



# **Final Data Compilation Report**

## **Data Collection for Climate Change Mitigation Potential Analysis and Scenario Development in Uganda's Transport Sector**



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## List of Abbreviations

BRT	Bus Rapid Transit
BURs	Biennial Update Report
CCD	Climate Change Department
CRMAS	Climate Change Risk Management and Adaptation Strategy
DRC	Democratic Republic of Congo
DUCARs	District, Urban and Community Access Roads
EDMP	Expressway Development Master Plan
EIA	Entebbe International Airport
GHG	Greenhouse Gas
GKMA	Greater Kampala Metropolitan Area
IWT	Inland Water Transport
KCCA	Kampala City Council Authority
KIS	Kalangala Infrastructure Services
LEAP	Low Emission Analysis Platform
LRT	Light Rail Transit
MoWT	Ministry of Works and Transport
MV	Marine Vessel
NBRB	National Building Review Board
NDCs	Nationally Determined Contributions
NITMP	National Integrated Transport Master Plan
NMT	Non-Motorised Transport
NRSC	National Road Safety Council
PKM	Passenger Kilometers
PSVs	Public Service Vehicles
SEA	Strategic Environmental Assessment
SGR	Standard Gauge Railway
SIP	Strategic Implementation Plan
TBD	To Be Determined
TKM	Tonne Kilometers
TLB	Transport Licensing Board
TOD	Transit Oriented Development
TraCS	The Advancing Transport Climate Strategies
UCAA	Uganda Civil Aviation Authority
UNFCCC	United Nations Framework Convention for Climate Change
UNRA	Uganda National Roads Authority
URA	Uganda Revenue Authority
URC	Uganda Railways Corporation
URF	Uganda Road Fund
VKT	Vehicle Kilometers of Travel

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# 1 INTRODUCTION

The Parties to the United Nations Framework Convention for Climate Change (UNFCCC) agreed upon a new climate agreement in Paris in December 2015<sup>1</sup>. Uganda signed the Paris Agreement on climate change in April 2016 and ratified the same in September 2016. The agreement entails Greenhouse Gas (GHG) mitigation targets, which are stipulated in the respective Nationally Determined Contributions (NDCs) of the Parties, and these are revised every five years. Developing country parties are currently reporting on their emissions and mitigation actions in National Communications and Biennial Update Report (BURs) (soon transitioning to Biennial Transparency Reports) and will continue to report under the Enhanced Transparency Framework<sup>2</sup> of the Paris Agreement from 2020 onwards.

Transport-related emissions are on the rise worldwide, particularly in developing countries and emerging economies. This is because transport plays a significant role in development and is linked to almost all sectors of the economy. The development of effective transport climate strategies rests upon the availability of comprehensive data and the application of sound assessment methods for emission reduction potentials. Unfortunately, many countries (including Uganda) lack comprehensive and readily available transport data for the development of mitigation scenarios to inform robust climate action planning. In most cases, transport emissions are determined with a top-down approach, however, this approach is not detailed enough to inform decision-making and does not account for the use of fuels in other sectors such as electricity generation, construction machines or fishery.

The Advancing Transport Climate Strategies (TraCS) project is funded by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety's International Climate Initiative, and started in June 2016. The project aims to support developing countries in systematically assessing GHG emissions from transport, analysing emission reduction potentials and optimising the sector's contribution to the mitigation targets in countries' NDCs.

TraCS is cooperating with the Climate Change Department (CCD) at the Ministry of Water and Environment in Uganda to develop mitigation scenarios for the country's transport sector. This is in line with the ongoing process of updating the country's Nationally Determined Contribution. To support the achievement of this objective, GIZ and CCD have brought on board a consultant (Ricardo) who will be undertaking a detailed transport mitigation potential analysis. Ricardo will develop an integrated bottom-up scenario based on mitigation activities identified by sectoral experts. This process relies heavily on country-specific data. MEIR has therefore been contracted to assist Ricardo with data collection for the transport mitigation potential analysis. MEIR will support the quantification of the mitigation potential in the transport sector through collection of data and statistics, as well as through stakeholder consultations on future trends and realistic assumptions. This will facilitate the baseline and scenario development process in view of the NDC revision process.

## 1.1 Purpose of the report

MEIR started the collection of transport data in March 2021 when the project commenced. Meetings were held with the climate change department (CCD), Ministry of Water and Environment, the Ministry of Works and Transport (MoWT) among various stake holders that were engaged during the project period. Based on the stakeholder engagements, the readily available data was sourced, analysed and detailed in this report. However, there were several delays and challenges in the more detailed data collection process mainly due to the Covid-19 lock down between June and August 2021. This report serves as a final data collection report that details the following:

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<sup>1</sup> Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104.

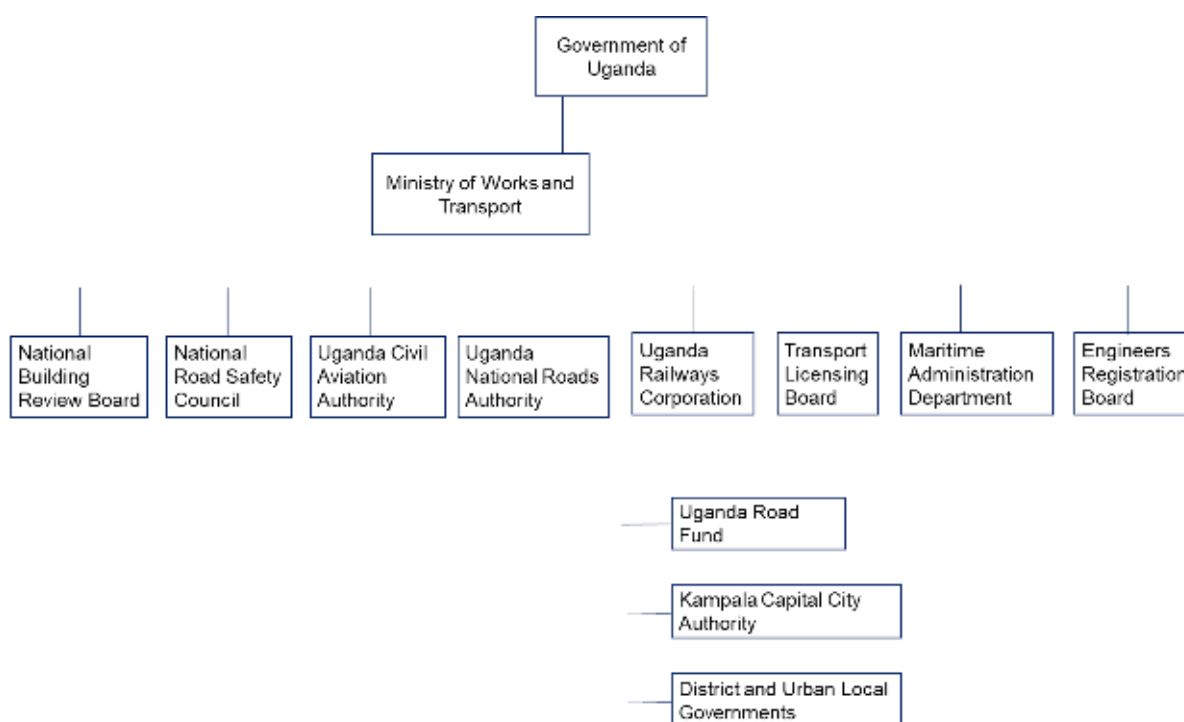
<sup>2</sup> UNFCCC, 2020: Reference Manual for the Enhanced Transparency Framework under the Paris Agreement, <https://unfccc.int/sites/default/files/resource/ETFReferenceManual.pdf>

- a) Overview of the transport sector in Uganda
- b) Process utilised for collection of all transport sector data
- c) Description of the transport sub-sectoral base line data (Road, Railway, In-land water transport, and Aviation)
- d) Expected future trends in the transport sector
- e) Conclusions from the data collection process

The report also provides a summary of the challenges encountered during the project period and the proposed way forward.

## 2 TRANSPORT SECTOR IN UGANDA

The Ministry of Works and Transport (MOWT) is the line ministry responsible for the transport sector in Uganda. As sector head, MOWT is responsible for policy (initiation, formulation, and planning), advisory, legal and regulatory services, implementation (selected projects), management and providing oversight to the sector. MOWT oversees several transport sector agencies including, the Uganda National Roads Authority (UNRA), the Uganda Railways Corporation (URC), the Uganda Civil Aviation Authority (UCAA), the Maritime Administration Department, the Transport Licensing Board (TLB), the National Road Safety Council (NRSC), the National Building Review Board (NBRB) and the Engineers Registration Board. Figure 2-1 summarises the organisation of Uganda's transport sector.



**Figure 2-1: Organisation of Uganda's transport sector**

UNRA is responsible for developing and maintaining the national road network, parts of which serve as transit corridors linking Uganda and its neighbours (i.e. Rwanda, Burundi, South Sudan and Eastern Democratic Republic of Congo (DRC) to the Indian Ocean ports of Mombasa and Dar-es-Salaam. Further, UNRA operates domestic Ro/Pax ferries, which are considered as road bridges in the context of connecting roads at different ends of waterways. District and Community Access Roads are managed by District Local Governments, while urban roads are the responsibility of the urban authorities where the roads are located. The Uganda Road Fund (URF), which is under the Ministry of Finance Planning

and Economic Development manages funding for the maintenance of District, Urban and Community Access Roads (DUCAR) and national roads.

TLB is responsible for regulating and licensing public service vehicles (PSVs) such as buses, minibus taxis (matatus) and commercial motorcycles (boda bodas), while NRSC oversees road safety work in Uganda including planning, coordination, advocacy and resource mobilisation, education, publicity and road safety research, monitoring and evaluation.

URC manages the railway sub-sector in compliance with the Uganda's Railways Corporation Act (1962), which gives the agency the sole mandate to construct, operate and maintain railways and the associated road and marine services in Uganda. In this context, URC operates wagon ferries across Lake Victoria. It is also worth noting that a new agency called the Standard Gauge Railway (SGR) Project has been set up to oversee the implementation of the proposed Standard Gauge Railway.

Apart from UNRA and URC, other Inland Water Transport (IWT) services are provided by the Kalangala Infrastructure Services (KIS), which operates 2 passenger ferries on Lake Victoria (Bukakata – Kalangala) under a private concession. The Nakiwogo–Lutoboka ferry is directly operated by MoWT with a commercial contractor, while the Uganda Wildlife Authority operates vessels on Lake Kyoga, Lake Albert and the River Nile. Recent organizational changes have allocated the responsibility of the IWT sub-sector to the Maritime Administration Department, under the MoWT. This department is responsible for maritime regulation.

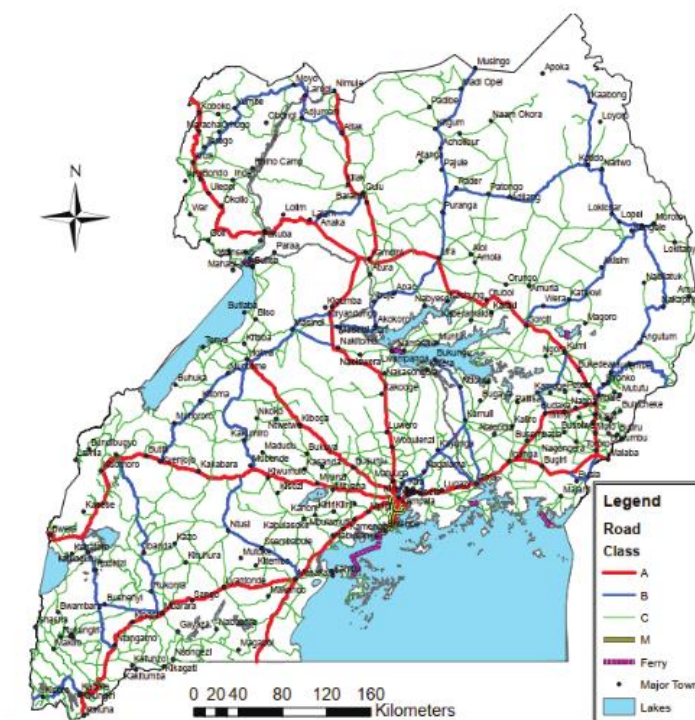
UCAA is the regulator of the aviation industry and is responsible for licensing, monitoring, and regulating civil aviation matters in Uganda, while the Uganda National Airline Company is the country's flag carrier.

## **2.1 Current Situation**

Uganda has a multi-modal transport system composed of road, rail, air and inland water transport, with road transport being the most dominant mode, carrying over 95% of the total traffic (passengers and cargo freight).

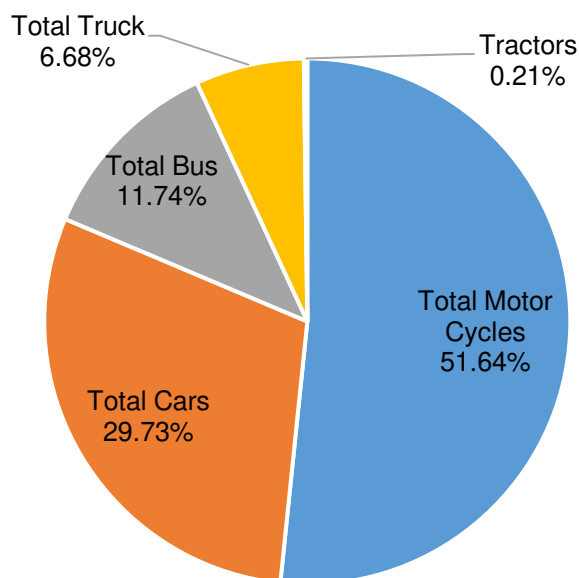
### **2.1.1 Situational Analysis of the Roads Sub-Sector**

The total length of Uganda's road network is 159,520 km composed of 21,010 km of national roads (13%), 38,603 km of district roads (24%), 19,959 km (12%) of urban roads and 79,948 km (51%) of community access roads. The percentage of paved roads is still very low and stands at 25.69% for national roads, 0.28% for district roads and 6.16% for urban roads. No community access road is paved. Overall, less than 5% of the entire road network is paved. Figure 2-2 presents the map of the national road network.



**Figure 2-2:** Map of the national road network (Source: UNRA)<sup>3</sup>

Recent data from the Expressway Development Master Plan Traffic Survey conducted in 2019 shows that road traffic is dominated by motorcycles (51.64%), followed by cars (29.73%), buses (11.74%), trucks (6.68%), and tractors (0.21%) as presented in Figure 2-3.



**Figure 2-3:** Road traffic mode shares (Source: UNRA, 2020)<sup>4</sup>

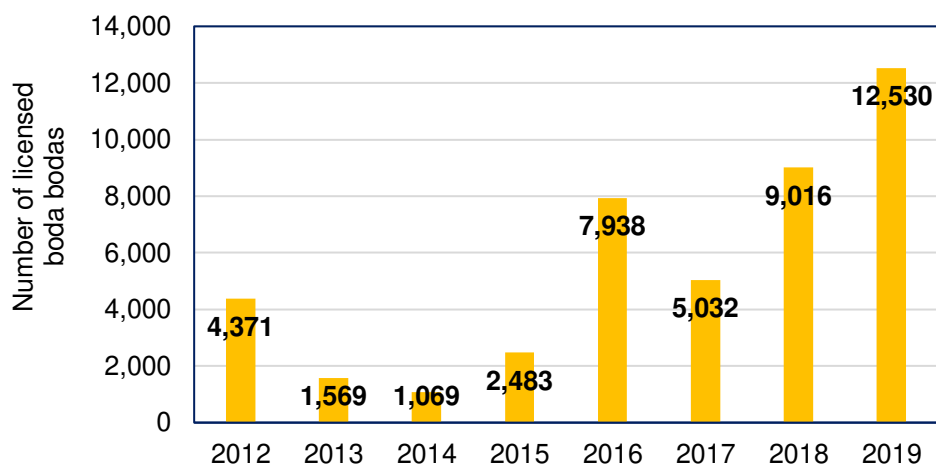
#### a) Motorcycles

<sup>3</sup> UNRA (2020) Annual Performance Report, FY 2019/20

<sup>4</sup> UNRA (2020) Expressway Development Master Plan Traffic Survey Report, released by the Consultant in April 2020



Motorcycles are a major paratransit mode (boda-boda) and a source of employment to the youth in most parts of the country, which explains their dominance in the traffic mix, despite their poor road safety record. Further, the over reliance on motorcycle travel is perpetuated by the poorly developed public transport systems and traffic congestion (specifically in Kampala), which makes most commuters and leisure travelers opt for motorcycles as these are able to maneuver through traffic jam. The number of licensed boda boda's has grown by about 186.7% between 2012 and 2019 as shown in Figure 2-4.



**Figure 2-4:** Number of licensed boda bodas (Source: UBOS)<sup>5</sup>

Despite their dominance, motorcycles are not provided for in the current road layouts and designs. Motorcycles have to share the road space with cars, which increases the accident risk for both riders and passengers (see Figure 2-5). About 31% of the reported accidents in Uganda in 2019 were on motorcycles (UBOS, 2020).



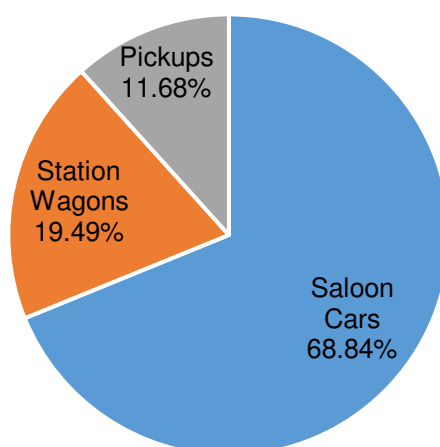
**Figure 2-5:** Boda Bodas and cars sharing road space in Kampala (Source: Nzekwe, 2020)<sup>6</sup>

#### b) Cars

<sup>5</sup> Uganda Bureau of Statistics (UBOS) Statistical Abstracts 2017, 2018, 2019, and 2020, data sourced from MOWT's Transport Licensing Board

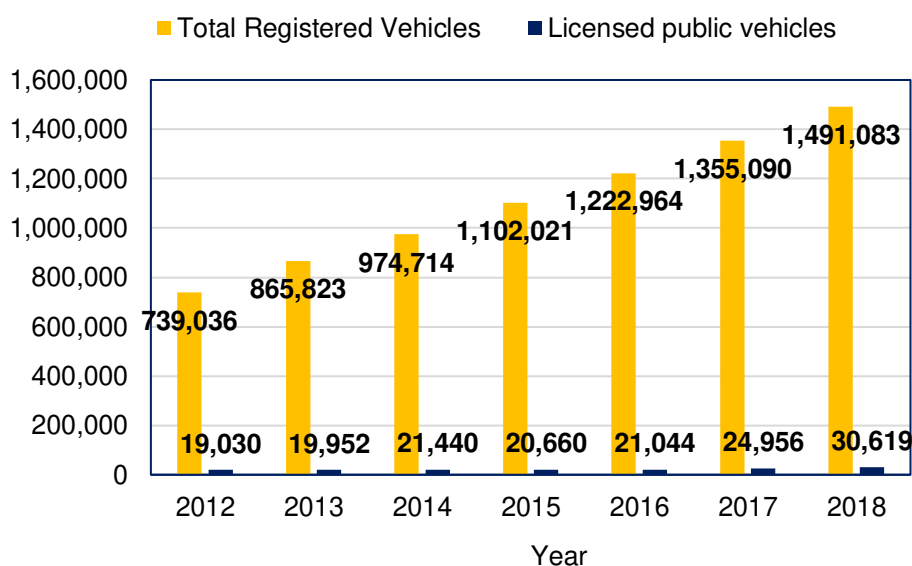
<sup>6</sup> Nzekwe, H (2020) Shock For SafeBoda, Others As Uganda Shifts Goalpost & Chains Bike Transport, <https://weetracker.com/2020/07/28/uganda-boda-boda-ban-within-city/>

Cars are still considered a status symbol by the majority of individuals in developing countries, though, a considerable proportion of individuals and/or businesses consider them a necessity. Figure 2-6 presents the car traffic mix, showing that the majority are saloon cars.



**Figure 2-6:** Car traffic mix (Source: UNRA, 2020)<sup>7</sup>

The persistent growth in private car ownership and usage is compounding the traffic congestion problem, leading to increased delays, air pollution, and loss of productivity. Figure 2-7 presents the trend of the total registered vehicles versus the number of licensed public vehicles showing that majority of the registered vehicles are private cars.



**Figure 2-7:** Trend of vehicle registrations versus licensed public vehicles (Source: UBOS and Draft NITMP Report)<sup>8</sup>

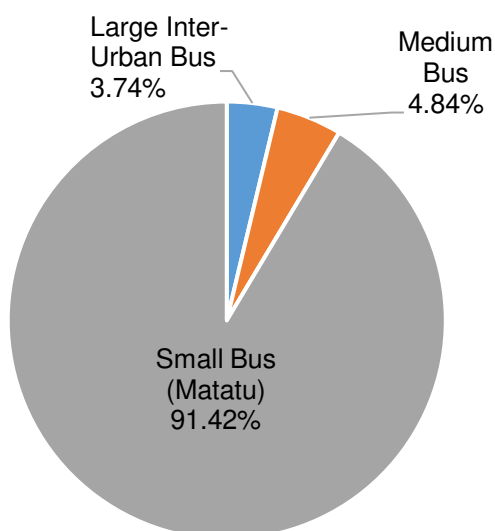
### c) Buses

Buses are largely dominated by 14-seater minibuses, which are known as ‘matatus’, ‘kamunyes’ or ‘taxis’ in Uganda, and these are the main mode of public transport (see Figure 2-8).

<sup>7</sup> UNRA (2020) Expressway Development Master Plan Traffic Survey Report, released by the Consultant in April 2020

<sup>8</sup> Combines data extracted from the Draft National Integrated Master Plan (2021 – 2040) and the UBOS Statistical Abstracts, all sourced from MOWT’s Transport Licensing Board



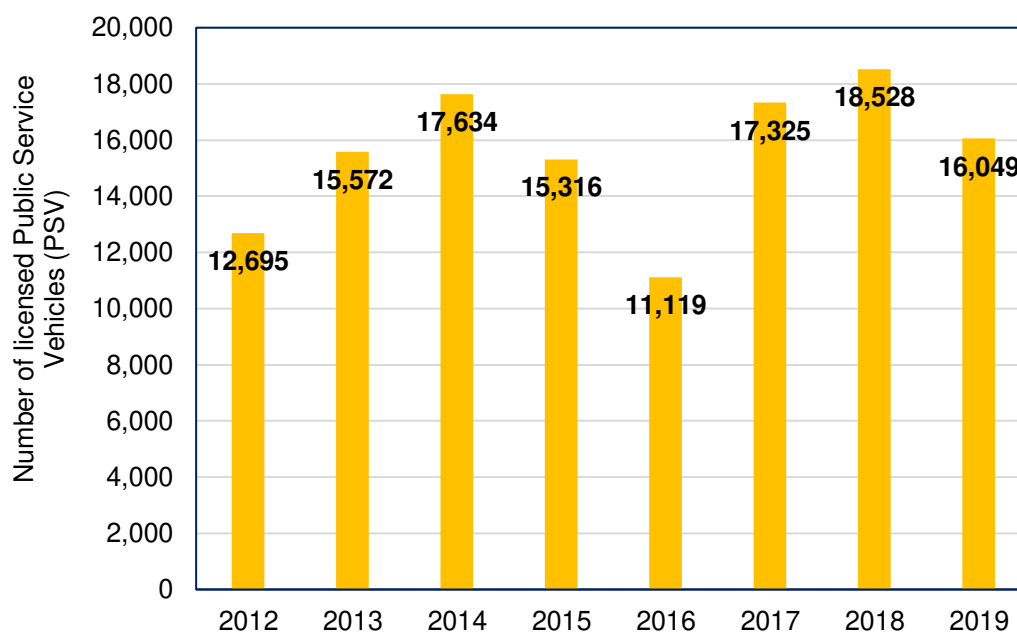


**Figure 2-8: Bus traffic mix (Source: UNRA, 2020)<sup>9</sup>**

Matatus are generally organised into operator associations and are mainly used for urban travel, however, many inter-urban (long-distance) journeys are also made using this mode. The proportion of medium and large buses is rather small, and these are mainly used for inter-urban (long-distance) journeys. Medium and large buses are managed by operator companies, most of which are mid-sized. The dominance of matatus in the Kampala public transport services, the general absence of designated stopping points, and the practice of routing most matatu journeys through city centre taxi parks, are factors compounding congestion, delay and passenger discomfort, thereby discouraging mode shift from private to public transport modes. However, under Vision 2040, there are plans to introduce high capacity mass transport systems such as the Bus Rapid Transit (BRT) system and stage buses in the Greater Kampala Metropolitan Area, which are likely to improve the attractiveness of public transport. Nonetheless, matatus may continue playing a residual role of feeding into the fixed route mass transit systems in a planned and regulated manner.

The number of licensed Public Service Vehicles (PSVs), which mainly fall under the category of buses, has grown by about 26.4% between 2012 and 2019 as shown in Figure 2-9. Although there has been a drop in the number of licensed PSVs between 2018 and 2019, this cannot be considered a trend until the 2020 and 2021 data are obtained.

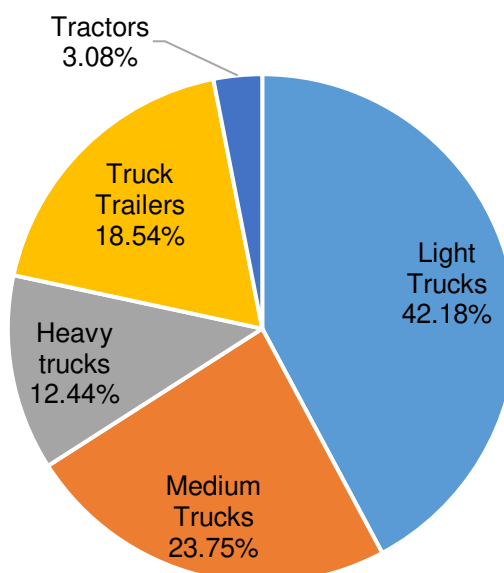
<sup>9</sup> UNRA (2020) Expressway Development Master Plan Traffic Survey Report, released by the Consultant in April 2020



**Figure 2-9:** Number of licensed PSVs (Source: UBOS)<sup>10</sup>

#### d) Trucks and tractors

Trucks are mainly used for cargo transport (i.e. construction materials, agricultural produce, import and export merchandise, oil and petroleum products, industrial raw materials, and minerals etc.), while tractors are mainly used on farms for ploughing and transporting agricultural produce. This category of traffic is dominated by light trucks as shown in Figure 2-10.



**Figure 2-10:** Truck traffic mix (Source: UNRA, 2020)<sup>11</sup>

<sup>10</sup> Uganda Bureau of Statistics (UBOS) Statistical Abstracts 2017, 2018, 2019, and 2020, data sourced from MOWT's Transport Licensing Board

<sup>11</sup> UNRA (2020) Expressway Development Master Plan Traffic Survey Report, released by the Consultant in April 2020

### e) Bicycles

Although bicycles were not counted in the EDMP Traffic Survey, they too have a significant proportion in the traffic mix. However, the provision of cycling facilities is very limited, which discourages cycling. Cycling is known to reduce greenhouse gas emissions. Kampala Capital City Authority (KCCA) recently introduced an NMT corridor in its Central Business District stretching from Namirembe Road to Luwum Street. A cycle lane has also been introduced along Archer Road (see Figure 2-11). Such interventions can be viewed as the start of Kampala's journey towards a cycling-friendly city; however, more work needs to be done to increase the spatial coverage of cycling facilities, both in Kampala and other towns of Uganda. KCCA has a target of increasing the total length of NMT facilities from the current 1.5 Km to 25 Km by the financial year 2024/25 (KCCA, 2020)<sup>12</sup>.



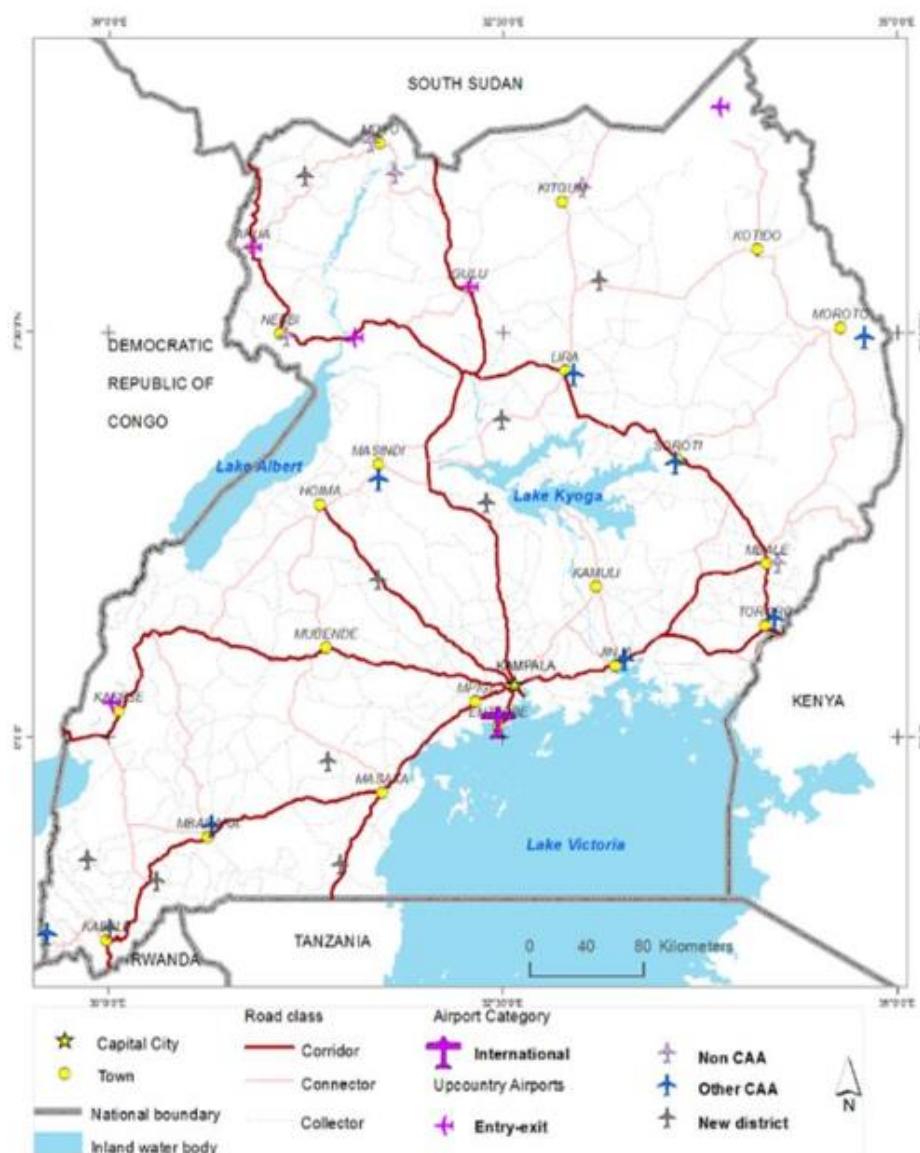
**Figure 2-11:** Cyclists along the Namirembe Road – Luwum Street NMT corridor (L) and a cycle lane along Archer Road in Kampala (R) (Source: KCCA, 2021)<sup>13</sup>

### 2.1.2 Situational Analysis of the Aviation Sub-Sector

There are 33 airports in Uganda. UCAA operates 14 of these, including Entebbe International Airport (EIA), the country's main airport, while the remaining 19 airports are either privately owned, NGO operated or managed by other government agencies and local authorities. The new Kabaale International Airport being constructed in Hoima to support the oil and gas sector is expected to be completed in 2023 and will increase the number of airports from 33 to 34. Figure 2-12 presents the airport locations, while Table 2-1 presents a description of the airports.

<sup>12</sup> KCCA (2020) Kampala Capital City Strategic Plan 2020/21 2024 /25, <https://kcca.go.ug/uDocs/Kampa-City-Strategic-Plan-2020-2025.pdf>

<sup>13</sup> KCCA (2020) Implementing the Non-Motorized Transport Pilot Corridor in Kampala City, Uganda, <https://www.kcca.go.ug/media/docs/IMPLEMENTING%20THE%20NMT%20-%20KAMPALA.pdf>



**Figure 2-12:** Location of airports in Uganda (Source: MOWT, 2020) <sup>14</sup>

**Table 2-1:** Airport descriptions (Source: MEIR's elaboration based on UCAA data)

Name	Operator	Runway length (m)	Runway surface	Operations	Status
Entebbe International Airport	UCAA	3,658 & 2,408	Asphalt	Most aircrafts	Under expansion (planned completion in 2021)
Kabale International Airport		3,500	Asphalt	Most aircrafts	Under construction (planned completion in 2023)
Arua National Airport	UCAA	1,800	Murram	Light and medium sized aircrafts	Upgrading to international status planned

<sup>14</sup> Ministry of Works and Transport (2020) *Draft Interim Report. Phase 2: preparation of the national integrated transport master plan, 2021-2040*

Name	Operator	Runway length (m)	Runway surface	Operations	Status
Gulu National Airport	UCAA	3,100	Asphalt	Most aircrafts	Upgrading to international status planned
Jinja Airfield	UCAA	1500	Murram	Light and medium sized aircrafts	
Kasese National Airport	UCAA	1750	Grass	Light and small aircrafts	Upgrading to international status planned. Masterplan, design and land acquisition completed
Kidepo Airport	UCAA	1500	Murram	Light and small aircrafts	Upgrading to international status planned
Kisoro National Airport	UCAA	1200	Asphalt	Light and small aircrafts	
Lira Airport	UCAA	1000	Murram	Light and small aircrafts	
Masindi Airport	UCAA	2100	Grass	Light and small aircrafts	
Mbarara Airstrip	UCAA	1500	Murram	Light and small aircrafts	
Moroto National Airport	UCAA	1600	Murram	Light and small aircrafts	
Pakuba Airport	UCAA	1760	Murram	Light and medium sized aircrafts	Upgrading to international status planned
Soroti National Airport	UCAA	1860	Asphalt	Light and small aircrafts	
Tororo Airport	UCAA	1500	Murram	Light and small aircrafts	
Adjumani Airfield	Adjumani District Local Government	1100	A	Light and small aircrafts	
Ankole Tea Airstrip	M/S Mc LEOD RUSSEL (U) LTD	925	Grass	Light and small aircrafts	
Bugambe Airfield	M/S Mc LEOD RUSSEL (U) LTD	723	Grass	Light and small aircrafts	
Bugungu Airfield	Uganda Wildlife Authority	1500	Murram	Light and small aircrafts	To be upgraded to a paved runway under the Tilenga Project for Buliisa Upstream Enabling Infrastructure Development
Chobe Airfield	Chobe Safari Lodge Ltd	1550	Murram	Light and small aircrafts	



Name	Operator	Runway length (m)	Runway surface	Operations	Status
Ishasha Airfield	Uganda Wildlife Authority	945	Murram	Light and small aircrafts	
Kaiso Airfield	Uganda Wildlife Authority	1000	Murram	Light and small aircrafts	
Kajjansi Airfield	Mission Aviation Fellowship	1100	Murram	Light and small aircrafts	The busiest domestic airfield
Kakira Airfield	Kakira Sugar Works Ltd	1270	Murram	Light and small aircrafts	
Kalong Airfield	Dr Ambroseli Memorial Hospital-Kalongo	1150	Murram	Light and small aircrafts	
Tilda/Kibimba Airfield	Tilda (U) Ltd	1000	Grass	Light and small aircrafts	
Kihihi Airfield	Savanah Resort Hotel	1800	Murram	Light and small aircrafts	
Kinyara Airfield	Kinyara Sugar Works Ltd	1170	Grass	Light and small aircrafts	
Kisaru Airfield	M/S Mc LEOD RUSSEL (U) LTD	1100	Grass	Light and small aircrafts	
Masika Airfield	CNOOC	1500	Murram	Light and small aircrafts	
Muzizi Airfield	M/S Mc LEOD RUSSEL (U) LTD	790	Grass	Light and small aircrafts	
Mwenge Airfield	M/S Mc LEOD RUSSEL (U) LTD	1100	Grass	Light and small aircrafts	
Mweya Airfield	Uganda Wildlife Authority	1200	Grass	Light and small aircrafts	
Semiliki Airfield	Uganda Wildlife Authority	1300	Murram	Light and small aircrafts	

Entebbe International Airport is the main concentration point of air traffic in Uganda. In 2019, there were 32,798 (90 per day) commercial aircraft landings and 15,900 (44 per day) over flights at Entebbe. In addition to the commercial air traffic, the UN operates a regional base at Entebbe for peace-keeping and humanitarian missions, and there is also a military base for the Ugandan Government, both of which contribute significantly to the air traffic at Entebbe. For example, in 2018, the non-commercial flights accounted for about 21% of the total aircraft landings at Entebbe.

Over the ten-year period from 2009 to 2018, international and domestic commercial aircraft movements at Entebbe International Airport have grown by 48% (from 18,338 to 27,068 movements p.a.) and 62% (from 3,281 to 5,315 movements p.a.), respectively, while international and domestic passengers have grown by 80% (from 929,052 to 1,670,232 passengers p.a.) and 50% (from 17,909 to 26,780 passengers p.a.), respectively, however, domestic air travel is rather limited and only accounts for 11% to 16% of the commercial aircraft movements and 0.9% to 1.9% of the passenger traffic at Entebbe.

Entebbe currently handles 14 international and 10 domestic passenger airlines serving over 30 international destinations (see Table 2-2). Air cargo is also active at the Airport with 6 regular cargo operators covering 10 destinations (see Table 2-3). The ongoing expansion of the passenger terminal

at Entebbe aims for a throughput of 3.5 million passengers per year, while the new cargo centre will bring additional capacity of 100,000 tonnes per year.

**Table 2-2: Passenger airlines operating at Entebbe**  
(Source: MEIR's elaboration covering various online sources)

Airline	Category	Vessels	Destinations
Air Tanzania	International Scheduled	Q400, A220	Dar-es-Salaam, Kilimanjaro
SN Brussels	International Scheduled	A330-200, A330-300	Brussels
Egypt Air	International Scheduled	B737-800	Cairo
Emirates	International Scheduled	B777-300	Dubai - International
Ethiopian Airlines	International Scheduled	B737-800, B787 - 800, A350 – 200	Addis Ababa, Juba
Fly Dubai	International Scheduled	B737-800	Dubai - International
Kenya Airways	International Scheduled	B737 - 800, E190	Nairobi-Jomo Kenyatta, Bangui, Kigali
KLM	International Scheduled	A330-200, A330-300	Amsterdam
Qatar Airways	International Scheduled	B787-800	Doha
Rwanda Air	International Scheduled	Q400	Kigali, Juba, Nairobi-Jomo Kenyatta
Tarco Airlines	International Scheduled	B737-400/500	Juba, Khartoum
Turkish Airlines	International Scheduled	B737-900	Istanbul
Uganda Airlines	International Scheduled	CRJ – 900, A330neo	Bujumbura, Dar-es-Salaam, Juba, Kilimanjaro, Kinshasa-N'diili, London-Heathrow, Mogadishu, Mombasa, Nairobi-Jomo Kenyatta, Zanzibar, Guangzhou, Mumbai
Aerolink	Domestic Non-Scheduled	C208	Bugungu, Chobe, Kasese, Kidepo, Kihiki, Kisoro, Kisumu, Masai Mara, Mweya, Pakuba, Semliki
Eagle Air	International and Domestic Scheduled + Local Charter Flights	Be1900C, L410, C206	Scheduled: Arua, Yei Charter: Apoka, Ishasha, Kasese, Kisoro, Mweya, Pakuba, Semliki, Soroti
United Nations Humanitarian Air Service	International Non-Scheduled		Bunia, Goma, Juba, Kisangani, Lubumbashi

Airline	Category	Vessels	Destinations
Aim Air	Domestic Non-Scheduled	C208, C206	
Air Serv (U) Ltd	Domestic Non-Scheduled	C208, 208B	
Vine Air Ltd	Domestic Non-Scheduled	PA28, C172, C152	
Kampala Aeroclub and Flight Training Centre	Domestic Non-Scheduled	C206, C210, C172	
Mission Aviation Fellowship (MAF)	Domestic Non-Scheduled	C208, C206, C182	
Premier Safaris	Domestic Non-Scheduled	C208, 208B	
Kampala Executive Aviation	Domestic Non-Scheduled	Agusta Bell 412, C206, C172, C208, C210	
Samaritan's Purse	International Non-Scheduled	DC-3, C208	

**Table 2-3: Cargo airlines operating at Entebbe**  
(Source: MEIR's elaboration covering various online sources)

Airline	Category	Vessels	Destinations
Emirates SkyCargo	International Scheduled	B777-300	Dubai - Al Maktoum
Ethiopian Airlines	International Scheduled	B737F	Addis Ababa
Qatar Airways Cargo	International Scheduled	B777F	Brussels, Doha, Nairobi-Jomo Kenyatta
Uganda Air Cargo	International Scheduled	Hercules L382G (C130)	Dubai-International, Frankfurt, Johannesburg–O. R. Tambo
Turkish Cargo	International Scheduled	A330F, B777F	Istanbul–Atatürk, Nairobi–Jomo Kenyatta
United Nations Humanitarian Air Service	International Non-Scheduled		Rome-Fiumicino
Transafrik	International Non-Scheduled	L-382	



Airline	Category	Vessels	Destinations
Kenya Airways	International Scheduled	B737F	Nairobi-Jomo Kenyatta, Bangui, Kigali
DHL Aviation (K) Ltd	International Non-Scheduled	C208	

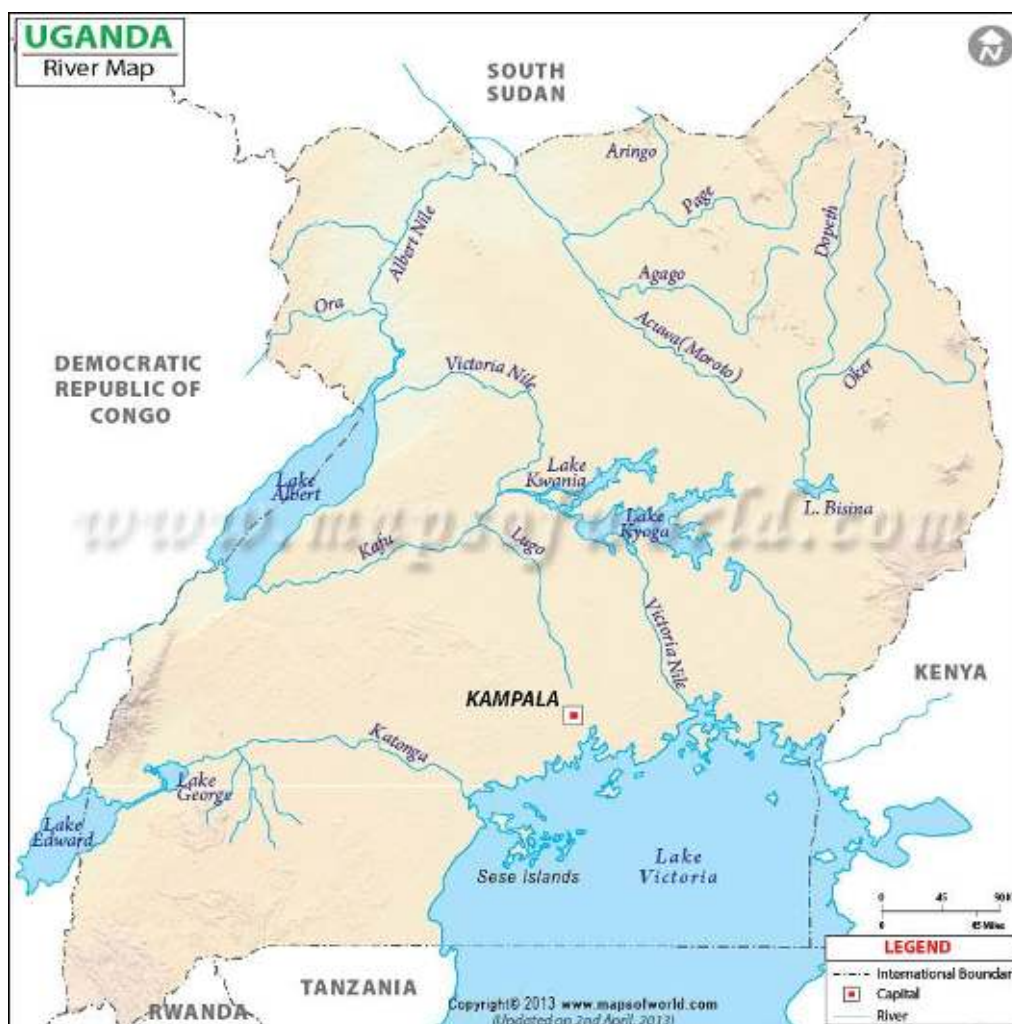
Growth in air traffic has also been registered at the other UCAA operated aerodromes, with the overall aircraft movements growing by 116% (from 3,724 to 8,041 movements p.a.) and passenger traffic growing by 72% (from 18,000 to 31,000 passengers p.a.) between 2008 and 2018.

### 2.1.3 Situational Analysis of the Inland Water Transport Sub-Sector

Uganda is a landlocked country of 241,038 km<sup>2</sup>, of which 15.39% is covered by freshwater bodies (lakes, rivers, and wetlands) as shown in Figure 2-13. The main water bodies with transport activity are Lakes – Victoria, Edward, Albert, George, Kyoga, Wamala, Bunyonyi, and Bisina), and Rivers – Victoria Nile, Albert Nile, and Kazinga Channel. Lakes Victoria, Albert and Edward are shared with neighboring countries, and are sometimes used as import and export trade routes. Table 2-4 summarizes the surface areas and transport activities on Uganda's main water bodies.

**Table 2-4:** Surface area and transport activity on Uganda's main water bodies  
(Source: MEIR's elaboration covering various online sources)

Lake	Surface Area (Km <sup>2</sup> )	Transport activity	
		Ferries	Boats
Lake Victoria	31,000	x	x
Lake Edward	674	x	x
Lake Albert	2,438	x	x
Lake George	250		x
Lake Kyoga	1,720	x	x
Lake Bisina	192	x	x
Lake Wamala	250		x
Lake Bunyonyi	60		x
Victoria Nile		x	x
Albert Nile		x	x
Kazinga Channel			x



**Figure 2-13:** Uganda's main lakes and rivers (Source: Maps of World, 2021)

Inland water travel has remained limited for decades due to poor maintenance of the ferries and the dilapidated crossing points, however, both passenger and cargo ferry services are being revived. There are 18 ferry services in Uganda with the majority being operated by UNRA. Other ferry operators include the Uganda Railways Corporation (URC), Uganda Wildlife Authority (UWA), the Ministry of Works and Transport (MOWT), and private operators such as, Kalangala Infrastructure Services (KIS), and Nation Oil Distributors Ltd.

Inland water freight services between Port Bell and Mwanza/Kisumu were revived in mid-2018 and early 2020, respectively, after about 13 years of no operation, however, there is still limited ferry wagon capacity, with the design capacity being 22 wagons (44 TEU containers). Nonetheless, the proposed transportation of fuel products by tanker barges between Kisumu and Port Bell is an opportunity to reduce reliance on road transport with all the carbon emission and safety considerations, however, the prevention of oil spills into Lake Victoria will be an important future concern. Table 2-5 summarizes the ferry operations in Uganda.

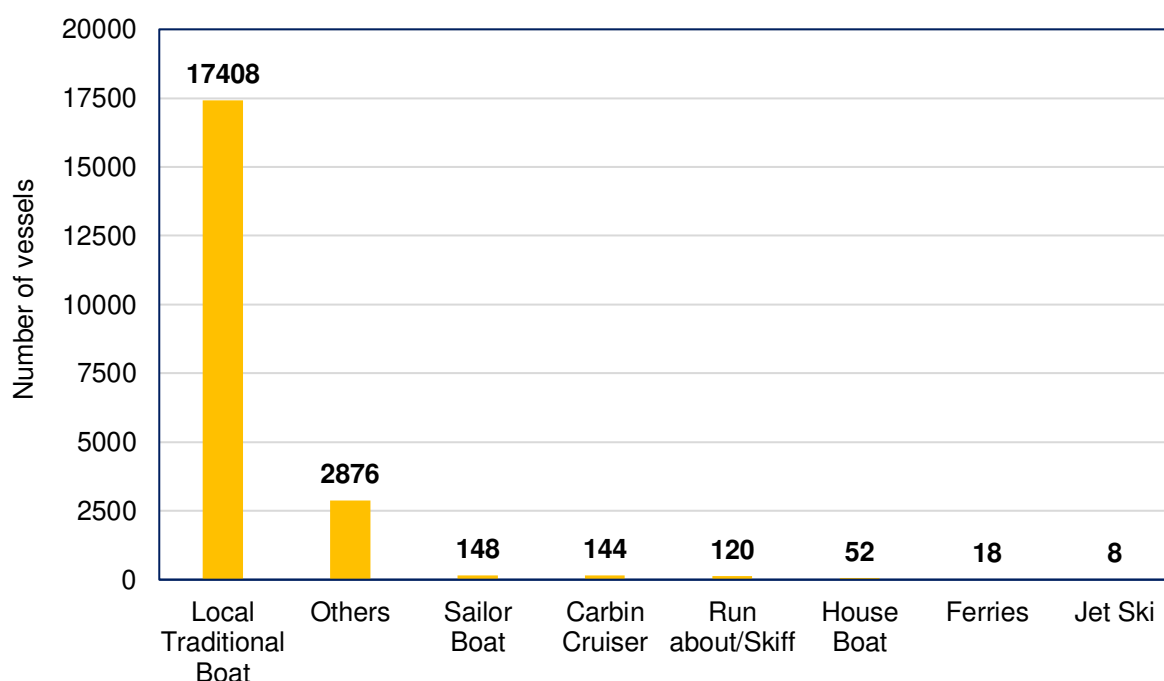
**Table 2-5: Ferry operations in Uganda**  
(Source: MEIR's elaboration covering various online sources)

Water body	Ferries	Operator	Category	Journey type
Lake Victoria	Nakiwogo - Buwaya	UNRA	Ro/PAX Scheduled	Short voyage on fresh water
	Kiyindi - Kirongo (Buvuma)	UNRA	Ro/PAX Scheduled	Short voyage on fresh water
	Sigulu Ferry (Watega - Bumalenge)	UNRA	Ro/PAX Scheduled	Long voyage on fresh water
	MV Kaawa (Port Bell - Mwanza)	URC	Ro Scheduled	Long voyage on fresh water
	MV Umoja (Port Bell - Mwanza)	URC	Ro Scheduled	Long voyage on fresh water
	MV Uhuru (Port Bell - Jinja - Kisumu)	URC	Ro Scheduled	Long voyage on fresh water
	MV Kalangala (Nakiwogo-Lutoboka)	MOWT/Nation Oil Distributors Ltd	Ro/PAX Scheduled	Long voyage on fresh water
	MV Pearl (Bukakata - Bugoma)	KIS	Ro/PAX Scheduled	Short voyage on fresh water
	MV Sese (Bukakata - Bugoma)	KIS	Ro/PAX Scheduled	Short voyage on fresh water
Victoria Nile	Mbulamuti - Nabuganyi	UNRA	Ro/PAX Scheduled	Short voyage on fresh water
	Paraa Ferry (across the river banks)	UWA	Ro/PAX Scheduled	Short voyage on fresh water
Lake Albert	Wanseko - Panyimur	UNRA	Ro/PAX Scheduled	Long voyage on fresh water
Albert Nile	Masindi Port – Kungu	UNRA	Ro/PAX Scheduled	Short voyage on fresh water
	Obongi – Sinyanya	UNRA	Ro/PAX Scheduled	Short voyage on fresh water
	Laropi – Umi	UNRA	Ro/PAX Scheduled	Short voyage on fresh water
Lake Kyoga	Kyoga 1: Zengebe-Namasale	UNRA	Ro/PAX Scheduled	Long voyage on fresh water

Water body	Ferries	Operator	Category	Journey type
	Kyoga 2: Zengebe-Namasale	UNRA	Ro/PAX Scheduled	Long voyage on fresh water
Lake Bisina	Agule – Okokorio	UNRA	Ro/PAX Scheduled	Short voyage on fresh water

In addition to the existing ferry services, there are several proposed new domestic ferries yet to be built by UNRA. These include the Buyende - Kaberamaido and Kagware (BKK) Ferry, the Amuru - Rhino Camp Ferry, the Kasensero Ferries, the Lake Kwanja Ferries, and the Katosi Ferry. Further, a new inland water port is currently being constructed at Bukasa. Mahathi Infra Uganda Limited, a private company, which has invested in the Lake Victoria fuel transport and storage system across Lake Victoria confirms that the jetty and tank farm at Bukasa-Kawuku is near completion. Further, the Uganda National Oil Company (UNOC) is also planning to build a jetty at Jinja to receive fuel for the Jinja Storage Tanks (JST) delivered by Mahathi. These planned developments point to increased ferry activities in the near future.

Data on boat operations in Uganda remains very scanty. However, the MOWT Mitigation Assessment Report for the Transport Sector (MOWT, 2021) estimates the number of boats at 20,756. Figure 2-14 presents the distribution of water vessels in Uganda by type (Note: the number of ferries has been updated from 16 to 18 using data from various online sources).

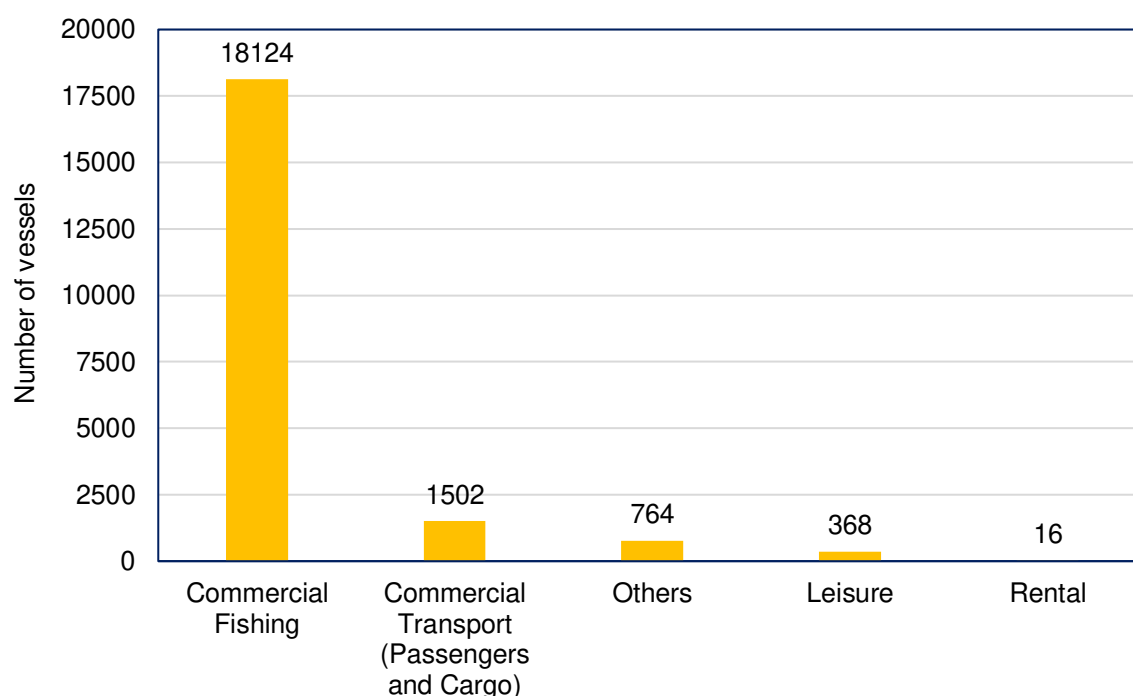


**Figure 2-14: Water vessels by type in Uganda (Source: MOWT, 2021)<sup>15</sup>**

Majority of the water vessels in Uganda are used for commercial fishing, followed by commercial transport (passengers and cargo), leisure, and rental. There is also a significant proportion of vessels

<sup>15</sup> MOWT (2021) Mitigation Assessment Report for Uganda's Transport Sector

used for other purposes that cannot be placed in any of the mentioned categories. Figure 2-15 presents the distribution of water vessels by function (use).



**Figure 2-15: Water vessels by function in Uganda (Source: MOWT, 2021)<sup>16</sup>**

#### 2.1.4 Situational Analysis of the Railway Sub-Sector

Rail transport has remained on a downward trend for several decades. Originally, the total railway length in Uganda was 1,266 Km. By 2006, the active rail section had reduced to 330 Km. The 25-year concession that was given to Rift Valley Railways (RVR) in 2006 was terminated in 2017 due to poor performance. The current active rail section is 269 Km (21% of the network). Figure 2-6 summarizes the status of Uganda's railway network.

**Table 2-6: Status of Uganda's railway network (Source: MOWT, 2021)<sup>17</sup>**

Section	Length (Km)	Category	Status
Malaba - Jinja	159	Mainline	Operational
Jinja - Kampala	92	Mainline	Operational
Jinja - Jinja Pier	4	Branch line	Operational
Tororo - Mbale	55	Mainline	Not Operational
Kampala - Nalukolongo	5	Branch line	Operational
Kampala - Port Bell	9	Branch line	Operational
Mbale - Soroti	106	Main line	Not operational

<sup>16</sup> MOWT (2021) Mitigation Assessment Report for Uganda's Transport Sector

<sup>17</sup> MOWT (2021) Mitigation Assessment Report for Uganda's Transport Sector

Section	Length (Km)	Category	Status
Soroti - Pakwach	346	Main line	Not operational
Nalukolongo - Kasese	330	Main line	Not operational
Branch to Kilembe Mines	4	Branch line	Not operational
Branch to Hima Cement	11	Branch line	Not operational
Busoga loop	145	Branch line	Not operational
Total (operational)	269 Km		
Total (not operational)	997 Km		
Total (overall)	1266 Km		

The active rail sections have remained operating below capacity due to the poor state of locomotives, theft of track materials and the poor state of real estate properties. In the ten-year period between 2008 to 2018, the rail cargo tonne-kms had reduced by 72% (see Table 2-7), with the affected cargo mainly being oils and liquids. Along the main cargo route (the Malaba – Kampala corridor), the cargo share by rail was 10.8% in 2015 and this had reduced to 4% in 2017. Although a slight increase in cargo transport demand was registered in 2019, this cannot be considered as a trend until we obtain the 2020 and 2021 data.

**Table 2-7: Evolution of railway cargo traffic (Source: MOWT, 2020) <sup>18</sup>**

Year	Number of Trains	Tonnes (,000)	Tonne-Km (in millions)
2019	2.263	169.3	77.54
2018	2.631	112.8	38.05
2017	3.043	355.3	70.05
2016	5.102	368.9	125.6
2015	3.792	818.5	166.17
2014	4.474	682.8	136.42
FY 2012/13	N/A	686.6	154.2
FY 2010/11	N/A	675.5	153.5
FY 2009/10	N/A	542.1	124.6
FY 2008/09	N/A	588.1	134.4

Similarly, rail passenger services have not been in operation for several decades and were revived in 2015 along the Kampala – Namanve route only as a Public Service Obligation. This passenger service has four daily scheduled trains and is operated by one locomotive and five coaches with sitting and standing capacity of 120 – 150 people per coach. By 2018, significant growth in rail ridership had been registered along the route and plans are underway to expand the rail passenger service to Bujjuko, Mukono and other parts of the Greater Kampala Metropolitan Area. Further, the government plans to build a Light Rail Transit (LRT) system radiating from Kampala to Namanve, Kawempe (Tula), Kibuye, Kajjansi, Kyengera.

<sup>18</sup> Ministry of Works and Transport (2020) *Draft Interim Report. Phase 2: preparation of the national integrated transport master plan, 2021-2040*



The railway sub-sector is set to undergo upgrading from the Metre Gauge Rail (MGR) to the Standard Gauge Rail (SGR). The total SGR length is 1,724 Km, and will be developed in a phased manner starting with the Eastern Route: Malaba – Kampala, followed by the Northern Route: Tororo – Gulu – Nimule/Gulu – Pakwach – Goli, and the Western Route: Kampala – Bihanga – Kasese – Mpondwe/Bihanga – Mirama Hills (see Figure 2-16). Currently, the Eastern Route is in the preliminary stages of development, i.e. land acquisition, capacity building and mobilisation of funding.



**Figure 2-16:** Coverage of the proposed SGR network (Source: SGR project, 2014)<sup>19</sup>

The SGR will allow for higher operational speeds (i.e. 120 Km/hr for passengers and 100 Km/hr for cargo) and harmony with regional railways. The SGR is expected to use electric locomotives. A separate unit called the Standard Gauge Railway (SGR) Project has been set up under MOWT/URC.

## 2.2 Transport Policy Review

In Uganda there are several strategies, policies and regulations which pertain to the transport sector and these include:

- Uganda National Climate Change Policy<sup>20</sup>
- Third National Development Plan<sup>21</sup>
- National Transport Master Plan (2008 – 2023)<sup>22</sup>
- The Draft National Integrated Transport Master Plan (2021 – 2040)<sup>23</sup> – Although this is not yet a policy document, it contains important information for this assignment

<sup>19</sup> SGR Project (2014) SGR Routes (Uganda), <https://www.sgr.go.ug/sgr-routes>

<sup>20</sup> MoWE, (2015) Uganda National Climate Change Policy, <https://www.mwe.go.ug/sites/default/files/library/National%20Climate%20Change%20Policy%20April%202015%20final.pdf>

<sup>21</sup> NPA (2020) Third National Development Plan (NDP) 2020/21 – 2024/25, [http://www.npa.go.ug/wp-content/uploads/2020/08/NDPIII-Finale\\_Compressed.pdf](http://www.npa.go.ug/wp-content/uploads/2020/08/NDPIII-Finale_Compressed.pdf)

<sup>22</sup> MoWT, (2009) National Transport Master Plan Including a Transport Master Plan for the Greater Kampala Metropolitan Area (NTMP/GKMA), <https://works.go.ug/wp-content/uploads/2015/08/National-Transport-Master-Plan-2008-2023.pdf>

<sup>23</sup> Ministry of Works and Transport (2020) *Draft Interim Report. Phase 2: preparation of the national integrated transport master plan, 2021-2040*

- Nationally Determined Contribution<sup>24</sup>
- Climate Change Risk Management and Adaptation Strategy (CRMAS) for the Transport sector<sup>25</sup>
- Multi-Modal Urban Transport Master Plan for Greater Kampala Metropolitan Area (GKMA)<sup>26</sup>
- Kampala Capital City Strategic Plan 2020/21 to 2024/25<sup>27</sup>
- Non-Motorized Transport Policy<sup>28</sup>
- Various regulatory initiatives such as:
  - Code of Practice for Inspection & Testing of used Motor Vehicles for Road worthiness, 2017
  - Traffic & Road Safety (Motor Vehicle Inspection) Regulations, 2017
  - Draft National Environment (Air Quality Control) Regulations

The Vision 2040 was also reviewed, but the contents of this report are discussed further in section 8 (Expected future trends in the transport sector).

These policies have been reviewed to determine what activities are occurring and what is being planned for the transport sector. This information can inform the scenarios and the mitigation actions.

### 2.2.1 Uganda National Climate Change Policy

Uganda developed a National Climate Change Policy<sup>29</sup> to ensure that all stakeholders address climate change impacts and their causes through appropriate measures while promoting sustainable development and a green economy. To achieve this overarching objective, the policy builds on a number of more specific objectives:

- To identify and promote common policy priorities to address climate change in Uganda.
- To identify and promote adaptation policy responses for Uganda.
- To identify and promote mitigation policy responses for Uganda.
- To identify and promote monitoring, detection, attribution and prediction policy responses for Uganda.
- To support the integration of climate change issues into planning, decision making and investments in all sectors and trans-sectoral themes through appropriate institutional arrangements and legal framework; and
- To facilitate the mobilisation of financial resources to address climate change in Uganda.

The policy acknowledges that the transport sector is a key production sector that is impacted by climate change. It includes an adaptation priority to develop and ensure integrated planning and management of transport infrastructure that builds on insights from climate predictions. Transport is also highlighted as an important sector in terms of mitigation. The Climate Change Policy mentions three transport mitigation priorities, namely:

- Promote the development, approval and effective implementation of a long-term national transport policy and plan that will take GHG mitigation concerns into account.
- Effect a gradual shift to the use of less carbon-intensive fuels (including compressed natural gas, ethanol and LPG) in vehicles instead of relying heavily on gasoline and diesel fuels; and

<sup>24</sup> MoWE (2015) Uganda's Intended Nationally Determined Contribution (INDC), <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Uganda%20First/INDC%20Uganda%20final%20%2014%20October%20%202015.pdf>

<sup>25</sup> MoWT, (2012) Climate Change Risk Management and Adaptation Strategy (CRMAS) for the Transport Sector.

<sup>26</sup> KCCA (2018) Multi-Modal Urban Transport Master Plan for Greater Kampala Metropolitan Area (GKMA), Draft Final Report.

<sup>27</sup> KCCA (2020) Kampala Capital City Strategic Plan 2020/21 to 2024/25, <https://kcca.go.ug/uDocs/Kampa-City-Strategic-Plan-2020-2025.pdf>

<sup>28</sup> MoWT (2012) Draft Non-Motorized Transport Policy.

<sup>29</sup> MoWE (2015) Uganda National Climate Change Policy



- Promote modes of transport that take into account GHG emission reduction.

Specific strategies identified for tackling these sectoral policy priorities are:

- Improve road infrastructure, and traffic management in urban centres to reduce traffic congestion and GHG emissions.
- Promote and encourage reduction of greenhouse emissions from the transport sector.
- Promote private-sector investment in the biofuel industry, covering the whole biofuel chain from cultivation to fuel processing; and
- Establish national standards for emissions and implement strict vehicular emissions standards in tandem with measures to gradually phase out old, inefficient motor vehicles, while encouraging the importation of efficient ones.

Specific details or targets are not provided as this is a more overarching policy, but it at least acknowledges transport as an important sector in Uganda's GHG emissions and understands that actions need to be taken in order to address this issue.

## 2.2.2 Third National Development Plan

The Third National Development Plan<sup>30</sup> first highlights the transport achievements since the last NDP, which include an increase in paved roads, an increase in dual carriageway roads, and reduced travel times. It outlines the core development objectives for Uganda for the period 2021 to 2025 and the objectives that are specifically related to transport are outlined in Table 2-8.

**Table 2-8: Objectives from the NDP III that are related to the transport sector**

Objective	Description
Objective 1: Optimize transport infrastructure and services investment across modes	Implement an integrated multi-modal transportation hub (air, rail, road, water etc.).
	Construct and upgrade strategic transport infrastructure (tourism, oil, minerals and agriculture).
	Increase capacity of existing transport infrastructure and services.
	Implement the mass rapid transport system (Light Rail Transport, LRT), Bus Rapid Transit (BRT)/Mass Bus Transport (MBT) and cable cars).
	Provide Non-Motorized Transport (NMT) infrastructure within urban areas.
	Rationalize development partners and government financing conditions.
Objective 2: Prioritize transport asset management	Rehabilitate and maintain transport infrastructure.
	Enforce loading limits.
	Adopt cost-efficient technologies to reduce maintenance backlog.
	Develop local construction hire pools.
Objective 3: Promote integrated land use and transport planning	Acquire infrastructure/ utility corridors.
	Develop and strengthen transport planning.
	Develop the National Transport Master Plan aligned to the National Physical Development Plan.
	Develop Transit-Oriented developments along transport infrastructure corridors (such as roadside stations).
Objective 4: Reduce the cost of transport infrastructure and services	Implement cost-efficient technologies for provision of transport infrastructure and services.
	Strengthen local construction capacity (industries, construction companies, access to finance, human resource etc.)
	Promote Research, Development and Innovation.

<sup>30</sup> NPA (2020) Third National Development Plan (NDP) 2020/21 – 2024/25

Objective	Description
Objective 5: Strengthen and harmonize policy, legal, regulatory and institutional framework for infrastructure and services	Review, update and develop transport infrastructure and services policies, regulations and standards and laws.
	Enforce relevant transport infrastructure and services policy, legal, regulatory and institutional frameworks.
	Streamline governance and coordination of transport infrastructure and services.
	Monitor and evaluate transport infrastructure and services policy, legal and regulatory framework.
Objective 6: Increase transport interconnectivity in the eastern region to promote intra-regional trade and reduce poverty	Upgrade transport infrastructure around Lake Kyoga to facilitate connections across the Lake (linking Nakasongola, Lango, Teso and Busoga through tarmacking of roads around the lake and introduction of ferry services on the lake).
	Rehabilitate of the meter-gauge railway (including Jinja/ Bukakata to Bukasa inland port).
	Upgrade transport infrastructure particularly in the Karamoja area to promote mineral exploitation and industrialization in that area".

The updated NDP identifies 18 programmes that have been designed to deliver the required results. These programmes incorporate the country's commitments to regional and international development frameworks and cross cutting issues. The corresponding human resource requirements for each programme has also been outlined. One of these programmes is the Integrated Transport Infrastructure and Services Programme. This aims to have a seamless, safe, inclusive and sustainable multi-modal transport system. Key expected results include;

- Reducing the average travel time;
- Reducing freight transportation costs;
- Increasing the stock of transport infrastructure;
- Increasing the average infrastructure life span and
- Reducing fatality and casualties from transport accidents.

The core projects outlined under this programme are;

- Regional trade roads;
  - Rakai-Isingiro-Kafunjo-Kikagati (135kms);
  - Koboko-Yumbe-Moyo (105kms);
  - Nabumali Corner-Butaleja-Namutumba;
  - Rukungiri-Ishasha-Ruthuru;
  - Rwebisengo-Budiba-Bunia Road (including bridge across River Semmuliki);
- Community Roads Improvement Project (Total 7,905kms);
- Rehabilitation of the Meter Gauge Railway (Relieving Road transport of cargo transportation);
- Kampala-Jinja Express Highway;
- Kibuye-Busega Express Highway (city decongestion);
- Busega-Mpigi Expressway (city decongestion);
- Kampala Flyover Construction and Road Upgrading Project (city decongestion);
- Iganga-Bulopa/Buwenge-Kaliro/Bugembe-Kakira-Bulongo;
- Rwenkuny- Apac-Lira (regional interconnectivity);
- Bukasa Inland Port (Inland Water transport to connect the country to Kisumu and Mwanza ports through Victoria);
- Bridge Project (including Karuma, Laropi, Mpondwe and Semliki Bridges, among others to promote connectivity across the country); and
- Improvement of Ferry Services Project (improvement of water transport services).

**Some of the key results to be achieved over the next 5 years are provided in Table 2-9.**

**Table 2-9:** Some key results to be achieved in the transport sector in the next 5 years  
(Source: NPA, 2020)<sup>31</sup>

Key result	Description	Baseline	2024/25
Reduce average travel time (min per km)	Within GKMA	4.1	3.5
	Within other cities	NA	2.0
	National roads	1.1	1.0
	District roads	1.0	1.0
	Inland water transport (MW to PB in hrs)	18hrs	12hrs
	Passenger rail services	0.75	0.5
	Freight rail services (Mombasa to K'la in days)	19	10
Increase stock of transport infrastructure	Kms paved national roads	4971	7500
	Kms paved urban roads	1248	1748
	Permanent way/railway road	262	462
	Construction of Roll-on Roll-off vessels (international)	5	7
	Construction of domestic passenger ferries	10	15
	Ferry crossings	9	13

In addition to these key activities there are a few other points which should be mentioned as they could have relevance for scenario and mitigation action developments. These are;

- In Uganda, over 80 percent of people use walking and cycling as the most sustainable mode of transport. As such, the non-motorized mode of transport should be promoted and given priority over motorized modes in order to discourage the use of private cars. Currently Uganda has insufficient investment and regulation of NMT thus accounting for high levels of congestion and road accidents. NMT infrastructure within urban areas should be provided in future.
- The country has only one operational International Airport, Entebbe which is currently being expanded and upgraded to accommodate the increasing demand of passenger and cargo traffic. Additionally, government is constructing a new international airport at Kabaale in Hoima district. In regard to regional and local transport, Government intends to develop five regional aerodromes (i.e. Arua, Gulu, Pakuba, Kidepo and Kasese) to promote trade and tourism.
- There is a plan for an integrated multi-modal transportation hub (air, rail, road, water), an inclusive mass rapid transport system (Light Rail Transport (LRT), BRT/Mass Bus Transport (MBT) and cable cars), enforcement of loading limits and rehabilitation, upgrade and extension of the meter-gauge railway. These activities are highlighted in more detail in the KCCA Multi-Modal Urban Transport Master Plan<sup>32</sup> (see section 2.2.6).

<sup>31</sup> NPA (2020) Third National Development Plan (NDP) 2020/21 – 2024/25

<sup>32</sup> KCCA (2018) Multi-Modal Urban Transport Master Plan for Greater Kampala Metropolitan Area (GKMA), Draft Final Report

- The NDP also mentions the existing Kenya oil pipeline from Mombasa to Eldoret which is now to be extended to Kampala and should capture much of the oil import traffic from road and rail. The costs of importing oil will be reduced and many heavy trucks will be removed from the road with beneficial effects in terms of congestion, vehicle overloading and pollution, on the other hand, the railway will lose some of its potential traffic base.

### 2.2.3 National Transport Master Plan

The National Transport Master Plan<sup>33</sup>, including a Transport Master Plan for Greater Kampala Metropolitan Area (NTMP/GKMA), sets out a framework for development of the transport sector between 2008 and 2023. In addition, it addresses wide-ranging topics such as institutional, legal, and financial issues, policy and strategy, environment and land use-related issues, stakeholder information and participation, and capacity-building for the Greater Kampala Metropolitan Area and other regions. It reflects the key role that transport plays in facilitating economic and social development.

The key objectives of NTMP/ GKMA include the following;

- To provide a long-term multi-modal reference framework within which consistent plans for individual modes can be developed;
- To serve as a key input to the overall national planning process spearheaded by the National Planning Authority (NPA);
- To serve also as a key input to regional transport planning at the East African Community, COMESA and African Union levels;
- To create a framework within which well-informed investment decisions can be made by both the public and private sectors; and
- To establish a permanent high-quality long-term transport planning capability within MoWT, equipped to monitor Plan performance, periodically update the Plan, and prepare subsequent Plans.

The Transport Master Plan for GKMA comprises four main elements, namely;

- Reorganisation of GKMA transport planning under a single authority;
- Adoption of the transit-oriented development (TOD) concept for long-term development and integration of transport and land use planning;
- Reorganisation and restructuring of the public transport services and fleet;
- Improvement to the existing road network to improve traffic flow and safety.

The NTMP/GKMA Transport Master Plan also provides insights into a longer term plan, i.e. activities to extend beyond 2023, and these are discussed in section 2.3.

The Transport Sector Working Group identified the need for a Strategic Implementation Plan (SIP) to guide the implementation of the NTMP/GKMA. The aim of the SIP<sup>34</sup> is to update the NTMP/GKMA with new initiatives that arose since 2008. The updated Plan aligns with the national development objectives contained in Vision 2040 and supporting policies. The SIP focuses on transport infrastructure, as opposed to transportation services. It uses a model to prioritise the activities and the SIP provides a detailed list of prioritised projects (planned or committed), timelines and costs should this level of detail be required.

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<sup>33</sup> MoWT (2009) National Transport Master Plan Including a Transport Master Plan for the Greater Kampala Metropolitan Area (NTMP/GKMA)

<sup>34</sup> MoWT (2015) A Detailed Strategic Implementation Plan for the National Transport Master Plan including the Greater Kampala Metropolitan Area 2015-2023, [http://works.go.ug/wp-content/uploads/2015/09/SIP-July-2015\\_combined-Final-1.pdf](http://works.go.ug/wp-content/uploads/2015/09/SIP-July-2015_combined-Final-1.pdf)

## 2.2.4 The Draft National Integrated Transport Master Plan (2021 – 2040)

The National Integrated Transport Master Plan (2021 – 2040)<sup>35</sup> is currently under development. This is happening in a phased approach and phase 1 has been completed, while phase 2 is underway. Phase 1 was a mid-term review of sector performance against the National Transport Master Plan including the Master Plan for Greater Kampala Metropolitan Area (NTMP/GKMA) (2008-2023). Phase 2 has three results, namely (a) preparation of an intermodal/multimodal transport strategy for Uganda (2021-2040), (b) setting up of a functional planning office at the MoWT, and (c) mainstreaming Strategic Environmental Assessment (SEA) in the MoWT's planning system. An interim report for phase 2 includes:

- A detailed collection of existing secondary data and primary data;
- A full situation analysis of the transport sector in Uganda;
- Development of a transport planning model as the main tool to assess future scenarios;
- A detailed multi-criterion assessment (MCA) methodology and procedures for assessing alternative transport scenarios, programmes and projects, taking as references Vision 2040, the National Development Plan, and transport policies in determining the transport sector's objectives.

The final output will be the National Integrated Transport Master Plan (2021-2040).

The interim report provides some short term and long-term recommendations for each of the transport subsectors, and these include, but are not limited to:

- Road transport:
  - Prioritize the maximum use of existing road assets through the promotion of higher capacity vehicles and modes LRT, BRT, high-capacity vessels, rail, buses, and non-motorized transport.
  - Introduce a plan to phase out low-capacity minibuses and boda bodas. Future opportunities for the informal transport systems and low-capacity systems such as motorcycle boda bodas and minibuses (Matutus) in developing cities is limited. These need to be replaced by sustainable and efficient urban transport systems.
- Rail transport:
  - Freight rail main corridors – prioritize the east corridor from Kampala to the Kenya border. As Uganda is a landlocked country (LLDCs) it is vital for import/exports by sea and transited through Kenya. This route is already a major transport service network, and by far the busiest in the country and the only one where an indisputable market for rail transport exists for freight. There is potential for passenger services too. The corridor Tororo-Mbale-Lira-Gulu is second in importance regarding international freight.
  - Passenger rail - the NITMP should include the development of commuter services within the GKMA in the short term and that it provides an integrated vision of mass transport including LRT and commuter trains.
- In-land water transport:
  - The Bukasa Port project envisions having a significant transformation on multimodal transport for Uganda but is dependent on connectivity being enhanced with regional development of complementary infrastructure.
  - The multimodal freight service between Port Bell and Mwanza was revived in mid 2018 after about 13 years and re-opens the Central Corridor

<sup>35</sup> MoWT, 2020: Interim Report: Phase 2: Preparation of the National Integrated Transport Master Plan, 2021-2040.

- The proposed fuel transportation by tanker barges on Lake Victoria is an opportunity to reduce reliance on road tankers with all the safety and carbon emission considerations
- Facilitate the deployment of more cargo vessels on Lake Victoria. Besides the planned rehabilitation of MV Pamba, there is a need for at least four more vessels of no less than 2,000-tonne capacity within the next five years in order to support the projections of traffic through Bukasa Port via the Central Corridor and Northern Corridor.

### 2.2.5 Intended Nationally Determined Contribution

In Uganda's Intended Nationally Determined Contribution<sup>36</sup> submitted in 2015, transport mitigation activities are not listed under the priority activities, however, the following two activities are listed under the additional mitigation actions (which are contingent on receiving support);

- Development and implementation of a long-term transport policy accounting for climate change mitigation concerns; and
- Development and implementation of policies and regulations to promote cleaner fuels, and more fuel-efficient vehicle technology. It indicates that national fuel efficiency could have the emissions reduction potential of 24–34% by 2030 compared to business as usual.

### 2.2.6 Climate Change Risk Management and Adaptation Strategy (CRMAS) for the Transport sector

The Climate Change Risk Management and Adaptation Strategy (CRMAS) for the Transport Sector<sup>37</sup> reports that climate change is already impacting the transport sector. The impacts on the sector have been and continue to be realized through floods which have washed away roads, bridges, and submerged railway lines in some parts of the country. The landslides in mountainous areas, fluctuating water levels, and the frequent strikes of lightening have all affected the sector in one way or another. Heavy rainfall and storms have had a great impact on air transport in Uganda as well.

It highlights that mitigation of GHG emissions in the transport sector is crucial to limit climate change, and longer-term mitigation measures are called for to maximize development outcomes. In addition to mitigation, the strategy highlights the importance of adaptation actions in the transport sector. The adaptation actions are not discussed here as mitigation is the focus of this report.

The strategy indicates that Uganda will implement several mitigation strategies to achieve its climate change response objective and these include;

- Prioritization of mitigation interventions that significantly contribute to the peak, plateau and decline in the emission trajectory where greenhouse gas emissions peak in 2020 to 2025 at 34% and 42% respectively below a business as usual baseline, plateau to 2035 and begin declining in absolute terms from 2036 onwards, in particular, interventions within the energy, transport and industrial sectors. These include promoting mass transport; and banning of motor vehicles older than 12 years; and encouraging walking and cycling;
- Mainstreaming of climate change response into all national, regional and local planning regimes for the road sector; and
- The use of incentives and disincentives, including through regulation and the use of economic and fiscal measures to promote behavioural change that would support the transition to a low carbon society and economy.

<sup>36</sup> MoWE (2015) Uganda's Intended Nationally Determined Contribution (INDC)

<sup>37</sup> MoWT (2012) Climate Change Risk Management and Adaptation Strategy (CRMAS) for the Transport Sector



The strategy identifies several critical needs in the roads and aviation subsectors, including:

- Road transport:
  - Exploring of alternative energy sources;
  - Promotion of public transport (mass transport e.g. buses, trains); and
  - Emission control through legislation, car importation policies, and enforcement of laws and policies.
- Air transport:
  - Use of newer aircrafts;
  - Use of cleaner fuels;
  - Established Carbon sinks; and
  - Ensuring an average load factor (passengers) of at least 80%.

As with most of the strategies and plans, no specific targets are provided.

## 2.2.7 Multi-Modal Urban Transport Master Plan for Greater Kampala Metropolitan Area (GKMA)

The Multi-Modal Urban Transport Master Plan for GKMA<sup>38</sup> provides detailed information on the plans for the transport sector in Kampala between now and 2040. The plan identifies the following activities;

- Improvement of Metro infrastructure;
- Implementation of the Light Rail Transport (LRT) system and infrastructure.
- Implementation of the Bus Rapid Transit (BRT) system and infrastructure;
- Development of cable car infrastructure; and
- Several other soft measures such as matatu and bus fleet renewal, NMT promotion, and traffic management.

The detailed expected roll out of these activities is provided in Table 2-10.

**Table 2-10: Proposed rollout of the MRT system in Kampala**

	Stations	Length (Km)	Cost (MUSD)	PILOT (2018-2021)	SHORT (2022-2025)	MID (2026-2030)	LONG (31-35)	HORIZON (36-40)
<b>Commuter Passenger Rail</b>								
Redevelopment & Extension of GKMA Passenger Rail		53	745		Design and Build	Design and Build	Operation	Operation
<b>Metro Infrastructure</b>								
Metro-Kololo CBD/Nansana	12	12.8	1,076	Design	Build	Operation	Operation	Operation
Metro-Namanve/CBD	7	12.9	1,008		Design	Build	Operation	Operation
Metro-CBD/Queensway	3	2.3	206			Design	Build	Operation
Metro-Queensway/Kajjansi	7	9.5	770				Design	Build
<b>LRT Infrastructure</b>								
LRT-Kira/Gaba	47	23.5	517		Design	Build	Operation	Operation
LRT-East Ring	40	19.6	432				Design	Build
LRT-Completion of Ring	71	35.3	777				Design	Build

<sup>38</sup> KCCA (2018) Multi-Modal Urban Transport Master Plan for Greater Kampala Metropolitan Area (GKMA), Draft Final Report

	Stations	Length (Km)	Cost (MUSD)	PILOT (2018-2021)	SHORT (2022-2025)	MID (2026-2030)	LONG (31-35)	HORIZON (36-40)
<b>BRT Infrastructure</b>								
BRT-Pilot		22	330		Design + Build	Operation	Operation	Operation
Dualization of BRT corridor		22	330			Design+Build	Operation	Operation
BRT-Entebbe extension		31.6	474			Design + Build	Operation	Operation
BRT-Masaka extension		18.2	273			Design + Build	Operation	Operation
BRT-Bombo extension		5.6	84			Design + Build	Operation	Operation
BRT-Gayaza extension		5.2	78			Design + Build	Operation	Operation
BRT-Jinja extension		13.4	201			Design+Build	Operation	Operation
<b>Cable Car Infrastructure</b>								
Cable Car-Jinja City		2	57		Design+Build	Operation	Operation	Operation
<b>Soft measures</b>								
Taxi & Bus fleet renewal			465	Design+Build	Operation	Operation	Operation	Operation
NMT		100	50	Design+Build	Operation	Operation	Operation	Operation
Traffic Management			15	Design+Build	Operation	Operation	Operation	Operation
Control Center			10	Design+Build	Operation	Operation	Operation	Operation
Parking			20	Design+Build	Operation	Operation	Operation	Operation
Terminals			20	Design+Build	Operation	Operation	Operation	Operation
Waterways and ports								
<b>Roads</b>								
Street Rehabilitation				Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
Toll Roads				Build / operation				Operation
Roads Projects				Build / operation				Operation

There is also another report titled, 'Detailed Design of Non-Motorised Transport Schemes for Kampala City'<sup>39</sup>, which is an extension of the Multi-Modal Urban Transport Master Plan for GKMA. This report outlines the design of a 4km NMT corridor in Kampala city and a 15km path for pedestrians and cyclists along the Kampala-Namanve railway reserve.

<sup>39</sup> KCCA (2019) Multi-Modal Urban Transport Master Plan for Greater Kampala Metropolitan Area (GKMA): Detailed Design of Non-Motorised Transport Schemes for Kampala City.



### 2.2.8 Kampala City Strategic Plan 2020/21 to 2024/25

The Kampala City Strategic Plan for 2020/20 to 2024/25<sup>40</sup> outlines several economic growth themes. Among them is the improvement of transportation by;

- Being resourceful in implementing the GKMA Multi-Modal Urban Transport Masterplan plan to address traffic congestion in Kampala (activities to support this are provided in Figure 2-17);
- Planning and implementing integrated mobility infrastructure to address all forms of available transportation within Greater Kampala;
- Elimination of congestion points in all transport and mobility planning;
- Developing multi-modal interchanges at key nodes within the city, and park and ride facilities beyond the city boundaries.
- Effectively and consistently enforcing road usage legislation and penalties; and
- Effectively maintaining all the infrastructure within Kampala.

Implement the GK Multi Modal Urban Transport Masterplan	
The GK Multi Modal Urban Transport Masterplan 2018, funded by the World Bank identified and scoped all the city's road, rail and non-motorized mass transport systems, infrastructure and traffic management projects up to 2040. The primary objective is to enhance economic development by improving connectivity and addressing traffic congestion in the short, medium and long term	
Transport Infrastructure	
i.	Implement the Kampala Road Rehabilitation Project financed by the African Development Bank
a)	Reconstruct and upgrade 69.25 KM of roads, 5km of associated drainages, 134km of pedestrian walkways and signalize 22 junctions.
b)	Introduce scheduled bus services along a 15km corridor from city-square-to-Jinja Road to Nakawa junction-to-Ntinda-to-Bukoto-Kamwokya-to-Mulago-to-Wandegeya-back to-City Square
ii.	Implement the Annuity Roads Project by the UK Export Finance
iii.	Road construction projects under Uganda Government Funding
iv.	Road maintenance under Uganda Road Funding, URF
v.	Pilot the Mass transit systems: Bus Rapid Transit, BRT
vi.	Increase Non-Motorized, NMT bike and pedestrian Infrastructures
vii.	The Kampala Street lighting Project
viii.	Parking, Tower and Transport terminal Development
ix.	Signalised junctions financed by JICA
x.	Effectively regulating the transport sector, including Boda Bodas, Special Hire taxis, Commuter taxis, lorries and buses
xi.	Develop, park and ride sites and upcountry bus and taxi parks, logistics, and traffic routes for heavy commercial vehicles outside the Kampala City limits to reduce congestion.

**Figure 2-17:** Activities outlined in the Kampala City Strategic Plan (KCCA, 2020) to implement the Multi-Modal Urban Transport Master Plan for Kampala.

### 2.2.9 Non-Motorized Transport Policy

While non-motorized transport (e.g. walking and cycling) are the most popular modes in Uganda, they are also the most unsafe. This policy is particularly important for low income people who need to walk and cycle to have access to water, wood/fuel, health care, education, etc.

The policy argues that “Walking and bicycling are healthy, sustainable, economical and non-polluting means of transport: the citizens of Uganda have the right to walk and cycle in safety, while conforming to appropriate regulations, in their pursuit of work and family tasks and in assessing social and economic

<sup>40</sup> KCCA (2020) Kampala Capital City Strategic Plan 2020/21 to 2024/25, <https://kcca.go.ug/uDocs/Kampa-City-Strategic-Plan-2020-2025.pdf>

activities and services.” Among other aspects, the policy integrates ‘universal design’ principles and issues around road safety and road maintenance, promoting equality among road users, gender, environment, and non-motorized transport technologies.

### 2.2.10 Regulations and Standards

The Government of Uganda introduced an environmental levy surcharge on automobiles that are older than 8 years at first registration with the aim of discouraging the importation of old vehicles into the country. The surcharges were 0% below 5yrs, 35% between 5 and 8 years and 50% above 8 years. Data<sup>41</sup> suggests that this has not been a good enough deterrent for the importation of older vehicles as the purchase price of a 20-year-old vehicle after paying all the taxes is still significantly lower than that of a 10-year-old vehicle.

In 2018, URA moved to effect a ban on the importation of motor vehicles older than 15 years from the date of manufacture following the passing of the Traffic and Road Safety Act 1998 Amendment Bill by Parliament<sup>42</sup> on 29<sup>th</sup> January 2020. This ban does not, however, apply to road tractors, semitrailers, and goods vehicles with a gross vehicle weight of at least six tones, and special purpose motor vehicles (e.g. breakdown lorries, crane lorries, fire fighting vehicles, concrete mixer lorries, road sweeper lorries, mobile radiological units, tanks, bullion spreaders, bitumen spreaders, bucket trucks, aircraft refuellers, spraying trucks).

Other fuel efficiency interventions are pre-shipment inspection and certification of vehicles for road worthiness and the control of heavy metals and carbons (Lead, Sulphur and Benzene)<sup>43</sup> in gasoline and diesel. The range of policy options available for Uganda to promote vehicle fuel efficiency include regulatory policies (such as import restrictions), fiscal-related incentives/disincentives (e.g. differential vehicle fees and taxes, higher fuel taxes, and increased parking fees in cities), and traffic control measures (e.g. priority lanes and parking restrictions). However, the implementation of these policies depends on the level of technology, the level of the infrastructure (e.g. road network) and the institutional capacity for enforcement of these policies.

## 2.3 Summary of Mitigation Actions for the Transport Sector

Considering all the policies and strategies reviewed above, the following mitigation activities have been highlighted for the transport sector:

- Development of the BRT system - The Design and Build of the pilot phase is scheduled to occur in the next 5 years i.e. 2021-2025 while the rest of the phases are to be rolled out between 2026-2030
- Development of the LRT system - The roll out of this (105 km) is planned over the next 15 – 20 years (Table 2-10).
- Redevelopment and Extension of GKMA Passenger Service - This 53 km upgrade is planned to occur in phases over the next 10 years (Table 2-10 )
- Improve metro infrastructure - This (38 km) is planned to occur in phases over the next 20 years (see Table 2-10 )
- Development of cable cars - To be developed in the next 5 years (see Table 2-10 )
- NMT - It is planned that 100km of NMT will be developed in the next 5 years (see Table 2-10)
- Shift to less carbon intensive fuels - This is mentioned however no specific details, targets or timelines have been provided. Further details on this action will be sought in the next phase of this project.

<sup>41</sup> MoWT, Uganda's Initiatives to Promote Cleaner Vehicles, Presentation by Immaculate Nyamaizi of the MoWT.

<sup>42</sup> MoWT (2020) The Traffic and Road Safety Act, 1998 (Amendment) Act, 2020, The Uganda Gazette no 32., <https://www.works.go.ug/wp-content/uploads/2020/05/Traffic-Road-Safety-Am-Act-2020-FINAL-mirrored.pdf>

<sup>43</sup> Mutenyo et al. (2015) Baseline survey on Uganda's National Average Automotive Fuel Economy

There are several other opportunities for mitigation discussed in several documents and these are provided as a list below. These can be discussed with experts and CCD in the next phase to determine if they need to be taken into consideration.

- Upgrade the Metre Gauge Railway and the Standard Gauge Railway Project;
- Upgrade the national aerodromes to international airports;
- Improve ferry services and upgrade the Bukasa port; and
- Development of the Mombasa – Kampala pipeline planned for the importation of oil.
- Alternative greener transport modes<sup>44</sup>:
  - Support viable long-term alternative to old and imported second hand vehicles, namely the establishment of local car assembly facilities that will supply low-cost localised car models (NAMA)
  - Utilization of water transport for international cargo from Kenya
  - Moving long-distance freight by rail
  - Electric vehicles:
    - Uganda's state-owned car maker, Kiira Motors Corporation (Kiira), has successfully tested the first locally assembled electric bus, called Kayoola, which is targeted for mass transport. Kiira plans to start production of Kayoola e-buses in 2021, at the Jinja plant that is being constructed under the Eco-Bus Pilot Project (KMC, 2019).
    - E-bikes
- Approaches to improve fuel efficiency<sup>45</sup>:
  - Differential tax rates/fees based on age of the vehicle. In other words, the tax should be targeted in such a way that a higher tax rate is imposed on older vehicles than on newer ones.
  - A tax based on engine capacity such that those that pollute more pay more.
  - Periodic inspection of all automobiles (vehicles and motorcycles) that are already registered in the country, and a limit/ceiling of emission per category of engine capacity of the vehicle beyond which the vehicle should either be put off the road, install a catalytic converter or pay a fee for polluting the environment.
  - Compulsory testing of imported vehicles for fuel economy and carbon emission before registration.
  - Vehicle inspections before importation should include carbon emission levels.
  - Labelling of imported vehicles with Fuel economy and Environmental Labels for easier comparison during shopping. These window stickers could provide fuel economy and environmental rating for all newly imported vehicles.
  - Providing parking spaces at different entry points into the city for private automobiles to encourage public transportation..
  - Discourage private transport into the City by increasing parking fees.
  - Mandatory parking spaces for every new building.
  - Providing security lights and security along the City roads to increase safety of NMT.

<sup>44</sup> High Volume Transport Applied Research, 2020: Country scoping of research priorities on low carbon transport in Uganda.

<sup>45</sup> Mutenyo et al. (2015) Baseline survey on Uganda's National Average Automotive Fuel Economy.

### 3 TRANSPORT DATA COLLECTION PROCESS

#### 3.1 Scope and Requirements of Data Collection

The scope and requirements of data collection were initially specified in the Terms of Reference. However, these have since been clarified by the consultant for mitigation potential analysis based on the actual data needs of the mitigation assessment model (Low Emissions Analysis Platform - LEAP). The updated data requirements are summarised in Table 3-1.

**Table 3-1: Data requirements**

Modelled element	Disaggregated elements	Roads <sup>46</sup> (High priority)	Railways (Medium priority)	Water-borne navigation (Low/Medium priority)	Aviation (Low priority)
Distance travelled	Modal share by vehicle type	VKT by passenger and freight modes (car, bus, truck etc)	VKT by locomotive type and journey type (freight, intercity, regional)	VKT by ship type	VKT by aircraft type
	Load factor	Passenger: Persons per VKT (or PKM)	Passenger: Persons per VKT (or PKM)	Passenger: Persons per VKT (or PKM)	International & domestic passenger numbers & number of flights
		Freight: Tonnes per VKT (or TKM)	Freight: Tonnes per VKT (or TKM)	Freight: Tonnes per VKT (or TKM)	International & domestic freight tonnes & number of flights
Fuel use	Fuel efficiency	Share by vehicle type fuelled by petrol and diesel by VKM  km/L by vehicle type and fuel type	km/L by locomotive type and journey type	km/L by ship type and fuel type	km/L by aircraft type and fuel type
Emission factor	Vehicle Type	GHG emissions g/km of CO <sub>2</sub> by vehicle type	GHG emissions per km travelled/ power output etc as appropriate	GHG emissions per km travelled/ power output etc as appropriate	GHG emissions per km travelled/ power output etc as appropriate
	Fuel Type	Carbon content of the fuel used	Carbon content of the fuel used	Carbon content of the fuel used	Carbon content of the fuel used

Further, the scope for data collection has also been refined to include a list of all the implemented and planned mitigation measures. This is based on the understanding that the mitigation potential analysis will include three mitigation scenarios beyond the baseline as follows;

<sup>46</sup> Level of priority is based on the significance of the mode in the total transport activity in Uganda.

1. A With Existing Measures (WEM) scenario that includes all implemented measures
2. A Current Development Plans (CDP) scenario that includes all planned measures
3. A With Additional Measures (WAM) scenario that includes any additional mitigation measures not included in the other scenarios

Complimentary to the above are stakeholder interviews to inform the development of realistic assumptions about the future of the sector. Assumptions such as the growth rates of vehicle ownership, expected vehicle fleet characteristics or future rail activity among others.

### 3.2 Key Transport Data Stakeholders

Transport data in Uganda is scattered across different sector players, and there is no centralised database where all relevant data can be accessed. Table 3-2 shows the identified transport data stakeholders based on the data collection needs of this project.

**Table 3-2: Transport data stakeholders**

Sector	Entity	Relevance
Roads	Uganda National Roads Authority (UNRA)	All relevant data/statistics on National roads (i.e. the current and projected future traffic volumes, load factors, road conditions, and capacity, and future development plans) including fuel economy data from the UNRA fleet management system
	Uganda Road Fund (URF)	Relevant data on District, Urban, and Community Access Roads (DUCAR)
	MoWT-Transport Licensing Boards (TLB)	In-use vehicle fleet information especially the Buses for public vehicles
	Uganda Revenue Authority	New registrations by year, origin, vehicle type, fuel type, engine capacity, and vehicle age
	Insurance Regulatory Authority	In-use vehicle fleet information
Railways	Uganda Railways Corporation (URC)	All relevant data on the Railways and marine subsectors
	Standard Gauge Railways (SGR) Project Office	All relevant data on the Standard Gauge Railway
Water-borne navigation	Kalangala Infrastructure Services	Relevant data on the KIS ferries operated on Lake Victoria
	Uganda National Roads Authority (UNRA)	All relevant data on UNRA ferries
Aviation	Uganda Civil Aviation Authority (UCAA)	All relevant data on the aviation subsector
Others/General	Ministry of Works and Transport (MoWT)	Future development plans within the transport sector
	MoWT-Environment Liaison Office	Ongoing and planned mitigation actions/climate strategies
	Kampala City Council Authority (KCCA)	All relevant data within the GKMA including Future development plans
	Uganda Bureau of Statistics	All National Transport Statistics
	Private Sector players (e.g., TOTAL, VIVO, Bolloré Logistics)	Data on fuel economy from fuel card data

Table 3-3 provides an overview of some of the key stakeholder consultation meetings held by MEIR. Detailed minutes of these meetings are present in Appendix 1 of this report. Other consultation was done through email correspondence.

**Table 3-3:** Stakeholder consultation meetings held to-date

Date	Stakeholder	Purpose of meeting	Venue/Location
05 <sup>th</sup> March, 2021	Climate Change Department, Ministry of Water and Environment, RICARDO Energy and Environment, UNDP, Zutari, GIZ	Kick-off meeting	Online
17 <sup>th</sup> March 2021.	Environment Liaison Office, Ministry of Works and Transport	Introduce the project to MoWT	MoWT Office, Kireka
01 <sup>st</sup> April, 2021	Climate Change Department, Ministry of Water and Environment	To provide CCD with an overview of the project and request for an introductory letter for data collection	Online via Zoom

### 3.3 Data Collection Approach

MEIR obtained a letter of introduction from the Climate Change Department (CCD) in the Ministry of Water and Environment on 26 April 2021 introducing the project and the data collection team to the different transport data stakeholders both in the public and private sectors. This letter was critical for the smooth running of the data collection exercise. For emphasis, the assignment had three broad data collection objectives as follows.

- To collect, organise, and analyse specified transport sector data and statistics to support the subsequent analysis of the mitigation potential of GHG emissions from the different transport sub-sectors (i.e. roads, aviation, water, and rail), with a bias towards road transport for the start;
- To obtain information on future trends in the transport sector and develop realistic assumptions to support the development and analysis of different mitigation scenarios in light of the NDC review process through stakeholder engagement and policy document review; and
- To establish whether any other mitigation potential analysis has been conducted in the recent past and obtain relevant information on the methods and data used for the analysis.

This section describes the approach followed to obtain the required data.

#### 3.3.1 Training

The Terms of Reference state that the Consultant for Mitigation Potential Analysis will facilitate several (at least two) training sessions attended by the data collection team focusing on the data requirements and formats. The Consultant for Mitigation Potential Analysis is Ricardo PLC. At the moment, no formal training has been scheduled or taken place. However, Ricardo PLC have specified the data requirements and formats. Training is particularly critical for the second data collection objective, where MEIR is expected to develop realistic assumptions to support the development and analysis of different mitigation scenarios.



### 3.3.2 Secondary Data Collection

The collection of secondary data involved document review to obtain information on relevant transport sector statistics and policies, as well as, an outlook for the future of the sector to help in the development and analysis of different mitigation scenarios. The documents reviewed include;

- The Uganda Vision 2040 document
- The Third National Development Plan (2020/21 – 2024/25);
- The UBOS annual statistical abstracts (2013 – 2020);
- The National Transport Master Plan including a Transport Master Plan for the Greater Kampala Metropolitan Area (2008 – 2023);
- The Draft National Integrated Transport Master Plan (2021 – 2040);
- The Expressway Development Master Plan (EDMP) Traffic Survey and Travel Demand Modelling Reports (2020);
- The Trademark East Africa Report on the Tool for the Estimation of Greenhouse Gas Inventory for Northern and Central Corridors (July 2020);
- The Kampala Capital City Strategic Plan (2020/21 – 2024/25);
- The Climate Change Risk Management and Adaptation Strategy (CRMAS) for the Transport Sector (2012);
- The Mitigation Assessment Report for the Transport Sector (2021);
- Greenhouse Gas Inventory Manual for Uganda, Version 1 (2015);
- Greenhouse gas emissions from the transport sector: Mitigation options for Kenya (2018);
- The National Civil Aviation Master Plan - CAMP (2014 – 2033);
- The Ministry of Works and Transport Strategic Plan (2020/21 – 2024/25);
- The UNRA Corporate Strategic Plan (2020/21 – 2024/25);
- The UNRA Annual Performance Report (2019/20);
- The Standard Gauge Railway Strategic Plan 2016 – 2020; and
- The MOWT Annual Sector Performance Report (2019/20).

In addition to document review, this task also involved the analysis of existing pre-processed excel data sourced from the different transport data stakeholders. The data analyzed at the moment includes the;

- The Expressway Development Master Plan Traffic Survey Data; and
- The National Integrated Master Plan Traffic Survey Data.
- KIS, 2021 Ferry Fuel Consumption Report
- KIS Ferry Specifications

Details of the information obtained to-date from each of the secondary data sources mentioned above are presented and discussed in Sections 3 to 6 of this report.

### 3.3.3 Primary Data Collection

This task involves conducting stakeholder interviews to inform the development of future trends in the transport sector based on realistic assumptions of the expected vehicle ownership/usage growth rates, the expected changes in the vehicle fleet characteristics, and the expected developments in the rail, water and air sub-sectors etc. The interviews will also involve a discussion on the gaps observed in the secondary data, as well as, the possible options/plans to improve the existing databases. Furthermore, the task involves collecting primary data where secondary data sources are not available. The scope of primary data collection is supposed to be specified by the consultant for mitigation potential analysis after exhausting all the secondary data sources. Extra care will be taken to minimize the risk of catching and/or spreading COVID-19 through observing the Ministry of Health Standard Operating Procedures (SOPs). At the moment, no primary data has been collected.



### 3.3.4 Data Processing

All the secondary and primary data obtained have been analyzed and presented in formats specified by the consultant for mitigation potential analysis. The main tool of analysis was Microsoft Excel. The data have been presented in four separate files covering the four transport sub-sectors of Uganda (i.e., roads, aviation, railway, and inland water transport) and properly referenced to the source documents or databases.

### 3.3.5 Data File Protection

All the processed data files to-date have been safely uploaded onto the GiZ Microsoft Teams Platform to facilitate secure data sharing with other team members.

## 3.4 Comprehensiveness and Robustness of Existing Transport Data

Table 3-4 highlights the initial data gaps per transport sector.

**Table 3-4: Data availability/gaps matrix**

Modelled element	Disaggregated elements	Roads	Railways	Water-borne navigation	Aviation
Activity Data	Modal share by vehicle type (VKT)	Available. 2019 estimates derived from EDMP & NITMP studies	Available for Mainline locomotives. VKT during FY 2020/21 provided	Available. VKT for major UNRA ferries & MV Kaawa (URC's wagon ferry) estimated for FY 2018/19	Route lengths missing. Aircraft movements at Entebbe and estimates of annual flights per carrier available
	Load factor (PKM)	Available. 2019 estimates derived from EDMP & NITMP studies for all modes	Available. PKM data available for Dec 2015 – FY 2020/21 has been derived. Only total passenger data for Kampala to Port bell line has been provided.	Available. Average Annual PKM for major UNRA ferries have been derived.	Missing. Only historical data of annual passengers at Ebb Int. airport available
	Load factor (TKM)	Available. Only the Net Max Load for Freight vehicle class Tractors is missing	Available. Gross TKM data available for 2008-2020	Available. Average Annual TKM for major UNRA ferries & MV Kaawa have been derived.	Historical data of annual cargo at Ebb Int. airport available
Fuel use	Fuel efficiency (km/L by vehicle type and fuel type)	2015 Fuel efficiencies for passenger modes i.e., Buses, Coasters, Saloon car, Taxis & Motorcycles. Fuel efficiency for	km/L for mainline locomotives have been derived. Missing for shunting/passenger locomotives	km/L for KIS vessels have been derived.  km/L for UNRA ferries have been derived.	Aggregated data on fuel use for all aircrafts at EBB per year

Modelled element	Disaggregated elements	Roads	Railways	Water-borne navigation	Aviation
		Freight modes missing. Data not disaggregated by fuel type  Fuel efficiency by fuel type by engine capacity available		km/L for URC MV Kaawa was available. Km/L for MV Umoja, BIDCO & other vessels not available	
Emission factor	Vehicle Type (GHG emissions per km travelled/ power output etc as appropriate)	2015 GHG emissions for passenger modes only. GHG emissions for freight modes missing	Missing. Only power output data per class of locomotive shared	Missing. Only power output data for KIS ferries shared	Missing
	Fuel Type (Carbon content of the fuel used)	Missing	Missing	Missing	Missing
Future Trends		Available	Available	Available	Available

In general, the largest data gaps have been in Equipment and Emission Factors. Moreover, the fuel economy estimates obtained for the Roads Sector are dated i.e., 2015

On the other hand, activity data for both passenger and freight is readily available across all sectors except aviation in which the information is not segregated by vehicle/aircraft type. Information on the aircraft characteristics is also not known and would require consultation with the individual airlines. This may be attributed to the dominance of the private players in the aviation sector with no obligation to remit activity and vehicle data to the government.

The above data gaps will form the focus of the next phase of data collection

### 3.5 Challenges and Limitations Faced in Accessing the Existing Transport Data

Transport data in Uganda is not centralised. Different organisations/entities collect different information and store it in various formats, mostly aggregated and tailored to their specific needs. This is highlighted in Table 3-5 below.

Additionally, because climate change mitigation has not been the main focus of the transport sector, information on fuel economy and transport emissions is not readily available as highlighted above. The main challenge in data collection has been the bureaucracy in government processes which has resulted in substantial delays. Moreover, this has been compounded by having to deal with multiple agencies.

**Table 3-5: Limitations in data**

Entity	Description
UNRA	No data received.
URA	Aggregated monthly vehicle import data was received for period 2011-2020. However, the vehicle classifications did not match the standard. URA vehicle classifications include Tractors and Trailors, Motor vehicles for the transport of 10 persons or more, Motor vehicles for the transport of less than 10 persons, Goods vehicles and Special purpose vehicles. This data was not usable for the study
CAA	No data on aircraft mix. Aircraft movements data was aggregated with no separation between landings and take-offs. Aggregated fuel data for both international and domestic flights. This was not usable. No information on Aircraft routes was provided
TLB	Aggregated information on number of PSV and Bus Operator Licenses issued in FY 2020/21 was obtained. Details of vehicle types, fuel consumption, Emission Factors were not available. Route Charts for Taxis operating within Greater Kampala were obtained however details of the number of operators, their schedules and number of trips made per day was unavailable. Route Charts for Buses was also obtained including Reg. No of the vehicles plying each route, however details of vehicle types and schedules were not available.  In general, the information was not usable.
URC	Fuel efficiency data was not disaggregated by locomotive type. It was assumed that the locomotives have the same efficiency.  No information was provided for km of travel for passenger locomotives. Limited information on the alighting and boarding patterns of passengers. PKM values were estimated from a previous O-D study.

### 3.6 Proposals to Improve Transport Databases

The government should create a multi-sectoral centralised transport database that is 'fed' by different entities such as Insurance regulators, CAA, UNRA, MAD, URC including private players, and managed by the Ministry of Works and Transport. Data should be stored in a disaggregate manner to ease processing for different uses. Key Aspects of this database can be made available to the public. Besides easing transport data availability, this will also save government resources lost in duplication of data collection activities.

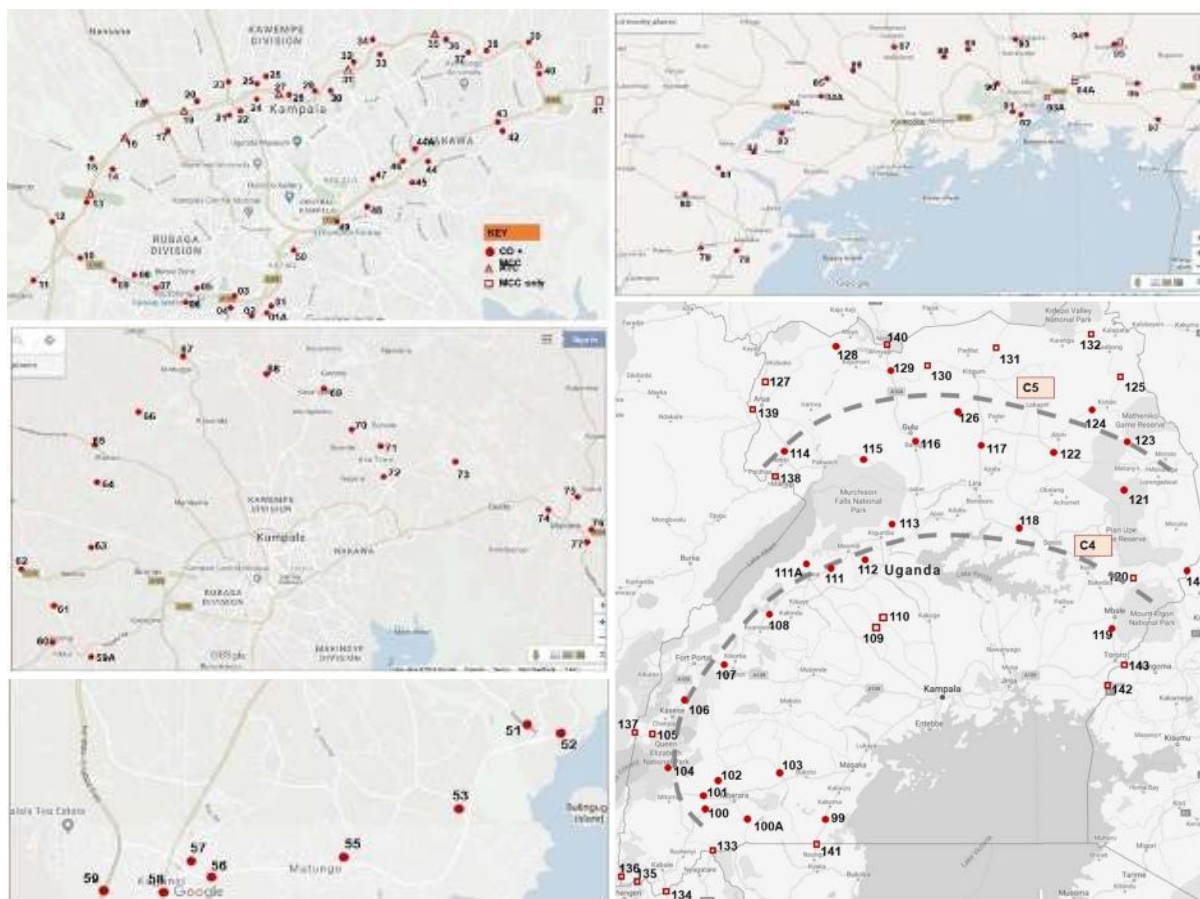
Innovative ways to support continuous data collection on both passenger and freight vehicles should be legislated. These include;

- Mandatory capturing of vehicle mileage data whenever a vehicle is paying for annual third-party insurance;
- Mandatory quarterly inspection of all vehicles in use;
- Give vehicles individual identifiers that are captured/registered at every gas re-fill. Mandate all gas stations to remit this information to a central database;
- Incorporate traditional infrastructure-based data sources along all transport networks e.g., pneumatic loops at major road links;
- Legislate the collection of mobility data from vehicles and handheld devices e.g., phones.

## 4 ROAD TRANSPORT SUB-SECTOR BASELINE DATA

### 4.1 Modal Share by Vehicle Type (Passenger and Freight)

The most recent data on modal share by vehicle type was obtained from the Expressway Development Master Plan (EDMP) Traffic Survey (2019). The data comprises classified traffic volume counts on 147 road sections distributed across all regions of the country as shown in Figure 4-1.



**Figure 4-1: Location of the EDMP Traffic Surveys**  
(Source: EDMP Traffic Survey Report)

The EDMP Traffic Survey considered 12 vehicle types, whose modal shares in the traffic mix have been computed and reported in Table 4-1.

**Table 4-1: Modal share by vehicle type**  
(Source: EDMP Traffic Survey, 2019)

Category	Vehicle type	Sample Count	Share (%)
Passenger modes	1. Car	498,307	20.46
	2. Station Wagon	141,064	5.79
	3. Pickups	84,527	3.47
	4. Minibus, matatu	261,266	10.73
	5. Medium bus	13,843	0.57
	6. Large Bus	10,674	0.44
	7. Motorcycles	1,257,460	51.64
Freight modes	8. Light Truck	70,825	2.91
	9. Medium Truck	39,880	1.64
	10. Heavy truck	20,885	0.86
	11. Truck Trailer	31,133	1.28
	12. Tractors	5,179	0.21
<b>Total</b>		<b>2,435,042</b>	<b>100.00</b>

## 4.2 Vehicle Kilometers Travelled by Passenger and Freight Modes

Road traffic demand expressed in terms of vehicle-kilometers, passenger-kilometers and net tonne-kilometers has not been systematically monitored as this is difficult to measure. The Draft National Integrated Transport Master Plan (2021 – 2040) travel demand model estimates a national road transport demand of about 20 billion vehicle-km (excluding motorcycles) in 2019, while the Expressway Development Master Plan travel demand model estimates a national road transport demand of 29.75 billion vehicle-km (including motorcycles) in 2019. We have therefore assumed that the vehicle and motorcycle transport demand estimates for 2019 were approximately 20 billion vehicle-km and 9.75 billion vehicle-km, respectively. To obtain the vehicle-km by vehicle type, we applied the modal share for each vehicle type and the results are reported in Table 4-2.

**Table 4-2: Vehicle-km by vehicle type**  
(Source: MEIR's analysis based on the NITMP (Draft) and EDMP Reports)

Category	Vehicle type	Vehicle-km (in billions)
Passenger modes	1. Car	8.46
	2. Station Wagon	2.40
	3. Pickups	1.44
	4. Minibus, matatu	4.44
	5. Medium bus	0.24
	6. Large Bus	0.18
	7. Motorcycles	9.75
Freight modes	8. Light Truck	1.20
	9. Medium Truck	0.68
	10. Heavy truck	0.35

Category	Vehicle type	Vehicle-km (in billions)
	11. Truck Trailer	0.53
	12. Tractors	0.09
<b>Total</b>		<b>29.75</b>

### 4.3 Load Factors by Passenger and Freight Modes

#### 4.3.1 Load Factors by Passenger Modes

To determine passenger-kilometers by vehicle type, the average vehicle occupancies were applied to the respective vehicle kilometers estimated in Section **Error! Reference source not found.**. The average vehicle occupancy for cars, national average bus capacity values and an average load factor of 85% for public passenger modes were adopted from the NITMP study. No recent data was available for station wagons, pickups and motorcycles, therefore we adopted 2012 estimates reported by JICA.<sup>47</sup>

A total of 111.17 billion passenger-kilometers in 2019 have been estimated. Private passenger modes (including motorcycles) account for 38%, while public modes account for 62% of the total passenger-kilometers.

**Table 4-3: Passenger-km by Vehicle Type**  
(Source: MEIR's analysis based on the NITMP (Draft) and EDMP Reports)

Category	Vehicle type	Vehicle-km (in billions)	Av. Veh Occupancy	Pkm (in billions)
Private Passenger modes	1. Car	8.46	1.4	11.84
	2. Station Wagon	2.40	3.79	9.1
	3. Pickups	1.44	3.79	5.46
	4. Motorcycles	9.75	1.58	15.41
Total				41.81
Category	Vehicle type	Vehicle-km (in billions)	Average Capacity	Pkm (in billions)
Public Passenger modes	5. Minibus, matatu	4.44	15	56.61
	6. Medium bus	0.24	25	5.1
	7. Large Bus	0.18	50	7.65
Total				69.36

#### 4.3.2 Load Factors by Freight Modes

Most roads in Uganda do not have permanent weigh bridge stations and there is a high tendency of truck over loading. At the moment, the consultant has not yet obtained data on truck loading to enable reliable estimation of the average net loads by truck type. For the current analysis, the consultant has used the maximum allowable net loads by truck type and multiplied these with the respective truck-

<sup>47</sup> JICA (2012) *The Project for Rural Road Network Development in Acholi Sub-region in Northern Uganda. Final Report Vol.2: Main Report*



kilometers estimated in Section 4.2) to obtain the tonne-kilometers by truck type as summarised in Table 4-4.

**Table 4-4: Tonne-km by Vehicle Type**  
(Source: MEIR's analysis based on the NITM and EDMP Reports)

Category	Vehicle type	Vehicle-km (in billions)	Max Net load	Tkm (in billions)
Freight modes	8. Light Truck	1.2	10	12
	9. Medium Truck	0.68	15	10.2
	10. Heavy truck	0.35	20	7
	11. Truck Trailer	0.53	30	15.9
	12. Tractors	0.09	-	-
Total		29.75		45.1

## 4.4 Fuel Efficiency by Fuel Type and Vehicle Type

A study by Mutenyo et al. (2015)<sup>48</sup> provides data on vehicle fuel efficiency by fuel type and engine capacity (Table 4-5 and

Table 4-6), as well as the fuel efficiency for motorcycles by year of registration (Figure 4-2).

**Table 4-5: Average fuel efficiencies of petrol vehicles (L/100kms)**  
(Source: Mutenyo et al., 2015)

Engine CC	2005	2008	2011	2014
500-1200	7.4	6.4	6.2	6.1
1201-1500	8	7.9	7.6	7.6
1501-2000	8.6	8.5	8.4	8.3
2001-2500	10	10.1	9.7	9.4
2501-3000	11.6	11.1	10.9	10.6
3001-3500	14.5	13.9	13.7	13.8
3501-4000	20.3	18	18.3	15.6
4001-5000	27.2	25.1	26.9	25.9
>5000			16.9	19.7

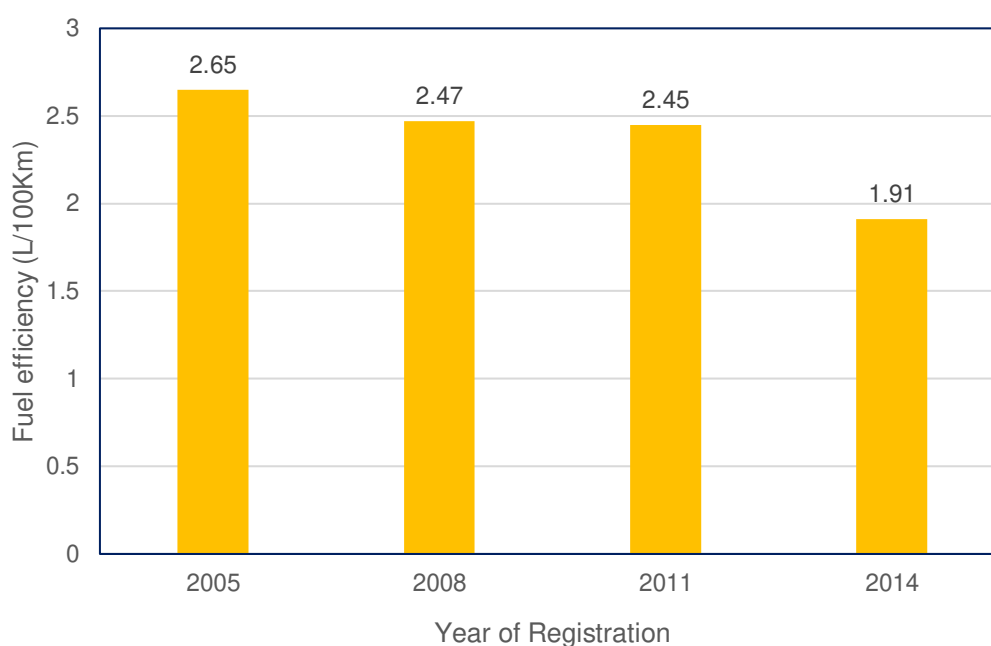
**Table 4-6: Average fuel efficiencies of diesel vehicles (L/100kms)**  
(Source: Mutenyo et al., 2015)

Engine CC	2005	2008	2011	2014
500-1200			9	5.6

<sup>48</sup> Mutenyo et al. (2015) Baseline survey on Uganda's National Average Automotive Fuel Economy.



1201-1500	7.4	6.7	7.1	7.3
1501-2000	8	8.1	8.1	8
2001-2500	10	9.2	8.4	8.5
2501-3000	9.8	9.6	9.7	9.5
3001-3500	11.3	9.9	10.4	11.2
3501-4000	12.6	12.6	12.6	12.8
4001-5000	13.1	12.8	14.5	13.5
>5000	33	34.6	31.6	30.2



**Figure 4-2: Average fuel efficiency for motorcycles**  
(Source: Mutenyo et al., 2015)

The same study provides a comparative fuel efficiency data analysis for 5 different transport modes. It assumes that 80 people need to be moved 21 kms. Table 4-7 shows the fuel economy, emissions and costs if those 80 people travelled the 21 kms using either buses, coasters, taxi's, saloon vehicles or motorcycles.

**Table 4-7: Comparative FE, emissions, and costs for different vehicle types**  
(Source: Mutenyo et al., 2015)

	Bus	Coaster	Taxi	Saloon	Motorcycle
Seat capacity	80	30	14	4	1
Fleet	1	3	6	20	80

FE(L/100KM)	13	13	10	9	2
CO <sub>2</sub> (gCO <sub>2</sub> /Km)	420.60	398.00	319.40	275.50	41.02
Cost of fuel	3,264.00	3,264.00	3,264.00	3,264.00	3,674.00
Cost (L/Km)	434.11	414.53	336.19	293.76	66.13
Ave. cost for 21km	9,116.35	26,115,264.00	42,360.19	123,379.20	111,101.76
Total financial cost	3,327,468.48	9,532,071.36	15,461,470.08	45,033,408.00	40,552,142.40
Daily emissions	88,326.00	25,074.00	42,360.19	129,548.16	68,913.60
Annual CO <sub>2</sub> emissions	3,223,899.00	9,152,010.00	15,461,470.08	47,285,078.40	25,153,464.00
Tons of carbon	3.22	9.15	15.46	47.29	25.15

#### 4.5 Emission Factors by Vehicle Type and Fuel Type

Emission factors are determined by multiplying the carbon content of the fuel by 44/12 (IPCC, 2006). No data on the carbon content of the various fuel types is available in Uganda. Therefore, the default IPCC emission factors may need to be applied as shown in Table 4-8 and 4-9. The GHG inventory from Kenya and South Africa also use IPCC default emission factors. Default factors are not provided per vehicle type, however the USA has determined factors for various vehicle types and these are also provided in the IPCC Guidelines (IPCC, 2006, Table 3.2.3) should they be required.

**Table 4-8:** IPCC default CO<sub>2</sub> emission factors for the various fuel types (Source: IPCC, 2006)

Fuel type	Default	Lower	Upper
	(kg/TJ)		
Motor gasoline	69 300	67 500	73 000
Gas/Diesel oil	74 100	72 600	74 800
Liquified petroleum gases	63 100	61 600	65 600
Kerosene	71 900	70 800	73 700
Lubricants	73 300	71 900	75 200
Compressed natural gas	56 100	54 300	58 300
Liquified natural gas	56 100	54 300	58 300

**Table 4-9:** IPCC default CH<sub>4</sub> and N<sub>2</sub>O emission factors for the various fuel types (Source: IPCC, 2006)

Fuel type/ Representative vehicle category	CH <sub>4</sub> (kg/TJ)			N <sub>2</sub> O (kg/TJ)		
	Default	Lower	Upper	Default	Lower	Upper
Motor gasoline – Uncontrolled	33	9.6	110	3.2	0.96	11
Motor gasoline – Oxidation Catalyst	25	7.5	86	8.0	2.6	24
Motor gasoline – Low mileage Light Duty Vehicle Vintage 1995 or later	3.8	1.1	13	5.7	1.9	17
Ga/ Diesel oil	3.9	1.6	9.5	3.9	1.3	12
Natural gas	92	50	1 540	3	1	77
Liquified petroleum	62	NA	NA	0.2	NA	NA

## 5 RAILWAY TRANSPORT SUB-SECTOR BASELINE DATA

### 5.1 Freight Transport Demand

Rail freight transport demand expressed in tonne-km for the period between 2008 and 2019 was obtained from the Uganda Railways Corporation (URC) and is reported in Table 5-1. As mentioned earlier, the data shows that rail freight demand has generally followed a downward trend for over a decade.

Nonetheless, the planned rehabilitation of the Metre Gauge Railway (MGR) and the proposed Standard Gauge Railway (SGR) are expected to boost freight demand in the near and far future respectively.

CANARAIL, 2011<sup>49</sup> projections suggest that the Northern Line (Tororo-Gulu) will transport up to 202.6 mtk pa (excluding crude oil volumes) in 2030. These are anticipated to increase to 222.1 mtkpa in 2035 and 242.6 mtkpa by 2040. (Refer to Appendix 2)

On the other hand, the Railway Development Strategy and Business Plan<sup>50</sup> prepared under the National Integrated Transport Master Plan estimates up to 104.9mtk pa of Rail traffic along the Northern line by 2030, which increases to ca 368.9mtkpa by 2040. Along the Eastern line, a total of 646.2 mtkpa is projected in 2030 and 2.3 bn-tkpa in 2040. The plan assumes a rail uptake of 10% in 2024, growing by 1.5% annually.

**Table 5-1: Historical rail freight transport demand (Source: URC, 2021)**

Year	Number of Trains (,000)	Tonnes (,000)	Gross Tonne-Km (in millions)
FY 2020/21	0.716	224.4	98.7
FY 2019/20	2.263	169.3	77.54
FY 2018/19	3.031	196.8	- 87.28
2017	3.043	355.3	70.05
2016	5.102	368.9	125.6
2015	3.792	818.5	166.17
2014	4.474	682.8	136.42
FY 2012/13	N/A	686.6	154.2
FY 2010/11	N/A	675.5	153.5
FY 2009/10	N/A	542.1	124.6
FY 2008/09	N/A	588.1	134.4

### 5.2 Passenger Transport Demand

Rail passenger transport demand relates to the commuter passenger train service currently being operated between Kampala and Namanve by the Government of Uganda through Kampala Capital City Authority (KCCA). It was introduced in 2015 as a PSO and until January 2021, it was the only passenger train service in the country. The train travels 12km between Kampala and Namanve along the Eastern Line and makes four scheduled trips per day (excluding weekends and public holidays), with four intermediate stops at Nakawa (MUBS), Nakawa (SPEEDAG), Kireka, and Nambole. A rail passenger

<sup>49</sup> CANARAIL (2011)., *Feasibility study for upgrading Tororo – Pakwach Railway Line, Appendix F*. Ministry of Works and Transport

<sup>50</sup> MoWT (2021) *Preparation of the National Integrated Transport Master Plan (2021-2040)*. Railway Development Strategy and Business Plan, 2021 (Unpublished)

study conducted by KCCA on 11<sup>th</sup> August 2016, revealed an average train occupancy of 47.62%. The same study revealed that the largest number of passengers in the AM period board the train at Namboole (62%) and exit at the Kampala Train Station (93%), while the reverse is true for the PM period. 91% board at Kampala Station and 36% alight at both Namboole & Namanve.

Table 5-2 shows the annual rail passenger patronage along the Kampala-Namanve line. There was a 63% reduction in ridership between FY 2020/21 and FY 2019/20. This is attributed to the closure of the service at the onset of the COVID-19 pandemic, after which it was operated at half capacity in adherence to MOH SOP guidelines. Similarly, the reduction in ridership in FY 2017/18 was due to the suspension of the service between Aug 2017 to Dec 2017.

Table 5-2 also provides an estimate of rail passenger-km derived from the O-D survey results as conducted by KCCA coupled with annual passenger numbers along the route

**Table 5-2: Historical Rail Passenger demand**

	Dec 15- Jun 16	FY 2016/17	FY 2017/18	2018/19	FY2019/20	FY 2020/21
Total passenger <sup>51</sup> (annual)	108,510	383,230	195,430	529,596	488,951	179,609
Passenger-km <sup>52</sup> (av. Annual)	97,069	342,823	174,824	473,757	437,398	160,672

Early this year 2021, a similar service running 2 trains per day was introduced from Kampala to Port Bell. The first morning train leaves Port bell yard at 7:00am and arrives at the destination station, Kampala at 7:35am. The afternoon train leaves Kampala station at 6:00pm and arrives at Port bell yard at 6:35pm. From Kampala, the train makes 6 stops at Go down Kasanvu, Namuwongo Transami, Kanyogoga Police, Kanyogoga Bukasa, Oryx Petrol Station and Kasaawe before reaching Portbell.

Table 5-3 shows the monthly number of passengers on the Kampala-Portbell route since the start of operations. Considering January to June, on average the service carries 18% of the passengers along the Eastern Line (Kampala-Namanve).

**Table 5-3: New Kampala-Port bell Service Rail Passenger demand**

Period	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21
<b>Kampala-Port bell</b>	1,662	5,650	3,989	4,140	4,957	2,214	0	678
<b>Kampala-Namanve</b>	11,875	20,239	27,229	26,308	28,224	10,578	-	8292
<b>Perc. passengers</b>	14%	28%	15%	16%	18%	21%	-	8%

### 5.3 Fuel Efficiency

According to the URC, the Corporation has 21 Shunting Locomotives of which 8 are no longer operational. The active shunting locomotives are Diesel Hydraulic of Classes 62 (760HP) and Class 73 (1230HP) manufactured by Thyssen Henschel between 1978-1990 with an average age of 40 years.

On the other hand, the 3 active Mainline Locomotives are Diesel Electric of Class 96,93 & 94 (2600 HP) with an average age of 47 years old. These belong to Stanbic and KR respectively

Basing on an average fuel consumption of 19Ltrs/1000NTK (i.e., 9.5Ltrs/1000GTK) for the locomotives, Table 5-4 provides estimates of fuel consumed by the freight locomotives over the last 10 years.

<sup>51</sup> (Source: Annual Sector Performance Reports, MoWT)

<sup>52</sup> Consultant's estimate based on KCCA's O-D survey, 2016

**Table 5-4: URC annual fuel consumption**

Year	Gross Tonne-Km (in millions)	Litres of fuel (1000 litres)
FY 2020/21	98.7	937.65
FY 2019/20	77.54	736.63
FY 2018/19	-87.28	829.16
2017	70.05	665.475
2016	125.6	1193.2
2015	166.17	1578.615
2014	136.42	1295.99
FY 2012/13	154.2	1464.9
FY 2010/11	153.5	1458.25
FY 2009/10	124.6	1183.7
FY 2008/09	134.4	1276.8

For FY 2020/21, URC reported a total of 49,032 km tractioned by Mainline locomotives of type 96xx,93xx,94xx (Table 5-5). Assuming uniform fuel efficiency of all types of locomotives, their fuel efficiency is estimated at 0.0523km/Ltr

**Table 5-5: Activity of URC Mainline Locomotives (FY 2020/21)**

Month	Kms Tractioned	No. of Active Locos	Avg Kms/Loco
July '20	3474	2	1737
Aug '20	4713	2	2356.5
Sept '20	2852	1	2852
Oct '20	4,224	1	4224
Nov '20	5968	2	2984
Dec '20	2578	2	1289
Jan '21	3324	1	3324
Feb '21	3219	1	3219
Mar '21	3194	1	3194
Apr '21	6197	3	2065.667
May '21	4809	3	1603
Jun '21	4480	3	1493.333

The Consultant was unable to gather information on the fuel efficiency of shunting locomotives 62XX and 73XX which are also used for Passenger services. Table 5-6 only provides information on the engine hours per locomotive

**Table 5-6: Activity of URC Shunting Locomotives (FY 2020/21)**

Month	Engine Hrs Worked	No. Active Locomotives	Avg. Ehrrs/Loco
July '20	1479	7	211.3
Aug '20	1616	7	230.9
Sept '20	2556	9	284
Oct '20	2818	9	313.1
Nov '20	2577	8	322.1

Month	Engine Hrs Worked	No. Active Locomotives	Avg. Ehrrs/Loco
Dec '20	2726	7	389.4
Jan '21	2003	6	333.8
Feb '21	2080	9	231.1
Mar '21	2144	7	306.3
Apr '21	761	6	126.8
May '21	838	4	209.5
Jun '21	583	6	97.2

URC recently acquired 4No. refurbished locomotives of 3000HP.



## 6 IN-LAND WATER TRANSPORT SUB-SECTOR BASELINE DATA

### 6.1 Freight Transport Demand

#### 6.1.1 UNRA Ferries

UNRA Ferries act as bridges across major Lakes and carry mixed traffic including motorvehicles, people, animals and cargo.

According to a 5 days survey carried out at the 8 of UNRA ferry terminals during the 2019 National Transport Survey, approximately 1.07 million tons of cargo (equating to 6.57 billion ton-kms) are moved on the major UNRA ferries annually. The bulk (over 70%) are moved between Masindi and Kungu i.e., at Masindi Ferry terminal<sup>53</sup>. According to the survey, mainly agricultural produce is moved. Table 6-1 provides estimates of ton-kms per ferry route

**Table 6-1: Ferry Cargo Statics**

No.	Ferry Terminal	O-D	Voyage Distance (km)	Trips per Annum	Ferry-Km	Estimated Annual Average Load (tonnes)	million ton-km
1	Kiyindi	Kiyindi - Kirongo (Buvuma) (UNRA)	8.00	696	5,568	152,935	851.54
2	Laropi	Laropi – Umi (UNRA)	1.50	2,628	3,942	7,227	28.49
3	Masindi	Masindi Port – Kungu (UNRA)	1.20	4,032	4,838	732,336	3,543.33
4	Nakiwogo	Nakiwogo-Lutoboka (MOWT, MOWT/Nation Oil Distributors Ltd)	6.48	2,076	13,452	20,440	274.97
5	Kyoga 1&2	Zengebe-Namasale (UNRA)	10.00	1,208	12,080	-	-
6	Obongi	Obongi – Sinyanya (UNRA)	1.20	3,784	4,541	2,628	11.93
7	Albert Nile 1	Wanseko - Panyimur (UNRA)	18.00	660	11,880	156,512	1,859.36
8	Bisina	Agule – Okokorio (UNRA)	7.00	1,308	9,156	146	1.34
<b>Sub-Total</b>						1,072,224	6,571

(Source: Consultant's estimation)

<sup>53</sup> Ministry of Works and Transport. (2020) *Transport Surveys and analysis Working Paper (Annex H of the Interim Report. Phase 2: preparation of the national integrated transport master plan, 2021-2040) (WP-16)*. Pg29

### 6.1.2 Wagon Ferries

In 2018, intermodal rail/water operations resumed on Lake Victoria. Until mid-2021 when MV Pamba was repaired and its operations resumed; only 2 wagon ferries; MV Kaawa operated by Uganda Railways Corporation and MV Umoja operated by Tanzania Railway Corporation ploughed the waters of Lake Victoria.

MV Umoja has a capacity of 19 wagons while MV Kaawa has a capacity of 22 wagons and a gross tonnage of 1241 tons. MV Kaawa has a maximum speed of 13 nauts and maintains an average speed of 10 nauts.

In the first year of resuming operations (26<sup>th</sup> June 2018- June 2019) a total of 66,255 tons (42,333 tons of imports and 23,921 tons of exports) were moved across L. Victoria by MV Umoja which made 23 voyages and MV Kaawa which made 41 voyages. For a crossing distance of 172 nautical miles (318.544 km); this amounts to 20,387 VKT and 1.35 bn ton-kms. Due to the unavailability of data, FY 2018/19 were considered reflective of annual values for the wagon ferries.

## 6.2 Passenger Transport Demand

In the financial year 2017/18, over 3.7 million passengers used UNRA ferry services. These increased to over 4.2 million passengers in FY 2018/19. Basing on the 2 periods, averagely over 3.4m passengers use ferry services per year. The highest demand is registered for the Laropi – Umi, the Obongi – Sinyanya and the Nakiwogo - Lutoboka ferries/road bridges. Table 6-2 provides key annual average passenger statistics over a 2-year period FY 2017/18 -2018/19. Ferries contribute an annual average of 17.25m pkm

**Table 6-2: Passenger statistics on major Ferries in Uganda**

No.	Ferry Terminal	O-D	Crossing time (hr)	Voyage Distance (km)	Trips per Annum	Ferry-Km	Average Annual Passengers	Passenger-Km
1	Kiyindi	Kiyindi - Kirongo (Buvuma) (UNRA)	0.55	8.00	696	5,568.00	216,305	1,730,440
2	Laropi	Laropi – Umi (UNRA)	0.20	1.50	2,628	3,942.00	816,584	1,224,876
3	Masindi	Masindi Port – Kungu (UNRA)	0.15	1.20	4,032	4,838.40	222,280	266,736
4	Nakiwogo	Nakiwogo-Lutoboka (MOWT, MOWT/Nation Oil Distributors Ltd)	0.32	6.48	2,076	13,452.48	492,333	3,190,318
5	Kyoga 1&2	Zengebe-Namasale (UNRA)	1.18	10.00	1,208	12,080.00	339,514	3,395,140
6	Obongi	Obongi – Sinyanya (UNRA)	0.25	1.20	3,784	4,540.80	616,249	739,499
7	Albert Nile 1	Wanseko - Panyimur (UNRA)	1.00	18.00	660	11,880.00	169,334	3,048,012

No.	Ferry Terminal	O-D	Crossing time (hr)	Voyage Distance (km)	Trips per Annum	Ferry-Km	Average Annual Passengers	Passenger-Km
8	Bisina	Agule – Okokorio (UNRA)	0.43	7.00	1,308	9,156.00	281,005	1,967,035
10	MV Pearl (KIS)	Nakiwogo-Lutoboka (Ssesse Island)	0.5	6.48	2,704	17,527.33	132,288	857,491
11	MV Sese (KIS)	Nakiwogo-Lutoboka (Ssesse Island)	0.5	6.48	2,600	16,853.20	128,544	833,222

## 6.3 Fuel Efficiency

### 6.3.1 KIS Vessels

Kalangala Infrastructure Services (KIS) runs two vessels (i.e. MV Pearl and MV Sese) on Lake Victoria between Bukakata and Bugoma Islands. Both ferries operate daily and travel at an average speed of 4-5 knots for a distance of 3.5 Nautical miles. Considering an average of 8 ferry crossings per vessel per day and the monthly diesel consumption data obtained from KIS, the fuel efficiency of MV Pearl and MV Sese have been estimated as summarised in Table 6-2.

**Table 6-3: Fuel Usage and efficiency (km/L) of KIS Vessels**  
(MEIR's analysis based on KIS, 2020 data)

Month	No. of days	km-travelled	MV Pearl		MV Ssesse	
			Diesel(L)	km/L	Diesel(L)	km/L
Feb-20	29.00	1502.76	12280	0.122	4,244	0.354
Mar-20	31.00	1606.40	12760	0.126	4,111	0.391
Apr-20	30.00	1554.58	4369	0.356	1,279	1.215
May-20	31.00	1606.40	4866	0.330	6,302	0.255
Jun-20	30.00	1554.58	7977	0.195	3,315	0.469
Jul-20	31.00	1606.40	8490	0.189	7,548	0.213
Aug-20	31.00	1606.40	9678	0.166	7,085	0.227
Sep-20	30.00	1554.58	7578	0.205	7,101	0.219
Oct-20	31.00	1606.40	8582	0.187	7,221	0.222
Nov-20	30.00	1554.58	8376	0.186	6,533	0.238
Dec-20	31.00	1606.40	9305	0.173	7,376	0.218
Jan-21	31.00	1606.40	8809	0.182	6,241	0.257
Feb-21	28.00	1450.94	7388	0.196	6,483	0.224
Mar-21	31.00	1606.40	8824	0.182	6,772	0.237
Average				0.200		0.339

### 6.3.2 UNRA Ferries

Table 6-4 provides an indication of the fuel efficiency of major UNRA ferries. These are derived from annual averages of km travelled and fuel consumed by each ferry. Ferry-km are derived from the voyage distances between ferry terminals and average number of trips per year<sup>54</sup>.

**Table 6-4: Fuel Usage and efficiency (km/L) of UNRA Ferries**

No.	Ferry Terminal	O-D	Ferry-Km	Average Annual Fuel Consumption (L) <sup>55</sup>	km/L
1	Kiyindi	Kiyindi - Kirongo (Buvuma) (UNRA)	5568.00	57044	0.098
2	Laropi	Laropi – Umi (UNRA)	3942.00	38701	0.102
3	Masindi	Masindi Port – Kungu (UNRA)	4838.40	24255	0.199
4	Nakiwogo	Nakiwogo-Lutoboka (MOWT, MOWT/Nation Oil Distributors Ltd)	13452.48	39465	0.341
5	Kyoga 1&2	Zengebe-Namasale (UNRA)	12080.00	72239	0.167
6	Obongi	Obongi – Sinyanya (UNRA)	4540.80	47325	0.096
7	Albert Nile 1	Wanseko - Panyimur (UNRA)	11880.00	40889	0.291
8	Bisina	Agule – Okokorio (UNRA)	9156.00	54982	0.167

### 6.3.3 URC Wagon Ferry -MV Kaawa

MV Kaawa is operated by 2 CAT D339 Engines. On average, it travels 28,808 Nautical miles per year and consumes 49litres/Nautical mile.

<sup>54</sup> UNRA,2021. Detailed Design Report for BKK Ferry Landing Sites. Prepared by Terrain Services Ltd [Unpublished]

<sup>55</sup> MOWT (2021) Mitigation Assessment Report for Uganda's Transport Sector

## 7 AVIATION SUB-SECTOR BASELINE DATA

The data obtained for the aviation sector includes the aircraft movements, the number of passengers, and the cargo tonnes handled at Entebbe Airport (Table 7-1) and aircraft movements at other National Aerodromes (Table 7-3). Table 7-2 provides the total of aircraft movements over Entebbe Int. Airport (including non-commercial flights and overflights) and the total fuel consumed per year.

**Table 7-1: Aviation statistics for Entebbe International Airport (Source: MOWT, 2020) <sup>56</sup>**

Description	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
<b>1 Commercial Aircraft Movements</b>										
1.1 International	18,338	20,483	21,852	26,652	25,595	22,743	24,469	25,023	25,154	27,068
1.2 Domestic	3,281	2,837	2,654	3,707	4,769	4,143	3,181	3,324	4,169	5,315
<b>1.3 Total</b>	<b>21,619</b>	<b>23,320</b>	<b>24,506</b>	<b>30,359</b>	<b>30,364</b>	<b>26,886</b>	<b>27,650</b>	<b>28,347</b>	<b>29,323</b>	<b>32,383</b>
<b>2 International Passengers</b>										
2.1 Arrivals	468,899	518,791	551,904	626,509	677,745	665,953	684,152	697,930	753,877	821,198
2.2 Departures	460,153	504,646	533,705	612,027	666,218	666,546	690,962	703,649	757,360	849,034
<b>2.3 Total</b>	<b>929,052</b>	<b>1,023,437</b>	<b>1,085,609</b>	<b>1,238,536</b>	<b>1,343,963</b>	<b>1,332,499</b>	<b>1,375,114</b>	<b>1,401,579</b>	<b>1,511,237</b>	<b>1,670,232</b>
<b>3 Domestic Passengers</b>										
3.1 Arrivals	9,188	6,004	4,832	7,190	13,066	12,164	7,634	7,350	9,539	13,798
3.2 Departures	8,721	5,875	4,676	6,590	12,392	10,625	7,300	6,816	9,285	12,982
<b>3.3 Total</b>	<b>17,909</b>	<b>11,879</b>	<b>9,508</b>	<b>13,780</b>	<b>25,458</b>	<b>22,789</b>	<b>14,934</b>	<b>14,166</b>	<b>18,824</b>	<b>26,780</b>
<b>4 International Cargo (Tonnes)</b>										
4.1 Imports	19,916	21,344	20,713	22,125	21,824	20,644	21,789	20,182	21,592	21,689
4.2 Exports	32,726	27,752	27,923	33,783	34,130	32,197	32,660	39,376	47,712	41,667
<b>4.3 Total</b>	<b>52,642</b>	<b>49,096</b>	<b>48,636</b>	<b>55,908</b>	<b>55,954</b>	<b>52,841</b>	<b>54,449</b>	<b>59,558</b>	<b>69,304</b>	<b>63,356</b>
<b>5 Domestic Cargo (Tonnes)</b>										
5.1 Unloaded	2.000	0.570		0.950	1.215					
5.2 Loaded	6.000	0.010			0.050					
<b>5.3 Total</b>	<b>8.000</b>	<b>0.580</b>	<b>0.000</b>	<b>0.950</b>	<b>1.265</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>

**Table 7-2: Aircraft movements at Entebbe International Airport (Source: CAA,2021)**

DESCRIPTION	2016	2017	2018	2019	2020
International Aircraft Mov'ts	34,198	33,633	32,653	33,179	14,719
Domestic Aircraft Mov'ts	7,929	7,902	8,109	8,417	5,976
Overflights	15,338	15,146	15,968	15,936	8,781
Fuel (litres)	121,608,561	127,501,528	124,564,656	126,967,546	74,632,110

<sup>56</sup> Ministry of Works and Transport (2020) *Draft Interim Report. Phase 2: preparation of the national integrated transport master plan, 2021-2040*

**Table 7-3: Aircraft movements at National Aerodromes (Source: MOWT, 2020)<sup>57</sup>**

AIRPORT	2014	2015	2016	2017	2018
ARUA	2305	1336	1464	1804	2298
GULU	398	428	390	226	476
KASESE	544	520	692	800	1445
PAKUBA	464	210	266	298	440
SOROTI	768	4804	410	752	268
MOROTO	336	366	400	422	512
MBARARA	80	182	150	102	98
MASINDI	14	2	0	0	0
JINJA	202	138	168	294	844
LIRA	128	58	42	100	86
KISORO	566	488	634	774	1082
KIDEPO	444	314	330	260	465
TORORO	56	44	102	170	105
<b>TOTAL</b>	<b>6305</b>	<b>8890</b>	<b>5048</b>	<b>6002</b>	<b>8119</b>

## 8 EXPECTED FUTURE TRENDS IN THE TRANSPORT SECTOR

This section discusses the future growth and prospects of Uganda's transport sector. The information has been drawn from various documents and provides an initial assessment of what the future holds. In the next phase of the project there will be further discussions with various stakeholders, including CCD, and national experts to gain further insight into the future outlook of the transport sector.

### 8.1 Socio-economic Drivers

As part of the preparation of the Expressway Development Master Plan (EDMP)<sup>58</sup> a very detailed demand side modelling exercise for the period 2020 to 2070 was completed. The socio-economic indicators applied in the study are shown in Table 8-1 below.

**Table 8-1: Summary of socio-economic indicator forecasts (Source: UNRA, 2020)<sup>59</sup>**

Socio-economic indicator	Scenario	2030	2050	2070
Population (person)	Low growth	53,758,069	81,521,495	117,554,158
	Central growth	54,875,430	86,587,689	129,989,002
	High growth	54,875,430	88,862,067	138,872,529

<sup>57</sup> Ministry of Works and Transport (2020) *Draft Interim Report. Phase 2: preparation of the national integrated transport master plan, 2021-2040*

<sup>58</sup> UNRA (2020) Expressway Development Master Plan Travel Demand Modelling Report by the Consultant

<sup>59</sup> UNRA (2020) Expressway Development Master Plan Travel Demand Modelling Report by the Consultant



GDP (mil USD)	Low growth	65,942	191,291	555,379
	Central growth	74,323	258,695	901,299
	High growth	80,009	333,590	1,392,403
GDP/Cap (USD)	Low growth	1,202	2,209	4,273
	Central growth	1,354	2,988	6,934
	High growth	1,458	3,853	10,712

## 8.2 The Roads Subsector

The dominant growth will be in the road sector, where traffic is expected to reflect economic growth through traffic growth at about 8% per annum to 2013, and 7% thereafter<sup>60</sup>. The Vision 2040<sup>61</sup> indicates that by 2040:

- Uganda will have an average paved road density of 100 km per 1000 km<sup>2</sup>. The main strategies will include:
  - Development of highways connecting Uganda to the neighbouring countries and the major productive centres within the country;
  - Improvement of road infrastructure within the Greater Kampala Metropolitan Area and other urban areas; and
  - Multi-lane express ways and superhighways connecting major cities, exit ports and economic zones will be built.
  - Investment in non-motorised transport infrastructure mainly in Greater Kampala Metropolitan Area and other cities.
- GKMA will have a safe and efficient transport system based on high quality public transport and a complementary non-motorised transport network. The strategy will be driven by heavy rails, new light rail systems and bus rapid transit and trams.

The outputs of the EDMP demand side modelling<sup>62</sup> are provided in Table 8-2. Some of the assumptions made in this model are;

- Modal shift assumptions:
  - A decrease in the proportion of motorcycles in the future, therefore the mode proportion was maintained until 2030 after which a reduction of 5% over 10 years to 2040 was assumed. The final target year (2070) is assumed to be a 20% reduction of motorcycles.
  - The ratio of small trucks, medium trucks, and heavy trucks handling freight traffic are at 43.2%, 15.5%, and 41.3% in 2030, respectively, and the same model was applied to the future modal split.
  - Although modal shares of freight traffic using trucks is expected to change in the future, the same modal shares model between present and future freight traffic was applied due to lack of relevant studies and the government's policies as of now.
- For VKT it was estimated that 81.5 million VKT per day (or 29.75 billion VKT per year) would occur in the 2019 base year.

<sup>60</sup> MoWT, 2009: National Transport Master Plan Including a Transport Master Plan for the Greater Kampala Metropolitan Area (NTMP/GKMA)

<sup>61</sup> NPA, 2013: Vision 2040 Uganda, <http://www.npa.go.ug/wp-content/uploads/2021/02/VISION-2040.pdf>

<sup>62</sup> UNRA (2020) Expressway Development Master Plan Travel Demand Modelling Report by the Consultant

**Table 8-2: Projections from the EDMP travel demand study (Source: UNRA, 2020)<sup>63</sup>**

Metric	2030	2050	2070
Length of roads improved as part of the expressway networks.	756.2 km	2480.1 km	5202.2 km
Modal split (vehicles per day)	Passenger cars: 561184 Buses: 238443 Motorcycles: 962636 Small trucks: 39505 Medium trucks: 14151 Heavy trucks: 37834		Passenger cars: 2066314 Buses: 865898 Motorcycles: 1599089 Small trucks: 1213463 Medium trucks: 457075 Heavy trucks: 1070000
VKT per day on all roads	188.3 million	293.6 million	660.0 million
VKT per day on expressway network	16.6 million	66.6 million	223.4 million

GKMA developed a Multi-modal Urban Transport Plan which included metro infrastructure development, the development of the BRT and LRT systems, development of the cable car, provision of NMT facilities and several soft measures. The length of the planned BRT routes and NMT corridors are shown in Table 8-3 and 8-4, respectively.

**Table 8-3: Length of the planned BRT routes (Source: MMUTMP-GKMA, 2018<sup>64</sup>)**

BRT Line	Length (km)	Route	Daily Ridership
BRT 1	22.2	Mukono-CBD	462,418
BRT 2	38.5	Entebbe-CBD	170,735
BRT 3	19.9	Maya - CBD	291,258
BRT 4a	9.8	Kawempe-CBD	161,331
BRT 4b	10.6	Kyanja-CBD	234,602
	Total km = 101		

**Table 8-4: Length of the NMT corridors (Source: MMUTMP-GKMA, 2018<sup>65</sup>)**

Area	Number of NMT corridors	Total Length (Km)
Water Channel Corridor	4	27
Railway Corridor	2	27
City Centre	5	8
Others	2	11
<b>Total</b>	<b>13</b>	<b>68</b>

<sup>63</sup> UNRA (2020) Expressway Development Master Plan Travel Demand Modelling Report by the Consultant

<sup>64</sup> Multi-Modal Urban Transport Master Plan for Greater Kampala Metropolitan Area (GKMA), 2018

<sup>65</sup> Multi-Modal Urban Transport Master Plan for Greater Kampala Metropolitan Area (GKMA), 2018

### 8.2.1 Plans and projections for GKMA

As part of the Plan, a projection modelling exercise was completed to model transport for GKMA for 2025 and 2040. There were various scenarios (details provided in MMUTMP-GKMA, 2018) but two main scenarios were modelled as follows;

- The Realistic Scenario – in which Kampala retains its current domination of formalized employment, and in both 2025 and 2040 will account for almost two thirds of the supply of workplaces.
- The GKMA Physical Development Framework (PDF) Scenario – considers the planned or forecasted land use patterns reported in the approved 2011/12 GKMA Physical Development Framework. This scenario is characterized by decentralization of employment centres within the GKMA, extending outwards from Kampala to both existing urban centres expected to intensify as well as new urban centres planned as new towns.

The projected 2040 modal splits for each of the above scenarios are presented in the excerpts below, which have been extracted from the MMUTMP-GKMA Report (see Table 8-5). The projected 2040 emissions for each of the scenarios above are also reported in Table 8-6.

**Table 8-5: Forecasted 2040 Mode Split in GKMA** (Source: MMUTMP-GKMA, 2018<sup>66</sup>)

**Table 9-3 – 2040 Mode Split Real LU**

	2040 Real Reference	2040 Real LRT	2040 Real Metro	2040 Real Metro Plus	2040 Real Metro Plus Plus
<b>Car Share</b>	<b>9.0%</b>	<b>8.0%</b>	<b>7.9%</b>	<b>7.8%</b>	<b>7.0%</b>
Boda boda Share	17.7%	11.0%	10.5%	10.0%	10.1%
PT Share	32.8%	45.8%	47.1%	47.9%	48.2%
NMT Share	39.9%	34.6%	34.0%	33.8%	34.2%
MRT Share of PT	7.3%	34.1%	40.9%	43.4%	40.9%
<b>VHT</b>	<b>1,711,212.0</b>	<b>484,863.5</b>	<b>445,226.6</b>	<b>427,695.5</b>	<b>301,489.2</b>

**Table 9-4 2040 Mode Split PDF LU**

	2040 PDF Reference	2040 PDF LRT	2040 PDF Metro	2040 PDF Metro Plus	2040 PDF Metro Plus Plus
<b>Car Share</b>	<b>13.0%</b>	<b>10.8%</b>	<b>10.3%</b>	<b>10.1%</b>	<b>9.6%</b>
Boda boda Share	13.0%	9.5%	9.2%	8.9%	9.2%
PT Share	29.9%	41.4%	43.0%	44.0%	44.3%
NMT Share	43.4%	37.6%	36.8%	36.3%	36.3%
MRT Share of PT	8.5%	41.8%	45.0%	48.5%	46.4%
<b>VHT</b>	<b>1,142,979.6</b>	<b>720,988.0</b>	<b>648,433.0</b>	<b>633,361.6</b>	<b>374,848.8</b>

<sup>66</sup> Multi-Modal Urban Transport Master Plan for Greater Kampala Metropolitan Area (GKMA), 2018

The Table 8-5 below shows the projected 2040 annual emissions in GKMA for various transport modes including the monetized environmental savings for real and PDF land use scenarios resulting from use of the respective modes.

**Table 8-5: Forecast 2040 emissions in GKMA (Source: MMUTMP-GKMA, 2018<sup>67</sup>)**

Mode	CO2 Emission Per Vehicle KM	2040 Real Reference	2040 Real LU Optimal	2040 PDF Reference	2040 PDF LU Optimal	2040 Real LU Optimal Benefit	2040 PDF LU Optimal Benefit
	Grams	Annual Emissions (Thousands of Tons)				Annual Savings (Millions USD)	
Car	120	920	767	1,841	1,506	3.63	0.69
BB	45	1,058	467	573	334	14.05	5.69
Taxi	350	370	387	268	235	-0.39	0.79
Bus	600	43	45	31	27	-0.05	0.09
Metro	7,000	-	41	-	41	-0.98	-0.98
LRT	3,500	-	28	-	28	-0.66	-0.66
BRT	800	7	30	7	30	-0.55	-0.55
Cable Car		-	-	-	-	-	-
Suburban Rail	10,500	4	4	4	4	-	-
Truck	800	478	519	398	464	-0.99	-1.57
<b>Total</b>	-	<b>2,879</b>	<b>2,288</b>	<b>3,121</b>	<b>2,668</b>	<b>14.06</b>	<b>10.78</b>

\*Social cost of CO2 is \$23.8 per metric ton (Source EERE 2017)

### 8.3 The Railway Subsector

The Vision 2040<sup>68</sup> indicates that by 2040:

- Uganda will have a multi-lane standard gauge railway system with high speed trains using the latest technology for both passenger transport and cargo freights. The standard gauge network will link Uganda to at least four routes to the sea through Mombasa, Dar-es-salaam, Djibouti and Tanga Ports connecting to the world superhighway. It will connect Mombasa to Kampala, Kasese, Kigali (Rwanda) and Kisangani (DRC). It will also link Tororo to Gulu, Nimulle, Juba and Djibouti. There will also be a link from Bukasa port on Lake Victoria to Musoma (Tanzania) and Kisumu (Kenya) linking to Tanzania and Kenya railway systems respectively. A link from Kasese to Pakwach will serve the oil producing and tourism areas of West and North west Uganda.
- GKMA will have an efficient transport system which will be driven by heavy rails, new light rail systems and bus rapid transit and trams. The light rail system will be developed and extended to cover the present GKMA, Wakiso, Mukono and Entebbe. Special and dedicated rail-lines connecting GKMA to Entebbe International Airport will be built. In addition, light rails will be developed in the other four proposed regional cities of Mbarara, Mbale, Arua and Gulu.

<sup>67</sup> Multi-Modal Urban Transport Master Plan for Greater Kampala Metropolitan Area (GKMA), 2018

<sup>68</sup> NPA (2013) Vision 2040 Uganda, <http://www.npa.go.ug/wp-content/uploads/2021/02/VISION-2040.pdf>

## 8.4 The Aviation Subsector

The Vision 2040<sup>69</sup> states that by 2040 Uganda will capitalize on its geo-graphical positioning to develop Entebbe International Airport as the regional hub. This requires transforming the airport to class A standards by improving the associated infrastructure. To consolidate this strategy Uganda has put in place a national carrier to increase connectivity to various destinations. Furthermore, Uganda will upgrade four aerodromes to exit ports (see Table 2-1 for details). Government will use PPPs to increase domestic flights to various parts of the country. The Nakasongola airport will be developed to a world standard class A International Airport for strategic reasons.

## 8.5 The Inland Water Subsector

The Vision 2040<sup>70</sup> states that Uganda will aim to reduce the cost of transportation and increase connectivity by gearing towards increasing the volume of passenger and cargo traffic by marine transport. Government will establish navigable routes and put in place adequate marine infrastructure.

## 8.6 Future Key Transport Projects

The Phase 2 interim report for the NIMTP<sup>71</sup> indicates the following major infrastructure development projects:

- Road transport:
  - About 1,000 km of road development has been committed and about 1,500km are on-going projects rehabilitation/procurements. These road projects include:
    - On-going projects rehabilitation/procurement: Rehabilitation of the main road corridors connecting Kampala with the rest of the country; rehabilitation of main road corridor connecting Arua; rehabilitation of main road corridors on the Southwest; rehabilitation of main towns roads; on-going projects through asset management scheme.
    - Committed on-going/procurement: Oil Roads; Albertine region roads; other committed projects across the country.
    - Road capacity improvements and expressway developments: Kampala capacity improvement projects; Kampala expressways; other Expressway developments.
    - On-going bridge projects.
    - Continuing with road rehabilitation and improvements: These projects amount, on average, to around 300 km per year for the next ten years, which is similar to what UNRA has achieved in previous years., It is assumed the same level of rehabilitation and improvement works of 300 km of road will be completed per year, for the next ten years.
  - District, Urban and Community Access Roads (DUCAR): considering an average of 50 km per year for the next 10 years, this programme would cover 500 km of DUCAR roads distributed throughout the country.
  - For the KCCA: considering an average of 50 km per year in the next 50 years, this programme would cover 500 km of KCCA roads.
- Railways:
  - Rehabilitation and improvement of MGR: Tororo–Gulu; Malaba–Kampala; Kampala–Nalukolongo; Nalukolongo–Kyengera–Bujoko.

<sup>69</sup> NPA (2013) Vision 2040 Uganda, <http://www.npa.go.ug/wp-content/uploads/2021/02/VISION-2040.pdf>

<sup>70</sup> NPA (2013) Vision 2040 Uganda, <http://www.npa.go.ug/wp-content/uploads/2021/02/VISION-2040.pdf>

<sup>71</sup> MoWT (2020) Interim Report: Phase 2: Preparation of the National Integrated Transport Master Plan, 2021-2040.

- Rehabilitation of rolling stock and other critical equipment: Revert from KRC, repair and maintain rail rolling stock; revert from KRC the railway signalling and telecommunications system to URC.
- Expansion of the passenger train services in Kampala.
- Aviation:
  - Entebbe Airport rehabilitation and expansion, including the design, construction and equipage of a new control tower; and the construction of Kabaale International Airport.
- In-land water transport:
  - Rehabilitation of Port Bell and Port Jinja, the construction of Bukasa port and the rehabilitation of MV Pamba.

## 8.7 Costs associated with planned transport activities

High level costs associated with the planned transport activities are summarized in Table 8-6. Figure 8-1 provides the capital expenditure versus passenger throughput for various modes. However, this costing information will require future validation for example in detailed feasibility studies.

**Table 8-6: Vehicle capacity and operational speed by PT mode**

Mode	Functional Speed	Passenger Capacity	Vehicle Unit Cost (USD) est.
Taxi	10 km/hr	15	15,000
Bus	10 km/hr	50 Articulated 80 - 100	150,000
Intercity bus	10 km/hr	50	150,000
Metro	25 km/hr	1,000	60,000 - 80,000 USD per meter, expected Kampala train length, 100 - 120m, estimated trainset cost: 8 million
LRT	Under reasonable traffic conditions 22 - 27km/hr	550	2,000,000 to 2,500,000
BRT	Under reasonable traffic conditions 22 - 27km/hr	120	200,000 to 300,000
Suburban Rail	30 km/hr	1,000	60,000 - 80,000 USD per meter, expected Kampala train length, 100 - 120m, estimated trainset cost: 8 million
Cable Car	15 km/hr	15	50,000

Figure 8-1: Comparison of capital expenditure versus passenger throughput



## 9 CONCLUDING REMARKS

This report presents the data MEIR has been able to collect amid several data accessibility challenges, mainly due to bureaucracy. The report presents relevant data for the roads, aviation, marine and railways subsector. Where possible, effort has been made to present the data in formats specified by the Consultant for Mitigation Potential Analysis, Ricardo. However, we have also included more data that we think could be beneficial to the other aspects of the mitigation modelling, especially, the forecasting of future scenarios. MEIR is still available to support the validation exercise of the mitigation assessment model.

## **APPENDIX 1**

## **APPENDIX 2**

## TRAFFIC FORECAST FOR MINIMUM REHABILITATION ALTERNATIVE, LOW GROWTH SCENARIO

**Non-Containerized Traffic, Tonnes**

Description	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Dry General Cargo	3,991	4,933	5,927	6,977	8,085	9,253	9,530	9,816	10,111	10,414	10,727	11,048	11,380	11,721	12,073
Dry Bulk Cargo	35,886	39,233	42,768	46,500	50,436	54,586	55,572	56,588	57,635	58,713	59,823	60,967	62,145	63,358	64,607
Cement	36,237	44,789	53,821	63,355	73,413	84,017	86,537	89,133	91,807	94,561	97,398	100,320	103,330	106,430	109,623
Seed Cake	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951
Inputs to sunflower mills	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560
Crude petroleum	1,500,000	3,000,000	5,071,854	5,071,854	5,071,854	5,071,854	5,071,854	5,071,854	5,071,854	5,071,854	5,071,854	5,071,854	5,071,854	5,071,854	5,071,854
Oilfield Supplies, Uganda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Refinery Construction, Uganda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Local cash crops	1,313	1,623	1,950	2,295	2,660	3,044	3,135	3,229	3,326	3,426	3,529	3,635	3,744	3,856	3,972
RANDGOLD traffic	1,394	1,394	1,394	1,394	1,394	1,394	1,394	1,394	1,394	1,394	1,394	1,394	1,394	1,394	1,394
Oilfield Supplies, Sudan	32,000	32,000	0	0	0	0	0	0	0	0	0	0	0	0	0
Refinery Construction, Sudan	40,000	40,000	40,000	40,000	40,000	0	0	0	0	0	0	0	0	0	0
Total Tonnes	1,702,332	3,215,482	5,269,225	5,283,886	5,299,352	5,275,658	5,279,534	5,283,526	5,287,638	5,291,873	5,296,236	5,300,729	5,305,357	5,310,124	5,315,033

**Non-Containerized Traffic, Tonne-Kms. (000)**

Description	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Dry General Cargo	5,634	6,964	8,368	9,850	11,414	13,063	13,454	13,858	14,274	14,702	15,143	15,597	16,065	16,547	17,044
Dry Bulk Cargo	55,264	60,087	65,181	70,557	76,229	82,209	83,630	85,094	86,602	88,155	89,755	91,403	93,100	94,848	96,649
Cement	12,564	15,529	18,661	21,966	25,453	29,130	30,004	30,904	31,831	32,786	33,769	34,783	35,826	36,901	38,008
Seed Cake	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873
Inputs to sunflower mills	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890
Crude petroleum	2,407,080	4,814,160	8,138,905	8,138,905	8,138,905	8,138,905	8,138,905	8,138,905	8,138,905	8,138,905	8,138,905	8,138,905	8,138,905	8,138,905	8,138,905
Oilfield Supplies, Uganda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Refinery Construction, Uganda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Local cash crops	1,948	2,408	2,893	3,406	3,947	4,517	4,652	4,792	4,935	5,084	5,236	5,393	5,555	5,722	5,893
RANDGOLD traffic	2,237	2,237	2,237	2,237	2,237	2,237	2,237	2,237	2,237	2,237	2,237	2,237	2,237	2,237	2,237
Oilfield Supplies, Sudan	47,138	47,138	0	0	0	0	0	0	0	0	0	0	0	0	0
Refinery Construction, Sudan	58,923	58,923	58,923	58,923	58,923	0	0	0	0	0	0	0	0	0	0
Total Tonne-Kms	2,633,551	5,050,208	8,337,930	8,348,607	8,359,870	8,312,823	8,315,645	8,318,553	8,321,547	8,324,632	8,327,808	8,331,081	8,334,451	8,337,923	8,341,498

**Containerized Traffic, TEUs**

Description	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Dry General Cargo	2,748	3,499	4,187	4,877	5,604	6,371	6,562	6,759	6,962	7,171	7,386	7,607	7,835	8,071	8,313
Inputs to Sunflower Plants	13	16	19	22	26	29	30	31	32	33	34	35	36	37	38
Inputs to RANDGOLD Mine	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440
Total TEUs	4,200	4,955	5,646	6,339	7,070	7,840	8,032	8,230	8,434	8,643	8,860	9,082	9,311	9,548	9,791

(Source: CANARAIL (2011)., *Feasibility study for upgrading Tororo – Pakwach Railway Line*, Appendix F. Ministry of Works and Transport)

## TRAFFIC FORECAST FOR MINIMUM REHABILITATION ALTERNATIVE, LOW GROWTH SCENARIO

**Non-Containerized Traffic, Tonnes**

Description	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Dry General Cargo	12,435	12,808	13,192	13,588	13,996	14,416	14,848	15,294	15,752	16,225	16,712	17,213	17,729	18,261	18,809
Dry Bulk Cargo	65,894	67,220	68,586	69,992	71,441	72,933	74,470	76,053	77,683	79,362	81,092	82,874	84,709	86,599	88,546
Cement	112,911	116,299	119,788	123,381	127,083	130,895	134,822	138,867	143,033	147,324	151,743	156,296	160,985	165,814	170,789
Seed Cake	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951	47,951
Inputs to sunflower mills	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560	3,560
Crude petroleum	5,071,854	5,071,854	5,071,854	5,071,854	5,071,854	0	0	0	0	0	0	0	0	0	0
Oilfield Supplies, Uganda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Refinery Construction, Uganda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Local cash crops	4,091	4,214	4,340	4,470	4,604	4,743	4,885	5,031	5,182	5,338	5,498	5,663	5,833	6,008	6,188
RANDGOLD traffic	1,394	1,394	1,394	1,394	1,394	0	0	0	0	0	0	0	0	0	0
Oilfield Supplies, Sudan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Refinery Construction, Sudan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Tonnes	5,320,091	5,325,299	5,330,664	5,336,191	5,341,882	274,497	280,536	286,755	293,162	299,760	306,556	313,556	320,767	328,193	335,843

**Non-Containerized Traffic, Tonne-Kms. (000)**

Description	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Dry General Cargo	17,555	18,082	18,624	19,183	19,758	20,351	20,962	21,590	22,238	22,905	23,592	24,300	25,029	25,780	26,553
Dry Bulk Cargo	98,503	100,414	102,381	104,408	106,495	108,645	110,860	113,140	115,490	117,910	120,402	122,969	125,613	128,337	131,142
Cement	39,148	40,322	41,532	42,778	44,061	45,383	46,745	48,147	49,592	51,079	52,612	54,190	55,816	57,490	59,215
Seed Cake	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873	37,873
Inputs to sunflower mills	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890
Crude petroleum	8,138,905	8,138,905	8,138,905	8,138,905	8,138,905	0	0	0	0	0	0	0	0	0	0
Oilfield Supplies, Uganda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Refinery Construction, Uganda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Local cash crops	6,070	6,252	6,440	6,633	6,832	7,037	7,248	7,465	7,689	7,920	8,158	8,402	8,654	8,914	9,181
RANDGOLD traffic	2,237	2,237	2,237	2,237	2,237	0	0	0	0	0	0	0	0	0	0
Oilfield Supplies, Sudan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Refinery Construction, Sudan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Tonne-Kms	8,345,181	8,348,975	8,352,882	8,356,906	8,361,051	224,179	228,577	233,106	237,772	242,577	247,526	252,624	257,875	263,284	268,855

**Containerized Traffic, TEUs**

Description	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Dry General Cargo	8,562	8,819	9,083	9,356	9,637	9,926	10,223	10,530	10,846	11,171	11,507	11,852	12,207	12,574	12,951
Inputs to Sunflower Plants	39	40	42	43	44	46	47	48	50	51	53	54	56	58	59
Inputs to RANDGOLD Mine	1,440	1,440	1,440	1,440	1,440	0	0	0	0	0	0	0	0	0	0
Total TEUs	10,041	10,299	10,565	10,839	11,121	9,971	10,270	10,579	10,896	11,223	11,559	11,906	12,263	12,631	13,010

(Source: CANARAIL (2011)., *Feasibility study for upgrading Tororo – Pakwach Railway Line, Appendix F*. Ministry of Works and Transport)