enter into agreement with Bus operators and fare collectors – hereby referred to as an Investor to the BRT system - ESMS implementation - Manage the operation of various BRT service providers: bus operators, fare collectors, fund manager - Traffic flow management - Monitoring and evaluation - Planning for future development
Development Partners	World Bank	Environmental and social safeguards advisory role (experience from BRT Phase I)
	French Agency for Development (AFD)	- Project financing - Environmental and social safeguards

Category	Institution/Authority	Roles and Responsibility
Local Government Authorities & Communities	Dar es salaam Regional Secretariat	- Advise the local authorities on matters relating to implementation and enforcement of EMA Cap 191 - Oversee and advise on implementation of national policies, laws, regulations at local government level; - Advise on implementation of development projects and activities at local government level; - Monitoring of project activities
	Dar es Salaam City Council	Apex coordinating body for all municipalities, facilitating BRT implementation & operation
	Ilala Municipal Council Ubungu Municipal Council Kinondoni Municipal Council Temeke Municipal Council	- Municipal Environmental Officer (MEMO) responsible for project monitoring on environmental issues - Responsible for all development activities, implementation and/or support in the district - In charge of monitoring implementation of the project - Advise on implementation of development of the project and activities at local government level - Overseeing community-investor relations
	Ward Executive Officers, Village/Mtaa Chairpersons Environmental Committees at LGA levels.	- Project monitoring (as watchdogs for the environment, ensure well-being of residents) and participate in project activities - To extend administrative assistance and advice on the implementation of the project - Managing community's relations
	Local communities, NGOs, CSOs, FBOs	- Project monitoring (as watchdogs) - Provide assistance and advice on the implementation of project - Part of the project beneficiaries through employment opportunities, income generation and CSR projects
Affected persons	Project Affected Persons (PAPs)	Relocation to pave way for the project implementation
Utility companies	Tanzania Petroleum Development Corporation (TPDC)	Gas pipelines relocation/disruption along the project corridor
	Tanzania Telecommunications Corporation (TTCL)	- Telecommunication cables (underground fibre optic) along the project road for relocation - Overhead telephone transmission lines - Telecommunication towers along the project area
	VODACOM, HALOTEL, TIGO, AIRTEL &	
	Tanzania Electric Supply Company Limited (TANESCO)	- Existing power transmission line all areas covering project area - Relocation of the utility - Power supply for the project's construction and operation activities
	Dar es salaam Water Supply and Sanitation Authority (DAWASA)	- Potable water supply and sanitation (sewerage) in some parts of the project area - Owner of the water supply and sewerage utility along the project road (to be relocated)

Source: Consultant, July 2020

3.6 Indicative Permits, Licenses and Authorizations

In compliance with the legal and regulatory framework described in the previous sections, TANROADS, DART, Contractor(s) and the BRT Phase 5 Operator will be required to apply for the following pertinent certificates, licences and permits summarized in Table 3-8 below, if this arrangement has not been initiated. However, the list may not be exhaustive; hence, TANROADS is responsible for applying for any other relevant permits from the responsible authorities.

Table 3-8: Legal certificates, permits and licenses to be secured

SN.	Type of Permit, Licence or Approval	Relevant Act/Regulation	Issuing Authority	Remarks
1.	EIA Certificate	EMA No. 20, of 2004	VPO-DoE through NEMC	This report is part of the application
2.	Building permit: Obtain permission to commence construction works	Local Government Act (District Authorities), 1982	Ubungo, Ilala, Kinondoni and Temeke municipal councils	After obtaining EIA certificate but before commencing construction
3.	Water use permit (Extraction of water from natural rivers, lakes and underground aquifers)	Water Resources Management (Water Abstraction, Use and Discharge) Regulations, 2010	Wami/Ruvu Basin Water Board (WRBWB)	To be acquired before commencing actual construction works
4.	Groundwater exploration and drilling licence/permit	Groundwater (Exploration and Drilling) Licensing Regulations, 2013	Ministry of Water and Irrigation	To be acquired before drilling/exploration
5.	Collection, transportation and disposal of hazardous wastes	Environmental Management (Hazardous Waste Control and Management) Regulations, 2008	NEMC	To be acquired before, during and after construction
6.	Discharge of pollutants to soil	Environmental Management (Soil Quality Standard) Regulations, 2007	NEMC	To be acquired
7.	Operation of own solid waste disposal site	Environmental Management (Solid Waste) Regulations, 2008	NEMC and LGAs	To be acquired
8.	Construction of bulk oil storage facility	Petroleum Act, Cap 392 Section 126	EWURA	To be acquired
9.	Industrial and Consumer Chemicals Registration and analysis of the chemicals including	Industrial and Consumer Chemicals (Management and Control) Act, No. 3 of 2003	Government Chemist Laboratory Authority (GCLA)	During importation

SN.	Type of Permit, Licence or Approval	Relevant Act/Regulation	Issuing Authority	Remarks
	guidance on storage, transportation & use			
10.	Disposal of chemical wastes			To be acquired before disposal
11.	Importation of industrial and consumer chemicals			To be acquired before importation
12.	Fire and Rescue Certificate	Fire and Rescue Act, No. 14 of 2007	Commissioner General of Fire and Rescue Force, Ministry of Home Affairs	To be acquired before commencing construction
13.	Certificate of Registration of Workplace	Occupational Health and Safety Act, 2003, S. 15-17	Occupational Safety and Health Authority (OSHA)	To be acquired before commencing construction
14.	Workplace Compliance Certificate	Occupational Health and Safety Act, 2003, S. 15-17	Occupational Safety and Health Authority (OSHA)	To be acquired during mobilization phase
15.	Mining licence (extraction of raw materials for construction - quarries)	Mining Act, 2010	District Mining Offices at Ubungo, Ilala, Kinondoni and Temeke districts	To be applied before actual construction works
16.	Surface public transportation	Surface and Marine Transport Regulatory Act (2001), Cap 413	LATRA	To be acquired
17.	Motor vehicle registration	Road Traffic Act No. 30 of 1973	TRA	To be acquired

Source: Consultant, July 2020

4.0 BASELINE AND EXISTING CONDITIONS

This chapter provides a description of the baseline environmental and socio-economic settings along BRT Phase 5 corridor project where construction and operation activities will be implemented. Information provided in this chapter will be superimposed onto the project concept and components for impact identification, evaluation and development of mitigation and/or enhancement measures.

4.1 The Existing Project Corridor/Route Description)

The key existing socio-economic and environmental features within the project's RoW are summarized in the sections below. This is the core and project's direct area of influence. Information has been derived from fieldwork along the corridor and analysis of the topographical survey investigation report (topo sheets). Detailed description, including types of key features of interest on both sides of the road (within and adjacent the RoW), and specific chainages for each road section under BRT Phase 5 is presented in Appendix II.

4.1.1 Nelson Mandela Road Section (Ubungo-TAZARA-Uhasibu-Kigamboni Bridge)

Nelson Mandela Road is a dual carriageway road which starts from Ubungo traffic lights in Ubungo municipality, coursing through Tabata, and Buguruni in Ilala municipality to Kigamboni Bridge in Temeke municipality. Along the corridor there are different activities taking place (as shown in Figures 4-1 and 4-2) including small- and large-scale commercial activities, industrial and institutional establishments, and residential houses. The corridor also has different utilities such as TANESCO's electricity transmission lines, TPDC's gas pipelines, TTCL telephone lines, cables, fibre-optic cables, water supply lines and associated facilities. There are also bridges (Msimbazi river across Mandela Road), culverts, TAZARA flyover (Mfugale Flyover) at Nyerere road junction, Standard Gauge Railway (under construction) crossing at TAZARA, existing metre-gauge railway crossing at TAZARA, Dar commuter railway crossing at Tabata Relini, and Buguruni pedestrian flyover across Mandela road.

Further, urban agriculture especially horticulture farming (vegetables and fruits) are grown along Msimbazi Valley particularly along the river soon after crossing

Mandela Road. Small scale livelihood activities are the dominant form of activities along this section.

The Mandela road corridor constitutes the key linkages to other sections of the BRT Phase 5 (Segerea-Tabata-Mandela-Kigogo), Nyerere and Kilwa roads where other BRT phases will be implemented.



Figure 4-1: Different land uses along Mandela road

Source: Fieldwork, 2018

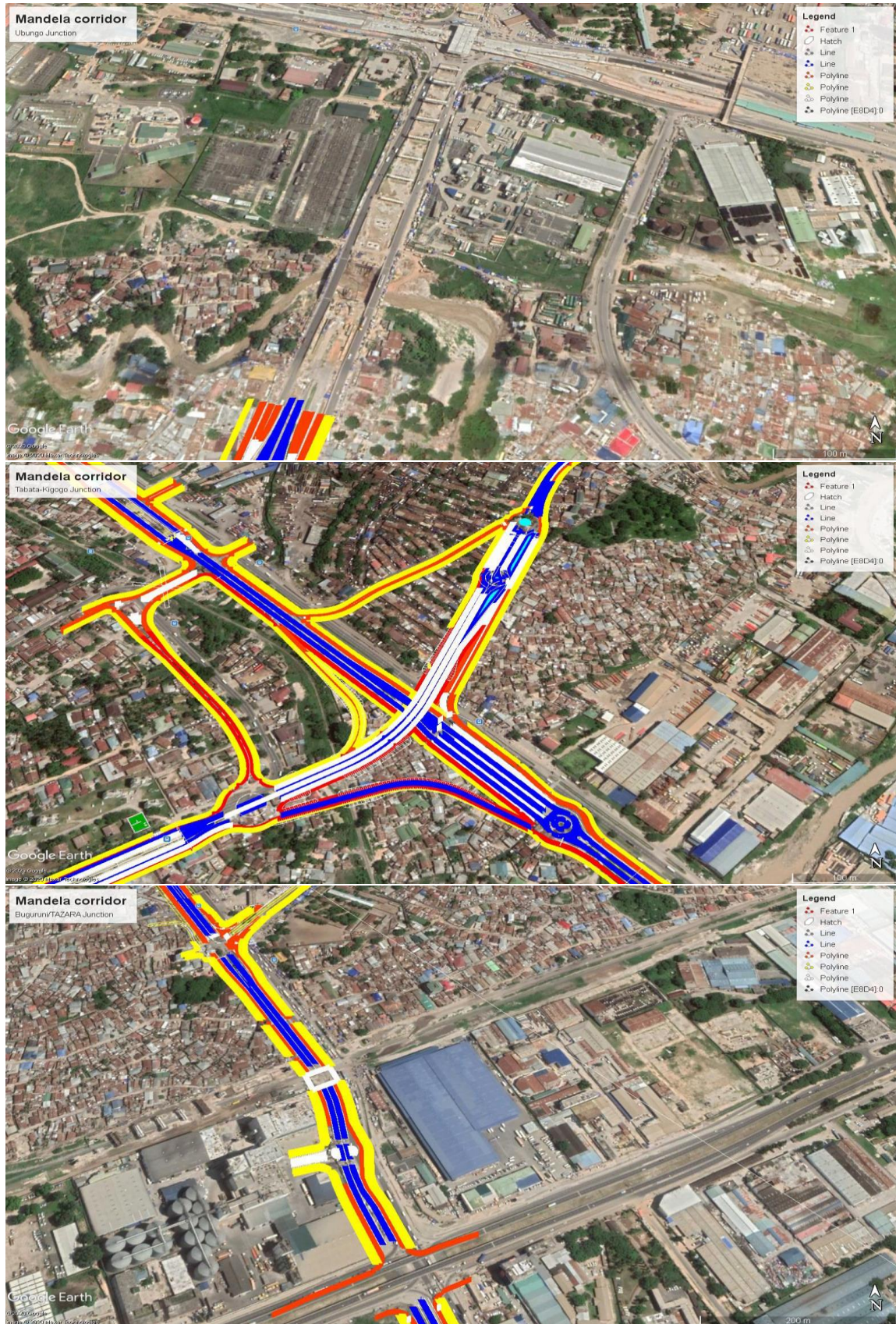


Figure 4-2: Mandela road corridor key intersections: Ubungo (top), Tabata (middle) and Buguruni/TAZARA (bottom)

Source: Consultant, July 2020

4.1.2 Temeke Corridor (Veterinary-Azizi Ally)

The corridor is a single carriage way, built-up area with residential, public offices, and commercial buildings such as fuel service stations and entertainment centers, restaurants, bus station and shops. Different types of trees are found along the road and some horticultural activities are taking place. The section is densely populated with residential, petty/retail stores trading, all sort of urban facilities, utilities, commercial and residential establishments as shown in Figures 4-3 and 4-4.

Like Mandela corridor, the Temeke section is also equipped with various utilities along and across the road. These are mainly water supply and sewerage network, electricity transmission, telephone lines and cables, telecommunication towers, and underground fibre optic cables.



Figure 4-3: Existing situation along Azizi Ally- Veterinary section
Source: Consultant, July (2020)

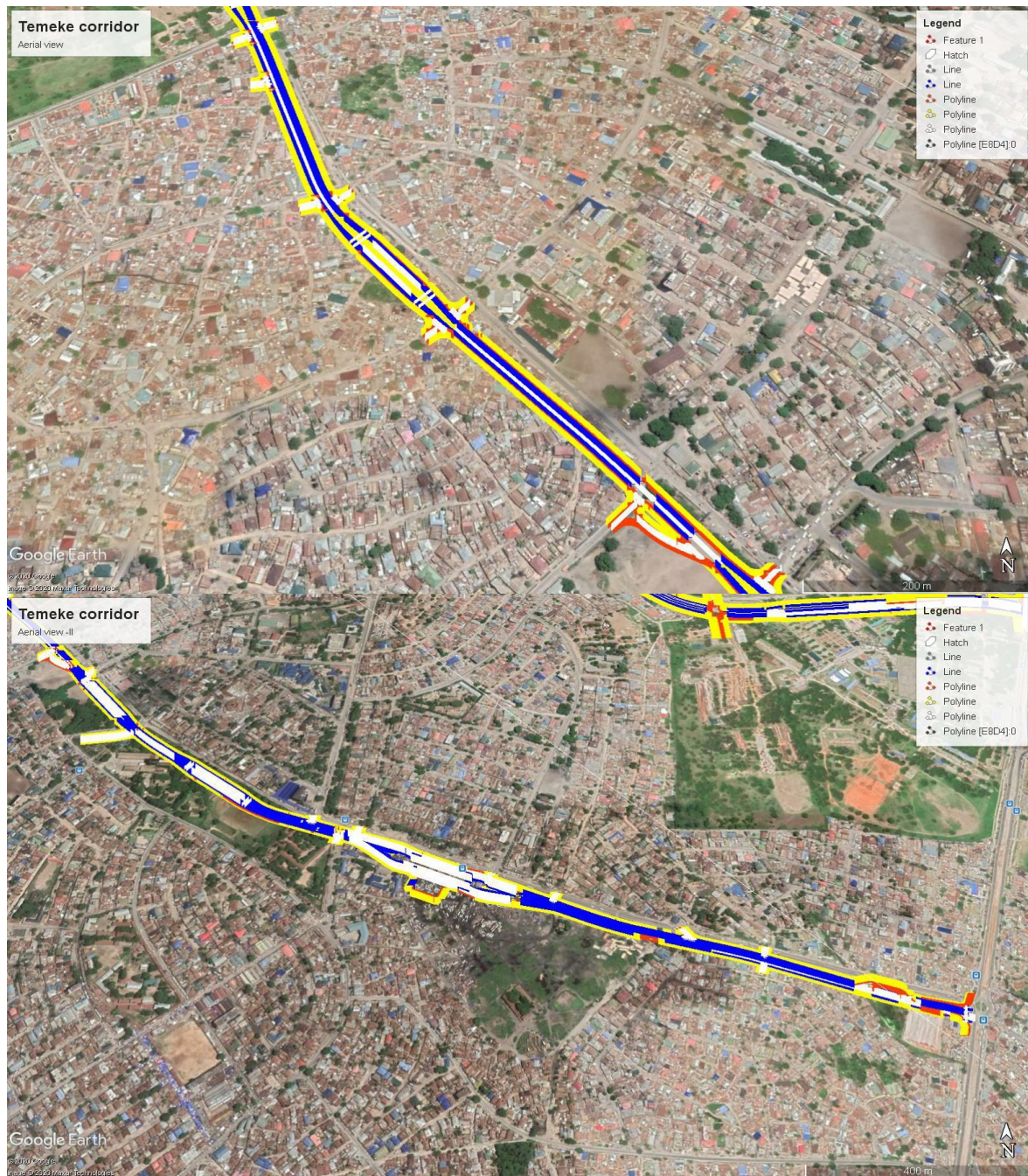


Figure 4-4: Various land-uses along the Temeke (Veterinary-Azizi Ally) corridor

Source: Consultant, July (2020)

4.1.3 Kigogo- Tabata-Segerea Mwisho Corridor

Kigogo to Segerea road section for BRT Phase 5 is a single carriageway road with a very narrow corridor bounded by built up areas with mixed uses of residential, institutional, and commercial activities such as fuel service stations, garages, automobile yards, churches, schools, mosques, hospitals and shops. Along the road there are electric lines closer to the road and different types of

planted trees as shown in Figures 4.5 and 4.6.



Figure 4-5: Existing land-uses along the Kigogo-Tabata- Segerea project corridor

Source: Consultant, 2018

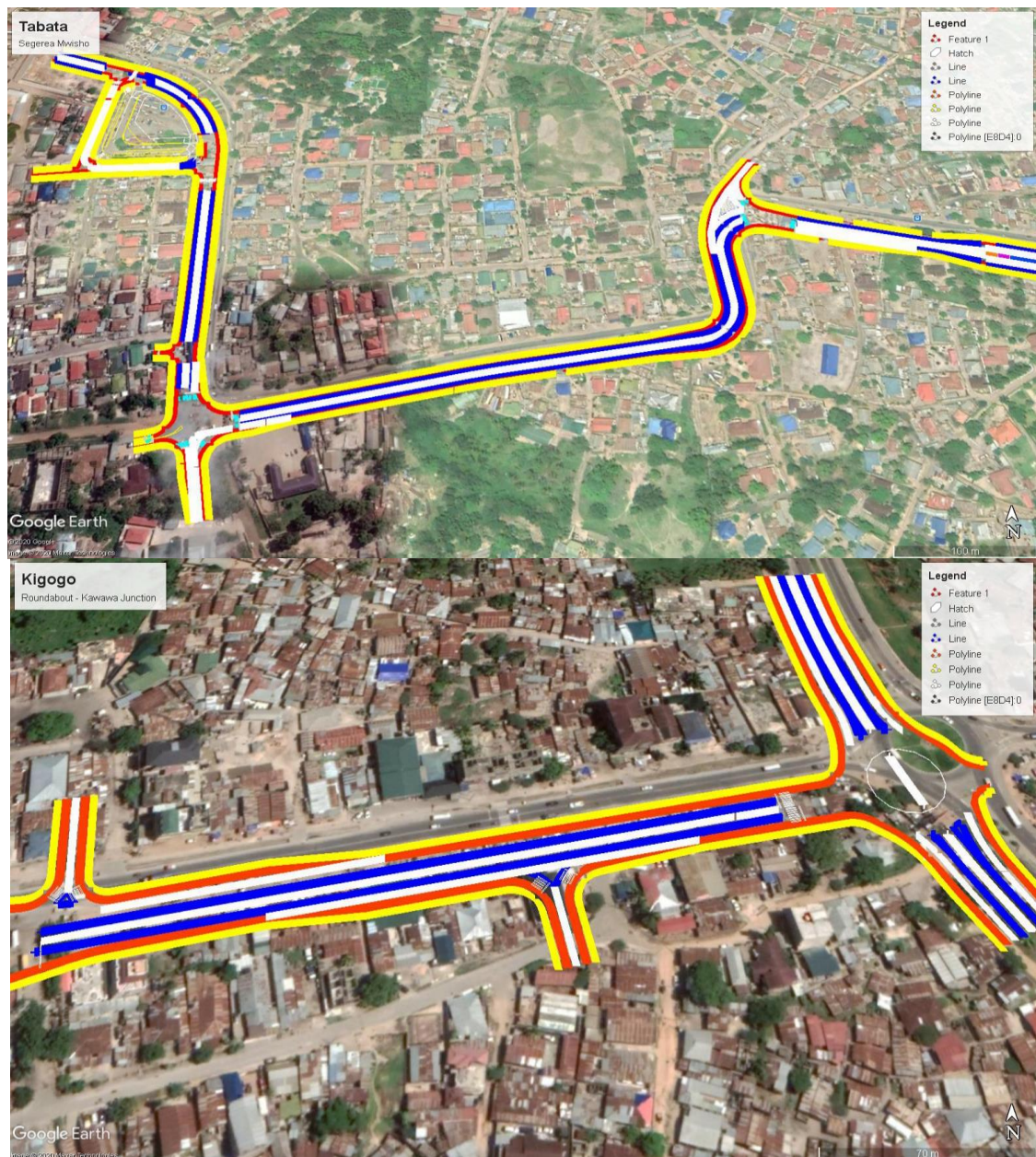


Figure 4-6: Horizontal alignment of the Kigogo-Tabata- Segerea section across various current land-uses

Source: Consultant, July 2020

4.1.4 Port Access Road Section

The Port Access Road is a single carriageway road which covers a 1.2km-long section of Bandari road and a 3.6 km section of Mandela Road. The road starts from Kilwa road roundabout – and passes along Bandari Road/Dar es Salaam port – through to Uhasibu junction at Kilwa road. Different socio-economic activities such as commercial establishments, mainly port operation support facilities such as yards, container terminals, fuel depots, warehouses and

industrial activities are dominant. There are also residential and small-scale entrepreneurship activities along the corridor. The existing environmental features present in the corridor include utilities, and buildings (residential, commercial and industries) as shown in Figure 4-7 and 4-8. It is also noted that, there is an ongoing weighbridge (700m) construction at Malawi Cargo area whereby the weighbridge was under construction using the cross width from the end of carriageway to external the wall of Malawi cargo, the total length used for the weighbridge construction is 700m.



Figure 4-7: Existent land-uses along the Port Access corridor
Source: Consultant, July 2020



Figure 4-8: Horizontal alignment of the Port Access Road section across various current land-uses

Source: Consultant, July 2020

4.2 Physical Environment

4.2.1 Climate and Climatic Characteristics

The project area has tropical type of climate characterized by a bi-modal rainfall regime that is influenced by the Indian ocean. The rainy season runs from

October to December and a long rainy season falls between March and May. The average rainfall is 1000mm (lowest 800mm and highest 1300mm). The rainy seasons are also the most humid periods. It is generally hot and humid throughout the year with an average temperature of 29°C. The hottest season is from October/November to March during which temperatures can raise up to 35°C. Humidity is around 96% in the mornings and 67% in the afternoons. The project area is less hot between May and August, with a temperature of around 25°C.

4.2.2 Topography and Landscape

The road runs along a flat and fairly rolling land from Dar es Salaam Port to TAZARA and to Ubungu and along Kigogo Road. There are three valleys that are occupied by the three major rivers across/along BRT Phase V corridor that flow into the Indian Ocean. On the upstream side of the road, the terrain is undulating, hilly and rugged. This is the area where Tabata Road passes along a ridge up to Segerea *daladala* terminal (Hydrology and Hydraulics report, Nov. 2019). The proposed project corridor generally traverses in two terrain categories, flat $\leq 10\%$ (Mandela Road and Temeke corridors) and rolling terrains $>10\%$ and $<25\%$ (Mandela-Tabata-Segerea section and Kigogo-Dampo-Tabata section) (DED, Nov. 2019).

The Municipalities have an altitude that ranges between 0 and 260m/853ft above sea level and they consist of a large lowland area and some parts forming the upland zone. The lowland areas start where the Municipalities border with the Indian Ocean and the small upland areas emerge as small hills or plateaus to the north-western part of the city. Whereas most of the lowland areas constitute the urban part of the Municipalities, the upland areas are predominantly agricultural and peri-urban in character (Kebede, Brown & Nicholls, 2010).

4.2.3 Geology, Soils and Seismic Activities

Sandstone and carbonate rocks are two dominant groups of rocks that typify the Dar es Salaam region. Sandstones occupy over three quarters of the city and comprise seven main types covering extensive parts of the central and south-eastern parts, and narrowly developed beyond 5km in the north-west direction of

the city centre (Soils and Materials report, Nov. 2019). The main soil types along BRT Phase 5 corridor consists of naturally existing well graded and loosely overlying silty sand and low clayey sand soils at fewer locations. The overlying whitish grey sand layer were found to be generally non-plastic and with predominantly varying finer to coarser grain distribution except for a few isolated marshy areas (Soils and Materials report, Nov. 2019). The dominant sand soil is highly permeable, with a low retention capacity and highly susceptible to erosion agents (e.g. wind, water).

Regarding seismic activities, available databases, records and indications suggest that the BRT Phase 5 corridor is located in area with minimal earthquake/seismic threats. There are no faults, or any features that indicate the seismic activities have been taking place (zone of lowest earthquake threats) (Soils and Materials report, Nov. 2019).

4.2.4 Hydrology, Drainage and Flooding Along BRT 5 Corridor

4.2.4.1 Hydrology and Drainage Pattern

The Dar es Salaam regional hydrology lies within the Wami-Ruvu basin. The key perennial rivers within the city are Msimbazi, Kizinga, Mlalakua, Mbezi, Kijitonyama and Tegeta, all of which discharge their waters directly into the Indian Ocean. Given that the regional climate is characterized by a bi-modal precipitation regime, rivers and streams in the area exhibit the highest flow rates at the peak of the rainy seasons covering the periods of November through December and March through May. The major rivers and tributaries draining Dar es Salaam city and the wider region are illustrated in Figure 4-9 below, along with the catchment areas relevant to the project impact area.

The BRT Phase 5 corridor (primary/direct impact area) falls within the catchment areas of Kizinga River and Msimbazi River (Figure 4-11 below).

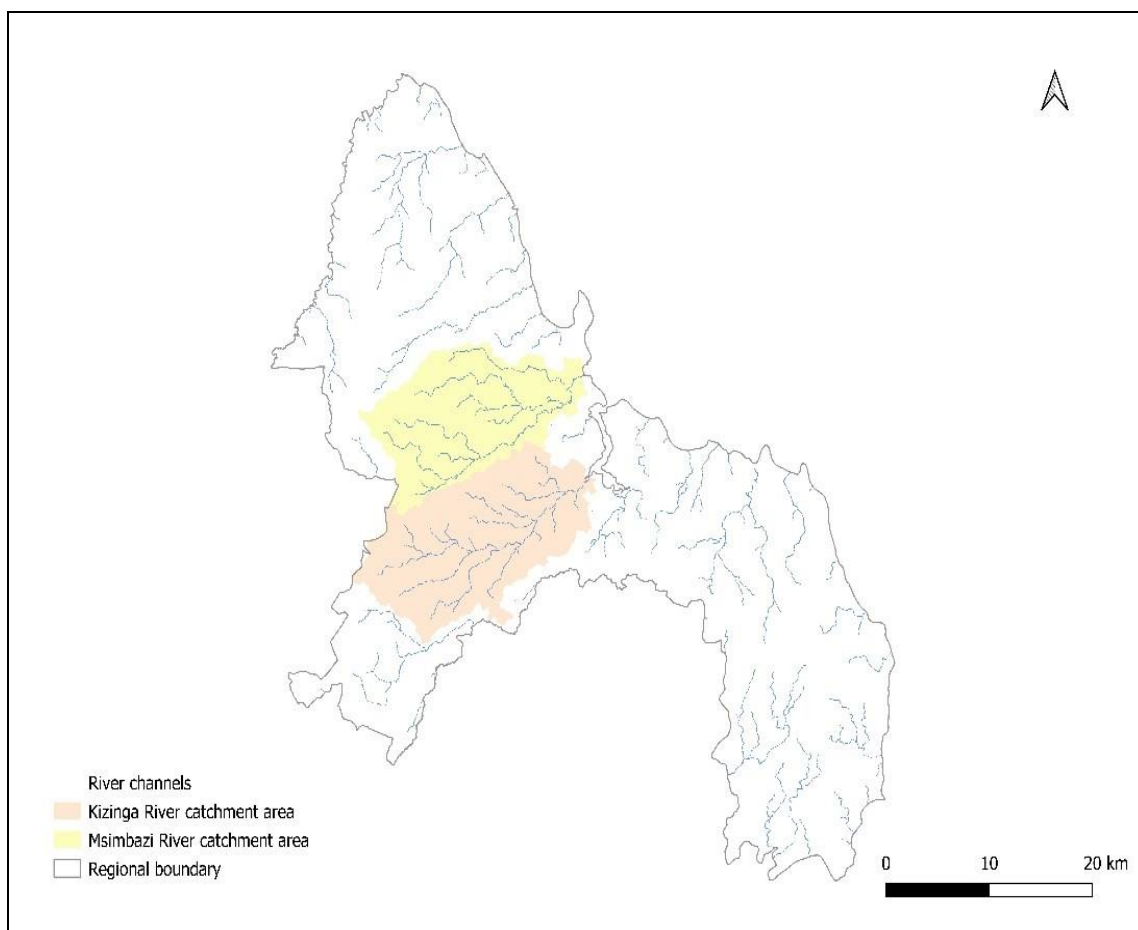


Figure 4-9: Drainage network and major river catchments of Dar es Salaam

Source: Consultant, July 2020

The Ubungu-Kigamboni section of the BRT Phase 5 project corridor is intersected by Tenge River and Msimbazi River in Matumbi street (*mtaa*) before and after Tabata-Kigogo junction. Tenge River also crosses the Tabata-Kigogo section of the corridor in Mandela street (*mtaa*). Kibangu River, an extensive tributary of Msimbazi River, is situated an approximate 125m away from where the BRT Phase 5 joins Ubungo flyover currently under construction. However, this is one of the key rivers that drains the entire catchment where the project road is located (Figure 4-10 below).

Kibangu and Tenge rivers joins Msimbazi river as it drains into Indian Ocean. Their tributaries have joined the main channels before crossing the roads, a situation that has resulted into having fewer drainage structures along the project roads. The three rivers are the most affected rivers by

numerous pollution sources. Msimbazi river is at its mature stage downstream the Msimbazi bridge where its bed slope has gone so low that the combined effect of settling sediment due to the reduced bed slope and the backwater from the Indian Ocean at high tide has causes repeated bed level rise. Extensive gardening on the river flood plains for horticultural production adds considerable sediment into the channels therefore contributes to the drainage problem.

The existing bridges along the project corridor include the TIOT bridge and Matumbi bridge along Nelson Mandela Road (Ubungo-Temeke corridor section) and the Mandela bridge along Uhuru Road (Tabata-Kigogo corridor section), as shown in Figure 4-10 below. Ubungo Bridge overpasses Kibangu River along Nelson Mandela Road. The channel segments at the bridge locations appear to be mostly alluvial.



Figure 4- 10: Existing bridges across the rivers traversed by the project corridor

Source: Consultant, July 2020

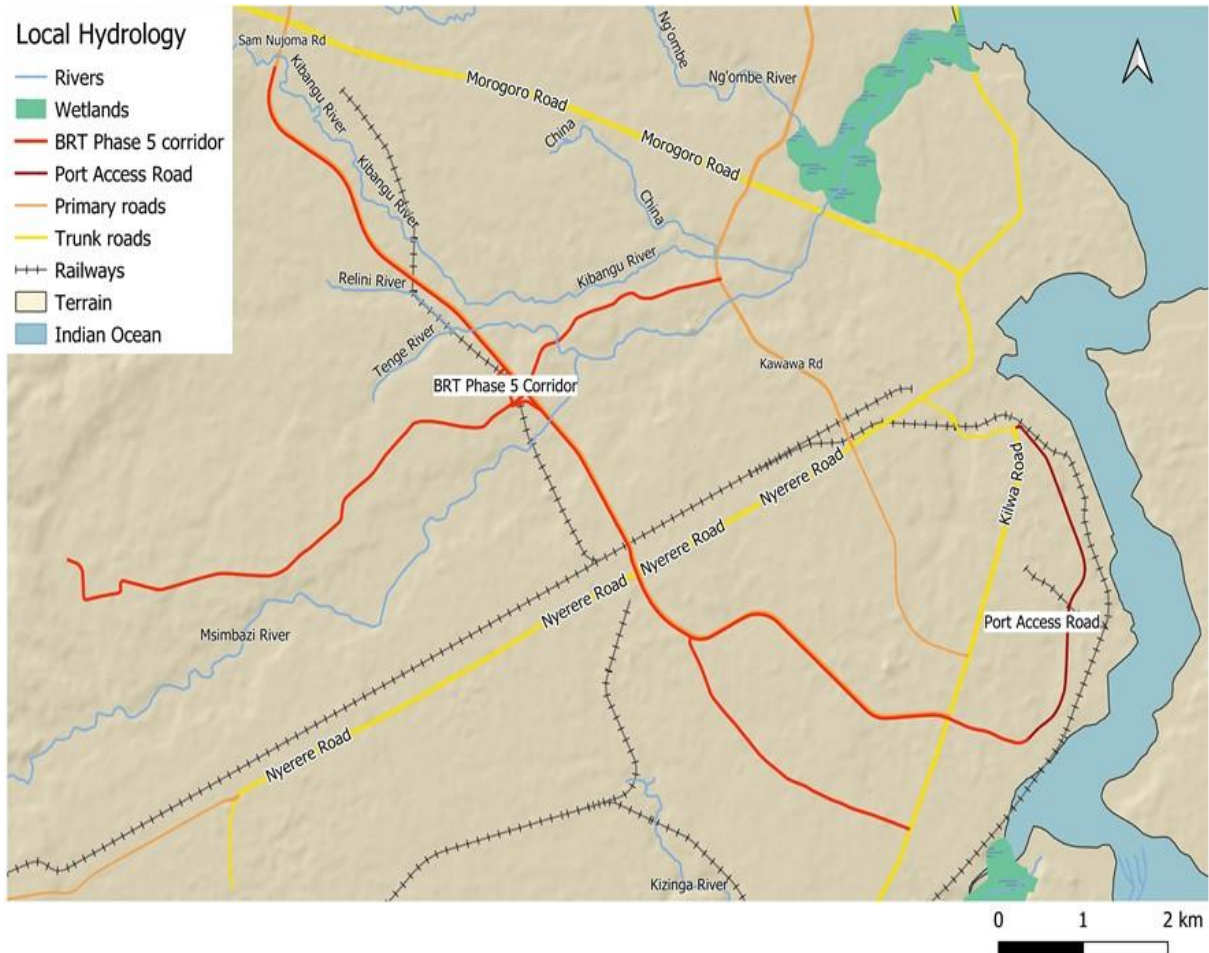


Figure 4-11: Major rivers within the project area

Source: Consultant, July 2020

4.2.4.2 Drainage and Flood Risk

The catchment imperviousness in some Dar es Salaam catchments have increased by 41%, causing flooding incidence, massive erosion and numerous pollution sources (Hydrology and Hydraulics report, Nov. 2019).

The rainfall data from Dar es Salaam stations (Ubungo and Julius Nyerere International Airport) depicts existence of two peaks, one from March to May, which is the high peak that produces high floods and the other one is the low peak that starts in November and ends in December.

The catchment area of Msimbazi River has become increasingly flood-prone over the past decade, as a result of progressive deforestation within the upper catchment, increased surface runoff from built-up watersheds and clogging of the hydraulic structures due to continual soil erosion and waste mismanagement along the river's lower valley. The extent and severity of the bi-annual flood events is especially extreme within the lower catchment, which has led to disastrous impacts on wide-ranging settlements and road infrastructure within the floodplains. Amongst the top sensitivities is the BRT Phase 1 depot in Jangwani area, which is subject to a flood depth of approximately 0.46m with a 10-year recurrence interval, as recent hydrological modelling has demonstrated⁴.

Flood-sensitive hydraulic conduits along the proposed BRT Phase 5 corridor include three bridges and 42 culverts. Stakeholder consultations carried out as part of the hydrological survey for the project have shown that the bridges of Matumbi and TIOT (overpassing the tributaries of Msimbazi River) have been overtopped by discharge during heavy rains. Information from Luhanga bridge on Tenge river at Kigogo indicates that the last serious overtopping occurred in 2016 caused heavy scouring at the bridge. This was contributed by heavy rains and debris that clogged the bridge opening. This was confirmed by subsequent hydraulic modelling. Further, stakeholder comments in Kigogo, Sandali, Temeke and Buguruni areas highlighted flooding risks in their areas due to frequent water stagnation for longer period during heavy rains.

Sustained flow burdens on the drainage canals within the project footprint have not been reported, though low-capacity culverts (i.e., those with diameter less than 0.9m) have been upgraded in certain sections. A canal section at Mchichani (chainage 6+260) was noted to be congested with solid waste and stagnant water in the course of the

⁴ COWI. 2018. Flood Mitigation in Msimbazi Valley. Final Report.

survey. The Ubungu bridge, which is under construction to widen it will never be overtopped due to the very large opening presence of four spans each with a width of about 12m, and bridge height of about 8m (Hydrology and Hydraulics report, Nov. 2019).

The hydrological effects of global climatic change are adopted in various countries as positive increase of 10% to 30%. A value of 15% has been adopted in BRT Phase 5 for the river peak flood discharge estimates and subsequent design. The East Africa Transport and Road Research Laboratory (TRRL) flood model was applied to derive a conceptual estimation of peak flood discharge levels from the dimensions of vulnerable hydraulic conduits along the corridor, historical hydro-meteorological data and catchment parameters obtained via field measurements. The results of conceptual peak flood models for the TIOT and Matumbi bridges have shown the vertical clearances of the bridges to be 0.1m and 0.8m short of the applicable standard respectively. The assessment has also indicated that the open channels are prone to scour effects. Further, the hydrological risk analysis shows that many of the existing drainage canal structures do not meet the capacity requirements for the prescribed return periods of 25 to 50 years (Hydrology and Hydraulics report, Nov. 2019).

However, due to existing data gaps at this stage, it is recommended to undertake flood risks assessment and modelling along BRT Phase 5 corridor including proposed locations for the stations, terminals and depots to ensure sustainability in terms of climate resilient urban infrastructure.

4.2.4.3 Hydrogeology

Groundwater was observed to be in between 4.5m to 8.0m for boreholes drilled at both Tenge and Msimbazi bridges sites and ground water was observed to be between 7.0m and 16.0m for boreholes drilled to Kigogo/Luhanga bridge site. At Matumbi, the stable ground water was

found at 8.0m deep, and this was observed for 48-72 hours after drilling (Soil and Materials Report, Nov. 2019). This is suggestive of a high-water table that can be susceptible to various forms of contaminations.

4.2.5 Water Quality

Water quality analysis was performed for the major river crossings along BRT Phase 5 corridor, that is, Msimbazi, Tenge/Luhanga and Kibangu/Ubungo rivers. Samples were collected in September 2018 during dry season and sent to Environmental Engineering Lab at Ardhi University for further testing of the physical, chemical and biological composition. Parameters measured include pH, turbidity, colour, salinity, electric conductivity, total dissolved solids, total suspended solids, nutrients, COD, BOD₅, faecal coliform and total coliform (Appendix III).

Table 4-1: results of the water quality analysis for major rivers within the project area

Water parameter	Unit	Results			Domestic (TBS)	Domestic (WHO)
		Rivers				
		Tenge	Msimbazi	Ubungo/ Kibangu		
Conductivity	uS/m	746	2480	2210	0 – 2.5	nm
Total Dissolved Solids	mg/L	371	1239	1103	0 – 1500	1500
Total suspended solids	mg/l	145	407	195	100	1000
Sulphate	mq/l	41.21	45.21	71.10	0 – 8.3	400
Nitrate-nitrogen	mg/l	2.50	0.20	1.30	0 – 10	10
Ammonia-Nitrogen	mg/l	1.479	45.45	0.561	0 – 0.4	
Phosphate	mg/l	10.30	66.30	4.26	0 – 0.7	6.0
Iron	mg/L	0.21	0.32	0.27	0 – 0.3	0.3
pH	1–14	7.64	7.52	7.78	6.5–9	9.2
Color	Mgpt/l	30	1284	9	50	
Salinity	% (ppt)	0.40	1.20	1.10		
Turbidity	NTU	23	379	28	5 - 25	25
Chemical oxygen demand	mg/l	87	320	23	60	
Biological oxygen demand	mg/l	38	106	12	30	
Fecal coliform	Count/100ml	13*10 ⁶	52*10 ⁶	18*10 ⁶	0	0
Total Coliforms	Cfu/100ml	29*10 ⁶	92*10 ⁶	35*10 ⁶	0	0

Source: Fieldwork, September 2018

The rivers are highly polluted with organic matter especially Msimbazi River (having a BOD₅ of 106mg/l). Therefore, much care is needed during construction

to avoid further pollution of these rivers. The standard methods as per HACH Water Analysis Handbook 7th Edition were adopted. All the three rivers had excessively high faecal and total coliforms compared to the WHO and TBS standards indicating that the rivers are highly polluted. This contamination is attributed to the establishment of settlements along the riverbanks with poor sewage infrastructure (improperly treated septic and sewage discharges), animal wastes, and/or leaching of animal manure. Total coliform bacteria are not likely to cause illness in human beings, but their presence indicates that water may be vulnerable to contamination by more harmful microorganisms. However, faecal coliform contamination indicates the presence of *E.coli* bacteria and other microbial contaminants.

The analytical results show that all three rivers have a high ammonia-nitrogen, phosphate concentration compared to regulatory standards. Msimbazi River has the highest levels compared to the rest. This has a negative implication to the aquatic life such as fish, given the eutrophic effects of inorganic nutrient loading.

Water turbidity for Msimbazi and Ubungu/Kibangu Rivers are comparatively higher compared to that of Tenge River and the WHO standards. Turbidity brought about by soil erosion and the ingress of organic waste is characterized by an excessive presence of suspended particulates. High turbidity levels negatively impact on aquatic habitats and biota with effects such as the smothering of feeding and breeding grounds, decrease of primary productivity with reduced light penetration and physical stress of aquatic fauna.

In addition to the analytical results, recent studies along Msimbazi Valley have pointed to the presence of contaminants posing public health risks. Water samples collected from seven sampling stations along Msimbazi River and its tributary Ubungo River, showed that water contains high concentrations of salts and pathogenic organisms e.g. *Ascaris Lumbricoides*. Fecal coliform level was found to be high in all samples with a maximum count of 2.1×10^6 cfu/100ml (Mayo & Kayombo, 2018). Further, it was revealed that downstream Msimbazi (where BRT Phase 5 is also located) is more polluted than the upstream, and vegetables grown in this area (livelihood activity) was found to be contaminated

with pathogenic organisms such as *Escherichia coli*, *Citrobacter ssp*, *Proteus ssp*, *Klebsiella ssp*, *Salmonella spp* and *Basillus spp*. Further pollution of the river was increasing towards downstream (Mayo & Kayombo, 2018).

The three rivers flow across the city's residential, commercial, industrial, and agricultural areas hence prone to various forms of pollution. The river waters are organically and microbially polluted by informal settlements located near these rivers systems, which lack adequate sanitation utilities. Untreated sewage and industrial effluents discharge, crude waste dumping, and on-going horticultural farming along the river valleys altogether contribute to the deterioration of the water quality of these rivers.

4.2.6 Ambient Air Quality and Dust Levels

Eleven sampling stations were selected for ambient air quality and dust (PM₁₀ & PM_{2.5}) measurements along BRT Phase corridor (see Table 4.2 and Figure 4-12 below).

Table 4-2: Air quality and noise sampling stations along BRT5 corridor

Description of sampling station	Sampling Code	WGS 84, UTM zone 37S		Notes and Comments
		Eastings	Northings	
Bandari road/Kilwa road roundabout	AQMS1	531613	9244983	The point is located at the roundabout toward Port Access Road near TPA. Measurement affected by trucks, vehicle, and motorcycle movements.
Uhasibu junction (Kilwa road and Mandela road intersection)	AQMS2	530835	9241995	The point is located about 10m from the intersection of Kilwa and Mandela road near TIA fence. Measurement affected by trucks, vehicle, and motorcycle movements.
Azizi Ally Roundabout (Kilwa road and Temeke corridor junction)	AQMS3	530367	9240875	The point is located at Azizi Ally roundabout near Oilcom filling station. Measurements affected by trucks, vehicle, and motorcycle movements.
Intersection of Mandela Road and Nyerere Road	AQMS4	537185	9243497	The point is located at the centre of TAZARA/Mfugale flyover. Measurement affected by trucks, vehicle, motorcycle movements and the ongoing construction activities of the flyover.
Buguruni junction along Mandela road	AQMS5	536894	9244066	The point is located at Buguruni near the pedestrian bridge. Measurement affected by trucks, vehicle, and motorcycle movements.
Intersection of Mandela				The point is located about 5m from the intersection of Mandela and Morogoro road near Symbion

Description of sampling station	Sampling Code	WGS 84, UTM zone 37S		Notes and Comments
		Eastings	Northings	
Road and Morogoro Road	AQMS6	523016	9249167	Power plant. Measurement affected by trucks, vehicle, motorcycle movements and the ongoing construction activities of the Ubungu Interchange bridge.
Kigogo roundabout towards Mandela road	AQMS7	528119	9246546	The point is located at Kigogo roundabout toward Mandela road. Measurement affected by trucks, vehicle, and motorcycle movements
The junction near Tabata Dampo	AQMS8	525991	9245721	The point is located at the junction near Tabata Dampo along Kigogo road. Measurement affected by trucks, vehicle, and motorcycle movements.
The intersection of Kigogo and Mandela Road	AQMS9	525849	9245415	The point is located at the junction where Kigogo and Mandela road does intersect. It is near the traffic light at about 50m. Measurement affected by trucks, vehicle, and motorcycle movements.
The junction at Tabata Barakuda	AQMS10	523284	9243755	The point is located along the Segerea road at Barakuda junction near the furniture workshop. Measurement affected by trucks, vehicle, motorcycle movements and the small activities around the area.
Segerea Terminal (where BRT terminal will be located)	AQMS11	520549	9243562	The point is located about 5m from the intersection of Mandela and Morogoro road near Symbion Power plant. Measurement affected by trucks, vehicle, motorcycle movements, movement of people and the small business at the terminal.

Source: Fieldwork, September 2018



Figure 4-12: Distribution of air quality sampling and noise measurement locations as part of the baseline assessment

Source: Consultant, July (2020)

For all points, the average measured concentrations during the study were found to be ranging between 15 $\mu\text{g}/\text{m}^3$ - 66 $\mu\text{g}/\text{m}^3$ and 11.6 $\mu\text{g}/\text{m}^3$ - 39 $\mu\text{g}/\text{m}^3$ for PM_{10} and $\text{PM}_{2.5}$ respectively. The details are summarized in Table 4-3.

Table 4-3: Average values of measured Dust levels

Sampling locations	Sampling Code	Average Measured Parameters in $\mu\text{g}/\text{m}^3$	
		PM10	PM2.5
Kilwa Road	AQMS1	21	13
Kilwa Road	AQMS2	50	26
Kilwa Road	AQMS3	27	18
Nyerere Road	AQMS4	31	16
Mandela Road	AQMS5	66	39
Mandela Road	AQMS6	54	28
Kigogo Road	AQMS7	20.67	15.67
Kigogo Road	AQMS8	34.00	25.33
Kigogo Road	AQMS9	28.33	21.67
Segerea Road	AQMS10	30.67	23.67
Segerea Road	AQMS11	15.33	11.67
TBS LIMITS [TZS 845:2005]		200	25
IFC (2007) and WHO		50	-
Manufacturer standards		≤ 150	≤ 75

Source: Fieldwork, September 2018

The concentration of ambient pollutant gases were measured with respect to the available limits set by WHO/IFC guidelines and TBS-NESC (Tables 4.3 and 4.4). Parameters measured included: Carbon monoxide (CO) in mg/m³, Carbon dioxide (CO₂) in %, Oxygen (O₂) in %, Hydrogen sulphide (H₂S) in mg/m³, Formaldehyde (HCHO) in mg/m³, Benzene (C₆H₆) in mg/m³ and Volatile organic compound (TVOC) in mg/m³. The average measured concentrations from the eleven sampling stations are shown in Table 4-4. All of the measured parameters for the established six sampling points were found to be within local and international guidelines except for TVOC and C₆H₆ which may be associated with petroleum products released from garages and other anthropogenic activities.

Table 4-4: Average values of measured ambient gases concentrations

Sampling stations	Measured parameters						
	HCHO mg/m ³	TVOC mg/m ³	C ₆ H ₆ mg/m ³	CO ₂ %	O ₂ %	H ₂ S mg/m ³	CO mg/m ³
AQMS1	0.00	0.01	0.02	0.036	20.9	0	0
AQMS2	0.00	0.23	0.08	0.036	20.9	0	0
AQMS3	0.00	0.09	0.03	0.037	20.9	0	0
AQMS4	0.00	0.11	0.03	0.035	21	0	0
AQMS5	0.00	0.21	0.07	0.043	20.9	0	0
AQMS6	0.00	0.24	0.07	0.036	21	0	0
AQMS7	0.00	0.57	0.20	0.035	20.9	0	0
AQMS8	0.00	0.72	0.27	0.039	20.8	0	0
AQMS9	0.00	0.77	0.27	0.040	20.8	0	0
AQMS9	0.00	0.69	0.25	0.036	20.9	0	0
AQMS11	0.00	0.52	0.19	0.037	20.9	0	0
TBS	-	0.5	-	-	-	0.12	10
WHO Guideline	-	0.5	-	-	-	0.12	30
Manufacturer standards	≤ 0.10	≤ 0.6	≤ 0.11	≤ 0.07	20.9	-	0.005

Source: Fieldwork, September 2018

Concentration values that recorded a zero reading (0.00 mg/m³) do not necessarily indicate the absence of the measured gases but rather that the levels present (if any) may be below the detection levels of the measuring device.

Further, based on the information provided and the scope of the development, traffic emissions (emissions to air from operational phase traffic) from road links have been considered in the assessment.

Table 4-5: Assessed road links for the ambient air quality

Reference	Road link
Port Access Road	
1	Bandari road
2	Dar es Salaam Port - Uhasibu
BRT Phase 5 corridor sections	
3	Temeke corridor (Mtoni kwa Azizi Ali -Veterinary)
4	Kigamboni Bridge-Veterinary
5	Veterinary – Ubungo
6	Kigogo RA – Tabata Reli
7	Tabata Reli – Segerea bus stand

Source: Consultant, 2020

4.2.7 Ambient Noise and Vibration Levels

Based on the noise level measurements taken during the daytime at the eleven established sampling stations (refer Figure 4-14 above), the recorded levels were between 70.97 – 79.13 dBA. As shown in the table below, noise levels measured in all stations were found to be above regulatory standards and it was noted that the main contributors of the measured noise are heavy equipment machines, vehicles and motorcycles passing through the proposed project site.

Table 4-6: Average values of measured noise levels

Sampling Stations	TBS Limit (Hrs)	Morning (dBA)	Afternoon (dBA)	Evening (dBA)	Daytime Noise
AQMS1	12	70.3	72.4	77.1	73.3
AQMS2	12	74.4	76.4	78.5	76.4
AQMS3	12	72.5	78.3	75.9	75.6
AQMS4	12	73.3	75.5	78.6	75.8
AQMS5	12	74.4	76.7	79.8	76.9
AQMS6	12	76.0	79.7	73.9	76.5
AQMS1	12	71.4	69.2	72.3	70.97
AQMS2	12	73.8	73.9	72.5	73.40
AQMS3	12	83.3	74.7	79.4	79.13
AQMS4	12	78.9	70.8	74.8	74.83
AQMS5	12	74.5	74.4	67.1	72.00
Average Noise Levels	12hrs	73.48	76.5	77.3	75.75
TBS-NES Limits					<70
WB/IFC Guideline					<70

Source: Fieldwork, September 2018

The construction works will involve the use of a variety of working methods, and operations will vary throughout the construction period. Noise and vibration levels from the works are likely to vary significantly over time as the type of construction activities change.

In the identification of the sensitive receptors for the noise, a summary of the sensitivity criteria used in this assessment for various types of receptors is presented in Table 4-6 below. The receptor sensitivity is consistent for both construction and operational phases.

Table 4-7: Sensitive receptors for acoustics and vibrations

Sensitivity	Description
High	Receptors particularly susceptible to noise, e.g. residential areas, schools, religious buildings, and healthcare clinics.
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance, e.g. offices, restaurants.
Low	Receptors where sensitivity to distraction or disturbance from noise is minimal, e.g. industrial areas, factories or work areas generating high levels of noise.
Negligible	Receptors not susceptible to disturbance from noise regardless of magnitude.

Source: Consultant, July 2020

For the purpose of predicting the likely noise impacts associated with the construction phase activities, the phases of works set out in Table 4-7 have been assumed:

Table 4-8: Construction phases activities triggering noise and vibrations

Phase	Activity
Site preparation	- Establish site compound - Demolition of existing buildings - Existing pavement removal - Earthworks
Buildings	- Substructure works - Superstructure works
External works	- Utility installations - Road construction

Source: Consultant, July 2020

In the absence of night-time noise measurement baseline data, the assessment considers only daytime working.

Table 4-9: Significance of effect – construction noise (indicative)

Significance of effect ($L_{Aeq,period}$)			
Negligible	Minor	Moderate	Major
Façade noise level less than 60 dB(A)	Façade noise level 60 - 70 dB(A)	Façade noise level 71 - 80 dB(A)	Façade noise level exceeding 80 dB(A)

**period relates to day (16hr 07:00-23:00) and night (8hr 23:00-07:00)*

Source: Consultant, July 2020

For the vibration levels, due to absence of national guidelines for vibrations, the BS 5228-2:2009+A1:2014 has been adopted to provide for construction assessment. Annex B of the standard gives guidance on the significance of vibration effects in terms of human response to vibration (Table 4-9 refers) and structural response to vibration (Table 4-10).

Table 4- 10: Guidance on effects of vibration levels perceptible to humans

Vibration level (PPV)	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level

Source: Consultant, July 2020

Table 4-11: Transient vibration guide values for cosmetic damage in structures

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	5 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
Industrial and heavy commercial buildings		
Unreinforced or light framed structures	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above
Residential or light commercial buildings		

Source: Consultant, July 2020

The following criteria have been adopted to identify significant effects from

construction induced vibration. Moderate and major effects are significant in terms of the assessment. This significance applies to receptors of a high sensitivity to vibration, from a construction point of view (i.e. lightweight). For less sensitive structures (i.e. heavy weight construction) the levels in Table 4-11 and be increased fivefold.

Table 4-12: Significance of effect – construction vibration

Significance of effect – construction vibration (PPV)			
Negligible	Minor	Moderate	Major
<0.3 mm/s	0.3 to 1.0 mm/s	1.0 to 10.0 mm/s	>10.0 mm/s

Source: Consultant, July 2020

4.3 Biological Environment

Ecologically, Dar es Salaam Region falls within the *Northern Zanzibar-Inhambane coastal forest mosaic* ecoregion. The terrestrial and marine ecology of the region comprises of habitat types including bushed and open grassland, open bushland, coastal thicket, mangrove forests, marshland, coral reefs and seagrass beds. With regards to the project's direct influence area, a mix of exotic plants forms the sparse vegetative buffer along the existing road corridors. The abundance and diversity of floral and faunal species is relatively higher within nearby mangrove forests along Indian Ocean coast and the riparian habitats along Msimbazi, Tenge and Kibangu Rivers.

With regards to the habitat categories specified in the IFC PS 6 (Biodiversity Conservation and Sustainable Management of Living Natural Resources), the biotic environment within the project's primary impact area can be described as a continuum of *modified habitats*, given the predominance of non-native floral species, low species diversity and the footprint of urban land-use. No IFC-recognized *critical habitats* or IUCN-designated *Key Biodiversity Areas (KBAs)* exist within the project's primary and secondary impact areas. Further, no observations of species of conservation concern or CITES-listed species were made in the biodiversity survey conducted as part of the ESIA.

4.3.1 Terrestrial Flora and Fauna

The project area is characterized by planted shade trees, lawns, hedges, and gardens and most of the natural vegetation cover has been lost due to urbanization.

The floristic landscape of the primary project area consists of exotic trees and shrubs of ornamental value, as well as numerous trees, herbaceous and grass species, some of which are food crops. Dominant floral species noted within the project corridor include Indian charcoal-tree (*Trema orientalis*), Neem trees (*Azadirachta indica*), Cassias (*Cassia species*), Cassod tree (*Senna siamea*), Palm trees (*Wodyetia bifurcate*), and Ashok trees (*Polyalthia longifolia* var. *pendula*). The list of the species identified in the course of a ground-truthing drive along the project corridor is presented in Table 4-12 below and pictured in Figures 4-13, 4-14 and 4-15.

Table 4-13: Common floral species encountered within the primary impact area of the project

Common name	Scientific name	Use	IUCN conservation status
Neem tree	<i>Azadirachta indica</i>	Medicinal	Least concern
Ashok tree	<i>Polyalthia longifolia</i> var. <i>pendula</i>	Shade	Not evaluated
Indian charcoal-tree	<i>Trema orientalis</i>	Shade	Least concern
Madras thorn/Manila tamarind	<i>Pithecellobium dulce</i>	Ornament	Least concern
Albizia	<i>Albizia spp.</i>	Medicinal	-
Machabel	<i>Brachystegia boehmii</i>	Medicinal/shed	Not evaluated
Coconut palm	<i>Cocos nucifera</i>	Spice	Least concern
Christmas palm	<i>Veitchia merrillii</i>	Ornamental	Not evaluated
Mango tree	<i>Mangifera indica</i>	Fruit	Not evaluated
Banana tree	<i>musa acuminata</i>	Fruit	Not evaluated
Pawpaw tree	<i>Carica papaya</i>	Fruit	Not evaluated
Mukigi	<i>Lantana camara</i>	Ornament/invasive	Least concern
Shoe flower	<i>Hibiscus rosa sinensis</i>	Ornament	Not evaluated
Yellow Bell	<i>Tecoma stans</i>	Ornament	Least concern
Geiger tree	<i>Cordia sebastana</i>	Ornament	Least concern
Pumpkin	<i>Cucurbita maxima</i>	Fruit	Not evaluated
Hibiscus	<i>Hibiscus rosa-sinensis</i>	Ornament/flower	Least concern
River tamarind/White lead tree	<i>Leucaena leucocephala</i>	Fodder/ornament	Least concern

Cassias	<i>Cassia species</i>	Medicinal/shed	Least concern
Cassod tree	<i>Senna siamea</i>	Medicinal/shed	Least concern
Palm flower/tree	<i>Wodyetia bifurcata</i>	Ornament/shed	Not evaluated

Source: Reconnaissance, June 2020



Figure 4- 13: *Trema orientalis*, *Polyalthia longifolia* var. *pendula*, *Cordia sebastana* and *Tecoma stans* visible along the project corridor

Source: Reconnaissance, June 2020



Figure 4-14: *Azadirachta indica*, *Polyalthia longifolia* var. *pendula*, *Cocos nucifera*, *Veitchia merrillii* and *Tecoma stans* visible along the project corridor

Source: Reconnaissance, June 2020



Figure 4- 15: Tree, shrub and herb species noted along Kibangu River and Tenge River

Source: Reconnaissance, June 2020

Besides domesticated animals, there is little to no presence of mega faunal species within BRT Phase 5 terrestrial habitats. Some of the species reported to inhabit Pande Game Reserve are vervet monkeys, sykes monkeys, various shrews, hares and squirrels, mongooses, duikers, bush-pigs and sunis (Doggart, 2003).

4.3.2 Coastal Marine Habitats

With regards to marine sensitivities, several species of mangroves inhabit the riverine ecosystems situated within 0.3-1.5 kilometers of the primary project area especially along Bandari Road where Port Access Road will be upgraded (Kigamboni bridge to Dar es Salaam Port roundabout). The baseline ecological survey and a recent habitat status assessment within the forests in the seaward approaches of Kizinga River and Msimbazi River have shown the dominant mangrove species in these habitats to be *Avicennia marina*, *Sonneratia alba* and *Rhizophora mucronata*. The surveys have also showcased the presence of a host of crustaceans, such as mud, mudskippers, marsh and fiddler crabs, as well as gastropods including creepers, periwinkles and mangrove whelks⁵, as shown in Figures 4-16 and 4-17.

⁵COWI Tanzania (2019). Assessment of Mangrove Health and Management Plan in the Msimbazi Basin of Dar es Salaam



Figure 4-16: Mangrove habitat in Kizinga River estuary (left), *Uca inversa* crab sighted in mangrove forest along Kizinga River (right)

Source: Reconnaissance, June 2020



Figure 4-17: Mangrove habitat in Msimbazi River estuary (left) and mangrove whelk (right)

Source: COWI, 2020

In terms of harbor mangrove habitats especially along Dar es Salaam port/Port Access Road, findings from the ESIA for Dar es Salaam port improvement and modernization (Dar es Salaam Maritime Gateway Project) shows that the harbor stretch is dominated by two areas of mangroves: the intact fringe at Kurasini and the highly degraded and fragmented remnants of a fringing mangrove strip on the eastern shoreline (see Figure 4-18 below). These two mangroves areas are protected Forest Reserves in recognition of their role as nursery for fish and crustacean species, in protecting the shoreline from erosion, trapping sediment and a source of numerous products (WAPCOS Consultants for TPA, 2016). Further, this survey indicated that the fringe is narrow throughout its length, and is composed mainly of ornamental, exotic trees, shrubs, coconuts and Indian

Almond trees. The species dominating mangrove assemblages were: *Sonneratia alba* and *Avicennia marina*, with scattered smaller *Rhizophora mucronate* (WAPCOS Consultants for TPA, 2016).



Figure 4-18: South-west Kurasini fringing mangrove forest viewed from the Kigamboni Bridge (left) and Consultants measuring the width of the narrow forest fringe during low tide.

Source: TPA, (2016)

4.3.3 Ornithological Characteristics

The project corridor is located in a highly urbanized area that is ecologically highly disturbed from anthropogenic activities over many years resulting into habitats fragmentation along the corridor. This has caused habitat loss, reduction in overall size and the remaining habitats have become extensively fragmented, lack of or very sparse vegetation cover, absence of some vegetation layers and increased distances between patches.

The fragmentation has resulted into declined birds' population by reducing adequate space for birds' territories, nesting sites, critical resources, extinction of some species, food resource availability and fecundity changes in predator densities or numbers, and increased predation pressure on forest birds. This has dramatically impacted avian reproduction success and availability within the city (Shirima & Werema, 2017).

As shown in Figure 4-19, the project's primary impact area is neighbored by an International Bird Area (IBA) referred to as the Coast of Dar es Salaam. The IBA runs from the open bay of Ras Kiramoni in the north, up to and including Ndege

Beach, to Ras Ndege, east of Mbwanaji village, measuring a total length of 40km. It is an IBA that has been assessed and categorized into very high threat score (pressure) (BirdLife International, 2020). The lateral span of the IBA stretches a seaward 12 km from the inland high-tide limit. The inland limit of the site is the high-tide mark, but this is extended in places to include mangroves and salt-workings.

Historical records for the site include a total of 457 species. The area is of major importance to migratory waders from northern Eurasia, which include large numbers of *Calidris ferruginea*, *Calidris minuta* and *Pluvialis squatarola*. Large flocks of some species, notably *Tringa nebularia* and *Charadrius mongolus*, are a feature of the return migration to northern latitudes during March and April. The only local population of *Egretta ardesiaca* feeds at Mwasani Bay and probably breed in the freshwater swamps adjacent to the now defunct Mwasani salt pans, an area of low-lying land unsuitable for building which is, nonetheless, rapidly being urbanized. Records of *Acrocephalus griseldis* suggest that several winter in coastal scrub near Mbezi Beach and Jangwani Beach wherever there is thick cover and a source of fresh water⁶.

According to historical data from BirdLife International, Dar es Salaam city as a whole fall within the geographic range of three critically endangered species and four endangered species, as detailed in Table 4-13 below. In 2019, a habitat status assessment of the Msimbazi River mangrove forest of demonstrated the presence the Dimorphic Egret, Great White Egret, Sacred Ibis and Mangrove Kingfisher in the area⁷. Two Sacred Ibis individuals were sighted at bridge crossing over Msimbazi River during reconnaissance.

⁶ Bird Life International. Dar es Salaam Coast IBA Profile. Accessed on 09/06/2020

⁷ COWI Tanzania (2020). Assessment of Mangrove Health and Management Plan in the Msimbazi Basin of Dar es Salaam

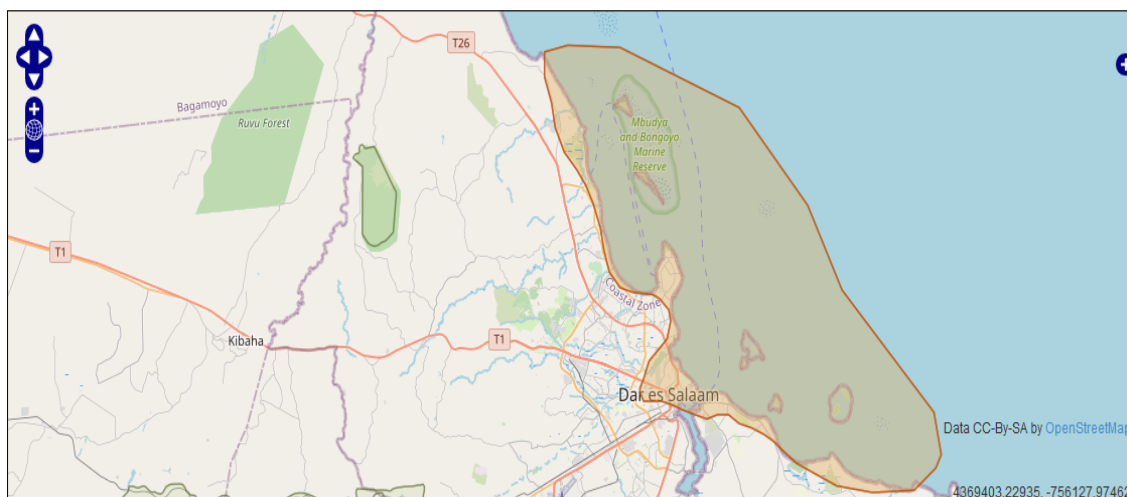


Figure 4-19: Coast of Dar es Salaam IBA

Source: Birdlife International, Dar es Salaam Coast IBA Profile, 2020

Table 4-14: List of endangered bird species associated with the IBA nearby the wider influence area

Common name	Scientific name	Order	IUCN conservation status (ver 3.1)	Movement pattern
Basra Reed-warbler	<i>Acrocephalus griseldis</i>	Passerine	Endangered	Full migrant
Madagascar Pond Heron	<i>Ardeola idea</i>	Pelecaniformes	Endangered	Full migrant
Lappet-faced Vulture	<i>Torgos tracheliotos</i>	Acciptriformes	Endangered	Resident
Steppe Eagle	<i>Aquila nipalensis</i>	Acciptriformes	Endangered	Resident
Rüppell's Vulture	<i>Gyps rueppelli</i>	Acciptriformes	Critically endangered	Resident
White-backed	<i>Vulture Gyps africanus</i>	Acciptriformes	Critically endangered	Resident
Hooded Vulture	<i>Necrosyrtes monachus</i>	Acciptriformes	Critically endangered	Resident

Source: BirdLife International, 2020

Further desktop survey of the bird species in the wider project area of influence revealed presence of some species in the fragmented habitats and outside the city where bushes and thickets exist. The recorded species falls under Least concern as per IUCN conservation status ver 3.1 (see Table 4.14). However, a comprehensive pre-construction fieldwork assessment is recommended to confirm birds and bats phenology in the core project area and immediate surroundings.

Table 4-15: Bird species recorded adjacent to the project area of influence

Common name	Scientific name	Order	Abundance LC = Locally common C = Common UC = Uncommon	IUCN Conservation Status (ver 3.1)	Movement pattern
African Fish Eagle	<i>Haliaeetus vocifer</i>	Accipitriformes	C	Least Concern	Resident
African Sacred Ibis	<i>Threskiornis aethiopicus</i>	Pelecaniformes	C	Least concern	Migrant
African Wood Owl	<i>Strix woodfordii</i>	Strigiformes	UC	Least Concern	Resident
Black Heron	<i>Egretta ardesiaca</i>	Pelecaniformes	LC	Least Concern	Resident
Black-backed Puffback	<i>Dryoscopus cubla</i>	Passeriformes	LC	Least Concern	Resident
Bronze Mannikin	<i>Spermestes cucullata</i>	Passeriformes	LC	Least Concern	Resident
Brown-headed Tchagra	<i>Tchagra australis</i>	Passeriformes	LC	Least Concern	Resident
Brown-hooded Kingfisher	<i>Halcyon albiventris</i>	Coraciiformes	LC	Least Concern	Resident
Curlew Sandpiper	<i>Calidris ferruginea</i>	Charadriiformes	C	Near Threatened	Migrant
Dimorphic Egret	<i>Egretta dimorpha</i>	Pelecaniformes	UC	Not evaluated	Resident
East Coast Boubou / Zanzibar Boubou	<i>Laniarius sublacteus</i>	Passeriformes	UC	Least Concern	Resident
Emerald-spotted Wood-dove	<i>Turtur chalcospilos</i>	Columbiformes	LC	Least Concern	Resident
Eurasian Thick-knee	<i>Burhinus oedicephalus</i>	Charadriiformes	UC	Least Concern	Migrant
Fork-tailed Drongo	<i>Dicrurus adsimilis</i>	Passeriformes	LC	Least Concern	Resident
Great White Egret	<i>Ardea Alba</i>	Pelecaniformes	C	Least concern	Migrant
Hamerkop	<i>Scopus umbretta</i>	Pelecaniformes	LC	Least Concern	Resident
Indian House Crow	<i>Corvus splendens</i>	Passeriformes	LC	Least Concern	Resident
Little Egret	<i>Egretta garzetta</i>	Pelecaniformes	LC	Least Concern	Migrant
Mangrove	<i>Halcyon</i>	Coraciiformes	LC	Least concern	Migrant

kingfisher	<i>senegaloides</i>				
Olive Sunbird	<i>Cyanomitra olivacea</i>	Passeriformes	LC	Least Concern	Resident
Palm-nut vulture	<i>Gypohierax angolensis</i>	Accipitriformes	C	Least Concern	Resident
Rattling Cisticola	<i>Cisticola chiniana</i>	Passeriformes	LC	Least Concern	Resident
Red-eyed Dove	<i>Streptopelia semitorquata</i>	Columbiformes	LC	Least Concern	Migrant
Red-fronted Tinkerbird	<i>Pogoniulus pusillus</i>	Piciformes	LC	Least Concern	Resident
Sombre Greenbul	<i>Andropadus importunus</i>	Passeriformes	LC	Least Concern	Resident
Speckled Mousebird	<i>Colius striatus</i>	Coliiformes	LC	Least Concern	Resident
Tacazze Sunbird	<i>Nectarinia tacazze</i>	Passeriformes	C	Least Concern	Resident
White-browed Coucal	<i>Centropus superciliosus</i>	Cuculiformes	LC	Least Concern	Resident

Source: Online sources, BirdLife International (2020); Shirima & Werema (2018).



Figure 4-20: Bird species sighted at TIOT bridge along Msimbazi River (2020) and at the mouth of the river (2019)

Source: Consultant 2020 & COWI (2020)

4.3.4 Bats Presence

With its share of coastal forests, Dar es Salaam and the neighboring Coast Region are also home to a host of bat species. The biodiversity survey conducted in Pande Game reserve in 2003 (wider project area away from BRT corridor) indicated that the area harbors about 15% of Tanzania's resident bat species, as overviewed in the Table 4-15 below (Doggart, 2003). None of the bat species recorded in the survey is of conservation significance concern as per the IUCN Red List (ver 3.1). The recorded species are resident, and only a single species (Dar es Salaam pipistrelle) is endemic to Tanzania.

Table 4-16: Bat species recorded in 2003 biodiversity survey of Pande Game Reserve

Common name	Scientific name	Order	IUCN conservation status (ver 3.1)	Movement pattern
Angolan soft furred fruit bat	<i>Rousettus (Lissonycteris) angolensis</i>	Chiroptera	Not evaluated	Resident
Commerson's leaf-nosed bat	<i>Hipposideros commersoni</i>	Chiroptera	Near Threatened	Resident
E. African collared fruit bat	<i>Myonycteris relicta</i>	Chiroptera	Least concern	Resident
Ethiopian epauletted fruit bat	<i>Epomophorus labiatus</i>	Chiroptera	Least concern	Resident
Lesser yellow house bat	<i>Scotophilus leucogaster</i>	Chiroptera	Least concern	Not evaluated
Dar es Salaam pipistrelle	<i>Pipistrellus permixtus</i>	Chiroptera	Data deficient	Data deficient
Noack's African leaf-nosed bat	<i>Hipposideros ruber</i>	Chiroptera	Least concern	Resident
Persian leaf-nosed bat	<i>Triaenops persicus afer</i>	N/avl.	Not evaluated	N/avl.
Slit faced bat	<i>Nycteris sp. 1</i>	Chiroptera	N/avl.	Not evaluated
Slit faced bat	<i>Nycteris sp. 2</i>	Chiroptera	N/avl.	Not evaluated
Wahlberg's epauletted fruit bat	<i>Epomophorus wahlbergi</i>	Chiroptera	Least concern	Resident

Source: Doggart, 2003

4.3.5 Protected Areas and Conservation Challenges

The protected areas present within Dar es Salaam Region are Pande Game Reserve, and a total of six mangrove forest reserves, namely Ras Dege Forest Reserve, Kunduchi Forest Reserve, Mbweni Forest Reserve, Mji Mwema Forest Reserve, Mtoni Kijichi Forest Reserve and Msimbazi Forest Reserve. The reserves fall under the protection of the Tanzania Forest Service (TFS) agency, providing a wide range of ecosystem services. The region's western border is adjoined by Pugu Hills Forest Reserve and Vikindu Forest Reserve, which both lie in Kisarawe District (in Coast Region). None of these reserves are located along or adjacent to BRT Phase 5 corridor.



Figure 4- 21: Pande Game Reserve and Coastal IBA in and around Dar es Salaam Region

Source: Birdlife International, July 2020

Beyond the inland reserves, protected areas within the region include the Dar es Salaam Marine Reserves System (DMRS), which comprises of seven islands of Bongoyo, Pangavini, Fungu Yasin, Mbudya Sinda, Makatobe, and Kendwa, all of which are managed by Marine Parks and Reserves Unit (MPRU). These reserves serve as nocturnal habitats for many of the birds that hover over Dar es Salaam city in the daytime, in addition to being stopover and nesting sanctuaries for palearctic birds in the course of their winter migrations⁸.

The rapid population growth and urbanization of Dar es Salaam City has led to greater anthropogenic pressures on the city's protected areas. Some of the major threats to the terrestrial forest and game reserves include agrarian encroachment from dwellers within the city's peri-urban fringes, as well as tree felling for the harvesting of wood resources such as timber and firewood to meet the energy demand of the low-income urban population (Lupala, Makarius & Stanslaus, 2014).

⁸ Marine Parks and Reserves Tanzania. Marine Reserves. Accessed on 09/06/2020

4.4 Socio-Economic Environment

4.4.1 Administration and Governance

Located within Dar es Salaam City, the proposed project falls within the districts of Ubungo, Ilala, Temeke and Kinondoni. These districts comprise of Municipal councils (Ubungo Municipal, Ilala Municipal, Temeke Municipal and Kinondoni Municipal), which are part of the six councils constituting Dar es Salaam Region. Other councils are Kigamboni Municipal and Dar es Salaam city council (Regional Profile, 2020). Administratively, these four Municipals are divided into wards, which are further sub-divided into Mitaa, the lowest administrative unit in the urban setting. Ubungo Municipal covers an area of 260.40km² (Ubungo Municipal, 2020), Ilala 210.1km² (Ilala Municipal, 2020), Temeke 240km² (Temeke Municipal Council, 2020), and Kinondoni 321km² (Kinondoni Municipal profile, 2018). The proposed project area traverses 13 wards within the four municipalities (see Table 4-15)

4.4.2 Demographic Characteristics and Trends

According to the 2012 Population and Housing Census, Dar es Salaam had a population of 4,364,541 people (2,125,786 males and 2,238,755 females) and the average household size was 4 people by 2012. The 2018 population projection indicates that Dar es Salaam region has a population of 6,107,473 living in 1,526,868 households. Projections from the UN show that Dar es Salaam has been growing with an increase of approximately 226,000 people per year in the period 2010-2020, and by 2025 will have reached a population of 7.3 million inhabitants (UN-Habitat 2014). Table 4-16 below summarizes the population sizes of the wards that are traversed by the project. The average household size in the proposed project area is four people per household.

Table 4-17: Population of the Municipal and their specific wards crossed by the proposed project roads

Sn	Municipal	Males	Females	Total	Total Population projections /Year	Wards	Males	Females	Total	H.H Size (Ward)	Total Population projection s/Year
1	Ubungo	409,149	436,219	845,368	1,031,349 (2016)	Ubungo	27,221	28,794	56,015	4.0	68,338 (2016)
						Makuburi	28,021	29,387	57,408		70,038 (2016)
2	Ilala	595,928	624,683	1,220,611	1,648,849 (2017)	Buguruni	34,547	36,038	70,585	4.0	80,173 (2017)
						Mnyamani	N/Av.	N/Av.	18,077		60,272 (2017)
						Tabata	35,909	38,833	74,742		99,168 (2017)
						Liwiti	N/Av.	N/Av.	21,586		57,447 (2017)
						Segerea	40,065	43,250	83,315		52,815 (2017)
3	Temeke	669,056	699,825	1,368,881	N/A	Miburani	21,667	22,623	44,290	3.9	N/Av.
						Sandali	26,050	26,610	52,660		N/Av.
						Temeke	12,692	13,355	26,047		N/Av.
						Azimio	37,462	39,370	76,832		N/Av.
						Kurasini	12,831	13,362	26,193		N/Av.
4	Kinondoni	451,653	478,028	929,681	1,245,861	Kigogo	28,229	29,384	57,613	4.0	77,207 (2018)
	Total	2,125,786	2,238,755	4,364,541					665,363		

Source: 2012 Population and Housing Census

4.4.2.1 Migration and Influx

As Tanzania's economic capital, Dar es Salaam City continues to attract an influx of people from different parts of the country and beyond. Hosting the Central Business District (CBD), Ilala represents the city's commercial mainstay. The municipality hosts a small population as compared to other councils. This is because, as with the municipality of Ubungo, the population of Ilala is largely mobile, with many of the residents occupying the area during working hours but permanently residing elsewhere in the city.

The rate of immigration in the municipalities and wards traversed by the project has increased due to the city's expansion and socioeconomic progress. However, complete migration statistics could not be obtained.

4.4.2.2 Ethnic Groups

The demography of the four municipalities consists of a range of ethnicities. No single or a few ethnic groups dominate any of the wards of the project corridor. Swahili is widely spoken as the primary language for communication and business with English spoken at official entities (government offices, health and educational facilities etc.).

4.4.3 Land Use, Tenure and Acquisition

The four municipalities are predominantly urban in nature, comprising multiple land tenure systems. Customary land tenure and statutory right of occupancy are the dominant forms of land tenure. The land is commonly acquired both through inheritance and purchasing.

4.4.3.1 Land Acquisition/Resettlement

The proposed construction of the BRT Phase 5 project and associated facilities such as stations, depots, and terminals will require additional land beyond the existing RoW in some sections. The re-aligned sections of the horizontal alignment will also trigger further land acquisition. Currently, the proposed sites to be acquired are utilized for various social and economic activities that will require the project proponent, that is TANROADS, to compensate those affected and ensure that the project does not impact those affected negatively

as a result of involuntary resettlement. Further details concerning land acquisition are found in a separate Resettlement Action Plan (RAP) report. The project will affect a total of 1018 compensable assets that include residential structures, businesses, public office, land, and utilities as presented in Table 4-17 below.

Table 4-18: Categories of Project Affected Persons (PAPs) who will be affected by the project

No	Type of PAPs	Number
1.	Tenants residing in affected houses	105
2	Tenants doing business in affected buildings	351
3	Landowners and affected structures	377
4	Business on structures/ <i>kiosks</i>	89
5	Those doing business in front of main affected structures	66
6	Those vending along road reserves/moving with items at the intersection commonly known as (<i>Machingas</i>)	30
	Total number of PAPs	1,018

Source: RAP report, Nov. 2019

4.4.3.2 Land Uses Along the Corridor

Details about specific land uses along and/or adjacent to the BRT Phase 5 were extracted from aerial imageries reviews, topographical survey sheets analysis and fieldwork conducted by the Consultant. The BRT Phase 5 corridor traverses a variety of land uses, including institutional, residential, commercial, and agricultural. The general land uses of Dar es Salaam explain the same for proposed project area which is mainly dominated by residential and commercial uses. The land cover along the corridor is characterized by dominance of buildings, structures, warehouses and roads (tarmac and gravel). The buildings are used as residential houses and others for industrial purposes especially along Mandela road and Port Access Roads (dominated by port-supportive facilities such as fuel depots, inland container depots, warehouses, yards etc.). Some farming of horticultural products is commonly done on river valleys particularly Msimbazi Valley. Light to dense forests are on the upstream part of Msimbazi catchment. Table 4-18 below presents specific overview in each road section.

Table 4-19: Land use along the BRT 5 corridors

Road Section/Chain age	Land use along the corridor
Ubungo to Tabata junction (0+000 - 4422.41)m	- Residential: houses, apartments, hostels - Commercial: restaurants, bars, groceries, Riverside social hall, and hotels (e.g. Landmark Hotel), Machingas places, filling stations (Gudal, Puma, Victoria, Oilcom, GULF, Lake oil), Benjamin William Mkapa Export Processing Zone, auto services and garages (e.g. Royal motor garage, banks (e.g. DTB Bank), AK Transport company, KAMAKA company Ltd., warehouses, shops, land container depot. - Transportation: Bus stop sites (Riverside, Mabibo, external bus stop, Gereji, Mwananchi Relini, TIOT), road to Kibangu, road from Mabibo hostel, road to Maziwa, Railway crossing. - Recreational: Riverside social hall - Industrial: Ubungo power plant, small-scale industries and enterprises (e.g. Mpishi Industries, Royal Soap & Detergents, Maxons paper converter, Color Print Tanzania, Sita steel rolling, Nyati wheat flour) - Institutional: TANROAD DSM Regional Office, Mosques (Masjid Jumuiyatil Islamiya), Church such as Victorious Living Church, Mormon church), schools, - Agricultural: Mchichani area where horticulture activities (vegetables) take place around Kibangu river - Open spaces: near Makuburi junction
Tabata junction to TAZARA flyover (4,425.00 to 8,250.00)m	- Residential: Houses and apartments - Commercial: Filling stations (e.g. Puma, Total, Oilcom), restaurants, cafeteria, groceries, clubs, warehouses, auto services and Garages (e.g. Pro-match Ltd), ST Abbi LTD, East African pump service Ltd, TAZARA Dsm Station, Tanzania Broadcasting Cooperation, Sun Shire Company Limited, Consultants company (Land consult Ltd), shops, land container depot - Transportation: Bus stop sites (Tabata, Matumbi, Buguruni shell, Chama, TAZARA, Road junctions (Tabata Segerea road junction, junction to Mnyamani road, junction to Mnazi Mmoja), Buguruni crossing bridge, SGR railway, Mfugale Flyover - TAZARA - Industrial: Bakhresa Industry Ltd. (UHA! drinks), Bakhresa Ltd - Institutional: Mosques (Tabata mosque,) Buguruni A Primary School - Agricultural: horticulture activities (Vegetables) around Tenge and Msimbazi river - Open spaces: Places near Tenge river, Mount Meru Open Space near Msimbazi river crossing at Mandela road - Graveyard: Kimbengere Cemetery
TAZARA to Kigamboni flyover (8,250.00 to 12,400) m	- Residential: houses and apartments - Commercial: Total port access tanks, filling stations (Oilcom, Camel Oil, Gapco Oil, GBP), auto services and garages (Nduvini Auto Works, Kanji Garage, Interpetro Garage), warehouses - Transportation: Transportation works (Golden Fleet, Malawi Cargo Centre, Motor Hub East Africa, APMT Polytra, TZ Road Haulage Ltd., Asus Transporters), TAZARA flyover, Junction to Temeke road, junction to Chang'ombe Road, Kilwa road, Weigh Bridge - Recreational: Playgrounds (Uhuru stadium) - Industrial: Serengeti Breweries and other industries located around this area - Institutional: Tanzania Zambia Railway Authority (TAZARA) houses, DMPD offices, TPDF, Tanzania Institute of Accountancy (TIA), mosques, - Graveyard: around Stadium-opposite DMDP Offices.

Road Section/Chain age	Land use along the corridor
Bandari road section (12,400.00 to 16,274 beyond chainage) m	- Residential: houses and apartments - Commercial: Cafeterias and Restaurants, warehouse and land container depot, filling stations (Oilcom HQ, Tank farms (oil tanks), port supportive infrastructures, DSM corridor group, Great Lake freight, Azania Grain Handling - Transportation: railway crossing, roads from Posta – Kariakoo, Kilwa Road - Recreational: Pubs - Industrial: Camel industry, Azam tanks/Azam grain terminal, Azania Grain Handling Silos AGHS - Institutional: Tanzania Port Authority, National Health Insurance Fund (NHIF), church and mosques
Temeke road section (0+000 to 3,441.46) m	- Residential: houses and apartments - Commercial: filling stations (Oilcom, Big bon), garages, restaurants, bars, supermarkets, Auto services, - Transportation: bus stops (veterinary, Sudan, Temeke Mwisho), road junctions (Veterinary, Mandela, junction to Yombo Street, junction to Tandika Road, Kilwa Road junction) - Institutional: Schools (Al-Hikima Girls secondary school, National College of Tourism, Lioness Mbulani Primary School, Wiles Secondary school, English medium school), Temeke Police post, Churches and Mosque - Open space: Mwembe Yanga Open Space, and another open space near local government offices, football field - Graveyard: Maganga cemetery
Kigogo to Mandela road (0+000 to 2,788.60) m	- Residential: houses and apartments - Commercial: restaurants, Bars (Chengula bar), supermarkets, groceries, auto services, Filling stations (Barrel Petrol Energy, Nafal Oil Petrol Energy) - Transportation: road junctions (Magomeni, Msimbazi, Jangwani, External), Taxi stop - Recreational: AZ-Hall - Institutional: churches, mosques, schools, dispensary (Arafa dispensary) - Agricultural: horticulture activities (vegetables) taking place along Tenge River - Graveyard: Tabata Dampo cemetery
Mandela to Tabata Bima (0+000 to 3,149.90) m	- Residential: houses - Commercial: Restaurants, bars, auto services, shops, furniture stores, filling stations (Oilcom, Gulf, Total) - Transportation: railway crossing, Tabata Mawenzi Road, - Institutional: schools (Tabata Primary School, Liwiti primary school), Tabata Dispensary, Ward Executive Office, churches, (e.g. Roman Catholic), mosques - Agricultural: horticulture (vegetables) - Open space: Playground that joins with project road area from JICA Primary School and Mtambani Primary School, parking areas
Tabata Bima to Segerea (3150.00 to 6662.83) m	- Residential: houses and apartments - Commercial: Restaurants, bars, TBL Store, filling stations (Camel oil, Lake oil, Bank ATM (NMB)) - Transportation: bus stops, Tabata Segerea - Industrial: sawmill, welding workshop - Institutional: churches, mosques, - Agricultural: urban farming, horticulture

Source: Consultant & Aerial imageries, 2020

4.4.4 Housing Structures and Settlements

More than three-quarters of the residents in Dar es salaam live in informal settlements. Along the project corridor, settlements vary between areas with low and high population densities. The proposed project corridor is characterised by linear, nuclear and scattered types of settlements. The dominant pattern is the nuclear settlements on both sides of the road, especially in the *mitaas* and business centres. Nuclear type of settlement were observed mostly along the project area in sections like Kigogo - Mandela road section, Temeke Road section, Ubungo to Tabata section, Tabata – TAZARA fly-over, and TAZARA to Kigamboni Bridge with some of the areas being unplanned where the houses are highly congested with plot sizes below 200m². Scattered types of settlements were observed in some parts of Mandela to Tabata Bima road section and Tabata Bima to Segerea section. Linear settlements were observed mostly from Mandela to Tabata Bima, and Tabata Bima to Segerea road section and Bandari Road section since the area is dominated by the port supportive infrastructures like container depot, and tank farms/fuel terminals.

Survey indicates that 20% of housing structures are multifunctional including business premises and renting for accommodation (rental property business), while 47.2% are used for residential purposes only. The other 15.2% of respondents use their houses for both residential and business (property used as private living quarters and used for business activities outside). The material used for house construction is influenced by the income of the household members. It was found that 79.5% of the respondents' houses had floor made of concrete followed by floor tiles (18.9%). Most of the roofing structures (98.7%) are made of corrugated iron sheets while (0.5%) is thatched.

4.4.5 Livelihood Activities, Occupation and Income

Most of the people in the project area are either employed or self-employed. With Dar es Salaam hosting the headquarters of many government institutions, there is a great number of formally employed people. However, most residents are employed in the private sector and self-employment dealing mainly in trading. In Ubungo Municipality 61% of people are engaged in the private sector, 35% are

self-employed, and 4% are employed in the public sector. Source (Ubungo Socio economic Profile, 2016).

Across the four municipalities comprising the project area, the economic activities vary as presented in the below sub-sections. Table 4-19 summarizes the findings regarding the sources of incomes of the households. Findings indicate that informal activities are the major source of income for most of the residents along the project corridor.

Table 4-20: Sources of income for residents within the project area

Source	Frequency	Percent
Informal employment	45	36
Formal employment	39	31.2
Business	36	28.8
Small scale business	31	24.8
Renting	16	12.8
Livestock rearing	5	4.0
Agriculture	2	1.6
Handcraft	2	1.6

Source: Socio-economic Field Study 2018

4.4.5.1 Petty Trade and Commercial Enterprises

Petty trade includes selling a range of products in retail and wholesale quantities to the communities and passengers. The service is mainly available from local markets along the streets or bus stop centers in the streets, which the Port Access Road and BRT Phase 5 project passes. The merchandise includes both food and non-food products such as household utensils and textiles (mainly second-hand clothes). In addition, there are small restaurants and food vendors along the project corridor serving residents, passengers and visitors.

Currently the streets along the project road has many retail shops. The shops have a wide range of both food and non-food products such as household utensils and textiles (mainly second-hand clothes, bites, vegetables, fruits, timbers, corrugated iron sheets, cements etc.). In addition, there are restaurants, bars, guesthouses and food vendors in the street centers along the project corridor serving residents, passengers and visitors. Typical livelihood activities along the corridor are depicted in Figures 4-22, 4-23 and 4-24 below.



Figure 4-22: Typical livelihood activities at Segerea *daladala* terminal
Source: Consultant, July 2020



Figure 4-23: Informal and formal livelihood activities (kiosks, shops, retails, trading) along BRT corridor
Source: Consultant, July 2020



Figure 4-24: Livelihood activities along BRT corridor

Source: Consultant, July 2020

4.4.5.2 Industrial Activities

The industrial establishments situated along the BRT Phase 5 corridor are mainly light industries manufacturing a variety of goods for both domestic and export markets. There are 177 medium size industries in Dar es Salaam. These industries deal mainly in textiles, breweries, distilleries, beverages, bags, cigarettes, cement, paints, pharmaceuticals, plastic, metal products, steel, grain milling, chemicals, timber and wood products, confectionery, food products, petroleum products, edible oil, dairy products, domestic utensils, tea blenders, batteries, radiators, body building, printing and publishing, paper products, ceramics, garments, electricity generation and glass. The region has 1,966 small-scale industries dealing mainly with grilling, brick making, small-scale food processing and packaging, welding, carpentry, garage and assembling of various machines etc.

Service industries, which include garages and warehouses are situated along Port Access Road from Veterinary to Aziz Ally and along the Mandela Highway and part of Kilwa Road. In terms of ownership, 64% are privately owned, 19% public owned and 14% are joint ventures. The Regional Development Report (2018) indicates that, these industries have created 239,600 reliable employment positions for residents of Dar es Salaam. Some of the industrial establishments located along the project corridor are shown in Figures 4-25 and 4-26 below.



Figure 4-25: Industrial establishments along the BRT Phase 5 RoW
Source: Consultant, July 2020



Figure 4-26: Industrial establishments along the project corridor
Source: Consultant, July 2020

4.4.5.3 Urban Farming (Agriculture and Livestock)

The livelihoods of the communities in the project area also depend on agricultural activities such as farming and livestock rearing. Dar es Salaam Region has 67,300ha of land suitable for agriculture. Out of this hectareage, 38,476ha (65%) is utilized. The crops grown are traditionally categorized as food crops (maize, rice, cassava, sweet potatoes, bananas) and export crops (cashew nuts, coconuts, vegetables, and fruits). In 2017, the region managed to grow 84,108 tons of food crops and 108,272 tons of export crops. In the same year the region had 48,444 cattle, 22,940 goats, 5698 sheep, and 6,842,734 chickens. The agricultural context across the three municipalities is elaborated below.

Ubungu Municipality

According to the Ubungu Municipality Profile (2016) land estimated under use for both cash and food crops is 174.94ha. Approximately 9.45% of land has the potential for agriculture. Farmers engage in small scale farming, and they mostly

till their land using hand equipment. Along the project corridor, horticultural activities were observed at the Garage area along Kibangu River where various vegetables are grown. There are also flower and tree vendors along the road.

Ilala Municipality

With an estimated area of 7,456ha for crop production, there has been an increase from 3,830 ha to 5,370ha of land for food crops and from 2,049 ha to 2,086 ha for cash crop production. Crop farming is done in the peri-urban areas. In urban areas, horticultural activities are carried out in open spaces and in backyard gardens (Ilala Municipal Council Socio-economic profile, 2014).

Temeke Municipality

Agriculture is a major activity that raises income and food for 6,118 households. Of the households, there are about 11,270 farmers, who farm an area of about 6,000ha. Of these, 250 ha are used to plant wheat, 20 hectares for cassava, and 5,730ha for fruits and vegetables. Along the project corridor in Temeke, horticultural activities take place at Temeke Mchicha, Kimengele area and Temeke mosque area. Flower and tree vendors are also found to conduct their works on the road.

4.4.5.4 Fishing Activities in the Indian Ocean

Dar es Salaam has a seashore stretch of 124km along the Indian Ocean. Along this stretch, fishing is carried out for both subsistence and commercial purposes. Fish of commercial importance to local communities include, but are not limited to, *Siganidae* (Rabbitfish), *Lutjanidae* (Snapper), *Lethrinidae* (emperors), *Scaridae* (Parrotfish), *Labridae* (wrasses), *Acanthuridae* (Unicorn fishes), *Mullidae* (Goatfish), *Haemulidae* (Sweetlips), *Serranidae* (Grouper), and *Dasyatidae* (Whiptail stingrays) (Kamukuru, 2005). According to the Dar es Salaam Region Development Report (2018), 7,581 people depend on fishing activities. The region has 1,186 fishing vessels. The contribution of fishing sector to the regional economy is 2.2%. The region has one main fish market at Kivukoni area and many other secondary markets near the seashore.

In relation to the BRT Phase 5 project especially along Port Access Road, the common fish landing sites are Kigamboni, Magogoni, Vijibweni, Mtoni Kijichi and Mjimwema. These sites are away from the core project area and highly unlikely to be affected by project activities.

4.4.6 Social Services and Infrastructure

4.4.6.1 Education Situation

Statistics from Pre-Primary, Primary and Secondary Education Statistics in Brief (2016) show that the enrolment of pupils has been increasing yearly since the inception of free primary and secondary education in 2016. The project area has 612 pre-primary schools, 706 primary schools, and 346 secondary schools. According to research conducted by the Human Rights Watch in 2016, many secondary schools especially government schools are affected by lack of infrastructure, school buses, educational materials, and qualified personnel. For transportation between school and home, pupils also tend to use the existing common transport system in Dar es Salaam, in particular the minibuses referred to as '*daladala*'.

Daladala tend to neglect students at bus stops intentionally because their transport fare (currently TZS 200) is lower than normal fares and instead prioritize other passengers who pay the full price (from TZS 400). Some students arrive to school late; others arrive tired after walking long distances, and some miss class periods entirely. Along with secondary schools, are Folk Development Colleges (FDCs) and Vocational Training Centres (VTCs) that provide vocational training to adolescents and young adults.

Despite the government's efforts to improve education accessibility in the country, gender-based issues such as sexual exploitation in schools force female students to drop out before completing their education due to early pregnancies. This abuse is carried out by bus drivers and adults who regularly ask them for sex in exchange for gifts, rides, or money, on their way to school.

In some schools, reports of such cases of sexual abuse are not reported to police and many schools lack proper means of reporting. This leads to an

increase in single mothers and orphans in the community. In addition to that, poor sanitation in schools also make it difficult for female students to attend school during their menstrual periods.

Up-to-date statistics on children's school attendance and drop-out rates within the municipalities could not be accessed at this stage. According to statistics from the latest national population and household census (2012), however, a total of 48,840 primary age drop-outs were registered in Dar es Salaam region by 2012, the drop-out rate in the same year being 8.6%⁹.

4.4.6.2 Health Services and Facilities

Statistics from the Dar es Salaam Regional Development Report (2018) indicate that the region has 579 health facilities distributed as follows; 48 hospitals, 56 health centers and 475 dispensaries. Over 70% of the population in Dar es Salaam utilizes health services in public facilities due to their affordability and accessibility.

During the study, respondents in the project areas named more than 175 health facilities (hospital, health center, dispensary, and clinics) where they obtain health services. Each respondent named the nearby facility and most of them spent less than an hour to reach the nearby facility. A large population in the project area employ these health services as they are accessible and affordable. In Ilala Municipality, the public Amana District Hospital has a doctor patient ratio of 1:1000 (Ilala Municipal Strategic plan 2017/2018 -2021/2022).

Households sought health services in order to check their health status or obtain medical treatments as a result of different diseases / illnesses contracted in the project areas or elsewhere. Dominant diseases confirmed in the project area include: Diarrhea, Neonatal disorders, unintentional disorders, STDs and malaria, HIV/AIDs, TB, Cardiovascular diseases, Nutritional deficiencies and other non-communicable diseases.

Another important health issue to be addressed is maternal/infant mortality. Recent data from Tanzania Demographic and Health Survey (TDHS 2016) showed that the death rate for children in urban areas is higher than in rural areas (87 and 76 deaths per 1,000 live births respectively). The main obstacles recognized by women when accessing delivery health services are poverty, distant health facilities, shortage of transport and unfavourable services. These factors cause a high rate of home deliveries leaving new-born babies and mothers exposed to health risks like neonatal disorders, nutritional deficiencies, unintentional injuries and even death.

With regards to the morbidity status among the affected households is good, 90.5% of respondents had not been sick or injured in a period of one month. For those who got sick, the majority were suffering from malaria (25%), followed by respiratory system diseases (17.8%) and diarrhea (16%). However, Malaria is the most dominant disease of morbidity and mortality in Dar es Salaam as reported by health service centres. Children below 5 years of age and pregnant women being the most vulnerable social group affected by malaria. Table 4-20 below presents an overview of health indicators in Ilala municipality.

Table 4-21: Health Indicators in Ilala Municipality

No.	Type of indicator	Municipal Rate	Regional Rate	National Rate
1	Population Growth Rate (PGR)	4.6%	4.3	4.6%
2	Total Fertility Rate (TFR)	5.7	5.7	5.7
3	Infant Mortality Rate (IMR)	69/1000	-	68/1000
4	Under Five Mortality (USMR)	191/1000	-	153/1000
5	Maternal Mortality Rate (MMR)	529/100,000	-	578/100,000

Source: Ilala Municipal Council strategic plan 2017/2018-2021/2022

4.4.6.3 HIV/AIDS Situation in the Project Area

Despite the decrease in number of PLHIV in Dar es Salaam and the government's efforts to control the transmission of HIV at different levels in the area, the disease still features among the top ten diseases. The Tanzania HIV Impact Survey (THIS) 2016-17 results showed a 28.3% decrease in the estimated number of People Living with HIV/AIDS (PLHIV) from approximately 193,000 to 138,400 (Tanzania Country

Operational Plan COP 2018 Strategic Direction Summary April 17, 2018). According to THIS (2016-17), the HIV prevalence among men and women aged 15 - 49 years in Dar es Salaam is 4.3%. Reports from Ilala Municipal Hospital shows that 50-60% of the patients admitted in the medical wards are on account of AIDS-related complications. So far, data shows that 6,425 HIV/AIDS cases have been reported since 1988. Out of these, 54% are females and the rest are males. A total of 1,842 HIV/AIDS related deaths have been reported so far.

The major HIV/AIDS drivers in Dar es Salaam are poverty, which leads to the presence of a large number of female sex workers, the tendency of having multiple partners, unprotected sex, non-adherence to ARV medication for those who have tested positive, and lack of accommodating HIV/AIDS testing and healthcare centers in the project area. The data collected by TACAIDS for the project area suggests more women are HIV positive than men (TACAIDS National HIV & AIDS Response Report for 2017). Table 4-21 presents a summary of prevalence in the project area.

Table 4-22: PLHIV District Clusters established and membership for project area

Municipal	Cluster	Groups	Male	Female
Ubungo	Ubungo Konga	74	3,558	4,862
Ilala	Ilala Konga	55	4,028	6,940
Temeke	Temeke Konga	24	5,250	7,958
Kinondoni	Kinondoni Konga	20	5,951	7,798

Source: TACAIDS National HIV/AIDS Response June 2017

The transport sector is especially susceptible to HIV/AIDS and is therefore also crucial to the prevention of progressive HIV/AIDS transmission. When building and maintaining transport infrastructure, workers are sent away from homes and families for long periods. This increases the probability of them having multiple sexual partners. The presence of

temporary labour close to the host communities neighbouring the DIA also attracts the availability of sex workers. Construction projects therefore pose a substantial risk of cross-transmission of HIV/AIDS and other STIs between project labour on the ground and residents nearby the project corridor. Also, the health sector will be affected because of the increase in the number of people seeking treatment, forcing the government to focus on treating AIDS instead of treating other diseases. This affects the economy greatly because health care for HIV patients is costly in comparison to other health conditions.

The purpose of the emphasis on the risk of HIV/AIDS transmission, as regards the project, is to alert the proponent and the contractor and other stakeholders about the prevalence of the disease in the project area, so that the provision of comprehensive community-based HIV/AIDS services) targeting contractors and host communities along the roads is prioritized. NGOs may be hired to undertake such work.

4.4.6.4 Energy Sources

Tanzania's power sector is dominated by TANESCO, which owns most of the country's transmission and distribution network and more than half of its generating capacity. The main energy users in Tanzania are the residential sector (biomass for cooking and heating), the electricity sector and transport sector. In Tanzania, electricity production depends on different sources like gas (2764GWh), hydropower (2108GWh), oil (1381GWh), biofuels-solid biofuels (21GWh), and solar PV (21GWh), which results into 6295GWh as final electricity production. Consumption of electricity in different sectors in Tanzania is industry 1362GWh, residential 2372GWh, commercial and public services 1181GWh, agriculture/forestry 178GWh, other non-specified 156GWh, which results in 5249GWh final electricity consumption (IEA Statistics, 2015).

Dar es Salaam city dwellers depend on different sources of energy such as electricity, solid biofuels (charcoal, firewood although the number of people who use firewood as a source of energy is diminishing), and gas

for cooking and lighting. Moreover, generators are used during power outages. Charcoal is the single largest source of household energy in urban areas and (roughly estimated, assuming primitive kilns) represents 20% of total energy use. The proportion of households in Dar es Salaam using charcoal has increased and is now above 70%. Approximately half of Tanzania's annual consumption of charcoal takes place in Dar es Salaam, amounting to 500,000 tons for 2009 approximately (Final Energy Report Tanzania, 2018).

The BRT Phase 5 corridor is adjacent to TANESCO power lines and therefore served by the same source, however, in some industrial and commercial areas, standby generators are used due to frequent load-shedding. The costs for each source of electricity vary and therefore households opted for different types of sources depending on affordability, accessibility, and reliability. Cited sources include electricity, charcoal, gas, solar power, kerosene, candles and batteries, with firewood being the least common source due to its availability issues. From the survey it was found that about 90.4% of the people spend less than TZS 50,000/= per month on energy, while 6.4% spend between TZS 50,000 and TZS 100,000 per month. This indicates that most of the people in the project area spend less on energy.

4.4.6.5 Water Supply and Consumption

Water supply for the project area is based on two major sources, Lower Ruvu River near Bagamoyo Town, and Upper Ruvu River near Mlandizi in Bagamoyo District. These two sources, along with a minor source located at Mtoni in Temeke Municipal supply water for the entire Dar es Salaam region. However, some residents rely on boreholes and local wells. Water supply from these sources nonetheless falls short of the current demand. Notably, some of the residents in the municipalities of Ubungu and Kinondoni face acute shortages of water forcing them to buy water from trucks and vendors at relatively high prices and without any assurance of water quality.

The water supply and sewerage services for the city are managed by Dar es Salaam Water and Sewerage Authority (DAWASA), which controls about 95% of the local water supply. The remaining 5% comes from shallow and deep wells owned both privately and publicly. In the project area, 60% of respondents have direct access to clean and safe water while 40 % lack direct access to water (having a source of safe water within 400m of the dwelling).

In order to alleviate the water shortage problem, municipalities have managed to drill 85 water boreholes of different types. Though the introduction of additional boreholes has had considerable success, the outstanding challenge is the lack of resources for constructing water distribution networks for the efficient utilization of these sources. Within the project area, water supply piping is buried alongside Mandela road, indicating that the water services will be affected by the project causing temporary interruptions of the water supply.

4.4.6.6 Stormwater Drainage System

Most of the roads are provided with storm water drainage systems, which collect and transport rainwater to the sea through natural rivers/streams. However, the shortage of drainage infrastructure, blockage of drainage network, poor management and maintenance and unplanned settlements results in the stagnation of water in some places and sometimes causes flooding during rainy seasons. This causes the contamination of water sources and creation of breeding sites for vectors, leading to the outbreak of diseases, reduced production in industries and traffic congestion during rainy season limiting the movement of goods and provision of some services, loss of properties and damage to many infrastructures, as well as increased number of traffic accidents, increased cost of maintenance of infrastructure and properties. Some of the existing drainage structures are presented in Figures 4-27 and 4-28.



Figure 4-27: Storm water drainage along Aziz Ally- Veterinary section

Source: Fieldwork, 2019



Figure 4-28: Storm water drainage system along Tabata- Segerea section

Source: Fieldwork, 2019

4.4.6.7 Markets

Markets refer to open spaces or covered buildings where vendors convene to sell their goods or where commercial dealings are conducted i.e. where demand for a commodity or service is available.

Ilala Municipality has 18 markets. Among these, 13 are functioning markets, of which six (6) are big and seven (7) are small markets while the remaining 5 markets are not yet in function. The 13 functioning markets employ at least 13,264 businesspeople. Most of the markets are located at the city center according to the field survey carried out in 2009 by the Trade and License Department. Ilala Municipality still have 21,500 businesspeople who are not accommodated in any market and instead operate in unauthorized areas. The Municipality intends to construct a high rise building at Kisutu, Ilala Ward and Buguruni markets to create

space for people who currently operate in unauthorized areas. The Municipality has also designed two big and modern market at Kinyerezi and Tabata, which eventually shall substitute the Kariakoo market for wholesale and retail businesses. The existence of these two markets will also reduce concentration and congestions of business at the existing city markets. The two planned markets are intended to accommodate 29,000 operators. This will enable the municipality to collect an estimated TZS 5,220,000,000.00 of rent annually.

Likewise, Temeke and Ubungu municipalities both have markets that are used by residents to access various goods. One the key markets along the project route is Sokoni in Temeke near Veterinary junction. The market lies immediately after the road reserve along Mandela road and is a key centre for fruits supplies and other food items year-round.

In addition, the key junctions such as Tabata, Ubungu, Segerea *daladala* terminal, Buguruni, TAZARA and along Kigogo and Temeke are popular for the evening markets where food vendors and food items sellers provide services to various commuters and residents. These key junctions are preferred hot spot areas for customers due to the presence of *daladala* terminals, transfer stations or popular junctions where most people meet hence customers are expected.

These evening markets that usually runs from 6:30 to 10pm are likely to be affected by the construction activities since they are located within the corridor in most cases. Permanent markets like Sokoni along Mandela Road (soon after TAZARA flyover and before Temeke junction) could partly be affected by construction activities. Further specific details on existing markets likely to be affected will be provided and verified at later stages before commencement of construction activities.

4.4.6.8 Communication Services

The telecommunication sector has been improved by the recent construction of the National Fibre Optic Cable network named as National

ICT Broadband Backbone (NICTBB). Telecommunication services found in the project area include TTCL, Tigo, Vodacom, Airtel and Zantel. TTCL still provides in land-based telephone services. Several internet services providers are also available in Dar es Salaam.

Postal services are available throughout the municipalities with at least one fully fledged postal office in each division to coordinate postal services. Also, there is radio and television stations broadcasting of TBC1, TBC2, TBCFM, ITV, Clouds FM/TV, EATV/Radio, Star TV, Capital Television, Tumaini TV and Mlimani TV.

4.4.6.9 Financial Services and Banking

There are several national and international commercial banks, as well as Village Community Banks (VICOBA) within the project area, as exemplified in Table 4-21 below. These banks offer financial services such as current and savings accounts, , and a variety of loans. VICOBA offer financial services at community level and are increasingly popular means of financial and credits support used by many people at the local level in both urban and rural areas. Most of the VICOBA groups are dominated by women. There are a number of bureau de change dealing with foreign currency exchange. The majority of bureau de changes are in Ilala Municipal in the Central Business District (CBD) and adjacent areas.

Table 4-23: Financial institutions in each Municipality under BRT5

Municipality	Financial Institution		
	Banks	VICOBA	Other Credit Facilities
Ubungo	NBC, NMB, TPB, ACB, Access Bank, Azania Bank, Efatha Bank Ltd., TPB, CRDB, TIB, TWIGO Bancorp, KCB, Advans	VICOBA groups including Kinondoni Youth employment network	WDF, SIDO, PTF, WYDF
Ilala	CRDB, VICOBA, DCB, TIB, NMB, NBC, EXIM BANK	Numerous VICOBA groups	
Temeke	N/A	Numerous VICOBA groups	N/A
Kinondoni	NBC, NMB, TPB, ACB, Access Bank, Azania Bank, Efatha Bank Ltd, CRDB, TIB, Postal Bank	Numerous VICOBA groups including Kinondoni Youth employment network	KWDF, WDF

Source: Consultant, July 2020

4.4.7 Traffic, Public Transport and Infrastructure

4.4.7.1 Public Transport Infrastructure

In terms of the infrastructure network, the municipalities in the project corridor are served with trunk, regional, district and feeder roads for provision of public transport. Being major routes, the roads are of tarmac. Despite regular maintenance, the roads do experience damage during the rainy seasons hence contributing to traffic congestion. Mode of transport within the project's vicinity is mainly by road including buses, minibuses (*daladala*), privately owned cars, three-wheelers (*bajaji*), motorcycles (*bodaboda*), bicycles, and commuter trains (mostly Ubungo Maziwa – Stesheni/city centre route, and city centre/Stesheni to Gongo la Mboto and Pugu).

In general, the existing road system towards the peri-urban parts of the project area is poor. Most of the road network in the peri-urban areas are constructed of gravel and bare earth and deteriorate during the rainy season.

Daladala, *bajaji* and *bodaboda* are the dominant modes of public transport in the city. The public road transport system mainly consists of approximately 7,000 registered and privately owned daladala (25-33 seats). Conventional buses are operated by Usafiri Dar es Salaam (UDA) which is a public-private entity, which

operates approximately 30 buses, mostly on out of town routes with an aggregate seating capacity of approximately 1,300. The commonly available transport modes within the project area are pictured in Figure 4-29 below.



Figure 4-29: Public transport services along BRT corridor (*bodaboda, daladala, bajaji*) along BRT Phase 5 corridor

Source: Consultant, 2020

Data collected from 10,000 commuters in a Dar es Salaam Transport Master Plan study funded by JICA (2007) found that:

- 80% dissatisfaction with the overall present transport arrangements (waiting time, comfort and safety);
- Respondent journey time (including waiting and access time) averaged 95 Minutes indicating that on average 3 hours a day is taken for commuting by *daladala*; and
- Traffic speeds are in the order of 10-12 km/hr (peak times).

The main transport challenges are associated with:

- Inadequate road network and storm water drainage;
- Traffic congestion and accidents;
- Disorganized CBD;

- Chaotic public transport;
- Inadequate Non-Motorized Transport (NMT) facilities; and
- Increasing air pollution from emissions.

Traffic congestion is one of the key challenges related to public transportation in Dar es Salaam. The city is one of the fastest growing and urbanized in Africa with a population of about 6 million people (over 70% in unplanned areas). The population is expected to reach 10 million residents by 2030 due to the city's growth rate of 6.5%. As a result, the city is experiencing serious congestion and mobility challenges, a situation that is coupled with an underdeveloped road network, an increase in motorization, and inefficient public transport. As a result, city residents face serious mobility challenges from rampant traffic congestion which in turn affects the economy (60% of national tax revenues generated from Dar es Salaam), productivity, increased living costs, and personal wellbeing (e.g. stress, anxiety, fatigue etc.). It is estimated that cumulatively, these challenges are potentially exacting a toll of TZS 4bn - about \$1.8 million - on the city each day in lost productivity (World Bank, April 2019)¹⁰.

Traffic jams are notorious and eat up to 20% percent of annual business profits, according to a Confederation of Tanzania Industries (CTI) study. Estimates made by DART in 2010 show that about Sh4 billion (\$2.5 million) was being lost daily in the city in terms of decreased productivity, wasted fuel and late delivery of products as a result of traffic jams. The unbearable traffic jams have been caused by, among other factors, an increase in the number of motor vehicles compared to the available roads and reliable infrastructure¹¹.

Traffic congestion poses a wide range of negative impacts on people, patients rushing to hospitals, businesses, and government revenues let alone other environmental impacts such as air pollution. It is estimated that traffic jam cost the country up to 20% of annual profits of most businesses. Daily losses to traffic jam are estimated at a whopping TZS 4bn and TZS 1.44 trillion annually in Dar

¹⁰ <https://www.worldbank.org/en/news/feature/2019/04/01/untying-dar-es-salaams-traffic-knots-one-feeder-road-at-a-time>
(Accessed on June 20, 2020)

¹¹ <https://www.urbanafrica.net/news/brt-curb-dar-es-salaams-traffic-jams/> (Accessed on June 20, 2020)

es Salaam alone (Basondole, n.d; Msigwa, 2013). Commuter bus owners are the biggest losers as they make fewer trips and use more fuel due to traffic jams (Ng'hily, 2013). The traffic jam dilemma has been blamed for rampant patient and accident casualty deaths that would otherwise be prevented as patients lose their lives on their way to hospitals (Msigwa, 2013). Further still, workers trapped in traffic jam waste both valuable work and rest time hence impeding on productivity and consequently escalating stress levels.

Delays due to traffic road congestion results in late arrival for employment, meetings, and education, resultant loss of business, disciplinary measures or personal losses and performing below standards. Earlier researches on cost of traffic congestion showed that long commuting distances and travel times faced by the urban poor have a negative impact on their human capital and productivity. This is because they induce fatigue and boredom; and use up both time and energy that could be spent on productive activities, for example, spending time with family, income generation activities etc. (Diaz et al, 2003).

Other people must wake up very early in the morning in order to board buses so that they can reach their working destinations on time. Mbagala, Gongo la Mboto, Kinyerezi, Bunju, Bocco, and Tegeta commuters in Dar es Salaam, for instance, commute to the city centre very early in the morning starting from around 4.00 am in order to avoid rush hours which is between 6.00 and 9.00 am. These workers are victims of risks associated with thieves and rapists who operate early in the morning and late evening and steal their belongings such as money, mobile phones, and others. Some are sometime being injured due to severe beating by assailants. Failure to wake up early in the morning makes them report to their working places late due to traffic congestion (Elisonguo, 2013).

Further, in terms of gender, employment in the transport sector remains male-dominated. Few women are employed in the sector except in travel service occupations (e.g. as travel agent). The great majority of drivers and operatives (e.g. mechanics) are male. Women are also under-represented in professional

and managerial positions within the sector, or in transport-related public bodies. Hence their influence over the decision-making process is very limited.

The goal of DART is to transform Dar es Salaam's informal system of "*daladala*" minibuses into a customer-oriented public transportation service. To this end, LATRA, after being advised by DART, will prohibit/ban *daladala* routes along all BRT corridors. The LATRA plans to cancel all the *daladala* routes to the designated route service for Phase 5. Banning of *daladala* (and enforcement of the ban) in all DART corridors which will become operational. This will be similar to BRT Phase 1 which is currently operational.



Figure 4-30: Road traffic congestion along BRT5 corridor (Mandela road & Port Access Road)

Source: Consultant, July 2020

4.4.7.2 Traffic Flow Along Project Road

Normal traffic includes traffic that is currently dependent on the existing roads and that which will continue to utilize these irrespective of the implementation of the project. The normal traffic growth occurs organically depending on the population growth and the economy. Other factors considered in determining the normal traffic growth include time series of traffic count data, GDP data, new vehicles registration data, vehicle with current licenses data, and transport sector growth/contribution data.

Generated traffic is additional traffic, which will occur in response to the provision or improvement of the road. This will in short time arise from increased number of trips of existing vehicles or generation of new trips

that were never present before the construction of BRT phase 5 and the upgrading of the Port Access Road. In the long-term, traffic generation will be due to increased economic activity along the project road after its improvement. Diverted traffic, is that traffic which was originally using another road or mode of transport but due to improvement diverts to the road. The likelihood of traffic to be diverted is difficult and tricky to determine (Traffic and Transportation Report, Nov. 2019).

4.4.7.3 Lessons from Traffic Accidents Along BRT Phase 1

Succinct records of traffic accidents along proposed BRT Phase 5 corridor and BRT Phase 1 (2016 – 2020 for lessons learnt) could not be obtained at the time of the study. This information will be updated later before commencement of construction activities. However, during the first month of the BRT Phase 1 operation there was a high number of accidents reported involving BRT buses and private cars, *daladala*, and motorcycles. Generally, this is because the system was new with drivers and pedestrians unaware of the rules and regulations governing the BRT operation. Overall, *daladala* and *bodaboda* have been the most common in BRT related accidents especially at the junctions and key intersections.

The existing accident reporting guideline under BRT Phase 1 is provided below whereby all types of accidents are reported to DART. The process entails:

- Driver reporting an accident to Transport Officer of the UDA-RT (Operator) on immediate basis;
- Operator reports to the DART;
- DART visits the site with BRT Traffic Police;
- The Operator team is also part of site investigation/visit;
- Accident is reported to the Police station having jurisdiction;
- The Operator prepares the details of the accident report and share with DART;
- The Operator keeps the DART updated on Police action and other necessary action/measures being taken;

- The Operator is to also inform the DART of the action taken from his side; and
- At the end of every month, the Operator prepare the Monthly Accident Report analysis and its summary and share with DART as part of monthly Operation Report.

The following issues are analysed and addressed in the Monthly Accident Report:

- i. Date of an incident;
- ii. Responsible driver for an incident;
- iii. Time of an incident;
- iv. Place of an incident;
- v. Responsible supervisor;
- vi. Number of people injured;
- vii. Number of fatalities;
- viii. Nature of an incident;
- ix. Bus registration number;
- x. Route of the bus;
- xi. Incident reporting to police;
- xii. Police station reported;
- xiii. Damage of equipment; and
- xiv. Cause of an incident.

4.4.7.4 Normal Traffic Along BRT Phase 5 Corridor

Manual traffic count data for 2018 along BRT corridor roads was performed to form the basis for normal traffic AADT. Result of the 7 days traffic count is presented in Table 4-23 below.

Table 4-24: Normal traffic AADT for Port Access Road (Bandari road) and BRT Phase 5 roads for 2018

Road Name	Motorcycle & tricycle	Cars	4WD & Pickups	Small buss ≤ 28 seats	Large bus > 28 seats	T>3.5T	T>3.5T(2axles)	T>3.5T(3 or 4axles)	ST & FT	AADT*1
Port Access road										
Bandari road	3343	4274	2565	277	150	394	199	322	3128	14652
Dar es Salaam Port - Uhasibu	5467	4352	2612	585	310	517	449	277	4463	19032
BRT Phase 5 corridor sections										
Temeke corridor (Mtoni kwa Azizi Ali -Veterinary)	4908	1706	1024	4017	2163	414	208	52	68	14560
Kigamboni bridge-Veterinary	12999	5905	3542	3228	1878	1165	1012	910	3832	34471
Veterinary - Ubungo *2	9179	4673	2803	2692	1518	1016	917	995	3958	27751
Kigogo RA – Tabata Reli*3	5001	3542	2086	1566	843	376	102	32	61	13608
Tabata Reli – Segerea bus stand*4	10001	7084	4172	3131	1686	752	203	64	122	27215
W'ted average for BRT5	10035	5212	3109	3015	1694	916	689	625	1602	26897

Source: Traffic Report and Evaluation Report, Nov. 2019

4.4.8 Existing Utilities Along/Within the Corridor

The existing BRT Phase 5 primary/direct area of influence host a number of utilities that are currently in use. These include electricity reticulation poles for electricity transmissions owned by Tanzania Electric Supply Company Limited (TANESCO), gas pipelines owned by Tanzania Petroleum Development Corporation (TPDC), water supply and sewerage pipes, control valves, chambers, and tunnel bulk meter owned by Dar es Salaam Water and Sewerage Authority (DAWASA), cable and telecommunication infrastructures such as (Vodacom cables), telecommunication towers, underground fiberoptic and overhead telephone lines owned by Tanzania Telecommunication Corporation (TTCL).

Detailed information regarding the location of each utility along the RoW, which has been extracted from aerial imageries and the analysis of the corridor's topographical sheets (Topographical Survey Investigation, Nov. 2019) is

presented in Appendix IV. In summary, available utilities along the proposed BRT phase 5 corridor are as follows:

- Mandela Road corridor Ubungu to Kigamboni flyover: available utilities are TTCL/Raha manhole, Vodacom cables, Toffi cables, Halotel manholes, fiber optic cables, telephone posts, for telecommunication purposes, sewerage manholes, water supply manholes, control box, DAWASA pumps for sewerage discharge and water supply to the surrounding residents, street lights, electric reticulation poles, overhead electric transmissions lines, oil tanks, gas pipes, and fuel pump dispensers located in supply;
- Mandela Road (Tabata junction) to Segerea *daladala* terminal: available utilities are electric reticulation poles for electric transmission along the corridor, telephone posts, TTCL/Raha manholes, Vodacom cables, Halotel manholes for telecommunication purposes, sewerage and water supply manholes for wastewater discharge and water supply along the corridor, oil tanks for energy supply;
- Temeke Road section – water tank, water supply manholes and sewerage manholes, for wastewater discharges and water supply, electric reticulation poles for electricity transmissions, fuel pump, oil tank, gas pipelines for energy supply, Vodacom cable, TTCL/Raha manhole, Toffi cable, Halotel manhole and telephone post for telecommunication purposes;
- Port Access Road - Bandari road section – electric reticulation poles for electricity transmissions, water supply manhole and sewerage manholes for water supply and wastewater discharge, gas pipeline for energy supply, telephone posts, Vodacom cable for telecommunication purposes, port supportive infrastructures and inland depots; and
- Kigogo to Mandela Road section – transformers, electric reticulation poles for electricity supply, sewerage manholes, water supply manhole for wastewater discharge and water supply, TTCL/Raha manhole, telephone post for telecommunication purposes, fuel pumps, fuel depots.

4.5 Archaeological and Cultural Heritage Resources

As defined in the Antiquities principal Act, 1964 and (Amendment 1979), and IFC PS 8, cultural heritage refers to (i) tangible forms of cultural heritage, such as

tangible moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values; (ii) unique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls; and (iii) certain instances of intangible forms of culture that are proposed to be used for commercial purposes, such as, cultural knowledge, innovations, and practices of communities embodying traditional lifestyles.

Site investigations along the project corridor and desk review have not indicated the presence of potential surface archaeological and historical heritage resources of significance within the BRT Phase 5 RoW. Experience from construction of the BRT Phase 1 shows that such resources were not encountered given the urban footprint of the project corridor.

The proposed road project may uncover (chance finding) physical cultural resources along or within the road corridor during construction period. TANROADS, DART in collaboration with Consultants and Contractors have to report immediately to the Antiquities Division and local government authorities for investigation and giving consent (The Antiquities Act No. 10 of 1964 and Amendment No. 22 of 1979 and The World Bank ESS8 and IFC PS8 on Cultural Heritage). During this period no work shall be continued on the specific area until a permission/approval from the Director of Antiquities is secured. In this case, for IFC compliance purposes (IFC PS8 paragraph 8), Contractor, TANROADS and DARTS, through its ESMS, shall develop provisions for managing Chance Finds¹² through a Chance Finds Procedure¹³ which will be applied if cultural heritage is subsequently discovered. Any Chance Find shall not be disturbed further until an assessment by competent professionals is made and appropriate actions are taken as stipulated in the Antiquities principal Act, 1964 and (Amendment 1979), and IFC PS 8. A CFP guideline is attached in Appendix V.

¹² Tangible cultural heritage encountered unexpectedly during project construction or operation.

¹³ A chance find procedure is a project-specific procedure that outlines the actions to be taken if previously unknown cultural heritage is encountered.

4.5.1 Potential Graveyard Sites

The review of the horizontal alignment, topographical survey sheets, and aerial imageries revealed presence of some graveyards along the corridor as summarized in Table 4-24. It is recommended to undertake ground truthing and documentation during development of the project's pre-construction ESMS. Preliminary overview shows that only one site (near National Stadium/Taifa station along Mandela Road) could potentially be affected directly by the construction activities (see Figure 4-31). Other identified graveyards appear to be away from RoW but worth taking into consideration during construction activities to avoid any indirect effects from activities like diversion and materials haulage traffic. If confirmed that the sites will be directly affected, the affected graves will be relocated with careful consideration, thorough involvement of all key stakeholders and compliance with the national statutory requirements especially the Graves (Removal) Act. No 9 of 1969 before actual commencement of civil works.

Table 4-25: Identified graveyards nearby the corridor (subject to confirmation)

BRT Corridor	ID/Graveyard	Chainage/Coordinates/Estimated distance from new BRT alignment (m)	Remarks
Mandela road (Ubungo-Kigamboni bridge section)	GVY1/TBN	6.8310619S, 39.2404533E 131m, LHS	Buguruni ward, number and status of the site currently unknown. Located away from project corridor
	GVY2/TBN	6.8356339S, 39.2397083E 110m, RHS	Buguruni ward, away from corridor, current status unknown
	GVY3/TBN	6.8375725S, 39.2414633E 70m, RHS	Buguruni ward, 250m north-west of Vingunguti/Uhuru junction. Away from corridor, current status unknown
	GVY4 (Kimbengere graveyard)	6.8398817S, 39.2433211E Chainage: 6600.00 – 6625.00 60m, RHS	Buguruni area opposite to Vingunguti/Uhuru junction, current status unknown
	GVY5/TBN	6.8549847S, 39.2681208E Chainage: 10175.00 – 10200.00 RHS, appears to be within RoW, some are likely to be affected	Located near National Stadium opposite DMDP Temeke Offices
Temeke Road section	GVY6/Maganga Cemetery	6.8539692S, 39.2540089E Chainage: 425.00-450.00 90m, LHS	Temeke ward, current status unknown
	GVY7/Kwa Mzuzuri Cemetery	6.8565425S, 39.2544639E Chainage: 800.00-825.00 RHS	Temeke ward. Partly appears to be within proposed new BRT alignment. Ground truthing required.
Mandela road - Segerea	No graveyard spotted close to the corridor		
Kigogo – Mandela road	GVY8/Tabata Dampo graveyards	6.8241156S, 39.2363931E Chainage: 2200.00 – 2475.00 90m, RHS	Makaburini street, Kigogo ward, soon after the Tabata-Kigogo junction viaduct
Port Access Road	No graveyard spotted close to the corridor		

Source: Aerial imageries, June 2020

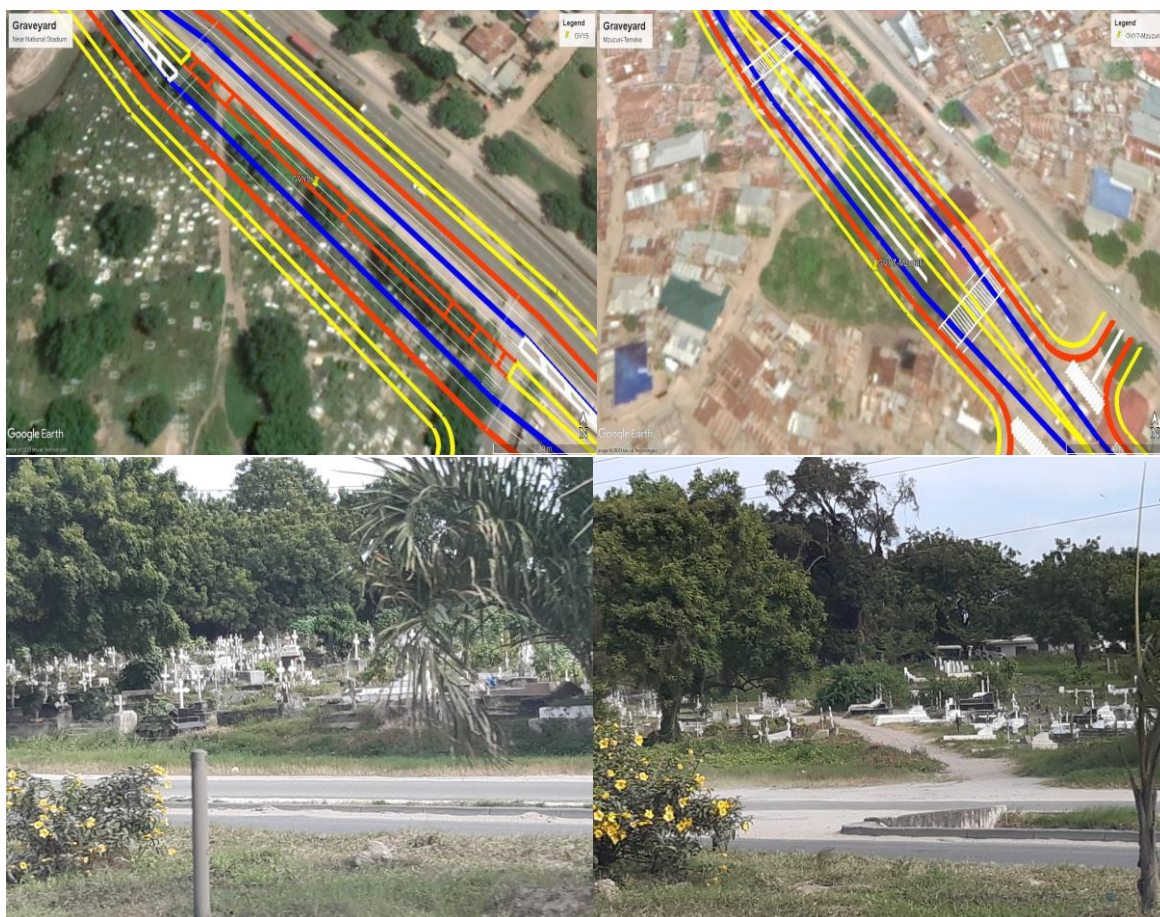


Figure 4-31: Key graveyards (GVY5 top left & bottom) near the RoW to be confirmed, and GVV7 (top right).

Source : Aerial imageries & reconnaissance, June 2020

4.6 Gender, Vulnerable Segments and Social Relations

4.6.1 National Gender Context

Even though some gender gaps have been reduced in Tanzania, women in the country are still experiencing inequalities in various aspects of life and work. Overall, Tanzania ranked 71 out of 148 countries in 2018 in the Global Gender Gap Report of the World Economic Forum, and in terms of economic participation and opportunity, its rank was 72, with several indicators revealing continuing gaps between men and women (World Economic Forum, 2018)¹⁴. About 60% of Tanzanian women live in extreme poverty, and the situation of women in rural areas is particularly dire, as poverty is relatively high in rural areas in Tanzania (Ministry of Health, Tanzania)¹⁵.

¹⁴ World Economic Forum, The Global Gender Gap Report 2018, World Economic Forum, Geneva, 2018

¹⁵ Ministry of Health, Community Development, Gender, Elderly and Children, United Republic of Tanzania website: <http://www.mcdgc.go.tz> (accessed June 2019).

In terms of the gender gaps in relation to work and employment, while the disparity between women and men's labour force participation rates, 81.1% and 88.3% respectively, it has not been as pronounced in Tanzania as it has been in many other countries, inequalities continue to exist in, for example, in income, with women's estimated earned income rising to only 72% of men's. Another indicator is the type of work women and men are involved in, with a higher share of women than men in informal employment (76.1% of women and 68.3% of men), among contributing family workers (60.3% of women, compared to 21.1% of men) and in part time work (36.3% of women, while for men the share is 24.9%) (World Economic Forum, 2018).

While the government has introduced measures to support the economic empowerment of women, including through the reform of landownership laws as well as practical assistance such as entrepreneurship training, women continue to be disadvantaged in terms of their access to and control over productive resources. Women's livelihoods are also negatively affected by their time poverty: women spend 3.7 times more time on unpaid care and domestic work than men, and have less time at their disposal to engage in productive work, as shown by the fact that women spent on average 195 minutes per day on production activities in 2014, while the average for men was 342 minutes per day (National Bureau of Statistics, 2014).

The society of Tanzania is characterized by a patriarchal culture that is rooted in patrilineal traditions, religious beliefs and customary law. The country's cultural fabric comprises over 120 tribal groups and ethnic minorities, with significant influence from the diasporic eras of the Arab rule and subsequent colonial regimes. While the country has earned significant progress in mobilizing various legal instruments and institutional machinery to bring gender inclusivity to the mainstream of national development, implementation gaps stemming from persistent traditional norms, legislative loopholes and bureaucratic barriers represent some of the existing constraints to national efforts on gender equality. In 2008, the Committee on the Elimination of Discrimination against Women (CEDAW) called upon state action to address traditional inertia related to gender equity, as well as the country's statutes and customary laws with a discriminative

bearing on women, notably the Law of Marriage Act of 1971, inheritance laws and the Law on the Custodian of Children.

According to 2018 statistics from the Human Development Report Office (HDRO) of the United Nations Development Program (UNDP), Tanzania falls into the third category of the Gender Development Index (GDI) with a score of 0.936, which denotes a moderate deviation from gender parity on constituent metrics cutting across the spheres of health, education and command over economic resources.

With regards to HDRO's Gender Inequality Index (GII), which analogously gauges national gender performance using women's relative statistics in reproductive health, empowerment and economic activity, Tanzania ranked 130th/162 on the 2018 global index, with a score of 0.539. Nationally, about 37% of parliamentary seats are held by women, and 11.9% of adult women have reached at least a secondary level of education compared to 16.9 percent of their male counterparts. For every 100,000 live births, 398.0 women die from pregnancy related causes, while the adolescent birth rate is 118.4 births per 1,000 women of ages 15-19. Female participation in the labour market is 79.4% as compared to 87.2% for men.

Notwithstanding recent strides in the attainment of increased educational, economic and political participation for women nationally, household-level duties and division of labour are, in general, traditionally gendered. Men are obliged to assume priority economic responsibilities within the household, along with authoritative sway over familial decision-making, finances and asset ownership, while women are expected to take on subordinate household duties that range from income generation to household maintenance and care for children and other household dependents.

Married women are typically positioned as the heads and/or breadwinners of their households under circumstances in which their spouses are absent, unwilling or unable to establish dominance (i.e., in the event of death, sickness, disability or divorce). Beyond the domestic level, however, women are legally

and constitutionally afforded all of the human rights and civil liberties that men are equally entitled to, despite constraining factors such as traditional and individualistic gender-based malpractices and bias.

The 2009 National Survey on Violence Against Children (VAC) in Tanzania estimates that more than 28% of girls and 13% of boys have experienced sexual violence, mainly in their homes. A study conducted by the Tanzania Demographic Health Survey (TDHS) in 2010 indicated that, about 20% of women had experienced sexual violence. The NBS (2016) report shows that of all the offences against the person in 2013 (6105 cases), 2014 (6028 cases), and 2015 (5802 cases), rape offence was leading. In January 2016 alone about 2031 cases were reported where 19 rape and sodomy cases were reported daily. Also, the current report released by LHRC (2019) showed that Sexual violence against children is an issue of major concern, with 66% of VAC incidents were sexual violence incidents.

While a comprehensive evaluation of results of the current National Action Plan for Violence against Women and Children (NAPVWC) is yet to be completed, notable progress has been achieved with the countrywide establishment of multi-sectoral child protection teams at the district level, pre-service training for police, social workers and health care providers, in-service trainings for over 6,000 frontline workers, and the introduction of a national hotline to report cases of violence. Government efforts have also scaled up protection and response mechanisms to tackle violence against women and children by means of:

- Protection committees – In 2018, the government reported that 89 out of 185 districts had instituted protection committees consisting of local government, relevant sectors (including social welfare, health, police, education and justice) and civil society. Grass-roots committees operate under a hierarchy that is headed by the National Steering Committee of the NAPVAWC. The committees are intended to improve cross-sectoral coordination and facilitate referrals for cases of violence.
- Police Gender and Children Desks (PGCDs) – The Tanzanian Police Force has established units staffed with specially trained police and social welfare

personnel in nearly 400 major police stations, with the aim of creating a safe and accommodating platform where victims of VAWC can seek assistance and support. One Stop Centres (OSCs) – These institutions provide integrated medical, legal and welfare services, including counselling services to support victims of violence, either on site or through referrals. Social welfare officers at OSCs assist clients with registering a police case, seeking medical services (including collection of forensic evidence), contacting prosecutors and NGOs for legal assistance and receiving psycho-social counselling.

- National Child Helpline – a toll-free number that can be used on all mobile networks throughout the country to report abuse and to connect with counsellors working under the NGO C-Sema. On mainland Tanzania, about 3,000 calls are received monthly (approximately 150 to 190 calls daily). Volunteers refer calls either to Social Welfare Officers or provide online counselling¹⁶.

4.6.2 Women Context

The differential distribution of power between men and women is ingrained in Tanzania's patriarchal traditions and is well manifested in the various inequalities between the country's female and male population. Even in the urbanized parts, women's economic participation is curtailed by gender stereotyping and sociocultural pressures on their domestic productivity. Because their societal roles are widely viewed as subservient, they are exceptionally prone to social banes such as financial exploitation, Gender-Based Violence (GBV) and decision-making restrictions with regards to microeconomic determinants such as asset ownership, educational advancement, family planning and reproductive health. Such challenges commonly translate to compounding effects on women's income status, welfare and access to justice, thereby enabling the continuity of inter-generational poverty cycles.

According to findings of the latest National Demographic and Health Survey, by 2017, in the employment rate of men (87%) was notably higher than that of

¹⁶ Together for Girls. 2019. Accelerating Action to Address Violence Against Women and Children. Key Lessons from the Together for Girls Partnership in Tanzania

women (66.4%) in Dar es Salaam Region, despite resident women having a generally higher educational attainment and literacy rate than that of the men. The survey also revealed that the percentages of female respondents owning land and housing were 12.4% and 18.5% respectively. It was further detailed that the percentage of female respondents lacking documented legal ownership rights to the property was 49.7% for land and 73% for housing. As reported in the Gender Dimension Monograph of 2015, women are underrepresented in the fishing, mining, transportation, and construction industries and overrepresented in the education, health, hotel and restaurant service industries, as well as in domestic employment. The monograph indicates that in mainland Tanzania, only 0.3% of women are employed within the transport and communication sector.

Widely held traditional values recognizing women's husbands as the households' disciplinary heads have perpetuated normative attitudes towards women's abuse. The social tolerance for domestic coercion of women lies in its disciplinary rationalization and women's will to preserve their marriages and prevent the various unfavorable consequences of separation. As documented in the latest National Demographic and Health Survey Report (2015-2016), in Dar es Salaam Region, 31.6% of 1,065 interviewed women (aged 15-49 years) had experienced physical violence and 18.4% had been subjected to sexual violence.

With ever-married women, only 16.5% of 718 respondents stated that their husbands did not exercise some form of marital control and associated infringements on their personal liberties and quality of life. About 39% of the respondents reported being subjected to physical, sexual and/or emotional abuse by their husbands. With regards to access to recourse for domestic abuse, of 420 affected women, only 48% sought help in response to the abuse inflicted on them. Further demographic information obtained through the survey indicates that acts of violence against women positively correlate with active employment, low educational attainment and motherhood.

Female Genital Mutilation (FGM) is of outstanding concern in the country's social development agenda, given its unlawful vestiges in local communities and the ramifications this bears on women's welfare and economic potential. As a matter

of public health, it has been linked to a myriad of medical conditions including obstetric, gynecological, urinary and psychological complications (USAID, 2008). It is existent within Dar es Salaam region, as the National Demographic and Health Survey (2015-2016) established the prevalence of female circumcision in the region at 4.2%.

Women are amongst the most disadvantaged demographics with regards to the existing public transport challenges. They are often less able to afford and own their own vehicles. Yet considering the diversity of their familial duties, they undertake more complex travel patterns to complete multiple errands within the course of the day and invest a substantial portion of their time in transport. Much of the time is expended on traffic and waiting times for low-cost transport means.

At the construction stage of the BRT Phase 5 corridor, the influx of project laborers of distant geographical origins and their interaction with low-income host communities raises the risk of HIV/AIDS cross-infections, to which single women are more vulnerable. During both the construction and operational phases, women can also be disadvantaged by discriminative employment terms and conditions.

With regards to safety and security risks at the operational phase, women are also easy targets for theft, physical and sexual harassment, especially in the crowded settings that characterize public transit facilities. For women, lone walking to or from bus stations and solitary waiting times during the night pose the risk of gross sexual violence such as rape.

4.6.3 Land and Property Ownership

Land is one of the most fundamental resources to women's living conditions, economic empowerment and, to some extent, their struggle for equity and equality. However due to economic, legal, social and cultural factors their rights to access, control and transfer land are weaker compared to those of men. The majority of Tanzanian women have no right to own land. Another problem according to land rights experts has been inadequate analysis of the gender aspect of the changing of the land tenure system in the customary land law.

Women have been caught between cultural and traditional restrictions which deny them independent land ownership rights. Like all other Tanzanian citizens, women have the legal right to own land under the 1999 Land Act. However, due to lack of independent financial resources and traditional gender role women rarely buy land either independently or jointly with their husbands. Household land is commonly titled only in the name of the male-headed of the household. Women living in household that own land, often access to land but rarely have legal ownership to that land.

According to the socio-economic survey results out of the 1,018 PAPs of the affected households, only 377 PAPs own land. Out of 377 PAPs, only 98 (26%) are female headed households while 275 (73.5%) of PAPs with land are male headed households. Moreover, lack of ownership of property, limited decision-making powers in the households, pre-occupation with household chores are among the indicators of women low socio-economic status in the households and families.

4.6.4 Widows, Female-Headed Households and Orphanage

According to the 2012 population and household census report, there was a total of 376,888 female-headed households in the urban parts of Dar es Salaam region, which corresponds to a significant respective percentage of 34.8%. Female-headed households were associated with an average household size of 5.8 twice as high as that for male-headed households (2.9). In the same year, a total 7.4% of married women in the region identified as being divorced, separated or widowed.

The household survey conducted within BRT Phase 5 primary impact area revealed that female-headed households account for 21.2% of the total count of Project-Affected Households (PAHs). The survey findings further indicate that 75% of the household heads are married, 7.9% are widows, 7.5% are divorced, 3.8% are separated and 5.8% are single. Further the survey indicates that 20.3% of the households have an orphan in their homes.

Women charged with household headship are accounted a vulnerable demographic with regards to economic shocks, partly due to the cultural burdens associated with women's education, economic empowerment and domesticity, which leave them with lesser means to secure sufficient livelihoods and productive resources to provide for their households. As with most women groupings in general, female breadwinners are also very time poor given the need for them to multi-task between activities such as domestic upkeep, care for their children/dependents and income generating commitments.

Female household heads who suffer intersectionality by virtue of their HIV/AIDS status, sexual orientation, disability, income level and residential status are even more disadvantaged in their socioeconomic endeavors, as recent studies have demonstrated. Divorced women and widows altogether account for an estimated 43% of the HIV prevalence recorded for Dar es Salaam Region (TACAIDS, 2018)¹⁷. Widows are a particularly vulnerable grouping, as they are subjected to various forms of mistreatment, harassment and social malpractices, most of which include:

- Dispossession of inherited property by extended family members based on factors such as traditional customs, property value, tribe, motherhood status, gender of the fathered child and the widow's educational status;
- Inheritance by one of their husbands' relatives in conformity with levirate systems;
- Forced sexual acts with their husbands' relatives for customary cleansing purposes;
- Blame for their husbands' death and allegations regarding deliberate harm in form of witchcraft etc;
- Social ostracism due to the stigma surrounding HIV/AIDS (Kessy *et al*, 2010).

Households headed by orphaned girl-children are also inherently disadvantaged in terms of their ability to secure an economic footing. As with other sub-sets of female breadwinners, protracted economic pressures can lead young (female)

¹⁷ Tanzania Commission for AIDS (TACAIDS), Zanzibar AIDS Commission (ZAC). Tanzania HIV Impact Survey (THIS) 2016-2017: Final Report. Dar es Salaam, Tanzania. December 2018

breadwinners to abandon formal education for immediate income-generation opportunities, such as commercial sex, menial service in leisure business (e.g. local bars/breweries) and child marriage. The high-risk livelihood fallbacks presented in these circumstances tend to compound their vulnerability, both in terms of both their health and safety, and long-term economic capabilities.

Transport infrastructure is of great essence to female household heads, who undertake complex travel patterns to perform their various tasks, with consequent time deprivations. Much of their time is spent on transportation during peak and off-peak hours, while other times, they have to make bigger monetary expenditures on intermediate public transport modes to meet difficult schedules. They are also severely prone to economic shocks from potential loss of livelihood assets.

4.6.5 Female Youth in Education

Girl children pursuing primary and secondary education are burdened by time constraints in their day-to-day routines, as they have to commute to and from their school grounds, while meeting the schedules for sharing in domestic chores and other activities that directly or indirectly contribute to their families' livelihoods, particularly those within the informal sector. This is a bigger challenge to the older girls in secondary school, many of whom have to travel longer distances between/within Dar es Salaam city to attend secondary schools and their respective homes, while taking on more demanding academic routines and a heavier share of domestic labour within their homes. The same holds for young women seeking higher education in tertiary training centres, while committing to home duties and part-time formal and/or informal employment.

Like their male counterparts, girl children attending school lose valuable time in heavy traffic conditions affecting existing commuter bus systems and spend long waiting times when commuter buses turn up full. The relatively low fares applicable to students on public buses deny them the privilege of taking seats in crowded conditions, which adds to the physical stress of their daily commutes. During peak hours, commuter buses tend board other passenger groups preferentially for more profit, which causes students to miss early classes.

This grouping can be heavily impacted by potential resettlement, as such dynamics can negatively impact on their educational engagement, considering factors such as change in the time required to travel to and from educational centres, as well as changes in the affordability of educational resources. In 2017, the government's declaration of regulatory restrictions on pregnant girls' access to public education sparked political controversy involving national civil society and development funding agencies, amidst what was viewed as discrimination against the country's pregnant girls and adolescent mothers with a right to education. With the advent of project labourers in the project's construction phase, adolescent girls within low-income host communities are at risk of being sexually exploited, and any resulting pregnancies would compromise their educational progress.

4.6.6 Sex Workers

Despite legal prohibitions, commercial and transactional sex are still commonplace in Dar es Salaam and Tanzania in general. Unlike commercial sex workers, women dealing in transactional sex operate on a more covert basis for benefits that are not limited to cash returns, thus their presence and numbers have remained relatively obscure. In 2019, UNAIDS estimated the total count of local women engaging in sex work at 155,450.

A recent study by USAID has shed some light on the black market for prostitution in various commercial centres across the country and Dar es Salaam in particular. The study found the spectrum of sex workers to range between upmarket workers and workers with other occupations to low-market workers and sex workers affiliated with brothels. Their operations are based within hotels, lodges, night clubs, bars, pubs, brothels, beach areas, busy streets, cemeteries, client's vehicles and their own homes. The study also revealed that while many sex workers share troubled backgrounds (e.g. juvenile sexual harassment, human trafficking, lacking childhoods and discharge from school), factors such as abject poverty, drug use, habituation to inter-generational sex and peer pressure tend to drive women into the sex industry (USAID, 2009).

Sex workers are a vulnerable socioeconomic demographic, considering the fluid nature of their livelihoods, social exclusion, exposure to environments potentiating physical harm, as well as their proneness to contracting HIV/AIDS. Respondents in Ilala, Kinondoni and Temeke, many of whom were in their late twenties, reported encountering coercion, violence and harassment from jealous partners and customers unwilling to pay for rendered services (29% of respondents), fellow sex workers (19%), and the Police who exploit them sexually in bargains to avert custody (16%). Some of the respondents reported feeling unsafe and stranded when travelling to desolate locations at their clients' requests, to find them absent. Moreover, while 74% of the respondents reported using condoms frequently, the women also stated that their financial motives mean they have less leverage in negotiating the use of condoms with clients who opt out of protected sex with more generous offers. In other cases, clients reportedly compromise protection in the course of the act without the women's volition (USAID, 2009).

In the context of the project, sex workers, particularly those constituting the low-market segment are dependent on transport services to access their workstations or client locations, particularly in the night. With public transport platforms, this puts them at heightened risk of attack and harassment. Potential physical and/or economic displacement also jeopardizes their livelihoods and welfare, as they are less equipped to re-establish themselves economically elsewhere. Further, experience from other infrastructure construction projects in Dar es Salaam suggests an influx of sex workers around the project area and contractor's camps where cash is believed to be in high circulation.

4.6.7 Other Vulnerable Groupings

4.6.7.1 Households Living in Extreme Poverty

Globally, Tanzania stands amongst the low-income, developing countries. With regards to development progress measures monitored by the UNDP, the Human Development Index (HDI) is an average measure of basic human development achievements in a country on the three basic dimensions of human development; (i) a long and healthy life, (ii) access to knowledge and (iii) a decent standard of living. Tanzania's scored value

of 0.528 places the country in the low human development category—positioning it at 159 out of 189 countries and territories. Discounting the national HDI value for inequality, yields an adjusted value of 0.397, which represents a loss of 24.9% due to inequality in the distribution of the HDI dimension indices.

The Multi-dimensional Poverty Index (MPI) – another composite poverty metric introduced by UNDP – evaluates overlapping deprivations suffered by a country's population on three dimensions, namely health, education and standard of living. The totality of deprivation scores categorizes a national population into three categories; (i) percentage that is multidimensionally poor, (ii) percentage that is vulnerable to multi-dimensional poverty, and (iii) percentage that lives in severe multidimensional poverty. According to the latest available data, 55.4% of the country's population are multidimensionally poor while an additional 24.2% are classified as vulnerable to multidimensional poverty. Notably, 49.1% of the population live below the income poverty line (USD 1.9 per person per day). The breadth of deprivation (intensity) in Tanzania, which refers to the average deprivation score experienced by people in multidimensional poverty, is 49.3 percent. The MPI, which is the share of the population that is multidimensionally poor, adjusted by the intensity of the deprivations, is 0.273.

According to the national Household Budget Survey Report for the period 2017-2018, Dar es Salaam Region ranked the highest in terms of average monthly household consumption, which was pegged at TZS 720,946. Over the period 2011-2018, the proportion of poor residents in Dar es Salaam doubled up to 3%, while the Gini coefficient for income inequality increased correspondingly from 0.35 to 0.42. The residents of Dar es Salaam's informal settlements and flood-prone wards (Kigogo Ward in particular) are amongst the city's poorest inhabitants, challenged with lacking access to social services, recurrent flooding of Msimbazi River and lack of rights to owned land property.

Households living in extreme poverty are amongst the vulnerable social receptors within the project's area of influence. Their coping mechanisms and resilience with regards to potential economic shocks are limited, and they are subject project-driven risks including:

- Destitution from economic and physical displacement;
- Exclusion from potential project benefits, such as recruitment for construction and operational activities, and improved access to distant social services and livelihood platforms with an affordable, pro-poor BRT fare structure;
- Welfare deterioration from engagement in illicit and opportunistic income generating activities such as sex work and theft, as a result of increased public presence and economic activities within the BRT corridor.

All the same, the project is anticipated to deliver ample development opportunities and poverty alleviation for the poorest of beneficiaries, with regards to:

- Creation of employment and capacity development opportunities in the project's construction and operational phases;
- Development of livelihoods within the transport sector, particularly intermediate transport means (hired feeder services using motorcycles and autorickshaws);
- Increased economic and domestic productivity from improved mobility and economies of time;
- Economic advancement from improved and more affordable connectivity of occupational centres, commercial hotspots and social services.

4.6.7.2 Disabled, Chronically Ill/Infirmary, Elderly

According to the UN Convention on the Rights of Persons with Disabilities (2006) persons with disabilities include those who have long term physical, mental, intellectual or sensory impairments that may hinder their full and effective participation in society on an equal basis with others.

According to the disability monograph derived from the latest national population and housing census, by 2012, the prevalence of disability in Dar es Salaam region was pegged at 5%. The monograph further details the prevalence of disabled persons in the region as 0.04 for albinism, 1.67 for seeing, 0.59 for hearing, 0.71 for walking, 0.52 for remembering, 0.38 for healthcare and 0.01 for other forms of disability. Violent attacks against Persons with Albinism (PWA) over the recent period have received grave concern, with about 123 cases registered by the year 2012. Incidents of elderly people being executed/lynched on suspicion of witchcraft remain common, with nearly 3,000 elderly victims reported for the period 2005-2011. A study by Tanzania's Legal and Human Rights Centre (LHRC) has also shown that elderly people suffer verbal abuse and concerning neglect in public service facilities, especially hospitals (Reisman *et al*, 2013).

The household survey carried out as part of the RAP Census for the BRT Phase 5 identified a total of eight persons designated as vulnerable PAPs. They include four elderly persons, one physically impaired individual and one individual suffering from a chronic disease. Within the project context, disabled, chronically ill and infirm PAPs comprise a vulnerable grouping that could be more adversely affected by BRT Phase 5 involuntary resettlement than others, and who may be limited in their ability to claim or take advantage of the resettlement assistance and related development benefits such as livelihoods restoration. The overwhelming majority of the disabled and the chronically infirm are characteristically physically or mentally challenged, less literate and underrepresented in the various waged and informal occupational sectors. Their debilitating conditions also render them marginalized as far as access to crucial social services including social security funds.

With regards to transportation facilities, this grouping is disadvantaged when it comes to transit service affordability, traffic safety and the physical navigation of transit systems. The chronically ill are heavily reliant on transit facilities for access to distant healthcare providers. The already

vulnerable status of this grouping also poses the risk of destitution due to impoverishment from project-driven physical and economic resettlement. This demographic is also subject to exclusion from economic opportunities during the construction and operational phases of the BRT Phase 5 project.

4.6.7.3 HIV/AIDS Sufferers

The HIV/AIDS epidemic is amongst the top-ranking challenges besetting Tanzania's current morbidity trends, with an estimated 5% of the national population infected with the disease. The country is geared towards attaining a controlled status for the epidemic by 2020, whereby 90% of people living with the disease are envisioned as being aware of their HIV status, 90% of those testing positives placed on continuous HIV treatment, and 90% of those on treatment reaching viral suppression (TACAIDS, 2018). While the Government of Tanzania remains committed to responding to and mitigating the effects of HIV/AIDS, sustained inadequacies of human resources, domestic financing, health infrastructure, and the supply chain for commodities continue to challenge progress.

Women in Dar es Salaam are disproportionately affected by HIV/AIDS relative to male residents, with the estimated prevalence of HIV/AIDS among women shown to be threefold higher (at 6.8%) than that of men (2.3%) (TACAIDS, 2018). The overall prevalence of the disease in the region stands at 4.7%. The household survey conducted within the BRT Phase 5 primary impact area did not yield any voluntary information regarding the PAP's HIV/AIDS statuses.

The HIV/AIDS-impacted demographic of the project area is regarded as a notable vulnerability within the project context, considering the negative implications of their HIV status on their livelihoods and social capital. With regards to transit facilities, HIV/AIDS sufferers and their caretakers are highly dependent on transportation services to access medical services and other sustenance essentials, particularly during pronounced clinical

stages of the sickness. Sufferers within the lower income brackets are sensitive to transportation costs given the overall economic burden of the disease on the household, particularly if the household heads are infected. Project-driven physical and economic displacement is also likely to intensify economic pressures on HIV/AIDS impacted households, potentially resulting in further impoverishment.

4.6.7.4 Asylum Seekers, Refugees and Victims of Human Trafficking

By the close of 2018, Tanzania was a host to some 330,755 refugees and asylum-seekers. Of these, 245,9641 were Burundian nationals, 84,170 were Congolese, while the minority counts were linked to 15 additional countries (UNHCR, 2020). Though most of Tanzanian-based refugees and asylum seekers are sheltered in refugee camps out in the rural north-west, an estimated population of 270 are hosted in the country's urban reaches, mainly Dar es Salaam (UNHCR, 2020). Limited funding and the growing overburden on many of the camps and humanitarian utilities, paired with chronic push factors such as fear of safety, has caused some of the migrants to seek refuge in Dar es Salaam, amongst other commercial centres offering more adequate social infrastructure and income-generation niches. Their employment and residence outside of designated establishments is nonetheless legally prohibited.

A recent study focused on the socioeconomic profile of a refugee cohort based in Dar es Salaam has shown that refugees in the city fall victim to financial exploitation, xenophobic harassment, social exclusion and marginalization within public service arenas (O'Loughlen and Bwami, 2018). Nearly half of the refugees interviewed have dealt with extortion or pressure for bribes from their landlords, neighbours and members of the police force, to which they yielded in fear of being reported to immigration authorities, and the broader spectre of lengthy imprisonment, deportation or refolement. Further, more than half of the respondents stated they had experienced discrimination at work, while a quarter indicated that they have not made any close local companions.

Having to make a clandestine living, many of the urban settlers employ themselves in menial and low-paying economic activities such as artefact workshops, jewellery dealership, street vending, personal care (salon, barber shop, beauty parlour) business, waiting and teaching. Most of the respondents reported having to subsist on less than TZS 300,000 per month. About a third of the respondents reported getting by with a monthly income of TZS 60,000. With such economic lifelines and limited welfare entitlements, many of the asylum seekers and refugees end up in marginalized informal settlements, such as the city's flood-prone slums, where they can afford to live with less strife from low-income host communities.

According to the Global Slavery Report of 2014, Tanzania was the worst plagued by human trafficking within the East African region, with more than 350,000 people reported to have been trafficked within and outside the country. Globally, Tanzania ranks 33rd out of 167 countries on the list of notorious countries with respect to trafficking in persons (TIP)¹⁸. Recent TIP reports by the US Department of State reports indicate Tanzania's human trafficking profile as including rural-urban trafficking and subjecting girls for domestic services and sex work to South Africa, Europe and the Middle East. Boys are internally trafficked for labour in agriculture and mining¹⁹. The incidence of internal trafficking is higher than that of transnational trafficking, and is usually facilitated by family members', acquaintances or intermediaries' offers of assistance with education or finding lucrative employment in urban areas especially in Dar es Salaam city. The exploitation of young girls in domestic servitude is a common practise. Smaller numbers of Tanzanian children and adults are trafficked, often by other Tanzanians, into conditions of domestic servitude and commercial sex work. A recent study focused on trafficked girls in Dar es Salaam City asserts the main factors of girls' vulnerability to domestic TIP to be endemic poverty, familial hardships (e.g. parental sickness,

¹⁸ Magare FM (2016) A Simplified Information Booklet on Human Trafficking and Gender in Tanzania. WILDAF TANZANIA

¹⁹ The US Department of State (2010; 2015; 2016; 2017;2018) Trafficking in Persons Report – Tanzania.

separation, demise etc.), forced marriage and polygamous and large families²⁰.

The national legal framework for TIP is centred on the Anti-Trafficking in Persons Act (2008), the Anti Trafficking in Persons Regulations and the National Anti-Trafficking in Persons Action Plan (2018-2021). The action plan prioritizes remedial initiatives such as public awareness creation and capacity-building programming for competent authorities and partners (including relevant LGAs, CSOs and MDAs) involved in combatting TIP. According to USAID's latest (2018) TIP report, the government has demonstrated increased efforts to this end by identifying more trafficking victims, increasing funding for focal institutions, cooperating with foreign law enforcement officials on trafficking investigations, and launching a central data collection system for trafficking crimes. The report nonetheless stresses imperative shortfalls such as the lax prosecution of offenders and limited support and protection services rendered to victims of human trafficking within the reporting period.

Within Dar es Salaam in particular, frontline institutions operating to counter TIP include MDAs such as the Ministry of Home Affairs (MoHA) and Anti-Trafficking Secretariat (ATS), as well as CSOs such as the International Organization for Migration (IOM), Daughters of Mary Immaculate, Catholic Relief Services (CRS), Kiota Women's Health and Development (KIWOHEDE) and the National Organization for Legal Assistance (NOLA). These actors have taken on concerted action to extend shelter, psycho-social counselling, medical care, legal assistance, vocational training and/or income generating activities and family reunification. A database hosted by IOM Tanzania records data on each case of human trafficking as reported by the partner NGOs on a monthly basis. The database is used as an indicator of trafficking trends in the regions where the NGOs are located²¹.

²⁰ Mathias. A. 2011. Child Trafficking in Tanzania: Exploring Experiences of Trafficked Girls in Dar es Salaam

²¹ International Organization for Migration (IOM). Programmes in Tanzania – UNDP Social Protection. Viewed on 22/07/2020 at <https://tanzania.iom.int/programmes/counter-trafficking/undap-social-protection>

During the construction phase of the BRT Phase 5 project, illegal migrants running livelihood activities in low-income host communities can be financially or sexually exploited by project labourers given their illicit residence status. Female migrants dealing in commercial sex are also at risk of contracting sexually transmitted infections.

4.6.7.5 Children and Other Vulnerable Youths

Children and youths are viewed as a vulnerable demographic in many respects. In terms of public health, children, particularly those under the age of five are immunologically disadvantaged and therefore susceptible to various infectious diseases. Children are also vulnerable to developmental retardation resulting from food shortages. Findings of the latest Demographic and Health Survey (2015-2016) have shown that in urban Tanzania, mortality rates for infants, children under the age of five years and children altogether are 63%, 86% and 25% respectively. Improved public transit services to the Dar es Salaam's low-income communities can potentially contribute to increased household earnings and greater accessibility of health centres, with a positive impact on the morbidity status of children within the project's area of influence.

With the rapid urbanization rates in Dar es Salaam city, economic stresses on low-income households and the spread of HIV/AIDS, the prevalence of orphans in the city remains high. Child-headed households are a socioeconomically vulnerable grouping in view of their low capital endowments, exclusion from formal employment and meagre support systems. Because their educational progress is typically limited, they are prone to engaging in low-paying and high-risk livelihoods to overcome economic hardships, with some resorting to criminal activity. Demographics characterized by a substantial youth bulge, high poverty, income inequality and out-of-school youth are associated with high crime rates. The involvement of impoverished youth in urban delinquency such as sex work and theft jeopardize their wellbeing and long-term economic capacity considering the risk of HIV/AIDS contraction and vigilantism.

In the context of the BRT Phase 5 project, mothers and young children are in notable need of low-cost transit services for access to livelihood resources and healthcare facilities. Orphaned children and child household heads are also needy of affordable transport means to aid their economic and educational commitments. Further, economic shocks from the physical and economic displacement of project-affected households could impinge on children's access to education, healthcare and other vital social services. In its construction phase, the project can present economic opportunities that may spur truancy and school discontinuation among youths within low-income host communities.

4.6.8 Gender and Transportation Insecurities

According to a national survey on Violence Against Children (VAC), 41.4% of girl children in VAC-affected areas have experienced at least one incident of unwanted contact or attempted sex on school grounds, or on their way to or from school²². A recent study probing into Gender-Based Violence (GBV) against adolescent schoolgirls in Dar es Salaam's transport sector indicates that the mistreatment of girl students within the city's public transport arena is not uncommon. In the study, nearly half of the respondents reported having been unable to attend school as a result of discriminative pick-up by *daladala* operators, while 18% of the respondents reported being refused access to public bus transport five or more times a month. With regards to physical abuse and sexual exploitation in connection with transport services, 66% of interviewed girls acknowledged having experienced mistreatment while seeking transport to school. Further, 46% of the respondents reported being hit and/or pushed by *daladala* drivers, conductors and incoming passengers, and many cited incidents of verbal harassment on public buses. Notably, 15% of the subjects recalled being sexually harassed by *daladala* operators, and 22% shared that they have dealt with or witnessed sexual exploitation attempts by strangers offering lifts²³.

²² Multi Sector Task Force on Violence Against Children, UNICEF. 2011. Violence Against Children in Tanzania Findings from a National Survey 2009

²³ Meck. L., Center for Gender Equity, Academy for Education Development (AED). 2009. Girls Getting to Secondary School Safely: Combating Gender-based Violence in the Transportation Sector in Tanzania

These findings are backed by more recent surveys conducted by the NGO WAJIKI in schools across the wards of Kawe, Makumbusho and Mwananyamala. The surveys have evidenced the prevalence of exploitative malpractices such as bus drivers offering girl students free rides, gifts and cash to entice them into sexual relations. This has been shown to result in incidents of early pregnancies, consequent school discontinuation and the transmission of Sexually Transmitted Infections (STIs)²⁴.

The demonstrated trend in school girls' abuse has been met with awareness-creation efforts by the Ministry of Health, Community Development, Gender, Elders and Children, as well as counter initiatives by local NGOs, such as the recent seminar for commercial and commuter bus operators held in Dar es Salaam by WAJIKI. Broader measures to combat VAC nationally include capacity development investments for LGA personnel, gender and children desks of the police force, justice actors and health workers. In 2016, the Ministry launched the National Plan of Action to End Violence against Women and Children (NPA VAWC) 2017/18-2021/22. The plan sets out ambitious targets to eliminate violence against women and children by 50 percent by 2021/22. In response to the directives set out in the plan, some schools are working to establish violence-free desks and anonymous incident report boxes where children can report cases of abuse. Guidance and counselling teachers can also refer VAC cases to a social welfare officer, provided trained officers are available. The government has also furthered the establishment of dormitories for public secondary school girls, aimed at reducing travel to school and the risks of violence *en route*²⁵.

4.6.9 Safety and Security Issues

The year 2016 saw a total of 153,327 criminal offences in Dar es Salaam Region, which were addressed by a police force totalling 1998 officers (Inspector General of Police, 2017). With regards to the transport sector, a staggering total of 774,765 traffic offences were registered in the region, with a corresponding

²⁴ News in Africa. 2018. Tanzanian Bus Drivers Asked to Stay Away from School Girls. Accessed at <https://www.newsinafrica.co/2018/03/16/tanzanian-bus-drivers-asked-to-stay-away-from-school-girls/> on 24/07/2020

²⁵ Together for Girls. 2019. Accelerating Action to Address Violence Against Women and Children. Key Lessons from the Together for Girls Partnership in Tanzania.

police force of only 651 officers. Street crime has also plagued the transport corridors of Dar es Salaam city. Table 4-25 below itemizes the typology and prevalence of the criminal offences in the districts of Ilala, Kinondoni and Temeke for the period of January- December 2016 (Inspector General of Police, 2017).

Table 4-26: Incidence of different crimes in Dar es Salaam

	Murder	Rape	Human trafficking	Armed robbery	Robbery with violence	Break-ins	Drug smuggling	Illegal immigration	Unnatural offences (i.e., other sexual offences ²⁶
Ilala	77	278	5	41	313	1554	4	22	87
Temeke	72	395	9	23	131	976	4	27	157
Kinondoni	159	467	4	65	397	3088	0	47	176

Source: Inspector General of Police, 2017

It is important to note potential understatements in the above statistics given the demonstrated history of urban crimes going unreported for reasons including fear of reprisal, fear of societal stigma that could ensue from disclosure of acts of sexual violence, and lack of time and/or resources for distant and bureaucratic legal recourse.

The reported incidences of homicide show a substantial gender disparity, with over 95% of cases involving male victims (Inspector General of Police, 2017). Leading causes of homicidal crime in the city are violent robbery, theft-related extrajudicial killings by the mob, and domestic violence. As an insecurity of particular threat to public transit, street crime is typically opportunistic, targeting people carrying bags, backpacks, computer cases, cameras, purses, or valuables left in plain sight inside a vehicle and existing public transport (*daladala*, *bajaji* and *bodaboda*). Most of these snatch-and-grab crimes have been reported to involve unarmed assailants who operate in small groups that, by default, improvise mugging on a covert and solitary basis. Upon the victim's resist, additional members pitch in with weapons such as knives, machetes and,

²⁶ Definition of unnatural offences under the national penal code (Tanzania Penal Code (CAP 16), 1981) include any person who has carnal knowledge of any person against the order of nature, has carnal knowledge, an animal; or permits a male person to have carnal knowledge of a felony, and is liable to imprisonment for fourteen years.

less commonly, firearms. Gang violence is also rampant within the city's low-income zones. Infamous gangs referenced in recent studies include *Panyarodi*, *Abajalo*, *Wakush*, *Vibe*, *Stars* from Sinza, *Wamarekani Weusi*, *Panga Nasia* and *Watoto wa Mbwa* (Reisman et al, 2013).

Besides existing capacity gaps within the law enforcement sector, notably the shortage of manpower, penal laxities resulting from low clearing rates of criminal cases and inordinate strains on detention facilities, fundamental drivers accounting for the high crime rates in Dar es Salaam include: a steadfast urbanization rate; unemployment, endemic poverty and income inequality; lacking development programming for poorly serviced informal settlements; corruption; and porosity of national borders and deficient customs facilities at border checkpoints and other international transit entry points.

Though the results of a recent impact assessment survey on Phase 1 of the BRT project suggest that security has not been an issue of notable concern since the system's commissioning (Morten et al, 2020), petty crime and sexual harassment that arises in public spaces, BRT stations and inside congested BRT buses continues to undermine public safety and security.

The above discussed gender-related issues should be considered and carefully integrated in the decision-making process throughout design, construction and operation of the BRT Phase 5. A versatile Gender Action Plan (GAP) developed in line with internationally recognized guidelines on gender performance is attached in Appendix VI to facilitate and provide guidance on the integration of gender-related matters in the project life cycle. The applied guidelines include the guidance note *Mainstreaming Gender in Road Transport: Operational Guidance for World Bank Staff* (2010) and the *Gender Guidance Note on Urban Rehabilitation and Transport Projects* by the European Bank for Reconstruction and Development (2011). Other incorporated guidelines are *World Bank Good Practice Note on Gender* (2019), and *World Bank Gender Equality, Poverty Reduction and Inclusive Growth* (2015).

In terms of corruption at the global level, Tanzania's position in the Corruption Perceptions Index (CPI) in 2019 is ranked 96th out of 180 countries assessed by Transparency International, a rank that depicts an improvement for the past 3 years with the onset of the fifth government regime. It is important to note that Tanzania's score has been regularly progressing since 2015, and it is ranked 2nd in East Africa after Rwanda (Transparency International 2019; Trading Economics 2019). With the new government administration and jurisdictions that have been brought under the spotlight, the country's score has slowly been dropping from 45 (2016 and 2017), 43 in 2018, to its present value (Global Integrity, 2019). Findings by the Bertelsmann Stiftung's Transformation Index place Tanzania 64 out of 129 countries whereby its findings indicates that corruption resides mainly amongst the political and economic elite, and in lower levels of administration, private and public sectors, civil society, faith-based organizations, and the general public (Bertelsmann Stiftung, 2018).

In term of peace, the 2020 Global Peace Index report (GPI) report ranks Tanzania the most peaceful nation in East Africa and 7th in the Sub Saharan Africa hence attracting both foreign and domestic developments by maintaining the peace in the country.

4.7 Glance at COVID-19 in Tanzania

Despite being amongst the countries with a low number of COVID-19 cases in East Africa, official government statistics have indicated an increase in patients that had been affected starting the third week of March 2020. Records and reports show that the number of victims increased from less than five (5) patients in the third week of March 2020 to 254 patients, with the incidence often deaths five weeks later by mid-April 2020. Dar es Salaam was the most hit region in the country and the national epicentre of the pandemic (UNDP, April 2020). As shown in Figure 4-32, official information released by the Ministry of Health showed that by April 29, 2020 the total number of cases had reached 480 and comprised of 16 fatalities and 167 recovered patients. Dar es Salaam accounted for about 46% of all cases (see Figure 4-32 below). Official government sources quoted in the media show that the number of officially registered patients in all health facilities throughout the country was 66 by second week of June 2020.

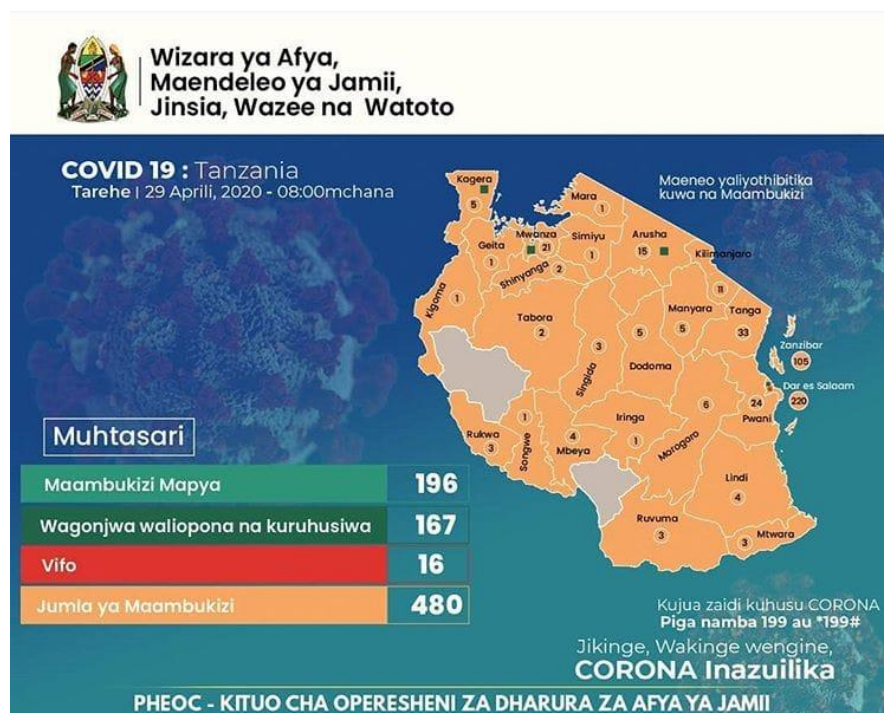


Figure 4- 32: COVID-19 statistics and transmission in Tanzania by April 29, 2020

Source: MHCDGEC, April 2020

The Ministry of Health in Tanzania mainland and Zanzibar enforced some of the measures brought forward by the World Health Organization (WHO) in order to control the spread of COVID-19. These include the appliance of personal hygiene, utilization of face masks, social distancing and fourteen (14) days quarantine for suspected or exposed individuals where applicable. Nevertheless, the pandemic's impact on the socio-economic sector has been immense. Poor and vulnerable groups in the local society have been greatly affected. Economic sectors such as the tourism and hospitality industry, transport and storage, wholesale and retail trade, agriculture, finance and Insurance have also been adversely affected (UNDP, April 2020). Vulnerable groups such as the disabled, women, youth, rural communities and marginalized urban dwellers in the informal sector being the most impacted in the society.

The International Monetary Fund (IMF) has approved a debt service relief of USD14.3 million. This will aid the country in dealing with the social and economic effects caused by the pandemic (IMF, 2020). The constant use of sanitizers, safety masks, running water and soap has proven cost effective and has left the poor quite vulnerable and exposed to the pandemic. Most of them have little or

no access to water especially in rural areas. Measures that have been put in place by the government have limited people's mobility leaving self-employed businesses in the informal sector at risk. This also affects women as most of them work in low paying informal sectors or run their own micro and small enterprises (NBS, Women and Men Facts and Figures, 2018).

The transportation sector, road transportation being the main sub-sector in Tanzania, promotes movements of people and goods within Tanzania and to neighbouring countries. The Ministry of Finance Planning Budget in the fiscal year 2018/19 gave an account of 5.7 million air travellers in international flights in Tanzania Mainland. Measures brought forth by the government to control the spread of COVID-19 in the transport sector through the Land Transport Regulatory Authority (LATRA), have been of benefit yet have proven rather costly, with a low level of income due to fewer passengers per route. Other potential customers avoid trips upcountry altogether. Customers on the other hand have had to resort to cheaper transport means such as three-wheelers (*bajaji*) and motorcycles (*bodaboda*) to avoid long bus waiting times. Due to entry restrictions and flight layoffs there has also been a drastic decline of revenue in airports, airlines and airport cargo handling companies.

Marine transport important for the transport of traders and tourists travelling back and forth amidst Zanzibar, Dar es salaam and Tanga. The Zanzibar Socio-Economic Survey highlighted that there were 2,709,000 marine passengers in 2018. The interruption in marine transport has caused a decrease in import and export of goods in both the manufacturing and agricultural sector (UNDP, April 2020).

In education, the sector in Tanzania has been put on a standstill as the schools were put on closure because of the pandemic. All schools, colleges and universities throughout the country were closed on March 17, 2020 as one of the measures to curb further spread of the pandemic. High schools and universities were re-opened on June 01, 2020 and the rest of the schools (primary and ordinary level secondary) effectively from June 29, 2020.

4.8 Non-Government Organizations

A number of Non-Governmental Organizations (NGO) offices are located along the project roads. These NGOs can generally be categorized into two groups; i.e. those providing various services to the needy and those focusing on advocacy and accountability for change in the way the government functions. The Ilala municipal has 212 registered groups (89 NGOs, 111 CBOs; 3 FBOs and 9 ITs). TANROADS and DART can draw on the support and agency of these organizations in the planning and execution of livelihood restoration and other mitigative initiatives to address socioeconomic impacts on PAPs.

Table 4-27: NGOs identified along the BRT PHASE 5 roads.

Name of NGO	Main services offered
Tanzania Gender Network Program (TGNP)	Research and Advocacy for women rights and participation
Kiota Women's Health and Development (KIWOHEDE)	Support to Women and Girls rights to health and provision of health-related services
Dominion Youth Foundation	Health System Strengthening & Health Policy Formulation
Women in Social Entrepreneurship (WISE)	Economic and Social Empowerment of women
Save your Generation Tanzania (SAGETA)	Health, Education, and Psychosocial Support
CHIMABA	Business training, empowerment of people, guidance on life and survival skills
Centre for Widows and Children Assistance (CWCA)	Human Rights, Legal Aid and Psychosocial Support for women, Children and vulnerable groups
PASADA	Health, Education, and Psychosocial Support
African Children Life Vision Recovery Foundation	Advocacy and capacity building and counseling services for Children
Poverty Alleviation Society of Tanzania	Economic and Social Empowerment

Source: Fieldwork, 2018/2019

4.9 Planned Development Activities

There are no known planned or ongoing development activities along these roads that could interrupt project activities or those which could cause physical or economic displacement to residents and users except for the BRT Project. Development activities observed were mainly private and in the form of construction of commercial or residential buildings. However, there are ongoing

projects that could affect or be affected by the project are summarized in Table 4-28 below.

Table 4-28: Major infrastructure projects along the BRT 5 corridor

Project	Remarks
Dar es Salaam Metropolitan Development Project (DMPD)	Dar es Salaam's economy and infrastructure suffers from frequent and severe flooding, and the situation is likely to get worse in the absence of major interventions. - Construction of Flood Control and Storm Water Drainage in Temeke Municipality Package 5: Kizinga River, and - Construction of Flood Control and Storm Water Drainage System in Ilala Municipality - Package 2: Msimbazi River Basin.
Ubungu Interchange	Currently under construction, key linkage between BRT network along Mandela, Sam Nujoma and Morogoro
Dar es Salaam – Makutupora Standard Gauge Railway (SGR)	Currently under construction, which is intended to replace the old metre-gauge railway system. The SGR will cut across project road at TAZARA junction.
TAZARA (Mfugale) Flyover along Nyerere road	Completed, currently operational. The 560m long bridge links Kigamboni municipality with the rest of the city, connection to the Dar port and the BRT Phase 5 terminal to be located nearby the bridge.
Kigamboni toll bridge (Nyerere bridge)	Completed, links Kigamboni municipality and other parts of the city, to be connected with BRT Phase 5 route with a bus terminal nearby the bridge.
Modernization of the Dar es Salaam port under Dar Maritime Gateway Programme	On-going port improvement, upgrading of Port Access Road is a key infrastructure for the efficiency of the port
Buguruni Sheli pedestrian flyover	Pedestrian flyover across Mandela road at Buguruni.

Consultant, July 2020

4.10 Data Gaps and Limitations

The data gaps and limitations identified are related to the below presented subjects, all of which can be determined, and it is recommended to be included in the fieldwork plans for the development of the project's Environmental and Social Management System (ESMS) prior to the commencement of the works.

- *Traffic accidents records along BRT Phases 1 and 5 corridors* could not be accessed. Analysis of accidents and security records involving BRT Phase 1 operations will provide valuable site-specific insights, trends, patterns and the most vulnerable/affected groups in relation to BRT operations to inform design and subsequent ground interventions.
- *Records of public transport operators particularly daladala plying along Mandela road, Port Access Road, Temeke and Tabata roads.* Once BRT

Phase 5 is operational, daladala will cease to operate along the routes. This is important in supporting livelihoods analysis and restoration plans.

- *Water quality sampling at Msimbazi, Tenge and Ubungo/Kibangu rivers:* number of samples collected, specific sampling locations, seasonality consideration and sampling protocols applied. Seasonal variations (dry and wet) and samples analyses from upstream, midstream and downstream will provide a comprehensive analysis of potential impacts and mitigations especially aquatic and riparian habitats, downstream users (domestic & horticulture farming), contaminations tracing and monitoring throughout construction period (36 months plus 12 months of DLP).
- *Ambient air quality and emissions:* due to the lack of long term reliable local air quality monitoring data (at least 7 days and nights measurements for all key parameters at ideal and pre-determined representative sampled locations) and detailed traffic data in the required format, it has not been possible to carry out a detailed air quality dispersion modelling assessment. Therefore, a qualitative assessment approach has been adopted in the assessment supported by interpretation of the traffic information available from the design reports (economic, and transport and traffic reports), assumptions and professional estimations. However, it is recommended that a further detailed assessment should be undertaken when such information becomes available before commencement of construction activities.
- *Acoustics and vibration data and assessment:* like air quality, the existing survey data is lacking in detail in terms of the monitoring approach, period and metrics stated. As no data has been provided to determine the baseline noise condition at night, the assessment considered only daytime working. It is recommended to undertake further comprehensive monitoring and analyses (pre-construction conditions) to ensure adverse impacts can be reduced particularly during night time where sleep disturbance is more likely to occur. For the assessment of the operation phase noise, flow data for the baseline scenario has been provided as 24-hour Annual Average Daily Traffic (AADT) flows, while the calculation methodology requires input data as 18-hour Annual Average Weekday Traffic (AAWT). As no correction factor has been provided, AADT has been used within the assessment. This may result

in a variance in the predicted absolute noise level. Further pre-construction noise monitoring will provide an accurate representation of acoustic and vibration levels at sensitive receptors. Revision of the assessment outcomes may be required following the baseline monitoring exercise.

- *Biodiversity data and assessment:* A comprehensive full season biodiversity survey (as per IFC PS6 and World Bank ESS6) requires more time for field sampling in all habitats over the dry and wet seasons to capture and articulate seasonal variations in line with specific construction activities. Such thoroughness was not feasible and therefore most records of occurrence are based on literature and Consultant's experience. The presence and abundance of flora, fauna, aquatic and marine species (along the shores) will vary seasonally and in response to environmental conditions. It is likely that additional species are present but were not captured. Additional surveys, undertaken at different times of the year would be required to validate species abundance and diversity and presence. Subsequently, more fieldwork assessment will be required in order to develop the Biodiversity Action Plan (BAP) for the project's ESMS before commencing construction works.
- *Stakeholders engagement and public involvement:* comprehensive and representative comments, concerns, issues and suggestions from the pertinent stakeholders within and outside project corridor is lacking. Detailed engagements should be undertaken as proposed in the Stakeholders Engagement Plan (SEP)

5.0 STAKEHOLDER ENGAGEMENT AND PUBLIC CONSULTATIONS

This Chapter presents all the stakeholders identified and consulted and elaborates on the main issues and concerns raised by these stakeholders during the study. The engagement process was aligned with requirements of the EIA and Audit Regulations 2005 and its 2018 Amendment, IFC Performance Standard 1 (Social and Environmental Assessment and Management Systems) guidelines paragraphs 25-33, and World Bank ESS1 (paragraphs 51-53) and ESS10 (Stakeholder Engagement and Information Disclosure). Therefore, stakeholder consultations were carried out during the reconnaissance visit, scoping and impacts assessment stages.

Emphasis is placed on the involvement of the key stakeholders, their fundamental concerns and incorporation of the stakeholders' issues in the decision-making process and entire project life cycle. Recording stakeholders' views and preferences was essential to inform the identification of impacts and highlighting effective mitigation measures that are presented in this ESIA report.

5.1 Objectives of the Consultation and Public Participation

The overall objective of the consultation process was to disseminate project information and to incorporate the views of stakeholders in the project design and operation including environmental and social mitigation measures, management and monitoring plans. The specific objectives (aligned with IFC PS1 and national legislative requirements) of the consultation process were to:

- Improve project design and, thereby, minimize conflicts and delays in implementation;
- Ensure the community and other key stakeholders are aware of the BRT Phase 5 project process and operations;
- Consult stakeholders to gather the information needed to complete the assessment;
- Increase long term project sustainability and ownership;
- Facilitation of the institutional coordination; and
- Incorporate the stakeholders' concerns in the project development and life cycle.

5.2 Stakeholders Identification and Engagement Plan

Identification of key stakeholders was based on the role and relevance and influence of an organization, group or individual to the proposed project. Stakeholders that can influence and/or affect the project and those who can be influenced and/or affected by the project were predetermined based on their roles and pertinence to the project, nature of the proposed project activities, discussions with the Client and the Consultant's experience. Stakeholders are found at both national and local levels and range from government authorities to local community members. The main stakeholders were identified and drawn from categorical groups of project proponents, relevant administrative and regulatory authorities, agencies, local communities, nature of the proposed project activities, and other interested and affected parties. Stakeholders are found at both national and local levels and range from government authorities to local community members. This stakeholder identification and plan of engagement is presented in the stand-alone Stakeholder Engagement Plan (SEP) in Appendix VII. The SEP provides a roadmap for the continuous engagement with the key stakeholders throughout the project phases. Summary of the consulted stakeholders is presented in Table 5-1. Signatures of the consulted stakeholders at all levels are included in Appendix VIII and minutes (from the affected communities) are found in Appendix IX.

5.3 Engagement Process

As per IFC PS1 and World Bank ESS10 requirements, three rounds of engagement are to be conducted whereby two rounds of stakeholder consultations have been performed and, the third round will be the stakeholder disclosure workshop as detailed in the below subsequent sections. The first round during project registration and scoping phase, second round during detailed baseline assessment and third round will be the public disclosure workshop. The public consultation for the proposed project was conducted simultaneously with the fieldwork targeting the various groups of stakeholders.

5.3.1 Project Registration and Scoping Phase

During project registration and undertaking of Scoping, some government agencies and/or authorities such as TANROADS, Dar es Salaam regional

secretariat and municipal councils were consulted for the purpose of introducing the project, gathering preliminary information especially the project corridor and facilitating access to the corridor through local level authorities.

5.3.2 Detailed Baseline Studies Phase

Community and other stakeholder consultations along the BRT Phase 5 corridor were carried out parallel to other fieldwork assessment for the ESIA and RAP. This round of consultation was integrated in the socio-economic survey and engagement with the affected communities/PAPs during PAP Census for the RAP. For the ESIA purposes, consultations were mainly with the local government leaders (Ward and *Mitaa* leaders) along the project route, while for the RAP directly affected communities were targeted. During consultative meetings and discussions with the stakeholders, details provided and clarified included: purpose, nature, and scale of the project; duration of proposed project activities; potential opportunities etc. This was based on prior discussions and alignment with TANROADS regarding key messaging and information disclosure.

5.3.3 Public Disclosure and Workshop

In compliance with IFC PS 1 (2012) paragraph 29²⁷ and World Bank ESS10²⁸, disclosure of relevant project information helps affected communities and other interested stakeholders understand the risks, impacts and opportunities of the project. The PS1 requires TANROADS to provide affected communities and any other stakeholders with access to relevant information. The World Bank ESS10 requires that before a sub-project is approved, the applicable documents (in this case BRT Phase 5 ESIA and RAP) must be made available to the public for review at a place accessible to communities and interested parties (e.g. at a district council office, relevant environmental authority) in a form, manner, and language they can understand. This will allow the public and other stakeholders to comment on the possible environmental and social impacts of the project. It

²⁷Disclosure of relevant project information helps Affected Communities and other stakeholders understand the risks, impacts and opportunities of the project. The client will provide Affected Communities with access to relevant information on: (i) the purpose, nature, and scale of the project; (ii) the duration of proposed project activities; (iii) any risks to and potential impacts on such communities and relevant mitigation measures; (iv) the envisaged stakeholder engagement process; and (v) the grievance mechanism.

²⁸ World Bank ESS10 paragraphs 19-20

also helps the appraisal team to strengthen the frameworks and/or management plans as necessary, particularly measures and plans to prevent or mitigate any adverse environmental and social impacts.

Toward this end, TANROADS will convene a Stakeholders Disclosure Workshop to be held in Dar es Salaam, and the final ESIA report will be publicly released as per the World Bank's *Public Consultation and Disclosure Policy*. The objective of the workshop is to disclose and discuss the ESIA (and RAP) reports, findings and soliciting further comments from the wider public. Participants from the workshop will include representatives from the affected communities, PAPs along the corridor, affected utility authorities, *daladala* operators along the corridor, civil society organizations, private sector, development partners, and various government agencies. Key concerns, comments, and suggestions from stakeholders will be documented and incorporated in the ESIA report. Given the diversity of the participants, it is recommended to use Swahili as the medium of communication during the workshop.

Further, TANROADS will publicly disclose this ESIA, in English and the Non-Technical Executive Summary in Swahili and make copies available and distribute with a letter accompanied to the respective local government authorities concerned. The final reports will be published on TANROADS's website and the World Bank's *Info Shop*.

5.4 ESIA and RAP Consultations Along BRT Routes

The engagement activities with the public undertaken to-date are mainly related to those carried out since February 2018, at the outset of the study. The stakeholders were consulted to solicit concerns and seek the views, opinions and seek their assistance and involvement in the project implementation processes as required. The consultations were of critical importance in gaining insights into the key environmental and social issues, concerns of communities and other stakeholders, and in aiding the development of potential strategies for addressing these impacts.

Consultative meetings, interviews and discussions were held with staff members of the respective organizations depending on the type of data required. A checklist of guiding questions and/or themes was prepared before holding an in-depth discussion with all stakeholders. In-depth interviews (semi-structured) and key informant interviews were held with staff members/key informants of the government institutions, agencies, regional, municipal levels depending on the type of data required. For the ESIA part, representatives were Municipal officials, and local leaders from the following wards: Ubungo, Makuburi, Buguruni, Mnyamani, Tabata, Liwiti, Segerea, Miburani, Sandali, Temeke, Azimio, Kurasini, and Kigogo. The interaction with relevant national stakeholders (Ministry of Works, Regional Administration, DART, TANROADS, Ministry of Land, Housing and Human Settlements Development etc.) comprised official submitted letters requesting relevant information on environmental and social resources conditions.

During RAP consultations at the community level, public meetings and Focus Group Discussions (FGDs) were held at the community level with the assistance of *Mitaa* leaders along the project area. Data collected during the public forums included data on the particulars of the community members and their opinion on the proposed project. During the RAP exercise, seven (7) meetings were held between September and December 2018, and eight (8) meetings between April and June 2019. Tables 5-1 and 5-2 below presents an overview of the consulted stakeholders.



Figure 5-1: Consultation with PAPs in Kigogo Ward

Source: Fieldwork, March 2019

Table 5-1: Consultations carried out as part of the ESIA

Level	Institution	Mtaa	Meeting Date	Participants		
				Total	Male	Female
MDAs	TANROADS (Maintenance Engineer)	Not applicable	24/09/2018	1	-	1
Temeke Municipality	Ag. Municipal Director	Not applicable	24/09/2018	1	1	-
	Municipal Human Resources Officer	Not applicable	26/09/2018	1	1	-
	Municipal Economist	Not applicable	26/09/2018	1	1	-
	DMDP – Coordinator	Not applicable	24/09/2018	1	1	-
	Azimio Ward (WEO)	Not applicable	11/10/2018	1	-	1
	Miburani Ward (WEO & Mtaa chairperson)	Not applicable	15/10/2018	2	2	-
	Kurasini Ward (WEO)	Not applicable	15/10/2018	2	2	-
Ilala Municipality	Kurasini ward (Mtaa chairperson)	Minazini	15/10/2018	1	1	-
	Ilala Municipal Council (WEO)	Not applicable	09/10/2018	1	1	-
	Buguruni ward (Mtaa Chairperson)	Matumbi	09/10/2018	1	-	1
Ubungu Municipality	Ilala Municipal Council (Mtaa chairperson)	Mandela	09/10/2018	1	-	1
	Ag. Municipal Director	Not applicable	25/09/2018	1	-	1
	Makuburi (WEO)	Not applicable	10/10/2018	1	1	-
	Mji Mpya (Mtaa Executive Officer)	Mji Mpya	10/10/2018	1	1	-
Total	Mji Mpya (Mtaa Chairman)	Mji Mpya	11/10/2018	1	1	-
				18	13	5

Source: Fieldwork, 2018

Table 5-2: RAP consultations (PAPs meetings) disaggregated information

No.	Ward/Institution	Mtaa	Meeting Date	Participants		
				Total	Male	Female
1.	TARURA – Temeke Municipality (Quantity Surveyor)	Not applicable	16/07/2019	1	1	-
2.	Temeke Municipal Council (Ag. Municipal Engineer)	Not applicable	16/07/2019	1	-	1
3.	Temeke Municipal Council (Town Planning)	Not applicable	16/07/2019	1	1	-
4.	Sandali (Mtaa Executive Officer – (MEO))	N/mentioned	16/07/2019	1	-	1
5.	Mnyamani Ward - Ward Executive Officer (WEO) Office	Not applicable	16/07/2019	2	2	-
6.	Ubungu Ward	Riverside	19/07/2019	22	12	10
7.	Kigogo Ward	CCM	07/05/2019	1	-	1
		Mkwajuni	07/05/2019	56	36	20
		Mbuyuni	07/05/2019	11	7	4
		Kati	07/05/2019	20	11	9
Total				116	70	46

Source: Draft RAP Report (Appendix 1), Nov. 2019

5.5 Main Concerns and Issues from Stakeholders

The comments, concerns and issues raised from these public consultations were reviewed and incorporated into this ESIA and project development decision

making process. The following were the main issues received during the public participation process:

- Compensation for land, commercial activities and buildings at market price;
- The width and alignment of the proposed road;
- Time frame for the project and time for moving the properties from the road reserve;
- Employment to local communities especially during construction;
- Safety while crossing the road especially students/pupils;
- Contractors should be familiar and respect community's views;
- Transparency in the valuation exercise;
- Utilization of the existing empty spaces along the project route instead of built ones;
- Use of peaceful means in addressing RAP related issues than force; and
- Construction of service parks.

5.6 Responses to Stakeholders' Concerns

Table 5-4 below presents a summary of the responses to the stakeholders' concerns and the incorporation of these into the BRT design, development and operation processes.

Table 5-3: Issues and comments response table

S/N	Issue/Comment	Response	Section Addressed in the ESIA Report
i.	Employment opportunities	Local communities and PAPs along the project road will be given priority in the employment opportunities. The Contractor will be required to develop, implement and report on the project's local content plan. Equal employment opportunities shall be offered	7.1.1.1, 7.1.2.1, 7.1.2.2, 7.1.2.4, 7.1.3.6, 7.2.2.15, ESMP and EMP
ii.	Pedestrian safety in crossing roads	Safe access corridors and crossings will be provided for pedestrians during construction. A construction Traffic Management Plan has been developed to guide traffic flow and provide safety measures to be implemented to ensure safety of construction workers, vehicles, pedestrians and surrounding communities	7.2.2.10, 7.2.4.3, ESMP and EMP
iii.	Compensation for land, commercial activities and buildings at market price	Transparent and inclusive valuation and compensation exercises will be implemented using national guidelines and international requirements (World Bank). The Resettlement	7.2.1.1, 7.2.1.2, ESMP, EMP

S/N	Issue/Comment	Response	Section Addressed in the ESIA Report
		Action Plan is being developed for implementation along the affected communities. The RAP will allow for resettlement in form of cash compensation and in-kind compensation (i.e. land for land replacement) in accordance with local regulations and international standards. A Livelihoods Restoration Plan (LRP) for physically and/or economically resettled PAPs will also be formulated and implemented in addition to the RAP. According to the Land Act, compensation has to be implemented within 6 months after the approval of the Valuation Report by the Chief Valuer. If the compensation will not be affected in this period, it will accrue an interest which is equivalent to the rate of fixed deposit in the Commercial Bank	
iv.	Time frame for the project and time for moving the properties from the road reserve	Construction phase is expected to take 36 months exclusive of 12 months for DLP. Before commencement of construction activities ample time will be provided for relocation, and TANROADS in collaboration with local authorities will ensure that all resettlement-related grievances have been resolved	2.4.3, 7.2.1.1, ESMP, EMP, Appendix VII
v.	Valuation transparency	Valuation exercise has been carried out in a transparent and in consultation with all key stakeholders. Computation methodologies, eligibility, entitlement and guiding national requirements were clarified during meetings with PAPs	7.2.1.1, separate RAP report
vi.	Grievances redress	A comprehensive, user-friendly and accessible Grievances Redress Mechanism will be made available throughout construction the project. All grievances will be promptly attended as per the mechanism	7.2.1.1, Appendix VII
vii.	Project road alignment and road reserve	The total width of the road reserve required is 60m according to the Roads Act of 2007. The detailed design strived to maintain and utilize the existing road reserve to the extent possible to minimize resettlement and livelihoods disruptions. However, in some sections horizontal re-alignment has been unavoidable in order to attain design requirements including safety of the infrastructure	2.3.4, 6.1.2
viii.	Use of free/empty spaces or land	Existing empty spaces/land in the municipalities will be given priority for establishment of various facilities such as stations, depots, terminals, and contractor camps to avoid resettlement and encroaching built up areas	2.6.3
ix.	Parking services/service bays parking service for trucks from port instead of using petrol stations	Noted and incorporated into the design. Service bay will be included in the design	2.3, 2.3.6, 7.1.3.1, 7.1.3.2

S/N	Issue/Comment	Response	Section Addressed in the ESIA Report
x.	Community sensitization: People should be well educated so that they can easily understand about the project; otherwise the project implementation may be very difficult	There will be on going stakeholder engagement, public consultations and effective information flow through the public meetings about the project – starting with the consultation during ESIA and during RAP exercise and also during disclosure of the ESIA report. The Stakeholders Engagement Plan has been developed to ensure continuous involvement of the key stakeholders throughout the project life cycle	7.2.1.2, 5.4.2, Appendix VII, ESMP, EMP
xi.	Provision of land new plots for resettlement	The compensation includes the land value, which will be used to purchase another plot. However, priority of buying plots will be given to the affected persons. The compensation amount should be used to buy a new plot as indicated in Land (Compensation Claims) Regulations, 2001)	7.2.1.1, ESMP, EMP
xii.	Compensation for shops/kiosks owners and tenants.	All affected business undertakings will be compensated for, and allowance including for loss of profit for 36 months will be paid. Compensation for tenancy includes payment equivalent to 36 months of rents	7.2.1.1, ESMP, EMP
xiii.	Loss of parking for taxi drivers along the corridor	The parking/car service area along the road will be considered in the design in consultation with affected persons. During the construction, the municipality will assist to get temporary parking for taxis, <i>bajaji</i> and <i>bodabodas</i>	7.2.1.1, ESMP, EMP
xiv.	Sensitization seminars on HIV/AIDS and sexually transmitted diseases should be given respective community groups dealing with such issues	During construction HIV/AIDS services will be provided in collaboration with the local NGOs, health facilities, TACAIDS and respective municipal councils. The project has identified a number of measures including HIV/AIDS Plan to be implemented to minimize long term adverse impacts related to HIV/AIDS	2.8.1, 2.8.2, 7.2.2.12, ESMP, EMP, Appendix XI
xv.	Sexual harassment of women especially food vendors (by construction staff)	No form of sexual harassment, assault, GBV or VAC will be condoned at the construction stage. The project has identified and strict preventive and control measures to curb the situation. These measures and Plans such as Gender Action Plan, Protection against Sexual Exploitation and Abuse (PSEA) are further detailed in the mitigation measures. All local and national regulatory bodies and NGOs will be highly involved in controlling and monitoring	7.2.2.14, 7.2.2.15, 7.2.4.4, ESMP, EMP, Appendix VI, Appendix XI
xvi.	Vegetation clearance & environmental degradation during construction	Vegetation clearance shall be restricted to project footprint area only. After construction, landscaping including replacing trees and other vegetation types will be done by Contractor	7.2.1.4, 7.2.2.4, ESMP, EMP

5.7 Additional Consultations

The BRT Phase 5 corridor is situated in a highly urbanized urban setting with a wide range of stakeholders with direct influence on and/or interest in the project. In this case, order to fully comply with the IFC PS1 and World Bank ESS10 and ensure long-term sustainability, the SEP (Appendix VII) identifies, analyse and map pertinent stakeholders to be engaged in a transparent, continuous and culturally appropriate manner throughout the project life cycle. These consultations will be undertaken during the process of developing the project's ESMS in the pre-construction phase. This will entail an inclusive and culturally appropriate on-going process, which involved soliciting concerns, issues sharing information and knowledge, seeking to understand the concerns of key stakeholders and building relationships based on collaboration. A summary of key stakeholders to be consulted is presented in Table 5-3 below and a detailed description is included in the SEP (Appendix VII).

From table 5-3 below:

- stakeholders have been identified and categorized into various groups ranging from government ministries, departments, agencies to municipalities, ward, *mtaa*, community, civil society, private sector, and other interested and affected parties;
- stakeholder's connection to the BRT Phase 5 entails pertinent role(s) of the stakeholder in relation to the BRT5 at any stage from conceptualization, design, financing, construction, transition, operation and maintenance;
- level of impact of the BRT5 project to the stakeholder (to what extent the project activities will impact the stakeholder) ranked as 'high', 'medium' or 'low';
- level of influence on the project (ranking of stakeholder's influence on project activities as 'high', 'medium' or 'low'; and
- stakeholder's level of interest on the project ('high', 'medium' or 'low').

Table 5-4: Tentative pertinent stakeholder identification for further consultations

Stakeholder Group	Key stakeholder	Connection to the Project	Level of Impact	Level of Influence	Level of Interest
Ministries, Departments and Agencies (MDAs)	President's Office-Regional Administration and Local Governments Authorities (PO-RALG)	Oversee the infrastructure development projects in Dar es Salaam through Regional secretariat and municipal council	Low	High	High
	Vice President's Office-Environment and Union Affairs (specifically Division of Environment)	Environmental compliance guidelines, issuing EIA certificate for the project	Low	High	High
	Ministry of Works, Transport and Communications	Oversee transport sector development including BRT Phase 5 through TANROADS	Low	High	High
	Ministry of Lands, Housing and Human Settlements Development	Facilitating land acquisition, approval of the valuation report (Chief Government Valuer), land use planning	Low	High	High
	Ministry of Finance and Planning	Facilitation of the project financing and negotiations	Low	High	High
	Ministry of Health, Community Development, Gender, Elderly and Children	Gender issues and vulnerable groups, diseases control and prevention, guidelines (e.g. COVID-19)	Low	Medium	Medium
	Wami/Ruvu Basin Water Board	Issues water use permit, boreholes drilling and extraction permit to the BRT contractor	Low	High	Medium
	Tanzania Forestry Services Agency (TFS)	Management of the national forest resources and forest-related services under. Applicable along Port Access Road (mangroves)	Low	Low	Medium
	Tanzania Rural and Urban Roads Agency (TARURA)	Management of the urban roads, some will be used for diversion and de tours during construction	Low	Medium	High
	Occupational Health and Safety Authority (OSHA)	Workplace safety regulation, registration, certification and equipment approvals (some)	Low	Medium	Medium
	Tanzania Ports Authority (TPA) – Dar es Salaam	Bandari road and Dar port operations. Port Access Road a key infrastructure to the port	Medium	High	High
	Tanzania Railways Corporation (TRC)	Dar-Morogoro SGR crossing, central railway line crossing (TAZARA/Buguruni junction), Dar commuter rail crossing at Tabata Mwananchi. Physical integration of the infrastructure	Medium	Medium	Medium
	Land Transport Regulatory Authority (LATRA)	Regulating/monitoring safety of the BRT buses operations, public fare rates/adjustment (consumers)	Low	High	High
	Fire and Rescue Force	Fire hazards/risks monitoring, support during accidents e.g. fire outbreaks, traffic accidents, flooding along the corridor	Low	Medium	Medium

Stakeholder Group	Key stakeholder	Connection to the Project	Level of Impact	Level of Influence	Level of Interest
	Department of Antiquities/National Museum	Chance Find Procedure and approvals during construction (if any)	Low	Low	Low
Project Proponent	TANROADS	BRT Phase 5 detailed engineering design including ESIA, compensation, construction supervision, safeguards implementation	Medium	High	High
	DART	Operating and supervision of the BRT services, infrastructure maintenance	Medium	High	High
Utility Authorities	Tanzania Telecommunications Corporation (TTCL)	Telecommunication towers, underground fibre optic cables, telephone transmission lines relocation. Provision of the internet services for the BRT's ITS system operation	Medium	Medium	High
	Dar es Salaam Water Supply and Sanitation Authority (DAWASA)	Water supply and sewerage network relocation along the route. Water service provision at the stations, depots, terminals.	Medium	Medium	High
	Tanzania Electric Supply Company Limited (TANESCO)	Power supply at the stations, depots, terminals; relocation of electricity lines and associated infrastructure along the corridor	Medium	Medium	High
	Tanzania Petroleum Development Corporation (TPDC)	Relocation of the gas pipelines likely to be affected along the route	Medium	Medium	High
	Vodacom, Tigo, Airtel, Halotel	Telecommunication towers, underground fibre optic cables relocation along the route	Low	Medium	High
Regional	Dar es Salaam Regional Secretariat	Advice, support and facilitate implementation of development projects and activities at the regional level including BRT	Low	High	High
	Dar es Salaam City Council		Low	Medium	High
Municipal	Temeke, Ilala, Ubungu and Kinondoni municipal councils (Directors and Technical Departments)	Oversee and facilitate implementation of BRT project including monitoring, facilitating land acquisition, compensations, access to ward and mtaa levels	Low	Medium	High
Ward	13 wards traversed by the project corridor	Directly affected communities/project beneficiaries as well	High	Low	Medium
Community	Community members in the respective <i>Mitaa</i> traversed by the project	Directly affected communities/project beneficiaries as well	High	Low	Medium
Development partners	World Bank	E&S Safeguards advice, experience in BRT development and implementation (Phase I)	Low	High	Medium
	French Agency for Development (AFD)	Project financing	Low	High	High
Private sector/public	Dar es Salaam Commuter Bus Owners Association (DARCOBOA)	Current public transport provider (dominant) along BRT Phase 5 route. Daladala owners along the route. These will be banned	High	High	High

Stakeholder Group	Key stakeholder	Connection to the Project	Level of Impact	Level of Influence	Level of Interest
transport operators		after BRT construction.			
	<i>Daladala</i> drivers and conductors along the corridor	Livelihoods relocation from banned <i>daladala</i> , employment, alternative routes	High	Low	High
	Tanzania Truck Owners Association (TATO)	Key users of the Port Access Road, and Dar port pertinent stakeholder. Cargo freighting in Tanzania and outside (SADC and Great Lakes region)	Medium	Medium	High
	Other existing public transport operators along the corridor e.g. <i>bodaboda</i> , <i>bajaji</i>	Public transport operators, livelihood activities	High	Low	Medium
	Industrial establishments & institutions along the corridor	Potential resettlement/land acquisition issues, accessibility to industrial premises, supply of goods and materials	Medium	Medium	High
Interested & Affected Parties (I&AP)	Project Affected Persons (PAPs) along the project corridor	Directly affected individuals (resettlement), compensations and relocation to pave way for the project	High	Low	High
Vulnerable groups	Vulnerable groups identified along the core project area e.g. association of disabled, women groups, single-parent/child/elderly-headed households, orphans etc.	Likely to suffer more from the project resettlement	High	Low	Medium
	Street vendors & micro-entrepreneurs along the route	Livelihood activities along the route	High	Low	High
BRT Phase I passengers	Commuters along Morogoro Road (sampled at Kimara Mwisho, Mbezi Mwisho, Morocco, Gereza and Kivukoni terminals)	Valuable commuting experience, issues and lessons learnt that can be transferred to enhance BRT Phase 5	High	Medium	High
Other I&AP	Public and private institutions, health facilities, NGOs, CBOs along the core project area	Advocacy groups, supporting project implementation, monitoring issues	Medium	Medium	High

Source: Consultant, July 2020

6.0 PROJECT ALTERNATIVES, IDENTIFICATION AND ASSESSMENT OF IMPACTS

This Chapter presents the various project alternatives and analysis of anticipated environmental and social impacts or issues that are expected throughout the project cycle i.e. mobilization phase, construction, demobilization, operation and decommissioning for the preferred alternative. The valued receptors affected by the planned and unplanned project activities have been identified and the nature and extent of potential negative and positive impacts are described and assessed.

6.1 Project Alternatives

One of the purposes of undertaking an ESIA is to determine whether there are alternative means of carrying out the project that could meet the project objectives from environmental, social and/or economic considerations. It is important to consider various alternatives early in the planning process and to provide a comparison of each based on economic, social, environmental and technological merits. In this case, impacts identification, analysis and development of the ESMP and EMP are based on the preferred project alternatives.

6.1.1 The 'No Project' Scenario

The no project alternative entails retaining the current status quo (no construction of BRT Phase 5 and Port Access Roads). Adopting this option would mean maintaining the current road infrastructure condition, public transport challenges in the city, and avoiding most of the negative effects associated with the presence of the project and missing all the positive benefits such as improved transport in Dar es Salaam City etc. The proposed project has many potential benefits as compared to negative ones. Therefore, this option is not a preferable one.

6.1.2 Alternative Project route

The important aspect of this project road is that it is envisaged to follow the existing alignment for both Port Access Road and the BRT Phase 5 roads. Most of the other routes that may be considered as alternatives for the project are

either very narrow or are occupied for other development activities. Since the proposed Dar es Salaam roads are gazetted as either regional or trunk roads and has been in use for many years, it leaves no or few other alternatives for the project routes. Since city residents are also familiar with the ongoing BRT Phases I & II, therefore the alternatives to the project route becomes limited. Therefore, the proposed route is considered the best route as BRT Phase 5 and existing Port Access roads.

6.1.3 Pavement Type Selection

Two major pavement options were considered for use: Portland Cement Concrete (PCC)/rigid and Asphalt Concrete (AC)/flexible pavements. The PCC and AC have different characteristics and advantages that influence pavement type selection. From the comparison in Table 6.1 below, PCC is a preferred option on BRT lanes and AC on mixed traffic lanes. Given that the BRT Phase 5 will be implemented in the urban area, frequent maintenance will be troublesome for road users. Consequently, the initial capital cost for PCC pavements may be higher than AC, but the long trouble-free condition of PCC pavements outweighs the overall cost.

Table 6-1: Pavement types comparison

Characteristics	Pavement Types	
	Asphalt Concrete (Flexible Pavement)	Portland Cement Concrete (Rigid Pavement)
Expected Life	Minimum design life 20-30 years	Minimum design life 10-20 years
Traffic Load	Suitable for heavily trafficked roads, certain terrains and roads where service interruptions due to maintenance and rehabilitation cannot be tolerated	Bituminous pavement is very sensitive to high traffic loading
Strength	Get stronger with time since its concrete strength matures with time	Strength is determined during construction process
Durability	Last longer than bituminous pavement	Plastic deformations
Cost	Construction unit cost is higher than AC	Construction unit cost is low compared to PCC
Maintenance	Requires very little maintenance and attention frequency	Needs very high maintenance and attention
Commonality	Need of concrete curing period. Disadvantage to the joint, noise	Advantage in immediate traffic pass. Advantage in flatness
Soil Impact	Can span weak spots in soil	Bituminous pavement cannot span.

Characteristics	Pavement Types	
	Asphalt Concrete (Flexible Pavement)	Portland Cement Concrete (Rigid Pavement)
	during due their rigidity	Early damage on differential settlement, fair adaptability
Climatic conditions	Suited to conditions which are wet and moist for long time in a year	Needs adequate treatment in moist and wet conditions. Bituminous pavements loss strength on exposure prolong poor drainage condition

Source: DED, Nov. 2019

6.1.4 Alternative Sources for Construction Materials

In order to minimize environmental degradation resulting from the opening of new sites, the project will source main construction earth materials from existing borrow and sand pits and quarry sites (refer Sections 2.5.1 to 2.5.4 above). Gravel for road bedding material will be extracted from existing borrow pits located in the Coast Region and which are currently used for regular maintenance of roads in Dar es Salaam. However, where necessary, both existing and new pits sites will be judiciously used. New borrow pits and quarries will trigger involuntary resettlement from land acquisition and further environmental degradation.

Water for construction works will be drawn from surface water resources with adequate supply and which meets water quality demands (perennial rivers – Section 2.5.4 above) in agreement with the local communities, other downstream users and Wami/Ruvu Basin Water Board (WRBWB). Therefore, the existing water supply utility from DAWASA tap water sources will not be used for construction purposes. Additionally, with permission from WRBWB, deep boreholes will be drilled to provide water for construction activities.

6.1.5 Fare Collection Systems in BRT Buses

Usually there are two types of fare collection namely manually issued paper tickets and advanced method of electronic device fare collection. The manual method involves considerable human efforts, resulting in delays for passengers and potential revenue leakages, while the electronic system makes fare collection process faster and more secure. The BRT Phase 5 will adopt an Automatic Fare Collection System (AFCS) platform that use electronics devices for fare collection, which is much more convenient to both passengers and the DART.

6.2 Impact Identification and Assessment

The proposed BRT Phase 5 project has the potential to cause a wide range of environmental and social impacts on its environs. These impacts are identified in this section with a view to enhancing the positive ones and mitigating the adverse ones. A methodology has been established to assess the significance of impacts in a transparent and consistent manner. Impact significance has been assessed before mitigation and re-assessed after mitigation to determine the significance of the residual impacts.

Potential environmental, socio-economic and cultural impacts of the project were identified and assessed by using the following techniques:

- Identification of project activities/aspects causing impacts (refer Section 2.4 above);
- Establishing affected environmental and human components (Valued Environmental Components/Receptors). These were determined to include: vegetation, water resources, soil, land stability, water quality and quantity, ambient air quality, employment and livelihoods, vulnerable groups, traffic, infrastructure, public safety and occupational health and safety (see Leopold matrix in Table 6-2 overleaf);
- Determining potential environmental and social impacts in an *Impact Identification Matrix* (see Leopold matrix);
- Superimposing baseline assessment outcomes (Chapter 4 above) onto the project concept and components for impact identification, evaluation and development of mitigation and/or enhancement measures;
- Review of issues and concerns raised by stakeholders;
- Recognition of an element by legislations, regulations, directives, or official decision;
- Considerations from the IFC EHS Guidelines and WB Environmental and Social Safeguards;
- Checklist and matrix methods (lists of potential impacts associated with specific activities) based on Consultant's experience and professional judgement from previous similar undertaking; and

- Evaluating the significance of impacts using criteria indicated in Tables 6-3 and 6-4.

In determining impact significance, two categories of positive and negative impacts are presented. Positive impacts are those that can be enhanced to realize more benefits in the project; contrastingly, negative impacts are adverse effects that need to be mitigated. The impacts are further evaluated based on magnitude, duration and extent as defined in Table 6-3.

Table 6-2: Valued Environmental Components/Receptors

Project Activities	Table 6-2: Valued Environmental Components/Receptors																					
	Physical							Biological						Socioeconomic								
	Soil & Erosion	Surface water/groundwater	Ambient air quality	Ambient noise	Land	GHG & climate change	Flooding & climatic effects	Terrestrial fauna	Birds, bats & avifauna	Reptiles & amphibians	Flora/vegetation	Sensitive habitats & aquatic	Coastal & marine habitats	Utilities	Infrastructure	Local economy	Employment & livelihoods	Culture & heritage	Health, safety and security	Involuntary resettlement	Gender & vulnerability	Transportation & Traffic
Pre-construction & Mobilization Phase																						
Field surveys and investigations & detailed engineering design																X	X		X			
Tendering for construction works & procurement																X	X					
Compensations, land acquisition and transfer to Contractor					X											X	X			X	X	
Mobilization of labourers/employment, equipment, materials and machinery				X											X	X	X	X	X		X	X
Construction of campsite, offices, workshop, material storage and material preparation yards	X	X	X	X	X	X		X			X	X	X	X	X	X	X	X	X			X
Site demarcation and clearing of site areas required	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X		X
Demolition of existing structures such as bus stands, storm drainage channels			X	X									X	X	X		X	X	X		X	X
Transportation of construction machinery, materials and equipment	X	X	X	X		X									X	X	X		X			X
Utilities identification, mapping and relocation plan														X	X		X	X	X			
Acquisition of various permits																X	X					
Construction Phase																						
Earthworks and excavations	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X			X
Extraction, transportation and storage of materials	X	X	X	X	X					X		X				X	X		X		X	X
Relocation and/or installation of utilities (e.g. power, communications lines, water and wastewater systems)	X	X	X	X	X			X		X	X			X	X	X	X		X			X

Project Activities	Table 6-2: Valued Environmental Components/Receptors																			
	Physical							Biological						Socioeconomic						
	Soil & Erosion	Surface water/groundwater	Ambient air quality	Ambient noise	Land	GHG & climate change	Flooding & climatic effects	Terrestrial fauna	Birds, bats & avifauna	Reptiles & amphibians	Flora/vegetation	Sensitive habitats & aquatic	Coastal & marine habitats	Utilities	Infrastructure	Local economy	Employment & livelihoods	Culture & heritage	Health, safety and security	Involuntary resettlement
Drilling of pile foundation in the ground	x	x	x	x	x							x					x		x	
Construction of BRT exclusive lanes, mixed traffic lanes, Port Access Road upgrading	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x		x
Construction of new bridges, storm water drainage channels, relief culverts etc.	x	x		x	x	x	x				x	x	x	x	x	x		x		x
Construction of terminal buildings, flyovers/viaducts	x	x	x	x							x		x	x	x	x	x	x		x
Construction and/or upgrading of access roads, diversions/detour	x	x	x	x	x	x		x		x	x	x		x	x	x	x	x	x	x
Construction of stations, depots, terminals	x	x	x	x	x	x	x			x	x		x		x	x	x	x		x
Construction of walls, staircases, columns, slabs and roofing		x		x		x					x			x			x	x		x
Construction of U-turns, walkways, pedestrian lanes	x	x	x	x				x	x	x	x			x	x	x	x		x	
Installation of the ITS and set-up of the Data Centre infrastructure	x				x									x	x	x	x		x	
Installation of utilities (e.g. power, communications lines, water and wastewater systems)	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x		x
Installation of road furniture	x	x		x				x	x	x	x			x	x	x			x	
Finishing works and installation of facilities				x												x	x		x	
Waste management and disposal	x	x	x	x	x		x	x	x	x	x	x	x				x		x	
Landscaping (reclaiming, re-contouring, restoration of areas)	x				x			x		x	x		x				x		x	
Demobilization Phase																				
Removal of temporary structures & camps closure			x	x	x												x		x	x
Demobilization of construction equipment and labour															x	x	x		x	x

Project Activities	Table 6-2: Valued Environmental Components/Receptors																					
	Physical							Biological						Socioeconomic								
	Soil & Erosion	Surface water/groundwater	Ambient air quality	Ambient noise	Land	GHG & climate change	Flooding & climatic effects	Terrestrial fauna	Birds, bats & avifauna	Reptiles & amphibians	Flora/vegetation	Sensitive habitats & aquatic	Coastal & marine habitats	Utilities	Infrastructure	Local economy	Employment & livelihoods	Culture & heritage	Health, safety and security	Involuntary resettlement	Gender & vulnerability	Transportation & Traffic
Wastes management and disposal	x	x	x	x	x	x	x	x	x			x	x	x			x		x			
Landscaping and/or re-vegetation	x				x			x		x		x					x		x			
Reinstating of pits, borrows and quarries	x				x							x			x				x			
Operation & Maintenance Phase																						
Employment and mobilization of O&M labour																x	x		x		x	
Operation of the BRT buses & passengers transportation		x	x	x	x	x	x					x		x	x	x	x		x		x	x
Freight transportation on Port Access Road		x	x	x								x	x	x	x	x	x		x		x	x
Traffic monitoring, control and management																x	x		x		x	
Routine maintenance of the infrastructure and facilities/utilities	x	x	x	x		x						x		x	x	x	x	x	x			x
Waste management and disposal	x	x	x	x	x	x	x	x	x			x	x	x			x		x			
Occupational health and safety management																	x		x			x
Housekeeping of the buildings/stations		x	x	x										x		x	x		x		x	
Overall maintenance of the structures, buildings, stations, terminals, depots, BRT buses, infrastructure and utilities	x	x		x										x	x	x	x		x		x	x
Decommissioning Phase																						
Periodic/major maintenance & rehabilitation	x	x		x										x	x	x	x		x		x	x
Removal of equipment and furniture that will be re-used for other purposes		x												x	x	x	x		x			
Rehabilitation/upgrading for new or similar purposes	x	x	x	x				x			x				x		x		x			

Table 6-3: Assessment criteria for the evaluation of impacts

Criteria	Category	Description
Nature	Positive	Beneficial environmental change
	Negative	Adverse environmental change
Extent of impact: spatial limit of the impact	International	Beyond Tanzania's borders
	National	Tanzania
	Regional	Beyond the Dar es Salaam regional boundaries
	Local	Within the Municipalities (Ubungo, Ilala, Kinondoni & Temeke), within Ward/Mtaa borders, or at off-site locations (material sources, waste disposal sites, etc.)
	Site-specific	Onsite or within the 60m and 30m RoW, including 100m buffer both sides from RoW
Magnitude of impact	High	Natural functions and processes/existing conditions are severely altered. Sensitive/protected species or habitats are severely affected
	Medium	Natural functions and processes/existing conditions are notably altered. Sensitive/protected species or habitats affected
	Low	Natural functions and processes/existing conditions are slightly altered. Sensitive/protected species or habitats not affected
	Very low	Natural functions and processes/existing conditions are negligibly altered
	Zero	Natural functions and processes remain unaltered
Duration of impact	Short term	Within construction period
	Long term	More than 5 years after construction
Probability: impact occurrence likelihood	Improbable	The possibility of the impact occurring is very unlikely
	Probable	There is a good possibility (<50% chance) that the impact will occur
	Highly probable	It is most likely (50-90% chance) that the impact will occur
	Definite	The impact will occur regardless of any preventive measures (>90% chance of occurring)

The significance of an impact is classified based on combining the criteria on extent, magnitude and duration into four major categories: as "major impacts", "moderate impacts", "minor impacts", and "no impact" (see Table 6-4). The resulting impacts relevant for each Valued Ecosystem Component (VEC) are then characterized as:

- Direct (primary): direct interaction between a planned project activity and the receiving environment;

- Indirect (secondary): following on from the primary interactions between the project and its environment because of subsequent interactions in the environment;
- Induced: resulting from other activities that occur as a consequence of the project; and
- Cumulative: impact occurring with other existing or planned projects.

Unplanned events may occur during critical unexpected situations with serious human, environmental or reputational consequences, potential material loss (e.g. spills and leakages) and external environment events affecting the project (e.g. landslides, floods). Unplanned events also include accidents.

Table 6-4: Definition of significance categories

Significance Category		Description
Major negative impact (-3)	Major positive impact (+3)	High magnitude with a local extent and medium-term duration
		High magnitude with a regional extent and construction period or a site-specific extent and long-term duration
		High magnitude with either a local extent and construction period duration or a site-specific extent and medium-term duration
		Medium magnitude with any combination of extent and duration except site specific and construction period or regional and long term
Moderate negative impact (-2)	Moderate positive impact (+2)	Low magnitude with a regional extent and long-term duration
		High magnitude with a site-specific extent and construction period duration
		Medium magnitude with a site-specific extent and construction period duration
		Low magnitude with any combination of extent and duration except site specific and construction period or regional and long term
		Very low magnitude with a regional extent and long-term duration
Minor negative impact (-1)	Minor positive impact (+1)	Low magnitude with a site-specific extent and construction period duration
		Very low magnitude with any combination of extent and duration except regional and long term
No impact (0)		Zero magnitude with any combination of extent and duration

6.3 Potential Environmental and Social Impacts

The impacts are described in terms of their nature (positive or negative), their duration (long term or short term) and their area of influence (site specific, local or general area of influence) according to different phases of the project.

6.3.1 Pre-construction Phase

6.3.1.1 Displacement of People, Loss of Properties and Livelihoods Disruption

As presented in the project design and baseline assessment (Sections 2.3 and 4.4), construction of the BRT infrastructure and support facilities such as stations, depots, and terminals will require additional land beyond existing RoW in some sections. Project activities (Section 2.4.3 above) that will trigger resettlement impacts are mainly construction of a terminal buildings, depots, stations, feeder stations, BRT and mixed-traffic lanes, construction of flyover/viaduct, turning radiuses, construction of walkways. The re-aligned sections of the horizontal alignment will also trigger further land acquisition along the corridor therefore triggering physical and economic displacement with the related livelihood impacts among local communities along the project corridor. These specific outcomes are further presented in the below sub-sections. As per RAP report, the project will affect a total of 1,018 compensable assets that include residential structures, businesses, public office, land, and utilities as detailed in Table 6-5 below.

Table 6-5: Categories of PAPs who will be affected by the project

No	Type of PAPs	Number
1	Tenants residing in affected houses	105
2	Tenants doing business in affected buildings	351
3	Landowners and affected structures	377
4	Business conducted in structures/kiosks	89
5	Those doing business in front of main affected structures	66
6	Those vending along road reserves/moving with items at the Intersection commonly known as (<i>Machinga</i>)	30
	Total number of PAPs	1,018

Source: Draft RAP Report, Nov. 2019

Impact on properties, structures and loss of shelter

Land and other properties such as buildings will be affected due to the requirement of extra land for construction activities contributing to loss of shelters business premises, land and other properties such as trees (fruit, coconut, shade trees etc.). The sensitive receptors for this impact are land and the property owners and the people renting the affected structures. The impact on some of the affected properties will majorly be short term as the paved ways, flowers and ornamental trees will be replaced as part of the landscaping works by the contractor. However, for the few people that will lose commercial or residential property, the impact will be long term, this is the case in areas like Kigogo roundabout to Mandela road, Bima area in Tabata, and Ubungu riverside.

Loss of access to livelihoods

This impact will be felt within the DIA of all proposed BRT Phase 5 roads and junctions. The sensitive receptors of this impact are traders and residents along the different roads. The roads being in an urban setting, there are many economic activities carried out along most of the roads as described in the livelihood characterization (Section 4.4.5 above). During the construction phase, access to the businesses (e.g. shopping malls, fuel stations, retail shops, open markets, etc.) will be lost temporarily leading to loss of customers. This will in turn lead to loss of income and disruption in the day to day activities of the affected parties. In addition, there are many residential structures whose access is connected to the proposed roads. Access to these properties will be temporarily disrupted. It should be noted that the main trunk corridor from Ubungu to Kigamboni bridge is largely industrial and commercial compared to round about Kigogo to Segerea-Mandela-Kigogo corridor, which is more residential and microentrepreneurs, and Temeke corridor, which is mixed residential and commercial.

Loss/disruption of business, decrease in customers and income

The impact will be felt on all project roads and junctions where formal and informal business premises will be affected. The sensitive receptors are the business owners and operators and owners of the affected buildings. The businesses that will be affected include supermarkets, shops, mobile vendors

post, garages, bars, restaurants, taxi drivers, *bajaji* and *bodaboda* riders, *daladala* drivers etc. In addition, *bodaboda*, *bajaji* and taxi stages will be temporarily affected as they will cease to park in their current loading stages and offloading thereby inconveniencing both operators and passengers.

Due to the impact on some of the business structures along the roads, the business owners and operators will temporarily lose income before they get alternative business premises. The owners of the premises will also lose income in form of rent. The design has nonetheless been optimized much as possible to avoid impact on structures on the different roads. This impact will be short term for the business operators and owners before they get alternative premises. The probability of it occurring is high. The severity is medium as not all commercial structures along the different roads will be affected.

Destitution of vulnerable groupings from displacement

Vulnerable groupings including women-headed and child-headed households, as well as elderly, chronically sick or extremely poor PAPs are likely to be affected by resettlement more severely than other PAP categories. Resettlement activities pose a disproportionate risk of impoverishment on vulnerable groupings given that they have insufficient capital endowments, economic participation, livelihood development skills and social protection systems, which altogether restrict their economic resilience and ability to re-establish elsewhere. Some of these PAPs may not have formal entitlements to their land property, which may further impinge on their compensation negotiations and re-establishment.

Unintentional damage to properties during construction

Accidental and/or temporal damage to the properties adjacent to the RoW may appear from unforeseen construction actions or simply by accidental damage to nearby utilities, crops, structures or infrastructure caused by movement of machines and other construction activities. Whenever an unintentional impact occurs, the property should be compensated as per the entitlement matrix developed in the RAP. This will be the Contractor's responsibility in liaison with the developer.

Displacement of people, loss of properties and livelihoods disruption is a negative impact that can be characterized as site specific, high magnitude, long term and definite.

6.3.1.2 Community Anxiety from Resettlement Information Disclosure

This impact will be felt within the DIA of all the project roads and junctions and the sensitive receptors are property owners and traders especially with *kiosks* and other temporary structures. At this stage, the PAPs have characteristically expressed concerns and apprehension surrounding land acquisition, loss of other property, compensation or the lack of it and related issues like family conflicts etc. During the stakeholder meetings there was general fear among the stakeholders with regards to issues of compensation, land acquisition, eligibility to compensation etc. However, this impact is normally experienced during the initial disclosure of information before identification of the property owners. Once information is disseminated to the PAPs and other implementing stakeholders, the anxiety is likely to diminish. This impact is local and short term, with a high probability of occurring. The severity of the impact is considered medium. Although the consequences of such fear and anxiety could lead to delay in project implementation, the impact can be mitigated once the information is disseminated to the right people. This is a negative impact that can be characterized as site specific, short term, highly probable and medium magnitude.

6.3.1.3 Potential Relocation of the Graves/Graveyard

From the baseline assessment (Section 4.5.1 above) some of the existing graveyards especially along the Mandela road corridor are likely to be affected. Some graves at the yard, especially those along and very close to the service road/pedestrian walkway, could be affected by the horizontal re-alignment. If not realigned, the graves are vulnerable to destruction from construction activities. The current status of the graveyard could not be established at the time of this study, and the count of graves likely to be relocated and/or affected by construction activities is

yet to be determined. This is a negative impact that can be characterized as site specific, long term, probable and medium magnitude.

6.3.1.4 Vegetation Clearance and Habitats Loss/Fragmentation

The preparation of the BRT corridor (primary influence area) for the construction, installation of the support infrastructure, setting up of the camps, and materials haulage will involve clearance of vegetation and removal of topsoil (organic soil). The proposed project is expected to disturb vegetation cover mainly composed of bushes and planted trees/flowers along the road reserve.

The project corridor is a brownfield site located in a highly ecologically disturbed environment. The baseline assessment on vegetation cover in Section 4.3.1 above, shows that the main vegetation cover to be cleared are scattered patches of bushes and planted ornamental trees and flowers at the middle part of the corridor, and along pedestrian walkways. This will result in fragmentation and loss of habitats for other faunal and avifaunal species along the corridor. However, none of the recorded species have significance conservation concern under IUCN. The existing vegetation that will be impacted by this project is common and has relatively low biological significance.

Therefore, clearing of vegetation and habitats fragmentation is expected to be minimum as most land is already cleared, and some facilities are existing. It is expected that after construction and restoration, there will be no removal of vegetation cover. The impact is therefore considered insignificant. This is a negative impact, short-term, direct, probable, site-specific impact of low magnitude. This is a positive impact, direct, short-term, local, definite with low magnitude.

6.3.1.5 Employment Opportunities

Activities associated with the project corridor preparation are expected to generate employment opportunities to residents from the 13 wards traversed by the project road and surrounding *mitaa*. Both skilled and

unskilled workers will be employed to perform various activities such as site clearance, mobilization of machinery, site preparations and sourcing and movement of various materials, installations and demarcations. Food vendors and other local suppliers will also benefit from additional income generated from increased demands though on a temporary basis. It is expected that food stalls (*mama lishe/baba lishe*) will be established nearby the works areas and camp construction sites for provision of service and various supplies. These labourers and suppliers will be from within the project area. This is a positive impact, direct, short-term, local and definite.

6.3.2 Construction Phase

Positive Impacts

6.3.2.1 Employment Benefits to Communities

The construction phase of the project will create both direct and indirect employment opportunities for both women and men. Directly employed people will be those working in the construction of the BRT infrastructure, ancillaries and will include skilled labour (engineers, surveyors, technicians, operators of equipment, drivers, artisans etc.) and unskilled labour (labourers). From Section 2.6.4 above, it is expected that about 300 workers will be directly employed in the construction activities whereby non-skilled jobs will account for at least 200 positions. Indirectly employed people will include food vendors (especially women) and other small businesses like food vendors (*mama lishe/baba lishe*), which are likely to be concentrated at camp sites.

The BRT Phase 5 construction will have a potential for the increase of women and family incomes in a number of ways. First women can be employed in road construction activities. This will likely increase family and individual level incomes. During the road construction, women and others will also establish small-scale businesses such as food vendor services popularly known as *Mama Lishe* to supply those working in the road construction sites. This again will lead to increases in the incomes of women and families in general. The involvement of the local population

including women will lead to capacity building in terms of new skills that could be learnt.

To enhance the impact due to employment, the contractor should be encouraged to give priority of employment especially for unskilled labour to the local people along the corridor, especially PAPs in order to boost up their daily incomes as well as reduce socio-economic conflicts among local and newcomers. Most of the casual labour and some skilled labour will be sourced within the project area and close to the project work. Individual members of the community who will work in various aspects of the project will gain additional skills and experience, which will make it easier for them to be employed or undertake entrepreneurial work once the project is over. Food vending and retailing of other similar items, which are a beneficial spin-off effect of the project, will also enhance the benefit of the project to the local communities. This is a positive impact that can be characterized as regional, high magnitude, short-term and definite.

6.3.2.2 Income Generation to Local suppliers & Service Providers

The project will require supply of large quantities of construction materials as presented in Sections 2.5 and 2.6 above. This will increase revenues for local businesses in Dar es Salaam and neighbouring Coast Region where the quarries, borrows and sand pits are located for construction purposes. Other materials such as cement, aluminium, roofing sheets, timber, paving blocks tiles, sanitary, plumbing and electrical appliances, steel, and other miscellaneous materials required for construction can be sourced locally within Dar es Salaam or other parts of Tanzania depending on the nature of the required materials.

Further, the construction workers required will provide ready market for various goods and services, leading to several business opportunities for small-scale traders such as shop owners, accommodation providers, and food vendors near the project site. With the commencement of construction activities, the influx of workers to the project sites is likely to attract small-scale business opportunities. These may include the growth

of eateries and hawkers that may seek to market food and products to the project workers. Construction work will indirectly cause an increase of individuals from the informal sector and service providers who may come from different areas beyond the project's primary influence area.

This demand for materials and services will therefore create a market for local people in Dar es Salaam and/or elsewhere in the neighbouring region engaged in supplying construction materials, leading to significant positive economic benefits to suppliers though on a short-term basis. As a result, this could result in considerable short-term positive improvement in the economic situation of some people in the project area. Meanwhile, some workers may prefer to find accommodation in and around the project sites, thereby leading to more income earnings to the local population. This is a positive impact that can be characterized as regional, high magnitude, short-term and definite.

6.3.2.3 Income/Revenue to Local Government and Agencies

The construction activities will generate additional revenues to the central, regional and local government in the form of taxes, fees, levies and other charges. The project will contribute to local and central government revenue through corporate taxes, duties, levies, fees and charges, contributions to the national social security fund (NSSF), and monthly PAYE income tax of all full-time employees.

The Contractor will also enter into agreements with local government to source construction materials and establishment of the campsites within identified suitable areas, which may be a source of additional income. Further, the contractor will pay the Wami/Ruvu Basin Water Board when sourcing water from existing perennial rivers (refer Section 2.5.4 above) and drilling of deep wells for construction purposes, payment of development/service levy to the municipal authorities, providers such as DAWASA, TANESCO, TTCL, and payment of royalty fee to the Eastern Zone Mineral Office for mining activities i.e. quarry, sand, gravel and

pebbles if new sites will be opened. This is a positive impact that can be characterized as regional, high magnitude, short-term and definite.

6.3.2.4 Skills Development and Technology Transfer

Those who will have the opportunity to work on the project during the construction Phase, particularly the unskilled and semi-skilled labour will get an opportunity for skills development. The unskilled are likely to be upgraded to semi-skilled while the semi-skilled will be exposed to better techniques and work methodologies etc. Construction of the BRT infrastructure will attract experts of diverse skills and experience that will interact with the locals to improve their skills in various sub-sectors within construction industry. Apart from benefiting from working skills and knowledge to be obtained from qualified experts, the employed people will also benefit from formal training opportunities which may be offered to them by the Contractor during road construction period. Thereby enable them to become more employable, earn more income and consequently improve their standard of living.

Skills to be acquired may include use of construction equipment, operation of heavy machinery, materials preparation and mixing, construction standards, health and safety procedures at construction sites, mixing concrete materials and tar, laying drainage, laying pavements, excavating trenches, building works etc. The value of skills is considered high. The duration of the impact will be long-long term since skills gained during the construction phase will be beneficial in the operation phase as well as in other similar projects elsewhere. The receptors (labourers) may use the acquired skills to access other employment opportunities within the industry due to broad-based and/or specialized set of acquired technical skills acquired. The extent of the impact is regional as people beyond the project will have an opportunity to work on the project and to apply their skills later on in life. This is a positive impact that can be characterized as regional, high magnitude, short-term and highly probable.

Negative effects

6.3.2.5 Air Emissions Impacts from Dust and Exhaust Fumes

Air emissions are typically related to dust during construction and exhaust from vehicles and construction traffic. Fugitive dust emissions arising from construction activities are likely to be variable in nature and will depend upon the type and extent of the activity, soil type and moisture, road surface conditions and weather. Periods of dry weather combined with higher than average wind speeds have the potential to generate more dust. The construction activities anticipated as part of the proposed development that are often the most significant potential sources of fugitive dust emissions are:

- Demolition of existing buildings;
- Earthworks comprising of levelling, construction of foundations, haulage, tipping, stockpiling, landscaping and tree removal, soil stripping, ground levelling, excavation and landscaping;
- Construction of proposed development and hard landscaped areas; and,
- Track out, involving the movement of vehicles over surfaces where muddy materials have been transferred off-site (for example, on to public highways).

Fugitive dust arising from construction and demolition activities is mainly of a particle size greater than the PM₁₀ fraction, however it is noted that construction activities may contribute to local PM₁₀ concentrations (which can potentially impact upon human health). With reference to the IAQM criteria outlined in the dust emission magnitudes for demolition, earthworks, construction and track out activities are summarised in Table 6-6 below. Where information is not yet known, a conservative approach has been adopted and professional judgement has been used based on the scale of the proposed development and experience of working on similar schemes.

Table 6-6: Summary of Dust Emission Magnitudes (Before Mitigation)

Activity	IAQM Criteria	Dust Emission Magnitude
Demolition	- Total volume to be demolished is estimated $>50,000\text{m}^3$ - It is assumed that there will be on-site crushing or screening - Materials being demolished are considered to be potentially dusty	High
Earthworks	- Total site area is estimated to be $>10,000\text{m}^2$ - The number of heavy earths moving vehicles active at any time is unknown at this stage, it is estimated to be >10 - The total material to be moved is expected to be $>100,000$ tonnes	High
Construction	- Total volume to be built is estimated to be $>100,000\text{m}^3$ - Construction materials are expected to include dusty materials	High
Trackout	- The maximum number of heavy-duty vehicle (HDV) outward movements in any one day is unknown at this stage, estimated to be >50 HDV ($>3.5\text{t}$) outward movements in any one day - Potentially on dusty surface material - The length of unpaved roads on site are likely to be $>100\text{m}$	High

Source: Consultant, July 2020

Regarding sensitive receptors, consideration is given to human and ecological receptors and the roads along which track out may occur. The settlements and institutions along the RoW in particular will be affected including materials haulage routes especially during dry season. Construction activities are relevant up to 350m from the proposed development site boundary whereas track out activities are only considered relevant up to 50m from the edge of the roads likely to be affected by track out (up to 50m from the site access based on small dust risk magnitude), as per the IAQM guidance. In this regard, some of the sensitive receptors are in densely populated areas like Kigogo-Mandela Road section, Segerea, Ubungu and the Temeke corridor, and the construction workers. Table 6-7 presents the determined sensitivity of the area.

Table 6-7: Sensitivity of the area (dust and air emissions)

Potential Impact		Sensitivity of the Surrounding Area			
		Demolition	Earthworks	Construction	Track out
Dust soiling	Receptor sensitivity	High	High	High	High
	Number of receptors	>100	>100	>100	>100
	Distance from the source	<50	<50	<50	<50
	Overall Sensitivity of the Area	High	High	High	High
Human health	Receptor sensitivity	High	High	High	High
	Annual mean PM ₁₀ concentration*	>32 µg/m ³	>32 µg/m ³	>32 µg/m ³	>32 µg/m ³
	Number of receptors	>100	>100	>100	>100
	Distance from the source	<50	<50	<50	<50
	Overall Sensitivity of the Area	High	High	High	High

*The annual mean PM₁₀ concentrations in the local area is unknown at this stage, it is estimated to be >32 µg/m³ as a conservative approach.

Source: Consultant, July 2020

Regarding exhaust emissions from construction plant and vehicles, operation of the construction vehicles and equipment powered by internal combustion engines will result in the emission of exhaust gases containing pollutants including NO_x, PM₁₀, volatile organic compounds, and carbon monoxide. The fumes will also be generated by construction plant and production of bituminous vapours during the sealing of the road surface. The quantities emitted depend on factors such as engine type, service history, pattern of usage and fuel composition. The detailed information regarding site equipment and machinery emissions is not available at this stage, but with suitable controls and site management such emissions are unlikely to be significant.

Dust and fumes are likely to deteriorate ambient air quality and will have major direct but short-term impacts during the project construction phase, especially due to the location of the project sites within the residential and highly urbanized areas.

This is a negative impact that can be characterized as site specific, high magnitude, short-term and highly probable negative impact.

6.3.2.6 Elevated Noise and Vibrations Levels

The actual sources of noise nuisance include plant and machinery involved in road construction works, plant and machinery used in extraction and processing of construction materials, and vehicles involved in transport of materials and staff. Plants machinery and construction traffic will inevitably generate noise and vibration. Heavy machines will open detours and excavate quarry pits while haul trucks will transport construction materials to working area. Traffic noise is generated by vehicle engines, emission of exhaust, and aerodynamic sources

Activities such as rock blasting, explosives, quarry operations, excavation, construction activities and other construction traffic movements can potentially impact substandard houses and other structures in the vicinity e.g. causing cracks.

The generated noise will add to the existing noise levels that were found to be slightly higher in some stations than the TBS and WHO limits for day and night hours (especially trading and village centres along the road), refer Section 4.2.7 above. The elevated noise levels can interfere with normal conversation and can cause stress in children and raise blood pressure, heart rates, and levels of stress hormones. Based on the baseline noise measurements recorded at the eleven sampling locations, the thresholds presented in Table 6-8 have been adopted to identify potentially significant noise effects.

Table 6-8: Significance of noise effect – construction noise (indicative)

Significance of effect ($L_{Aeq,period}$)			
Negligible	Minor	Moderate	Major
Façade noise level less than 60 dB(A)	Façade noise level 60 - 70 dB(A)	Façade noise level 71 - 80 dB(A)	Façade noise level exceeding 80 dB(A)

**period relates to day (16hr 07:00-23:00) and night (8hr 23:00-07:00)*

Source: Consultant, July 2020

Table 6-9 presents the predicted unmitigated noise levels at various distances from the primary construction activities associated with the proposed development. The noise reduction with distance assumes geometric divergence over hard ground conditions i.e. 6 dB per doubling of distance. Due to the close proximity of the nearest noise sensitive receptors (e.g. settlements, schools,

churches, mosques, health facilities, public offices etc.) to the BRT corridor, there is potential for a moderate to major adverse impact during construction works should mitigation not be implemented.

Table 6-9: Predicted construction noise levels (dB LAeq10hr)

Construction activity	Distance to receptor (m)					
	10	20	40	80	100	150
Establish site compound	81	75	69	63	61	57
Demolition	77	71	65	59	57	53
Pavement removal	84	78	72	66	64	60
Earthworks	85	79	73	67	65	61
Substructure works	90	84	78	72	70	66
Superstructure works	87	81	75	69	67	63
Utility installations	84	78	72	66	64	60
Road construction	88	82	76	70	68	64

Source: Consultant, July 2020

For the vibrations, the main source associated with the proposed development is expected to be attributable to piling, materials extraction and vibratory compaction works. These activities have therefore been considered as part of the assessment. Vibration during construction is likely be limited to localized impacts where breaking activities, piling or high energy compaction is undertaken. Locations will be limited to road widening areas, the new over pass and any demolition works. Compaction will be localized and low energy and therefore not considered any further. The potential magnitude of vibration from piling and breaking activities are presented in Tables 6-10 and 6.11, respectively.

Table 6-10: Estimated generic vibration - Piling

Magnitude	Corresponding Vibration PPV, mms^{-1}	Distance from Piling, m
Negligible	<0.3	>401
Minor	0.3 –1.00	73-400
Moderate	1.01–10.00	12-73
Major	>10.01	9-12
Predictions have been undertaken using the calculation procedure as detailed within Annex E of British Standard (BS) 5228-2: 2009. Based on: Impact piling $V_{\text{res}} \leq K_p (\sqrt{W}/r^{1.3})$ $K_p = 3$ (value from Table E.2 – very stiff cohesive soil as worst		

Magnitude	Corresponding Vibration PPV, mms^{-1}	Distance from Piling, m
case) $W = 100 \text{ kNm}$ (maximum energy per blow) $r =$ distance at which the prediction applies		

Source: Consultant, July 2020

Table 6-10 above provides an indication of impacts associated with piling for generic distances. These are theoretical and will be confirmed once the construction method is finalized. At the current stage, moderate and major impacts are identified for sensitive receptors/structures within 80m of a piling location. This is inclusive of a 10% uncertainty, due to the limitation of piling vibration control measures, other than method replacement. Sensitive receptors within 80m of a piling location will potential be exposed to vibration generating a significant impact, and mitigation/further assessment should be considered.

Table 6-11: Typical Maximum Vibration Levels from Rock Hammering

Distance from Activity (m)	PPV Vibration Level (mm/s) at Distance (m)					
	5	10	20	30	40	50
Heavy rock hammer (1.5 t)	4.5	3	1.5	0.4	0.35	0.3
Medium rock hammer (0.6 t)	0.2	0.06	0.02	0.01	-	-

Source: Consultant, July 2020

Table 6-11 above determines that moderate and major impacts will potentially occur through the use of a heavy rock hammer at distance less than 25m from a sensitive receptor/structure. Sensitive receptors within 25m of a rock breaking activity will potential be exposed to vibration generating a significant impact, and mitigation/further assessment should be considered. For a medium weight rock hammer/breaker impacts are unlikely to be significant unless within 2-3m of the location. Again, these are theoretical and will be confirmed once the construction method is finalized. This is a negative impact that can be characterized as site specific, high magnitude, short-term and highly probable.

6.3.2.7 Risk of Soil Erosion, Slope Instability and Siltation

Erosion of cut sections and in rolling terrain may potentially arise from road construction works. The erosion impacts might reach far beyond the

project road itself, affecting slopes, streams, and major rivers draining the project area (Msimbazi, Tenge, Kibangu rivers) and some distance downstream. Slopes stability can be disturbed during construction of road cuttings or embankments. Steepness of cut slopes, deficiency of drainage, and modification of water flows can result in landslides/mass movement especially along relatively steep areas like Kigogo Darajani, Tabata Barakuda. From the baseline assessment (refer Section 4.2.2 above), the rolling terrains $>10\%$ and $<25\%$ along Mandela-Tabata-Segerea section and Kigogo-Dampo-Tabata section are susceptible to erosion and instability. Further risks and challenges may be posed to the construction activities during heavy rainy season. This is a negative impact that can be characterized as site specific, medium magnitude, short-term and probable.

6.3.2.8 Terrestrial and Aquatic Habitats Alteration and/or Fragmentation

Loss of habitats and fragmentation will be associated with land clearance and use for the project road, the deviations and alternative roads, which will be used during the construction phase of the project, quarries for stones and aggregates, and borrow materials sources. Further clearing of the remaining vegetation in the immediate vicinity of the road is likely to happen.

The project corridor is a brownfield site located in a highly ecologically disturbed zone. Vegetation within the existing road's RoW will be cleared during site preparations activities, and construction camps settings as well as in order to pave way for the road's construction. The most direct impact of site preparation and horizontal re-alignment entailing land clearing and leveling on vegetation will be the removal of vegetation and canopy cover and hence destruction, damage and/or further fragmentation of the little existing habitats that potentially host several small mammals, reptiles and birds along the corridor. This will be key especially with the patches of bush habitats located along the Mandela-Kigamboni bridge section and thickets/bushes along the major rivers crossing the project road. Fragmentation may cause loss of nesting sites, disruption of

watercourses, visual and auditory disturbance due to the presence of machinery, construction workers, and associated equipment.

In addition, sediment and erosion from construction activities and stormwater runoff may increase turbidity of surface waters/major rivers in the project area. Construction and/or upgrading of the new hydrological structures mainly the bridges and culverts along major rivers (Msimbazi, Tenge, Kigogo/Luhanga) may potentially disrupt existing aquatic life particularly macroinvertebrates due to excavations, changing stream flow, surface run-off and various forms of contamination. The water quality baseline assessment (refer Section 4.2.5 above and Appendix III) indicates that the existing rivers are highly polluted meaning that the aquatic life has been disturbed already. Further contamination, disturbances and disruptions from project construction activities will exacerbate the problem.

Overall, the vegetation clearance and habitats fragmentation will constitute no significant ecological loss. This is a negative impact that can be characterized as site specific, medium magnitude, short-term and probable.

6.3.2.9 Potential/Accidental Contamination of Water and Soil Resources

During pre-construction and construction phases, various activities may potentially contribute to the contamination of the surface water bodies (the Msimbazi, Tenge and Kibangu rivers & Indian Ocean), ground water and soil resources through inadequate hydraulic capacity, effluents generated at the construction camps, accidental spillage of fuels, asphalt, oil leakages, or other materials and chemicals associated with the implementation of the construction activities. Sanitary wastes from project staff and camps may contaminate ground and surface water sources as well. Further pollution by fuel, oil, and concrete waste is possible if there will be poor management of the same. The prone rivers include Tenge, Msimbazi and Ubungu rivers that are already contaminated. Impacts can also result from accidental spillage of fuels and construction materials.

Water pollution may result especially at river crossings (Msimbazi, Tenge and Kibangu rivers) and during construction of off-road drainage structures. Bridges and culvert construction across the three major rivers may stir riverbed deposits into suspension. This is attributed to the fact that the project road is physically proximate to a number of water bodies and crosses ecologically important perennial rivers that are already highly contaminated with high levels of faecal and total coliforms, turbidity and nutrients (refer Section 4.2.5 above). Additional contamination from BRT construction activities will increase pollution load to the aquatic ecology, downstream users (vegetables gardening along the same riverbanks – see livelihoods in Section 4.4.5 above) and marine pollution along western Indian Ocean coast.

Construction of the infrastructure will also require the creation of drainage channels in order to drain concentrated run-off from the road. In flat terrain, the drainage channels will be prolonged claiming land uptake. In rolling terrain, offside structures may erode the soil causing pollution of water sources and perennial rivers along the road. Improper deposition of construction materials may lead to possible siltation in these major waterbodies, and disposal of any nutrients may escalate existing higher levels of contamination and possible impacts for downstream users and coastal/marine ecology at large.

The relatively high water-table observed in some places along the corridor (refer Section 4.2.4 above) is also prone to contaminations. The groundwater is an important resource which is abstracted for various uses in the project area. All these water bodies and water sources can be polluted by project activities. Water or soil pollution by accidental spillage of fuel or other materials and chemicals associated with road construction is an undesirable possibility. Obviously, it is not possible to predict the location or type of spillage due to its accidental nature, but it is considered that any spillage to soil will be local in nature and remediation should be commissioned. Spillage to watercourse is potentially very damaging with

impacts on humans, fish, benthic fauna, riparian vegetation and macro invertebrates.

This is a negative impact that can be characterized as local, high magnitude, long-term and probable.

6.3.2.10 Littering from Generated Solid and Liquid Wastes

Different types of construction wastes (solid and liquid) will be generated from various construction activities. Waste generation will occur at the construction camps, works areas and at the materials extraction sites. The wastes to be generated by the project can have aesthetic and scenic quality degradation effects if not properly managed. Significant quantities of rock and soil materials may be generated from earth moving during construction activities.

Improper management of the waste can also cause soil and water pollution with consequent environmental and public health effects including proliferation of communicable diseases at the camps and adjacent communities due to improper sanitation practices. A description on the types and sources of the wastes generated by construction activities is also covered in Section 2.7 above, this will include:

- Sediments and sludge;
- River dredges, trees and other greens from the clearing work;
- Soil from the excavation of foundations/spoilt soil materials;
- Material wastes such as sand, aggregates, concrete, timber, nails, roofing sheets, steel reinforcement bars, barbed wire (for fencing works resulting from mobilization and construction works);
- Oil and fuel leakages from equipment (concrete mixer, trucks etc.);
- Packaging materials such as cement bags, plastic bags, timber and paper boxes, including cushioning materials (to protect packaging contents);
- Plastic bottles from drinking water; and
- Food wastes.

This is a negative impact that can be characterized as site specific, medium magnitude, short-term and probable.

6.3.2.11 Potential Land Degradation from Borrows, Quarries and Sand Pits

Construction of the road will have direct impacts related to excavation, quarrying and deposition of spoil material. Significant volumes of earthworks fill, road gravel and rocks are expected to be extracted from Lugoba Quarry, Kisarawe hills borrow areas (Vigungu kwa Pazi, Mabwe Vidunda, and Ngugu/Dalu) in the nearby Coast Region. New material sources will be opened if the existing ones will be depleted (refer Section 2.5 above). Quarrying involves clearing the vegetation at the sites, excavation and transportation of the material. Thus, borrowing and quarrying activities will cause habitat change, land degradation, landscape impairment (visual intrusion) and exposing the land to soil erosion susceptibility which lead to siltation of water ways. Quarrying, excavation and the disposal of spoil material can destroy the economic and aesthetic value of public and/or private property including land.

Borrow pits and quarry sites may also raise health hazards. Abandoned pits become filled with rainwater and become dangerous to children and livestock as they may drown. In addition, stagnant water may harbour water-borne disease vectors responsible for malaria and schistosomiasis, which may be a threat to neighbouring communities. This is a negative impact that can be characterized as site specific, high magnitude, long term and probable.

6.3.2.12 Utilities Relocation/Damage and Service Disruption

The baseline assessment on infrastructure and utilities show that several types of utilities (e.g. gas pipes, water supply and distribution network, electricity, fibre optic cables, control valves, chambers, tunnel bulk meter, telecom towers, fuel dispensers etc.) are located throughout the entire corridor (refer Sections 4.1, 4.4.8 and Appendix IV). The existing utilities within RoW will be directly affected by construction activities through relocation resulting into temporary service disruption. The project will

require demolishing and relocating some of the structures within the RoW such as water supply pipes, drainage structures, and electric and communication cables thus disturbing other development plans for the residents and service users along the corridor and beyond. This will result into loss of access to water supply, electricity, telecommunication services and industrial activities suspension (gas connected facilities). The relocation of these utilities will cause temporary disruption in the services to the people along the respective roads. In addition, there will be temporary loss of revenue to the utility's owners and the government.

The sensitive receptors for this impact are the respective utility authorities and the persons along the different roads using the services from these utilities (consumers). However, the vulnerable groups (refer to Section 4.6) along the corridor are likely to be affected most as compared to the rest. This impact will be felt throughout the corridor. Specific details on the type(s) of utility to be affected, location, chainage along the corridor are presented in Appendix IV.

However, any damage or relocation will require compensation from the project developer to be paid to the institution that owns the utility. This should be done in a timely manner to avoid inconveniences to the users of the infrastructures.

This is a negative impact that can be characterized as local, high magnitude, short term and definite.

6.3.2.13 Occupational Health and Safety Risks/Hazards

The occupational health and safety issues associated with the construction of the BRT infrastructure primarily include physical hazards, chemical hazards and noise as summarized in Table 6-12 below. The labour to be carried out at the construction stage poses several health and safety hazards. The likely physical hazards include operational and workplace hazards, machinery and vehicles, confined and restricted space entry and risk of fire and explosion. Many of the project

construction activities involve the handling of potentially injurious objects, working at heights, transportation and lifting of heavy equipment, vehicular traffic, as well as contact with electrical conductors, dust exposure and excessive noise. Thus, construction workers will be at risk of suffering injuries such as falls, cuts, fractures and electrical shocks, and ailments from harsh ambient effects and unsanitary conditions.

Construction of the proposed roads will expose the laborer's and the general public to various safety and health risks including, accidents, bronchial and other respiratory tract diseases from elevated dust levels. Workers will be prone to all sort of safety and health risks during construction which include; falling objects, working at height, fire accident, poor ventilation, injuries from working tools and equipment and ergonomic hazards. Also, poor use (or not using at all) of the safety gears during construction will result into loss of lives or injuries during construction for workers.

The general public is also at-risk during construction especially for the communities located closer to the working sites. Accidents, air pollution, noise and fire hazards are among safety and health risks subjected to general public during construction.

The impact could have permanent effects on the affected persons. In addition, non-use and poor use of personal protective gears will have adverse health and safety effects, including accidental injuries and loss of lives. The project staff and the public will be exposed to bronchial and other respiratory tract diseases, and sexually transmitted diseases (especially HIV/AIDS). In addition, if proper sanitation service is not provided and personal hygiene is not properly observed incidence rates of sanitation and hygiene related diseases including cholera and diarrhoea may increase. Construction related accidents can be fatal, or more so less fatal, leaving the injured person unable to perform their work in future.

Table 6-12: Occupational health and safety hazards during construction

Category	Description	Hazards/Risks
Physical hazards	Operational and workplace hazards, working at elevation, overhead works, on bridges and overpasses	- Slips, trips, and falls (inadequate workplace) resulting in sprains, strains, and fractures - Ergonomics hazards from manual handling, lifting weights, or repetitive movements - Sharp and moving objects in the workplace (e.g. foot injuries from thorns on oil palm fronds and fruit) - Over-exposure to noise, vibration, and extreme or adverse weather conditions - Wounds from equipment or sharp objects - Exposure to extremes of weather, including sustained exposure to the sun or cold, can be harmful - Exposure to vibration and noise from equipment operation - Typical problems include hypo- or hyperthermia dehydration, ultra-violet damage to skin or eyes, and heat or cold exhaustion cases - Noise and vibration from hand-held equipment (such as chainsaws, brush cutters, or strimmer's) can cause hand/arm problems or hearing loss
	Machinery and vehicles operations	Accidents may occur in the use of machines, equipment and vehicles. This may include vehicle and machinery roll-overs; uncontrolled movement resulting in personal injury (e.g. crushing by moving vehicles); damage or loss of asset; injury, entrapment, or death due to faulty or unguarded equipment and machinery (e.g. moving parts and pinch points on machinery and vehicles); entrapment due to unplanned starting, activation, or engagement of equipment (e.g. rollers); or injury during inspection or repair of vehicles (e.g. vehicle lift not secured while personnel working underneath)
	Confined and restricted space entry	- Risk of asphyxiation; explosions due to gas, dust, or fumes (e.g. residual petroleum fumes); and entrapment or enclosure within the confined space, injury or fatality can result from inadequate preparation when entering a confined space or in attempting a rescue from a confined space - Entry into all confined spaces should be restricted and subject to permitted supervision by properly trained persons
	Risk of fire and explosion	Combustion of stored oil/fuel residues, which can lead to a loss of property or cause possible injury to or fatality of project workers
Chemical hazards	- Exposures to dust during construction and paving activities - Exhaust emissions from heavy equipment and motor vehicles - Inhalation during preparation, mixing, and application	
Noise	Exposure to extremely high levels of noise from heavy equipment operation and from working in proximity to vehicular traffic	
Health hazards	- Exposure to bronchial and other respiratory tract diseases, HIV/AIDS, STDs and other communicable diseases - Risk of contracting and/or transmission of COVID-19 pandemic - Exposure to communicable diseases especially water supply and sanitation related diseases	

Source: Compiled from IFC EHS Guidelines for Toll Roads (2007), IFC EHS General

Guidelines & Consultant (2020)

This is a negative impact that can be characterized as site specific, high magnitude, short term and highly probable.

6.3.2.14 Traffic Flow Interference & Traffic Accidents Along BRT5 Corridor

Traffic will be disrupted on all the roads and junctions under construction due to slow and interrupted traffic flow and diversions. This is mainly due to the fact that construction will be carried out on the existing roads that are presently experiencing traffic congestion even in the absence of construction activities (refer baseline assessment in Section 4.4.7 above). Delays in commuting to different parts of the city for various livelihood activities, attending schools, health centers and social gatherings are expected especially during peak hours (high traffic to and from CBD). The sensitive receptors of this impact are the road users and people residing and operating along the different roads.

Mandela road is the key corridor connecting the port to the Morogoro road, a key corridor to the neighboring landlocked countries. Transportation of international and upcountry cargos from the Dar es Salaam port will also be affected thus contributing to an increase in traffic jam. Given the urban nature of the roads, there is not enough space to create alternative routes for continuous traffic flow. This will cause delays for road users going to or from work and going to other destinations. In addition, pedestrians moving along the roads will also be largely inconvenienced. Experience from BRT Phase 1 construction shows that the main junctions are the worse-affected areas by traffic jam. In BRT Phase 5, the key intersections (refer to Section 2.3.5 above) to be affected will include TAZARA junction and Uhasibu/Kilwa Road junction, feeder areas and depots/terminals construction sites. Delays could potentially exacerbate during rainy season (bimodal rains in the project area – refer to Section 4.2.1 above) as traffic and construction activities will be naturally slowed down.

On pedestrians and cyclists, the project will be implemented on existing corridors of which some are highly populated such as Kigogo, Segerea, Tabata, Buguruni and Ubungu junctions. Pedestrians will be restricted due to ongoing construction activities. Construction activities will restrict free movement of vehicles (private and public transport alike) and therefore hamper timely movement of goods, services and people within and beyond construction corridor.

Regarding traffic accidents, with increased traffic (construction traffic and the usual traffic) along the corridor, there are risks of traffic accidents. Construction of the proposed BRT roads will increase the number of vehicles (carrying construction materials and workers) and at the same time will limit use of part of the roads to pave way for construction works. More vehicles will be introduced within construction corridors while passage will be constrained due ongoing construction activities and temporary closure of some parts of the road. This scenario may increase accidents during the entire period of construction.

Collisions and accidents can involve a single or multiple vehicles, pedestrians or bicyclists, and livestock. Given that the project corridor is situated in the highly urbanized and developed areas, pedestrians, bicyclists, *bodaboda* and *bajaji* riders, *daladala*, communities along the corridor, and children are at greatest risk of serious injury from collisions with moving vehicles and/or construction machinery. Children especially for the primary schools located along the RoW (e.g. Kigogo Shule) are generally the most vulnerable due to lack of experience and knowledge of traffic related hazards, their behavior while at play, and their small size making them less visible to motorists and construction traffic.

Heavy earth moving equipment might attract inquisitive children to construction sites. If due caution is not taken by drivers, haulage trucks and road construction equipment might be an accident risk to school children. This is a negative impact that can be characterized as site specific, high magnitude, short term and definite.

6.3.2.15 Disruption of Access to Homes and Public Services/Activities

Several institutions and public services such as school, health facilities, private and public institutions, industrial activities, entertainment centers, shops (wholesale, retailers), garages and residential premises are located adjacent to the corridor's RoW. During construction, some sections will be temporarily closed, or access blocked to pave way for construction traffic and activities. Some of the residents in densely populated areas and closer to the road like Kigogo Roundabout – Mandela Road section, Tabata (Segerea, Barakuda, BIMA areas), and Ubungu, access to the residential areas will be temporarily blocked depending on nature of on-going construction activities. The schools like Kigogo Shule area and other schools along Mandela road that are very close to the road, the existing markets (e.g. Sokoni in Temeke) could also be affected. However, it is understood that alternative access will be provided to avoid complete and permanent blocked access.

Besides the safety risk, noise and dust from road construction activities and equipment might temporarily disrupt school activities and other services offered at the nearby public institutions. The value of the aspect is high. The duration of the impact will be short term, but the impact can have far reaching consequences if not well managed. This is a negative impact that can be characterized as site specific, medium magnitude, short term and highly probable.

6.3.2.16 Exposure to HIV/AIDS and New Transmission

Baseline assessment (refer Section 4.4.6.3 above) shows that HIV/AIDS prevalence among men and women aged 15 - 49 years in Dar es Salaam is 4.3% whereby women are more affected than men, and key drivers include poverty that triggers proliferation of sex workers. The most affected age group constitute the most active working group that is likely to be involved in the construction activities directly or indirectly.

In this case, influx of job speculators from other parts of the region and neighboring regions will increase interaction, and thus potentially cause

an increased exposure to the HIV/AIDS infection risks. The presence of HIV/AIDS will likely increase the number of orphans and vulnerable children, and patients along the project corridor. There will be high social interaction between communities' casual laborers and some from the skilled workforce who are coming from different places during the construction phase. This could result in an increase in the incidence of diseases including STI, and HIV/AIDS.

HIV/AIDS aspect and other STIs are concerns for every construction project associated with interactions among construction workers and the local communities. Workers tend to be tempted to engage in unsafe sexual relationships with women and young girls in the project area. In addition, sex workers may be attracted to the area due to the presence of construction workers who are usually perceived to possess a lot of money. This is likely to increase risk of transmission of new STDs including HIV/AIDS to both workers and the surrounding communities.

Further, during its construction, the project is likely to attract people because of opportunities for direct and indirect employment. The social interaction between the waged and mobile project labor and the neighboring communities with low-income vulnerabilities inherently bears the risk of HIV/AIDS transmission. This is a negative impact that can be characterized as local, high magnitude, long term and probable.

6.3.2.17 Influx of People in the Project Area and its Implications

When construction activities begin, there is a high probability that the project area will experience an influx of employment hopefuls in search of direct and indirect income generation opportunities associated with the construction of the road. The labour influx may also result into crime rate, theft and security as well as increases the risks of HIV/AIDS, pressure on utilities and services, and local prices inflation. The population increase and the project activities will have impacts on the community in the following ways.

Insecurity & theft: Usually, the influx of new people in a project area comes with vices including the theft project materials and equipment. Such delinquency may involve the local community members and project workers in their activities which in the long run might affect the quality of the works. Theft of project materials normally leads to an increase in the project cost and may contribute to project delays. In addition, with more people in the area, the crime rate might become even higher. This impact will mainly be felt on roads that are congested with many informal businesses. e.g. Buguruni, Ubungu, Tabata and Kigogo- Mandela Road section.

Pressure/competition on social services: Waste disposal in Dar es Salaam and Kigogo in particular is currently a major challenge and is a threat to sanitation and the health of the people in the city. There are no proper waste disposal facilities for the people along most of the roads. With the project work force, it is likely that the problem of haphazard waste disposal and littering will be exacerbated. Furthermore, sanitation facilities are mainly privately owned which will make access to them almost impossible and thus contributing to the already poor sanitation problem in the project area. This may altogether lead to an outbreak of hygiene related diseases like diarrhea and cholera.

Conflicts & grievances: As with most construction undertakings, it is likely that conflicts and grievances will arise between the residents (directly affected and indirectly affected) road users and project workers. Conflicts and grievances that may arise will be as a result of workers luring away married women and school children, compensation-related strife, and physical nuisances from construction works. Lack of proper channels to handle grievances from the different stakeholders may cause delays to project activities and thus increase the cost of the project.

Increase of rent and prices of goods and services in the project area: The influx of people during construction will create more demands for houses to rent for accommodation and more demands for goods and

services in the project area. These demands will lead to increase of prices for renting and purchasing goods.

HIV/AIDS & STDs cases: covered in 6.3.2.16 above

The impact of influx of the people in the project area will be short term only during the construction phase. The severity of the impact will be medium because it is expected that the impact will be felt mainly during day because large section of the proposed BRT Phase 5 is located in Temeke and Ilala municipalities. The project workers can easily commute from their residential areas daily to the project sites, thus reducing the level of impact during night. The probability of the impact occurring is high. The extent of the impact is regional. This is a negative impact that can be characterized as site specific, medium magnitude, short term and probable.

6.3.2.18 Sexual Harassment and Violence Against Women & Vulnerable Segments

The baseline survey findings demonstrate that several forms and risks related to GBV, discrimination and violence against women, children and vulnerable people exist in the communities at different levels along the project corridor (refer Section 4.6 above). The sensitive receptors of this impact are mainly the women and girls because generally they bear the greatest and most direct costs of gender inequalities.

Women involved in supporting services to the project workforce are subject to the risk of sexual harassment and rape, especially marginalized women groupings, such as sex workers, immigrants, orphaned adolescent women and women living in extreme poverty. Rape crimes potentially compromise women's welfare through psychological trauma, HIV/AIDS transmission and pregnancy-related outcomes such as unsafe abortions, departure from formal education and impoverishment from single parenthood. Women dealing in micro-enterprises are also at risk of theft, which may range from petty larceny to violent robbery and result in injury and economic losses among victims of such crime.

Furthermore, there is likelihood of sexual harassment especially from the male workers on the female workers or young girls and women staying in the vicinity of the construction sites. Acts of sexual assault harassment may include unwelcome sexual touching, sexually suggestive or degrading remarks and sexually explicit or abusive language, rape or defilement among others. It may cause psychological torture to the victims which may lead to permanent damage to their self-esteem. In addition, it may lead to early pregnancies for young girls, increased school dropouts and exposure to sexually transmitted diseases.

Women, commercial sex workers (available nearly in all areas and entertainment centers along the corridor), children and girls from secondary schools are also vulnerable. It is believed that construction workers will have monetary influence that can be used as a catch in engaging in sexual relationships and abuse against women and children.

Vulnerable people may also be exploited due to their vulnerable nature and the lack of proper means to protect themselves. In some cases, children who are supposed to be at school may be used by the contractor as cheap labour. In addition, there is likely to be developments of relationships between workers and the women of the area that are either engaged or already married, which can result into marriage break ups and disintegration of families. This is a negative impact that can be characterized as local, medium magnitude, long term and highly probable.

6.3.2.19 Exclusion from Economic Opportunities and Fair Labour Terms

Marginalized demographic segments within and beyond the primary project area and beyond, such as women and disabled persons are subject to exclusion from formal employment opportunities offered within the project's construction phase, due to common stereotypes that undermine their perceived occupational capabilities and productivity. Granted their employment, recruits with special needs are potentially subject to financial exploitation and other discriminative labor conditions, such as exclusion from on-the-job capacity building offerings, considering

their low bargaining power and stereotypical mistreatment. Women are likely to be least favored in the employment opportunities in the project area. This is because the nature of jobs available during construction is perceived to be done mainly by men. Immorality could also result especially with the young girls of the area in efforts to gain favour for employment opportunities, this can result into spread of sexually transmitted diseases such as HIV/AIDS and other sexually related diseases. This is a negative impact that can be characterized as local, medium magnitude, short term and probable.

6.3.2.20 Child Labour and Increased School Truancy

The construction activities along the primary impact area will lead to bursts of income-generating opportunities for residents along the project corridor. Semi-skilled work opportunities within informal supporting services may motivate students, resident nearby the project corridor (and the low-income adjacencies in particular) to abandon their educational commitments in search of quick financial gains. Children and students along the corridor may end up involved in wage labour activities by, for example, fulfilling various construction activities, petty trading and vending. This situation will potentially increase truancy and school drop-outs especially for schools that are located along the project road.

Sustained truancy and educational departures bear longer-term risks on young drop-outs such as early pregnancies and engagement in delinquent activities, which ultimately impinge on the economic capabilities and welfare of the youths. Involvement of child labour in food vending and other activities related to services provided to project staff by local community members could also occur. This problem can result in high rates of truancy and involvement of children/adolescent girls in sexual relationships due to their undue interactions with construction workers associated with the project. This is a negative impact that can be characterized as local, medium magnitude, short term and probable.

6.3.2.2 Risk of Contracting and/or Transmission of COVID-19

The baseline assessment (refer to Section 4.7 above) shows that Tanzania has been affected by the pandemic like many other countries. According to official sources and public statements, by May 2020 the disease was highly controlled with few official registered cases in health facilities. Different socio-economic activities including construction of infrastructure projects are currently on-going with precautionary measures in place as per Ministry of Health guidelines. Likewise, during construction of the BRT Phase 5, it is likely that construction workers can contract COVID-19 from interaction (within the project), and/or transmission from interaction with the surrounding communities. This is a negative impact that can be characterized as local, medium magnitude, short term and probable.

6.3.3 Demobilization Phase

6.3.3.1 Displacement of Workers and Loss of Jobs

There will be loss of jobs for the project workers after completion of construction. About 300 staff that were employed directly in various construction activities will be demobilized. Loss of jobs and income can lead to psychological challenges to affected individuals and their families. The impact is expected to be temporary-medium term until the affected workers can get other opportunities. The probability of its occurrence is also expected to be high. This is a negative impact that can be characterized as regional, medium magnitude, short term and definite.

6.3.3.2 Loss of Business Opportunities

Different business and income generation opportunities that were linked to the project's presence in the area will cease soon if not immediately after project completion. This is a negative impact that can be characterized as local, medium magnitude, short term and highly probable.

6.3.3.3 Waste Generation and Disposal Challenges

Management and final disposal of the accumulated construction wastes in various locations such as at the camps, materials storage areas, and

along the corridor is usually a challenge in most projects. Different types of wastes like expired tyres, containers, rubbles, bitumen, spoilt soil/materials, oil etc. will need to be disposed off. Improper handling of these wastes will lead to littering and potential contamination of the land, water and soil resources posing environmental and public health risks. This is a negative impact that can be characterized as site specific, medium magnitude, short term and highly probable.

6.3.4 Operation Phase

Positive Impacts

6.3.4.1 Improved Urban Mobility, Reduced Travel Time and Congestion

The BRT is expected to provide an efficient and effective urban mobility by providing mass transit for the urban dwellers engaged in various livelihood activities, reduced travel time and rampant congestion along the routes. It is expected that after construction of the BRT Phase 5, the currently heavy traffic will be properly managed and reduced and there will be improved mobility (motorized and non-motorized) from one point to another and the time used will also be reduced. Therefore, provision of BRT system is expected to directly enhance and improve the traffic circulation and eliminate bottlenecks to traffic flow to various economic activity centers across the residential areas and industrial zones.

Regarding reduced travel time, the analysis undertaken during detailed engineering design shows that travel time will be reduced by 60-90 minutes per trip for public transport commuters and reduced transport costs hence use these savings for other productive economic activities.

Regarding mass transit of the commuters, the BRT Phase 5 will comprise an articulated fleet of 277 buses (140 passenger capacity vehicles), 50 feeder buses (50 passenger capacity vehicle) and 40 feeder buses (35 passenger capacity vehicle) whereby an average of 2,000 passengers/day/bus will be transported categorized into three types of services (express, semi-express and regular/local) as presented in Sections 2.3.4 and 2.3.6 above. If compared to the majority of the current

daladala along BRT Phase 5 corridor with carrying capacity of 20 to 30 passengers at a time, BRT will offer a preferred and efficient mass transit. The BRT system comprises a two- lane, two- ways road dedicated for buses only that allows buses to bypass peak-hour congestion as well as maintain designed average speed to reach destinations faster than the mixed traffic.

Further, the BRT Phase 5 will provide Park and Ride facilities in the system to motivate safety and attract modal shift as other motorists could park their cars and use the BRT system and thereby reducing traffic congestion. The facility is one of the attractions to traffic diversion, especially for private car riders.

Introduction of the BRT buses along the densely populated corridor will provide a reliable transport services, flow of goods and passengers, convenient and comfortable urban public transport system at reasonable cost to the users and yet profitable to the operators. Upon completion, the road project will reduce travel time, improve travel comfortability, shortening travel distance and reduce travel, time, stress among drivers and passengers caused by existing poor road, and costs (e.g. fare, vehicles wear and tire, maintenance costs). The Port Access Road will equally facilitate and enhance Dar es Salaam port operations by providing an effective and reliable transport linkage. It will ease exit of goods from the port, as well as transportation of goods and movement of passengers within Dar es Salaam City.

The sensitive receptors are the users of the road and the communities living or working along the roads, and those who are connected to the CBD and major market centers like Kariakoo, Amana, Ilala, Temeke, and Ubungu. This is a positive impact that can be characterized as regional, high magnitude, long term and definite.

6.3.4.2 Improved Productivity, Access to Livelihood Activities and Welfare of Vulnerable Groups

Given the nature of Dar es Salaam's urban sprawl, improved urban transportation and mobility will link different parts of the city with the rest of the economy, hence highly contribute to the improved accessibility to economic and social opportunities. Since the majority of the population in the project area and the city at large are engaged in the informal sector, the BRT Phase 5 (and the entire BRT network) will provide better access to various livelihood activities, facilitate increased growth of service sector, education, microentrepreneurs and health sectors as well. The BRT system also target low income segment of the population to improve their quality of life through better access to socio-economic infrastructure and opportunities such as schools, health centers, markets and jobs by providing affordable and reliable public transport. The high density areas of Buguruni, Tabata, Kigogo and Temeke along Mandela, Tabata, Kigogo and Mbagala roads will directly benefit from the project.

An analysis of traffic congestion along Morogoro road and Mandela road to gauge workers' productivity using travel time and productivity indexes revealed that workers spent about 2 times of the average commuting time to work and 3 times of the same commuting from work to their various residences. About 2.5 hours were lost on traffic jam per day and that people worked 1.4 times less than the required time due to traffic congestion. It was further established that in 10 working days, almost 3 days were lost to traffic congestion (Mpogole & Msangi, 2016). It was estimated that daily losses from the rampant traffic jam accounted for about TZS 4bn and TZS 1.44tr annually in Dar es Salaam alone (Msigwa, 2013). Reduced travel time and facilitation of the access (including vulnerable groups) to various economic activities will improve productivity. With the adoption of recommended enhancement measures, the project extends multiple benefits for the range of vulnerable project recipients, particularly beneficiaries with a low current income status. Potential benefits include:

- Creation of employment and capacity development opportunities in the project's operational phases;

- Development of livelihoods within the transport sector, particularly intermediate transport means (hired feeder services using motorcycles and autorickshaws);
- Increased economic and domestic productivity from improved mobility and economies of time; and
- Economic advancement from improved and more affordable connectivity of occupational centres, commercial hotspots and social services.

This is a positive impact that can be characterized as regional, high magnitude, long term and highly probable.

6.3.4.3 Increased Safety and Security of Urban Public Transport Sector

The construction of the BRT Phase 5 network is anticipated to deliver increased safety for public transport users, considering the establishment of dedicated motorways that are at lower risk of traffic accidents and the employment of trained and tightly regulated operational personnel. Potential safety benefits are dependent on the enactment of enhancement measures concerning traffic safety at high-risk points of the BRT Phase 5 sections, such as inter-modal intersections with non-BRT roadways and railway passages.

The *daladala* commuter buses are among the main contributors of traffic crashes in Dar es Salaam partly due to pressure of the *daladala* drivers to achieve daily financial targets set by owners. Evaluation of the operational features of the vehicle such as vehicle route coverage, fare collection method, service frequency and the application of the Intelligent Transportation System (ITS) to the BRT shows that buses using exclusive lanes (median) experienced 40% lesser accidents in comparison to mixed traffic operations (Zimmerman, 2003). Further research in crashes predictions along BRT Dar es Salaam indicates that crashes will be lowered to 39.5% during the period of operations of BRT buses, which is a good sign to the public traffic safety. For instance, the reduction of number of *daladala* in the BRT corridor will lower the occurrence of crashes by

29.4% (Mwemezi & Rafiki, 2017). This is because BRT systems are more organized and cover multiple services with just one operating agency while implementing routine standards such as driver training, vehicle maintenance and the like. BRT also isolates bus traffic from other modes which lessens pedestrian crossings and potential accidents (Duduta, 2012).

In terms of security, the delivery of the BRT Phase 5 system will contribute to the amelioration of the security status of Dar es Salaam's public transport sector, with the roll-out of robust security measures on passenger and pedestrian facilities, such as the BRT buses and platforms. The realization of significant security upgrades is also contingent on the implementation of enhancement measures to safeguard public security within the proposed facilities, particularly for women, who may be targeted for sexual harassment and theft under conducive circumstances.

Further, absence of street lights on some roads in the project area (e.g. Kigogo-Mandela-Segerea, Temeke corridor) contributes to the high rate of crime. Street lighting is part of the proposed improvements for the roads. It is expected that with street lighting, the rate of crime will reduce, and the general visual appealing of the respective roads improve. This is a positive impact that can be characterized as local, high magnitude, long term and highly probable.

6.3.4.4 Improved Mobility Access to Women and Disadvantaged Groups

Operation of the BRT Phase 5 will offer an improved transport accessibility to women, children, students, elderly and the handicapped who are currently denied access to travel comfortable and safely especially during peak hours in other public transport modes. The vulnerable groups may also benefit from travel time cost saving by avoiding use of *bajaji* as their alternative means after failing to board *daladala*. Their accessibility to livelihood activities will also be improved.

This is a positive impact that can be characterized as local, high magnitude, long term and highly probable.

6.3.4.5 Reduction of National Carbon Footprint & Augmentation of Climate-Resilient and Low-carbon Urban Infrastructure

Technological improvements of the BRT Phase 5 buses will contribute significantly to reduce roadside concentration of GHG emissions thereby improving air quality and public health. The emissions by BRT trunk buses carrying 140 passengers are estimated at 2,100g/km (since they will be compliant to EUROIII and/or above emission standards), while emissions of the feeder buses carrying 60 passengers are 1,250g/km. The amount of NO_x emitted by the *daladala* fleet in Phase 5 is about 160.23 metric tons/day of pollutants, compared to 55.987 metric tons/day of pollutant emitted by BRT buses (DED, Nov. 2019). In compliance with the Safeguard policies and strategies, this BRT project is in Climate Change Category 2.

Transport is a major source of pollution, accounting for half of the global oil consumption and nearly 20% of world energy use, of which about 40% is used in urban transport. By 2025, under a business-as-usual scenario, urban transport emissions are estimated to increase two-fold to nearly 1 billion annual tons of carbon dioxide equivalent, and 90% of growth in urban transport emissions will come from private motorized travel. A modern public bus, with conventional diesel fuel, nevertheless emits only half the carbon dioxide of a small car, per passenger km traveled (IFC & WBG, 2017)²⁹.

The BRT Phase 5 project offers a binary contribution to Tanzania's climate performance. On one front, the country's widening investment into bus rapid transit systems represents a sizeable rollback of the Greenhouse Gas (GHG) emissions projected for its transport sector, with the curtailment of demand for fuel inefficient commuter buses and private

²⁹ IFC and WBG. 2017. Mobile Metropolises: Urban Transport Matters. An IEG Evaluation of the World Bank Group's Support for Urban Transport

vehicles. On the other front, with climate-proofing enhancements, the project represents an addition to the country's low-carbon and climate-resilient transport infrastructure, which is essential for strengthening the urban resilience of climatically vulnerable coastal cities such as Dar es Salaam. Further to advancing progress on the national commitments to the Kyoto Protocol, Paris Accord and the UNDP Sustainable Development Goals (SDG), the project may, in the longer term, usher in economic gains based on the Clean Development Mechanism (CDM) established under the Kyoto Protocol.

Further, it is understood that the proposed BRT Phase 5 project will divert passenger traffic from public passenger transport (*daladala*) to BRT buses. However, no diverted traffic is foreseen for upgrading of Bandari road and Dar Port-Uhasibu road. Based on the information provided in the Bus Operations, Economic Study, and Transport and Traffic Engineering reports, it is understood that Passenger diversion for large buses (greater than 28 seats) and small (up to 28 seats) buses has been assumed at 100%, and it is assumed that passenger diversion of 90% and 80% for Cars & 4WD vehicles and motorcycles and *bajajis* respectively as shown in Table 6-13 below. Given the significant number of trips anticipated to be reallocated from motorcycles and private cars (80% - 90%), it is assumed that this represents a future scenario when the scheme is in full operation and represents maximum potential uptake.

Table 6-13: Number of passengers to be diverted from passenger vehicles to BRT buses

Item	Rows	Motorcycle & Tricycle	Cars	4WD & Pickups	Small bus ≤ 28 seats	Large bus > 28 seats	Passengers/ day
Weighted AADT for BRT5*1	a1	10035	5212	3109	3015	1694	
Passenger Occupancy*2	a2	1.5	1.6	2	23	23	
Factor for Passenger diversion*3	a3	0.8	0.9	0.9	1	1	
Number of passengers divertible to BRT5 buses/day*4	A4	12042	7505.28	5596.2	69345	38962	133451

Source: Traffic Report, Nov. 2019

Further, based on adopted traffic flow (Transport and Traffic Flow Engineering report, Nov. 2019) data assessment, it is noted that there will be a significant reduction in traffic flows in 2034 as a result of the proposed BRT Phase 5 project. Therefore, it is considered that the proposed BRT Phase 5 project will likely have a positive impact by reducing local traffic flows and traffic-generate air pollutant emissions. This is a positive impact that can be characterized as national, high magnitude, long term and probable.

6.3.5.6 Employment Opportunities & Skills Development

Operation of the BRT Phase 5 will create various employment opportunities to various groups, both skilled and semi-skilled labour. Various operation and maintenance activities will require employees, e.g. depot operations, maintenance workshop, ticketing, drivers (about 277 buses), ITS system controllers/administrator, traffic controllers, engineers, technicians, supervisors, security/guards, mechanics, ticketing, housekeeping etc. Employees and operators of the BRT will have a chance to improve their technical skills, and/or acquire new skills through on-job and off-job training programmes as part of the capacity building and development to ensure efficient operation and maintenance of the system.

This is a positive impact that can be characterized as regional, high magnitude, long term and definite.

Negative Impacts

6.3.4.7 Impacts on Daladala and Other Public Transporters Along BRT Route

Daladala operating along BRT Phase will be deregistered by LATRA from the route due to the planned 100% traffic diversion (passengers) from *daladala* to the BRT buses consisting of two rapid bus lanes and 4 lane normal traffic. In this case the *daladala* operators will be restricted to access the existing lucrative market along the BRT Phase 5 corridor that they are used in their daily operations. Further, an estimated diversion

from cars and 4WD vehicles (90%), and from *bodaboda* and *bajajis* is 80%.

The LATRA plans to cancel all the *daladala* routes to the designated route service for Phase 5 after introduction of newer BRT buses which are capable of carrying about 140 passengers and on trunk roads and 80 passengers on feeder roads. Existing *daladala* will cease from operating. The passengers will be commuting using BRT buses. This will be the case as in BRT Phase I which is currently operational. Even though existing *daladala* will relocate, it may result into livelihood impacts particularly the drivers, conductors and owners.

Apart from the livelihood dimension, a terminal evaluation of the BRT in Dar es Salaam conducted recently by the United Nations revealed the risks of BRT system opposition from the public and current transport service providers. Success of the new BRT system is strongly dependent on the engagement of the existing personnel from the old systems including owners (e.g. DARCOBOA) to minimize opposition risks and operational disruptions of the new BRT system (UNEP, 2018).

This is a negative impact that can be characterized as local, medium magnitude, long term and probable.

6.3.4.8 Wastes Generation, Littering and Potential Contaminations

During the operational phase, both liquid and solid wastes will be generated at various locations. Various types of solid wastes such as food waste, plastics, paper material are expected to be generated from inside the buses (passengers), at the stations, terminals and depots. The liquid wastes will be generated mostly from various sanitation facilities (terminals, depots) and maintenance activities at the workshops in depots.

Operation and maintenance of the buses will generate hazardous wastes and potentially contaminate soil and water resources if not handled properly (e.g. accidental spillage of hydrocarbon). The hazardous wastes

will include hydrocarbon products, spare parts, scrap metals etc. Accidental spillage of the hydrocarbon may potentially happen at the depots and terminals.

Proper management of these waste is mandatory to avoid environmental pollution as well as protecting human health avoiding proliferation of communicable diseases. This is a negative impact that can be characterized as site-specific, medium magnitude, long term and probable.

6.3.4.9 Community Health and Safety Risks

Drivers on the newly improved roads are commonly excited to drive faster than is often safe: a risky behavior common to new roads in Tanzania. This usually happens in the first few months of commissioning a new road and often leads to accidents resulting in injuries, fatalities or damage to vehicles and other properties. In the project area, most *bodaboda* and *bajaji* are known to drive recklessly, a common behavior throughout Dar es Salaam. There is a community risk for accidents from existing traffic along improved and better roads. Pedestrians, cyclists and children along the route are mostly at risk. Key junctions and intersections are also critical areas for accidents particularly *bodaboda*, *bajaji* riders and pedestrians.

Experience from BRT Phase 1 shows that traffic accidents were at the peak during the first few months of operation. These collisions and crashes involved BRT buses, *bodaboda*, *bajaji*, other *daladala* (plying different routes), passenger, pedestrians and vulnerable groups. This is likely to happen in BRT Phase 5 route as well. However, with time commuters and other drivers get used to the system and changed traffic flow, therefore minimized rate of accidents.

Safety is a very important aspect as well. High passenger traffic along public transport platforms and in-vehicle congestion during peak hours results in crowded conditions that give way to petty theft.

Regarding transmission risks of the communicable diseases such as COVID-19, it can potentially happen due continuous flow of passengers at the stations as well as in the buses. Uncontrolled passenger movements, congestion at the stations and inside the buses is likely to trigger transmission. If proper health control measures are not put in place, then we will have a transmission of mostly communicable diseases such as COVID-19, Tuberculosis and other air-borne diseases. This is a negative impact that can be characterized as site-specific, high magnitude, long term and probable.

6.3.4.10 Sexual Assault & Harassment Risks in BRT System

In terms of using public transport, women and girls are likely to face endemic levels of harassment on and around public transport. Women modify their travel patterns and dressing code to avoid danger with consequences for their participation in work, education and public life. Further, women are still the primary group charged with the mobility of care (travel necessitated by caring for children or the elderly).

Learning from BRT Phase 1 operations, several sexual harassment cases against women and girls have been witnessed and/or reported inside the stations and buses especially when there is a heavy overcrowding. The common acts of sexual misconduct are groping, sexual rubbing, unwelcomed sexual touching, sexually suggestive or degrading remarks and sexually explicit or abusive language particularly during rush hours (morning and evening). Passengers overcrowding in buses/stations, longer waiting times, absence of preventive measures, and clear mechanism for victim support creates conducive environment for the proliferation of the assaults. Sexual assault affects women mobility patterns and behavior, trauma, stress, anxiety and wellbeing issues that can last for years after the incident.

A separate study conducted in Latin America transit systems (Bogota's BRT, Colombia and El Anto in Bolivia) confirms that 37% of female riders of the BRT system reported experiencing unwanted sexual contact (e.g.

groping, sexual rubbing etc.) while using the overcrowded system. Due to overcrowded transit system, women can hardly safeguard their personal space or maintain personal boundaries. Other victims choose physically protected locations, such as near a wall or near the driver, and using objects as shields to insulate themselves (Kash, 2019).

Women are also likely to face boarding and alighting challenges if the stations and buses are overcrowded. Fighting to get into the bus requires someone to be physically fit. Women, infants, elderly and the sick people are mostly the victims who are also at risk of injuries.

Further, the BRT Phase 5 users will include passengers with navigational difficulty and special needs. These include the physically infirm and disabled, women travelling with infants/young children and passengers boarding with heavy baggage. The design of the BRT facilities should accommodate the needs of such users, with the availability of accessibility aids and dedicated safety measures in order to minimize the likelihood of accidents that can result in injuries and fatalities. This is a negative impact that can be characterized as site-specific, high magnitude, long term and probable.

6.3.4.11 Occupational Health and Safety Risks/Hazards

Personnel involved in the operation and maintenance of the BRT buses, depots, terminals and station are exposed to different occupational health and safety risks and hazards (physical, chemical and noise) depending on nature of the specific activities undertaken. The risks are summarized in Table 6-14 below.

Table 6-14: Occupational health and safety hazards during operation and maintenance

Category	Description	Hazards/Risks
Physical hazards	Operational and workplace hazards, working at elevation, overhead works, on bridges and overpasses	- Operating machinery and moving vehicles - Slips, trips, and falls (inadequate workplace) resulting in sprains, strains, and fractures - Ergonomics hazards from manual handling, lifting weights, or repetitive movements - Sharp and moving objects in the workplace - Over-exposure to noise, vibration, and extreme or adverse weather conditions - Wounds from equipment or sharp objects - Exposure to extremes of weather, including sustained exposure to the sun or cold, can be harmful - Exposure to vibration and noise from equipment operation
	Machinery and vehicles operations	Accidents may occur in the use of machines, equipment and vehicles, buses. This may include vehicle and machinery roll-overs; uncontrolled movement resulting in personal injury (e.g. crushing by moving vehicles); damage or loss of asset; injury, entrapment, or death due to faulty or unguarded equipment and machinery (e.g. moving parts and pinch points on machinery and vehicles); entrapment due to unplanned starting, activation, or engagement of equipment; or injury during inspection or repair of buses (e.g. vehicle lift not secured while personnel working underneath)
	Confined and restricted space entry	Risk of asphyxiation; explosions due to gas, dust, or fumes (e.g. residual petroleum fumes); and entrapment or enclosure within the confined space, injury or fatality can result from inadequate preparation when entering a confined space or in attempting a rescue from a confined space
	Risk of fire and explosion	Fire explosion at the oil storage facility/tanks can lead to a loss of property or cause possible injury to or fatality of project workers
Chemical hazards	Exhaust emissions from heavy equipment and motor vehicles	
Noise	Exposure to extremely high levels of noise from heavy equipment operation and from working in proximity to vehicular traffic	
Health hazards	- Exposure to bronchial and other respiratory tract diseases, HIV/AIDS, STDs - Exposure to communicable diseases such as COVID-19, TB, and other air-borne diseases	

Source: Adapted from IFC EHS Guidelines & Consultant, July 2020

This is a negative impact that can be characterized as site-specific, high magnitude, long term and probable.

6.3.4.12 Potential Disruption of Services from Flood Events

The baseline assessment on climatic characteristics (Sections 4.2.1 and 4.2.4 above), shows that the project corridor is characterized by a bi-modal precipitation regime, with rivers and streams in the area exhibiting the highest flow rates at the peak of the rainy seasons. The area receives a substantial amount of rainfall and some places along the corridor are prone to flooding. The Msimbazi River catchment area where the project lies, has become increasingly flood-prone over the past few years contributing to flooding along Jangwani and temporal halt of BRT Phase 1 services. Hydrological assessment indicates that bridges along Tenge and Msimbazi bridges along Mandela corridor are frequently overtopped during heavy rains. Likewise, Luhanga bridge in Kigogo area (Kigogo-Mandela corridor) has been experiencing similar challenge. Floods and unpredicted weather patterns caused by climate change dynamics have been affecting the areas along the planned project area and the worst case being the occasional floods at Kigogo, Sandali, Temeke, TAZARA, Buguruni and Tabata areas.

Adverse climatic variations especially high level of precipitation could potentially affect BRT buses operations. This is likely to cause temporal disruption of services, damage to properties and passenger inconveniences. Learning from BRT Phase 1, a comprehensive floods risk assessment and mapping needs to be undertaken to provide climate resilient measures to be integrated into the BRT Phase 5 design, construction and operation. This is a negative impact that can be characterized as site-specific, medium magnitude, short term and probable.

6.3.5 Decommissioning Phase

As decommissioning will take place in the remote future, the specific conditions for mitigation are generally uncertain. In view of this, specific mitigation measures pertaining to environmental impacts of decommissioning works cannot be proposed with a reasonable degree of certainty.

However, the project is economically strategic and expected to endure through an indefinitely long-term operational period since the user population is anticipated to utilize the infrastructure on an open-ended basis. Therefore, only few components of BRT Phase 5 and Port Access Road project can reach the decommissioning phase, for example depot, terminals, stations and bridges, but the rest of the infrastructures will be maintained.

This phase entails the work needed to dismantle the site proposed when required. It includes a demolition plan that will take into consideration the health, safety, traffic, environmental issues, the public, neighboring materials and properties before decommissioning works. Its definite mitigation measures are unclear as it is not foreseen to occur in the distant future.

A Detailed decommissioning plan that takes environmental issues into consideration shall be prepared by the developer prior to the decommissioning works. Should it be done, decommissioning may entail change of use (functional changes) or demolition triggered by change of land use.

6.4 Significance of Impacts (Without Mitigation Measures)

The significance rating for the identified impacts in the absence of mitigation and/or enhancement measures is presented in Table 6-15 overleaf.

Table 6-15: Significance assessment of the impacts without mitigation measures

Phase	Impact	Nature		Probability	Impact Evaluation Criteria			Significance Rating
	Description	Positive/Negative	Direct/Indirect		Extent	Magnitude	Duration	
Pre-construction	Displacement of people, loss of properties and livelihoods disruption	-ve	Direct	Definite	Site specific	High	Long term	-ve Major
	Community anxiety from resettlement information disclosure	-ve	Direct	Highly probable	Site-specific	Medium	Short term	-ve Moderate
	Potential relocation of the graves/graveyard	-ve	Direct	Probable	Site-specific	Medium	Long term	-ve Major
	Vegetation clearance and habitats loss/fragmentation	-ve	Direct	Probable	Site-specific	Low	Long term	-ve Moderate
	Employment opportunities	+ve	Direct	Definite	Local	High	Short term	+ve Major
Construction	Employment benefits to communities	+ve	Direct	Definite	Regional	High	Short term	+ve Major
	Income generation to local suppliers and service providers	+ve	Direct	Definite	Regional	High	Short term	+ve Major
	Income/revenue to local government and agencies	+ve	Indirect	Definite	Regional	Medium	Short term	+ve Moderate
	Skills development and technology transfer	+ve	Indirect	Highly probable	Regional	High	Long term	+ve Major
	Air emissions from dust and exhaust fumes	-ve	Direct	Highly probable	Site-specific	High	Short term	-ve Major
	Elevated noise and vibration levels	-ve	Direct	Highly probable	Site-specific	High	Short term	-ve Major
	Risk of soil erosion, slope instability and siltation	-ve	Direct	Probable	Site-specific	Medium	Short term	-ve Moderate
	Terrestrial and aquatic habitats alteration and/or fragmentation	-ve	Direct	Probable	Site-specific	Medium	Short term	-ve Moderate
	Potential/accidental contamination of water and soil resources	-ve	Indirect	Probable	Local	High	Long term	-ve Major
	Littering from generated solid and liquid wastes	-ve	Indirect	Probable	Site-specific	Medium	Short term	-ve Moderate
	Potential land degradation from borrows, quarries and sand pits	-ve	Direct	Probable	Site-specific	High	Long term	-ve Major
	Utilities relocation/damage and service disruption	-ve	Direct	Definite	Local	High	Short term	-ve Major
	Occupational health and safety hazards	-ve	Direct	Highly probable	Site-specific	High	Short term	-ve Major
	Traffic flow interference & traffic accidents along	-ve	Indirect	Definite	Site-	High	Short	-ve Major

Phase	Impact	Nature		Probability	Impact Evaluation Criteria			Significance Rating
	Description	Positive/Negative	Direct/Indirect		Extent	Magnitude	Duration	
	BRT 5 corridor				specific		term	
	Disruption of access to homes and public services/activities	-ve	Indirect	Highly probable	Site-specific	Medium	Short term	-ve Moderate
	Exposure to HIV/AIDS and new transmission	-ve	Direct	Probable	Local	High	Long term	-ve Major
	Influx of people in the project area and its implications	-ve	Indirect	Probable	Site-specific	Medium	Short term	-ve Moderate
	Sexual harassment and violence against women & vulnerable segments	-ve	Indirect	Highly probable	Local	Medium	Long term	-ve Major
	Exclusion from economic opportunities and fair labor terms	-ve	Indirect	Probable	Local	Medium	Short term	-ve Moderate
	Child labour and increased school truancy	-ve	Indirect	Probable	Local	Medium	Short term	-ve Moderate
	Risk of contracting and/or transmission of COVID-19	-ve	Indirect	Probable	Local	Medium	Short term	-ve Moderate
Demobilization	Displacement of workers and loss of jobs	-ve	Direct	Definite	Regional	Medium	Short term	-ve Major
	Loss of business opportunities	-ve	Direct	Highly probable	Local	Medium	Short term	-ve Moderate
	Waste generation and disposal challenges	-ve	Indirect	Highly probable	Site-specific	Medium	Short term	-ve Moderate
Operation	Improved urban mobility, reduced travel time and congestion	+ve	Direct	Definite	Regional	High	Long term	+ve Major
	Improved productivity, access to livelihood activities and welfare of vulnerable groups	+ve	Indirect	Highly probable	Regional	High	Long term	+ve Major
	Increased safety and security of urban public transport sector	+ve	Indirect	Highly probable	Local	High	Long term	+ve Major
	Improved mobility access to women and disadvantaged groups	+ve	Indirect	Highly probable	Local	High	Long term	+ve Major
	Reduction of national carbon footprint & augmentation of climate-resilient and low-carbon urban infrastructure	+ve	Indirect	Probable	National	High	Long term	+ve Major
	Employment opportunities and skills development	+ve	Direct	Definite	Regional	High	Long term	+ve Major
	Impacts on <i>daladala</i> and other public transporters along BRT route	-ve	Direct	Probable	Local	Medium	Long term	-ve Moderate
	Wastes generation, littering and potential contaminations	-ve	Indirect	Probable	Site-specific	Medium	Long term	-ve Moderate

Phase	Impact	Nature		Probability	Impact Evaluation Criteria			Significance Rating
	Description	Positive/Negative	Direct/Indirect		Extent	Magnitude	Duration	
	Community health and safety risks	-ve	Direct	Probable	Site-specific	High	Long term	-ve Major
	Sexual assault & harassment risks in BRT System	-ve	Indirect	Probable	Site specific	High	Long term	-ve Major
	Occupational health and safety risks/hazards	-ve	Direct	Probable	Site-specific	High	Long term	-ve Major
	Potential disruption of services from climatic dynamics	-ve	Indirect	Probable	Site-specific	Medium	Short term	-ve Moderate
Decommission	Not applicable*							

Source: Consultant, July 2020

7.0 IMPACTS MITIGATION AND ENHANCEMENT MEASURES

This Chapter outlines mitigative measures intended to avert, minimize or alleviate the negative project impacts identified in the preceding chapter, along with complementary measures to enhance potential project benefits. These measures have been proposed based on stakeholder consultations, expert analysis, experiential insights from similar projects and applicable industry-best practices.

7.1 Enhancement Measures for Positive Impacts

7.1.1 Pre-construction Phase

7.1.1.1 *Employment opportunities*

The project proponent/contractor should give local communities surrounding the project corridor preference to have a chance to engage in road construction works. Semi-skilled and unskilled labour will be sourced locally to provide affected communities with employment and the opportunity to earn an income from the project. The PAPs will be given priority as well to work in the project as part of livelihoods restoration support. A special clause that requires local residents to be employed as laborer's during construction will be included in the contract. An inclusive, transparent and gender-sensitive recruitment process shall be established and implemented. Local leaders along the project area will be involved in the recruitment of the labourers.

Further, the project proponent/contractor shall encourage/permit small businesses that support the construction such as cafes, food vendors, *kiosk* etc. to provide services to the construction staff in consultation with relevant local government authorities.

Regarding gender and equity, the recruitment system through local government leaders at *mtaa* level shall ensure equal opportunities are provided for both females and males for all jobs that can be done by either gender.

Vulnerable groups, particularly disabled, destitute, women-headed households, and those who have lower access to employment opportunity than youths and non-disabled shall be given consideration in the employment opportunities. The contractor will ensure vulnerable groups are given priorities to all works that they are able and willing to perform. For example, involving female-headed family/ poor households, and women-widow groups in food catering services for project labour leasing of rental amenities to construction personnel based in nearby camps, undertaking activities such as traffic control, and supplies of various project items as it may be required.

In addition, the Contractor will be required to develop and implement a Labour Recruitment and Management Plan/Procedures management that will be applicable to the BRT construction project. The plan shall comply to the national labour and employment relations legislative framework, IFC PS2 and World Bank ESS2 on labour and employment conditions.

The Contractor will also adapt and tailor requirements from the national local content policy and regulations for mining and petroleum sectors as presented in Section 3 above.

7.1.2 Construction Phase

7.1.2.1 *Employment Benefits to Communities*

The project proponent/contractor should give local communities surrounding the project corridor preference to have a chance to engage in road construction works. Semi-skilled and unskilled labour will be sourced locally to provide affected communities with employment and the opportunity to earn an income from the project. The PAPs will be given priority as well to work in the project as part of livelihoods restoration support. A special clause that requires local residents to be employed as laborer's during construction will be included in the contract. An inclusive, transparent and gender-sensitive recruitment process shall be established and implemented. Local leaders along the project area will be involved in the recruitment of the labourers.

Further, the project proponent/contractor shall encourage/permit small businesses that support the construction such as cafes, food vendors, *kiosk* etc. to provide services to the construction staff in consultation with the local government authority.

Regarding gender and equity, the recruitment system through local government leaders at *mtaa* level shall ensure equal opportunities are provided for both females and males for all jobs that can be done by either gender.

Vulnerable groups, particularly disabled, destitute, women-headed households, and those who have lower access to employment opportunity than youths and non-disabled shall be given consideration in the employment opportunities. As part of an economic empowerment contractor, will ensure vulnerable groups are given priorities to all works that can perform.

Additional enhancement measures include:

- Timely and continuous information dissemination about the existing job opportunities and any other opportunities besides the jobs such as sourcing of materials and supplies. The contractor will use effective communication methods so as to ensure that the message reaches the intended people using communication channels that reach a wider section of the population;
- The contractor will present a transparent Worker's Recruitment Plan. The recruitment procedures must provide equal opportunity for all including females. The Plan should be clear on the working conditions and terms of employment;
- Implementation of the Gender Action Plan (see Annex VI) regarding employment opportunities for women. This will include human resource management trainings concerning equal opportunity, gender-inclusive recruitment and non-discriminative employment terms;

- The Contractor will prepare and implement and Sexual Harassment Policy or Plan to safeguard women and other vulnerable groupings;
- The Contractor will provide fair working conditions and environment as required by the Employment and Labour Relations Act. The implementing agency will have to approve the Worker's Recruitment Plan including the proposed wages for the workers;
- All forms of child and forced labour shall be restricted through a strict recruitment screening and monitoring mechanism;
- Implementation of the construction Labour Recruitment and Management Plan (LRMP) that will be applicable to the BRT construction project. The plan shall comply to the national labour and employment relations legislative framework, IFC PS2 and World Bank ESS2 on labour and employment conditions; and
- The Contractor will also adapt and tailor requirements from the national local content policy and regulations for mining and petroleum sectors as presented in Section 3 above. These applicable measures are:
 - Preparation and implementation of the of the project's guidelines for local content practices (Local Content Plan (CLP));
 - Ensure that preference is given to works and goods and that the services are provided and manufactured locally in Tanzania;
 - Prioritize and advertise employment of Tanzanians who are qualified, experienced and competent to perform various construction activities;
 - Preparation of the scheme for the training of Tanzanian employees;
 - Support and follow the national technology transfer plan by attaining all financial, legal and labour services locally; and
 - Preparation of the local content performance reports.

7.1.2.2 Income Generation to Local Suppliers and Service Providers

The Contractor and sub-contractors shall strive to optimize national local content will strive to source materials, equipment and other resources (refer Sections 2.5 and 2.6 above) that can be provided by local suppliers from within the project area/Dar es Salaam and Tanzania in general. This

will enhance internal money circulation and growth of business in Dar es Salaam and nearby Coast region. The proponent (TANROADS) is encouraged to procure experienced local contractor and sub-contractors who can perform the job. The international contractors will be required to associate with national/local sub-contractors.

At the local level (*mtaa/ward*), contractor(s) should encourage/permit small businesses that support the team involved with construction activities. For instance, food vendors (*mama lishe* and *baba lishe* stalls), transport services (*bodaboda*, *bajaji*, *private hires etc.*), kiosks, etc. that can provide services to the construction staff.

In addition, the procurement plan shall be required to incorporate affirmative actions involving the preparation of equal opportunity, gender-inclusive procurement.

The Contractor will also adapt and tailor applicable requirements from the national local content policy and regulations for mining and petroleum sectors as presented in Section 3 above. These applicable measures are:

- Preparation and implementation of the of the project's guidelines for local content practices (i.e. the LCP);
- Ensure that preference is given to works and goods and that the services are provided and manufactured locally in Tanzania;
- Prioritize and advertise employment of Tanzanians who are qualified, experienced and competent to perform various construction activities;
- Preparation of the scheme for the training of Tanzanian employees;
- Support and follow the national technology transfer plan by attaining all financial, legal and labour services locally; and
- Preparation of the local content performance reports.

7.1.2.3 Income/Revenue to Local Government and Agencies

TANROADS, Contractor and all sub-contractors will be required to pay all the applicable corporate taxes, fees, levies and charges to appropriate

local and central authorities or agencies. On the other hand, government is encouraged to develop a streamlined system for the clearance and monitoring, e.g. enhancing efficiency of the clearance and payment systems and create a transparency system for computation and collection of all taxes, levies, custom duties and revenues.

7.1.2.4 Skills Development and Technology Transfer

Proposed enhancement measures include:

- Provision of on-job training for the workers (unskilled and semi-skilled) in various areas of construction. This could be achieved through deliberately placing unskilled workers with semi-skilled personnel and semi-skilled with skilled workers;
- The international contractors shall be required to associate with national/local sub-contractors;
- Capacity-development opportunities (e.g. internships, training seminars) for women and minority employees, and women and minorities pursuing education within transport sector services;
- Contractors and sub-contractors will be encouraged to deliver skills and trainings to local staffs (both skilled and unskilled);
- The construction staff will be encouraged to further develop acquired knowledge and skills through Vocational Training Centres (VTCs), transfer of the skills into other livelihood activities, seek opportunities in other similar projects in the region and beyond; and
- Adoption and implementation of the project's LCP in compliance with the national statutory requirements. Such measures in the LCP shall include but not limited to:
 - Preparation of the scheme for the training of Tanzanian employees;
 - Support and follow the national technology transfer plan by attaining all financial, legal and labour services locally; and
 - Preparation of the local content performance reports.

7.1.3 Operation Phase

7.1.3.1 *Improved Urban Mobility, Reduced Travel Time and Congestion*

Proposed enhancement measures are:

- The services can be enhancing through proper management of new roads and facilities and introduce proper maintenance and operations of BRT buses to ensure adequate service is offered, and control any damage that may lead to closure or suspension of its use;
- Introducing adequate fleet of BRT buses to cover the routes, and match up with peak demand and avoiding overcrowding at the stations and buses;
- Ensuring smooth traffic flow along the corridor, key intersections and junctions;
- Enforcement of the procedures such as driver training, to improve driver and vehicle safety;
- Establishment of the effective bus operation schedules (efficient fleet traffic management) depending on the demand/peak times etc. to avoid passenger delays and congestion at the stations and inside buses;
- Establishing a transparent and accessible mechanism for receiving, addressing and feedback communicating complaints, suggestions or any other issues from the passengers, freight transporters (especially truck drivers utilizing Port Access Road and Nelson Mandela Road), and other road users; and
- Ensuring that the station attendants/security guards/supervisors are first aiders trained in addition to other duties they perform. Each station/terminal/depot should always have at least one trained personnel.

7.1.3.2 **Improved Productivity, Access to Livelihood Activities and Welfare of Vulnerable Groups**

Proposed enhancement measures are:

- Ensuring smooth traffic flow along the corridor and adequate BRT buses;
- Regular maintenance of the BRT buses and road infrastructure;

- Cost reduction measures such as the availability of differential fare structures (time of day, routing, concessionary fares) and flexibility provisions (same ticket for multiple journeys);
- Boosting of services during off-peak hours and between radial areas (as opposed to periphery-to-center services only);
- Planning bus stops strategically (near key services, schools, health centers, and so on);
- Promotion of intermediate transport means in peri-urban extremities to facilitate access to the nearest BRT stations; and
- Increasing the frequency, regularity, and predictability of the BRT buses schedules to reduce the waiting time.

7.1.3.3 Increased Safety and Security of Dar es Salaam's Public Transport Sector

Proposed enhancement measures are:

- Providing adequate lighting on sidewalks, at bus stops, on platforms, and in terminals to increase personal safety;
- Installation of surveillance cameras in BRT facilities in areas with high criminal activity, including all buses and platforms;
- Stationing of security personnel at terminals, on platforms, and in BRT buses on a full operational time basis;
- Promoting business development activities near stations, stops and waiting areas as a measure to increase pedestrian movement in the areas;
- Recruitment of the competent qualified drivers and continuous comprehensive trainings e.g. defensive driving techniques (DDT), enforcement of procedures such as driver training, to improve driver and vehicle safety;
- Establishment of the effective bus operation schedules (efficient fleet traffic management) depending on the demand/peak times etc. to avoid passenger delays and congestion at the stations and inside buses;

- Development and dissemination of mechanisms to report, address and register incidents of violence and harassment (e.g. help desks, warning posters, posted help lines, emergency buttons etc.);
- Establishing a transparent and accessible mechanism for receiving, addressing and feedback communicating complaints, suggestions or any other issues from the passengers, freight transporters (especially truck drivers utilizing Port Access Road and Nelson Mandela Road), and other road users; and
- Ensuring that the station attendants/security guards/supervisors are first aiders trained in addition to other duties they perform. Each station/terminal/depot should always have at least one trained personnel.

7.1.3.4 Improved Mobility Access to Women and Disadvantaged Groups

Proposed enhancement measures are:

- Establishment of the boarding system that gives priority to the elderly, disabled and other vulnerable groups such as pregnant women, students and sick people;
- Security system (guards/supervisors) at the stations, depots and terminals to monitor and assist disadvantaged groups during boarding and alighting;
- Increasing the frequency, regularity, and predictability of public transport services, to reduce women waiting time at the stations; and
- Establishing a transparent and accessible mechanism for receiving, addressing and feedback communicating complaints, suggestions or any other issues from the passengers, freight transporters (especially truck drivers utilizing Port Access Road and Nelson Mandela Road), and other road users.

7.1.3.5 Reduction of the National Carbon Footprint and the Augmentation of Climate-Resilient and Low-Carbon Urban Infrastructure

The following enhancement measures are proposed:

- Routine maintenance of BRT buses to ensure engines and other systems are well functioning (emission controls);

- Monitoring and evaluation of the BRT's carbon footprint;
- Ensuring the design and construction of adequate hydraulic conduits to minimize damage to BRT infrastructure and the disruption of BRT services due to flood events;
- Ensuring the structural design of the depots, terminals and stations are climate-resilient and sufficiently protective against destructive risk of tropical storms;
- Implementation of the recommendations and strategies from National Climate Change Strategy³⁰ regarding reduction of the GHG emission and climate change adaptation in the infrastructure sector particularly road transport; and
- It is recommended that the vehicles driving along the BRT Phase 5 routes should comply with the emission limits specified in the Environmental Management (Air Quality Standards) Regulations, 2007.

7.1.3.6 Employment Opportunities and Skills Development

- Optimization of the national local contents by giving priority to the qualified nationals in employment opportunities;
- Capacity building and provision of on-job training for the workers in various BRT operation and maintenance activities. This could be achieved through deliberately placing unskilled workers with semi-skilled personnel and semi-skilled with skilled workers;
- Establishment of periodic training programmes for existing and newly recruited staff;
- Provision of equal employment opportunities for men and women in operation and maintenance activities. For example, widening scope of women participation across various BRT operations e.g. drivers, maintenance workshop, traffic controllers, engineers etc.;

³⁰ National Climate Change Strategy, Vice President's Office-Division of Environment, Tanzania 2012

- Capacity-development opportunities (e.g. internships, training seminars) for women and minority employees, and women and minorities pursuing education within urban transport sector services;
- Human resource management trainings concerning equal opportunity, gender-inclusive recruitment and non-discriminative employment terms; and
- Mainstreaming of the Gender Action Plan (Appendix VI) throughout BRT operations.

7.2 Mitigation Measures for Negative Impacts

7.2.1 Pre-Construction Phase

7.2.1.1 *Displacement of People, Loss of Properties and Livelihoods Disruption*

In order to avoid and/or minimize resettlement impacts, several design revisions have been made. Design of the proposed BRT Phase 5 corridor and supportive infrastructure maximized utilization of the existing RoW in all road sections to minimize extra land acquisition, involuntary relocation of people and properties, compensation costs, and livelihoods disruption (e.g. businesses, daladalas etc), and disturbances of the communities. The BRT has been designed in such a way that unnecessary demolition of structures has been minimised except where horizontal realignment outside the existing corridor is unavoidable. Thus, to a large extent the road construction will be confined to the existing road reserve.

For the affected properties and communities, a detailed RAP including Valuation (separate report) as guided by national framework and World Bank's ESS 5 (Land Acquisition, Restrictions on Land Use and Involuntary Resettlement) has been developed along with this ESIA. The RAP set out the land acquisition and resettlement procedure highlighting all available alternatives for compensation. According to the the draft RAP, a total of 1,018 PAPs with compensable assets and associated costs amounting to TZS 71,641,785,910.12 as per breakdown presented in Table 7-1 below. The properties valuation has been undertaken by a nationally registered and certified Valuer along the project road.

TANROADS will make sure that all procedures for acquiring land for the proposed project are followed to avoid land disputes and PAPs will be fairly and promptly compensated.

Along with the RAP, an indicative Grievance Redress Mechanism (GRM) has been developed and used during land acquisition process and construction phases to ensure that all complaints are fully captured and addressed with set time frame and modalities (see Appendix VII). The detailed and comprehensive GRM complies to national guidelines and international standards (IFC PS 5 and World Bank ESS5). It is recommended that the GRM should be translated into Swahili language, be made easily accessible and understandable by the PAPs.

Further, two kinds of compensation modalities are expected to be used for compensation, that is cash and in-kind compensations. Cash compensation will be calculated and paid to compensate for land, assets, or to cover allowances such as disturbance, accommodation, transportation, loss of profit where all individuals (PAPs) opted for this kind of compensation. The in-kind compensation, mainly for community/public properties, include a Ward Office, primary school buildings, Kigogo Police post, a fence wall at Bandari College and the CCM *Mtaa* office in Sandali ward, Temeke.

The affected households declared willingness to relocate should they receive prompt and fair compensation. Households respondents interviewed indicated their preference for relocating to a site close to their current household, though they were unsure of the availability of adjacent land or if the compensation provided will allow them such opportunity. When asked if they would prefer their respective municipal council to find alternative land for the affected PAPs, respondents stated their disinterest in this, as the mentioned sites that the municipalities are developing are away from their current neighborhoods.

Given the extent of the involuntary displacement and livelihoods disruption for communities along the corridor, it is proposed that a Livelihoods Restoration Plan (LRP) should be developed and implemented as per IFC Performance Standard 5 (Land Acquisition and Involuntary Resettlement) and WB ESS 5 (Land Acquisition, Restrictions on Land Use and Involuntary Resettlement). Livelihood restoration and improvement programs should be timely implemented in order to ensure that PAPs are sufficiently prepared to take advantage of alternative livelihood opportunities and restoration measures that may be available.

Table 7-1: Compensation breakdown for the BRT Phase 5

Categories	Components	Resettlement Cost (TZS)
1,018 PAPs	Compensation for structures	11,804,780,900.00
	Compensation for loss of land	6,461,083,200.00
	Disturbances allowances	1,473,044,338.00
	Loss of profits	7,245,196,000.00
	Transport allowances	81,300,000.00
	Accommodation allowances	5,416,890,000.00
	Trees	14,190,125.00
	Sub-total (a)	32,496,484,563
Utilities*	TPDC gas pipes	1,509,470,954.33
	TTCL cables	2,701,361,511.99
	TANESCO electricity lines/poles	19,990,861,251
	DAWASA water supply network	7,925,718,001.60
	Sub-total (b)	32,127,411,718.92
Other costs	Cost for hiring NGOs for HIV/AIDS services	455,000,000.00
	Expenses for three resettlement committees (sitting and transport allowances)	50,000,000.00
	Sub-total (c)	505,000,000.00
	Sub-total (a + b + c)	65,128,896,282
	Contingency 10%	6,512,889,628.2
	Grand total	71,641,785,910.12

Source: Draft RAP report, Nov. 2019

*Note: Utilities relocation issues are addressed separately in detail Section 7.2.2.8 below.

Additional mitigation measures include:

- Access to existing non-affected businesses adjacent to RoW will be maintained by creating temporary driveways, and/or providing alternate access points. Accesses will be restored after construction;
- Regarding taxi drivers, bajaji bodaboda riders, daladala drivers etc. these groups do not reach the threshold of being PAPs because the

government will provide them with new routes and packing stations. They will not be denied access to their businesses or lose their businesses;

- Compensate the owners of business premises adequately to enable them to replace the buildings before onset of construction activities;
- Provide ample time e.g. 3-4 months for the business owners, *bodaboda*, *daladala*, bajaji, mobile vendors and taxi operators to look for alternative business premises;
- Provision of resettlement support (from respective municipal authorities) to economically and/or physically displaced PAPs who are categorized as vulnerable e.g. additional guidance, compensation process, relocation support etc. to the child- and/or women-headed households, elderly, chronically ill persons etc.; and
- Accidental and/or temporal damage the properties adjacent to the RoW unforeseen construction actions the property shall be compensated as per the entitlement matrix developed in the RAP. This will be Contractor's responsibility in liaison with the developer.

7.2.1.2 Community Anxiety from Resettlement Information Disclosure

To reduce the anxiety, all information regarding the project and land acquisition and compensation will be thoroughly disseminated to the community, especially during the preparation of the RAP and any other relevant project information throughout other Phases of the project so that all fears, anxieties and queries are answered, reduced or eliminated. During the RAP preparation and implementation, sensitization campaigns will be undertaken and information about land take and acquisition will be disseminated to the appropriate people e.g. family members, property owners, spouses, children etc.

Further, a transparent valuation and compensation mechanism will be established in order to ensure that all PAPs are aware. The PAPs will be directly and actively involved in the entire process from design, implementation, monitoring and evaluation. Communication channels in

form of hotlines (for all mobile network service providers) and e-mail addresses will also be established to enable PAPs to convey any queries, fears and concerns to designated attendants to be addressed accordingly, in line with the project grievance mechanism.

7.2.1.3 Potential Relocation of the Cemeteries/Graveyard

The horizontal alignment design for BRT and mixed traffic lanes, and sitting of other infrastructure such as stations, depots and terminals will strive to avoid direct impacts/relocation/disturbances on the existing cemeteries along and/or adjacent to the RoW.

If unavoidable, the affected graves will be relocated with careful consideration, removal, transportation and reinstatement or re-interment of the affected graves shall be undertaken in compliance with the Graves (Removal) Act. No 9 of 1969 that recommend removal of grave to be respected with due regard to the view of the person interested and the religious susceptibilities of the members of the religious community to which the person belonged.

Through involvement of the affected households, the grave relocation will be undertaken by government (respective municipal authority and TANROADS) whereby the affected households/owners should be paid a disturbance allowance to compensate for the cost of relocation of the grave. The owners are to be given a chance to propose ideal alternative sites for relocation.

7.2.1.4 Vegetation Clearance and Habitats Loss/Fragmentation

The BRT Phase 5 project corridor is a brownfield site located in a highly disturbed and fragmented terrestrial habitats due to anthropogenic activities primarily development of the city's settlements, infrastructures and daily livelihood activities. None of the recorded species have significance conservation concern under IUCN. The existing vegetation that will be impacted by this project is common and has relatively low biological significance and can be replanted during landscaping.

However, further damages can be minimized through:

- Confining the construction activities within the existing brownfield road reserve and designated areas;
- During site preparation activities, limiting vegetation clearance to the specific space required for construction. Ground clearance is minimized and if possible concentrated only to the footprint area and only when it is necessary;
- The Contractor should ensure minimum disturbance occurs to vegetated areas outside the project footprint;
- Temporary projects infrastructures and materials sourcing areas in Coast Region (borrow pits, access roads, road construction camps, stockpiling areas) should avoid woodlands, wetlands and ecologically sensitive areas;
- Areas cleared of vegetation and left after construction should be re-vegetated to prevent soil erosion. Plants and grasses for re-vegetation should be sourced within the project area to avoid introduction of exotic species;
- All road diversion should be closed when they are no longer in use, to allow the vegetation to recover;
- The Contractor will ensure that the removal of vegetation is done only when it cannot be avoided. It is expected that after construction and restoration, there will be no removal of vegetation cover. The impact is therefore considered insignificant; and
- It is recommended to undertake further biodiversity assessment and develop a tailor-made project-specific Biodiversity Action Plan (BAP) to inform construction activities and post-construction restoration and/or enhancement.

7.2.2 Construction Phase

7.2.2.1 Air Emissions from Dust and Exhaust Fumes

A number of sensitive receptors (e.g. dense settlements, business premises, public and private institutions such as schools, health facilities, public offices and industrial establishments) are found adjacent to the

BRT Phase 5 corridor. The Contractor shall be required to adopt measures in controlling dust and exhaust fumes emissions:

- Dust suppressive agents such as water will be used (regular water sprinkling along excavated routes) using non-potable water where possible and appropriate;
- All activities producing excessive dust levels will be confined within working areas, fine earth materials such as sand and murram will be covered during haulage to prevent spillage and dusting;
- Excavated soils will be compacted in order to reduce the amount of dust spreading by wind to the neighbouring environment, settlements and commercial premises located throughout the project corridor;
- Use of dust screens or nets to confine works areas adjacent to key sensitive receptors along the RoW;
- Administering adequate Personal Protective Equipment (PPE) such as goggles, dust/fumes masks for the construction workers to ensure to prevent potential respiratory disorders from excessive exposure to dust and fumes; air purification (chemicals, mists, vapors and gases);
- Haulage trucks will have tailgates that close properly and tarpaulins to cover materials being transported;
- Vehicles, equipment and machinery operations will be of acceptable standards e.g. less fumes emitting equipment and motorized construction machinery will not be left running idle
- Timely and proper maintenance of machinery, equipment and vehicles to keep the fumes emissions as low as possible. Equipment shall be serviced as per schedule to avoid excessive emission from their exhausting system.

7.2.2.2 Elevated Noise and Vibration Levels

Like the case of dust and emission, elevated noise and vibration levels are likely to affect sensitive receptors (e.g. dense settlements, business premises, public and private institutions such as schools, health facilities, public offices and industrial establishments) located adjacent to the BRT Phase 5 corridor. The Contractor will adopt the following measures in controlling noise and vibration emissions:

- The contractor should take measures to limit noise level during construction especially for the noises exceed 90dB for 8 hours continuous and focus on the reduction to 55dB because the project is closer to the sensitive environmental receptors;
- Activities that generates excessive noise will be limited to daytime hours e.g.;
 - Good practice dictates than notifications should occur to all dwellings, schools and hospitals within 200m of concrete batch plants; and
 - Concrete batch plants within 500m of dwellings or 750m of schools and hospitals to operate daytime only.
- Contractors and sub-contractors will be required to maintain properly functioning equipment and comply with standards stipulated in the Occupational Health and safety Act No. 5 of 2003 standards, IFC PS 2 (Labour and Working Conditions), and World Bank ESS2 (Labour and Working Conditions);
- Available noise suppression devices are properly maintained, and mufflers will be affixed to construction equipment in use. For example; preference will be given to selecting equipment and devices (e.g. fitting of mufflers on exhaust) that generate low levels of noise and vibration where possible. This includes the use of hydraulic piling rigs where practical and required. Soundproofing enclosures will also be employed for high-impact stationery sources;
- Potential noise and vibration impacts will be assessed where piling is to be undertaken close to sensitive receptors (within 80m), or where rock breaking is undertaken within 25m. Where possible, alternative techniques or materials will be used to reduce potential impacts, as well as restrictions on times that piling/breaking activities are undertaken (e.g. restrictions on concurrent operations to limit total vibration);
- Blasting operations and schedules will be thoroughly communicated in advance and widely circulated within the primary impact zone. Operations to be conducted away from sensitive receptors at least 500m away to minimize noise and vibration impacts;
- Contractors' vehicle and machinery operations will be of acceptable standards as per Tanzanian legislations, IFC and/or WHO Standards in

relation to noise emission;

- Ensure that equipment and machinery are well maintained and properly fitted with exhaust mufflers to minimize noise and vibrations due to materials transport trucks;
- Activities that generate significant levels of noise and vibration will be assessed to determine potential impacts. Mitigation will be implemented where appropriate;
- Local residents will be notified before activities are undertaken that could generate significant levels of noise and vibration that may disturb or alarm people or animals, especially during approved 24-hour activities;
- A construction noise and vibration management plan will be developed by a competent person to detail the impacts, identify control measures, and implement a monitoring and complaint handling regime where required;
- Proper choice and location of plant and machinery coupled with noise and vibration reducing strategies such as proper orientation or use of enclosures;
- Where people live near to the works or there is a high potential for disturbance (e.g. from noise and vibration) from construction activities undertaken between 7 p.m. and 7 a.m., a location-specific assessment will be completed to identify appropriate mitigation. Special consideration will be given to any highly sensitive receptors including schools and hospitals;
- The validity of any damage claims will be assessed; repairs will be undertaken, or appropriate compensation paid if damage is proved, through data or photographic evidence, to be associated with construction activities (e.g. construction vehicle movements);
- Residences and other receptors, such as schools, will be considered when locating fixed and mobile equipment (e.g. generators);
- Workers during project construction should be protected (PPE use) from the effects of noise by hearing protective devices such as earplugs and earmuffs;
- Contractor should select equipment with low noise emission level and that equipment should of the acceptable standards;
- Establishing and maintaining a buffer from sensitive receptors such as churches, mosques, schools, health facilities for noise and vibration damage control (nearby houses/structures) along the construction corridor and

materials sourcing areas where blasting operations may be performed; and

- Unnecessary idling of equipment within noise sensitive areas to be avoided.

7.2.2.3 Risk of Soil Erosion, Slope Instability and Siltation

The Contractor shall ensure that measures from erosion risk assessment are proactively addressed and incorporated into all project construction activities especially in areas that are prone to erosion and possibly flooding. Such measures will include avoiding directing stormwater into the settlements or public institutions, engineering measures e.g. use of gabions for steep slopes protection and reinforcement; installation of proper hydrological structures in all susceptible locations, controlled excavations and siltation etc. Other measures include:

- Lined drainage channels at sensitive terrains shall be provided to control speed and volumes of stormwater. The discharge points must be carefully chosen to avoid inundation in the nearby settlements, institutions, commercial and industrial premises, and creation of gullies;
- Install silt traps to prevent sediments from surface water source;
- Landscaping/revegetation of the *Vetiver* grass species on embankment slopes to add slope stability (sediment binding grasses along embankment slopes) after construction to compensate for the vegetation loss; and
- Embankment slopes: the steeper the embankment slope, the faster the speed of rainwater runoff down the slope and the more severe its eroding effect. Furthermore, the natural angle of repose of sand is around 30° (1 in 1.7) so it is considered that 1 in 1.5 slopes as recommended in the Road Geometric Design Manual for embankments higher than 3m to be about adequate.

7.2.2.4 Terrestrial and Aquatic Habitats Alteration and/or Fragmentation

Permanent clearance will be confined to the area where there will be acquisition of extra land to accommodate BRT Phase 5 facilities.

Vegetation on the extension portions mainly grass, a few planted trees and other secondary vegetation important in the stabilization of soil will be replaced by vegetation species capable of the same functions.

Further mitigation measures include:

- Construction activities will be confined within the road reserve and designated areas, whereby vegetation clearance will be controlled and limited only to the specific footprint required for construction only;
- Contractor and TANROADS should ensure minimum disturbance and fragmentation occurs to vegetated areas outside the project footprint (beyond right of way);
- Avoid clearing or damaging of riparian vegetation where possible, and limit river and stream crossings as far as possible;
- The less disturbed vegetation communities/habitats need to be protected to offer habitat for wildlife (small mammals and reptiles in particular) that will lose their habitat during construction;
- During construction of the main bridges across Msimbazi, Tenge. Kigogo/Luhanga rivers, unnecessary destruction of the riparian habitats and soil excavations along the riverbanks shall be restricted;
- Keep all areas of riparian vegetation upstream/midstream and downstream as continuous as possible to maintain ecological corridors along the three main rivers within the proposed project area;
- Landscaping and vegetation restoration shall cover both onsite and offsite areas that have been disturbed as a consequence of the project activities along the river banks and the corridor. All bare areas around the river banks must be planted with grass and/or shrubs immediately after construction to stabilize soils and minimize river bank erosion;
- Contractor should seek to avoid the introduction of invasive species, as well as control and reduce their further spread through activities like materials extraction, transportation and disposal;
- Avoid indirect effect of run-off erosion and sedimentation from roads that may lead to loss of riparian habitats; and
- Implementation of the recommendations from project's BAP.

7.2.2.5 Potential/Accidental Contamination of Water and Soil Resources

The suggested mitigation measures to avoid contamination of the soil and water resources during construction phase are:

- Construction activities (with exception of bridges) will be carried away from water courses at least a buffer of 60m as per EMA No. 20, 2004. e.g. locating workers camps away from water bodies, car/equipment washing;
- Avoid construction of workers camp site facilities close to surface water sources;
- Avoid washing of construction equipment and vehicles near the water sources;
- Effluents generated at the camps and various construction activities shall not be discharged into adjacent rivers, streams;
- Fuel/oil storage containers will be properly sealed and monitored to avoid any possible spillage, all activities involving transfer of fuel and chemicals from one containing vessel to another shall be done far away from water courses;
- The Contractor shall develop and implement Waste Management Plan (WMP), and Spill Prevention and Contingency Plan (SPCP) to provide guidance and response mechanism to accidental unplanned events such as oil spills;
- Establishment of the bunding walls (secondary containment) of at least 110% of the volume of the hydrocarbon storage tanks/area to prevent spillage. The fuel storage areas will be concrete and bunded to contain spillage. The drip pans at petroleum products dispensing points;
- Pit latrines must be located not less than 60m from surface water sources and the bottom of the pit latrine should not be less than 1m below the water table to avoid groundwater contamination;
- The generated wastes and/or excavated materials that are no longer in use will be properly stored, transported and disposed of at the approved designated dump sites agreed upon with the municipality's provisions and national regulations guiding waste management. No waste shall be disposed into waterways (including their beds, or within immediate proximity to them), alluvial plains, wetlands and swampy areas in the project area of influence;
- Remediation/cleaning of the contaminated sites will soon after completion of

the civil works;

- Repair all construction equipment to avoid fuel and oil leakages;
- Construction equipment service bays shall be provided with berms to avoid spills from being washed away to the water sources; and
- Solid and liquid waste must be handled as prescribed in the Standard Specification for Road Works (*Section 1713*) to avoid any spillage and contaminations.

7.2.2.6 Littering from Generated Solid and Liquid Wastes

To ensure that waste is properly managed and potential littering, pollution, contaminations and public health risks are mitigated, the Contractor shall develop a robust Waste Management Plan (WMP) to be strictly be implemented during pre-, construction and demobilization phases of the project. The plan shall be reviewed and approved by TANROADS and AFD before commencing of actual civil works. The WMP is to be incorporated into project's ESMS.

The generated wastes shall be disposed in compliance with the municipal and city guidelines, and good international industry practices. Solid waste will be sorted into different containers for appropriate disposal. For example, waste paper and cardboard boxes will be recycled and/or re-used. Scrap metals such as iron and steel, copper and aluminium will be availed to smelters; and other wastes can be transported to the approved dumping sites for proper waste disposal.

At the camps and construction site, pit latrines and/or a septic and soak-away tanks will be used to collect generated liquid waste. The pits will be regularly emptied. Sediment traps should be installed to avoid sediment-laden water from entering the storm water system/surrounding watercourses.

Further specific mitigation measure includes:

- Promotion of the waste sorting at the source for recycling, re-use, recovery and disposal as per municipal guidelines, national regulations governing

wastes management and good international industry practices. Sort waste according to their type and quality into different containers for appropriate disposal, decomposable wastes can be transported to the approved dumping sites for proper waste disposal, and recyclable materials can be sent to the recycling stations such as Scarp materials like iron, steel, copper, aluminum, wastepaper, cardboard boxes will be reused/recycled;

- Waste storage containers are covered, tip-proof, weather-proof, scavenger proof, and storage area is fenced off to prevent wind-blown;
- Inert construction rubble and waste materials are disposed of by burying them in the borrow pit or a designated site;
- All facilities are maintained in a neat and tidy condition and the site is kept free of litter, measures are taken to reduce the potential for litter and negligent behaviour regarding the disposal of all refuse, litter bins, containers and refuse collection facilities for later disposal are provided at all places of work;
- All excavated materials and debris from construction work are not stockpiled or deposited near or on stream banks or other water course perimeters where they can be washed away by high water or storm runoff or can in some way enter the water sources;
- Used oil, lubricants, cleaning materials, etc. from the maintenance of vehicles and machinery are collected in holding tanks and sent back to the supplier or removed from the site by a specialist oil-recycling company for disposal at an approved hazardous waste site;
- Runoff from fuel depots/workshops/machinery washing areas and concrete batching areas is collected in a tank and disposed of at a designated site;
- No burning, on-site burying or dumping of waste shall occur;
- All equipment shall be properly maintained to prevent oil and fuel leakages, servicing and and/or re-fueling of equipment shall not allowed near water courses, and all construction equipment working near the river should be well serviced to ensure that there is no oil leakage; and
- Sanitary waste at the camps shall be disposed of by the use of pour-flush toilets that shall be availed at every active constructive site.

7.2.2.7 Potential Land Degradation from Borrows, Quarries and Sand Pits

The Contractor should avoid establishment of the new borrow and quarry sites, by utilizing existing approved/licenced borrow areas such as those currently used for road construction located in Coast Region (refer Section 2.5 above).

Once these borrow pits are no longer in use, they will be backfilled using clean sand or granular materials, landscaped, steep edges of these pits will be smoothened to avoid posing community health and safety risks (e.g. pedestrians and livestock accidents, mosquito breeding sites etc.). Plant species characteristic of the landscape of the construction site shall be used during the restoration of the vegetation cover.

The Contractor shall be required to develop and implement Borrow Pits and Quarry Operation and Reinstatement Plan (BPQORP) that will ensure smooth operation and reinstatement of the materials sourcing areas.

7.2.2.8 Utilities Relocation/Damage and Service Disruption

The following mitigation measures shall be implemented by the Contractor in collaboration with TANROADS, DART, respective municipal council, local and utility authorities to avoid and/or minimize damage to the utilities, service disruption and inconveniences to the consumers.

- Identification and mapping of the utilities to be affected, specific areas along the corridor and groups (residential areas, commercial and industrial premises, vulnerable groups) that are likely to be affected directly. Further details on the specific utilities and road sections/areas to be affected is presented in Appendix IV;
- Development of the Utility Relocation Plan (URP). In case damage cannot be avoided the Contractor will collaborate with relevant utility authority to identify and relocate them from the road reserve;
- The Contractor will avoid damage to existing public service utilities as much as possible;

- The damaged utilities will be restored immediately to avoid inconveniences to the public. The Contractor will make arrangement with responsible authorities before moving or altering any public service utilities. The respective utility authority will be responsible for relocation after compensation of the associated costs as per breakdown in Table 7-1 above. Procedures in the Standard Specification for Road Works (*Section 1202*) and guidelines from respective utility authority such as TANESCO, TPDC, TTCL, DAWASA etc. shall be adhered to. It is expected that compensation costs will be paid by TANROADS (as the developer) to the respective utility authority who will be ultimately responsible for actual relocation works after sorting all approvals and alternative relocation site(s);
- Liaise with utility owners to provide early warning to the communities about any possible disruption in service provision for the different utilities. Existing communication channels such as phone text messages to consumers, media announcements could be utilized;
- Feasible alternatives should also be provided during temporary absence of service; and
- Compensation payment for the relocation of the affected utilities. The valuation conducted amounts to TZS 32,127,411,718.92.

7.2.2.9 Occupational Health and Safety Risks/Hazards

The proposed mitigation measures for implementation to avoid and/or minimize occupational health and risks/hazards are outlined below:

- The Contractor shall develop and implement the Health and Safety Policy, and the Health and Safety Management Plan (HSMP);
- The contractor will be fully responsible for health and safety of workers on-site, including providing all workers with appropriate PPE against noise, impact and dust, and through training in the use of protective safety clothing such as helmets, gloves, and boots;
- Performing task or activity-specific risk assessment and mitigation measures before actual commencement;
- Adequate access and egress shall be maintained, a fire-fighting system will be established, and hazard cones will be used to demarcate the working

area. This will improve the visibility of the construction work to drivers and pedestrians on access roads and thereby help prevent accidents;

- A well-stocked First Aid kit (administered by a trained first aider) shall be made available at each camp site, quarry site, active work sites;
- Regular induction training course on health, safety, security and environment to all workers before beginning of construction activities. The HSE Officer shall conduct periodic workshops and trainings to create awareness amongst construction workers;
- Effective safety and warning measures should be taken to reduce accidents. Safety signal devices and signage will be installed to ensure safety during construction;
- Minimizing pedestrian interaction with construction vehicles and collaboration with local communities and responsible authorities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations where children may be present;
- The Contractor shall develop and practice an emergency response plan, with the conduct of induction and refresher trainings for project staff, the latter of which will involve programmed emergency tests;
- Further, the Contractor shall adhere to construction guidelines and directives issued by Occupational Health and Safety Authority (OSHA); and
- Implementation of the additional specific measures related to physical, chemical, health and noise hazards as recommended by IFC Guidelines (see Table 7-2 below).

Table 7-2: Occupational health and safety hazards during construction

Category	Description	Management Practices to Prevent/Control
Physical hazards	Moving equipment and traffic safety	• Development of a transportation management plan for road repairs that includes measures to ensure work zone safety for construction workers and the traveling public • Establishment of work zones to separate workers on foot from traffic and equipment (e.g. routing of traffic to alternative roads, lanes closure, diversion, protective barriers to shield workers and road users, signage, eliminate blind spots etc.) • Speed controls in work zones • Training of workers in safety issues related to their activities
	Elevated overhead works	• Barricading of the works area to prevent unauthorized access • Hoisting and lifting equipment should be rated and properly maintained, and operators trained in their use • Elevating platforms should be maintained and operated according to established safety procedures including use of fall protection measures • Working at height training and safety measures, equipment and personnel movement protocols
	Fall protection	• Implementation of a fall protection program e.g. training, use of fall protection equipment, measures, inspection, maintenance, rescue of fall-arrested workers • Workers training of working at heights • Installation of fixtures on bridge components to facilitate the use of fall protection systems • Ensure availability and use of correct PPE for the fall protection
	Confined and restricted space entry	• Entry into all confined spaces should be restricted and subject to permitted supervision by properly trained persons • Workers training and awareness creation
	Risk of fire and explosion	• Fire protection measures including spill prevention • Signage and markings • Controlled access, surveillance and tight security controls in risky zones
Chemical hazards	• Reduction of engine idling time in construction sites • Maintenance of work vehicles and machinery to minimize air emissions • Ventilation of indoor areas where vehicles or engines are operated, or use of exhaust extractor hose attachments to divert exhaust outside • Provision of adequate ventilation in tunnels or other areas with limited natural air circulation • Use of protective clothing when working with cutbacks (a mixture of asphalt and solvents for the repair of pavement), diesel fuel, or other solvents • Use of extenders or other means to direct exhaust/fumes away from the operator	
Noise	• Use of personal hearing protection by exposed personnel • Implementation of work rotation programs to reduce cumulative exposure	
Health hazards	• VCT on HIV/AIDS, STDs, awareness campaigns • Proper waste management and sanitation in all works areas/camps • Provide adequate sanitation facilities for workers • Risk assessment and preventive measures against COVID-19 and other communicable disease	

Source: Adapted from IFC EHS Guidelines for Toll Roads (2007) & IFC EHS General Guidelines

7.2.2.10 Traffic Flow Interference & Traffic Accidents Along BRT 5 Corridor

Additional measures shall be implemented to optimize traffic flow and safety (construction traffic, pedestrians, vehicles, cyclists, students, children and other vulnerable groups) as presented below.

The road design has taken into consideration safety issues related to traffic accidents especially near settlements and urban centres and in all accidents-prone sections.

The Contractor shall review and update the Traffic Management Plan (TMP) that has been developed in the detailed engineering design to guide traffic flow and operations during construction (refer a separate Traffic Management Study report). The overall traffic plan is designed and intended to specify adequate safety measures in advance against identified hazards and specify implementation of the said safety measures to ensure safe movement of traffic during the construction operations of BRT Phase 5 Project. The TMP includes a description of measures to be taken to protect pedestrians and community health and safety, proposed diversions, detours, traffic flow and scheduling in the key intersections, junctions, feeders, haulage routes, traffic signage and monitoring mechanism.

The safety measures identified in the TMP provides safe travel to the drivers of vehicles plying on the Project roads throughout the day, throughout the year and provide protection to the Project workers when they are on the work.

Other proposed measures include:

- Provision of safe corridors and crossings along the road alignment and construction areas e.g. separated paths/lanes;
- Installation of barriers (e.g. fencing, plantings) to deter pedestrian access to the roadway except at designated crossing points;

- Installation and maintenance of speed control and traffic calming devices at pedestrian crossing areas;
- Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions;
- Traffic can be accommodated by means of stop/go conditions in partial width construction wherever possible;
- Inform road users about location of road works and advise on use of alternative existing roads through media outlets, and notice boards in public places;
- Coordination with district traffic police (Kinondoni, Ubungu, Ilala and Temeke) in traffic management;
- Deployment of flag men to control traffic flow at all project subcomponent sites;
- Effective safety and warning measures should be taken to reduce accidents. Safety signal devices will be installed to ensure safety during construction;
- Establishment of the support mechanism for the movement of the vulnerable groups such as disabled people including wheelchair users, children, students, patients;
- Continuous sensitization and awareness creation amongst community, transporters using Port Access Road, public transport operators and construction workers. For the public, media outlets can be used for safety campaigns along construction zones; and
- Minimizing pedestrian interaction with construction vehicles and Collaboration with local communities and responsible authorities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations where children may be present.

7.2.2.11 Disruption of Access to Homes and Public Services/Activities

Proposed measures to ensure continued access to various public and private institutions such as schools, churches, mosques, government

offices, residential, commercial and industrial premises that are located adjacent to the RoW are presented below:

- Implementation of the construction TMP and routing traffic flow to alternative roads will reduce the impact;
- Exploring alternative routes or diversions with proper access before implementation will also reduce the impact;
- The contractor will engage school administrators to sensitize pupils/students about the risks associated with the road construction and necessary precautions they need to undertake, and alternative access routes offered;
- Disseminate information regarding the work plan for construction activities along sections with sensitive blocked receptors in a timely manner to enable the school administrations make any necessary plans that they may see fit;
- Use of flagmen at the construction site near schools to control traffic and reduce noise level;
- Ensure that after construction, permanent, controlled and safe accesses (e.g. signalized U-turns) to the blocked homes and premises adjacent to the RoW;
- Effective safety and warning measures should be taken to reduce accidents. Safety signal devices will be installed to ensure safety during construction; and
- Minimizing pedestrian interaction with construction vehicles and Collaboration with local communities and responsible authorities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations where children may be present.

7.2.2.12 Exposure to HIV/AIDS and New Transmissions

The contractor shall take initiative in collaboration with Ministry of Health and respective municipalities, health facilities in each project area and local NGOs in preventing spread of HIV/AIDS during construction period and after construction period. The suggested measure shall include:

- The contractor shall accommodate the current district/municipality HIV/AIDS program in-order to make the use of district health officers in sensitization;
- Developing a Comprehensive HIV/AIDS Management Plan covering biomedical, behavioral and structural aspect of HIV/AIDS program will be implemented. An independent NGO will be procured to carry out the Comprehensive HIV/AIDS program;
- The HIV/AIDS strategy should be compatible with the construction programme to address issues, success of the HIV/AIDS prevention and provide peer educators for sustainability in collaboration with the local NGOs and health facilities along BRT corridor;
- Hiring of well established, reputable and competent local NGOs/skilled practitioners to implement the HIV/AIDs intervention strategy (including gender issues) and/or developing specific HIV/AIDS programmes in areas that do not have any running program;
- The contractor shall put condom in the private consultation room and should have dissemination about HIV/AIDS at the works place at least once per week by training peers' group;
- Continuous awareness campaigns to the surrounding communities and construction workers on gender-based violence, sexual exploitation and child abuse in relation to HIV/AIDS, STDs and other gender impacts. This will target issues like basic knowledge, attitude, practices and behavioural changes;
- Promotion of quarterly Voluntary Counselling and Testing (VCT) during construction and operation stages, including support and monitoring of the infected workers; and
- Distribution of free and adequate protective gears such as condoms in designated posts e.g. distribution box installed in the showers/toilets.

7.2.2.13 Influx of People in the Project Area and its Implications

The following measures are suggested for implementation to prevent and/or manage influx and its implications along the corridor:

- Development and implementation of the Influx Management Plan (IMP);
- the Contractor shall deploy locally available labour to avoid causing a further influx of newcomers into the *mitaa*/wards and hence reduce HIV/AIDS transmission risks;
- In order to avoid struggle for existing resources and services, the community in collaboration with the local authority shall be advised to monitor movement of newcomers in and out of the project area;
- Developing a clear hiring procedure that will be socialized to the community through public meetings and media, information dissemination to the interested communities and local leaders along each road about the available jobs;
- Prohibition of the recruitment of workers at the gate of the camps;
- Security control at the camps, materials storage areas, yards and works areas;
- Developing and implementing Code of Ethical Conduct for the construction workers that will address vices, collusion and other criminal acts; and
- Promotion of the community policing, collaboration with the local police force and private security companies/service providers along the corridor for security and safety issues for workers, surrounding communities and project materials.

7.2.2.14 Sexual Harassment and Violence Against Women & Vulnerable Segments

The following measures shall be implemented to ensure safe working environment for the women project workers, and wellbeing of the surrounding communities (vulnerable groups in particular):

- Implementation of the Gender Action Plan (GAP) attached in Appendix

VI, develop and implement Child Abuse Protection Plan (CAPP) and Gender Based Violence Action Plan (GBVAP) that will contain and address:

- Protection against Sexual Exploitation and Abuse (PSEA) including Codes of Conducts and ongoing sensitization of staff on responsibilities related to the conduct and consequences of non-compliance;
 - Response to PSEA: including survivor-centered coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management;
 - Engagement with the community as presented in the SEP in Appendix VII: including development of confidential community-based complaints mechanisms discrete from the standard Grievance Redress Mechanism (GRM); mainstreaming of PSEA awareness-raising in all community engagement activities; regular community outreach to women and girls about social risks and their PSEA-related rights;
 - Management and coordination: including integration of PSEA in job descriptions, employments contracts, performance appraisal systems, etc., development of contract policies related to PSEA, including whistleblower protection and investigation and disciplinary procedures, training for all project management, management of coordination mechanism for case oversight, investigations and disciplinary procedures, supervision of dedicated PSEA focal points in the project and trained community liaison officers.
- Establishing Gender Help Desk at the construction yard/site/camps and ensuring adequate and transparent referral mechanisms are in place for reported cases at the community level related to project implementation. The contractor's Gender Desk should be linked with

the Gender Desk at each local police post and Municipal Social Welfare Department;

- Effective, on-going and culturally appropriate dialogue and continuous engagement with the communities and different vulnerable groups such as women, girls, and students (see SEP in Appendix VII);
- Review of specific project components and activities that are known to heighten sexual abuse/harassment/abuse/GBV risks at the community level, e.g. compensation schemes, employment opportunities, women food vendors, influx of sex workers etc.;
- Developing and implementing Code of Ethical Conduct for the construction workers;
- Sensitization of employees and supervisors about sexual harassment will be undertaken at the beginning of the construction to minimize any possible sexual harassment cases. In addition, continuous reminders and inductions will be made from time to time;
- Promote women involvement in all stages of project activities and ensure that vulnerable people are involved in taking decisions on matters that affect them directly;
- Jobs will be equitably distributed to both women and men as long as one has the qualification rather than basing on gender to allocate jobs. Employment records disaggregated by sex will kept by contractor and easily accessed by the monitoring and supervising team; and
- Display clear and visible posters on reporting channels at the respective construction offices and along the several sections of the roads where construction is taking place. The messages will be passed on using the locally understood language for better understanding.

7.2.2.15 Exclusion from Economic Opportunities and Fair Labour Terms

The proposed mitigation measures include:

- Jobs will be equitably distributed to both women and men as long as the candidate has the qualification rather than basing on gender to allocate jobs. Employment records disaggregated by sex will kept by contractor and easily accessed by the monitoring and supervising

team;

- Livelihood restoration strategies will be extended to the vulnerable groups and their income levels monitored closely during the implementation process;
- Human resource management trainings concerning equal opportunity, gender-inclusive recruitment and non-discriminative employment terms, and on-the-job capacity development for laborers representing vulnerable groupings;
- Establishing affirmative action involving the preparation of equal opportunity, gender-inclusive procurement plan; and
- Capacity-development opportunities (e.g. internships, training seminars) for women and minority employees, and women and minorities pursuing education within transport sector services.

7.2.2.16 Child Labour and Increased School Truancy

The contractor will ensure no under-age children/students are employed in project activities. All concerned parties shall collaboratively enforce strictly policies and recruitment screening mechanism prohibiting child labour and any other forms of forced labour throughout construction period. Measures to prevent child labour and school truancy will also include:

- The contractor will ensure no under-age children/students are employed in the project activities in compliance with the national legislations and ILO conventions requirements (refer Sections 3.2 and 3.4.4 above);
- Recruitment protocol for project labor to necessitate the presentation of identification documentation for confirmation of candidates' age (use of national IDs, voter's registration cards, driving licences, passport, introduction letter from Mtaa authority etc.);
- Due diligence, monitoring and audit of the suppliers and service providers to ensure child labor is absent within the project's supply chains;
- There will be no forced labour or child labour at the project site. All employees will be aged 18 years and above. Furthermore,

employment records will be disaggregated by age and sex;

- The Contractor, adjacent schools, parents and local governments shall be engaged in raising awareness on issues pertinent to child labour, monitor school attendance to prohibit business trading by children around the construction campsites and works areas;
- Enforcement of the CAPP for the protection of minors against undesirable impacts of the project activities; and
- All staff of the contractor, sub-contractors, supply chain must sign Codes of Conduct with clauses committing themselves towards protecting children, which clearly defines what is and is not acceptable behavior.

7.2.2.17 Risk of Contracting and/or Transmission of COVID-19

The Contractor, TANROADS, DART in collaboration with Ministry of Health and other partners will collaborate in ensuring that construction workers and community will be safe and free from the pandemic. Specifically, this will involve:

- Conducting pre-construction Risk Assessment and Management for the COVID-19 situation in collaboration with the Ministry of Health, relevant government agencies and World Health Organization (WHO);
- Implementation of the guidelines, preventive/precautionary measures as per Ministry's guidelines (National Guideline of Clinical Management and Infection Prevention and Control of Novel Coronavirus, January 2020) - see Appendix X;
- Development and implementation of the project's COVID-19 Response Plan (CRP), and Project Continuity Plan (CPC) that will be linked with the project's Environmental and Social Management System (ESMS) as detailed in Appendix X; and
- Project's ESMS to incorporate AFD's Prescriptions for Inclusion in Construction/Worksite ESMPs to Strengthen COVID-19 Health Control (2020) as presented in Appendix X. The Prescription covers:
 - Actors, roles, responsibilities and resources;
 - Coordination with stakeholders;
 - Decision process for project continuity;

- Prevention of transmission of COVID-19 at the project site;
- Management of COVID-19 cases amongst project workers;
- Management of community health risks;
- Plans, procedures and processes; and
- Monitoring and reporting.

7.2.3 Demobilization Phase

7.2.3.1 Displacement of Workers and Loss of Jobs

During this phase, the Contractor will demobilize equipment, machinery, closure of camps, and construction laborer's before handing over the project to TANROADS and DART. Proposed mitigation measures are presented below.

- The affected employees will have to look for other employment opportunities in order to sustain their livelihoods. The experience and skills gained on the project are expected to make it easier for them to get other similar jobs elsewhere;
- Entrepreneurship, financial literacy and management trainings should be carried out for the workers to ensure proper and prudent use and investment of their salaries and other benefits to ensure continued earning even after completion of construction;
- Performing counselling programs for the workers before completion of the construction;
- Issuance of recommendation or reference letters/certificate of service for the employees to support their applications for any other job opportunities elsewhere; and
- Human resources department is to ensure that all employees dues, claims, arrears, benefits and statutory contributions are dully cleared for all employees before lay-off.

7.2.3.2 Loss of Business Opportunities

Various service providers and the primary supply chain will be informed several months in advance about expected project closure plans.

7.2.3.3 Waste Generation and Disposal Challenges

Proper management for waste disposal will be required for the various types of wastes collected in various locations (camps, yards, works area) to prevent public health risk, environmental pollution and contamination.

Proposed mitigation measures are outlined below:

- Disposal and management of the wastes in accordance with the approved project's WMP;
- Dispose the spoil materials into the numerous borrow pits located along the project road before they are restored;
- Wastes sorting according to their type and quality and specific disposable means per category. Recyclable waste such as used spare parts, scrap metals, tyres, plastics, papers etc. shall be sent to the registered and certified recyclers around Dar es Salaam;
- Hazardous wastes such as lubricants, waste oil etc. shall be collected by the certified waste dealer for safe treatment and disposal;
- Biodegradable wastes may be buried on sanitary landfills for decomposition;
- Cleaning and remediation of the contaminated sites; and
- Treatment of any other liquid wastes before disposal.

7.2.4 Operation Phase

7.2.4.1 Impacts on Daladala and Other Public Transporters Along BRT Route

Proposed mitigation measures are outlined below:

- The DART and LATRA shall ensure that there is smooth transition from existing public transport system to the new BRT system for project's and livelihoods sustainability. An effective, transparency and continuous engagement with *daladala*, *bajaji*, *bodaboda*, taxi operators, owners' associations and groupings along the corridor is key (see SEP in Annex VII);
- The existing *daladala* on BRT routes will be re-assigned to other routes in other parts of the city where there is high demand and absence of BRT services;
- *Daladala* owners through their umbrella organization in Dar es Salaam

(DARCOBOA) will team up with the BRT management to discuss plans for formation of a company that will have a stake in operating with BRT as feeder buses connecting passengers to the BRT system;

- The economic displacement of *daladala* drivers and conductors will be addressed as part of the Livelihood Restoration Plan;
- Training programs for BRT prospective bus operators will accommodate project-affected *daladala* drivers and conductors to the extent possible;
- Apart from the livelihood dimension, a terminal evaluation of the BRT in Dar es Salaam conducted recently by the United Nations revealed the risks of BRT system opposition from the public and current transport service providers. Therefore, success of the new BRT system is strongly dependent on the engagement of the existing personnel from the old systems including owners (e.g. DARCOBOA) to minimize opposition risks and operational disruptions of the new BRT system (UNEP, 2018); and
- Public transport integration (physical and policy wise). The existing informal public transport modes are an integral part of the city's mobility by facilitating and connecting passengers (majority in squatter & unplanned settlements) with BRT system.

7.2.4.2 Waste Generation, Littering and Potential Contaminations

During operation phase, various types of wastes will be generated mainly at the stations, terminals, depots and inside buses. Suggested measures to prevent littering and potential environmental contaminations from accidental spills/leakages are outlined below:

- Management and disposal of each type of waste as per approved project's WMP;
- Provision of water supply and onsite sanitation facilities at all depots and terminals, unless there is a possibility to connect to the existing nearby sewerage system;
- Passengers awareness creation inside the buses and at the stations, depots, terminals;
- Employees training/inductions on appropriate waste management practices;
- Provision of solid waste collection bins (different bins for waste sorting) at the

stations, depots, terminals and inside buses and proper collection of the same;

- Contract a registered and certified waste dealer in Dar es Salaam to collect, transport and dispose hazardous wastes such as used oil, used filters and other wastes from the garages, maintenance workshop at the depots;
- Avoid washing of construction equipment and vehicles near the water sources;
- Fuel/oil storage containers will be properly sealed and monitored to avoid any possible spillage, all activities involving transfer of fuel and chemicals from one containing vessel to another shall be done far away from water courses;
- Development and implementation of the Spill Prevention and Contingency Plan (SPCP) to provide guidance and response mechanism to accidental unplanned events such as oil spills; and
- Establishment of the bunding walls (secondary containment) of at least 110% of the volume of the hydrocarbon storage tanks/area to prevent spillage. The fuel storage areas will be concrete and banded to contain spillage. The drip pans at petroleum products dispensing points.

7.2.4.3 Community Health and Safety Risks

Frequent accidents are likely to be experienced in the first few months of operations. Proposed mitigation measures to minimize traffic accidents risks and exposure to other health hazards/risks are outlined below.

- Provision of safe corridors along the road alignment to cater for school children, for schools along, pedestrians, cyclists and other road users. This will involve establishing of designated lanes and walkways for non-motorized transport and pedestrians along the corridor;
- Design and construction of roadways to accommodate anticipated traffic volume and flow;
- Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions;
- Instituting a Traffic Management Plan (TMP) for the operation of the BRT buses, and safe traffic flow (along the corridor);

- Maintenance of the road to prevent mechanical failure of vehicles due to road conditions;
- Targeting the use of a real-time warning system with signage to warn drivers of congestion, accidents, adverse weather or road conditions, and other potential hazards ahead;
- Construction of roadside rest areas at strategic locations to minimize driver fatigue;
- Setting of speed limits appropriate to the road and traffic conditions. Proposed speed limits in various sections of the roads will be strictly maintained;
- Enforcement of country's traffic regulations and controls along BRT corridor;
- Road safety campaigns especially among pupils/students and general public will be undertaken. This will be accompanied by introduction of road safety education curriculum in schools especially primary and secondary levels;
- Road safety campaigns in general for road users through radio talk shows;
- Placement of traffic officers along areas that may considered most at risk e.g. at junctions and key intersections;
- Constant performance monitoring of the roads to identify any black spots that could lead to accidents; and
- For the vulnerable groups such as infirm, children, elderly, patients etc. shall be provided with accessibility aids (e.g. ramps and waiting areas) for prams and wheelchairs, evenly paved, unobstructed access roads with speed humps, traffic lights, pedestrian crossings, clear signages and road markings.

7.2.4.4 Sexual Assault & Harassment Risks in BRT System

The following measures should be implemented to minimize the risk of sexual abuse within the BRT system:

- Establishment of the well-functioning traffic flow plan and scheduling for the BRT buses especially during peak hours to avoid over-crowding at the stations, fighting to board, alight, and struggles inside the buses. Personal experiences and testimonies from BRT Phase 1 indicate that overcrowding at the stations and inside BRT buses is one of key conducive environment that facilitates sexual harassment amongst women;

- Development and dissemination of mechanisms to report, address and register incidents of violence and harassment (e.g. help desks, warning posters, posted help lines, emergency buttons etc.);
- Demarcating spaces inside the buses to create space special for needy girls and women e.g. pregnant women expecting soon and nursing mothers, and disabled women;
- Establishment of the transparent and accessible system/mechanism for the victim support, reporting and other forms of counselling;
- Implementation of the GAP, and protection of women against all forms of sexual abuse, harassment and violence;
- Developing and implementing Code of Ethical Conduct for the BRT employees, operators and throughout the supply chain;
- Conduct gender sensitive training and awareness creation (mass awareness);
- Reorganizing and strict supervision of the passengers boarding and alighting system at the stations e.g. adapt the Kimara Mwisho-Mbezi system of boarding the bus whereby passenger queue while waiting to board. This will allow private space and comfortability for women and vulnerable ones, minimize risk of injuries and loss of personal belongings (e.g. earrings, necklaces, purses, mobile phones etc.) during boarding;
- Promote women involvement in all stages of project activities and ensure that vulnerable people are involved in taking decisions on matters that affect them directly; and
- Ensuring that the station attendants/security guards/supervisors are first aiders trained in addition to other duties they perform. Each station/terminal/depot should always have at least one trained personnel for emergency cases.

7.2.4.5 Occupational Health and Safety Risks/Hazards

The following safeguards should be carried out to prevent the incidents of occupational health and safety hazards:

- During operation phase, DART shall develop and implement Health, Safety and Environment Plan (HSEP) that will provide specific guidance and

associated standard operating procedures for the safety operations and maintenance activities of the BRT system. The Plan shall address and cover all major items of BRT operations including health and safety of all employees in various departments/operations, community, environment and safe operations of the equipment and machinery;

- Development and implementation of the Emergency Response Plan (ERP) for unplanned events such as fire accidents/incidences (buses), potential floods, electrocution, explosions in fuel storage areas, spills, leakages etc.;
- Periodic HSE, emergency response, fire drills and first aid training for the employees. For drivers and maintenance/workshop facility employees, DDT and first aid trainings should be mandatory;
- Ensuring at least two first aid trained personnel are available at the stations, depots and terminals throughout;
- To minimize noise nuisance to the staff working at the depots, the building design has located many offices on the 1st floor to allow the office bearer a reduction in the workshop noise as well as create a visual access for supervision of the maintenance staff from above;
- Zoning of heavy moving parts and machinery away from employees and public paths as much as possible; and
- Installation of fire detection and alarm systems especially at the depots, terminals, BRT buses. Providing adequate firefighting facilities e.g. underground water storage for firefighting, fire extinguishers, properly designed escape routes and a dedicated space for a fire fighting vehicle.

7.2.4.6 Potential Disruption of Services from Flood Events

Several measures shall be implemented to minimize flooding risks from climatic dynamics and its associated effects (e.g. service disruption, loss of properties, economic losses etc.) given that the BRT Phase 5 corridor is situated in a bi-modal precipitation regime, and some sections have recorded water overtopping during heavy rains. The measures are outlined below:

- Conducting a comprehensive flood risk assessment mapping and modelling along BRT corridor to inform and optimize design and construction of the climate-resilient infrastructure. Experience and lessons learnt from BRT Phase 1 should be highly incorporated;

- Ensuring design and construction of adequate hydraulic conduits to minimize damage to BRT infrastructure and the disruption of BRT services due to flood events;
- Ensuring the structural design of the depots, terminals and stations are climate-resilient and sufficiently protective against destructive risk of tropical storms.
- The suitability of the sites selected for stations, depots and terminals should be comprehensively assessed including flooding risks;
- Proper and timely maintenance of drainage structures (e.g. clearing of congested culverts). Timely and routine cleaning of the drainage structures should be done in order to control structure blockage and therefore ensure sustainable hydraulic performance of the structures. This is particularly important because the roads pass residential areas where channels are used as damping points for both liquid and solid wastes;
- Controlling crude dumping of solid wastes, sedimentation, and domestic effluent discharge into channels and clog the drains especially along Msimbazi, Tenge, Kibangu rivers; and
- Strengthening mechanism for rapid public information dissemination in case of services disruption and alternatives that can be used.

7.3 Significance of Impacts (After Mitigation Measures)

In view of the proposed mitigation and enhancement measures, as presented in this Chapter, Table 7-3 (overleaf) presents a summarized significance rating of the identified environmental and social impacts in the presence of mitigation and enhancement measures.

Table 7-3: Significance assessment of impacts after mitigation measures

Phase	Impact	Nature		Probability	Impact Evaluation Criteria			Significance Rating
	Description	Positive/ Negative	Direct/ Indirect		Extent	Magnitude	Duration	
Pre-construction	Displacement of people, loss of properties and livelihoods disruption	-ve	Direct	Definite	Site specific	Medium	Long term	-ve Moderate
	Community anxiety from resettlement information disclosure	-ve	Direct	Highly probable	Site-specific	Low	Short term	-ve Minor
	Potential relocation of the graves/graveyard	-ve	Direct	Probable	Site-specific	Low	Long term	-ve Moderate
	Vegetation clearance and habitats loss/fragmentation	-ve	Direct	Probable	Site-specific	Very low	Long term	-ve Minor
	Employment opportunities	+ve	Direct	Definite	Local	High	Short term	+ve Major
Construction	Employment benefits to communities	+ve	Direct	Definite	Regional	High	Short term	+ve Major
	Income generation to local suppliers and service providers	+ve	Direct	Definite	Regional	High	Short term	+ve Major
	Income/revenue to local government and agencies	+ve	Indirect	Definite	Regional	Medium	Short term	+ve Moderate
	Skills development and technology transfer	+ve	Indirect	Highly probable	Regional	High	Long term	+ve Major
	Air emissions from dust and exhaust fumes	-ve	Direct	Highly probable	Site-specific	Medium	Short term	-ve Moderate
	Elevated noise and vibration levels	-ve	Direct	Highly probable	Site-specific	Medium	Short term	-ve Moderate
	Risk of soil erosion, slope instability and siltation	-ve	Direct	Probable	Site-specific	Low	Short term	-ve Minor
	Terrestrial and aquatic habitats alteration and/or fragmentation	-ve	Direct	Probable	Site-specific	Low	Short term	-ve Minor
	Potential/accidental contamination of water and soil resources	-ve	Indirect	Probable	Local	Medium	Long term	-ve Moderate
	Littering from generated solid and liquid wastes	-ve	Indirect	Probable	Site-specific	Low	Short term	-ve Minor
	Potential land degradation from borrows, quarries and sand pits	-ve	Direct	Probable	Site-specific	Low	Long term	-ve Minor
	Utilities relocation/damage and service disruption	-ve	Direct	Definite	Local	Medium	Short term	-ve Moderate
	Occupational health and safety hazards	-ve	Direct	Highly probable	Site-specific	Medium	Short term	-ve Moderate
	Traffic flow interference & traffic accidents along BRT 5 corridor	-ve	Indirect	Definite	Site-specific	Medium	Short term	-ve Moderate
	Disruption of access to homes and public services/activities	-ve	Indirect	Highly probable	Site-specific	Zero	Short term	No impact
	Exposure to HIV/AIDS and new transmission	-ve	Direct	Probable	Local	Medium	Long term	-ve Moderate
	Influx of people in the project area and its implications	-ve	Indirect	Probable	Site-specific	Low	Short term	-ve Minor
	Sexual harassment and violence against women & vulnerable segments	-ve	Indirect	Highly probable	Local	Low	Long term	-ve Moderate
	Exclusion from economic opportunities and fair labor terms	-ve	Indirect	Probable	Local	Low	Short term	-ve Minor
	Child labour and increased school truancy	-ve	Indirect	Probable	Local	Very low	Short term	-ve Minor
	Risk of contracting and/or transmission of COVID-19	-ve	Indirect	Probable	Local	Low	Short term	-ve Minor
Demobilization	Displacement of workers and loss of jobs	-ve	Direct	Definite	Regional	Very low	Short term	-ve Minor
	Loss of business opportunities	-ve	Direct	Highly probable	Local	Low	Short term	-ve Minor
	Waste generation and disposal challenges	-ve	Indirect	Highly probable	Site-specific	Low	Short term	-ve Minor

Phase	Impact	Nature		Probability	Impact Evaluation Criteria			Significance Rating
	Description	Positive/ Negative	Direct/ Indirect		Extent	Magnitude	Duration	
Operation	Improved urban mobility, reduced travel time and congestion	+ve	Direct	Definite	Regional	High	Long term	+ve Major
	Improved productivity, access to livelihood activities and welfare of vulnerable groups	+ve	Indirect	Highly probable	Regional	High	Long term	+ve Major
	Increased safety and security of urban public transport sector	+ve	Indirect	Highly probable	Local	High	Long term	+ve Major
	Improved mobility access to women and disadvantaged groups	+ve	Indirect	Highly probable	Local	High	Long term	+ve Major
	Reduction of national carbon footprint & augmentation of climate-resilient and low-carbon urban infrastructure	+ve	Indirect	Probable	National	High	Long term	+ve Major
	Employment opportunities and skills development	+ve	Direct	Definite	Regional	High	Long term	+ve Major
	Impacts on <i>daladala</i> and other public transporters along BRT route	-ve	Direct	Probable	Local	Low	Long term	-ve Minor
	Wastes generation, littering and potential contaminations	-ve	Indirect	Probable	Site-specific	Low	Long term	-ve Minor
	Community health and safety risks	-ve	Direct	Probable	Site-specific	Medium	Long term	-ve Moderate
	Sexual assault & harassment risks in BRT System	-ve	Indirect	Probable	Site specific	Low	Long term	-ve Minor
	Occupational health and safety risks/hazards	-ve	Direct	Probable	Site-specific	Low	Long term	-ve Minor
	Potential disruption of services from climatic dynamics	-ve	Indirect	Probable	Site-specific	Low	Short term	-ve Minor
Decommission	Not applicable*							

8.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

An Environmental and Social Management Plan (ESMP) entails the plan for managing the impacts during different phases of the proposed BRT Phase 5 project. The plan attempts to guarantee that suggested measures are practically feasible or implementable depending on the prevailing ground conditions if the proposed project becomes fully operational as envisaged.

8.1 Components of the ESMP

The standard ESMP is composed of the following key elements:

- Description of an impact;
- Description of proposed mitigation and enhancement measures;
- Institution responsible for implementation;
- Cost estimates (whenever possible); and
- Implementation time frame i.e. pre-construction, mobilization, construction, operation or demobilization.

The ESMP for the proposed BRT Phase 5 project including upgrading of the Port Access Road is presented in Table 8-1. The ESMP covers above-mentioned aspects for each identified impact. The proposed costs are only indicative. Should the proposed development proceed with the suggested changes, the developer will work out on actual costs and include them in the overall cost of the project.

8.2 Impact Management Strategy

The ESMP points out essential obligations for TANROADS, DART, construction Contractors, sub-contractors and operators to meet relevant environmental guidelines in line with the recommendations provided in this EIA report. With respect to the proposed BRT Phase 5 project, the ESMP requires that the contractor(s), sub-contractors, key services providers in the supply chain, and/or operator:

- Possesses an Environmental Policy statement;
- Addresses contractual and regulatory requirements;
- Provides procedures developed to address the environmental aspects and risks related to the construction;

- Provides for the implementation and operation of the ESMP to ensure that structure and responsibilities are assigned; staff are trained, aware and competent; and that there is proper communication, documentation, operational control, reporting and emergency preparedness and response;
- Provides clear and precise organisational and technical procedures for implementation of the ESMP, which ensure that construction and operation activities associated with potential environmental and social impacts are carried out in a controlled and responsible way;
- Provides checking and corrective action through monitoring and measurement; and
- Provides records collection and storage, and programme audit that includes management review of the ESMP and enables improvements to be incorporated in the Plan.

8.3 Implementation Arrangement and Coordination

The ESMP incorporated in the detailed engineering design will be handed over to the Contractor prior to the construction period. The Contractor has to take stock of the contents of the ESMP of the Project. The contractor has to implement the ESMP during the construction period under close supervision of consultant's management. During the Operation Phase, TANROADS and DART will manage the facility and implement the ESMP.

The overall implementation of the enhancement and mitigation measures is the primary responsibility of TANROADS and DART as per national requirements, IFC requirements, AFD E&S Guidelines, and World Bank ESSs1-10. The supervision of the construction works and implementation of the E&S Safeguards (including ESMP) for this BRT project will be carried out primarily by TANROADS's Safety and Environment Department supported by DART Environment Department. Specifically, the Environmental Expert shall be appointed to assist the Resident Engineer and he/she will be responsible for making sure that the aspects of the ESMP that are to be implemented during construction are included in the Contractor's tender documents and are responsible for the overall monitoring of the Contractor to ensure that the

safeguards are implemented. Also, environmental and social protection clauses for contracts and specifications will be provided to support implementation of mitigations.

TANROADS will forward its monitoring reports to the AFD and NEMC during project implementation as part of their monthly, quarterly, semi-annual and annual progress reports. The AFD and/or NEMC may conduct an audit to ensure that the approved mitigation measures are implemented and that the project implementation has not led to the emergence of new impacts. With a view to ensuring effective implementation of the ESMP including the associated monitoring activities, both the Contractor and TANROADS shall have Environmentalists, or personnel responsible for ensuring environmental compliance (e.g. HSE Officers). The Contractor's Environmentalist/HSE Officer shall be responsible for translating and implementing the provisions of the ESMP while the TANROADS' Environmentalist shall supervise the Contractor with respect to the implementation of the provisions of the ESMP.

To minimize potential environmental and social negative impacts, the project will require the support of various institutions in the implementation of the ESMP. The organizational framework for the ESMP is designed to evolve as the project progresses through pre-construction, construction and operation phases. The key institutions that TANROADS will liaise with include NEMC, OSHA, TANESCO, TTCL, DAWASA, TARURA, Dar city council, Regional secretariat, municipalities and *mitaa* traversed by the project corridor, local communities and NGOs/CBOs along the route.

The responsible authorities for compliance audits, principally NEMC and OSHA, may wish to visit, inspect and monitor the site or specific activities at their own convenient time. In such cases, TANROADS, DART, contractor(s), and sub-contractors are fully committed to collaborate.

8.4 Review and Reporting Procedures

TANROADS will provide the Environmental monitoring reports during implementation as part of the monthly, quarterly, semi-annual progress reports,

and annual reports. The reports will be forwarded to the AFD, NEMC and any other stakeholder/partner that will be deemed necessary. Depending on the status of environmentally sensitive locations in areas where there are project activities, NEMC will perform annual or bi-annual Environmental reviews to ensure that environmental aspects of the project are reviewed alongside project implementation.

The parameters, timing, frequency and responsible parties are thoroughly presented in the monitoring matrix presented in Chapter 9. During the implementation process of the ESMP and mitigation measures, the key player and follow up team for Environmental and Social issues will be TANROADS, Local government, Resident engineer, AFD and NEMC. The contractor shall be responsible for daily implementation and internal monitoring to all activities, which fall under his care. NEMC will be responsible for overseeing that all Environmental construction activities are conducted in a manner that adheres to regulations outlined in Environmental Impact Assessment and Audit Regulations (2005).

8.5 Contingency and Emergency Preparedness/Plan

Emergency situations most commonly associated with road operations include accidents involving single or multiple vehicles, pedestrians, and / or the release of oil or hazardous materials. The selected contractors for Lot 1, Lot 2, TANROADS and DART, as the operator of the transit system, shall have emergency response measures as part of their environmental policy and/or health and safety policy. The developed and internalized Emergency Preparedness and Response Plan along with comprehensive Health, Security and Safety Plan shall be reviewed and approved by TANROADS, DART and AFD. This feature will form part and parcel of the daily operations.

Table 8-1: Environmental and Social Management Plan for the BRT Phase 5 project

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
Pre-Construction	-ve	Displacement of people, loss of properties and livelihoods disruption	- Design and construction within existing RoW in all road sections to minimize extra land acquisition - BRT has been designed in such a way that unnecessary demolition of structures has been minimised except where horizontal realignment outside the existing corridor cannot be avoided - Preparation of the detailed RAP and valuation of PAPs - PAPs to be compensated fairly and promptly - Development and implementation of the LRP - All procedures for acquiring land for the proposed project are followed to avoid land disputes - Development and implementation of the Grievance Redness Mechanism (GRM) - Livelihood restoration and improvement programs should be timely implemented - Access to existing non-affected businesses adjacent to RoW to be maintained by creating temporary driveways, and/or providing alternate access points. Accesses to be restored after construction - Taxi drivers, <i>bajaji bodaboda</i> riders, <i>daladala</i> drivers to be provided with new routes and packing stations - Provide ample time e.g. 3-4 months for the business owners, <i>bodaboda</i>, <i>daladala</i>, <i>bajaji</i>, mobile vendors and taxi operators to look for alternative business premises - Provision of resettlement support (from respective municipal authorities) to economically and/or physically displaced PAPs who are categorized as vulnerable - Accidental and/or temporal damaged properties adjacent to the RoW unforeseen construction actions the property shall be compensated as per the entitlement matrix developed in the RAP	TANROADS, Municipal Councils, DART	Costs in RAP report
	-ve	Community anxiety from resettlement information disclosure	- Timely dissemination of relevant project information regarding land acquisition - PAPs to be compensated fairly and promptly - Sensitization campaigns to be undertaken, information about land take and acquisition will be disseminated to the right people - Transparency valuation and compensation mechanism to be established - Involvement of PAPs directly to entire process from design, implementation, monitoring and valuation - Establishment of communication channels in form of hotlines across all mobile network service	TANROADS, Municipal Councils, DART	Covered in RAP above and SEP

³¹ Cost estimation based on review of bill of quantities, previous experience, some mitigation measures to be partly or directly included in the civil works activities, some O&M related-costs during operation not included (covered by DART directly) and cost sharing for mitigations that are cross-cutting. Further, RAP related costs including utilities are dealt with separately in RAP Report. Cost breakdown is provided for each project phase, whereby during operation phase an indication has been provided for annual repetitive and once-off costs.

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
			providers and e-mail addresses to enable PAPs to convey any queries, fears and concerns to designated attendants to be addressed accordingly, in line with the project grievance mechanism.		
	-ve	Potential relocation of the cemeteries/graveyard	- BRT design to avoid direct impacts/relocation/disturbances on the existing cemeteries along and/or adjacent to the RoW - Removal, transportation and reinstatement or re-interment of the affected graves to be undertaken in compliance with the Graves (Removal) Act. No 9 of 1969 - Graves relocation to be undertaken by government authorities where affected households/owners should be paid a disturbance allowance to compensate for the cost of relocation of the grave or propose alternative site for relocation	Municipal authorities, TANROADS, DART	To be determined after re-confirmation
	-ve	Vegetation clearance and habitats loss/fragmentation	- Confining the construction activities within the existing brownfield road reserve and designated areas - Vegetation clearance to be limited only to the specific space required for construction. - Ground clearance to be minimized and if possible, concentrate only to the footprint area and only when it is necessary - Minimum disturbance to the vegetated areas outside the project footprint - Materials sourcing areas (borrow pits, access roads, road construction camps, stockpiling areas) should avoid woodlands, wetlands and ecological sensitive areas - Landscaping and vegetation restoration - All new road diversion should be provided where necessary and should be closed when they are no longer in use, to allow vegetation to recover - Development of the project's BAP	Contractor, Sub-contractor(s), TANROADS	50,000,000
	+ve	Employment opportunities	- Priority to local communities surrounding the project roads - Sourcing semi-skilled and unskilled labour locally/affected communities - PAPs to be given priority as well to work in the project as part of livelihoods restoration support - Special clause that requires residents to be employed as labourers to be included in the contract - An inclusive, transparent and gender-sensitive recruitment process to be established and implemented - Encourage/permit small businesses that support the construction such as cafes, food vendors, kiosk etc - Equal employment to be provided to both women and men regarding gender and equity	Contractor., Sub-contractor(s), Mtaa authorities	20,000,000

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
			- vulnerable groups to be given consideration in the employment opportunities - Develop and implement a Labour Recruitment and Management Plan (LRMP) - Adapting applicable national local content requirements from petroleum and mining sectors (policy and regulations). Development and implementation of the project's Local Content Plan (LCP)		
			Sub-total I (once-off cost) during project preparation/mobilization		70,000,000
Construction	+ve	Employment benefits to communities	- Priority to local communities surrounding the project roads - Sourcing semi-skilled and unskilled labour locally/affected communities - PAPs to be given priority as well to work in the project as part of livelihoods restoration support - Special clause that requires local residents to be employed as labourers to be included in the contract - An inclusive, transparent and gender-sensitive recruitment process to be established and implemented - Encourage/permit small businesses that support the construction such as cafes, food vendors, kiosk etc - Equal employment to be provided to both women and men regarding gender and equity - vulnerable groups to be given consideration in the employment opportunities - Implementation of the LRMP - Timely and continuous information dissemination on the existing job opportunities and other potential work such as sourcing of materials and supplies - Implementation of the Gender Action Plan (GAP) - Develop and implement a Sexual Harassment Policy or Plan to safeguard women and other vulnerable groups - Provision of fair working conditions and environment - Adapting applicable national local content requirements from petroleum and mining sectors (policy and regulations). Development and implementation of the project's Local Content Plan (LCP).	Contractor., Sub-contractor(s), Mtaa authorities	Covered in employment above
	+ve	Income generation to local suppliers and service providers	- Sourcing materials, equipment and other resources locally - Permit small businesses that support the team involved with construction activities - Procurement plan to incorporate affirmative actions involving the preparation of equal opportunity, gender-inclusive procurement - Procurement from registered and licenced suppliers throughout supply chain - Adapting applicable national local content requirements from petroleum and mining sectors (policy and regulations). Development and implementation of the project's Local Content Plan	Contractor & sub-contractor TANROADS	10,000,000

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
			(LCP).		
	+ve	Income/revenue to local government and agencies	- Timely payment of all applicable charges, fees, taxes, levies etc. - Strengthening of a streamlined system for the taxes/charges clearance and monitoring - Transparency system for computation and collection of all taxes, levies, custom duties and revenues	Contractor, sub-contractors	No cost envisaged
	+ve	Skills development and technology transfer	- Deliver skills and on-job trainings (both skilled and unskilled) - International contractors will be required to associate with national/local sub-contractors - Capacity-development opportunities - Construction staff will be encouraged to development of the acquired knowledge and skills through Vocational Training Centres (VTCs) - Transfer of the skills into other livelihood activities, seek opportunities in other similar projects in the region and beyond - Development and implementation of the project's Local Content Plan (LCP)	Contractor, sub-contractors, TANROADS	5,000,000
	-ve	Air emissions from dust and exhaust fumes	- Dust suppressive agents such as water to be used/sprinkling along excavated routes - Activities producing excessive dust levels to be confined within working areas - Fine earth materials such as sand and murram to be covered during haulage to prevent spillage and dusting - Excavated soils will be compacted in order to reduce the amount of dust spreading by wind - Use of dust screens or nets to confine works areas adjacent to key sensitive receptors - Administer adequate Personal Protective Equipment (PPE) - Haulage trucks to have tailgates that close properly and tarpaulins to cover materials being transported - Vehicles, equipment and machinery operations to be of acceptable standards - Timely and proper maintenance of machinery, equipment and vehicles to keep the fumes emissions as low as possible	Contractor, sub-contractors,	30,000,000
		Elevated noise and vibration levels	- Limit noise level during construction within works areas - Activities that generates excessive noise will be limited to daytime hours - Maintain proper function of equipment and comply with required standards - Noise suppression devices are properly maintained, and mufflers will be affixed to construction equipment in use - Vehicle and machinery operations to be of acceptable standards (national and international) - Vehicles and machinery to be fitted with noise silencers such as mufflers	Contractor, sub-contractors	30,000,000

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
	-ve		• Proper choice and location of plant and machinery coupled with noise and vibration reducing strategies • administer adequate PEE usage such as earplugs and earmuffs • Select equipment with low noise emission level and that equipment to be of the acceptable standards • Establish and maintain a buffer from sensitive receptors for noise and vibration damage control along the construction corridor and material sourcing areas • Unnecessary idling of equipment within noise sensitive areas will be avoided • A construction noise and vibration management plan will be developed • Residences and other receptors, such as schools, will be considered when locating fixed and mobile equipment (e.g. generators) • Validity of any damage claims will be assessed; repairs will be undertaken, or appropriate compensation paid if damage is proved, through data or photographic evidence • Residents will be notified before activities are undertaken that could generate significant levels of noise and vibration that may disturb or alarm people or animals, especially during approved 24-hour activities		
	-ve	Risk of soil erosion, slope instability and siltation	• Avoid directing stormwater into the settlements or public institutions • Engineering erosion control measures such as gabions for steep slopes protection and reinforcement, installation of proper hydrological structures in all susceptible locations, controlled excavations and siltation • Lined drainage channels at sensitive terrains to be provided to control speed and volumes of stormwater • Discharge points to be carefully chosen to avoid inundation in the nearby settlements, institutions, commercial and industrial premises, and creation of gullies • Install silt traps to prevent sediments from surface water source • Landscaping/revegetation of the <i>Vetiver</i> grass species on embankment slopes	Contractor, sub-contractors,	Covered in civil works construction
		Terrestrial and aquatic habitats alteration and/or fragmentation	• Permanent clearance will be confined to the area where there will be acquisition of extra land • Vegetation on the extension portions mainly grass, a few planted trees and other secondary vegetation important in the stabilization of soil will be replaced by vegetation species capable of the same functions • Construction activities to be confined within the road reserve and designated areas, whereby vegetation clearance will be controlled and limited only to the specific footprint required for construction only • Ensure minimum disturbance and fragmentation occurs to vegetated areas outside the project footprint (beyond right of way)	Contractor, sub-contractors	20,000,000

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
	-ve		- Avoid clearing or damaging of riparian vegetation where possible, and limit river and stream crossings as far as possible - Less disturbed vegetation communities/habitats need to be protected to offer habitat for wildlife (small mammals and reptiles in particular) that will lose their habitat during construction - Unnecessary destruction of the riparian habitats and soil excavations along the riverbanks shall be restricted - Keep all areas of riparian vegetation upstream/midstream and downstream as continuous as possible to maintain ecological corridors - Landscaping and vegetation restoration shall cover disturbed onsite and offsite areas - Avoid introduction of invasive species, control and reduce their further spread - Avoid indirect effect of run-off erosion and sedimentation from roads that may lead to loss of riparian habitats - Implementation of the recommendations from project's BAP		
	-ve	Potential/accidental contamination of water and soil resources	- Construction activities (with exception of bridges) to be carried away from water courses at least a buffer of 60m as per EMA No. 20, 2004 - Avoid construction of workers camp site facilities close to surface water sources - Avoid washing of construction equipment and vehicles near the water sources - Effluents generated at the camps and various construction activities shall not be discharged into adjacent rivers, streams - Fuel/oil storage containers will be properly sealed and monitored to avoid any possible spillage - Activities involving transfer of fuel and chemicals from one containing vessel to another shall be done far away from water courses - Develop and implement Waste Management Plan (WMP), and Spill Prevention and Contingency Plan (SPCP) to provide guidance and response mechanism to accidental unplanned events such as oil spills - Establishment of the bunding walls (secondary containment) of at least 110% - Pit latrines to be located not less than 60m from surface water sources and the bottom of the pit latrine should not be less than 1m below the water table to avoid groundwater contamination - Generated wastes and/or excavated materials that are no longer in use will be properly stored, transported and disposed of at the approved designated dump sites. - No waste shall be disposed into waterways (including their beds, or within immediate proximity to them), alluvial plains, wetlands and swampy areas - Remediation/cleaning of the contaminated sites will be done soon after completion of the civil works - Solid and liquid waste must be handled as prescribed in the Standard Specification for Road	Contractor, sub-contractors	50,000,0000

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
			Works (<i>Section 1713</i>) to avoid any spillage and contaminations - Repair all construction equipment to avoid fuel and oil leakage - Construction equipment service bays shall be provided with berms to avoid spills from being washed away to the water sources		
	-ve	Littering from generated solid and liquid wastes	- Proper waste management & potential littering, pollution, contaminations and public health risks are mitigated - Development and implementation of the Waste Management Plan (WMP) - Generated wastes to be disposed in compliance with the municipal and city guidelines, and good international industry practices - Solid waste will be sorted into different containers for appropriate disposal, decomposable waste to be transported to the approved dumping sites for proper waste disposal, and recyclable materials sent to the recycling stations - At the camps and construction site, pit latrines and/or a septic and soak-away tanks will be used to collect generated liquid waste, pits will be regularly emptied - Sediment traps should be installed to avoid sediment-laden water from entering the storm water system/surrounding watercourses - Promotion of the waste sorting at the source for recycling, re-use, recovery and disposal as per municipal guidelines, national regulations governing wastes management and good international industry practices. - Ensure waste storage containers are covered, tip-proof, weather-proof, scavenger proof, and storage area is fenced off to prevent wind-blown - Inert construction rubble and waste materials to be disposed of by burying them in the borrow pit or a designated site - Facilities to be maintained in a neat and tidy condition and the site is kept free of litter - Excavated materials and debris from construction work should not be stockpiled or deposited near or on-stream - Used oil, lubricants, cleaning materials, etc. from the maintenance of vehicles and machinery to be collected in holding tanks and sent back to the supplier or removed from the site by a specialist oil-recycling company for disposal at an approved hazardous waste site - Runoff from fuel depots/workshops/machinery washing areas and concrete batching areas to be collected in a tank and disposed of at a designated site - No burning, on-site burying or dumping of waste shall occur - Equipment shall be properly maintained to prevent oil and fuel leakages, servicing and and/or re-fueling of equipment shall not be allowed near water courses, and all construction equipment working near the river should be well serviced to ensure that there is no oil leakage - Sanitary waste at the camps shall be disposed of using pour-flush toilets that shall be availed	Contractor, sub-contractors	50,000,0000

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
			at every active constructive site		
	-ve	Potential land degradation from borrows, quarries and sand pits	- Avoid establishment of the new borrow and quarry sites, by utilizing existing approved/licenced borrow - Backfilling of the borrows using clean sand or granular materials, landscaped, steep edges of pits will be smoothened to avoid posing community health and safety risks - Plant species characteristic of the landscape of the construction site shall be used during the restoration of the vegetation cover. - Develop and implement Borrow Pits and Quarry Operation and Reinstatement Plan (BPQORP)	Contractor, sub-contractors	40,000,000
	-ve	Utilities relocation/damage and service disruption	- Identification and mapping of the utilities to be affected, specific areas along the corridor and groups that are likely to be affected directly - Development of the Utility Relocation Plan (URP) - Collaborate with relevant utility authority to identify and relocate utilities - Avoid damage to existing public service utilities as much as possible - Damaged utilities to be restored immediately to avoid inconveniences to the public - Arrangement with responsible authorities before moving or altering any public service utilities - Respective utility authority will be responsible for relocation after compensation of the associated costs - Procedures in the Standard Specification for Road Works (<i>Section 1202</i>) and guidelines from respective utility authority such as TANESCO, TPDC, TTCL, DAWASA etc. shall be adhered - Liaise with utility owners to provide early warning to the communities about any possible disruption in service provision for the different utilities - Feasible alternatives should also be provided during temporary absence of service - Compensation payment for the relocation of the affected utility	Contractor, TANROADS, DART, Municipal authorities, Utility Authority	Costs in RAP report
	-ve	Occupational health and safety hazards	- Develop and implement the Health and Safety Policy, and the Health and Safety Management Plan (HSMP) - Performing task or activity-specific risk assessment and mitigation measures before actual commencement - Providing all workers with appropriate PPE and enforcement of the use - Adequate access and egress shall be maintained, a fire-fighting system will be established, and hazard cones will be used to demarcate the working area. - Well-stocked First Aid kit (administered by a trained first aider) shall be made available at each camp site, quarry site, active work sites - Regular induction training course on health, safety, security and environment to all workers	Contractor, sub-contractors	60,000,0000

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
			before beginning of construction activities. • Effective safety and warning measures should be taken to reduce accidents • Safety signal devices will be installed to ensure safety during construction • Minimizing pedestrian interaction with construction vehicles improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations where children may be present • The Contractor shall develop and practice an emergency response plan, with the conduct of induction and refresher trainings, the latter of which will involve programmed emergency tests • Adhere to construction guidelines and directives issued by Occupational Health and Safety Authority (OSHA) • Implementation of the additional specific measures related to physical, chemical, health and noise hazards as recommended by IFC EHS Guidelines		
	-ve	Traffic flow interference & traffic accidents along BRT 5 corridor	• Road design to consideration safety issues related to traffic accidents especially near settlements and urban centres and in all accidents-prone sections • Review and update the construction Traffic Management Plan (TMP) • Provision of safe corridors and crossings along the road alignment and construction areas • Installation of barriers (e.g. fencing, plantings) to deter pedestrian access to the roadway except at designated crossing points • Installation and maintenance of speed control and traffic calming devices at pedestrian crossing areas • Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions • Traffic can be accommodated by means of stop/go conditions in partial width construction wherever possible • Inform road users about location of road works and advise on use of alternative existing roads through media outlets, and notice boards in public places • Coordination with district traffic police (Kinondoni, Ubungu, Ilala and Temeke) in traffic management • Deployment of flag men to control traffic flow at all project subcomponent sites • Effective safety and warning measures should be taken to reduce accidents • Safety signal devices will be installed to ensure safety during construction • Establishment of the support mechanism for the movement of the vulnerable groups such as disabled people including wheelchair users, children, students, patients • Continuous sensitization and awareness creation amongst community, transporters, <i>daladala</i>, <i>bajaji</i>, <i>bodaboda</i> riders • Minimizing pedestrian interaction with construction vehicles	Contractor, sub-contractors, Traffic Police	20,000,000

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
			Collaboration with local communities and responsible authorities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations where children may be present		
	-ve	Disruption of access to homes and public services/activities	- Implementation of the construction TMP and routing traffic flow to alternative roads to reduce the impact - Exploring alternative routes or diversions with proper access before implementation - Sensitization and awareness creation especially students/schools adjacent to the RoW - Early warning system and information dissemination regarding the work plan for construction activities along sections with sensitive blocked receptors - Use of flagmen at the construction site near schools to control traffic - After construction, provide permanent, controlled and safe accesses (e.g. signalized U-turns) to the blocked accesses - Effective safety and warning measures to minimize accidents - Safety signal devices will be installed to ensure safety during construction - Minimizing pedestrian interaction with construction vehicles - Collaboration with local communities and responsible authorities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations where children may be present	Contractor, sub-contractors	5,000,000
	-ve	Exposure to HIV/AIDS and new transmission	- Accommodate the current district/municipality HIV/AIDS program in-order to make the use of district health officers in sensitization - Developing and implement a Comprehensive HIV/AIDS Management Plan covering biomedical, behavioral and structural aspect of HIV/AIDS program - HIV/AIDS strategy should be compatible with the construction programme - Hiring competent local NGOs/skilled practitioners to implement the HIV/AIDS and gender intervention strategy - Continuous awareness campaigns to the surrounding communities and construction workers on gender-based violence, sexual exploitation and child abuse in relation to HIV/AIDS, STDs and other gender impacts - Promotion of quarterly Voluntary Counselling and Testing (VCT), support and monitoring of the affected workers - Distribution of free and adequate protective gears such as condoms in designated posts - Monitoring of HIV/AIDS preventive activities	Contractor, sub-contractors, NGOs, Health facilities, Municipal councils	80,000,000
	-ve	Influx of people in the project area and its implications	- Development and implementation of the Influx Management Plan (IMP) - Deploy locally available labour to avoid causing a further influx of newcomers into <i>mitaas</i> - Community and local authorities to monitor movement of newcomers in and out of the project	Contractor, sub-contractors, Municipal	5,000,000

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
			area - Developing a clear hiring procedure that will be socialized to the community through public meetings and media, information dissemination to the interested communities and local leaders along each road about the available jobs - Prohibition of the recruitment of workers at the gate of the camps - Security control at the camps, materials storage areas, yards and works areas - Developing and implementing Code of Ethical Conduct for the construction workers - Promotion of the community policing, collaboration with the local police force and private security companies/service providers along the corridor	councils, <i>Mtaa</i> authorities	
	-ve	Sexual harassment and violence against women & vulnerable segments	- Implementation of the Gender Action Plan (GAP) - Develop and implement Child Abuse Protection Plan (CAPP) and Gender Based Violence Action Plan (GBVAP) that will contain and address Protection Against Sexual Exploitation and Abuse (PSEA), response to PSEA, engagement with community, mainstreaming of PSEA, Management and coordination including integration of PSEA in job description - Establishing Gender Help Desk at the construction yard/site/camps and ensuring adequate and transparent referral mechanisms are in place for reported cases - Effective and on-going dialogue and continuous engagement with the communities and vulnerable groups - Review of specific project components and activities that are known to heighten sexual abuse/harassment/abuse/GBV risks at the community level - Implementing Code of Ethical Conduct for the construction workers - Sensitization of employees and supervisors about sexual harassment & periodic inductions - Promote women involvement in all stages of project activities and ensure that vulnerable people are involved in taking decisions on matters that affect them directly - Jobs will be equitably distributed to both women and men. - Employment records disaggregated by sex will be kept and easily accessed by the monitoring and supervising team - Display clear and visible posters on reporting channels at the respective construction offices and sites	Contractor, sub-contractors, NGOs, Health facilities, Municipal councils (Social Welfare Depts.), Police, Community	20,000,000
	-ve	Exclusion from economic opportunities and fair labor terms	- Jobs to be equitably distributed to both women and men as long as the candidate has the qualification rather than basing on gender to allocate jobs - Livelihood restoration strategies will be extended to the vulnerable groups and their income levels monitored closely during the implementation process - Human resource management trainings concerning equal opportunity, gender-inclusive recruitment and non-discriminative employment terms, and on-the-job capacity development	Contractor, sub-contractors, Municipal councils, <i>Mtaa</i> authorities	No cost. Covered in employment, and sexual harassment above

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
			- for laborers representing vulnerable groupings - Establishing affirmative action involving the preparation of equal opportunity, gender-inclusive procurement plan - Capacity-development opportunities (e.g. internships, training seminars) for women and minority employees, and women and minorities pursuing education within transport sector services		
	-ve	Child labour and increased school truancy	- No under-age children/students will be employed - Strict policies and recruitment screening mechanism prohibiting child labour and any other forms of forced labour - Recruitment protocol for project labour to necessitate the presentation of identification documentation for confirmation of candidates' age (use of national IDs, voter's registration cards, driving licenses, passport, introduction letter from Mtaa authority etc.) - Due diligence, monitoring and audit of the suppliers and service providers to ensure child labor is absent within the project's supply chains - Employment records will be disaggregated by age and sex - Contractor, adjacent schools, parents and local governments shall be engaged in raising awareness on issues pertinent to child labour, monitor school attendance to prohibit business trading by children around the construction campsites and works areas - Enforcement of the CAPP for the protection of minors against undesirable impacts of the project activities - All staff of the contractor, sub-contractors, supply chain must sign Codes of Conduct with clauses committing themselves towards protecting children, which clearly defines what is and is not acceptable behavior	Contractor, sub-contractors, NGOs, Schools, Ward & Mtaa authorities), parents	10,000,000
	-ve	Risk of contracting and/or transmission of COVID-19	- Conducting pre-construction Risk Assessment and Management for the COVID-19 situation in collaboration with the Ministry of Health, relevant government agencies and World Health Organization (WHO) - Implementation of the guidelines, preventive/precautionary measures as per Ministry's guidelines (National Guideline of Clinical Management and Infection Prevention and Control of Novel Coronavirus, January 2020) - Development and implementation of the project's COVID-19 Response Plan (CRP), and Project Continuity Plan (CPC) that will be linked with the project's Environmental and Social Management System (ESMS) - Project's ESMS to incorporate AFD's Prescriptions for Inclusion in Construction/Worksite ESMPs to Strengthen COVID-19 Health Control (2020) - COVID-19 disease awareness campaign to be done	Contractor, Sub-contractors, TANROADS, DART, Ministry of Health, Health facilities, communities	To be determined. Case-by-case basis.

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
			Sub-total II (once-off cost) during actual BRT construction		435,000,000
Demobilization	-ve	Displacement of workers and loss of jobs	- Affected employees will have to look for other employment opportunities in order to sustain their livelihoods. The experience and skills gained on the project are expected to make it easier for them to get other similar jobs elsewhere - Entrepreneurship, financial literacy and management trainings to be carried out for the workers - Performing counselling programs for the workers before completion of the construction - Issuance of recommendation or reference letters/certificate of service for the employees to support their applications for any other job opportunities elsewhere - All employees' dues, claims, arrears, benefits and statutory contributions are fully cleared for all employees before lay-off	Contractor	5,000,000
	-ve	Loss of business opportunities	Service providers and the primary supply chain will be informed several months in advance about expected project closure plans	Contractor, TANROADS, DART	No cost
	-ve	Waste generation and disposal challenges	- Disposal and management of the wastes in accordance with the approved project's WMP - Dispose the spoil materials into the numerous borrow pits located along the project road before they are restored - Wastes sorting and appropriate storage before disposal - Recyclable waste shall be sent to the registered and certified recyclers around Dar es Salaam - Hazardous wastes such as lubricants, waste oil etc. shall be collected by the certified waste dealer for safe treatment and disposal - Biodegradable wastes may be buried on sanitary landfills for decomposition - Cleaning and remediation of the contaminated sites - Treatment of any other liquid wastes before disposal	Contractor	15,000,000
			Sub-total III (once-off cost) during contractor demobilization		20,000,000
Operation	+ve	Improved urban mobility, reduced travel time and congestion	- Ensure proper management of new roads and facilities - Appropriate maintenance and operations of BRT buses - Control any damage that may lead to closure or suspension of BRT buses - Introduce adequate fleet of BRT buses to cover the routes and match up with a peak demand - Ensure smooth traffic flow along the corridor, key intersections and junctions by segregating the right of way as much as possible to avoid stuck on traffic - Establishment of the effective bus operation schedules (efficient fleet traffic management) depending on the demand/peak times etc. - Driver's training to improve driver and vehicle safety - Establishing a transparent and accessible mechanism for receiving, addressing and feedback	DART & TANROADS	Part of DART's annual O&M budget

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
			communicating complaints, suggestions or any other issues from the passengers, freight transporters and other road users - Ensuring that the station attendants/security guards/supervisors are first aiders trained - Ensuring presence of at least one first aid trained personnel in each station/terminal/depot - Ensure on-time performance of BRT buses along BRT route		
	+ve	Improved productivity, access to livelihood activities and welfare of vulnerable groups	- Ensuring smooth traffic flow along the corridor and adequate BRT buses - Regular maintenance of the BRT buses and road infrastructure - Cost reduction measures such as the availability of differential fare structures (time of day, routing, concessionary fares) and flexibility provisions (same ticket for multiple journeys) - Boosting of services during off-peak hours and between radial areas (as opposed to periphery-to-center services only) - Planning bus stops strategically (near key services, schools, health centres, and so on) - Promotion of intermediate transport means in peri-urban extremities to facilitate access to the nearest BRT stations - Increasing the frequency, regularity, and predictability of BRT Bus services, to reduce the waiting time	DART	Part of DART's annual O&M budget
	+ve	Increased safety and security of Dar es Salaam's public transport sector	- Providing adequate lighting on sidewalks, at bus stops, on platforms, and in terminals to increase personal safety - Installation of surveillance cameras in BRT facilities in areas with high criminal activity, including all buses and platforms; Stationing of security personnel at terminals, on platforms, and stations on a full operational time basis - Promoting business development activities near stations, stops and waiting areas as a measure to increase pedestrian movement in the areas - Recruitment of the competent qualified drivers and continuous comprehensive trainings e.g. defensive driving techniques (DDT), enforcement of procedures such as driver training, to improve driver and vehicle safety - Development and dissemination of mechanisms to report, address and register incidents of violence and harassment (e.g. help desks, warning posters, posted help lines, emergency buttons etc.) - Establishment of the effective bus operation schedules (efficient fleet traffic management) depending on the demand/peak times etc. to avoid passenger delays and congestion at the stations and inside buses - Ensuring station attendants/security guards/supervisors are first aiders trained in addition to other duties they perform, at least one trained personnel in each station/terminal/depot - Establishing a transparent and accessible mechanism for receiving, addressing and feedback communication	DART	Part of DART's annual O&M budget

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
	+ve	Improved mobility access to women and disadvantaged groups	- Establishment of the boarding system that gives priority to the elderly, disabled and other vulnerable groups such as pregnant women, students and sick people - Security system (guards/supervisors) at the stations, depots and terminals to monitor and assist disadvantaged groups during boarding and alighting - Increasing the frequency, regularity, and predictability of public transport services, to reduce women waiting time at the stations - Establishing a transparent and accessible mechanism for receiving, addressing and feedback communications, complaints register	DART	Part of DART's operation costs
	+ve	Reduction of national carbon footprint & augmentation of climate-resilient and low-carbon urban infrastructure	- Routine maintenance of BRT buses to ensure engines and other systems are well functioning (emission controls) - Monitoring and evaluation of the BRT's carbon footprint - Ensuring the design and construction of adequate hydraulic conduits to minimize damage to BRT infrastructure and the disruption of BRT services due to flood events - Ensuring the structural design of the depots, terminals and stations are climate-resilient and sufficiently protective against destructive risk of tropical storms - Implementation of the recommendations and strategies from National Climate Change Strategy regarding reduction of the GHG emission and climate change adaptation in the infrastructure sector particularly road transport	DART, VPO-DoE, TANROADS	15,000,000/year
	+ve	Employment opportunities and skills development	- Optimization of the national local contents by giving priority to the qualified nationals in employment opportunities - Capacity building and provision of on-job training for the workers in various BRT operation and maintenance activities. - Establishment of periodic training programmes for existing and newly recruited staff - Equal employment opportunities for men and women in operation and maintenance activities - Capacity-development opportunities (e.g. internships, training seminars) for women and minority employees, and women and minorities pursuing education within urban transport sector services - Human resource management trainings concerning equal opportunity, gender-inclusive recruitment and non-discriminative employment terms - Mainstreaming of the Gender Action Plan throughout BRT operations	DART	Part of DART's HR budget
	-ve	Impacts on <i>daladala</i> and other public	- Ensure smooth transition from existing public transport system to the new BRT system <i>Daladala</i> owners through their umbrella organization in Dar es Salaam (DARCOBOA) will	DART, LATRA, DARCOBOA	20,000,000 (once-off)

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
		transporters along BRT route	team up with the BRT management and buy shares to become part of the BRT operators under new buses and scheme - Existing <i>daladala</i> on BRT routes will be re-assigned to other routes <i>Daladala</i> will also be used as feeder buses connecting passengers to the BRT system - The economic displacement of daladala drivers and conductors will be addressed as part of the livelihood restoration plan; - Training programs for BRT bus operators will accommodate daladala drivers and conductors to the extent possible; - Thorough of the existing personnel from the old systems including owners (e.g. DARCOBOA) to minimize opposition risks and operational disruptions of the new BRT system - Public transport integration (physical and policy wise)		costs)
	-ve	Wastes generation, littering and potential contaminations	- Management and disposal of each type of waste as per approved project's WMP - Provision of water supply and onsite sanitation facilities at all depots and terminals, unless there is a possibility to connect to the existing nearby sewerage system - Passengers awareness creation inside the buses and at the stations, depots, terminals - Employees training/inductions on appropriate waste management practices - Provision of solid waste collection bins (different bins for waste sorting) at the stations, depots, terminals and inside buses and proper collection of the same - Contract a registered and certified waste dealer to collect, transport and dispose hazardous wastes - Avoid washing of construction equipment and vehicles near the water sources - Fuel/oil storage containers will be properly sealed and monitored, all activities involving transfer of fuel and chemicals from one containing vessel to another shall be done far away from water courses - Development and implementation of the Spill Prevention and Contingency Plan (SPCP) to provide guidance and response mechanism to accidental unplanned events such as oil spills - Establishment of the bunding walls (secondary containment) of at least 110% of the volume of the hydrocarbon storage tanks/area to prevent spillage	DART	20,000,000/y ear
	-ve	Community health and safety risks	- Provision of safe corridors along the road alignment to cater for school children, for schools along, pedestrians, cyclists and other road users - Design and construction of roadways to accommodate anticipated traffic volume and flow - Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic - Instituting a Traffic Management Plan (TMP) for the operation of the BRT buses, and safe traffic flow (along the corridor)	DART, Traffic Police, LATRA	Part of DART's annual O&M budget

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
			- Maintenance of the road to prevent mechanical failure of vehicles due to road conditions - Targeting the use of a real-time warning system with signage to warn drivers of congestion, accidents, adverse weather or road conditions, and other potential hazards ahead - Construction of roadside rest areas at strategic locations to minimize driver fatigue - Setting of speed limits appropriate to the road and traffic conditions - enforcement of country's traffic regulations and controls along BRT corridor - Road safety campaigns especially among pupils/students and general public will be undertaken - Road safety campaigns in general for road users through radio talk shows - Placement of traffic officers along areas that may considered most at risk - Constant performance monitoring of the roads to identify any black spots that could lead to accidents - Vulnerable groups shall be provided with accessibility aids for prams and wheelchairs, evenly paved, unobstructed access roads with speed humps, traffic lights, pedestrian crossings, clear signages and road markings		
	-ve	Sexual assault & harassment risks in BRT System	- Establishment of the well-functioning traffic flow plan and scheduling for the BRT buses especially during peak hours to avoid over-crowding at the stations, fighting to board, alight, and struggles inside the buses - Development and dissemination of mechanisms to report, address and register incidents of violence and harassment - Demarcating spaces inside the buses to create space special for needy girls and women - Establishment of the transparent and accessible system/mechanism for the victim support, reporting and other forms of counselling - Implementation of the GAP, and protection of women against all forms of sexual abuse, harassment and violence - Developing and implementing Code of Ethical Conduct for the BRT employees, operators and throughout the supply chain - Conduct gender sensitive training and awareness creation - Reorganizing and strict supervision of the passengers boarding and alighting system at the stations - Promote women involvement in all stages of project activities and ensure that vulnerable people are involved in taking decisions on matters that affect them directly - Station attendants/security guards/supervisors are first aiders trained in addition to other duties they perform	DART, Traffic Police (Gender Desk)	5,000,000/year

Identified Impacts			Mitigation and/or Enhancement Measures	Implementation	
Project Phase	Type	Description		Responsibility	Relative/Est. Costs (TZS) ³¹
	-ve	Occupational health and safety risks/hazards	- Develop and implement Health, Safety and Environment Plan (HSEP) - Development and implementation of the Emergency Response Plan (ERP) for unplanned events - Periodic HSE, emergency response, fire drills and first aid training for the employees - Ensuring at least two first aid trained personnel are available at the stations, depots and terminals throughout - To minimize noise nuisance to the staff working at the depots, the building design has located many offices on the 1st floor to allow the office bearer a reduction in the workshop noise as well as create a visual access for supervision of the maintenance staff from above - Zoning of heavy moving parts and machinery away from employees and public paths as much as possible - Installation of fire detection and alarm systems especially at the depots, terminals, BRT buses. Providing adequate firefighting facilities	DART, OSHA, LATRA	Part of DART's operation costs
	-ve	Potential disruption of services from climatic dynamics	- Conducting a comprehensive flood risk assessment mapping and modelling along BRT corridor to inform and optimize design and construction of the climate-resilient infrastructure - Ensuring design and construction of adequate hydraulic conduits to minimize damage to BRT infrastructure and the disruption of BRT services due to flood events - Ensuring the structural design of the depots, terminals and stations are climate-resilient and sufficiently protective against destructive risk of tropical storms - Suitability of the sites selected for stations, depots and terminals should be comprehensively assessed including flooding risks - Proper and timely maintenance of drainage structures, and ensure timely and routine cleaning of the drainage structures - Controlling crude dumping of solid wastes, sedimentation, and domestic effluent discharge into channels especially along rivers - Strengthening mechanism for rapid public information dissemination in case of services disruption and alternatives that can be used	DART	Part of DART's annual O&M budget
			Sub-total IV (once-off costs) during operation phase of the BRT		20,000,000
			*Sub-total V (likely annual & continuous cost)		40,000,000 plus O&M costs
Decommissioning		Not applicable*	Decommission impacts and costs to be covered in the Decommissioning Plan		
Grand total (excluding resettlement and utilities costs)					585,000,000

Source: Consultant, July 2020

8.6 Environmental and Social Management System for BRT Phase 5

8.6.1 Development of the Project ESMS

Based on the outcomes of the baseline assessment (refer Chapter 4 above), identified and assessed impacts, and proposed ESMP presented above, it is recommended to carry out supplementary specialized baseline surveys in order to develop the BRT Phase 5 Environmental and Social Management System (ESMS) to be fully compliant with IFC Performance Standard 1 and World Bank's ESS9. The supplementary assessment will be for covering biological environment, physical, socio-cultural and stakeholder engagements. The ESMS should be developed during or before pre-construction phase in order to fully integrate environmental and social concerns into BRT's life cycle.

The key findings and recommendations from this ESIA report will be critical inputs to the ESMS and it will determine which other additional management plans and/or programmes should be developed and the related responsibilities. The ESMS shall entail a structured methodological approach (processes, practices, procedures and plans – see Figure 8-1 below) in managing identified environmental and social risks and impacts in a dynamic, continuous and participatory way throughout the life cycle of the BRT Phase 5 project. In the long term, this will enhance environmental, social and financial performance of the BRT Phase 5.

As recommended by the IFC Performance Standards, the ESMS to be developed shall include, but not be limited to, the following (see Figure 8-1):

- Policies and procedures e.g. environmental and social policies, pertinent certification schemes;
- Identification of risks and impacts: assessment tools to be used, identification methodologies, due diligence checks;
- Management programs: e.g. ESMP, EMP, SEP etc.;
- Organizational capacity and competence: financial and human resources, competencies, responsibilities, and institutional assessment;

-
- Emergency preparedness and response: Emergency Response Plans (ERPs) both to the project and adjacent communities;
 - Stakeholders engagement: BRT Phase 5 SEP (see Appendix VII) and framework;
 - External communication and grievance mechanism: Grievance Mechanism in place, and management of external communications;
 - Ongoing reporting to the affected communities: periodic reporting to the communities, and on-going consultations; and
 - Monitoring and review: M&E system and procedures, review of ESMS performance.

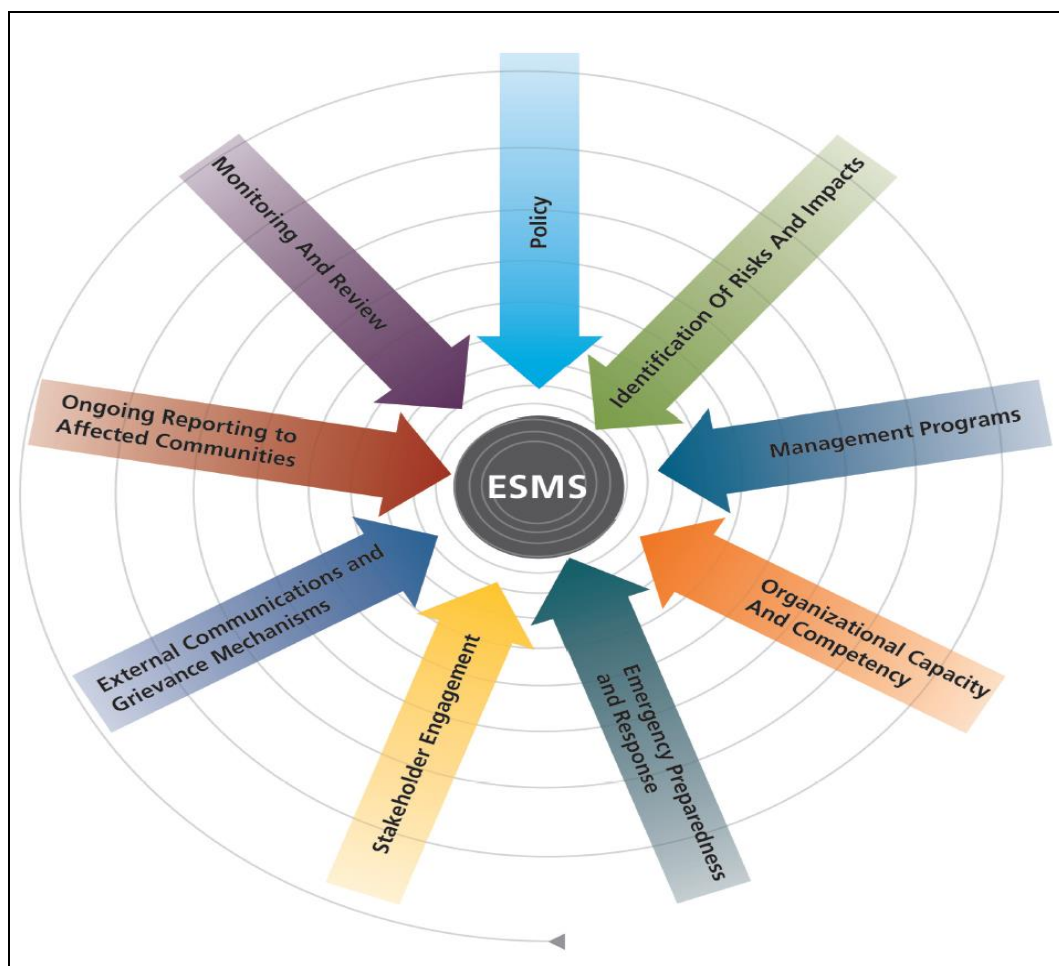


Figure 8- 1: The ESMS components

Source: IFC, 2014

8.6.2 Indicative Mandatory Safeguards Tools

Based on ESIA findings (baseline studies, impacts assessment and proposed ESMP/EMP), during mobilization phase, the Contractor shall be required to develop additional independent safeguard tools (aligned with the project's overall ESMS) to guide implementation and supervision of environmental and social issues. These tools shall comply to national requirements, IFC Standards, AFD and World Bank's ESSs. The plans, presented below, shall be reviewed and approved both by TANROADS and AFD before being rolled out in the field.

These tools shall be prepared prior to the implementation of the projects and shall form part of the project contract and must be approved by the Resident Engineer

and TANROADS before implementation. These tools will draw the basis for Contractor to abide with the requirements of the implementation of the environmental, social, health and safety mitigation measures. These tools will be updated from time to time by the Contractor on emerging issues and challenging during project implementation or upon the request from TANROADS and/or AFD.

The proposed safeguard tools shall include, but not be limited to, the following:

- i. Biodiversity Action Plan (BAP);
- ii. Borrow Pits and Quarry Sites Operation and Reinstatement Plan (BPQSORP);
- iii. Chance Finds Procedures (CFP) – attached in Appendix V;
- iv. Child Abuse Protection Plan (CAPP);
- v. Code of Ethical Conduct (CEC);
- vi. Community Health and Safety Plan (CHSSP);
- vii. HIV/AIDS Management Plan
- viii. Contractor's ESMP (C-ESMP);
- ix. Contractor's Inspection Plan;
- x. COVID-19 Response Plan (CRP);
- xi. Emergency Preparedness Plan (EPP);
- xii. Gender Action Plan (GAP) - attached in Appendix VI;
- xiii. Gender Based Violence Action Plan (GBVAP);
- xiv. Grievance Redress Mechanism (GRM) - included in Appendix VII;
- xv. Health and Safety Management Plan (HSMP);
- xvi. Influx Management Plan (IMP);
- xvii. Labour Recruitment and Management Plan (LRMP);
- xviii. Livelihoods Restoration Plan (LRP);
- xix. Sexual Harassment Policy or Plan;
- xx. Spill Prevention and Contingency Plan (SPCP);
- xxi. Stakeholder Engagement Plan (SEP) – attached in Appendix VII;
- xxii. Traffic Management Plan (TMP) – based on existing TMP developed for construction (refer DED, Nov. 2019);
- xxiii. Utilities Relocation Plan (URP); and
- xxiv. Waste Management Plan (WMP).

A brief description and essence of the above mandatory safeguard tools is presented in Appendix XI.

9.0 ENVIRONMENTAL MONITORING PLAN

An Environmental Monitoring Plan (EMP) describes the monitoring activities to ensure that adverse environmental and social impacts are minimized while the positive impacts are enhanced during the project implementation. The plan describes how, when and where the monitoring activities will be undertaken and who will carry them out. It entails compliance for carrying out the plan, and outlines mechanisms for checking environmental performance during the operation life of the project.

9.1 Purpose of the EMP

The purpose of environmental and social monitoring is to measure the environmental effects of the project (quantitatively) whenever possible. The environmental monitoring program will operate through the preconstruction, construction, and operation phases. It will consist of a number of activities, each with a specific purpose, key indicators, and significant criteria.

There are four types of monitoring that are also relevant to this ESIA:

- *Baseline monitoring*: the measurement of environmental parameters during a pre-project period and operation period to determine the nature and ranges of natural variations and where possible establish the process of change;
- *Impact/effect monitoring*: involves the measurement of parameters (performance indicators) during establishment, operation and decommissioning Phase in order to detect and quantify environmental and social change, which may have occurred as a result of the project. This monitoring provides experience for future projects and lessons that can be used to improve methods and techniques;
- *Compliance monitoring*: takes the form of periodic sampling and continuous measurement of levels of compliance with standards and thresholds – e.g. for waste discharge, air pollution; and
- *Mitigation monitoring*: aims to determine the suitability and effectiveness of mitigation programs designed to diminish or compensate for adverse effects of the project.

To ensure that mitigation measures are properly done, monitoring is essential. Table 9-1 provides the EMP for the BRT Phase 5 project detailing parameters to be monitored, frequency, monitoring sites/sampling area, measurement unit/method, target level/standard, responsibility for monitoring and estimated costs. The monitoring costs are only approximations and therefore indicative.

9.2 Internal Monitoring and Auditing Programs

The ESIA study has identified a number of areas of concern. Mitigation measures have been developed and the monitoring of the effectiveness of such mitigation measures is important. It will be the responsibility of TANROADS and DART to conduct regular internal monitoring of the project to verify the results of the Contractor and to audit direct implementation of environmental mitigation measures contained in the ESMP for the Project. Environmental monitoring will also require the engagement of a specialist (third-party professional) to provide an objective evaluation of the implementation of impact management measures and any residual impacts in line with local and international standards. The monitoring of presented parameters will form part of the routine management of the proposed project from implementation to operations. During pre-construction, construction and demobilization phases, TANROADS, DART and AFD will attend Monthly Progress Meetings/Site Meetings and conduct site visits to discuss and address issues related to progress of works.

TANROADS and DART shall also be responsible for monitoring the *Result Based Logical Framework* in consultation with appropriate institutions. The Safety and Environment Department at TANROADS supported by similar department from DART will be responsible for safeguards monitoring throughout the project. The responsibility for mitigation monitoring during the operations phase will be solely DART with technical support from TANROADS. The monitoring unit should produce an annual report that should be available for public inspection.

9.3 External Monitoring Programmes

Regulation 50.-(1) of the EIA and Audit Regulations of 2005 requires that, in executing a project or development, after an environmental impact statement has been approved by the Minister, the Proponent shall take all practical measures to ensure implementation of the EMP by- (a) carrying out self-auditing annually; (b) preparing an environmental audit report after each audit and submitting the report to the NEMC annually or as may be prescribed by NEMC; and (c) ensuring that the criteria used for the audit are based on the EIA process. It is recommended that environmental audits be carried out on the project as part of the on-going activities. The audits will unveil the actual performance of mitigation measures and will allow effective measures to be included in future projects based on the audit results.

Table 9-1: Environmental Monitoring Plan for the BRT Phase 5 project

Phase	Impact	Monitoring Requirements						
		Parameters	Monitoring Frequency	Sampling Sites	Measurement/ Unit	Target/ standard	Responsible	Relative/Estimated cost (TZS)
Pre-construction	Displacement of people, loss of properties and livelihoods disruption	PAPs relocation	Daily during land acquisition, and weekly afterwards	Affected households in the project area	Number of households fully compensated prior to land grievance mechanism report	All PAPs are compensated fairly and promptly	TANROADS, DART, Municipal councils, Ward/Mtaa authorities, Chief Valuer	Covered in RAP
		Livelihoods	Monthly during land acquisition and quarterly afterwards	Affected communities & livelihood activities	Livelihoods restoration reports, site verifications	Livelihood restoration of affected persons	TANROADS, DART, Municipal councils, Ward/Mtaa authorities, NGOs	
		Grievances	Weekly	Affected households, PAPs	Grievances reported & addressed, site verification, complaints	All grievances resolved promptly, fairly and transparently	TANROADS, DART, Municipal councils,	
		Accidental damage to properties adjacent to RoW	Daily during construction	All works areas	Complaints, site verification	Prompt valuation and compensation	Contractor, Municipal council, Ward/Mtaa authorities	
	Community anxiety from resettlement information disclosure	Anxiety & resettlement information	Daily during land acquisition	Affected communities	Stakeholder engagement reports, complaints/grievances, observation, number of received vs. resolved phone calls and e-mails concerning PAP's queries and concerns in relation to resettlement	Timely and appropriate information disclosure, clear and on-going community communication before and after land acquisition	TANROADS, DART, Municipal councils, Ward/Mtaa authorities	Covered in RAP
	Potential relocation of cemeteries/grave	Graves	Daily	Graveyards along the RoW	Complaints, site inspections	Graves relocated and restored in compliance with	TANROADS, DART, Municipal councils,	Impact to be reconfirmed

Phase	Impact	Monitoring Requirements						
		Parameters	Monitoring Frequency	Sampling Sites	Measurement/ Unit	Target/ standard	Responsible	Relative/Est . cost (TZS)
	yard					statutory requirements	Ward/ <i>Mtaa</i> authorities	
	Vegetation clearance and habitats loss/fragmentation	Vegetation species to be cleared	Weekly during pre-construction	100m buffer along project road, new diversions, materials sourcing sites	Area (m²) of cleared vegetation, site inspections	Minimum vegetation clearance to the extent possible	Contractor, TANROADS, DART, Municipal councils	5,000,000
		Areas of vegetation replanted	Bi-monthly during 1 year of operation	100m buffer along project road, new diversions, materials sourcing sites	Site verifications, vegetation survival rate	Restoration beyond original situation	Contractor, TANROADS, DART, Municipal councils	
	Employment opportunities	Number of local recruits (%)	Monthly	Construction workers	Records, inquires and observation, site verification	Optimization of local content, High recruitment from local community	Contractor, TANROADS, DART, <i>Mtaa</i> authorities	5,000,000
		Petty businesses	Monthly	Work areas, campsites	Records, inquiries, and observations, site verification, local content compliance reports	Increased income generation for locals	Contractor, TANROADS, DART, <i>Mtaa</i> authorities	
	Sub-total I (once-off cost) during project preparation and mobilization							
Construction	Employment benefits to communities	Number of local recruits (%)	Monthly	Construction workers	Records, inquires and observation, site verification,	High recruitment from local community	Contractor, TANROADS, DART, <i>Mtaa</i> authorities	Covered in employment above
		Local content	Monthly	Works areas, campsites, procurement & supply chain	Local content compliance reports, inquiries, site or supply chain verifications	Optimization of local content	TRA, TANROADS, DART, Contractor	
	Income generation to local suppliers and service	Local suppliers & service providers (supply chain)	Monthly	Works areas, campsites, procurement & supply chain	Records, inquiries, observations, complaints, procurement	Increased income generation for locals	Contractor, TANROADS, DART, Municipal/Regional	2,000,000

Phase	Impact	Monitoring Requirements						
		Parameters	Monitoring Frequency	Sampling Sites	Measurement/ Unit	Target/ standard	Responsible	Relative/Est . cost (TZS)
	providers				reports, local content compliance reports		authorities	
		Local content	Monthly	Works areas, campsites, procurement & supply chain	Local content compliance reports, inquiries, site or supply chain verifications	Optimization of local content	TRA, TANROADS, DART, Contractor	
	Income/revenue to local government and agencies	Revenue and taxes	Quarterly	TRA offices	TRA reports, accounting audit reports	All applicable taxes and fees are paid	TRA, TANROADS, DART, Contractor	2,000,000
	Skills development and technology transfer	Skills & competencies	Bi-annual	Project corridor	Project reports, Training needs assessment reports, local content compliance reports, Number of unskilled workers attached with semi-skilled workers or skilled workers	Improved local competencies	TANROADS, DART, Contractor, VTCs	3,000,000
	Air emissions from dust and exhaust fumes	Dust levels: PM ₁₀ , PM _{2.5} , TSP	Once before construction and quarterly thereafter	Construction footprint and adjacent receptors	Detector tubes, Mini Vol.Sampler TBS – TZS 837-1:2004 Air Quality Sampling and Test, public/workers annoyance with excessive dust levels, site inspections	TBS - TZS 845: 2005 Air Quality Specifications, IFC/WHO tolerance limits, No reports of excessive dust	Contractor, TANROADS, DART, Local authorities and community	10,000,000
		Exhaust emission levels: SO ₂ , NO _x , CO ₂ , TSP, NO _x	Quarterly during construction	Construction footprint and adjacent	TBS - EMDC 2 (1758): ASM-2 test and/or TSI-A	TBS - EMDC 2 (1758) Air Quality - Vehicular Exhaust	Contractor, TANROADS, DART, Local	

Phase	Impact	Monitoring Requirements						
		Parameters	Monitoring Frequency	Sampling Sites	Measurement/ Unit	Target/ standard	Responsible	Relative/Est . cost (TZS)
		CO, H ₂ S		receptors	test	Emission Limits, IFC/WHO tolerance limits	authorities and community	
	Elevated noise and vibration levels	Noise & vibration emissions	Once before construction and quarterly thereafter	Construction site & adjacent sensitive receptors	ISO 1996 - 1: 2003 Part 1: Acoustics - Basic quantities and assessment procedures, Public annoyance/complaints	TBS - EMDC 6 (1733) P3 Noise Pollution Tolerance Limits, IFC EHS (Environmental Noise) thresholds, Minimum public annoyance on noise, zero vibration impacts on nearby structures	Contractor, TANROADS, DART, Local authorities and community	10,000,000
	Risk of soil erosion, slope instability and siltation	Erosion	Daily during rainy season, monthly during dry season	Erosion-prone areas	Site inspections, monthly progress reports, complaints (nearby communities)	Erosion and siltation risks avoided	TANROADS, DART, Contractor,	Covered in civil works supervision
	Terrestrial and aquatic habitats alteration and/or fragmentation	Flora & fauna species	Weekly	Construction footprint area and vicinity	Area (m ²) of cleared vegetation, site inspections, monthly progress reports	Minimum habitat fragmentation, improved flora & fauna conservation	Contractor, TANROADS, DART, Municipal authorities	5,000,000
		Aquatic ecology & macro-vertebrates, riparian habitats	Daily during construction of the bridges, and monthly afterwards	Major river crossings (Msimbazi, Tenge, Kibangu)	Site inspections, monthly progress reports	Zero damage to aquatic habitats	Contractor, TANROADS, DART, Municipal authorities	
		Water quality (nutrients, hydrocarbons etc.) & macro-vertebrates	Quarterly	Msimbazi, Tenge, Kibangu rivers (upstream, midstream,	Site inspections, water quality test results, monthly progress reports	Zero water contamination & aquatic life support	Contractor, TANROADS, DART, Municipal authorities	

Phase	Impact	Monitoring Requirements						
		Parameters	Monitoring Frequency	Sampling Sites	Measurement/ Unit	Target/ standard	Responsible	Relative/Est . cost (TZS)
	Potential/accidental contamination of water and soil resources			downstream)				
		Water quality (e.g. Nitrate, Lead, Sulphate, Turbidity, Hydrocarbons, pH)	Once before construction and quarterly thereafter	Water bodies along the road, All sites with heavy machinery stationed	Sampling analyses: spectrophotometer AAS, HPLC, pH meter	Zero contamination	Contractor, TANROADS, DART, Wami/Ruvu Basin Water Board	15,000,000
		Spills and leakages	Weekly	Oil, fuel, bitumen storage areas	Site inspections	Zero spill/leakage cases	Contractor, TANROADS, DART	
	Littering from generated solid and liquid wastes	Littering and non-conformance to waste management requirements, wastes generation	Daily	All construction sites and camp site	Site inspections, community reports/complaints , monthly progress reports	No incidences of non-conformance to waste management requirement, zero public health and environmental risks collected and properly disposed	Contractor, TANROADS, DART, Municipal councils (Ward & Mtaa), adjacent communities	20,000,000
	Potential land degradation from borrows, quarries and sand pits	Borrows, quarries, sand pits	Monthly	Existing materials extraction sites	Number and condition of the backfilled pits, site verifications, site closure reports	No new borrow/sand pits and quarries, sites re-instated and vegetation restored	Contractor, District Councils & TANROADS, DART, Local authorities	10,000,000
		Restoration & revegetation	Quarterly until end of year 1 of operation	Materials extraction sites	Area of cleared vegetation, closure/restoration reports	All borrow pit sites re-instated and vegetation restored	Contractor, District Councils & TANROADS, DART, Local authorities	
	Utilities relocation/damage and service disruption	Utilities & service disruption	Daily during relocation, and weekly for the rest of the construction period	Construction site, access roads, adjacent residential areas	Number of damaged/relocated utilities, excessive demand/utility shortages, complaints/grievance	Continued utilisation of the existing utilities	Utility authority, TANROADS, DART, Contractor, Local authorities, Community	Covered in RAP
		Alternatives offered	Daily during	Affected	Number of	Continued	Utility authority,	

Phase	Impact	Monitoring Requirements						
		Parameters	Monitoring Frequency	Sampling Sites	Measurement/ Unit	Target/ standard	Responsible	Relative/Est . cost (TZS)
		for continued services provision	temporary & permanent relocation	utilities, affected consumers/rec eptors	alternatives replaced e.g. water sources; users' grievances	utilisation of the existing utilities	TANROADS, DART, Contractor, Local authorities,	
	Occupational health and safety hazards	Accidents, injuries, number and types of PPEs, HSSE measures	Daily	All works areas & campsites	Number & types of accidents, HSSE reports, site verification and inspections, HSE induction sessions	Zero accidents, incidences, near misses, loss time injuries	OSHA, DART, TANROADS, Contractor	15,000,000
		Sanitation facilities	Weekly	All works areas & campsites	Inspections, HSE reports, workers complaints	No sanitation-related diseases outbreak/communi ty exposure	OSHA, Municipal councils, TANROADS, DART, Contractor	
	Traffic flow interference & traffic accidents along BRT 5 corridor	Traffic flow	Daily	BRT corridor & campsites and materials sourcing areas, haulage routes	Duration of congestion, traffic congestion complaints from road users; number of bottleneck incidences lacking traffic management controls	Minimum traffic flow disturbances and zero damage to infrastructure	TANROADS, DART, Local Police Force, Contractor, Community	4,000,000
		Traffic accidents	Daily	BRT corridor & campsites and materials sourcing areas, haulage routes	Traffic accidents/incident s reports/records, inquiries, and accident statistics	Zero construction-related traffic accidents/incident s	TANROADS, DART, Local Police Force, Contractor, Community	
	Disruption of access to homes and public services/activities	Access to residential, institutions, industrial along RoW	Daily	All works areas & campsites	Complaints, progress reports, site inspections	Continued and improved access to all premises along RoW	Local government authorities, community, TANROADS, Contractor	1,000,000
	Exposure to HIV/AIDS and new transmission	HIV/AIDS cases	Quarterly	Campsites, communities along the	VCT reports, sensitization campaigns held,	No new cases recorded	Contractor, TANROADS, DART, Municipal	10,000,0000

Phase	Impact	Monitoring Requirements						
		Parameters	Monitoring Frequency	Sampling Sites	Measurement/ Unit	Target/ standard	Responsible	Relative/Est . cost (TZS)
				project road	health facilities records		Councils, NGOs, Local health facilities, Communities	
	Influx of people in the project area and its implications	Immigrants/Jobseekers	Monthly during construction	Communities along project road	Local government reports, complaints, covert observations	Minimum pressure on existing resources, project safety & security assured, facilities in place for the project workforce	Local government authorities, community, Contractor, TANROADS, DART	1,000,000
		Crimes & vices, theft of construction materials/equipment	Weekly	Campsite, works areas and vicinity	Security reports	Zero project-induced crimes especially theft	Local police, community, Mtaa authorities, community police, TANROADS, DART, Contractor	
	Sexual harassment and violence against women & vulnerable segments	Assaults/harassment, GBV and VAC cases	Daily	Campsites, Works areas, adjacent communities along project corridor, materials sourcing sites, supply chain	Site verification, observation, complaints, Police reports, no. of sexual harassment cases reported cases and reports,	Zero assault/harassment, GBV and VAC cases	Contractor, Sub-contractors, primary suppliers, TANROADS, Municipal councils, local authorities, HIV/AIDS & Gender service provider, Local police	4,000,000
		Women participation & recruitment	Monthly	Construction/ works areas, campsites, materials sourcing areas, supply chain	Number & positions of women involved in project activities, grievances	Gender-sensitive/inclusive/ representation	TANROADS, DART, Contractor, NGOs	
	Exclusion from economic opportunities and fair labor terms	Employment opportunities	Monthly	Construction/ works areas, campsites, materials sourcing	Complaints, labour recruitment reports, site verifications	Increased women opportunities	TANROADS, DART, Contractor, NGOs	Covered in employment and gender

Phase	Impact	Monitoring Requirements						
		Parameters	Monitoring Frequency	Sampling Sites	Measurement/ Unit	Target/ standard	Responsible	Relative/Est . cost (TZS)
				areas, supply chain				
		Suppliers & service providers	Monthly	Supply chain/service providers	Supply chain reports, complaints, site verifications	Inclusion of women suppliers & service providers	TANROADS, DART, Contractor, NGOs	
	Child labour and increased school truancy	Children under 18 years	Bi-monthly	Construction/ works areas, campsites, materials sourcing areas, supply chain	Site verifications, Contractor's reports and local government reports	Zero child labour in the construction activities	Contractor, TANROADS, DART, NGOs, communities, parents	3,000,000
		School attendance rate	Weekly	Schools along/adjacent to BRT corridor	Disaggregated attendance reports, truancy/drop-outs reports, parent's assessment views	No construction-induced dropouts and/or truancy	School administration, Ward authority, TANROADS, DART	
	Risk of contracting and/or transmission of COVID-19	COVID-19 cases	Weekly	Construction/ works areas, campsites, nearby communities	Medical check reports, Ministry of Health reports	Zero cases (construction workers & adjacent community)	Ministry of Health, TANROADS, DART, AFD, Contractor, Local health facilities	Case-by-case basis
Sub-total II (once-off cost) during actual construction								125,000,000
Demobilization	Displacement of workers and unemployment	Number of unemployed persons	Weekly during closure	Campsites & works areas	Inspections, human resource manager reports, grievances	Minimized severance for the retrenched employees	TANROADS, DART, Contractor, Sub-contractors, local authorities	500,000
	Loss of business opportunities	Revenues/incomes	Once	Campsites & works areas	TRA reports	Alternative sources secured	TRA, TANROADS, DART, Contractor	No cost
	Waste generation and disposal challenges	Littering & contaminations	Daily during demobilization	Works areas, campsites, materials sourcing areas	Project closure reports, site inspections,	Zero public health and environmental risks from littering/contaminations	TANROADS, DART, Contractor, Sub-contractors, local authorities	2,500,000
Sub-total III (once-off cost) during contractor demobilization								3,000,000
	Improved urban	Traffic flow &	Daily, hourly	Key	ITS monitoring	Smooth & timely	DART,	Part of

Phase	Impact	Monitoring Requirements						
		Parameters	Monitoring Frequency	Sampling Sites	Measurement/ Unit	Target/ standard	Responsible	Relative/Est . cost (TZS)
Operation	mobility, reduced travel time and congestion	congestion	during peak hours	intersections, BRT and mixed traffic lanes	reports, Traffic police reports, complaints, inspections	traffic flow, well-functioning intersections/junctions	passengers, Traffic police, truck operators	DART's annual O&M budget
		Passengers mobility, overcrowding & comfortability	Daily, hourly during peak hours	Stations and terminals	Complaints, ITS monitoring reports, supervisor reports (stations & terminals), passengers' grievances, inspections	Absence of passengers overcrowding in stations & buses	DART & passengers	Part of DART's annual O&M budget
		Bus schedules	Daily, hourly during peak hours	Depots, terminals, stations, <i>en route</i> buses	ITS monitoring reports, passengers' grievances	Uninterrupted and flexible bus schedules that matches passengers demand in different times of the day	DART & passengers	
		Damaged sections of the road & facilities	Monthly during DLP, daily during rainy season, bi-monthly during rest period	BRT lanes, mixed traffic lanes, stations, depots, terminals	Operation and maintenance reports, site inspections, complaints	Well-maintained BRT infrastructure & minimum disruption on BRT services	DART, TANROADS, passengers, truck operators	
	Improved productivity, access to livelihood activities and welfare of vulnerable groups	Productivity & livelihood activities	Bi-annual	Project corridor	Travel time and costs, traffic flow reports	Maximized productivity	DART	Part of DART's annual O&M budget
		Vulnerable groups	Weekly	Project corridor	Complaints, inspections	Accessible and user-friendly BRT infrastructure and services	DART, passengers	
	Increased safety and security of urban public transport sector	Traffic accidents & collisions	Daily	BRT and mixed traffic roads	Traffic police reports, inspections, audit reports,	Zero traffic accidents, fatalities and injuries related	DART, passengers, Traffic police	Part of DART's annual O&M budget

Phase	Impact	Monitoring Requirements						
		Parameters	Monitoring Frequency	Sampling Sites	Measurement/ Unit	Target/ standard	Responsible	Relative/Est . cost (TZS)
					complaints from other road users	with BRT operations		
		Security (passengers & facilities)	Daily	Stations, depots, terminals	Reports, complaints, verifications	Guaranteed passenger's security in all BRT facilities	DART, security guards	
	Improved mobility access to women and disadvantaged groups	Women & vulnerable groups		Stations, depots, terminals	Complaints, inspections,	Accessible and user-friendly BRT infrastructure and services	DART, women, vulnerable groups	Part of DART's operation costs
	Reduction of national carbon footprint & augmentation of climate-resilient and low-carbon urban infrastructure	Carbon footprint	Annually	BRT Phase 5 infrastructure	Site inspections, Operations' reports, IPCC-approved procedures	Reduced carbon emission	DART, VPO-DoE, IPCC	3,000,000/ye ar
	Employment opportunities and skills development	Number of local recruits (%)	Monthly	Stations, depots, terminals, buses, operators	Human resources recruitment reports	Priority to nationals	DART	Part of DART's HR costs
		Skills & competencies	Bi-annual	Stations, depots, terminals, buses, operators	Training needs assessment reports, performance evaluation reports	Improved staff competencies in operation and maintenance of BRT	DART, VTCs	
	Impacts on <i>daladala</i> and other public transporters along BRT route	<i>Daladala</i> along BRT Phase 5 routes	Weekly during first year of operation, monthly afterwards	Project corridor, feeder routes	Number of <i>daladala</i> operators relocated, routes/feeders restored, number of project-affected <i>daladala</i> operators in attendance at BRT training programs	Undisrupted livelihoods of the <i>daladala</i> owners and operators	DART, LATRA	4,000,0000

Phase	Impact	Monitoring Requirements						
		Parameters	Monitoring Frequency	Sampling Sites	Measurement/ Unit	Target/ standard	Responsible	Relative/Est . cost (TZS)
	Wastes generation, littering and potential contaminations	Littering & contaminations	Daily	Stations, terminals, depots (especially maintenance workshop), inside BRT buses	Waste management reports, inspections, complaints, water quality test results	Zero public health and environmental risks from littering/contaminations	DART, Municipal authorities, community	3,000,000/year
	Community health and safety risks	Accidents, injuries, pedestrians/communities along the corridor	Daily	Project corridor	Traffic police reports, community complaints, corridor inspections, bus monitoring reports	Zero pedestrian accidents, injuries, fatalities related to BRT operations	DART, communities, Traffic police	Part of DART's annual O&M budget
	Sexual assault & harassment risks in BRT System	Assaults/harassment incidences	Daily	Stations, terminals and inside buses	Site verification, observation, complaints, Police reports, no. of sexual harassment cases reported and complaints	Zero assault/harassment, GBV and VAC cases	DART, security guards, passengers, station supervisors	1,000,000/year
		Passengers overcrowding	Hourly during peak hours	Stations, terminals and inside buses	Complaints, inspections and monitoring reports, passengers/traffic flow reports	Zero assault/harassment cases	DART, security guards, passengers, station supervisors	
	Occupational health and safety risks/hazards	Accidents, injuries, number and types of PPEs, HSSE measures	Daily	Project corridor, stations, depots, terminals	Number & types of accidents, HSSE reports, site verification and inspections	Zero accidents, incidences, near misses, loss time injuries. Accident-free BRT operations	OSHA, DART, Community	Part of DART's operation costs
	Potential disruption of services from climatic dynamics	Flooding, inundation and services disruption	Daily during rainy season	Flood-prone areas along the corridor	Surface water flow & drainage; assessment of damage e.g.	Maximum draining of the flood prone areas along RoW, zero service	DART, WRBWB, Community, Municipal councils	Part of DART's O&M costs

Phase	Impact	Monitoring Requirements						
		Parameters	Monitoring Frequency	Sampling Sites	Measurement/ Unit	Target/ standard	Responsible	Relative/Est . cost (TZS)
					cracks, blockages, capacity, site verifications	disruption & BRT infrastructure/facilities damage		
		Sub-total IV (once-off costs) during operation phase of the BRT						
		Sub-total V (likely annual continuous costs e.g. wastes, community management) excl. O&M annual costs highlighted above						
Decommission	Not applicable*	Decommission impacts and costs to be covered in the Decommissioning Plan						
Grand total (excluding resettlement and utilities costs & operation and maintenance monitoring costs)								139,000,000

Source: Consultant, July 2020

10.0 COST BENEFIT ANALYSIS OF THE PROJECT

This Chapter presents an analysis of the costs and benefits to determine the viability of the proposed project from the environmental, social and economic perspectives. The economic evaluation focused on the review of the economic study undertaken during the engineering design phase of the project. The Cost Benefit Analysis (CBA) is a tool used either to rank projects or to choose the most appropriate option. The ranking or decision making is based on the expected economic costs and benefits. The general rule is that the project should be undertaken if the expected lifetime benefits, both environmentally and socially, exceed all expected environmental and social costs. The overarching objective is to present the lifetime costs and benefits of a project as a single number that can be compared to either the interest rate prevailing or the costs and benefits of environment. To get this indication, the stream of net benefits (benefits minus costs) is discounted. In the following sections, the environmental, social and economic cost benefit analysis of the project is presented.

10.1 Economic Evaluation

The Highway Design and Maintenance model (HDM-4 version 2.09) has been used to perform the economic analysis of improving/reconstructing the project road. Three evaluation alternatives ALT0, ALT1 and ALT2 were employed in the analysis whereby:

- ALT0 being the base case or “Do nothing” scenario; and
- ALT1 and ALT2 were “Do something” scenario (reconstruction/upgrading the road to bitumen and concrete surface standards respectively).

The results relate to alternatives ALT1 and ALT2 as compared to ALT0 for the project roads. The relevant economic indices were the Net Present Values (NPV at 12% discount rate), NPV/Cost ratio and Internal Rate Return (IRR%) (Economic Study Report, Nov. 2019).

The economic assessment considered two scenarios of road construction namely Reconstruction/Upgrading the road to bitumen (ALT1) and concrete surface standards (ALT2). Considering the implementation of the BRT Phase 5 as one

project, the ALT2 yielded the highest Economic Internal Rate of Return (EIRR) at 74.14% compared to 72.13 % for ALT1. Similarly, ALT2 yielded the highest EIRR when all the road sections are considered as one project at 74.7% compared to 72.5% for ALT1 (Economic Study Report, Nov. 2019).

A sensitivity test was carried out on the alternative, which yielded the highest economic benefits in terms of NPV, NPV/Cost ratio and IRR. ALT2 (involving construction of Bandari road to 50mm SP (AC12.5);100mm SP(AC19.0); 225mm DBM40; 250mm CRR;150mm C2; 150mm C1 and construction of BRT5 to 50mm SMA (AC12.5);150mm CRR;150mm C2;150mm C1 for mixed traffic lanes and BRT bus lanes to 300mm reinforced concrete; 150mm C2 and 150mm C1 yielded the highest economic returns (Economic Study Report, Nov. 2019).

From the assessment, it is recommended to construct the BRT roads through pavement option no. 2, basically consisting of:

- Port Access Road (Bandari road) to 50mm SP (AC12.5); 100mm SP (AC 19.0) surface; 225mm DBM40 base; 250mm CRR; 150mm C2;150mm C1;
- BRT5 to 50mm SMA (AC12.5) surface;150mm CRR base; 150mmC2; 150mmC1 for mixed traffic lanes; and
- BRT bus lanes to 300mm reinforced concrete; 150mmC2 and 150mmC1.

Implementation of the construction works can proceed without delay. The economic and financial assessment indicates that DART Phase 5 project is viable, and it is therefore worthy investing.

Other benefits which will accrue from implementing this project will include:

- Endogenous benefits included savings in vehicle operating costs and travel time costs, maintenance cost, savings and salvage value;
- Exogenous benefits were i) diverted passenger user cost saving from *daladala* to BRT system once the project is implemented and ii) vehicle operating cost

saving for buses component of the Port access & BRT Phase 5 vehicle fleet in HDM4 for diverting to BRT fleet using a concrete road surface;

- Increased mobility and social interaction within neighborhood Municipal Councils of Dar es Salaam Region;
- Reduced road accidents along the project roads; and
- Reduced vehicle emissions due to reduced congestion and use of the new BRT buses.

See a separate Economic Evaluation Report (Nov. 2019) for the detailed analysis of these benefits and costs.

10.2 Capital Expenditure (CAPEX)

Financial analysis considered analysis of the financial return of the DART as an operator and owner of the BRT system. Total infrastructure project financing is estimated to be TZS 410,312,128,831 (Draft Economic Study Report, Nov. 2019), and TZS 71,641,785,910.12 for the implementation of the Resettlement Action Plan for the 1,081 identified PAPs out of which about TZS 32,127,411,718.92 is for relocation existing utilities within the project corridor.

In addition, the cost of implementing proposed ESMP is estimated to be TZS 585,000,000, while the cost for implementing the proposed EMP is about TZS 139,000,000.

10.3 Environmental and Social Costs

Chapter Seven (7) of this report presented impacts associated with the proposed project. The project negative impacts will include displacement of people due to land acquisition, relocation of infrastructures and disruption resulting from relocation of utilities infrastructures (water pipelines, sewerage and drainage systems, electric reticulation facilities etc.), vegetation loss through clearance, soil erosion and improper location of workers' camps, poor air quality- emissions and dust, noise pollution, solid and liquid waste generation, impacts on public health and safety from

work camp operations, depletion and pollution of water sources, water and soil contamination, increase in traffic accidents for pedestrians, delays in transportation, and socio-economic changes.

During operation of the BRT PHASE 5 and Port Access Roads, the impacts were noted to be soil erosion on slopes and embankments, reduced air quality from increase in traffic, increase in HIV/AIDs cases, and production of solid and liquid wastes.

If each one of these negative impacts is assigned a monetary value at current market value, based on a combination of the market value methods and one's willingness-to-pay methods for the damage or impact caused, or based on cost for a remedy such as water sprinkling to control dust or provision of PPE, whereby estimated costs for mitigations and enhancements are presented in the ESMP and EMP above.

The market prices or monetary values of environmental negative impacts are very difficult to obtain. They cannot be easily calculated as we can do for the project costs. The estimates on environmental costs are based on the assumption that the environmental cost may be equated to the cost of prevention or remedy in terms of providing PPEs or health insurance as per common practice.

10.3 Environmental and Social Benefits

BRT Phase 5 and Port Access Roads construction will open up many opportunities to the City of Dar es Salaam, especially along the project roads and other neighboring centers, regions and the nation at large. The BRT Phase 5 system will allow more vehicles to reach the city centre within a shorter time span, thus commercial activities will be performed within shorter times and more benefits will be gained. Movements of goods from and to the Dar es Salaam port will also be improved.

Roadwork activities will have offered some short-term employments to local community members such as construction labourers, security personnel, contractors, engineers, etc. Many more benefits ranging from taxes on construction materials, availability of good infrastructure in the City, etc. will be realised. Overall, the BRT Phase 5 and Port Access Roads project will have great benefits economically and environmentally compared to current status of the City transport system. Therefore, the benefits to be realised from the proposed project surpass the envisaged environmental and social costs within the lifetime of the project.

The proposed BRT PHASE 5 and Port Access Roads project poses relatively low environmental and social costs in value and are thus outweighed by the benefits to be realised from the project. The consideration of the “No-Project” or “Do-Nothing” option is dismissed as an alternative due to the need and desirability of the BRT Phase 5 system and Port Access Road to solve transport problems in Dar es Salaam City. Therefore, the country at large will benefit if the project will be implemented.

11.0 DECOMMISSIONING

11.1 Decommissioning Overview

As decommissioning is not anticipated to take place in the near future, the specific conditions for mitigation are inherently uncertain. The adopted design return periods are 25 years for pipe culverts, 50 years for box culverts and 100 years for bridges. In view of this, specific mitigation measures pertaining to environmental impacts of decommissioning works cannot be proposed now with a reasonable degree of certainty.

A detailed Decommissioning Plan that takes environmental issues into consideration shall be prepared by the developer prior to the decommissioning works. Should it be done, decommissioning may entail change of use (functional changes) or demolition triggered by change of land use. A preliminary decommissioning plan is given below for an overview of issues to be taken into consideration among others if the need for decommissioning arises.

11.2 Preliminary Decommissioning Plan

This Plan will be used as a reference that provides the framework to ensure that demolition activities on the site do not adversely affect the health, safety, traffic or the environment of the public and neighboring properties. The Contractor will be required to prepare a detailed Demolition Plan and Construction Management Plan as per required regulatory framework, guidelines and industry good practices prior to the commencement of works on site.

11.3 Demolition Methods

The indicative demolition methodology will be as follows:

- The strip out and removal of non-structural elements will be undertaken utilizing manual labour and small plant including – bobcats, excavators and dingo type loaders;
- The materials will be removed from site using small to medium sized trucks;

- The structures will be demolished using larger plant and equipment including hydraulic excavators. These machines will be equipped with rock breakers, pulverizes and the like which would be used in a sequential manner; and
- During the demolition process erosion control measures will be established. These will include treatment of dust and potential discharge into storm water systems.

11.3.1 Materials Handling

Materials handling will be carried out using mechanical plant (including excavators and bobcats) loaded into trucks (bogie tippers and semi-trailers). The debris will be carted offsite to an approved waste facility or recycling centers. The Contractor shall submit a Demolition Waste Management Plan to DART and TANROADS, which outlines the objectives of:

- Maximization, reuse and recycling of demolition material;
- Minimization of waste disposal; and
- Evidence of implementation for specified arrangements of waste management.

All re-usable and recyclable materials will be temporarily and appropriately stored on-site while waiting for pick-up by registered and certified dealers. Hazardous materials will be collected, stored, treated and disposed separately. A hazardous materials inspection will be undertaken by an accredited consultant and a report issued. Hazardous materials will be removed in accordance with EMA 2004. A final clearance report will be provided by the hygienist who will include the provision of tip dockets from waste centers.

11.3.2 Proposed Sequence

The Contractor will be required to prepare the following documentation prior to the commencement of demolition and/or excavation works:

- Dilapidation Survey;
- Construction Waste Management Plan; and
- Demolition Management Plan.

- *Protective measures:* A sign will be erected around the perimeter of the construction site prior to the commencement of demolition works. Additionally, wherever the risk arises of material falling into public areas, overhead protection will be provided in the form of a sign. support will be erected to facades where materials could fall in excess. The support will be clad with chain wire and shade cloth to enclose debris and dust onto the site. During the demolition, dust control measures will be used to minimize the spread of dust from site. The Contractor will always have a senior representative on site to ensure compliance with the safety guidelines and agreed work methods;
- *Traffic management:* The management of construction traffic during the decommissioning phase will be subject to the provision of a detailed traffic management plan. This plan will be prepared by the Contractor for the various stages of demolition. During demolition, all traffic will be held within the site boundaries. The site will remain closed to pedestrian traffic and will be generally manned by security;
- *Occupational Health and Safety:* a detailed OH&S Plan will be provided by the Contractor prior to work commencement. A detailed Site Safety Plan will be prepared for the specific project activities at a site;
- *Environmental Management Plan:* A detailed Environmental Management Plan will be provided by the Contractor prior to the commencement of the work.

12.0 CONCLUSION AND RECOMMENDATIONS

12.1 Summary and Conclusion

The findings from this environmental and social impact assessment report can be summarized as follows:

- Findings indicate that the proposed BRT Phase 5 project has been accepted and welcomed by the community and other stakeholders based on its long-term desirable outcomes in improving urban mobility within the city. Comprehensive stakeholder engagements should be implemented in a continuous and transparent manner along the corridor throughout the project life cycle;
- Implementation of BRT Phase 5 will significantly contribute in the improvement of urban mobility and transportation within the city, facilitating accessibility and connectivity to various livelihoods activities, and overall productivity;
- The BRT PHASE 5 will connect with existing BRT1, and ongoing BRT2, BRT3, and BRT4 and significantly improve community mobility and access to basic services. The BRT Phase 5 system will improve the economy and access to social and health services not only to the population located immediately along the project road, but also for those within a larger area even beyond borders of the city;
- The BRT Phase 5 corridor is a brownfield site located in a highly urbanized, built-up urban settings dominated by residential, industrial and commercial premises and institutional establishments. The proposed corridor is also dominated by myriad forms of informal livelihood activities and other infrastructure (utilities) within and/or adjacent to the RoW;
- Land acquisition and subsequent involuntary resettlement along the project corridor is expected to be one of the key social and economic issue of concern;
- The project corridor is located within two main catchment areas (Kizinga and

- Msimbazi) characterized by bi-modal precipitation regime; whereby three major rivers (Msimbazi, Tenge and Ubungo/Kibangu drains the corridor. The rivers are highly contaminated with organic matter especially downstream Msimbazi river, excessively high faecal and total coliforms levels, turbidity and high concentration of ammonia-nitrogen, phosphate concentration;
- The hydraulic investigations and stakeholder comments indicate that the bridges of Matumbi and TIOT (overpassing the tributaries of Msimbazi River along Mandela road corridor), and Luhanga bridge on Tenge river at Kigogo area have been overtopped by discharge during heavy rains (heavy rains and debris clogging at bridge openings). Other potentially susceptible areas to be taken into consideration are Sandali, Temeke and Buguruni;
 - Ecologically, the BRT Phase 5 corridor is situated in the ecologically highly disturbed area due to anthropogenic activities over many years that resulted into habitat fragmentation, loss and declined species abundance and diversity;
 - The biotic environment within the project's primary impact area exhibits a continuum of modified habitats, given the predominance of non-native floral species, low species diversity and the footprint of the urban land use dominated by residential and commercial establishments. No IFC-recognized critical habitats or IUCN-designated Key Biodiversity Areas (KBAs) exist within the project's primary and secondary impact areas. None of the recorded and/or reported species within project footprint area is listed in the IUCN Red List or CITES Appendices;
 - There are no officially recognized protected wildlife areas such as national parks, game reserves, game-controlled areas, partial game reserves or marine park areas traversed by the project corridor or falls within project's primary/direct area of influence;

- In terms of coastal harbour mangrove habitats nearby Port Access Road section the mangrove habitats along Dar es Salaam port (harbour stretch) is characterized by the intact fringe at Kurasini and the highly degraded and fragmented remnants of a fringing mangrove strip on the eastern shoreline. The fringe is narrow throughout its length, and is composed mainly of ornamental, exotic trees, and shrubs;
- The bird species reported to exist adjacent and/or within the project area of influence revealed presence of some species in the fragmented habitats that falls under Least concern as per IUCN conservation status (Red List ver 3.1 of 2019);
- The wider project area is neighbored by the 40km long Coast of Dar es Salaam Important Bird Area (IBA) that stretches seaward 12km from the inland high-tide mark. However, the IBA is extended in some places to include mangroves and salt-workings. The IBA has been assessed and categorized into very high threat score (pressure) but it is of major importance to migratory waders from northern Eurasia. The BRT Phase 5 project activities are not expected to interfere with the IBA;
- The main soil types along BRT Phase 5 corridor consists of naturally existing well graded and loosely overlying silty SAND and low clayey SAND soils at fewer location. The dominant sand soil is highly permeable, with low retention capacity and highly susceptible to erosion agents (e.g. wind, water).
- The negative impacts of concern are:
 - displacement of people, loss of properties and livelihoods disruption
 - potential relocation of the graves/graveyard (impact to be reconfirmed by further ground truthing)
 - utilities relocation/damage and service disruption during construction
 - occupational health and safety risks and hazards related to construction, operation and maintenance activities

- air emissions from dust and exhaust fumes during construction
 - elevated noise and vibration levels during construction
 - potential/accidental contamination of water and soil resources from construction, BRT operations and maintenance activities
 - traffic flow interference & traffic accidents along BRT 5 corridor during construction
 - exposure to HIV/AIDS, STDs and potentially new transmissions
 - sexual harassment and violence against women & vulnerable segments during construction
 - community health and safety risks related to operation and maintenance of the BRT infrastructure
- The significant long-term positive impacts of concern are:
 - creation of the local employment opportunities and benefits to communities during construction and operation phases of the BRT Phase 5
 - income generation opportunities to material/equipment suppliers and local contractors
 - skills development and technology transfer
 - improved urban mobility, reduced travel time and congestion
 - improved productivity, access to livelihood activities and welfare of vulnerable groups
 - increased safety and security of urban public transport sector
 - improved mobility access to women and disadvantaged groups
 - reduction of national carbon footprint & augmentation of climate-resilient and low-carbon urban infrastructure
 - income/revenue generation to local government and agencies

In view of the above findings, it can be concluded that the BRT Phase 5 project activities from design, construction to operations and maintenance will have manageable negative impacts on the biological, physical and social-economic and cultural environments, provided that the proposed mitigation measures are

appropriately implemented. In this way, the BRT Phase 5 project will have minimal impacts of environmental, socio-economic and cultural concern that would inhibit its implementation and development. In the long term, it is anticipated that the project will potentially result into more positive than negative impacts for community and environment.

12.2 Recommendations

The findings of this ESIA report support the development and operation of the proposed project provided that the recommended mitigation and enhancement measures in the form of ESMP, EMP, RAP, LRP, and any further conditions that may be imposed by the NEMC following consultations with lead agencies and other stakeholders are appropriately implemented by TANROADS, DART, Contractor, Sub-contractors and other responsible parties in order to minimize and/or avoid footprints on the biophysical and social-economic receptors. TANROADS and DART have the overall responsibility of ensuring effective implementation of the RAP, LRP, ESMP and EMP as well as conducting periodic environmental monitoring and audits.

Further it is strongly recommended to:

- develop and implement a comprehensive project's Environmental and Social Management System (ESMS) during pre-construction phase. The overall ESMS framework has been presented in this ESIA report.
- undertake an assessment of predictable climate change dynamics and resilience issues along BRT Phase 5 corridor especially floods and extreme weather patterns. This entails undertaking a comprehensive flood risk assessment mapping and modelling along BRT corridor to inform and optimize design and construction of the climate-resilient infrastructure by incorporating experience from BRT Phase 1. The suitability of the sites selected for stations, depots and terminals should be comprehensively assessed including flooding risks.

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