THE PROJECT FOR CAPACITY ENHANCEMENT OF KCCA IN MANAGEMENT OF TRAFFIC FLOW IN KAMPALA CITY IN UGANDA

PROJECT COMPLETION REPORT

ANNEX-1

URBAN TRAFFIC MANAGEMENT PLAN (UTMP)

January 2022

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

ORIENTAL CONSULTANTS GLOBAL CO., LTD.

IM
JR
22-013

THE PROJECT FOR CAPACITY ENHANCEMENT OF KCCA IN MANAGEMENT OF TRAFFIC FLOW IN KAMPALA CITY IN UGANDA

PROJECT COMPLETION REPORT

ANNEX-1

URBAN TRAFFIC MANAGEMENT PLAN (UTMP)

January 2022

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

ORIENTAL CONSULTANTS GLOBAL CO., LTD.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATION

Sl. No.	Abbreviations	Full Expansion
1	AfDB	African Development Bank
2	ATC	Area Traffic Control
3	BRT	Bus Rapid Transit
4	D/D	Detailed Design
5	DETS	Directorate of Engineering and Technical Services
6	DPP	Directorate of Physical Planning
7	EU	European Union
8	EUR (€)	Euro
9	F/S	Feasibility Study
10	FY	Fiscal Year
11	GKMA	Greater Kampala Metropolitan Area
12	GOU	Government of Uganda
13	GVW	Gross Vehicle Weight
14	HGV	Heavy Goods Vehicle
15	ITS	Intelligent Transport System
16	KCCA	Kampala Capital City Authority
17	KIIDP	Kampala Institutional and Infrastructure Development Plan
18	KPDP	Kampala Physical Development Plan
19	KSTP	Kampala Smart Traffic Project
20	LOS	Level of Service
21	LRT	Light Rail Transit
22	MATA	Metropolitan Area Transport Authority
23	MMUTMP	Multimodal Urban Transport Master Plan
24	MODERATO	Management of Origin-destination related Adaptation for Traffic Optimization
25	MOFPED	Ministry of Finance, Planning and Economic Development
26	MoWT	Ministry of Works & Transport
27	MP	Management Plan
28	MRT	Mass Rapid Transit
29	NDP	National Development Plan
30	NMT	Non-Motorized Traffic
31	NTMP/GKMA	National Transport Master Plan including A Transport Master Plan for the Greater Kampala Metropolitan Area
32	NTR	Non Tax Revenue
33	PEB	Pioneer Easy Bus
34	PPP	Public Private Partnerships

Sl. No.	Abbreviations	Full Expansion
35	PT	Public Transport
36	SGR	Standard Gauge Project
37	TCC	Traffic Control Centre
38	TCIP	The Project for the Improvement of Traffic Control in Kampala City
39	TDM	Travel Demand Model
40	TDMP	Transportation Demand Management Plan
41	TIA	Traffic Impact Assessment
42	UBS	Uganda Bureau of Statistics
43	US$	United States Dollar
44	UTODA	Uganda Taxis Operators and Drivers Association
45	VOC	Volume over Capacity
46	VVIP	Very Very Important Person
47	WB	World Bank

1 INTRODUCTION

1.1 Background

1.1.1 Uganda experienced a sharp population increase from 24.2 million in 2002 to 34.9 million in 2014, being one of African countries with the biggest population increase in the last 20 years. According to population projection by Uganda Bureau of Statistics (UBS), the national population will be increased up to 41.2 million in 2020. The increase rate in the urban zone is estimated to be 6.1%, which is much higher than that of the national average of 3.1% from 2002 to 2014, as per UBS census report.

1.1.2 The Kampala metropolitan area (Greater Kampala Metropolitan Area: GKMA) that is the nation's economic and political centre generates 50% of its GDP as 80% of all industrial sectors concentrate there. Progress of urban sprawl development as a result of concentration of goods and people in Kampala has caused threating of basic human needs in areas where there is an urgent need to improve the public services which include the infrastructure development as the population is increasing.

1.1.3 Along with economic development, the GKMA is facing the rapid motorization especially for motorcycle while the road space is limited due to the hilly topography. As other emerging countries experienced, it is expected that the motorization trend might be further accelerated. Since the reduction of road travel speed affects service level of the road-based public transport, traffic congestion enhances modal shift to private mode of transport. Therefore, this causes vicus circle of motorization.

1.1.4 In addition, pedestrians, motorcyclists and motorcycle passengers are suffering from fatal traffic accidents. 88% of fatalities of traffic accidents in Kampala are them according to the traffic accident statistics data from 2012 to 2014. Casualties can significantly increase in line with motorization and population increase.

1.1.5 Therefore, the Government of Uganda is taking vigorous actions on transport issues in Kampala. The interventions include infrastructure development, institutional arrangement, formulation of legal framework and expanding financial capacities by several government authorities including the Kampala Capital City Authority (KCCA) which is established in 2010 with expanded autonomy and budgetary capacities and other central government institutions such as the Ministry of Works, the Uganda National Road Authority and the Uganda Police Force.

1.1.6 Meanwhile, the Government of Uganda as well as the Kampala Capital City Authority (KCCA) developed several policies and plans in transport sector. The "National Transport Policy" formulated by the Ministry of Works and Transport (MOWT) in 2014 provides overall direction of transport sector in the country including infrastructure development and management policy interventions to alleviate traffic congestion. The "National Transport Master Plan including a Transport Master Plan for the Greater Kampala Metropolitan Area (NTMP/GKMA)", which was approved by the Cabinet in 2010, set out a framework for urban transport sector development for the GKMA for the period of 2008 – 2023. In addition, A detailed "Strategic Implementation Plan (SIP) for NTMP/GKMA 2015 – 2023" was prepared

in 2015 by the MOWT to consider new initiatives after 2008 and to guide implementation of NTMP/GKMA especially focusing on infrastructure development.

1.1.7 With regard to the plans and policies of the KCCA, the "Kampala Physical Development Plan (KPDP)" including transport model and transport project list directs the physical development of the city targeting year 2040. The KCCA also prepared the "Urban Transport Policy and Strategy for Greater Kampala Metropolitan Area (GKMA Urban Transport Policy)" in 2014. The GKMA Urban Transport Policy was intended to integrate scattered national and regional policy into one instrument. In addition, the "Decongestion Plan for Kampala" describes detailed schedule of short (2015), medium (2016-2019) and long (beyond 2020) term policy interventions to alleviate traffic congestion. "Multi-Modal Urban Transport Master Plan for Greater Kampala Metropolitan Area (GKMA)" has been formulated in 2018 as a part of "Kampala Institutional and Infrastructure Development Project Phase 2 (KIIDP2)" with funding from the World Bank.

1.1.8 Based on the policies and plans mentioned above, a number of transport sector projects have commenced such as road infrastructure development, introduction of new transit systems, transport management policies and capacity building of government authorities.

1.1.9 However, it is alleged that the countermeasures are not catching up with the rapid increase of motor vehicles and urbanization trend in the GKMA. It also should be noted that these policy interventions should be carefully arranged and coordinated taking relations of each policy into account.

1.1.10 Taking this background into consideration, the Kampala Capital City Authority (KCCA) and the Japan International Cooperation Agency (JICA) commenced the technical cooperation project, "the Project for Capacity Enhancement of KCCA in Management of Traffic Flow in Kampala City in Uganda" (hereinafter referred to as the "Kampala Smart Traffic Project" or the "KSPT") aiming to enhance the capacity of traffic flow management in 2015.

1.1.11 The Urban Traffic Management Plan (UTMP) is one of the core components of the KSTP to coordinate various on-going and planned projects, to give clear policy direction on traffic management in GKMA and to formulate the plan for short, intermediate and long term.

1.2 Objectives

1.2.1 While there are various transport sector policy and planning documents, traffic management was not the main focus as infrastructure development was the highlight. Taking Kampala's geographical and topological constraint on transport infrastructure development, maximum utilization of existing road space is essential. Therefore, the objective of the Urban Traffic Management Plan is to support smooth management of urban traffic in Kampala by;

1) Clarifying issues in urban traffic management,
2) Setting visions and goals of the traffic management,
3) Coordinating a number of on-going and planned projects,

4) Determining policy directions on road traffic management, and,
5) Formulating action plans on urban road traffic management.

1.3 Planning Horizon

1.3.1 The "Uganda 2040", the national long-term development vision, is targeting year 2040. The "Second National Development Plan (NDPII) 2015/16 – 2019/20" provides detail plan for 2015/16 – 2019/20. In terms of transport, the latest plan of the "Strategic Implementation Plan (SIP) for NTMP/GKMA 2015 – 2023" follows planning target of 2023 which is defined by the NTMP/GKMA.

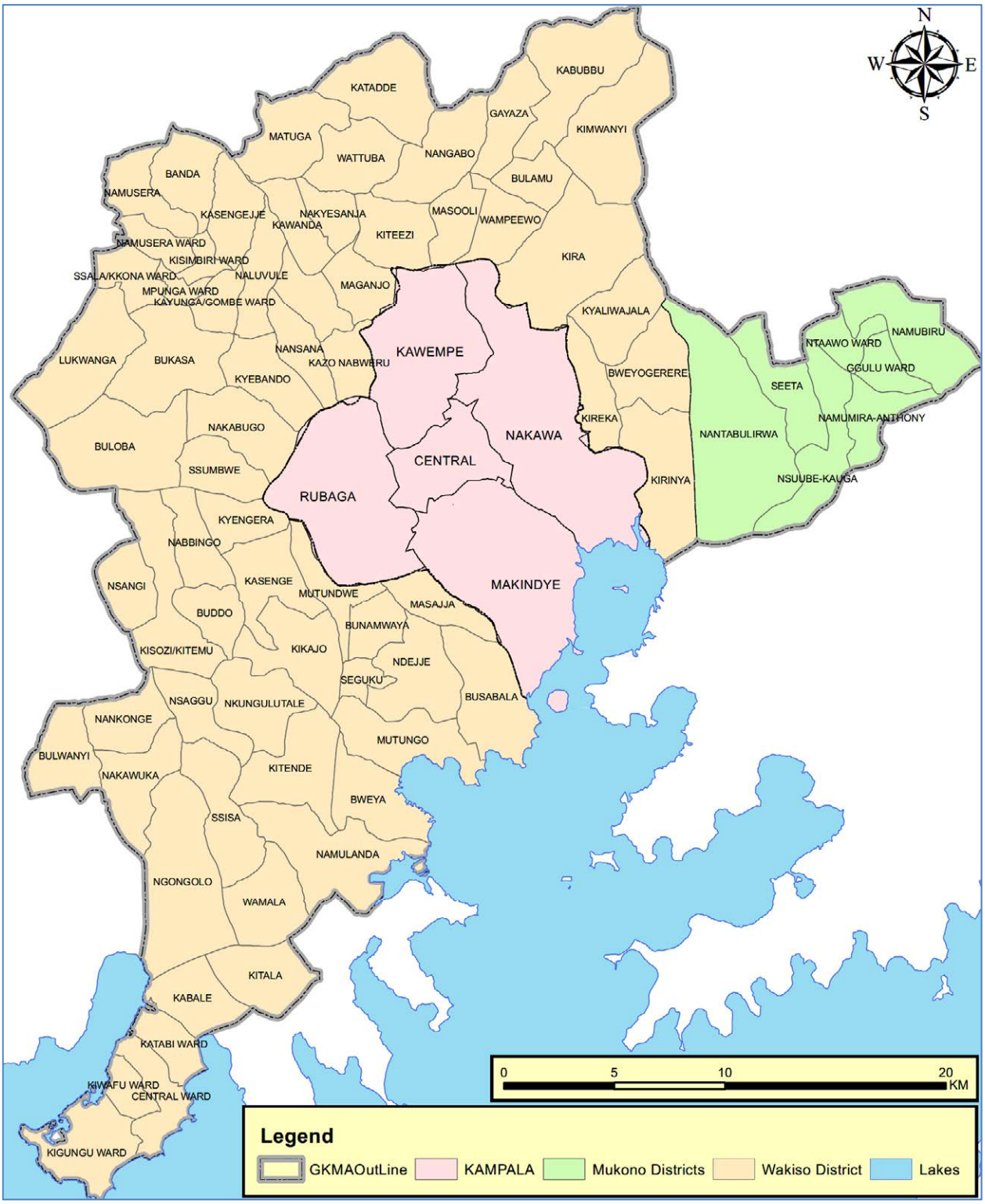
1.3.2 When it comes to the KCCA, the "Kampala Physical Development Plan (KPDP)" mainly describes plans of 10 years from 2012 to 2021 while it also refers long-term goal of 2040. On the other hand, the "Decongestion Plan for Kampala" defines 2016-19 as medium and beyond 2020 for long term.

1.3.3 Since most of traffic management policy interventions can be done in short term such as 3 to 5 years, the short-term target is defined as 2023. In line with existing policies and plans, "medium-term" and "long-term" refers to 2030 and 2040 respectively in this document. As "immediate action" should be implemented within the project period of the KSTP, it refers to 2020.

1.4 Planning Area

1.4.1 In line with "National Transport Master Plan Including a Transport Master Plan for the Greater Kampala Metropolitan Area (NTMP/GKMA)" as well as the "Kampala Physical Development Plan (KPDP)", the Greater Kampala Metropolitan Area (GKMA) is planning area of the this UTMP.

1.4.2 As the key traffic problems of traffic congestion and traffic accident are obvious in KCCA, the proposed management plans are mainly in the KCCA jurisdiction.



Source: KSTP

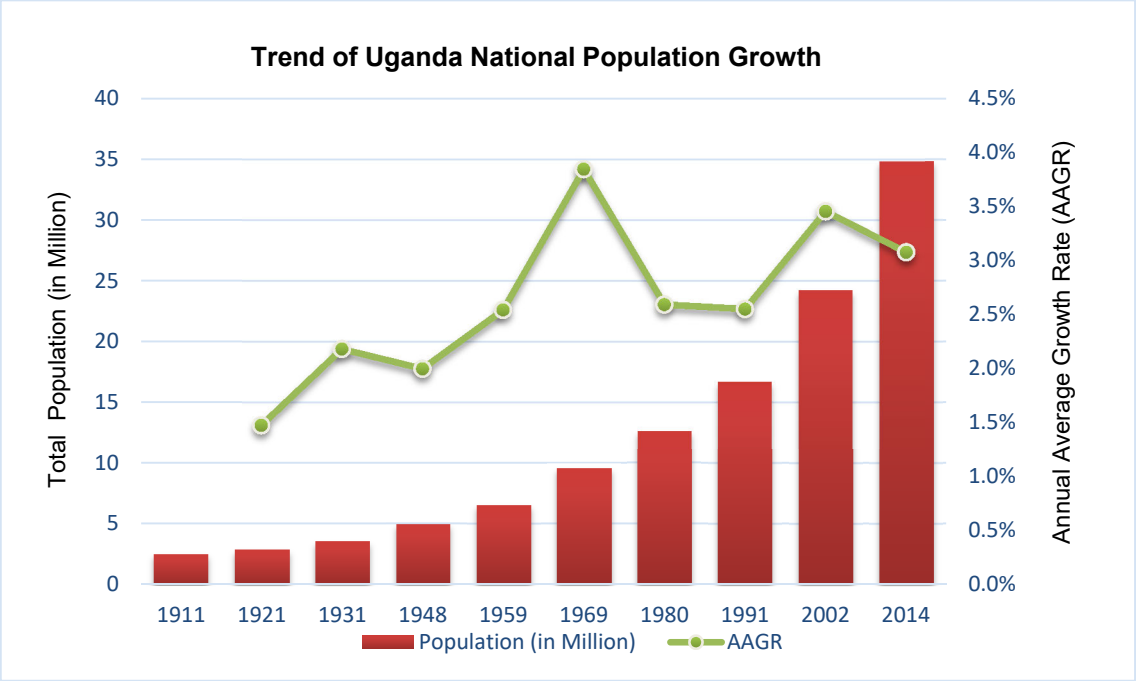
Figure 1-1 Planning Area for UTMP

2 CURRENT TRAFFIC CONDITIONS

2.1 Socio-economic Conditions

2.1.1 Population

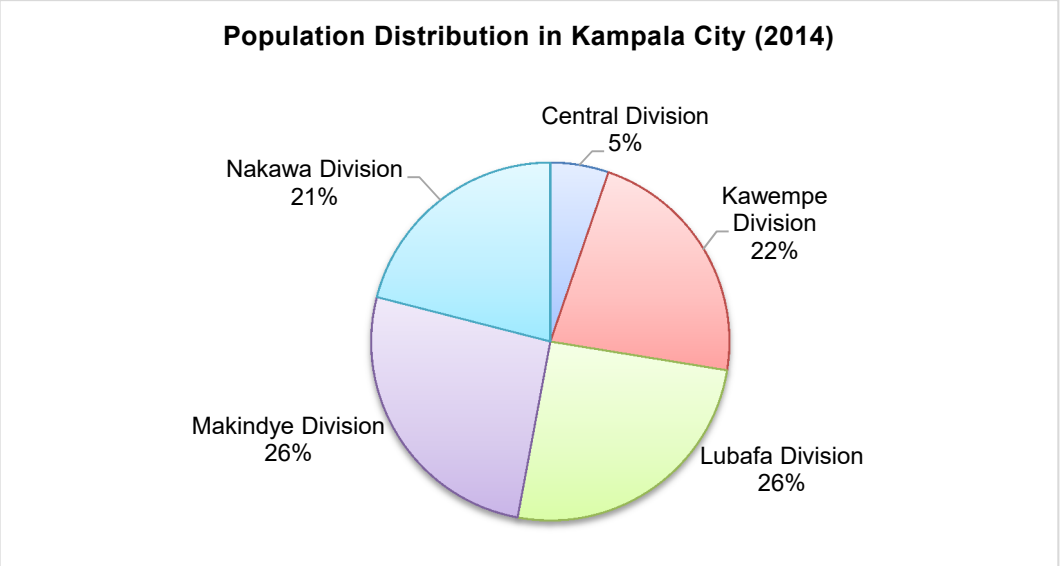
1) Population census in Uganda was carried out in the year of 1911, 1921, 1931, 1948, 1959, 1969, 1980, 1991, 2002 and 2014 (Source: 2002 Uganda Population and Housing Census, Analytical Report). Annual average growth rate (AAGR) is varied from 1.47 to 3.85 in the whole period. However, according to the latest census which was carried out in 2014 the AAGR is found as 3.08.



Source: 2002 Uganda Population and Housing Census, Analytical Report (Oct, 2006) - Page 14 (for 1911-2002)
National Population and Housing Census 2014, Provisional results (Nov, 2014) for 2014

Figure 2-1 Trend of Uganda National Population Growth (1911-2014)

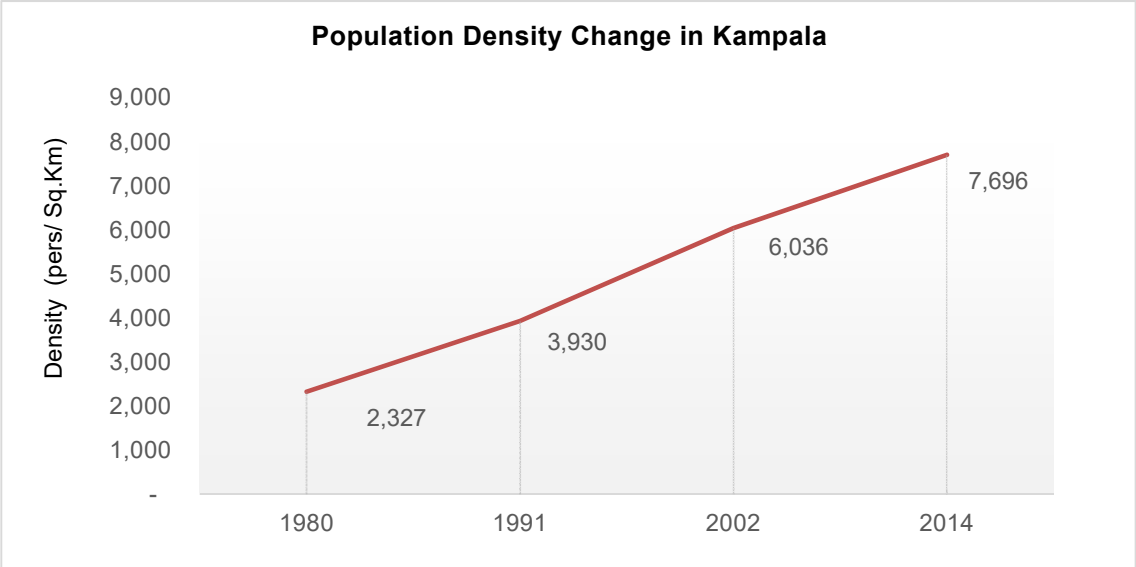
2) According to 2014 census, Kampala city consists of 1,516,210 population. Kampala city is divided into 5 divisions, known as Central, Kawempe, Lubafa, Makindye and Nakawa. Out of these, Lubafa (26%) and Makiendye (26%) have the highest share of population of the whole city.



Source: National Population and Housing Census 2014, Provisional Results, November 2014

Figure 2-2 Population Distribution in Kampala City (2014)

3) Kampala is a city of 197 (0.8% of whole country) square kilometres which is holding 4.3% of total population of Uganda. The population density in Kampala is increasing continuously in the period of 1980 – 2014. According to 2014 census, population density in Kampala was 7,696 persons/ sq. kilometre.



Source: National Population and Housing Census 2014, Provisional Results, November 2014

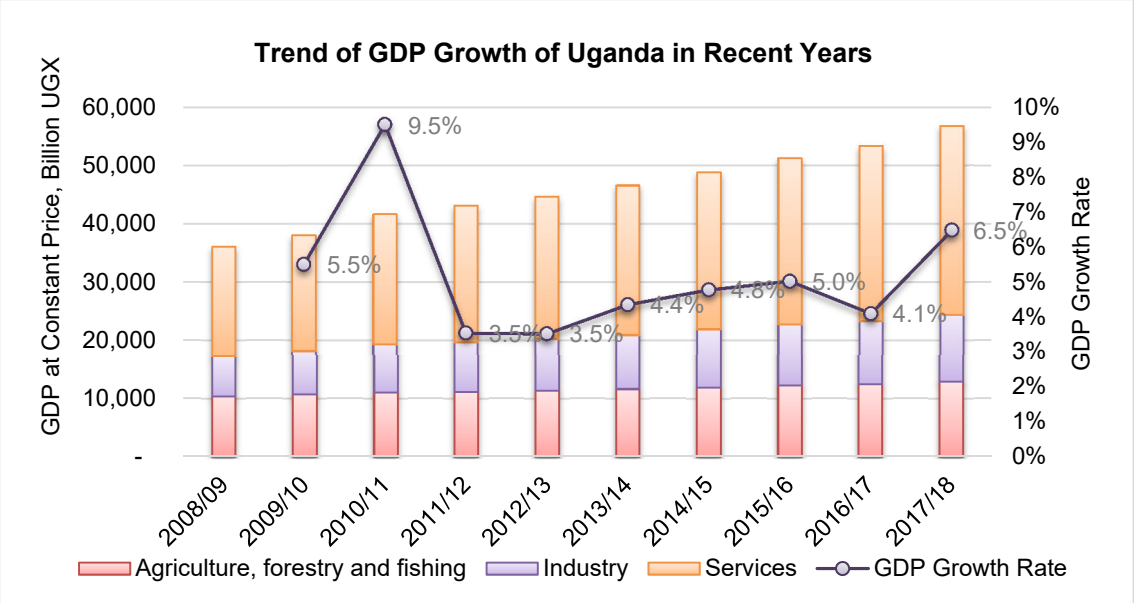
Figure 2-3 Change of Population Density in Kampala

4) According to The Study on Greater Kampala Road Network and Transport Improvement in the Republic of Uganda, the population of GKMA area is projected as 4.5 million in 2023.

5) However, according to KPDP, GKMA population is projected to be climbed up to app. 5.0 million by 2021. It is also predicted that if the in-migration accelerate the population of greater Kampala area may be climbing up to 20 million by 2040.

2.1.2 Economy

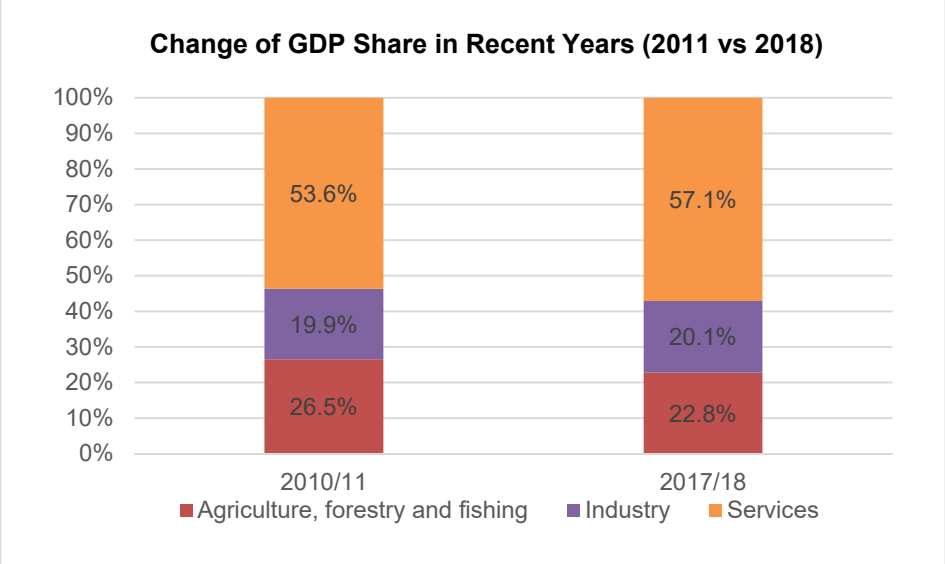
1) The growth of constant GDP in Uganda is increasing at a stable rate every year from FY 2008/09 to FY 2017/18 as shown in Figure 2-4. The constant price is calculated based on the FY 2009/10 prices. In FY 2010/11, the GDP growth was quite high (9.5%) compare to the other years. Except that the GDP growth rate was hanging around 4~6%, which is quite impressive.



Source: Statistical Abstract 2015 & 2018, Uganda Bureau of Statistics

Figure 2-4 Trend of GDP Growth of Uganda (based on Constant Price 2009/10 FY)

2) The share of services and industries in GDP composition are also increasing year by year. From Figure 2-5, it is clear that the share of agriculture, forestry and fishing are decreasing in FY 2017/18 compared to FY 2010/11.



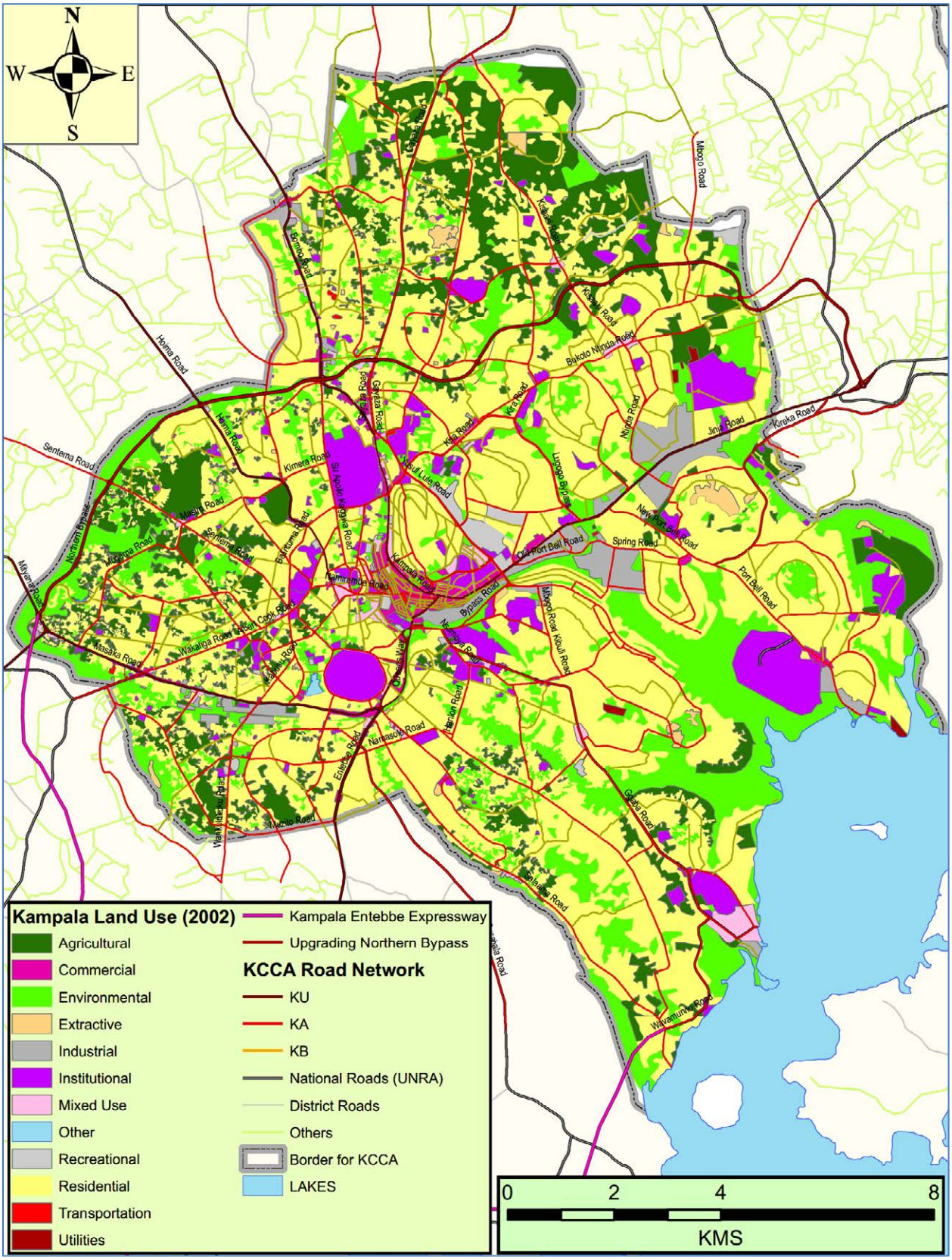
Source: Statistical Abstract 2015 & 2018, Uganda Bureau of Statistics

Figure 2-5 Comparison of Change in Sectorwise GDP Share in Recent Fiscal Years

3) According to Statistical Abstract 2018, GDP per capita in FY 2017/18 is calculated as US$799, which was US$734 in FY 2013/14.

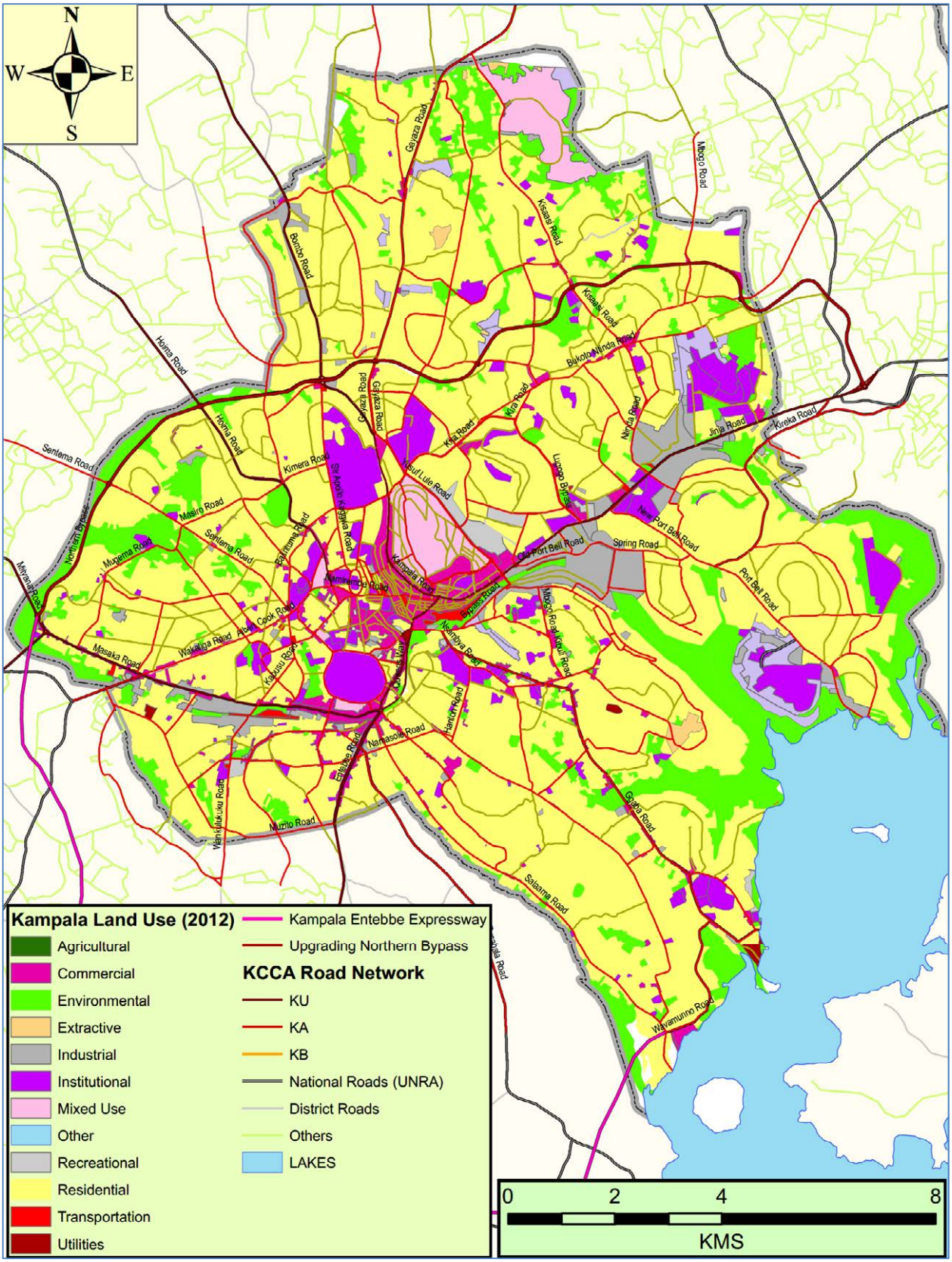
2.1.3 Land-use

1) The land use pattern in 2002 has been changed significantly by 2012. In 2002, land use pattern in Kampala was quite mixed up, whereas in 2012 the land use is much more concentrated in residential and commercial areas.
2) The central business district area is redefined in 2012 compared to 2002. As example, the whole Nakasero area was a residential area in 2002 which is now converted into a mixed commercial area and now many office buildings, restaurants are built here. Naturally, the demand of traffic flow in whole Kampala area especially CBD area is drastically changed in 2012 compared to 2002.



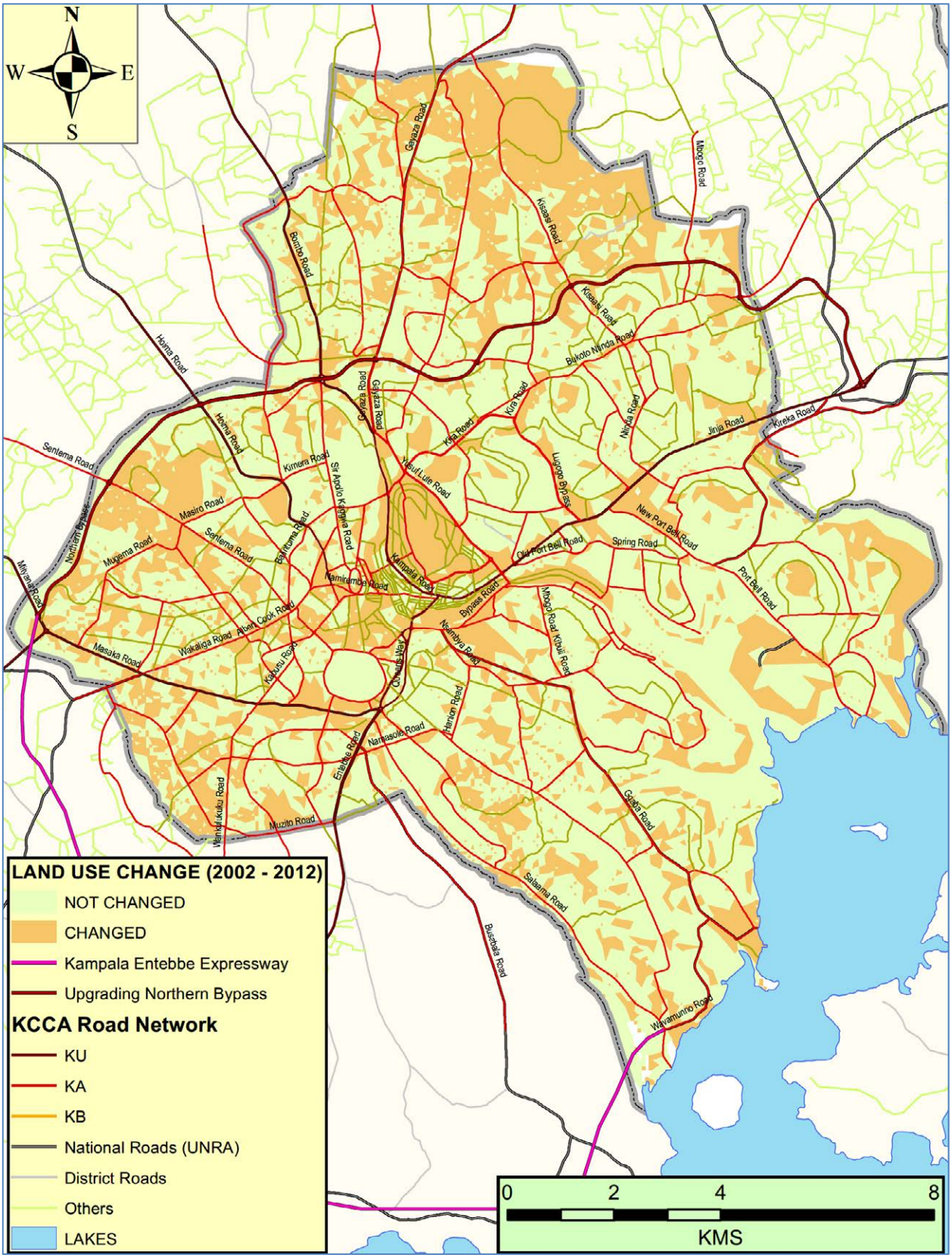
Source: Kampala Physical Development Plan (2012)

Figure 2-6 Land Use Pattern of Kampala in 2002



Source: Kampala Physical Development Plan (2012)

Figure 2-7 Land Use Pattern of Kampala in 2012



Source: Kampala Physical Development Plan (2012)

Figure 2-8 Change of Land Use Pattern of Kampala from 2002 to 2012

2.2 Road Infrastructure

2.2.1 Road Network

1) According to Roads Infrastructure Inventory and Conditions Assessment Survey, conducted by KCCA in 2015, Kampala city road network is 2,113 km in total length. Out of 2,113 km, only 27% were found paved, which means major share of road length are still unpaved. Even though the paving ratio is poor, the road is the main mode of transportation for the city.
2) As per old KCCA road classification, major road of Kampala was divided into sub groups: UCI, UCII, UCIII, UCIV up to UCVII. This road classification has been changed into KU to KI since 2016, as per the Road Condition Report of KCCA Roads Infrastructure Inventory and Conditions Assessment. The details of each road class are described in Table 2-1.

Table 2-1 Kampala Road Classification

Feature	KCCA Road Classification				
KCCA Road Class	**KU**	**KA**	**KB**	**KC**	**KI**
Former Class	UC-1	UC-2 and UC-3	UC-4	UC-5	
Definition	Urban expressway	Arterial road	Collector road	Local road	Industrial area road
General Description	High Standard Dual carriageway road carrying traffic predominantly through traffic with limited access and may have motorway restrictions	Good standard single/dual carriageway road with frontage access and more than two side roads per km	Variable standard road carrying mixed traffic with frontage access, side roads, bus stops and at grade pedestrian crossings	Road carrying local traffic with traffic friction from frontage activity, side roads, may have bus stops, side walkways	Industrial Area roads carrying heavy industrial loads
Speed Limit	70Km/hr	50Km/hr	50Km/hr	30Km/hr	30Km/hr
Number of Lanes	Min 4	4 or 2	min 2	2 or less	min 2
Lane Width (m)	3.5	3.5	3.25	3.25	4
Parking and Loading	None	Restricted	Unrestricted	Unrestricted	Unrestricted
Pedestrian Crossings	Grade separated	Some at-grade	Some at-grade	Frequent at-grade	At grade
Bus Stops	None	In lay-bys	At kerbside	At kerbside	
Road Sign Background Colour	Blue	Blue	White	White	White
Road Sign Character Colour	White	White	Black and Red	Black and Red	Black and Red
Walkway Width: one side	none	2.00m	2.00m	1.50m	1.50m

Source: KCCA Roads Infrastructure Inventory and Conditions Assessment, Road Condition Report

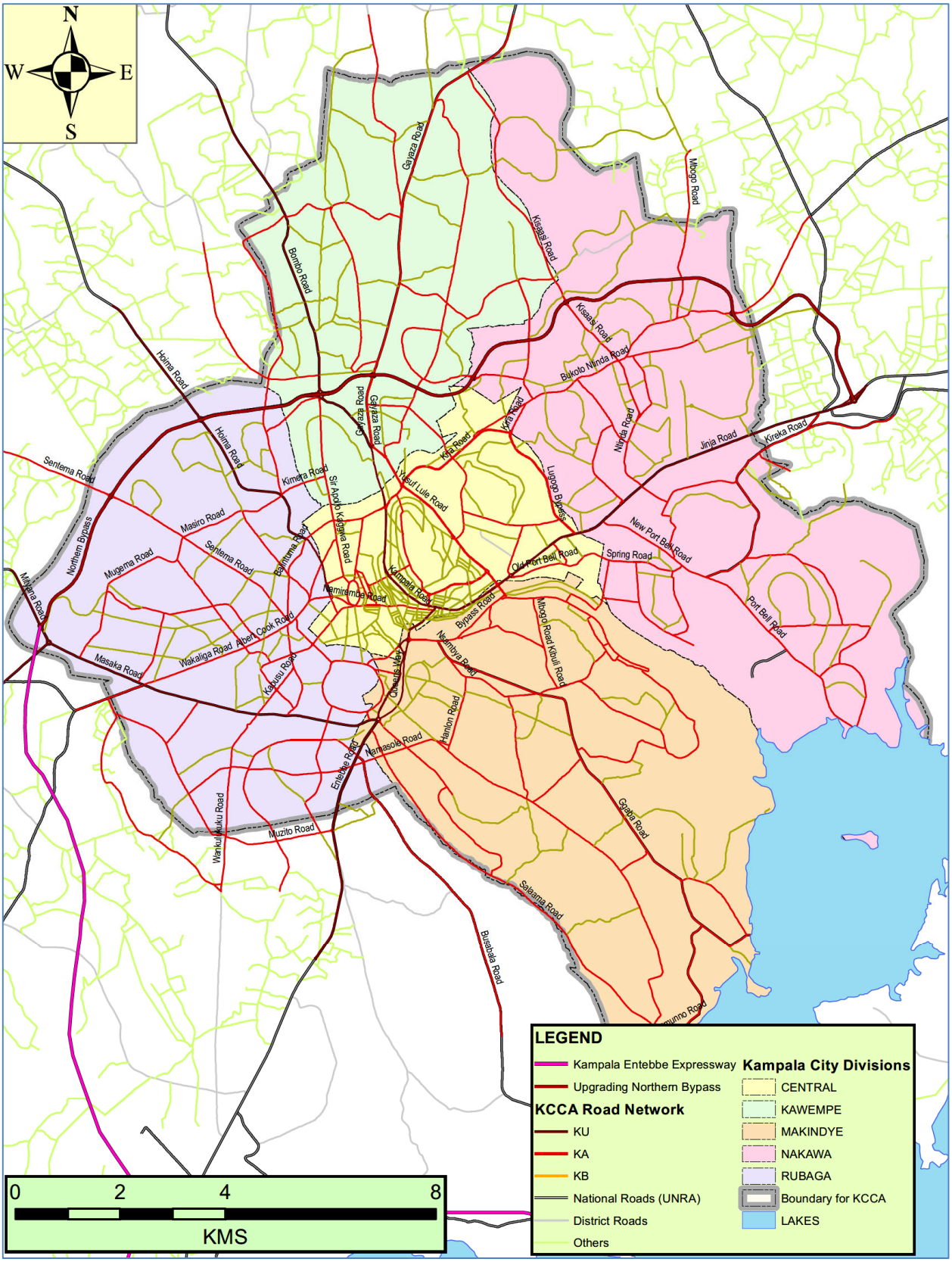
3) Division wise road length from road class KU to KB is derived from KCCA GIS data of 2013, which are shown in Table 2-2. It should be noted that, some new road sections are developed in Kampala since 2013, which data are still to be reflected in this table.

Table 2-2 Division Wise Kampala Road Length from Class KU to KB

Classification	KU	KA	KB	Total
Central	9.1	30.4	56.8	96.3
Makindye	2.1	63.3	29.6	95.0
Nakawa	18.4	62.3	66.2	146.9
Rubaga	30.0	79.0	38.4	147.5
Kawempe	16.5	50.4	38.7	105.6
Total Kampala	76.1	285.4	229.7	591.2

Source: KSTP (based on KCCA GIS Data)

4) The classified roads are shown in Figure 2-9.



Source: Kampala Physical Development Plan (2012)

Figure 2-9 Major Road Network of Kampala City According to KCCA Road Class

2.2.2 Traffic Signals & Roundabouts

1) Traffic Signal is the device to control traffic flow, which also contributes to improvement of road safety. In other word, effective provision and use of signal make traffic flow optimum with safety, which UTMP shall focus upon.
2) In 1868, the first, non-electric, gas-lit traffic lights were installed outside the Houses of Parliament in London to control the traffic in Bridge Street, Great George Street and Parliament Street. The first electric traffic light was developed in 1912 by Lester Wire, a policeman in Salt Lake City, Utah, who also used red-green lights. On 5 August 1914, the American Traffic Signal Company installed a traffic signal system on the corner of East 105th Street and Euclid Avenue in Cleveland, Ohio. It had two colours, red and green, and a buzzer to provide a warning for colour changes. Signal technologies have been developed as traffic increase and its pattern become complicated.
3) Signalizations in Kampala were started in 1957. Since then 10 junctions were signalized with various type of devices from different countries.

Table 2-3 Signalization History in Kampala

No	Junction	Installation Year	Devise Origin	Type of Light	Year of Damage	Cause of Damage	Measures taken
1	Kampala/ Entebbe	1957	India	Bulb	NA	NA	NA
		1072	Germany	Bulb	1986	By internal conflict	No spear parts available due to bankruptcy of manufacturer
		1986	India	Bulb	1999	Damaged the control panel due to power fluctuation	do
2	Namirenbe/ Luwum	1987	India	Bulb	2003	Nocked by vehicle	do
3	Makerere Hill/ Appollo Kagwa	1987	India	Bulb	2003	Damage on control panel due to short circuit	do
4	Kampala/ Parliament	1957	UK	Bulb	1986	By internal conflict	NA
5	Kampala/ Burton	1957	UK	Bulb	1986	By internal conflict	NA
6	Kyagwe Road	2000	Germany	Bulb	2001	Suspended by Nakibuvo Channel Construction	N/A
7	Nakawa/ Spear	1997	Germany	Bulb	1998	NA	NA
8	Udyum House/ Jinja Road	1957	UK	Bulb	1986	By internal conflict	NA
9	Luwam Street/ Burton	1957	UK	Bulb	1986	do	NA
10	Nile Avenue/ Sadi Barre	1972	Germany	Bulb	1986	do	NA

Source: KSTP

4) The Government of Japan has started to make intervention of junction improvements in Kampala since 1998. Since then 13 junctions have been improved with Japanese signal devices. Out of 13, 3 are replaced by Siemens traffic control device using KCCA's fund in the year 2016.

Table 2-4 List of Signalization Projects by Government of Japan

No.	Jct. Name	Year	Status as of May 2019	Lamp	Power Voltage	UPS	Remarks
1	Wandegeya	1998	Operating	Bulb	AC240V	Yes	*1
2	Port Bell	1998	Operating	Bulb	AC240V	Yes	*1
3	Natete	1998	Operating	Bulb	AC240V	Yes	*1
4	Bakuli	2002	Operating	LED	AC100V	No	
5	Nsambya	2002	Operating	LED	AC100V	No	
6	Clock Tower	2005	Operating	LED	AC100V	Yes	
7	Shoprite	2005	Operating	LED	AC100V	Yes	
8	Jinja	2005	Operating	LED	AC100V	Yes	
9	Kampala/Entebbe	2005	Operating	LED	AC100V	Yes	
10	Upper Kololo	2018	Operating	LED	AC100V	Yes	*2
11	Naguru	2018	Operating	LED	AC100V	Yes	*2
12	Katikati	2018	Operating	LED	AC100V	Yes	*2
13	Jinja Road Game	2018	Operating	LED	AC100V	Yes	*2

Source: KSTP

*1: Replaced by Siemens Signal by KCCA fund; new lamps are LED

*2: Installed as a part of pilot project under KSTP

5) A roundabout is a method of traffic control at junction without electricity for traffic signal. In terms of cost such as initial cost, operation and maintenance cost, a roundabout is superior to traffic signal control; however, in terms of capacity of traffic flow at large scale junction, traffic signal control is superior to roundabout. In Kampala, several roundabouts are existing at major junctions and contribute to serious traffic congestion in peak period.

6) As of May 2019, improvement or rehabilitation of road sections by KIIDP2 has been completed at Kira Rd., Makerere Hill Rd. Bakuli Kasubi (Hoima) Rd. and Mambule Rd. In accordance with road improvements, 9 junctions and 3 roundabouts are improved and signalized. The traffic signals installed under the project are isolated vehicle actuated type. At 2 locations, traffic lights are installed only to allow the pedestrians to cross. The complete list is shown in Table 2-5.

7) Not only non-signalized junction/roundabout but also signalized junction, traffic flow in peak period is controlled by traffic police at major junctions and roundabouts. The design of existing traffic signal is based on the standard of each country of traffic signal product, and different designs of traffic signal have been operated. From the point of view of traffic safety, alignment of signal lamp, principle of signal phase design should be uniformed and standardized.

Table 2-5 Traffic Signal Installation under KIIDP2

No.	Name of the Junctions	Status as of May 2019
1	Fairway Junction (Yusuf Lule Road/ Acacia Avenue/ Sezibwa Road/ Kafu Road Junction)	Completed
2	Kira Road/ Lugogo Bypass Junction (at Old Kira Police Station)	Completed
3	Kira Road/ Old Kira Road Junction (at Bemuga)	Completed
4	Kabira Junction (Kira Road/ Bukoto-Kisaasi Road Junction)	Completed
5	Bwaise Junction (ie Mambule Road/ Nabweru Road Junction)	Completed
6	Jjunju Road/ Makerere Hill Road Junction (Pedestrian Crossing only)	Completed
7	Makerere University Main Entrance Junction (Makerere Hill Road)	Completed
8	Ghadafi Road/ Makerere Hill Road Junction	Completed
9	Kyaddondo Road/ Makerere Hill Road Junction (Pedestrian Crossing only)	Completed
10	Sir Apollo Kaggwa Road/ Makerere Hill Road	Completed
11	Kyaddondo Road/ Hoima Road Junction (ie Mengo S.S Junction)	Completed
12	Nakulabye Junction (Hoima Road/ Makerere Hill Road/ Balintuma Road/ Mutesa 1 Road)	Completed
13	Kasubi Junction (Hoima Road/ Kimera Road/ Masiro Road/ Kawaala Road)	Not Completed

Source: KCCA KIIDP Office, May 2019

2.2.3 Road Infrastructure Manuals

1) Ministry of Works and Transport and Uganda National Roads Authority has prepared "Geometric Roads Design Manual, 2010" which covers the design standard of Class A: International Truck Roads, Class B: National Trunk Roads, Class C: Primary Roads, Class D: Secondary Roads and Class E: Minor Roads according to the functional road classification in Uganda.

Table 2-6 Functional Road Class in Uganda

Class	Road	Function
A	International Trunk Road	◆ Roads that link International Important Centres. ◆ Connection between the national road system and those of neighbouring countries. ◆ Major function is to provide mobility
B	National Trunk Road	◆ Roads that linking provincial capitals, main centres of population and nationally important centres, ◆ Major function is to provide mobility
C	Primary Roads	◆ Roads linking provincially important centres to each other or to a higher class road (urban/rural centres) ◆ Linkage between districts local centres of population and development areas with higher class road. ◆ Major function is to provide both mobility and access
D	Secondary Road	◆ Roads linking locally important centres to each other, to a more important centres, or to a higher class roads (rural/market centres) and linkage between locally important traffic generators and their rural hinterland. ◆ Major function is to provide both mobility and access.
E	Minor Road	◆ Any road link to minor centre (market/local centre) and all other motorable roads. ◆ Major function is to provide access to land adjacent to the secondary road system.

Source: Geometric Roads Design Manual, MOWT, 2010

2) In the manual, the Urban Road has been classified in the Class C: Primary Roads that refers II Paved, III Paved or A Gravel according to the Road Design Class. As Table 2-8 shows that the design class of 'Ia Paved' only comply with dual carriageway/multi lanes roads.

Table 2-7 Road Design Standard of Urban Road in Uganda

Design Class	Capacity [pcu x 1,000/day]	Road-way width[m]	Maximum Design speed (Km/h)			Functional Classification				
			Level	Rolling	Mountainous	A	B	C	D	E
Ia Paved	12 – 20	20.80-24.60	120	100	80	√				
Ib Paved	6 – 10	11.0	110	100	80	√	√			
II Paved	4 – 8	10.0	90	70	60	√	√	√		
III Paved	2 – 6	8.6	80	70	50	√	√	√		
A Gravel	4 – 8	10.0	90	80	70		√	√	√	
B Gravel	2 – 6	8.6	80	60	50				√	√
C Gravel		6.4	60	50	40					√

Source: Geometric Roads Design Manual, MOWT, 2010

Table 2-8 Road Design Standard of Urban Road in Uganda (Cont.)

Design Class	Right of Way Width [m]	Road way width [m]	Carriageway			Shoulder width[m]	Median width[m]
			Width[m]	Lane Width [m]	Nos. of Lane		
Ia Paved	60	20.80-24.60	14.6	3.65	4	2x2.5	1.2-5.0
Ib Paved	60	11.0	7.0	3.5	2	2x2.0	
II Paved	50	10.0	6.0	3.0	2	2x2.0	
III Paved	50	8.6	5.6	2.8	2	2x1.5	
A Gravel	40	10.0	6.0	3.0	2	2x2.0	
B Gravel	30	8.6	5.6	2.8	2	2x1.5	
C gravel	30	6.4	4.0	4.0	1	2x1.2	

Source: Geometric Roads Design Manual, MOWT, 2010

3) MOWT Traffic Sign Manual prepared by the British consultant in 2004 contains proposed standard of various traffic signs, road marking and traffic signal. The manual recommends following items. However, traffic signal control is not included in the scope of the manual and following items are referred as guidance principles.

Table 2-9 Summary of Traffic Sign Manual

Type	Items in the Manual
Junction	◆ Alignment and diameter (more than 200mm) of signal lamps. ◆ Primary and secondary signals (same set of signal lamps) for each approach are recommended. ◆ Consideration upon visibility of traffic signal (antireflection etc.) ◆ Clearance should be secured (2.1 – 2.3m for standard type, 5.0m for over-head type).
Pedestrian crossing	◆ Alignment and diameter (more than 200mm) of signal lamps. ◆ Cycle of signal (Red, Green, blinking Green). ◆ Visibility should be secured and alarm is desirable. ◆ Install on same pole of signal for vehicle is recommended. ◆ Clearance should be secured (2.1 – 2.6 m).
Railway crossing	◆ Both of crossing gate and signal are recommended. ◆ Stop line is required. ◆ Diameter (minimum 200mm, 300mm is recommended). ◆ Visibility should be secured and maintained.
Traffic signal control	◆ Fewer signal phases in one signal cycle are recommended. ◆ Cycle length should be 120 seconds or less. ◆ Maximum capacities by each approach should be secured. ◆ Signal split should be tuned in accordance with actual traffic flow. ◆ Coordinated signal control is preferred than isolated control. ◆ Enough inter-green time which is a gap between end of a green and start of next green should be secured. More than four seconds but it depends on the size of junction. ◆ Right turn movement should be guided by fully control which is the exclusive green, yellow and red arrow lamp.

Source: Traffic Signal Manual, MOWT, 2004

2.2.4 Present Maintenance System and Budget

1) The roads and traffic signals under KCCA jurisdiction are maintained by the Directorate of Engineering and Technical Services of KCCA. A contractor has been engaged to carry out the maintenance work of 9 existing traffic signal junctions, since June 2017, under framework contract. Regarding pavement and marking framework contract, pavement marking is carrying on under a works contract.
2) According to KCCA officials, the yearly required budget of overall maintenance and rehabilitation works of Kampala roads and traffic signal is app. 45-50 billion UGX. However, KCCA receives only 34.90 billion UGX from Uganda Road Fund for FY 2019-20.
3) At present, there are 3 sources of funding in KCCA's budget:
   1) Government of Uganda (GOU)
   2) Uganda Road Fund (URF)
   3) Non Tax Revenue (KCCA's own Fund)
4) KCCA prepares the budget under different categories and submits to GOU and URF. In principle, GOU Development budget can be used for construction, reconstruction, upgrade and maintenance of the roads and traffic signals. However, funding under URF is conditional and can only be used for maintenance (routine and periodic) of the roads and traffic signals. Though road side drainage repair and maintenance cost can be covered under this fund, works related to street lights cannot be covered.

Table 2-10 Overview of KCCA Budget for FY 2018-19 and 2019-20 (in billion UGX)

	Type	Source	Budget 2018-19	Estimated Budget 2019-20
a	Wage	GOU	73.28	71.04
b	Non-wage	GOU	19.73	23.08
(I)	Total a+b		93.01	94.12
c	Development	GOU	77.65	94.37
d	External Financing - KIIDP2	WB	157.26	107.51
e	Road Maintenance/ Traffic Signal	URF	34.90	34.90
(II)	Total c+d+e		269.81	236.78
(III)	Non Tax Revenue	KCCA	116.82	122.00
Grand Total (I + II + III)			479.64	452.90

Source: KCCA Ministerial Policy Statement FY 2018-19

5) As of Table 2-10, KCCA could spend 34.90 billion UGX (i.e. About 9.3 million US$ or 1 billion Japanese Yen) from URF for the road and signal related maintenance work in FY2019-20. According to Signal Maintenance Frame Work Contract, KCCA needs to pay approximately 600 million UGX to the contractor.

Table 2-11 Request of Engineering Directorate to Uganda Road Fund for 2019-20

Activity		Length (Km)	Annual Work Plan		
Category	Sub Category		Treatment Length (Km)	Planned Expense UGX '000	Implementation strategy
Routine Maintenance (combined mechanised and manual)					
Paved roads		140	140.0	4,600,000	Force Account
Unpaved Roads		453	453.0	3,255,161	Force Account
Sub total		**593**	**593.0**	**7,855,161**	-
Periodic Maintenance					
Paved roads		**3.30**	3.30	16,900,000	FA/Contract
Sub total		**3.30**	**3.30**	**16,900,000**	-
Road Safety works					
Road marking and Road Furniture				1,800,000	Contract
Road safety & Traffic management works				1,000,000	
Maintenance of street lights and traffic junctions				800,000	
Sub total				**3,600,000**	
Other qualifying work					
Transport studies				200,000	
Maintenance of equipment				1,000,000	FA/Contract
Purchase of new light equipment				500,000	
Supervision / Administration costs roads				500,000	
Sub total			-	**2,200,000**	-
Total			**596.3**	**30,555,161**	

Source: Directorate of Engineering, KCCA

6) In 2019-20 budget, DETS has divided the category of Road Safety Works into 2 subcategories: (i) Road marking and road furniture; (ii) Road safety & traffic management works and (iii) Maintenance of street lights and traffic junction and the details of the budget is shown at Table 2-11.

2.3 Road Traffic Conditions

2.3.1 Vehicle Registration

1) Motorization in Uganda especially in Kampala has been rapidly increasing in recent years, as shown in Table 2-12. As the vehicles registration of Uganda is only carried out by one organization and according to current procedure it is not possible to designate the vehicles used in Kampala or rest of the country.
2) The number of registered cars has increased at 10.2% between 2005 and 2009 which was quite significant. Motorcycles commonly known as Bodaboda have increased with the highest rate (28.2% per annum) and followed by minibuses (22.6% per annum) during the same period. Trucks also indicated a significant increment in growth rate (15.7% per annum).

Table 2-12 Newly Registered and Estimated Number of Road Vehicles in Uganda (2005-2009)

Item	2005	2006	2007	2008	2009	Average Increase Rate
Newly Registered						(%). P.a.
Motor Cars	9,870	9,764	11,375	11,975	8,445	-3.8%
Pickups/ Vans	4,206	3,658	4,407	3,486	2,597	-11.4%
Minibuses	6,583	6,367	8,431	10,943	14,578	22.0%
(Big) Buses	78	76	155	262	240	32.4%
Trucks	2,030	2,747	3,237	5,644	5,494	28.3%
Sub-Total	22,767	22,612	27,605	32,310	31,354	8.3%
Motorcycles	27,916	36,599	49,230	70,527	69,998	25.8%
Total	50,683	59,211	76,835	102,837	101,352	18.9%
On the Road						
Motor Cars	65,471	70,652	81,320	90,856	96,575	10.2%
Pickups/ Vans	53,203	53,137	55,950	58,317	59,747	2.9%
Minibuses	27,568	32,006	39,476	49,235	62,336	22.6%
(Big) Buses	868	857	995	1,237	1,453	13.7%
Trucks	18,684	20,497	23,324	28,501	33,425	15.7%
Sub-Total	165,794	177,149	201,065	228,146	253,536	11.2%
Motorcycles	108,207	133,985	176,516	236,452	292,263	28.2%
Total	274,001	311,134	377,581	464,598	545,799	18.8%

Source: Preparatory Survey on the Greater Kampala Roads Improvement Project in the Republic of Uganda

3) New vehicle registration data is available only for motor vehicle and motorcycle from 2013 to 2017 as shown in Table 2-13.

Table 2-13 Newly Registered Vehicles in Uganda (2013-2017)

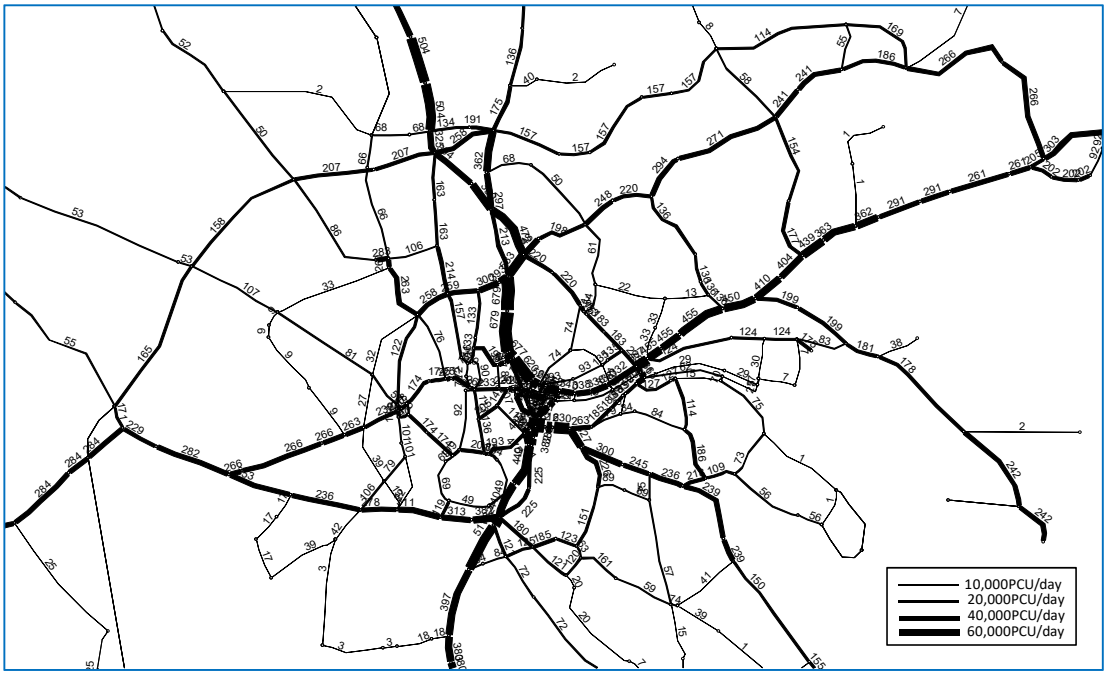
	2013	2014	2015	2016	2017
Motor Vehicles	45,169	45,560	43,337	33,750	42,005
Motorcycles	88,776	81,838	78,865	83,131	93,027
Motor Vehicles & Motorcycles Total	133,945	127,398	122,202	116,881	135,032

Source: Statistical Abstract 2018, UBS

2.3.2 Road Traffic Demand

1) The Study on Greater Kampala Road Network and Transport Improvement

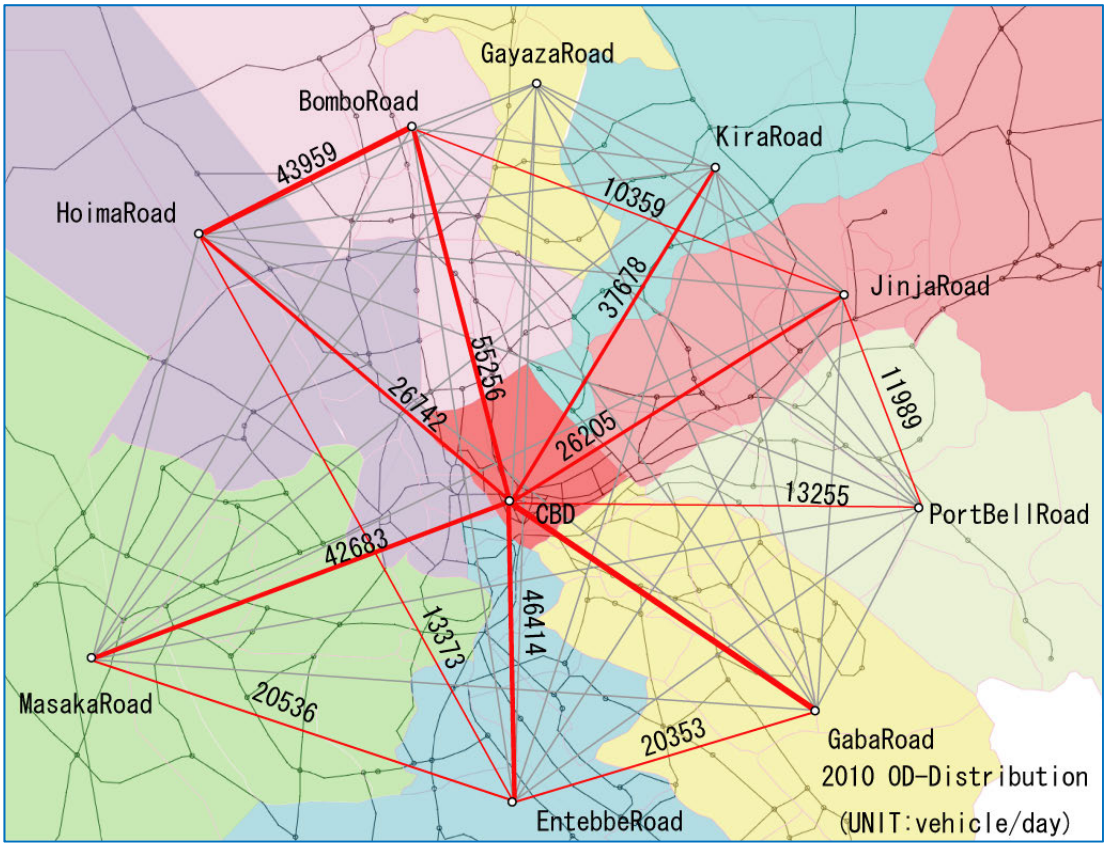
a) The Study on Greater Kampala Road Network and Transport Improvement in the Republic of Uganda was completed in 2010. According to the travel demand forecast of this project, total 733,000 trips per day were found in 2010 in the GKMA and predicated that 788,369 trips would be generated in 2013.



Source: The Study on Greater Kampala Road Network and Transport Improvement in the Republic of Uganda

Figure 2-10 Result of 2013 Traffic Volume estimated by Assignment Model

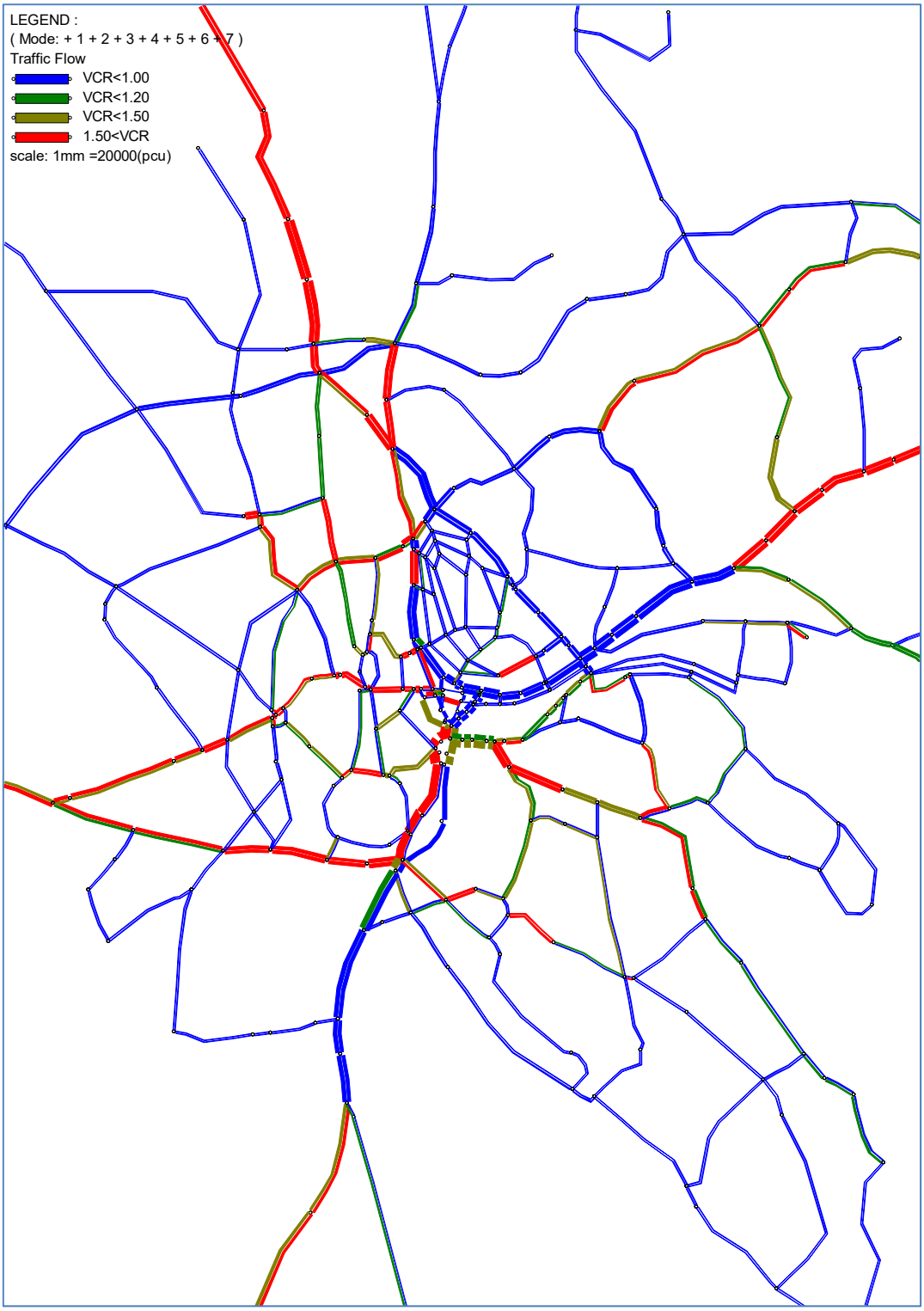
b) Based on the same trend, in 2016 the total generated trips of Kampala Area are calculated as 879,874.



Source: The Study on Greater Kampala Road Network and Transport Improvement

Figure 2-11 Estimated O-D Distribution (2010)

c) Traffic on GKMA has been reproduced in the JICA study named "Preparatory Study on the Greater Kampala Roads Improvement Project, 2013". It was based on the traffic survey carried out in 2013 and other traffic studies. The Figure 3.7 shows the traffic assignment result. The interesting finding was that despite large traffic volume in CBD, the network capacity was still large enough to accommodate exiting traffic according to the traffic assignment result.

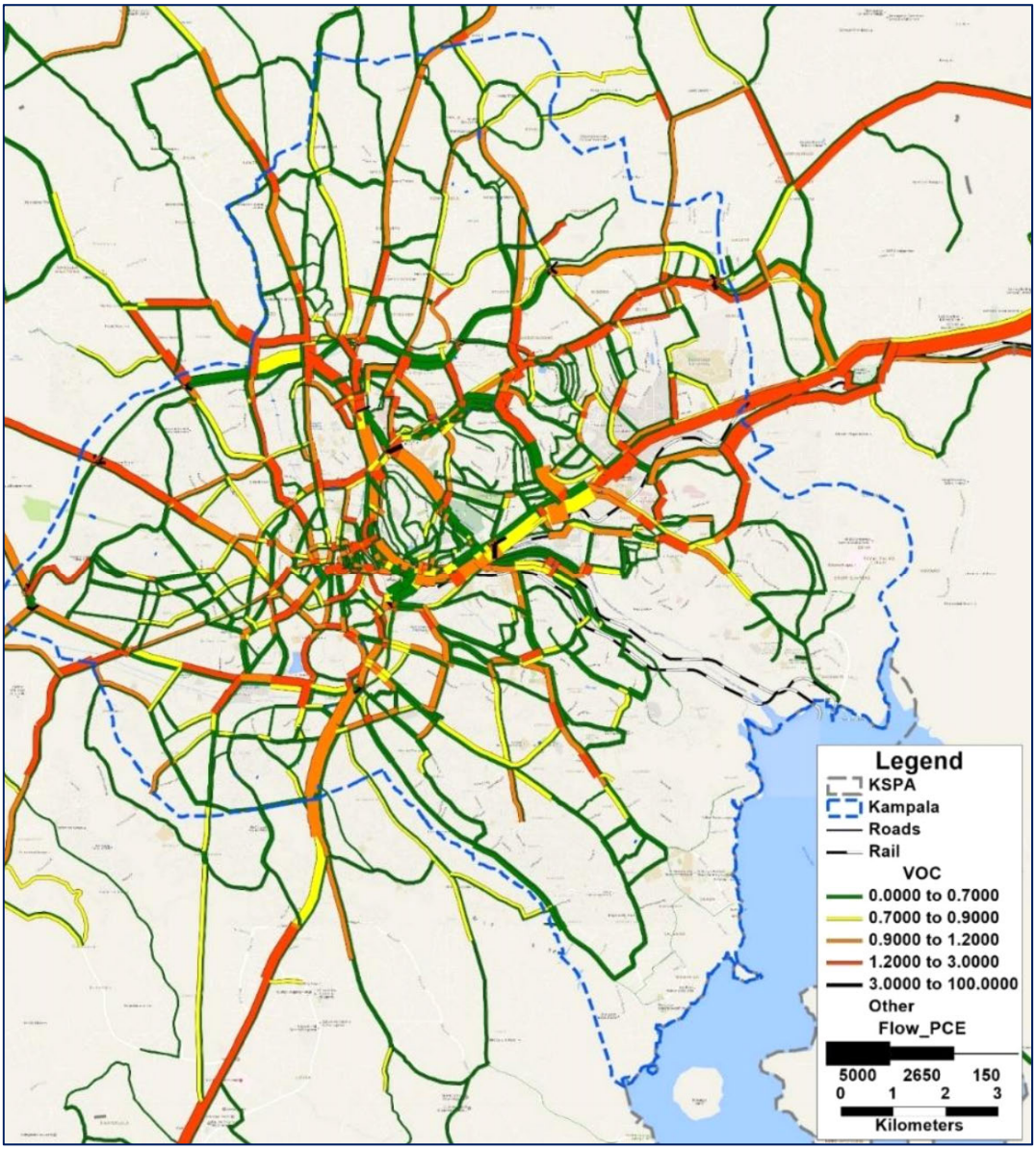


Source: Preparatory Study on the Greater Kampala Roads Improvement Project, 2013

Figure 2-12 Traffic Assignment in GKMA Network

2) Multimodal Urban Transport Master Plan for GKMA

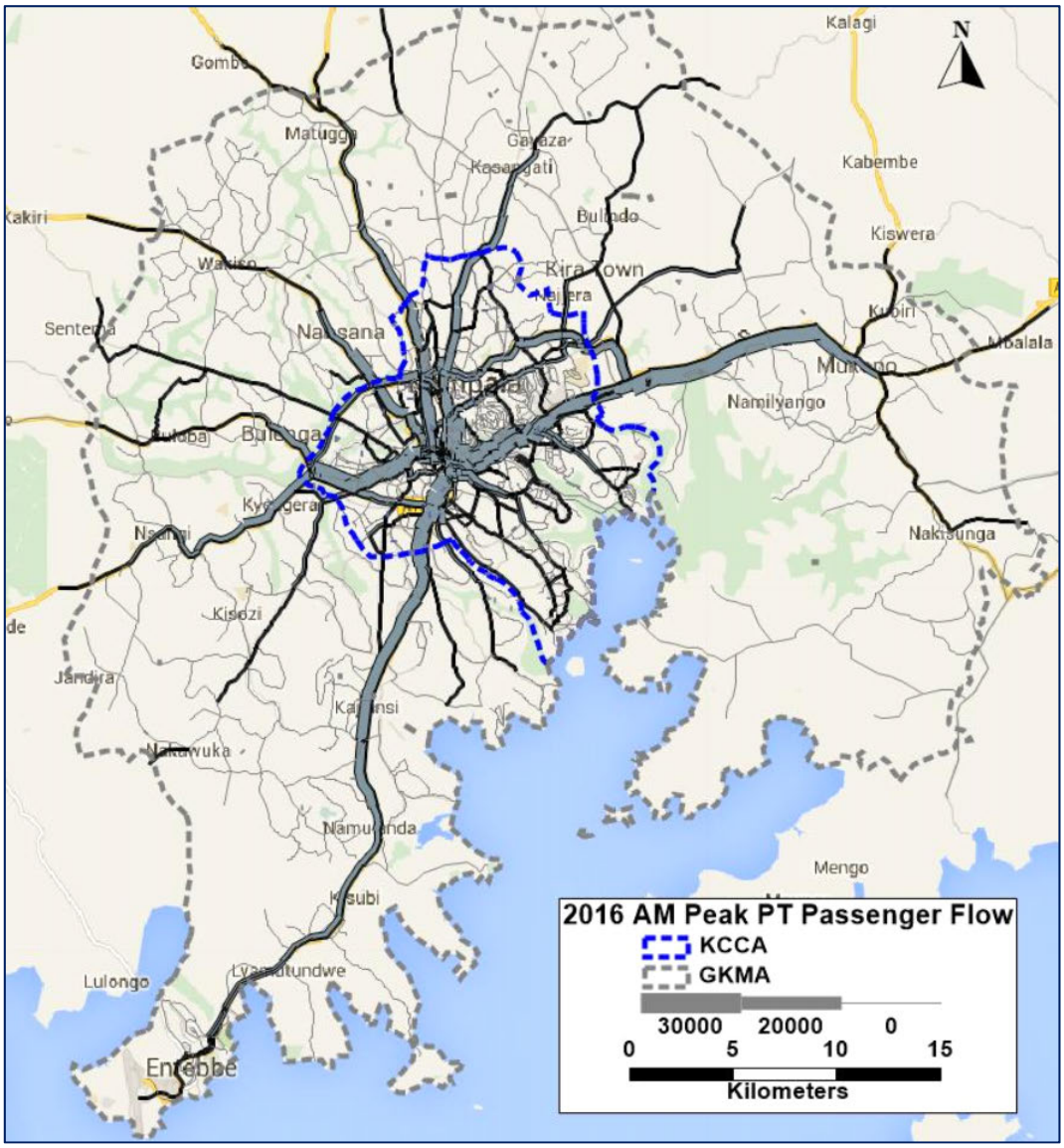
a) According to MMUTMP, 1.8 million trips has been generated in GKMA area (including KCCA area) in 2016. In this year, total vehicles traveling distance were almost 1.6 million veh-Km and about 0.1 million veh-hour. The share of congested road links (here considered as VOC>0.8) is found as 22%.



Source: Multimodal Urban Transport Master Plan for GKMA, Final Report

Figure 2-13 PM Peak Auto Assignment GKMA, 2016 Base Scenario

b) Figure 2-13 shows the evening peak auto assignment of 2016, where the congestion scenario of KCCA roads can be understood.



Source: Multimodal Urban Transport Master Plan for GKMA, Final Report

Figure 2-14 Public Transport Passenger Flow, 2016 Base Scenario

c) In 2016, over 300 thousand people have used public transportation during the AM Peak period, represented in the TDM, each person committed on average 1.19 transfers (i.e. used on average 2.19 different PT services- taxi/bus routes), resulting in over 670 thousand boarding. Public transport passenger flow in the morning peak hour of 2016 is shown in Figure 2-14.

d) Based on the TDM output for 2016, 38% are non-motorized trips and the rest are motorized trips. Out of the motorized trips, 19% of person trips during the AM peak period are completed by private car (referring to both drivers and passengers), 16% by bodaboda and 65% by public transportation, i.e. taxis and buses.

2.3.3 Travel Speed

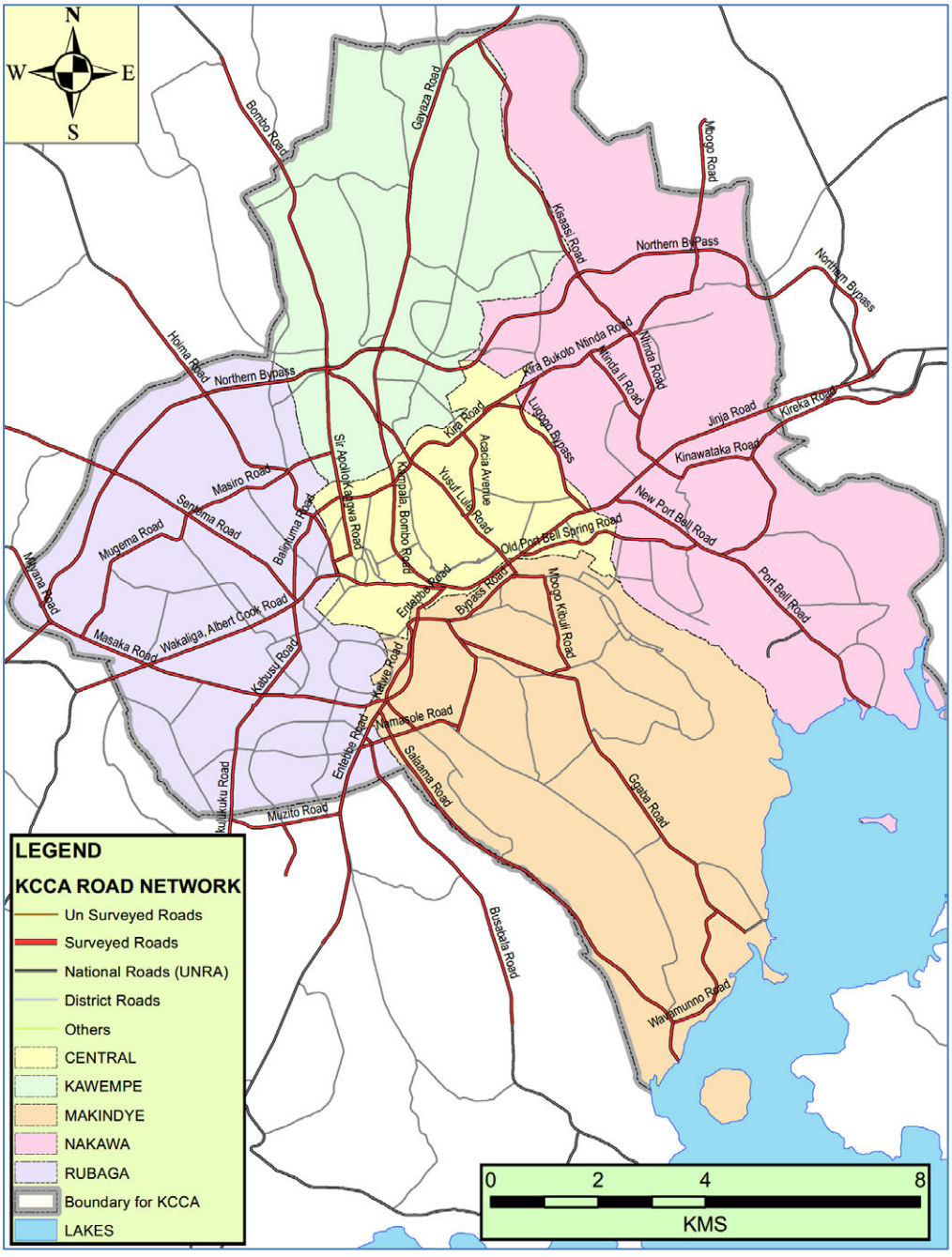
1) Travel speed identifies the congested road section and also gives quick identification of traffic bottleneck in the network. The travel speed survey therefore has been conducted covering major road network

including UCI, UCII and UCIII roads according to KCCA's classifications. The survey covered about 310 Kilometre of road length.

2) The survey details are as follows:

a) Survey Period: 1st May to 31st July 2015

b) Survey day: Monday to Friday (Data on Monday and Friday was processed separately)



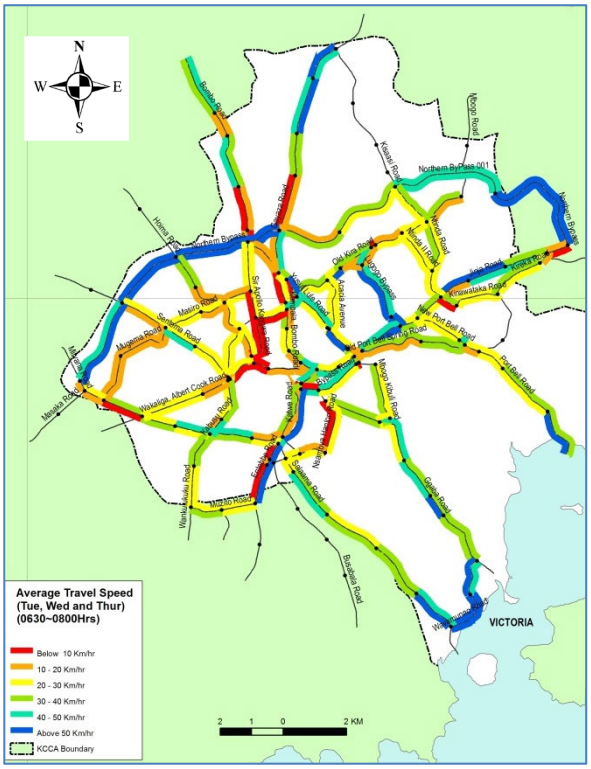
Source: KSTP

Figure 2-15 Travel Speed Survey Routes

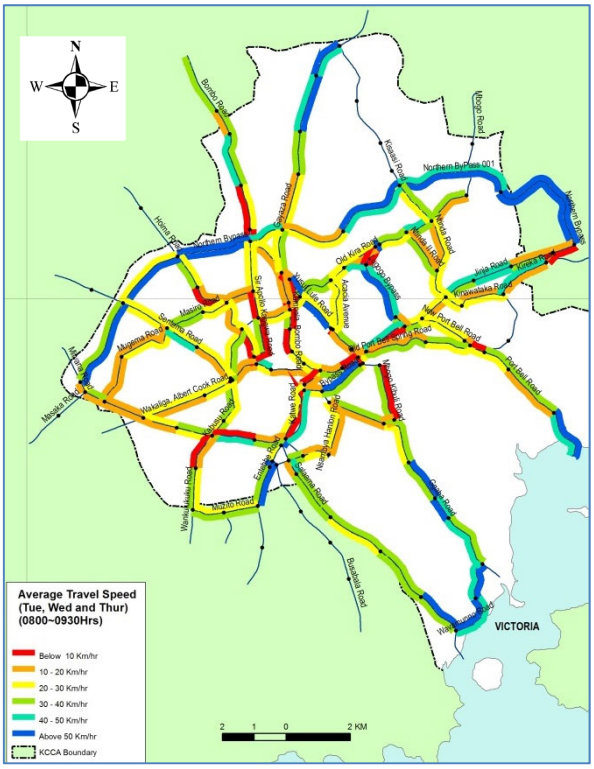
Table 2-14 Surveyed Length by Divisions

Division	Central	Kawempe	Makinddye	Nakawa	Rubaga	Total
Length (Km)	26.0	65.9	52.2	84.6	80.3	308.9

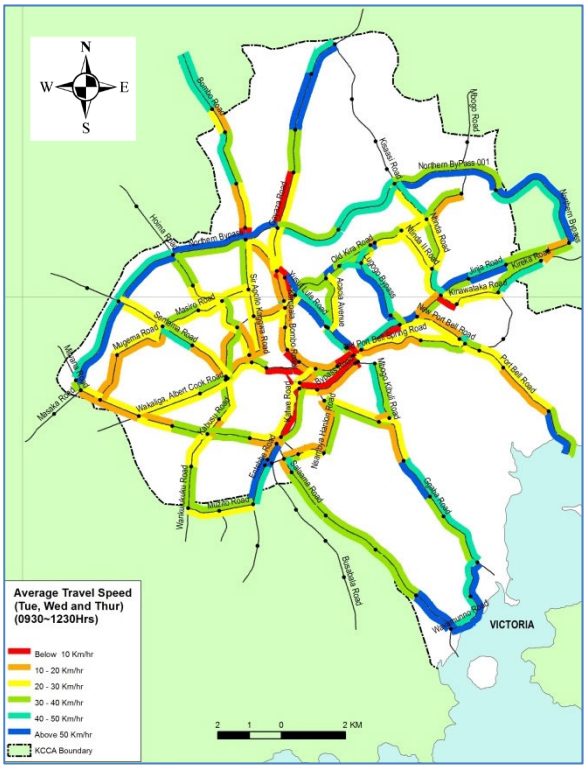
3) The survey results are presented in Figure 2-16 and Figure 2-17.



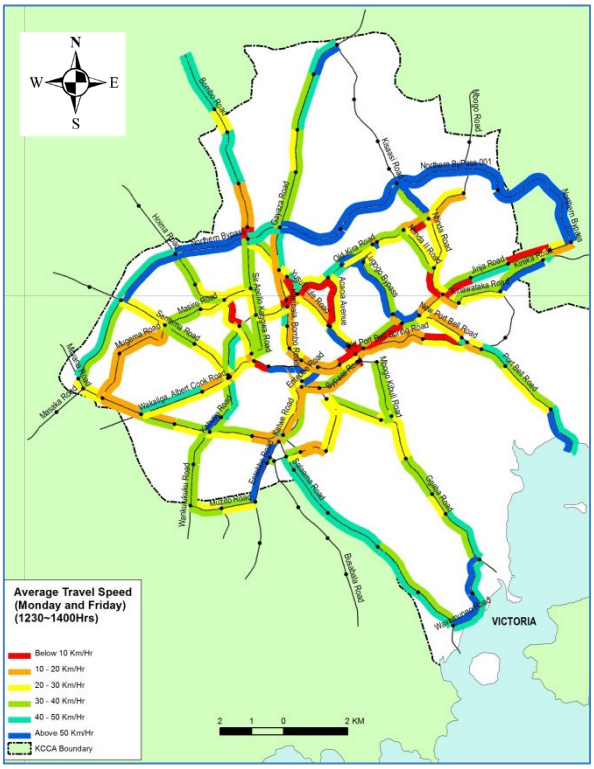
06:30~08:00 : Tuesday to Thursday



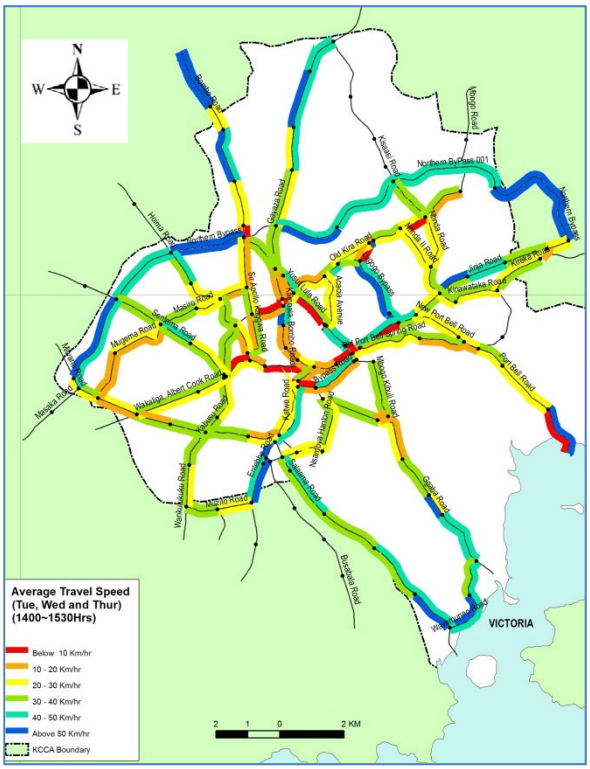
08:00~09:30 : Tuesday to Thursday



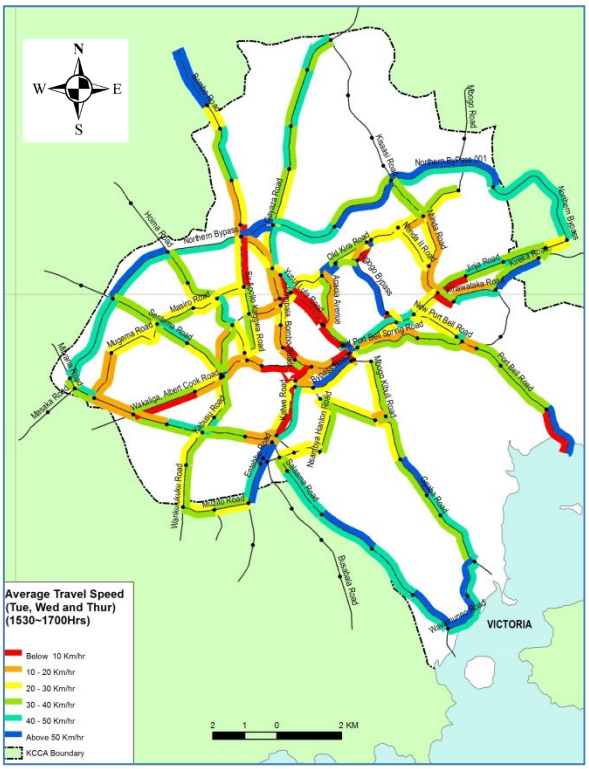
(09:00~11:00 : Tuesday to Thursday



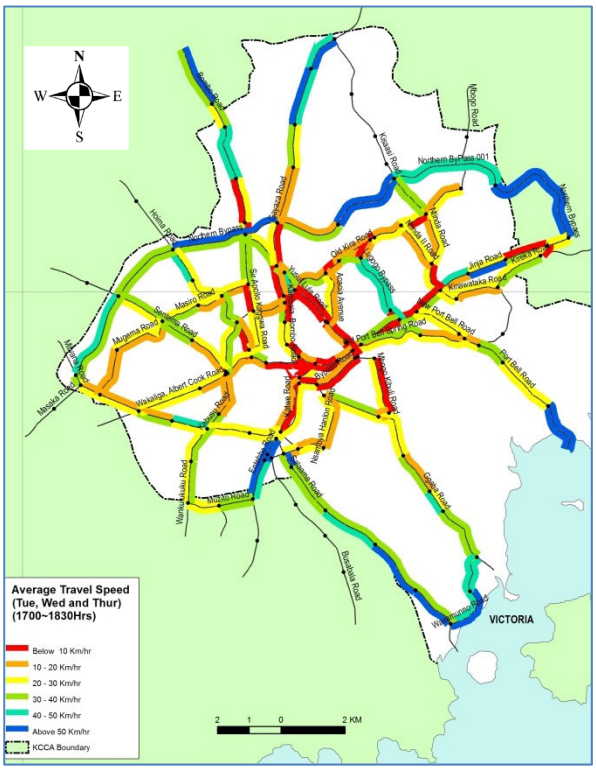
12:30~14:00 : Tuesday to Thursday



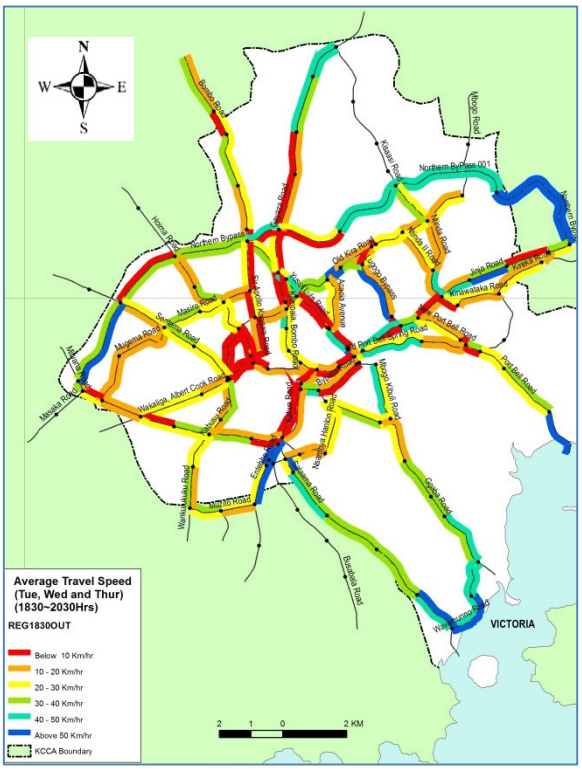
14:00~15:30 : Tuesday to Thursday



15:30~17:00 : Tuesday to Thursday



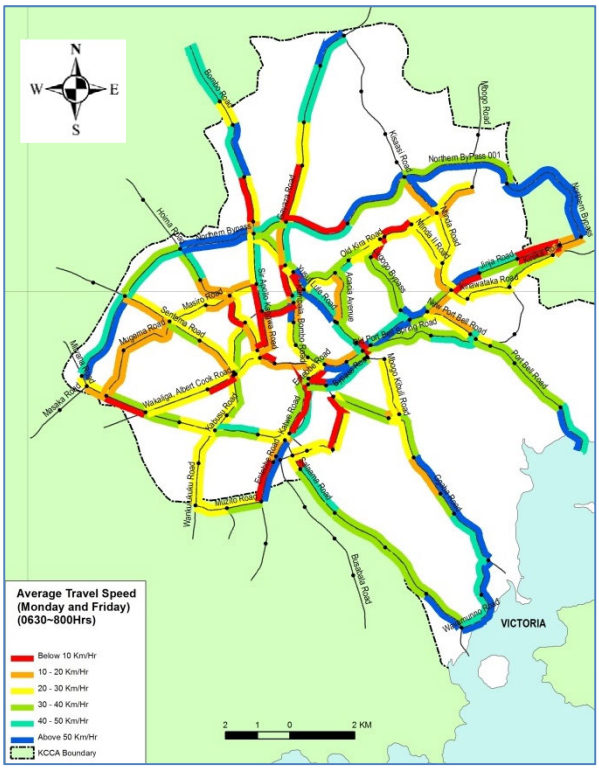
17:00~18:30 : Tuesday to Thursday



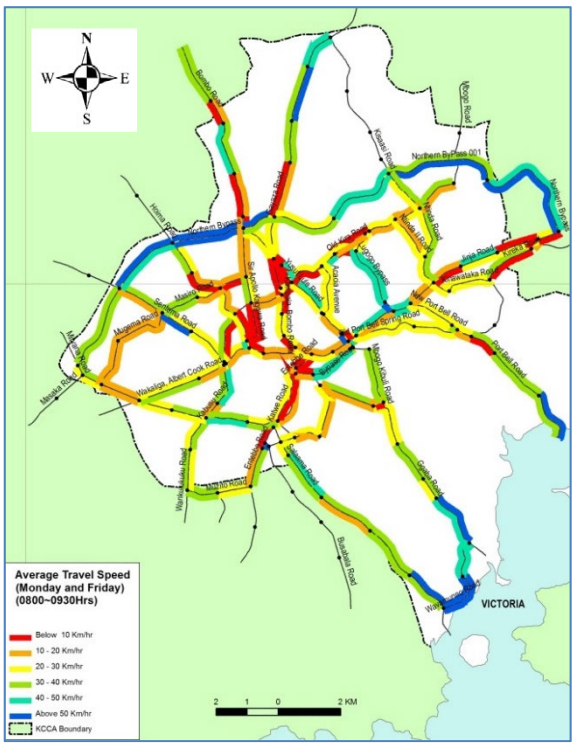
18:30~20:00 : Tuesday to Thursday

Source: KSTP

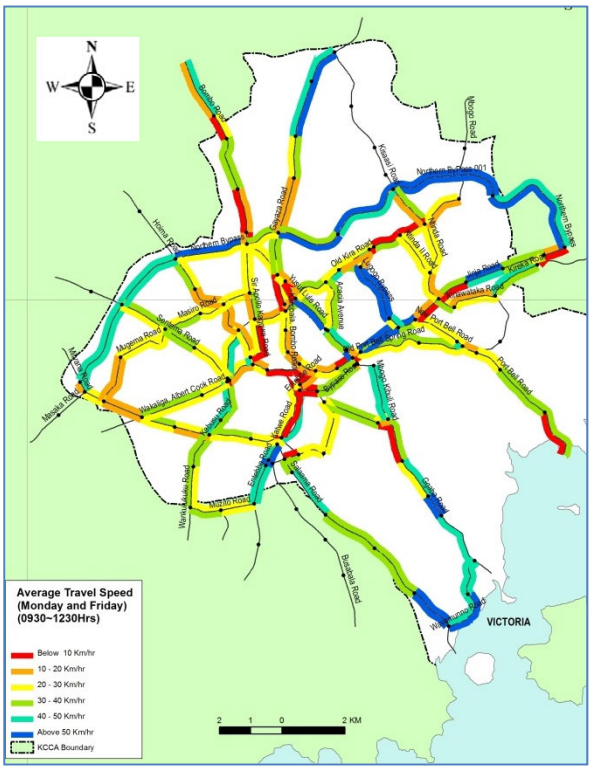
Figure 2-16 Travel Speed Survey Result (Tuesday- Thursday)



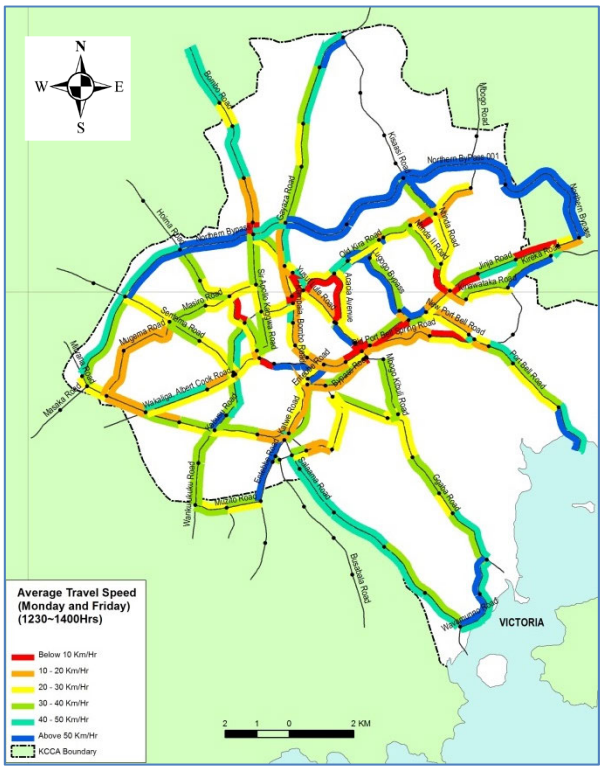
06:30~08:00 : Monday and Friday



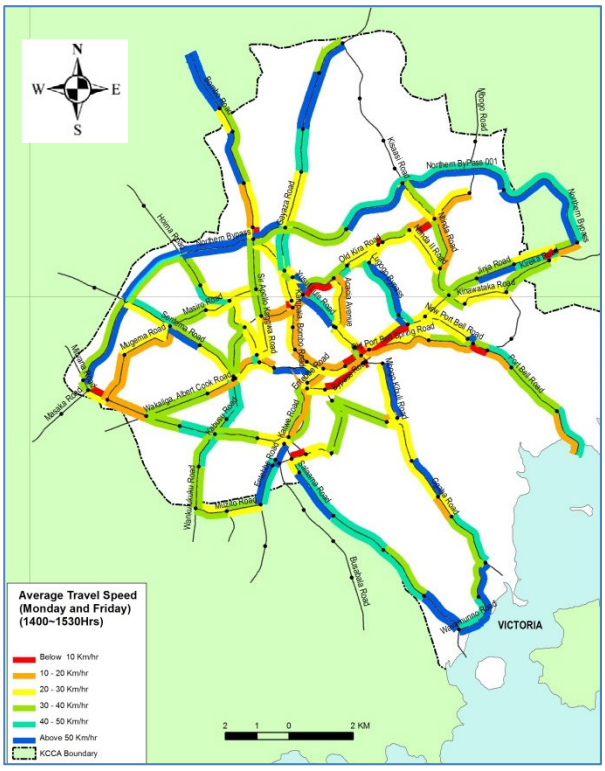
08:00~09:30 : Monday and Friday



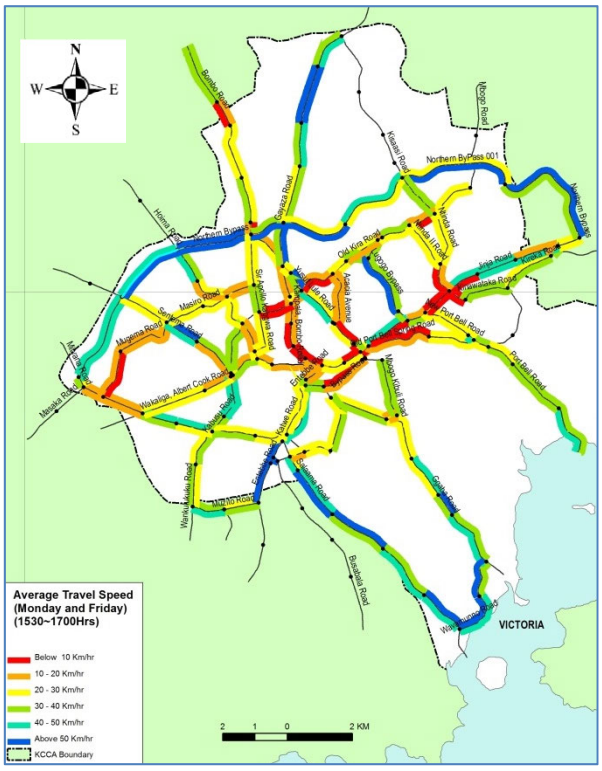
09:00~11:00 : Monday and Friday



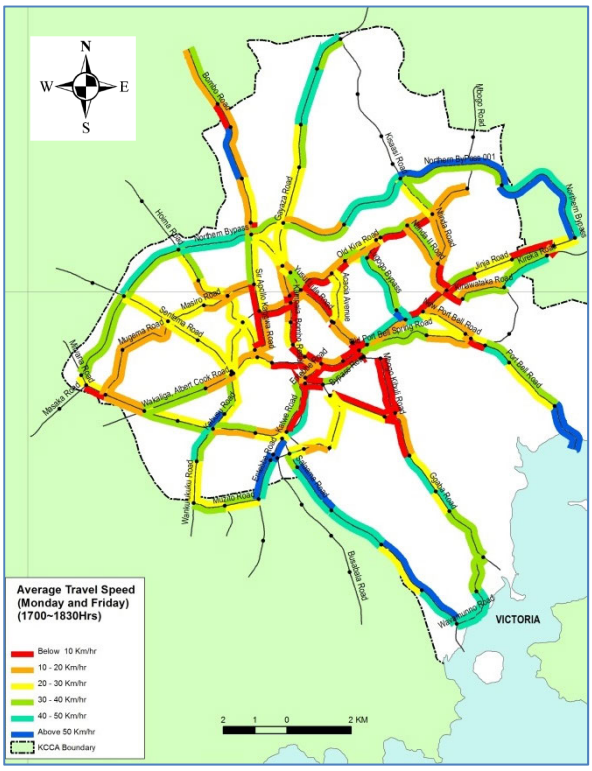
12:30~14:00 : Monday and Friday



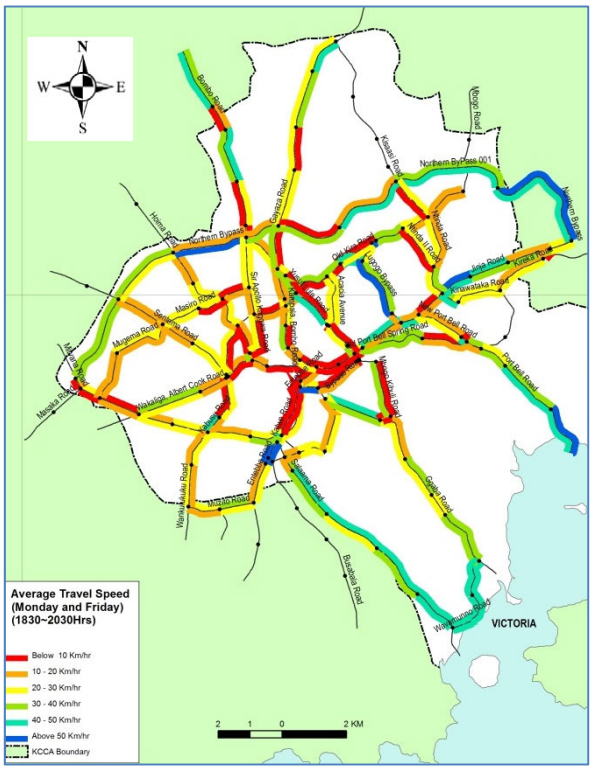
14:00~15:30 : Monday and Friday



15:30~17:00 : Monday and Friday



17:00~18:30 : Monday and Friday



18:30~20:00 : Monday and Friday

Source: KSTP

Figure 2-17 Travel Speed Survey Result (Monday& Friday)

4) There are some interesting observations on the results:

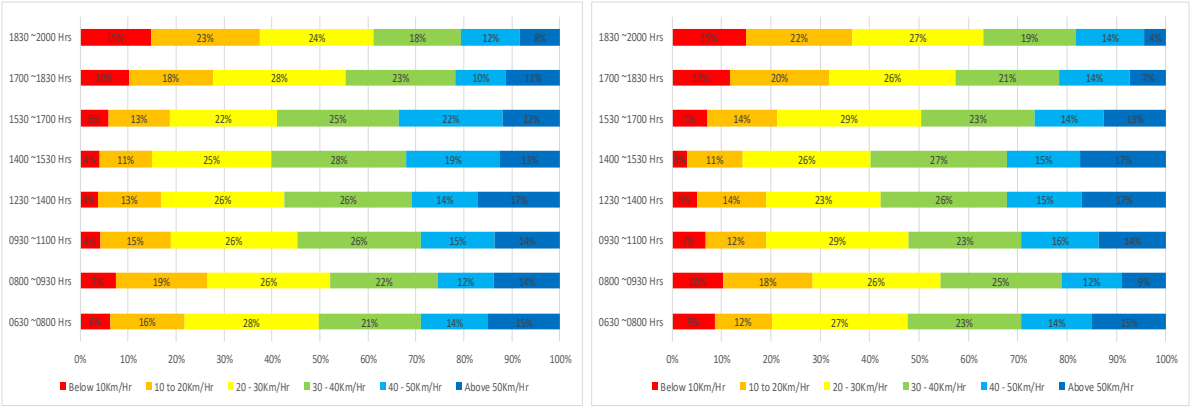
a) Lowest average travel speed on Kampala roads was observed at 08:00~09:30 and 18:30~20:00.

b) Average travel speed is 20~30 Km/hr was observed for most of the roads for over the day.

c) Average speed of less than 10 Km/hr was observed at 18:30~20:00 for most of the sections. Therefore, evening peak is more severe than morning peak in Kampala.

d) There was no significant difference in travel speeds between normal working day (i.e. Tuesday - Thursday) and extensive working day (i.e. Monday and Friday) as shown in Figure 3.11

e) In division wise, the travel speed in Central Division is obviously different as low from others and second lowest is Kawempe while the others are almost same.



Source: KSTP

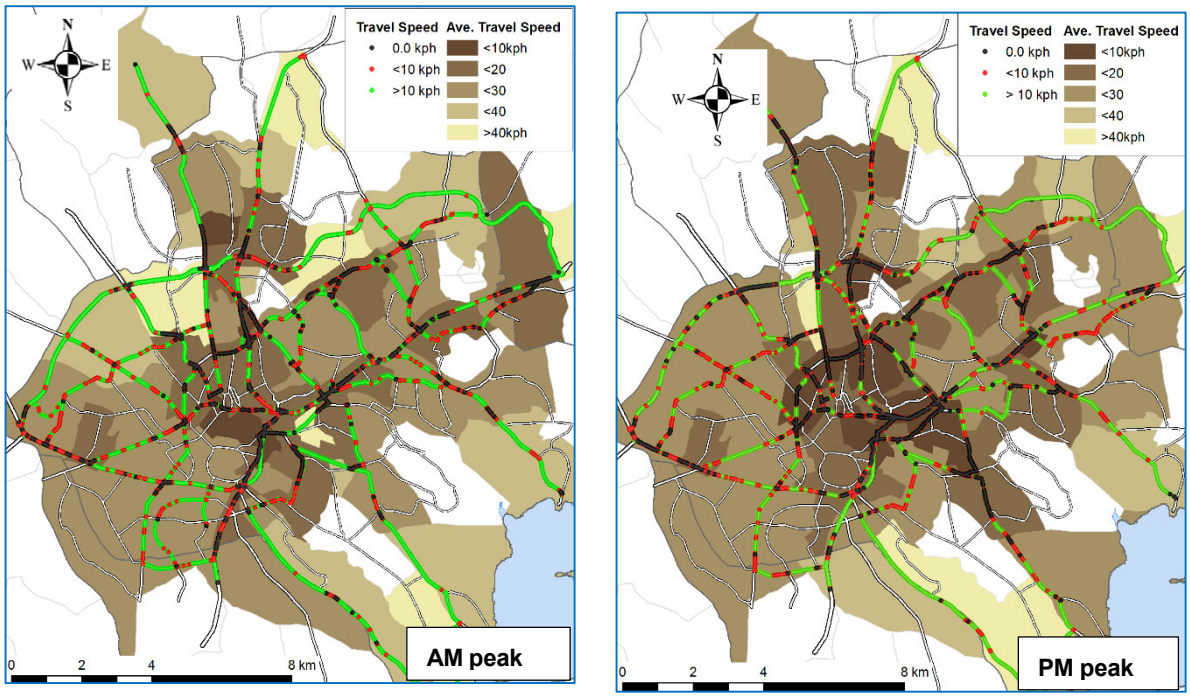
Figure 2-18 Travel Speed Composition in the Network

2.3.4 Bottleneck Junction

1) Based on point analysis of travel speed survey data of 2015, low speed junctions (less than 10Km/hr in 10 seconds) are observed at major junctions and roundabouts as shown in Figure 2-19.

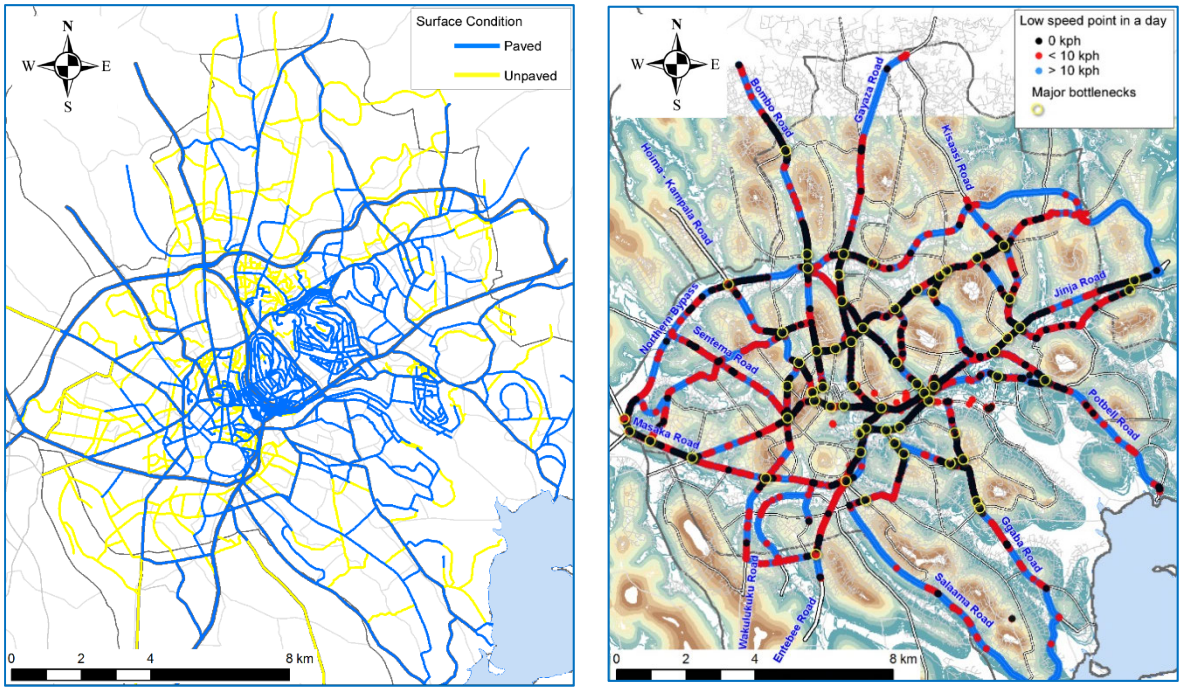
2) The causes of speed reduction are considered as, traffic congestion due to considerable traffic volume to road capacity, poor road surface condition, selfish and bad driving behaviour, spill back due to long manual traffic signal by traffic police and movement of heavy goods vehicles in CBD in peak period.

3) Current major congested junctions and roundabouts are extracted based on the travel speed survey as shown in Figure 2-19. Most of all congested junctions are in the area bounded by Northern By-pass, Masaka Rd. and Nsambya Rd. The congested junctions and roundabouts are expected to be improved quickly for the improvement of traffic congestion in Kampala.



Source: KSTP

Figure 2-19 Low Speed Point based on Travel Speed Survey in June-August 2015



Source: KSTP

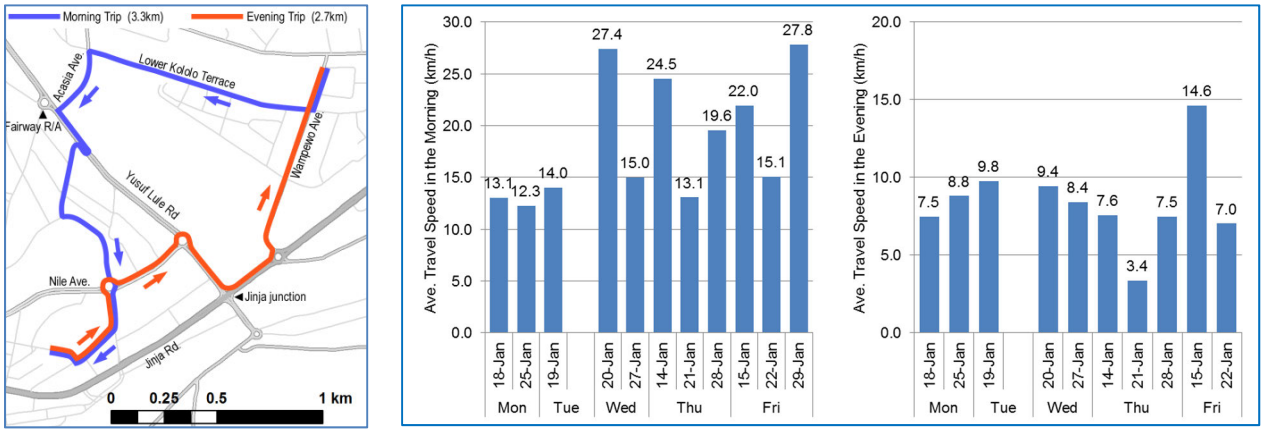
Figure 2-20 Major Bottlenecks and Surface Treatment

4) Traffic condition such as travel speed of vehicle is fluctuated by time and day because of the fluctuation of traffic demand, traffic control at junction/roundabout, weather and other incident such as broken-down of a vehicle or VIP movement. Figure 2-21 shows the average travel speed in the morning and

evening peak for two weeks. In the morning peak around 8:00 – 8:30, average travel speed is fluctuated between 12 – 27 km/h based on the travel speed survey data collected in 2016. In the evening peak, travel speed is fluctuated between 3 – 15Km/hr.

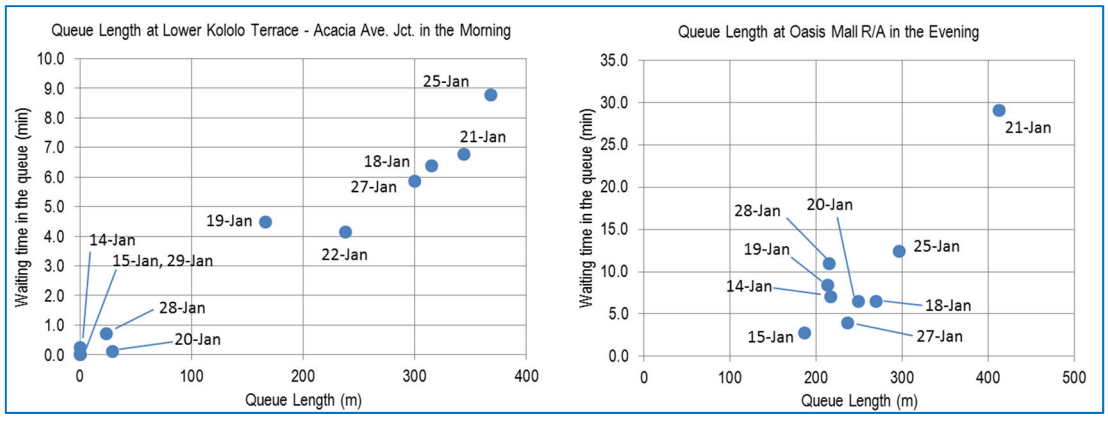
5) In the morning peak, traffic congestion is observed at Fairway R/A and vehicle queue at Acacia Avenue reached junction with Lower Kololo Terrace and other vehicle queue is observed at Lower Kololo Terrace from junction with Acacia Avenue. The queue length is also fluctuated between 0 – 370 m and waiting time is 0 - 9 minutes by time and day. In the evening peak, traffic congestion is observed at Jinja junction and extended to Oasis Mall R/A. Vehicle queue in evening peak at Nile Avenue to Oasis Mall R/A is fluctuated between 190 – 410 m and waiting time is 3 – 30 minutes.

6) To cope up such unstable traffic condition in Kampala, adaptive traffic signal control which generates signal parameters such as cycle length, split and offset is expected rather than pre-timed traffic signal control.



Source: KSTP

Figure 2-21 Average Travel Speed in Peak Period



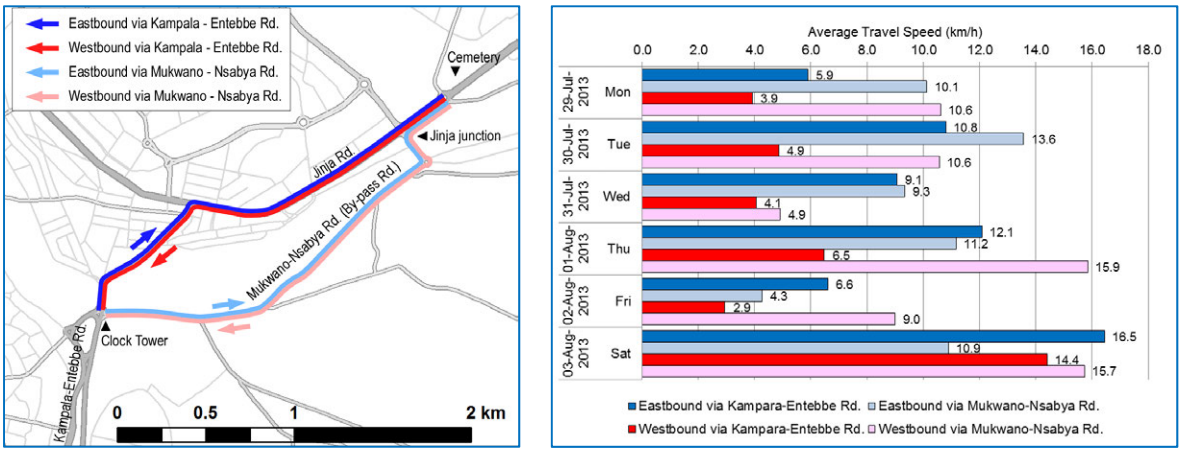
Source: KSTP

Figure 2-22 Queue Length and Waiting Time at Congested Junction (left: morning, right: evening)

7) A spatial fluctuation of traffic flow is also identified based on the travel speed survey on competitive routes as shown in Figure 2-23. According to the result of travel speed survey between Clock Tower and Africana Roundabout carried out in 2013, average travel speeds of Kampala - Entebbe Rd. – Jinja

Rd. and Mukwano – Nsabya Rd. are quite different by week day. Average travel speed of westbound via Mukwano – Nsabya Rd., were more than 2 times of westbound via Kampala-Entebbe Rd. – Jinja Rd. during four days out of five survey days.

8) To manage a spatial fluctuation of traffic flow by traffic signal, traffic signal timing optimization by each sub-area is insufficient and signal optimization by larger area is desired.



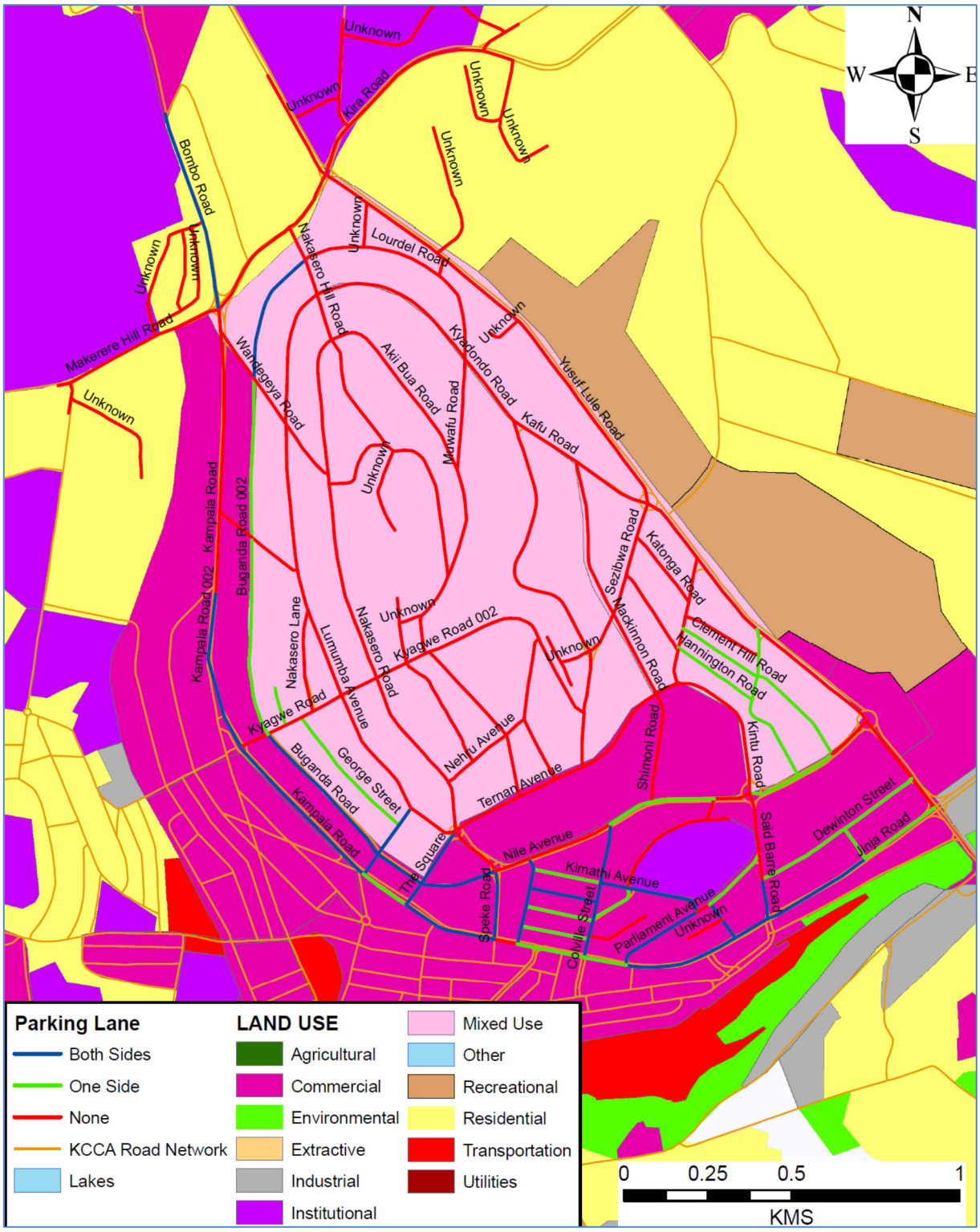
Source: Preparatory Survey on the Greater Kampala Roads Improvement Project in the Republic of Uganda (JICA, 2013)

Figure 2-23 Results of Travel Speed Survey in PM Peak

2.4 Traffic Demand Management

2.4.1 Car Park

1) Current Street Parking System in Kampala was introduced in 2003 by Kampala City Council (former name of KCCA). They employed M/S Multiplex Limited to maintain the parking space and collect toll from users in 2007. The contract with the Multiplex Limited was renewed in 2010 with the extension of duration for 10 years. This new contract requires the Multiplex to pay fixed amount to KCCA, monthly regardless the amount of toll collected by the Multiplex.
2) Space of the on street parking has been identified in the Gazette by the GOU and numbers of the space was counted at 5,344 according to the Gazette. However, all of the spaces are not currently available for parking, because, some space have been converted to different land use by private sector's development and there is no report showing numbers of available space. Electric parking ticket vending machines have been introduced at CBD, however, most of the machines seem abandoned. Convectional manual toll collection is still largely active.
3) Present on street parking in Nakasero area are presented in Figure 2-24. Some of the roads are allocated for both side parking, whereas, some are allowed for only either side of the road.



Source: KSTP

Figure 2-24 On Street Parking Roads in Nakasero Area

2.4.2 Traffic Impact Assessment

1) A traffic impact analysis is a study which assesses the effects that a particular development's traffic will have on the transportation network in the community.
2) Currently, planning applications are reviewed by KCCA officers from the Directorate of Physical

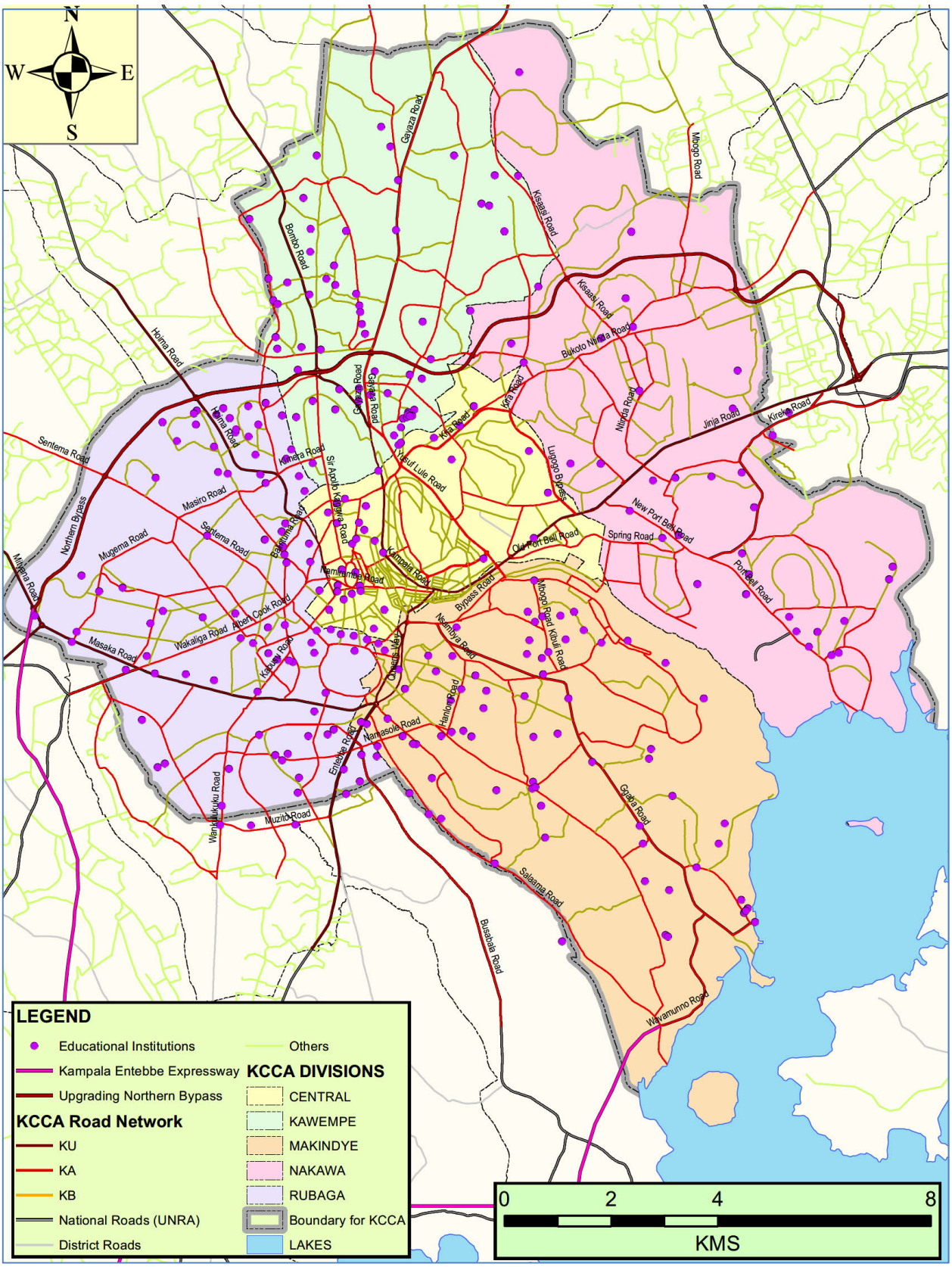
Planning (DPP). These are mainly urban planners. These officers decide which development proposals should undertake a Traffic Impact Assessment and are supposed to determine this based on guidelines that were provided to them by KCCA's transport officers from the Directorate of Engineering and Technical Services (DETS). These guidelines were also uploaded on KCCA's website so that they could be easily accessed by the public.

3) When the DPP officers identify a development that needs a TIA, they inform the developer who then undertakes the TIA usually assisted by a consultant. The TIA is submitted to DETS through DPP and is reviewed by experienced transport officers in DETS who then advise the developer, through DPP, regarding the transport impacts of their development proposals ie whether they are satisfied with the TIA and proposed impact mitigation measures if there are any or what other measures need to be considered. DETS also advise DPP on the planning conditions, from a transport point of view, any development approval should be subject to.
4) That is the end of the TIA process at KCCA. After DPP grants the development planning approval, for major developments, DETS approves several stages during the construction phase but for the smaller developments, it is left to the development control inspectors under DPP to follow up any transport measures proposed or agreed upon in the TIA and the conditions set by DETS.
5) Subjects for review and preapproval will include but not limited to:
   a) Trip distribution and assignment assumptions and trip generation rates
   b) Capacity analysis of the junctions and roadway segments where required. As a minimum, junctions where the project will add 51 (i.e 3% of 1700) or more trips during either AM or PM weekly peak hours need to be studied. This threshold may be reduced for junctions that are projected to or currently operate at LOS E or F.
   c) Junction capacity analysis assumption
   d) Inclusion of a Transportation Demand Management Plan (TDMP) to mitigate unacceptable traffic impacts
   e) Any specific issues that require special consideration such as access, parking and special traffic controls

2.4.3 School Traffic Management

1) Kampala City has about 2,101 schools, out of which 148 are located in the Central Division. Most of these schools lack a comprehensive travel management system (with wider travel choices say a school bus system, cycling, walking etc.) that ensure safety & efficiency and as a result, they have significantly contributed to the traffic congestion especially in the peak periods. Vehicular congestion near schools is more than just an inconvenience to parents; it also jeopardizes the safety of teachers, administrators, school staff, and local residents. Traffic congestion around schools is also a potential source of injury to children and a growing problem that KCCA cannot afford to ignore. Several interventions have been proposed in a bid to manage traffic demand especially within the CBD during peak hours. Key among the proposed measures KCCA is considering is Sustainable School Travel that will see schools getting more involved in providing several alternatives of travel to their pupils/students/staff and thereby reducing vehicular trips made to and from schools.

2) It has been observed that there is a seasonal fluctuation in peak travel within Kampala city attributed to beginning of school terms especially for schools located within the central business district. School term times exhibit high traffic volumes as compared to holiday times. During holiday times cars move freely whereas during term time there is congestion.
3) To understand the magnitude of the problem, a School Travel Survey is conducted, which provides a basis for proper school travel planning. Because of the localized traffic congestion within and around schools, each school will submit a Sustainable School Travel Plan (SSTP) highlighting several interventions being undertaken/ suggested in reducing travel times within the locality of the school. KCCA is also working with individual schools to come up with short term interventions that can quickly reduce traffic jam e.g. providing safe crossing points for children, restricting On-street parking etc. KCCA believes that SSTPs as part of a bigger Sustainable Urban Mobility Plans will create safer routes to school, reduced traffic congestion reduce pollution and enhance the attractiveness and quality of the urban environment especially around/within school.
4) The recent study conducted by Kampala Climate Change Action, 2015 showed that most of the KCCA Schools are travelling to/from school using sustainable means such as walking.
5) Proposed short-term measures to reduce school area congestion are:
   a) School administration should analyse the local traffic congestion problem to give a better understanding of the factors contributing to it.
   b) Start instituting school busing system as soon as possible.
   c) Define drop-off/pick-up sites, where considered feasible & viable.
   d) Encouraging carpooling (also car-sharing, ride-sharing, & lift-sharing).
   e) School parking areas should be well organized from traffic management point of view with proper traffic controls and markings.
   f) Restrict car parking for private vehicles within school premises and no on-street parking outside the schools.
   g) Vary dismissal time or location by mode or grade to reduce the number of students arriving at or leaving school simultaneously.
   h) Educate parents about unsafe driving behaviors and using alternative transportation modes to and from school.
   i) Educate students in proper walking and cycling rules of the road; provide lessons that build safety skills.
   j) Install fences to prohibit students from crossing at inappropriate locations.
   k) Encourage students who live near school to walk or cycle.
   l) Establish a School Travel/Transportation Committee.
6) Compliance with Ministry of Education (or KCCA) guidelines are as below:
   a) Lessons for Nursery schools shall begin at 8:00am
   b) Classes in Nursery schools shall end by 12:00 noon
   c) Lessons in Primary & Secondary schools shall begin at 8:00am
   d) Classes in all schools in the city shall close at 4:30pm



Source: KSTP

Figure 2-25 Location of Educational Institutions in Kampala

2.5 Public Transport and Paratransit

2.5.1 Taxi (Matatu/Minibus)

1) At present, taxi is the main mode of public transport in Kampala. A taxi is kind of a minibus which is licenced to carry up to 14 passengers. Usually every taxi starts from one of the old or new taxi parks, bound for different destinations. Most of the taxis are owned by individuals who assign drivers to drive them and the drivers will remit an agreed-upon amount of money on a daily, weekly or monthly basis.
2) However, some taxi owners actually drive one and assign the rest of the taxis to other drivers. This helps them in monitoring their taxi operations. Each taxi, upon registration, applies for a route which they wish to ply. This depends on how much money one is would like to make as agreed upon with the taxi owner. There are a few designated taxis stops within the city, but the taxis will stop anywhere as long as a passenger would like to disembark, or to load a passenger if there is space in the taxi. Time is not a factor to these taxis and at designated stages; the taxis will not depart until they are filled to capacity. This leads a lot of time loss on the passengers' side (who actually don't seem to mind a lot about it). It should however be noted that for shorter distances, or at critical times, passengers will opt not to take the taxi, and use the faster and versatile bodaboda means.
3) Taxi fares vary from place to place and the range is UGX500 for the shortest distance and UGX2,000 for the longest distance within the city. These fares are not fixed and they usually increase especially during the evening peak, and on days when it has rained so much that bodaboda cannot ply some of the roads.
4) Taxi drivers are very reluctant to follow the driving rules and timely departure. It is observed that, taxis stop anywhere to drop and pick up passengers, stop the vehicle in the middle of the road even in the peak hour, which obstruct the flow of traffic. When the carriageways are congested, if the space allowed some drivers even use pedestrian walkways to move forward. Apart from bad driving behaviour, some other prominent issues also discourage people to use Taxi, such as, filthy seats, discomfort atmosphere inside vehicle, presence of pickpocket etc.


Taxi


Bodaboda


City Bus Service

Figure 2-26 Different Public Transport Modes in Kampala

2.5.2 Bodaboda (Motorcycle taxi)

1) Bodaboda is one of the main modes of transport in Kampala. It's the fastest means of public transport to use, when one wants to get from one point to another in the shortest time possible for most of the cases.

Bodabodas do not observe any traffic rules and will take any direction on the road as long as it's the shortest distance to their destinations. It is because of this same reason that bodaboda is also the most dangerous means on transport in Uganda.

2) Bodabodas have no fixed fare and thus, the fare is determined based on one's negotiating power. However, it should be noted that the smallest amount charged is UGX 1,000. The usual fares almost double or triple on the days, when it rains heavily. This is due to the fact that only a few of them are willing to risk riding through the murky waters that are always dangerous.
3) Safety while riding on a bodaboda is determined by how strict one is otherwise they will be rushed through dangerous manoeuvres by the riders as they rush to pick as many customers as possible. Helmets are only worn by the bodaboda riders despite having laws that require each rider to carry an extra helmet to be worn by their passengers. A few safety-conscious passengers (especially foreigners) always carry their own helmets.

2.5.3 Medium-sized Bus

1) In order to mitigate the traffic congestion problem, KCCA introduced mass transport means by engaging private bus companies to run a bus system within the city since June 2015. Pioneer Bus and Awakula Ennume are two prominent companies that are handling this system. The buses have a seating capacity of about 30 - 35 passengers and a standing capacity of approximately 30, thus each can carry about up to 60 - 65 passengers at a go.
2) KCCA has divided the city into 4 regions; Northern, Eastern, Southern and Western regions for the introduction of bus services. Each region is to be run by the best bidder of any of the companies that apply to run that particular region. For example, the Eastern region is operated by Pioneer Bus Company.
3) The bus fare varies in between UGX1,000 and UGX2,000. Introduction of the bus system has been hugely welcomed by general population who work within, but reside outside the city, since the fares do not fluctuate during peak hours and even with heavy rains. For the beginning, only a few routes are being covered, with a view of rolling out the system to cover all the major routes leading in and out of the capital city.
4) KCCA is now planning to introduce high capacity public transport vehicles (city buses which can carry 64 passengers and above). KCCA is going to introduce the service on 2 pilot routes which will start and end City Square after running through different locations inside Kampala. The details are described in section 3.6.1.

2.5.4 Long Distance Bus

1) Long distance buses are operated between Kampala and other majors towns of Uganda, and East Africa at large. All these bus companies are privately owned. Bus fares range from UGX15,000 - 35,000 for 4 - 8 hour journeys depending on the distance. It should be noted that these fares spike during the festive seasons (Christmas and Easter) since many people are travelling upcountry to their families.
2) They all have terminals within the capital city from where they set off for the different destinations. There is no time management observed by all these companies, apart from a few new ones that are

striving to focus on departure and arrival times. Each bus is required to have at least 2 drivers who can always switch at intervals to curb the fatigue problem. There are police checks on all buses along all routes to check the problem of over speeding buses that strive to make as many routes as possible. This has greatly helped reduce on the number of bus accidents as compared to the past.

2.5.5 Railways

An experimental commuter rail service was launched in Kampala on December 2015 under an agreement between Government of Uganda/ Uganda Railways Corporation and Rift Valley Railways (RVR) Uganda and overseen by KCCA. The details about the service are available in section 3.6.2.

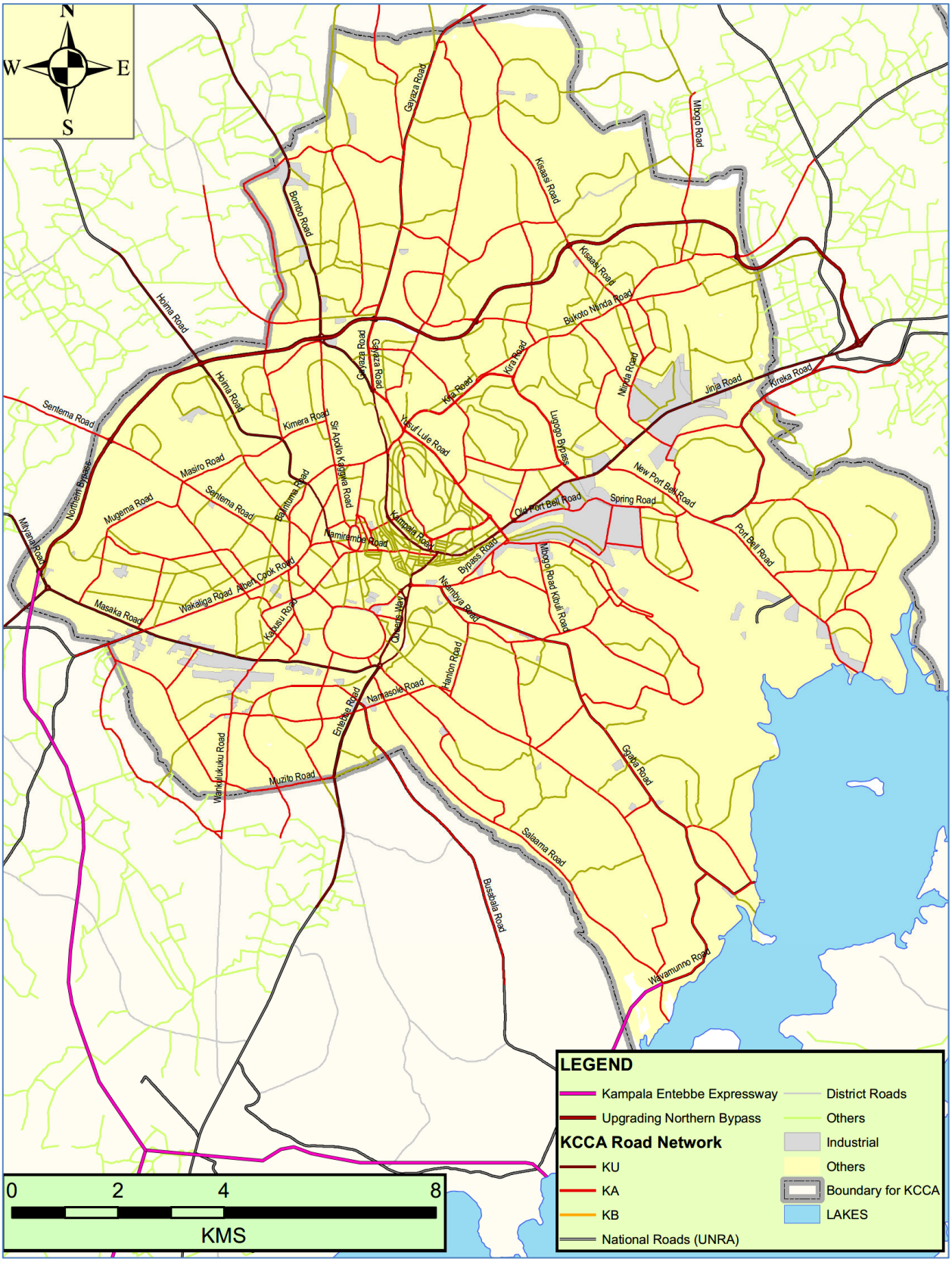
2.6 Freight Transport

2.6.1 Heavy Goods Vehicles (HGVs) volume of major junctions

According to the manual traffic count survey under the Preparatory Survey on the Greater Kampala Roads Improvement Project in the Republic of Uganda (Flyover project), 3.4% heavy vehicles were counted at Jinja junction, 2.2% at Yusuf Lule Junction and 2.1% at Nsambya Junction in 2013. It means the concentration of heavy vehicles in the city centre was quite heavy.

2.6.2 Industrial Areas

1) The industrial area is also very close to CBD, therefore an impact of the area is always observed over city traffic. There are several industrial areas located inside the Kampala city as shown in Figure 2-27. It is also understood that the area influenced by industrial area are quite large in Kampala city.
2) The industrial areas of Kampala are concentrated in Nitinda, Nakawa, Port Bell Road, Kampala, Katwe, Kibuye and Busega.

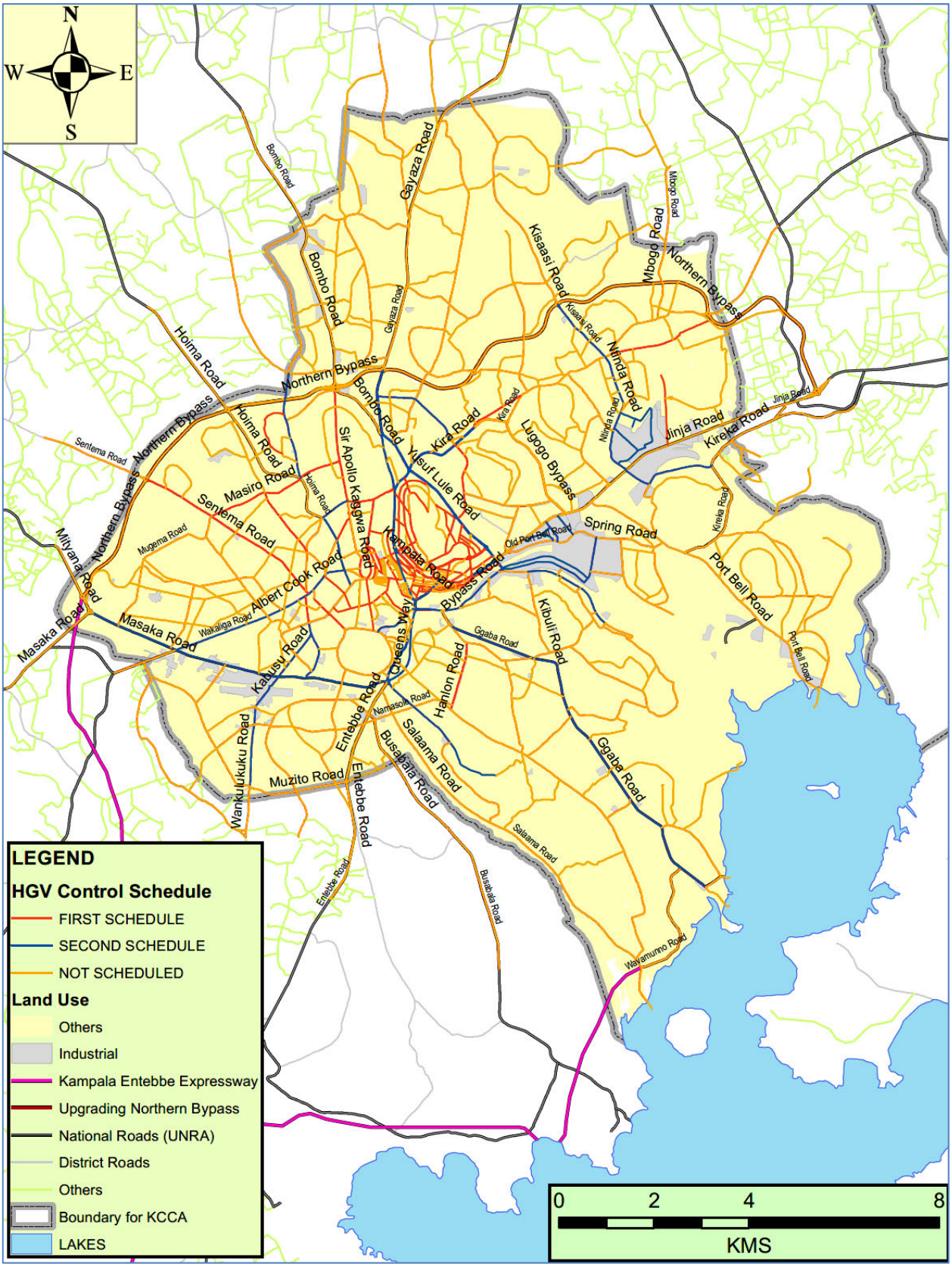


Source: KSTP

Figure 2-27 Industrial Areas and Buffer Zone of Heavy Vehicles in Kampala City

2.6.3 Heavy Goods Vehicles (HGVs) Regulation

1) The Statutory Instrument on the restriction of movement of heavy goods vehicles in Kampala city is being reviewed by the Transport Regulation Department in the Ministry of Works and Transport before it can be signed off by the responsible Minister.
2) According to this Statutory Instrument, the heavy goods vehicles can only enter the city only in the prescribed hours. Prescribed hours mean the times:
   a) Between 10:00PM and 6AM on Monday to Friday;
   b) Between 8PM and 7AM on Saturday;
   c) Between 8PM and 7AM on public holidays falling on Monday to Friday; and
   d) At any time on Sunday
3) The roads are also divided into 2 schedules, the goods vehicle exceeding a Gross Vehicle Weight (GVW) of 12 tonnes or length of 10 metres whichever is applicable on the city roads specified in Schedule 1 cannot enter during day time. The goods vehicles exceeding 12 tonnes but less than 22.5 tonnes Gross Vehicle Weight (GVW) or 10 metres in length are not restricted on the City Roads specified in Schedule 2 at any time. However, no person shall use, drive or park a goods vehicle exceeding a Gross Vehicle Weight (GVW) of 22.5 tonnes or length of 16 metres whichever is applicable on the city roads specified in Schedule 2 except during the prescribed hours.

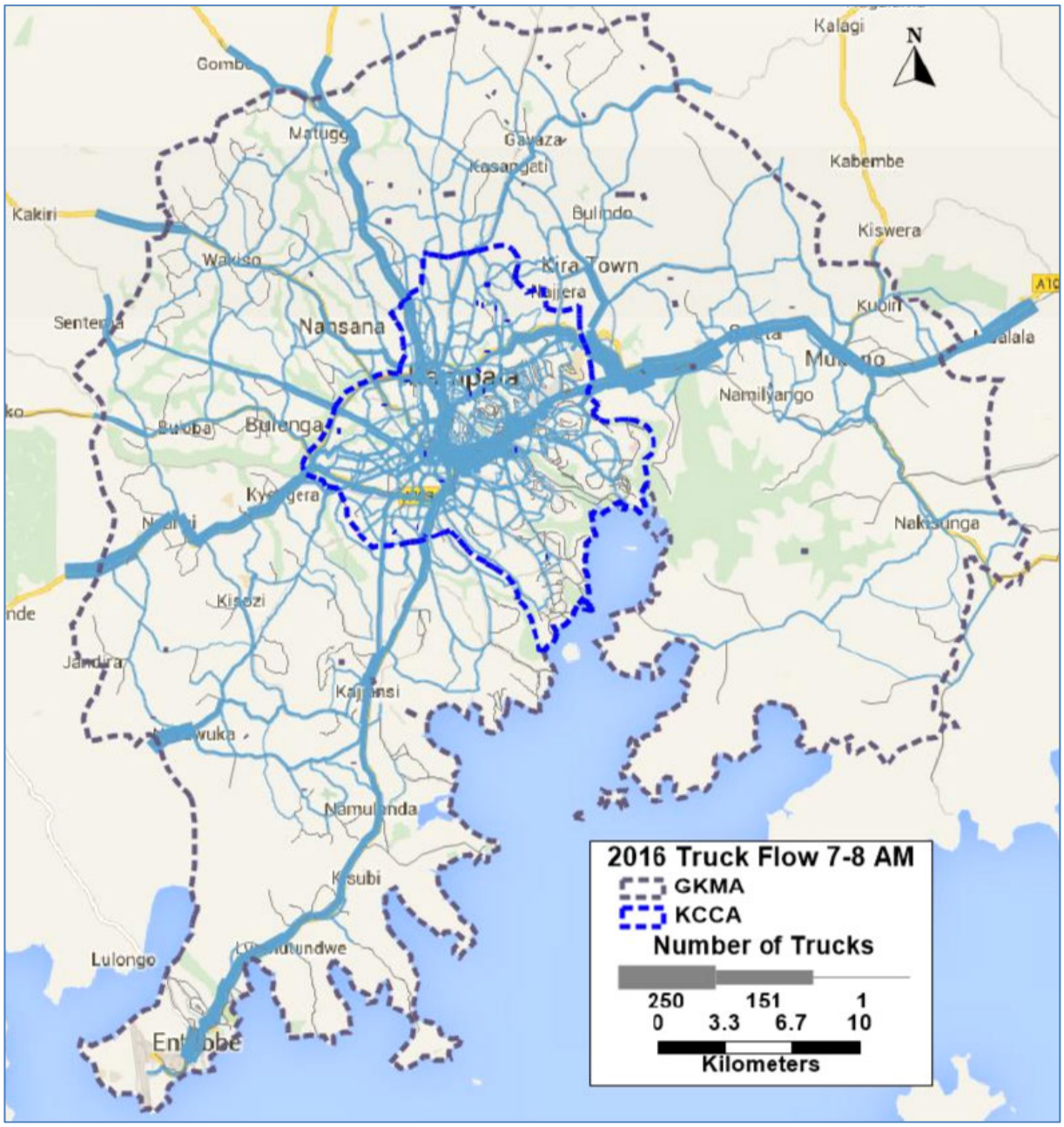


Source: KSTP

Figure 2-28 Restricted Roads for Heavy Vehicles in Kampala City

4) Heavy vehicle flow in morning hours of 7-8AM of 2016 is shown at Figure 2-29, where major corridors

congested due to heavy vehicles are understood.



Source: Multimodal Urban Transport Master Plan for GKMA, Final Report

Figure 2-29 Freight Flow Volumes AM Peak, 2016 Base Scenario

2.7 Non-motorized Transport

2.7.1 In Kampala, majority of the population travel by Non-Motorized Transport (NMT) modes. According to MMUTMP, 46% trips in Kampala are completed by walking. The proportions of people that walk are the urban poor, who do not have enough funds to afford public transport.

2.7.2 The existing urban road network for Kampala has a discontinuous NMT infrastructure. In the central business district, there are a number of streets with walkways, but outside the CBD walkways are a scarcity. Pedestrians frequently mix with vehicles on roads in many cases. This behaviour is also seen on

major arterial roads like Masaka Road.

2.7.3 The concept of bicycle lanes has not been recognized in Kampala for the past decades, thus the low infrastructure levels. Today cycle lanes are being introduced and so the presence of cycle lanes is quite thin. As of 2015, the only planned and constructed cycle lane could only be found along Jinja Road. Owing to the above challenges, a common occurrence is for pedestrians and cyclists to share the available space on walkways.

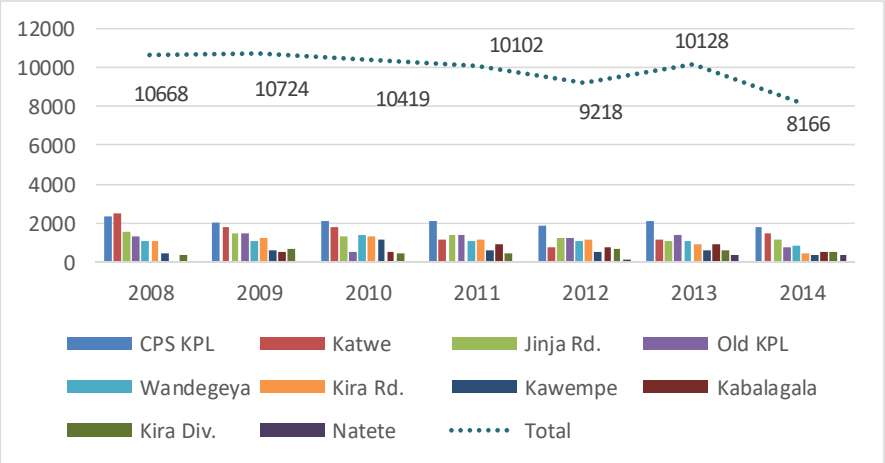
2.7.4 In Kampala the case of designated and demarcated pedestrian crossings is limited and remains unseen of large expanses of many roads. The main pedestrian crossings are in the city re zebra crossings with a few overhead bridges. Most pedestrian crossings are at road junctions as would be expected. However it is important to recognize that a common characteristic of pedestrians in Kampala who have a dislike for grade separated crossings and do cross the streets on them. Therefore we find that on roads with high traffic speeds, pedestrian bridges that have been constructed do not achieve the design intention of removing the risk of accidents. Subsequently, pedestrians are frequently involved in accidents on these high speed roads.

2.7.5 Recently, a new approach has been adopted to improve NMT. The Non- Motorized Transport policy was launched in May 2013 which requires urban road designs to provide for pedestrian and cycle paths. To that effect, a pilot project has been designed for the highly trafficked Namirembe road and Luwun Street. The location of the pilot was chosen because it is at the heart of the CBD, where the commercial activities are compact and it is the hub of public transport in the city. Introduction of NMT is in line with the urban transport strategy for Kampala. In addition, a 15Km long NMT corridor is planned and under implementation by KCCA, details of which are described in section 3.7.

2.8 Road Safety and Emergency Services

2.8.1 Traffic Accident Statistics

1) Traffic Accident data are collected by Kampala Police and investigated to identify the proper cause of the accident. A monthly summary of crash data under each station is compiled and sent to the district headquarters, later which is forwarded to the regional traffic control office. After that, the regional traffic control office sends the data to Police Headquarters for overall compilation.
2) Traffic accident data from 2008 through 2014 has been complied by the police stations in Kampala. The numbers of the traffic accidents from 2008 through 2014 were almost constant as approximately 10,000 cases in Kampala.
3) Another observation from the collected data is the number of minor accidents is decreasing year by year. The reason behind this is mainly under reporting of the minor accidents. It was found that if the accident is minor the parties mutually solved by themselves in the field, instead of going to police. Therefore, these kinds of accidents are out of police register.

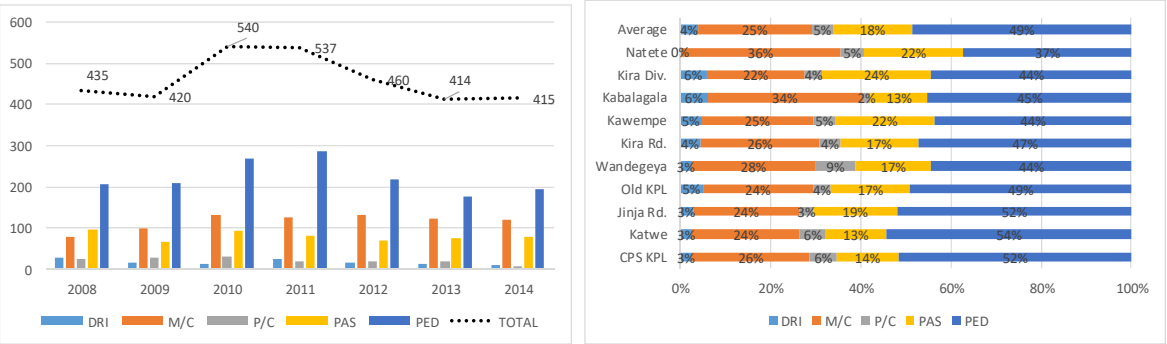


Note: 'KPL' stands for 'Kampala', 'CPS' stands for 'Central Police Station', 'Div' stands for 'division'. 'Rd' stands for 'road'

Data Source: Kampala Central Police Station

Figure 2-30 Yearly Variation of Nos. of Traffic Accidents in Kampala (2008 - 2014)

4) As for accident case involving persons killed, the number of annual cases were ranged from 410 to 540, however, there was a tendency of decrease of the case in recent years. The majorly of the victim was pedestrian and the second largest was motor cyclist for all years. The composition of kinds of victim were almost same in all of the stations.



Note: 'DRI' stands for 'Driver'. 'M/C' stands for 'Motor Cyclist'. 'P/C' stands for 'Pedal Cyclist'. 'PAS' stands for 'Passenger'. 'PED' stands for 'Pedestrian'.

Data Source: Kampala Central Police Station

Figure 2-31 Traffic Accidents involving Persons Killed (2008 – 2014)

2.8.2 Traffic Safety Awareness among Residents

1) A traffic awareness survey has been conducted to identify the awareness situation of the road safety in Kampala during December 2015 under KSTP.
2) The key results of the survey were as follows:
   a) 90 % of road users had received road safety education.
   b) Lower road safety awareness to follow signal and reducing speed at junction by public transport driver has been identified as compared to those of other road users.
   c) Sharp curves (bend) are identified as blackspot by passenger car and taxi drivers, while junctions are

identified by bodaboda drivers and pedestrians on the other hand.

d) As for major cause actor of traffic accident, bodaboda drivers identify taxi, while pedestrians identify bodaboda. Both taxi and bodaboda drivers have no consciousness that they are the actors.

e) Strick enforcement, increasing traffic signals and strengthening of the road safety education have been identified as major countermeasures.

3) To conclude above, the public transport drivers shall be the target group for road safety consciousness improvement.

2.8.3 Impact of Traffic Accidents on Congestion

When a traffic accident occurred, the impact of the accident definitely transferred to the smooth traffic flow and unless the lane not is cleared the traffic flow is not smooth in that section and its neighbouring areas.

2.8.4 Emergency Services

1) The emergency services in Kampala are the Police, Ambulance and the Fire Fighting Vehicles. As the roads are congested and most of the cases these vehicles need to apply some unorthodox way of driving.

2) With these emergency services, the VVIP (Very Very Important Person) movement inside Kampala has also observed quite frequent. Therefore, it may be necessary to implicit some sort of solutions through traffic signals or ITS (Intelligent Transport System), so that general users will not suffer due to the VVIP movement.

2.9 Transport Sector Administrator in Uganda

2.9.1 Urban Planning and Land-Use Control

The authorities responsible for the urban planning and land use inside Kampala are Directorate of Physical Planning of KCCA, Ministry of Works and Transport and Ministry of Land.

2.9.2 Road Infrastructure Development and Maintenance

KCCA is the implementing agency of all the infrastructure and road development including maintenance. Directorate of Engineering and Technical Services of KCCA is particularly responsible. However, Ministry of Works and Transport is the policy making agency. The present maintenance and development funding is under three types:

1) Uganda Road Fund
2) Government of Uganda Funding
3) Non-taxable Revenue

2.9.3 New Vehicle Registration

1) New vehicle registration is done by Uganda Revenue Authority. Everybody needs to register his/her car here before using on the road. However, as most the vehicles are imported through Mombasa port of

Kenya they can register once entered into Uganda. The required documents for registering a vehicle are:

a) Tax Identification Number (TIN),
b) Commercial Invoice,
c) Bill of Lading,
d) Insurance Certificate,
e) Certificate of Origin,
f) Permits (if necessary),
g) Original and translated certificates of cancellation or permanent export,
h) Copy of Importer's Identity Cards or Passport.

2) Once a vehicle is registered in Uganda, it can be used anywhere in Uganda. The only formalities they need is they have to purchase a 3rd party insurance every year.

2.9.4 Railway Administration

Uganda Railways Corporation (URC) is a corporate body reporting to the Ministry of Works and Transport. Its mandate is to carry out construction, operation and maintenance of railway, marine and road services both in and outside Uganda, for the carriage of passengers and goods.

2.9.5 Law Enforcement

For all types of law enforcement Uganda Police Force is the organization. It has separate Directorate of Traffic and Road Safety, who is responsible for traffic related enforcement in Uganda.

3 REVIEW OF EXISTING PLANS AND PROJECTS

3.1 National and Urban Development Policies and Plans

3.1.1 Uganda Vision 2040

1) Government of Uganda developed Vision 2040 as a follow up to the Comprehensive National Development Planning Framework policy (CNDPF) 2007. Vision 2040 is aimed at changing Uganda from a predominantly low income to a competitive upper middle income country within 30 years with a per capita income of US$ 9,500.
2) The concept for Vision 2040 is to strengthen infrastructure for (energy, transport, water, oil and gas and ICT); Science, Technology, Engineering and Innovation (STEI); land; urban development; human resource; and peace, security and defence. Strengthening of the aforementioned areas is expected to from the backbone for harnessing the opportunities in oil and gas, tourism, minerals, ICT business, abundant labour force, geographical location and trade, water resources, industrialisation, and agriculture that exist within Uganda.
3) This Vision 2040 is expected to be an all-encompassing perspective plan for the thirty years, which will also act as a guide to any future planning. In essence, all ministries, departments and autonomous and semi-autonomous entities will realign their development priorities with the Vision.
4) The design and implementation of the Vision emphasizes sustainable development through preservation of natural resources such as forests and wetlands. The NDP plans to promote access to basic needs such as education, health services, food, housing and the equitable distribution of incomes among all citizens. Furthermore, the vision also is looking to amend the land reforms in Uganda to allow for faster acquisition necessary in planned urbanisation and infrastructure development.
5) Vision 2040 set a number of socio-economic indicators and targets for Uganda such as such as per capita income of 9500 US$, percentage of population below poverty line of 5%, percentage of standard paved roads at 80% among others, that shall be used to monitor progress towards meeting vision 2040 goals.
6) The government of Uganda proposes to use a quasi-market approach to achieve set targets; that is by achieving the goals through a mix of both Government investments in strategic areas and private sector market driven actions. The private sector will be the engine of growth and development. The government's role on the other hand will be provision of conducive policy regulatory and institutional framework and promote public-private partnerships. The implementation of this vision will be a "business approach" management style. It will focus on improving efficiency in management techniques and service delivery within the local government.

3.1.2 Kampala Physical Development Plan – KPDP (2012)

1) The proposed Vision for the long term development of Kampala, is that of a Modern, Functional, Balanced City and Metropolitan System:
   a) Driving Uganda's Growth, Transformation and Modernisation;
   b) Ensuring Kampala's future as a Vibrant, Attractive and Sustainable City

2) In so doing Kampala will fill a number of essential roles and functions:
   a) Hub of an integrated, balanced Urban System in Uganda;
   b) Engine of Growth for Uganda, enabling and driving prosperity;
   c) The "Garden City of Africa" - the Gateway to and Showcase of Uganda;
   d) Capital City and Seat of Government;
   e) Leading Cultural and Educational Centre of East and Central Africa;
   f) Centre of the Buganda Kingdom;
   g) Quality Home and Living Environment for its residents;
   h) Tourism Destination and Hub
3) The KPDP sets the project areas for the Capital investment Plan (CIP) for Kampala. These areas are categorised into drainage; Education & Community Development; Economic Development (Capacity Building and Pilot Projects only); Environmental; Health; Housing (Capacity Building and Pilot Projects only); Institutional; Physical Planning; Transportation; Water & Sewage.
4) In line with the set categories, transportation projects selected under CIP are; Public Transport (BRT/MRT and rail in the future); NMT (pedestrian and cycle); Construction of the Urban Highway and Ring Roads (with provision for mass transport); Inner city roads upgrade; and Traffic Management that requires Capacity Building (Integrative Master Plan as well as PT & Traffic Management).

3.1.3 KCCA Strategic Plan (2014)

1) The KCCA strategic plan 2014/15 – 2018/19 was developed in line with the National Vision 2040 and the Greater Kampala Metropolitan Area (GKMA) Development Framework 2040 to address the need to transform Kampala, rebuild key institutional, infrastructural and social structures that drive the delivery of goods and services, and respond to the challenges of increasing urbanization. The Plan is designed to foster the Uganda Vision 2040 plans that aspire to move Uganda to a middle-income country by raising Per capita GDP to US$9500 by the year 2040.
2) The strategic plan is directed towards four themes;
   a) Economic Growth and the Integrated City Transport Infrastructure theme in which KCCA shall seek to create an enabling environment needed to realize an economically empowered Kampala city.
   b) Planned and Green Urban Environment theme where KCCA seeks to ensure that communities and neighbourhoods live harmoniously while taking care of the environment for intergenerational equity and sustainable development
   c) Social development, Health and Education theme that seek to promote preventive and promotion health systems to improve quality of life.
   d) Operational Excellence and Governance theme which focuses alleviating institutional inefficiencies and redundancies develop and operate modern integrated business systems supported by Information Technology.
3) Within these themes, the following programmes were identified to form the city's development strategies for the period up to 2018;
   a) Integrated neighborhood planning,

b) Integrated city transportation infrastructure,
c) City resilience and sustainable drainage management system,
d) Institutional development program,
e) Economic growth program,
f) Health, social development and inclusive growth program

4) According to the KCCA strategic plan, these programs shall be implemented over the next five years to address the structural bottlenecks within Kampala.

3.1.4 Second National Development Plan - NDPII (2015)

1) NDPII launched in June 2015 is set on the theme "Strengthening Uganda's Competitiveness for Sustainable Wealth Creation, Employment and Inclusive Growth". It was developed subsequent to the National Development Plan 2010/11 – 2013/14. NDPII analyses the key achievements of the preceding NDP, picks out key lessons learned and incorporates these lessons into the generation of new development approaches and strategies for the following 5 years (2015/16 – 2019/20).
2) NDPII identifies the key development areas for government of Uganda as agriculture, tourism, Minerals, Oil and Gas Development, Infrastructure Development and Human Capital Development in line with vision 2040. NDP II suggests that these areas present the best potential for launching the Uganda onto a sustained path of growth and development. Agriculture is stated as central to the country's economic growth and poverty reduction strategy, employing 72 percent of the total labour force, accounting for 54 percent of total exports, generating 25.3 percent of GDP (2012/13).
3) The NDPII indicates the financing for its Plan as government funding through the Medium Term Expenditure Framework; Public Private Partnerships (PPPs); the Private Sector; Development Partners; and other non-state actors. From this we can see that the NDP climaxes into the Uganda Vision 2040 goals and strategies.

3.1.5 KCCA Ministerial Policy Statement (FY2017/18)

1) KCCA was mandated to continue implementation of the key strategic programmes and projects stipulated in the KCCA 5 Year Strategic Plan. Planned activities for FY2017/18 are,
a) Integrated City Transportation Infrastructure
b) Neighborhood Planning
c) City Resilience and Sustainable Drainage Management
d) Social Development, Health and Education
e) City Economic Growth
f) Enhancing efficiency in local revenue mobilization
g) Institutional Development
2) KCCA is determined to put emphasis towards prudent financial management to ensure value for money, reinforcing strategic partnerships with the private sector, development partners and agencies in the delivery of public services in the City cognizant of the need to promote an all-inclusive growth strategy and enhanced Citizen Engagement and Accountability.

3) The programmes planned for FY2017/18 include following Transport Projects;

a) Road improvement and maintenance under GOU funding

b) Road upgrading and junction improvement under KIIDP2

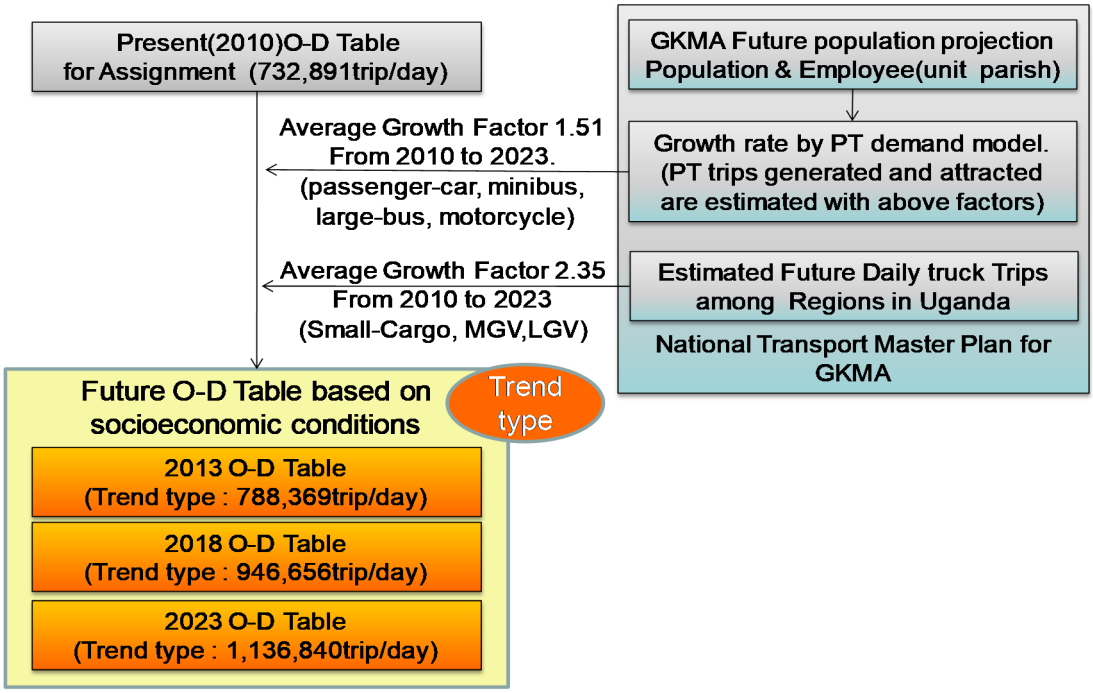
3.2 Future Perspectives on Transport Demand

3.2.1 The Study on Greater Kampala Road Network and Transport Improvement (2010)

1) The Study on Greater Kampala Road Network and Transport Improvement has been carried out in 2010. The study area was Greater Kampala Metropolitan Area and planning horizon was set as 2013, 2018 and 2023.

2) In this study, the Public Transport (PT) production model and Cargo Transport (CT) model was used for the previous JICA study known as NTMP/GKMA were adopted to maintain consistency with the master plan. PT production model considers population growth and number of employees as parameter for trip generation. This PT model is applied to passenger cars, buses and motorcycles. Growth rate derived from this model was recalculated using the latest data for population and employment.

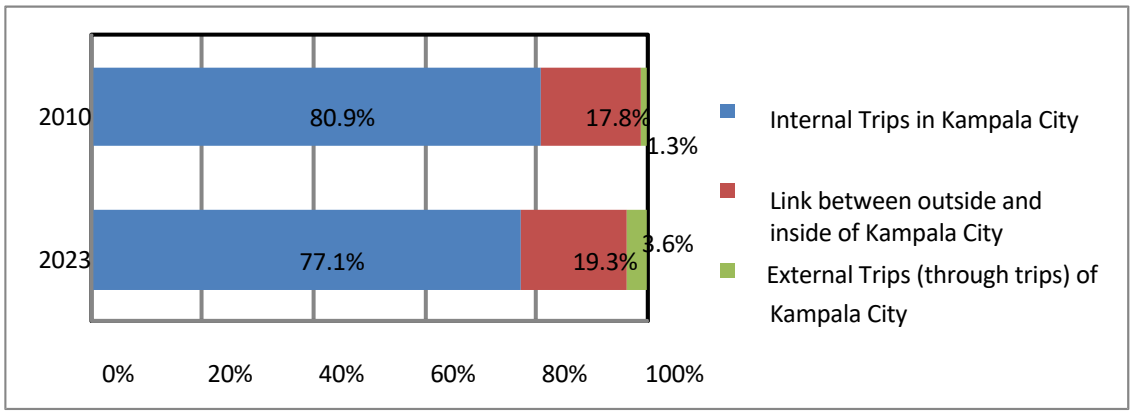
3) As a result, the number of trips in 2018 was estimated as almost 0.95 million per day and in 2023 to be approximately 1.1 million per day.



Source: The Study on Greater Kampala Road Network and Transport Improvement

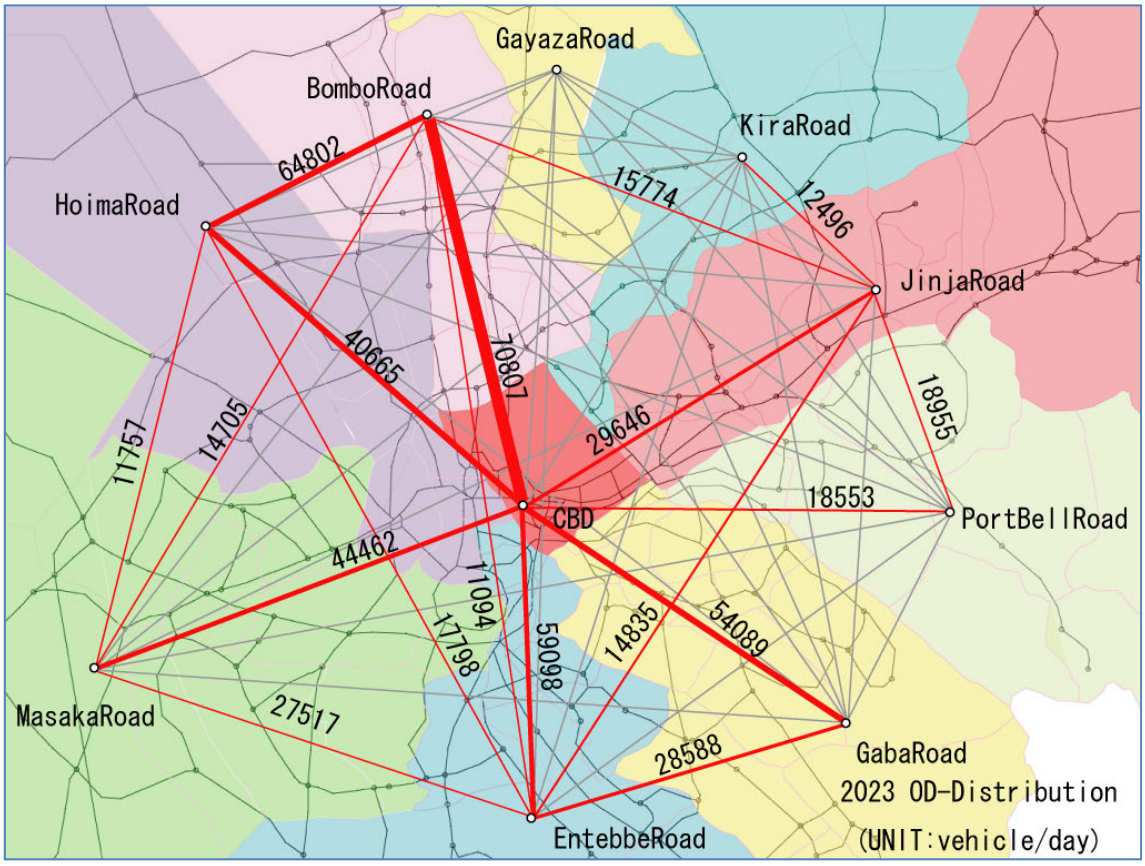
Figure 3-1 Flow of Future Trip Number Estimation

4) Figure 3-2 shows the trip distributions for all purpose in 2010 and 2023. These distribution patterns were derived from the OD table calculated for traffic assignment model. The major trip flows are limited within Kampala City in 2010. Distribution pattern in 2023 is basically the same pattern as that in 2010. Only the share of external trips (through trips) will slightly expand because future population and employment outside Kampala City are expected to be developed.



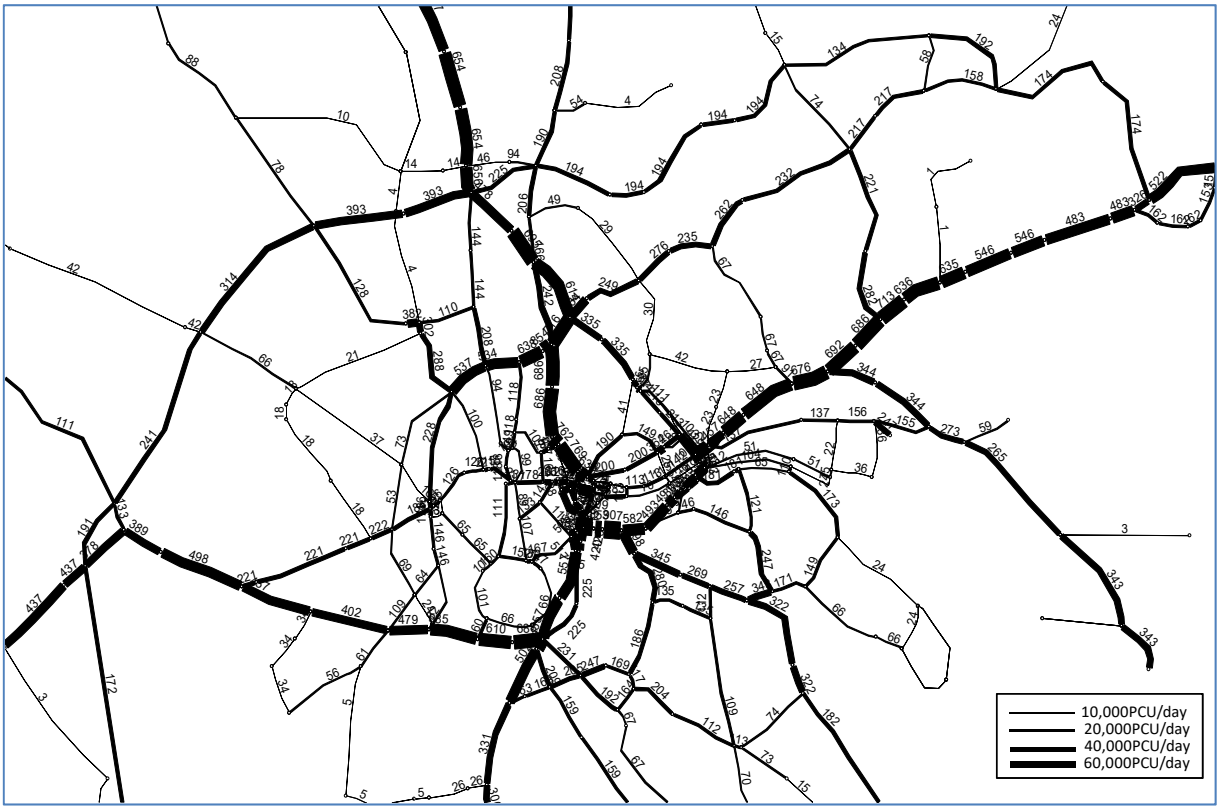
Source: The Study on Greater Kampala Road Network and Transport Improvement, Final Report

Figure 3-2 Trip Distribution in 2010 and 2023



Source: The Study on Greater Kampala Road Network and Transport Improvement, Final Report

Figure 3-3 Estimated O-D Distribution: Scenario 2023



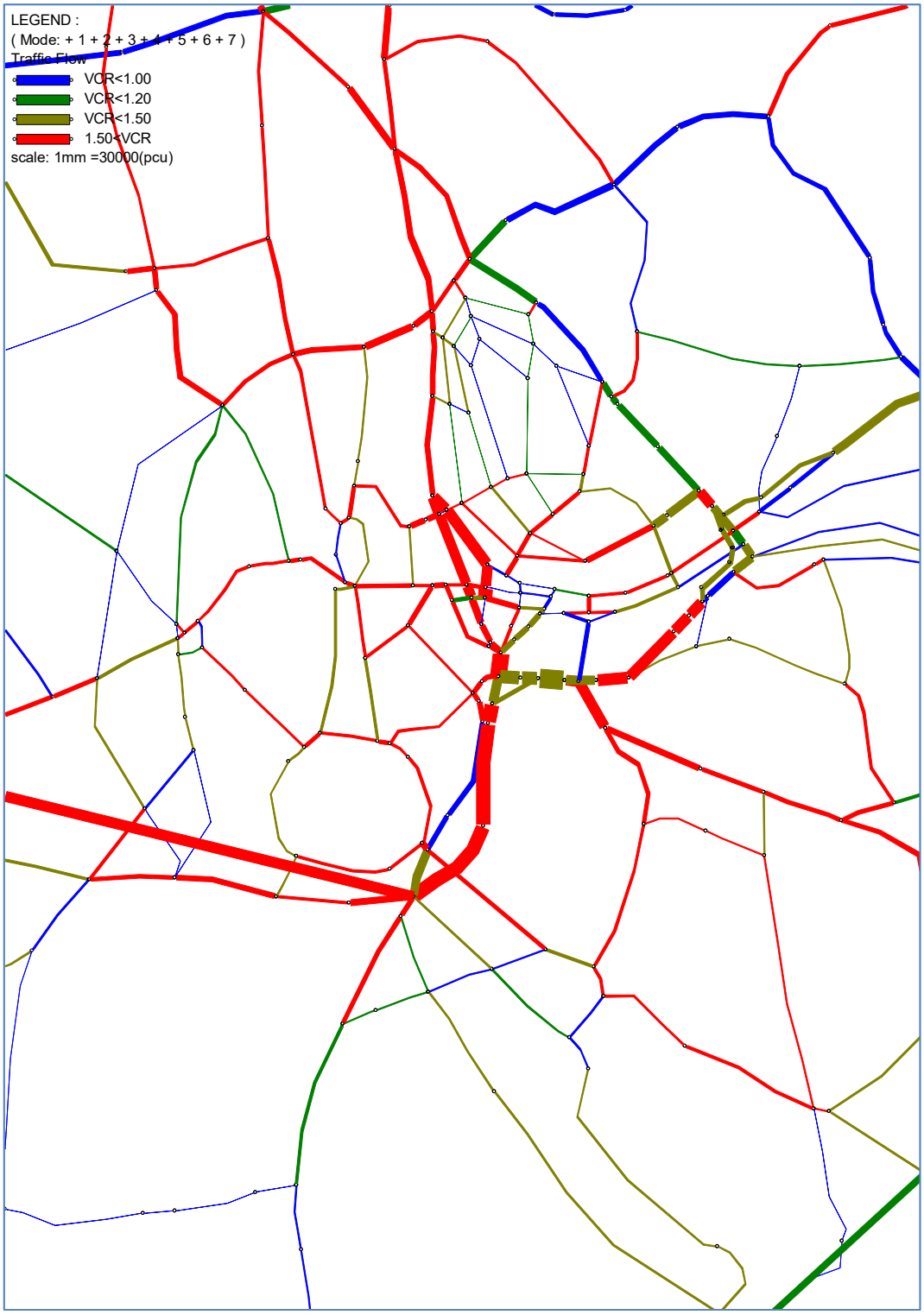
Source: Preparatory Survey on the Greater Kampala Roads Improvement Project, Final Report

Figure 3-4 Result of Future Traffic Assignment in Kampala: Scenario 2023

5) The future traffic assignment result of 2023 which was estimated under the Preparatory Survey on the Greater Kampala Roads Improvement Project is shown in Figure 3-4. It was assumed that the Kampala Flyover and other ongoing major projects such as dual carriageways & Kampala-Entebbe Expressway are already completed and BRT pilot route is under operation. All the major roads connecting to central Kampala are highly congested to accommodate more than 1.1 million trips in KCCA jurisdiction.

6) In Figure 3-5, the ratio of traffic volume and capacity is shown using the same results. Here it is observed that all the connections to Nakasero area is red means the V/C ratio is more than 1.5. Some of the major roads towards Central Kampala where V/C Ratio will be greater than1.5 is observed are:

- Bombo Road
- Apollo Kaggwa Road
- Makerere Hill Road
- Nile Avenue
- Acacia Avenue
- Jinja Road
- Namirembe Road
- Kampala Road
- Queen's Way



Source: Preparatory Survey on the Greater Kampala Roads Improvement Project, Final Report

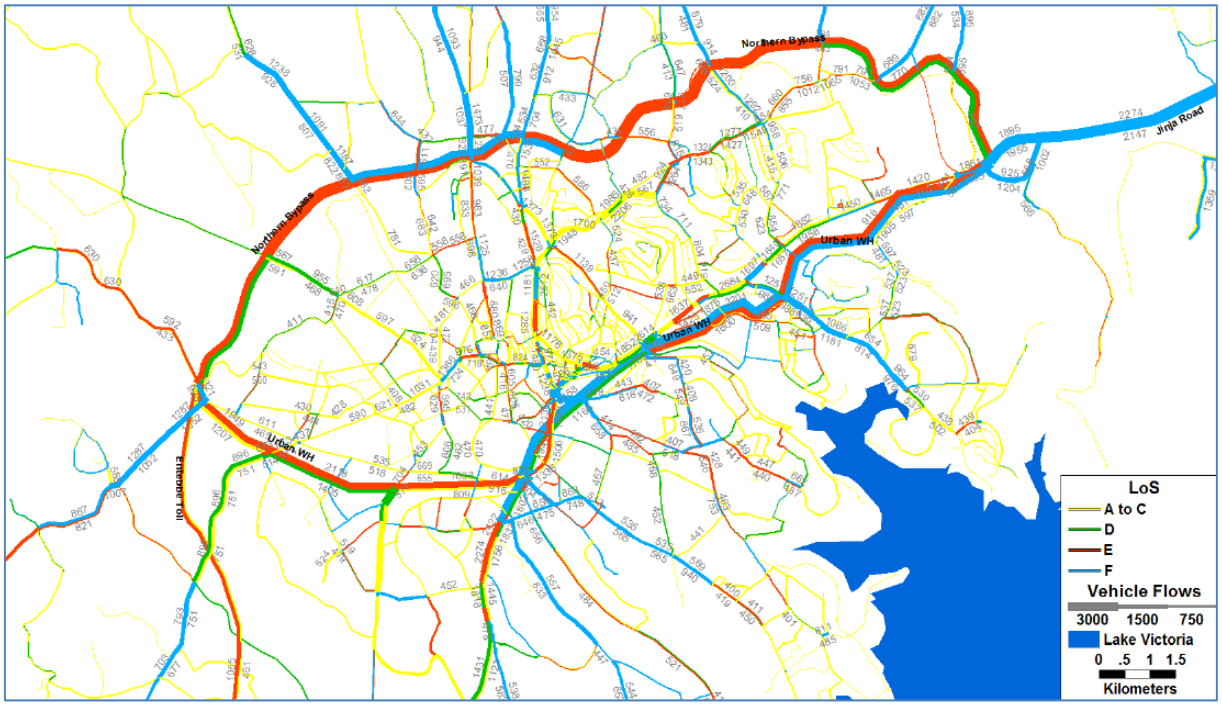
Figure 3-5 Volume Capacity Scenario of Future Traffic Assignment in Kampala: Scenario 2023

3.2.2 Kampala Physical Development Plan - KPDP (2012)

1) KPDP is formulated in 2012 for greater Kampala. Since the Preparatory Survey on the Greater Kampala Roads Improvement Project has forecasted on traffic flow in 2023, to understand the future traffic flow situation in Kampala, KPDP report has been studied. KPDP has been formulated in 2012 and focused

on Greater Kampala Metropolitan Area. The planning horizon is set as 2022 and 2040.

2) The Consultant under KPDP project developed new vehicle trip matrices for the year 2022 and a long term matrix for the year 2040, taking into account the forecasts regarding population and employment for these years. The Consultant developed a base scenario called: "Do minimum and more of the same (DMMOTS)". In this scenario, the population and employment were increased and their spatial distribution followed the unregulated pattern observed for the last 15 years. As for the road network, new road sections were introduced into the 2022 network only if these new highways are already under some discussions (i.e. the toll way to Entebbe).



Source: Kampala Physical Development Plan, Final Report

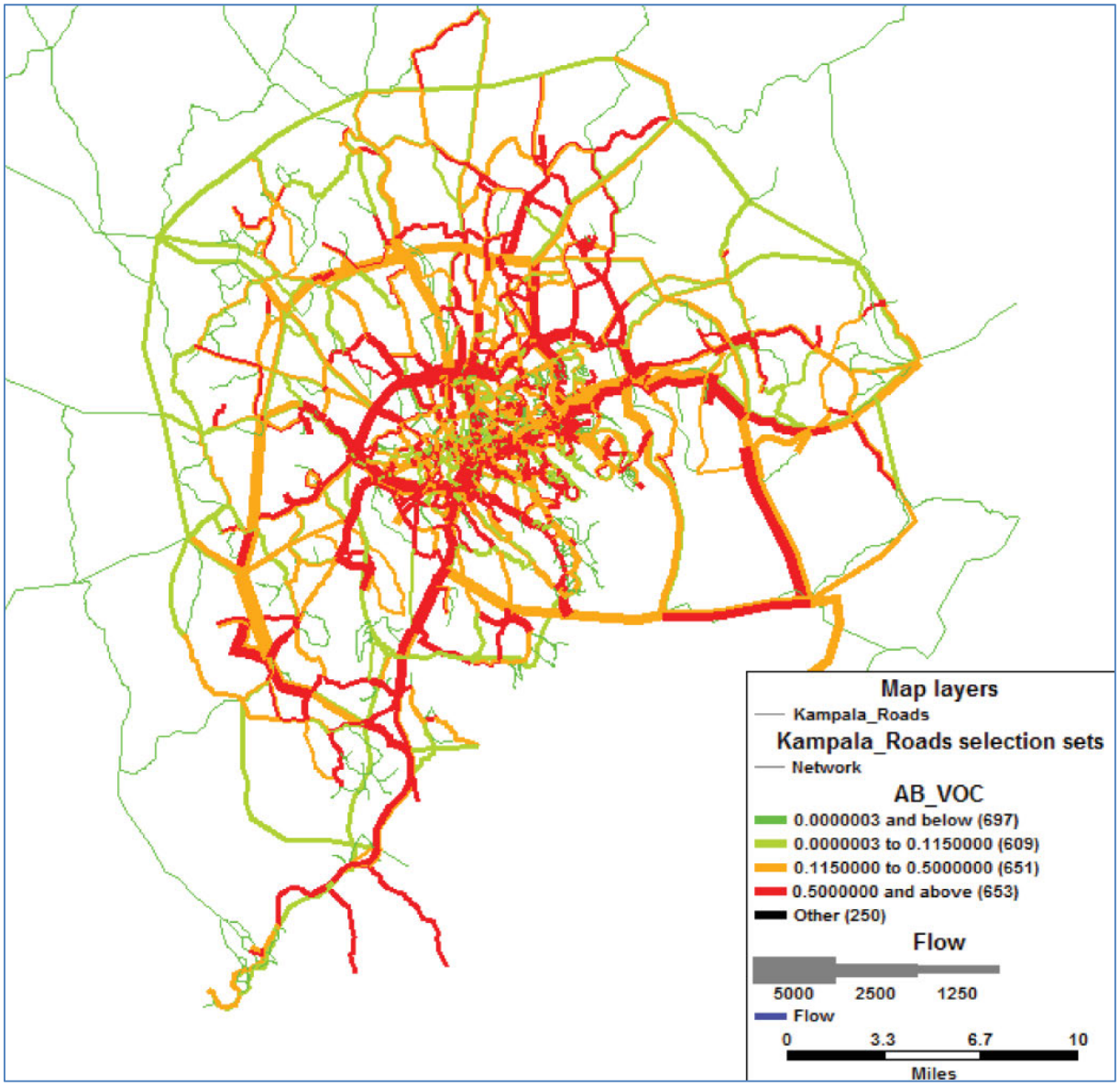
Figure 3-6 PM Taffic Assignment of GKMA: Scenario 2022

3) Future traffic situation of Kampala in KPDP concluded as following:

a) The expected increase in number of vehicle trip trips due to increase in both population and standard of living will cause major gridlock within few years if no new roads are constructed.

b) Even with large investments in the road network, the city will still experience congestion and slow speeds during the morning AM peak hour.

c) It is important to reserve the necessary Right-of-Ways (ROW) for the second middle ring road as it will support the proposed PDP.



Source: KPDP 2040 Transport Modelling and Forecasting Report

Figure 3-7 Roadway Network with AUTO Assignments: Scenario 2040

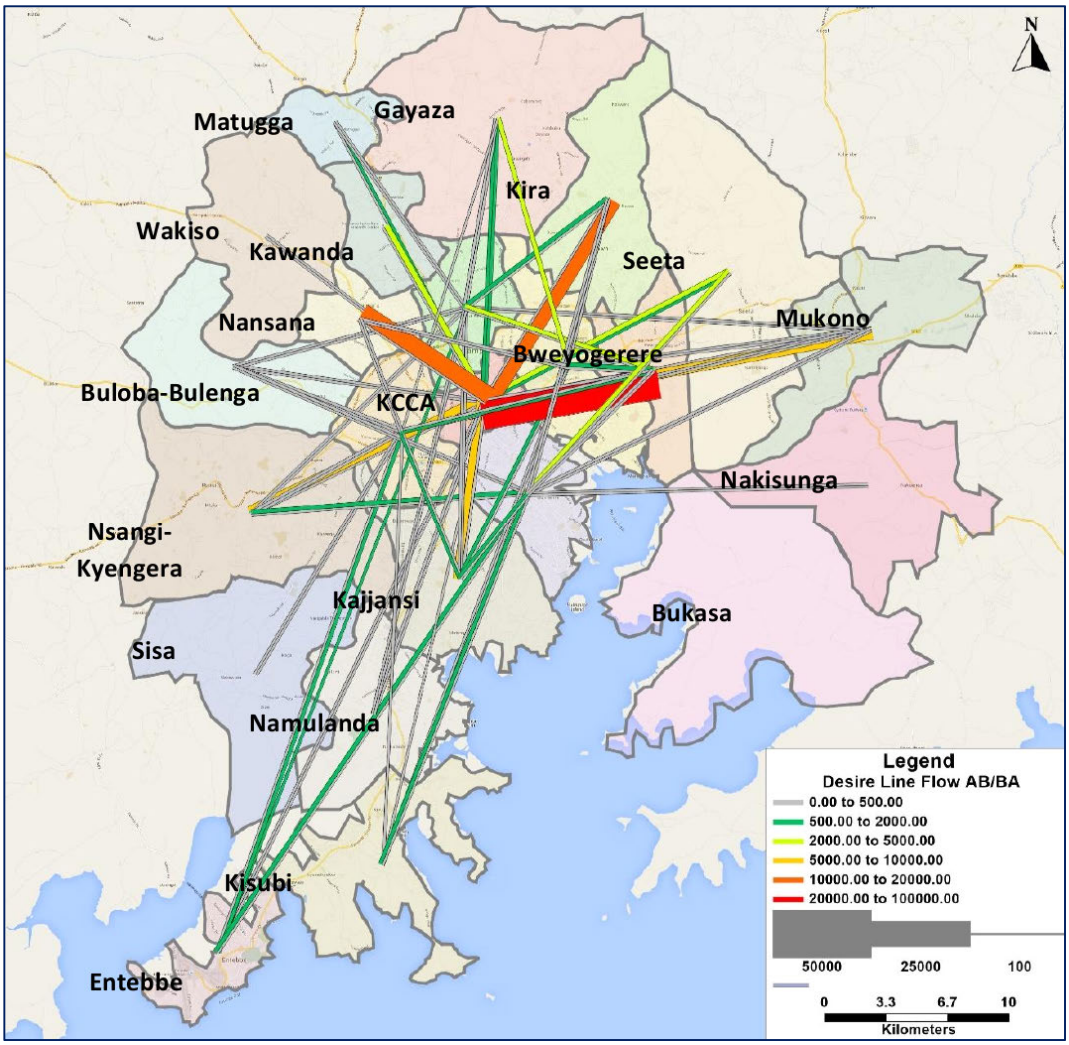
d) Results of the assignment for the 2040 matrix on the base model revealed that, the base capacity was insufficient to meet long term demand. Therefore, it will be necessary to consider expanding capacity of the existing network while also upgrading and widening existing roadways. The road network will not be able to function properly without significant increase of capacity (i.e. adding at least 2 more lanes per direction for each major highway).

e) The model shows that in 2040, even with an updated road network, congestion in the central business district is significant as shown in Figure 3-7. Therefore, the transportation network in the GKMA an only remains sustainable with a heavily bolstered mass transit network.

3.2.3 Multi-Modal Urban Transport Master Plan – MMUTMP (2018)

1) Multi-modal Urban Transport Master Plan has been formulated in 2018 and focused on Greater Kampala Metropolitan Area. The planning horizon is set as 2025 and 2040.

2) Desire lines, geographical representations of OD sets were formulated, based on the aggregated synthetic PT OD matrix for 2040 is shown in Figure 3-8. During AM Peak period, inbound demand towards Kampala is greater than outbound, and Bweyogerere-KCCA Central Division represents the largest GKMA-KCCA OD pair.

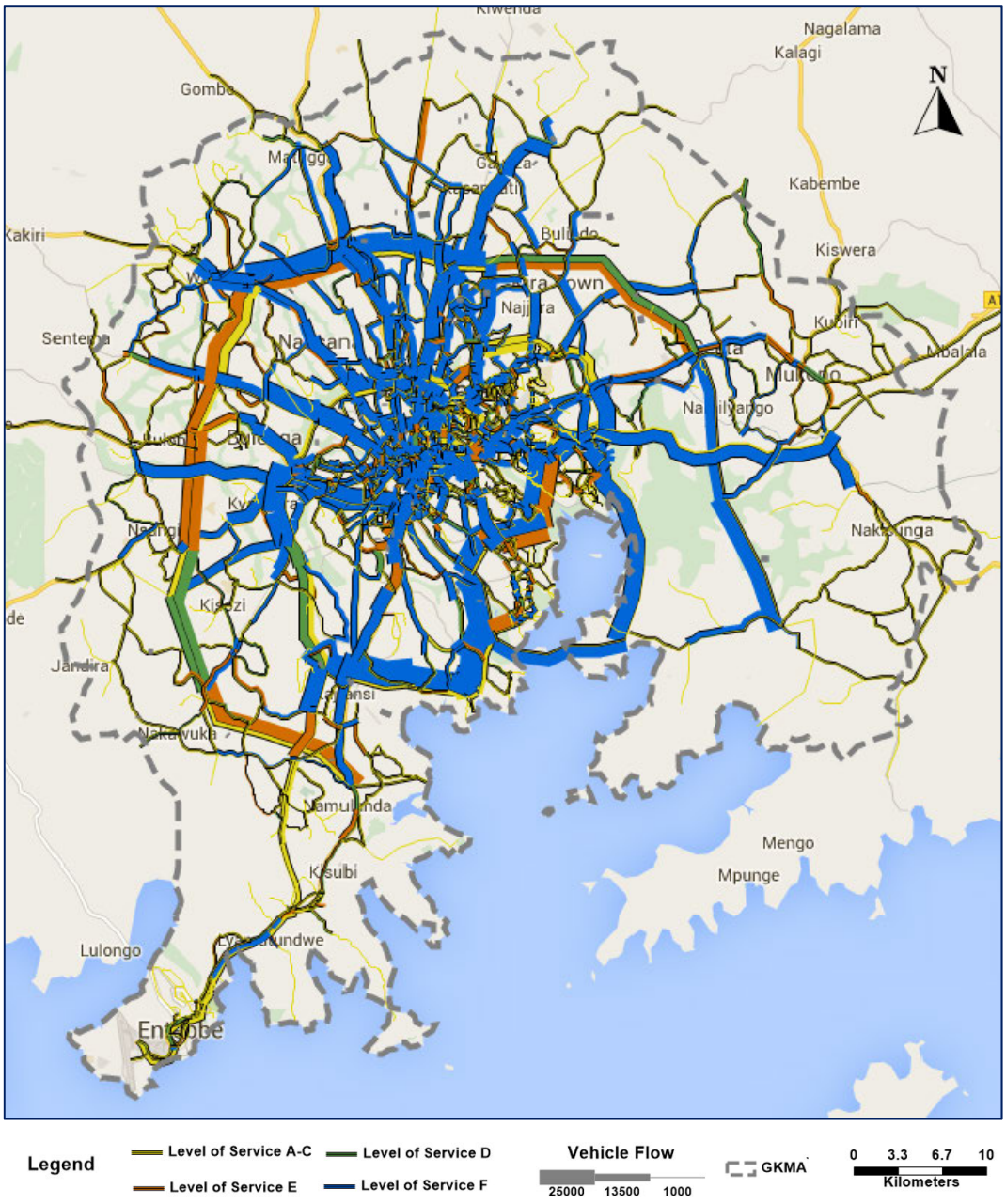


Source: Multimodal Urban Transport Master Plan for GKMA, Final Report

Figure 3-8 GKMA-KCCA PT Desire Lines 2040 AM Peak, 100+ Passengers for OD Set

Source: Multimodal Urban Transport Master Plan for GKMA, Final Report

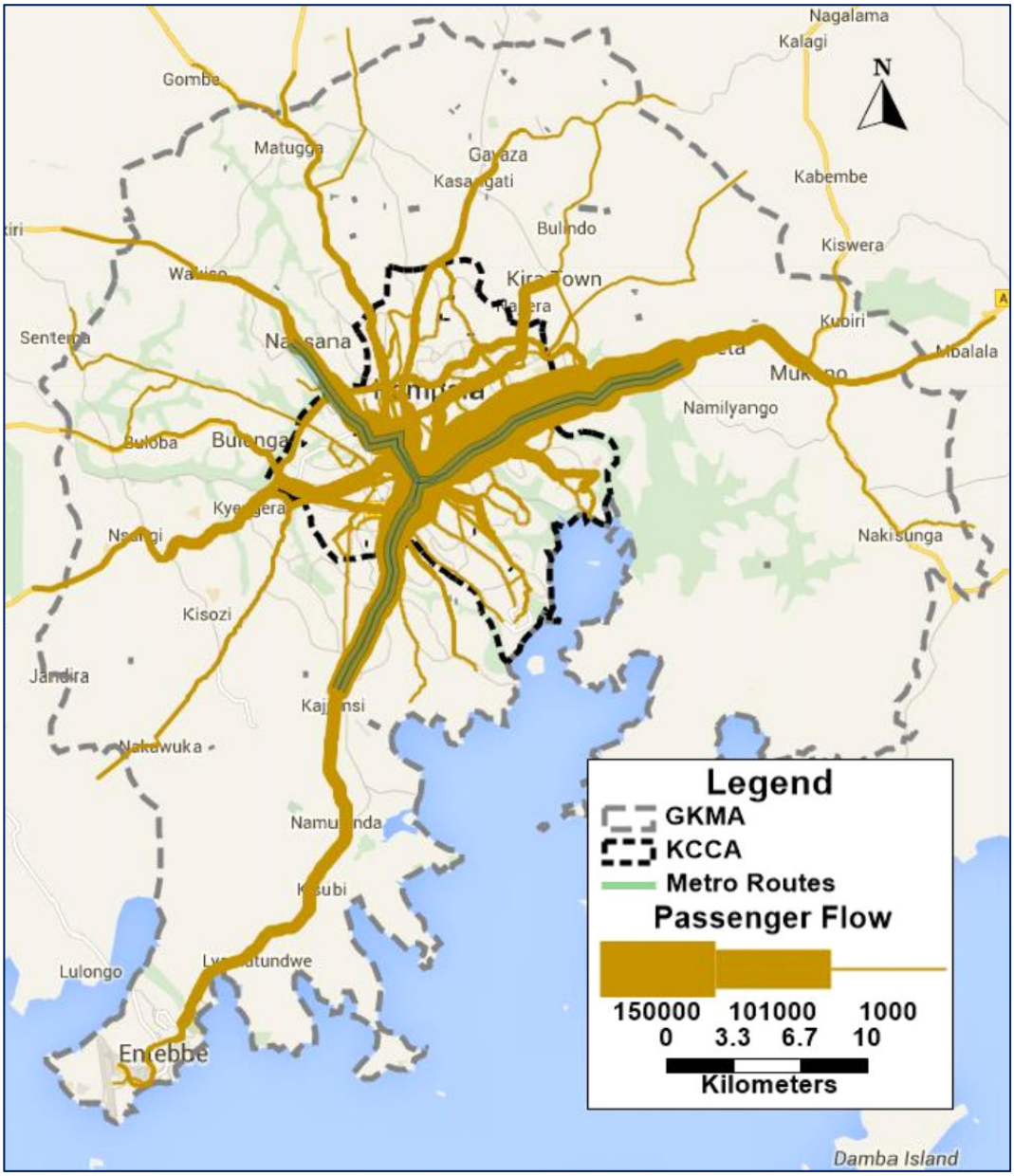
3) Figure 3-9 demonstrates the auto assignment outputs of 2040, if no BRT, LRT or Metro are in operation. Most of the roads in Kampala will be below LOS F, as the roads will be congested due to no alternative of mass movement. The real land-use scenario, characterized by intense urbanization of peripheral areas, and concentration of employment in the CBD shows increased levels of service for the AM peak hour, most likely due to the efficiency of transportation to the CBD and urban centre.



Source: Multimodal Urban Transport Master Plan for GKMA, Final Report

Figure 3-9 2040 Auto Assignment Real LU Scenario

4) The public transportation assignment is another TDM output that enables the consultant to conduct an evaluation of the various scenarios. The public transportation passenger flow in 2040 is shown in Figure 3-10 and major PT routes can be understood from this figure. According to the analysis, the highest number of demand will be from Seeta of Mukono corridor, followed by Kajansi of Entebbe corridor.



Source: Multimodal Urban Transport Master Plan for GKMA, Final Report

Figure 3-10 2040 Metro Routes & PT Assignment

3.3 Transport Plans and Policies

3.3.1 National Transport Master Plan – NTMP (2009)

The NTMP, including the Greater Kampala Metropolitan Area master plan sets out a framework for development of the transport section over 15 years, 2008~2023. This plan constitutes an essential element for overall planning of the medium-term economic and social development of Uganda. The main objectives of the NTMP/GKMA are:

1) To provide a long term multi-modal reference document giving a comprehensive framework within which consistent plans for individual modes can be developed
2) To serve as a key input to the overall national planning process spearheaded by the National Planning

Authority

3) To serve as a key input to regional transport planning as East African Community, COMESA and African Union levels;
4) To create a framework within which well-informed investment decision can be made by both public and private sectors.
5) To achieve establishment of a permanent high quality long term transport performance, to undertake periodic updating of the plan, and eventually to prepare subsequent National and GKMA Transport Master Plans.

3.3.2 KCCA Strategic Plan (2014)

1) The KCCA strategic plan 2014/15 – 2018/19 was developed in line with the National Vision 2040 and the Greater Kampala Metropolitan Area (GKMA) Development Framework 2040 to address the need to transform Kampala, rebuild key institutional, infrastructural and social structures that drive the delivery of goods and services, and respond to the challenges of increasing urbanization. The Plan is designed to foster the Uganda Vision 2040 plans that aspire to move Uganda to a middle-income country by raising Per capita GDP to US$9500 by the year 2040.
2) The strategic plan is directed towards four themes;
   a) Economic Growth and the Integrated City Transport Infrastructure theme in which KCCA shall seek to create an enabling environment needed to realize an economically empowered Kampala city.
   b) Planned and Green Urban Environment theme where KCCA seeks to ensure that communities and neighbourhoods live harmoniously while taking care of the environment for intergenerational equity and sustainable development
   c) Social development, Health and Education theme that seek to promote preventive and promotion health systems to improve quality of life.
   d) Operational Excellence and Governance theme which focuses alleviating institutional inefficiencies and redundancies develop and operate modern integrated business systems supported by Information Technology.
3) Within these themes, the following programmes were identified to form the city's development strategies for the period up to 2018;
   a) Integrated neighborhood planning,
   b) Integrated city transportation infrastructure,
   c) City resilience and sustainable drainage management system,
   d) Institutional development program,
   e) Economic growth program,
   f) Health, social development and inclusive growth program
4) According to the KCCA strategic plan, these programs shall be implemented over the next five years to address the structural bottlenecks within Kampala.

3.3.3 Urban Transport Policy & Strategy – UTPS (2014)

KCCA formulated its original urban traffic policy, Urban Transport Policy & Strategy for Greater Kampala Metropolitan Area, in January 2014. It generally covers the followings:

1) A large portion of the UTPS has been allocated for improvement of public transportation. The improvement shall be carried out based on the Transit-Oriented Development (TOD) approach which is in accordance with the National Policy in Uganda. It also describes needs of establishment of the agencies to implement operation roles by mode (BRT, matatu and bodaboda).
2) The UTPS also touches upon the effective use of Non-Motorized Traffic (NMT) in CBD by saying that NMT space should be allocated on the road.
3) As for another traffic operation management policy, the road space should be allocated preferentially for public transportation. It specifically proposes installations of bus exclusive lane and giving entitlement of priority passing to public transport at junctions.
4) It also discusses switching of personal passenger cars to public transportation as a measure to curve passenger car use. As for specific measures, a regulation to restrict public parking use by personal passenger cars in CBD shall be implemented. KCCA shall also support and encourage the public transport operator to improve of service standard and safety level.
5) A need of new regulation is recognized for logistic transportation to be restricted to pass CBD area at peak time. A development policy regarding establishment of new logistics base at outside GKMA as large-vehicle traffic management shall also be introduced.
6) Harmonization of land management and new road network development shall be considered since road traffic demand cannot be controlled and managed unless well-planned land management is implemented.

3.3.4 Draft National Transport Policy (2014)

1) National Transport Policy of Uganda was drafted in June 2014 and the key priorities of the Policy as agreed by the Policy Committee were to:
   a) Encourage greater private sector participation
   b) Improve inter-agency co-ordination in inter-modal transport
   c) Have users contribute towards the costs of transport services
   d) Facilitate access to subsidies for the provision of transport services to the vulnerable in society
   e) Create policy awareness and further participation in policy development policy, planning appraisal and implementation across modes
   f) Improve the integration of transport policy with land use and other critical areas of policies
   g) Increase access to reliable and efficient transport and transport services in rural areas
   h) Ensure that adequate regulations are in place meeting international safety, security and environmental standards
   i) Ensure safety and security of transport and transport services
   j) Support the reduction in fuel importation
2) The Policy covered the following sectors:
   a) Roads/Infrastructure
   b) Public Transportation

c) Traffic Management
d) Non-motorized Transport
e) Rail Transport
f) Air Transport
g) Marine Transport

3.3.5 Decongestion Plan for Kampala (2015)

Latest decongestion Plan for Kampala, an action plan of traffic management, was prepared in March 2015. The plan proposes the action plans by terms.

1) In short terms (target year: 2015), the following actions are planned:
   a) Maintenance of the paved and unpaved links, road drainage system, replacing street furniture, maintaining the street lighting network and repairing walkways
   b) Construction of major bypasses across divisions like Lugoba Road and Mutundwe Road will decongest the Bombo Road and Entebbe Road respectively
   c) Resumption of passenger rail services along the existing rail network starting with a service from Kampala to Namanve
   d) Reviewing the street parking
   e) Implementation of bus service
   f) Bodaboda free zone
   g) HVG restricted roads etc.
2) In medium terms (target year: 2016 to 2019), the following actions are planned.
   a) KCCA will complete KIIDP2 Batch 2 that will include design and construction of several kilometres of roads, construction of an urban traffic control centre and installation of 22 traffic signal controlled junctions.
   b) The Authority has developed a proposal to the Chinese Government for infrastructure work worth US$ 25million that shall construct a multistorey car park and a bus station at the new taxi park in 2015.
   c) KCCA will continue to work with URC to extend the passenger service to Kyengera via Nalukolongo.
   d) UNRA is leading the Kampala Flyover Project that will commence the construction of flyovers at Kitgum House and Clock Tower with Mukwano Road being widened to a dual carriageway. KCCA will play a key role in the construction phase in preparation for the Flyover Operation & Maintenance.
   e) KCCA worked together MOWT to ensure that the BRT Pilot project design was completed. The World Bank insisted that construction and operation of BRT may only be carried out by an implementing agency with the responsibility for Transport in the Metropolitan Area. The BRT project now requires an implementing agency that can be guided by Ministry of Finance, Planning and Economic Development (MOFPED) to source funding for the project. MOWT has acquired a certificate of financial implication from MOFPED for the formation of Metropolitan Area Transport Authority (MATA).
   f) Using the GOU and Non Tax Revenue (NTR), KCCA will continue to improve the road network in Kampala by making road improvements and carrying out road maintenance by filling potholes,

maintenance of the paved and unpaved links, maintaining road drainage, replacing street furniture, maintaining the street lighting network, managing the traffic lights and repairing walkways.

g) KCCA is working on developing several transport solutions and will implement the Non-Motorized Transport network.

h) KCCA will plan to provide more off-street parking in the city, convert the new and old taxi parks into multi-storey developments that include bus interchanges and deliberately promote the removal of taxis through regulation.

3) In long terms (target year: beyond 2019), the following actions are planned,

a) KCCA is in an integrated manner beginning the process of land use planning that is coordinated with transport infrastructure in line with the KPDP that promotes the use of mass transport for inter-satellite cities transport, which will predominantly be through Bus Rapid Transit (BRT), commuter rail service and Light Rail Transit (LRT). The main emphasis shall be the promotion of efficient public transport as the choice mode for a city whose population is predicted to be doubled in the next 15years.

b) KCCA will develop the road network to ensure that car accessibility to all parts of the metropolitan authority is done smoothly with efficient junctions, accurate journey time and parking information. The main radials and arterials that shall be designed in the multi-modal urban transport masterplan (funded under KIIDP2) shall be developed and maintained as very high quality links to provide car accessibility to all parts of the city. Deliberate efforts shall be developed in design of how goods (cargo or freight) are transported in the city as the requirements for the population are set to increase and movement of goods in the city must be managed efficiently so that the city remains accessible with no heavy goods vehicles in the centre especially during the traffic peak hours.

c) KCCA through MPPA will continue to review the land use and transport master-plan every 10 years to ensure that it takes note of new advancements in design and construction technology, overall global development, new innovations in information technology and always promoting a better life &work balance for the city dwellers.

3.3.6 National Transport and Logistics Policy and Strategy – NTLPS (2018)

1) The Uganda Government commissioned a study to develop a National Transport and Logistics Policy and Strategy (NTLPS) in 2018. Transport policy that explicitly supports the implementation of the objectives of Uganda's Vision 2040. The objectives of transport policy centre on fostering a system that allows society and the economy to reach their potential. The priorities for the transport system are consistent with the overall development objectives for the country.

2) The vision of NTLPS is the Public transport in urban areas in Uganda, and especially in the GKMA, should be regulated, integrated, reliable, affordable, safe, and attractive enough for car users.

3) The network of public transport routes should cover the whole metropolitan area. Passengers should be able to access any stop by walking no more than 1.5 km from their homes or work places. Public transport should be the dominant mode for motorized trips in the GKMA area. At least 65% of all person-trips in motorized vehicles should be in a PSV. Major policies regarding public transport in Kampala are as follows:

a) Regulated public transport will be the preferred motorized mode of personal travel in Uganda; specifically in the GKMA.
b) Government, in consultation with Municipalities sharing cross border services, will review and extend KCCA powers to manage and operate transport in the GKMA.
c) Mass transit will be promoted, designed and implemented in a comprehensive manner in GKMA.
d) All public transport bus and MRT routes operating in the GKMA should be hierarchical and integrated. Routes should not compete, but should complement each other. The bus network will also be integrated with walking, cycling and car traffic.
e) All bus routes in the GKMA will be organized into financially balanced groups of routes, and these groups will be tendered for operation by the private sector.
f) The public transport system will be made affordable to poor people. People should not pay more than 15% of their available monthly income for public transport services in the GKMA.
g) In GKMA, most motorized person-trips will be done by integrated public transport system whose backbone will be urban rail and supplementary BRT system.
h) Government will consult with all stakeholders on an integrated ticketing system, preferably using electronic ticketing, as it could have major benefits for passengers.
i) By 2020, at least 50% of the public transport network should be operated by high capacity buses using environmentally friendly engines.
j) Bodaboda service will be restricted to operating as a feeder system, and will not be allowed in Kampala's centre without being registered. Fares for bodaboda will be restricted to become more affordable.

4) Proposed policy implementation and evaluation framework for urban transport is described as below:

No.	Policy Context	Policy Action	Performance Indicator	Monitoring & Evaluation	Assumptions & Risks
1	Modal shift from road to public transport	Franchise high bus routes to competent operators	Increased public transport patronage	KCCA to establish system (to be replicated in other urban areas)	
2		Fare integration and electronic ticketing	Increased public transport patronage	KCCA to establish system (to be replicated in other urban areas)	
3		Planned network of services	Increased public transport patronage	KCCA to establish system (to be replicated in other urban areas)	
4	Increase revenue for transport projects	Require developers to pay for impacts	Authority revenue increased	Authority revenue accounts	Requires new legislation
5	Reduce private car travel by school students	Schools to adopt green transport plans	Plans approved	Authority reports	

5) Various types of urban transport interventions are also proposed in NTFS.

a) Public transport policy areas are:

- Regulated system: Undertake review of existing system.
- Larger buses: Phase out the 8 to 14 seater buses (taxis) and replace with larger buses and introduce a pilot route to trial the use of larger buses with restrictions for the existing taxi service.

- Mass Transit System: Fast-track the introduction of BRT on one corridor.
- Bodabodas: Restrict licensing and restrict Bodabodas within CDB and on other key routes
- Smart Ticketing System: Undertake a trial on a pilot route using larger buses and restricted taxis.
- New Transport Authority: Fastrack the proposed Metropolitan Area Transport Authority (MATA).

b) Parking policy areas are:

- Enforcement: Issue authority to KCCA staff so that they can issue tickets and enforce parking laws.
- Parking charges: Undertake parking study initially within CBD to determine how long drivers park, introduce limited parking areas and automated ticketing system.

  Multi-Storey Car Parks: Review existing policy regarding more multi-storey parks within the CBD and improve public transport links to reduce the need to use the car.

c) Traffic management interventions are as follows:

- Further signalisation: Undertake further signalisation of key city wide junctions, including NMT facilities.
- Provide new traffic control centre: Integrate all traffic signals city wide, fully adaptive system, develop Intelligent Transport Systems, parking management, real time information, variable message signs and smart ticketing.
- Maintenance Contract: One service supplier for all traffic signal installations.
- Road Class System: Review existing system and implement a new road hierarchical system.
- Truck Bans: Restrict the use of heavy trucks within the CBD and limit the hours for loading and unloading in the CBD.

d) Covered road safety policies are:

- Road Safety Audits: Undertake road safety training for transport authority staff and police and introduce new road safety audit system so all highway improvements are audited.
- Accident data: Introduce new accident database system so all road traffic collisions are recorded.

3.3.7 Multi-Modal Urban Transport Master Plan for Greater Kampala Metropolitan Area, MMTTMP (2018)

1) The Multi Modal Urban Transport Master plan for the Greater Kampala Metropolitan Area (GKMA) was administered by the Government of Uganda through Kampala Capital City Authority (KCCA) as part of Phase 2 of the Kampala Institutional and Infrastructural Development Project (KIIDP).
2) The project vision was defined as: The GKMA transport system should be efficient, integrated, sustainable, safe, and designed to promote socially inclusive economic and territorial development, ensuring a high quality of life for residents and visitors of the metropolis.
3) The operational goals of this vision are:

a) Accessibility - Ensure all citizens are offered affordable transport options that enable access to key destinations and services;
b) Mobility - Ensure all citizens can reach their destination in a quick and efficient way;
c) Safety - Improve safety and security for all transport users;

d) Environment - Reduce air and noise pollution, greenhouse gas emissions, and energy consumption relating to transportation;
e) Economic Efficiency - Improve the efficiency and cost-effectiveness of the transportation of persons and goods;
f) Sustainability - Reduce the use of non-sustainable modes (motorized/ Auto) and transfer more people to use sustainable modes (walking, cycling, and public transport).

4) The consultant recommended the following points of action:

a) Adopt geometric design standards for at-grade urban intersections
b) Adopt design standards for traffic signals
c) Adopt guidelines for marking and signing urban roads
d) Prepare performance-based tender for 5 years of installation and maintenance of road marking and signing
e) Adopt committing on-street parking regulation
f) Enact the necessary legal changes for the new parking policy
g) Prepare detailed design for the new on-street parking arrangements and regulations
h) Identify all unregulated taxi parks and relocate these parks to off-street location, based on the new restructuring of the PT network
i) Adopt new regulations for Bodaboda operation on GKMA
j) Prepare a tender for on street parking regulations and issue
k) Prepare tender for a performance based contract for installation of control center, traffic signals, maintenance, operation, training, and transfer
l) Design and introduce bike-sharing scheme throughout GKMA with at least 30% availability of e-bike.
m) Promote private sector operation of car sharing scheme
n) Contact mobile operators and promote low cost packages for car navigation smartphone applications like Waze.
o) Prepare some road sections as pilot sections for mixed operation of autonomous/driverless vehicles.

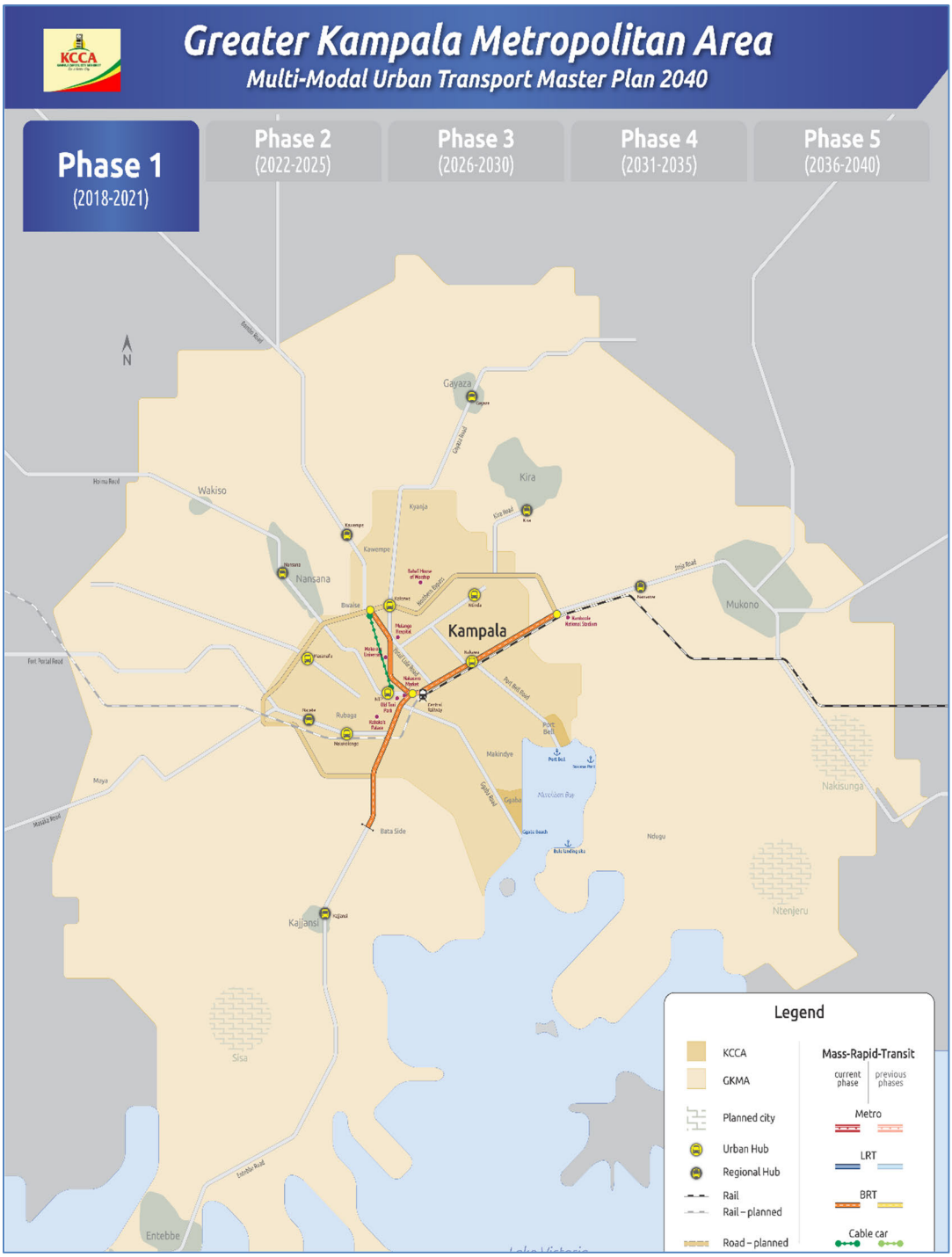
5) Proposed transport investment plan is divided into four-five year packages, ending with the plans for the horizon year of 2040. Based on the Uganda Vision 2040, the five year timeframe was found to be a best practice methodology which fits the objectives proposed by the consultant. The conceptual design of the MRT system was planned by the consultant to provide a comprehensive solution to the rising demand for transportation in Kampala. The gradual development of an MRT network is a crucial part of the master plan and was determined according to several factors including demand, difficulty of implementation, connection of strategic points of interest and others.

a) Pilot Phase (2018-2021)

The pilot phase includes immediate projects that are critical to leverage existing conditions and are relatively easy to implement. These cost-effective and critical projects include several soft measures which the consultant recommends as action based interventions to harmonize and improve the current situation without limitations of slow infrastructure and bureaucratic processes. These include NMT infrastructure, traffic control center, traffic management and other parking policies which can drastically

improve the present situation.

The pilot phase also includes the design and building of pre-approved concepts of BRT pilot, cable car and suburban rail which will serve as an initial basis for the future MRT network. Simultaneously, the consultant recommends engaging in the bureaucratic foundations and conditions for MRT design. The defining characteristics of these MRT modes as well as recommendations regarding in which situations each should be used are developed in later chapters of the report.

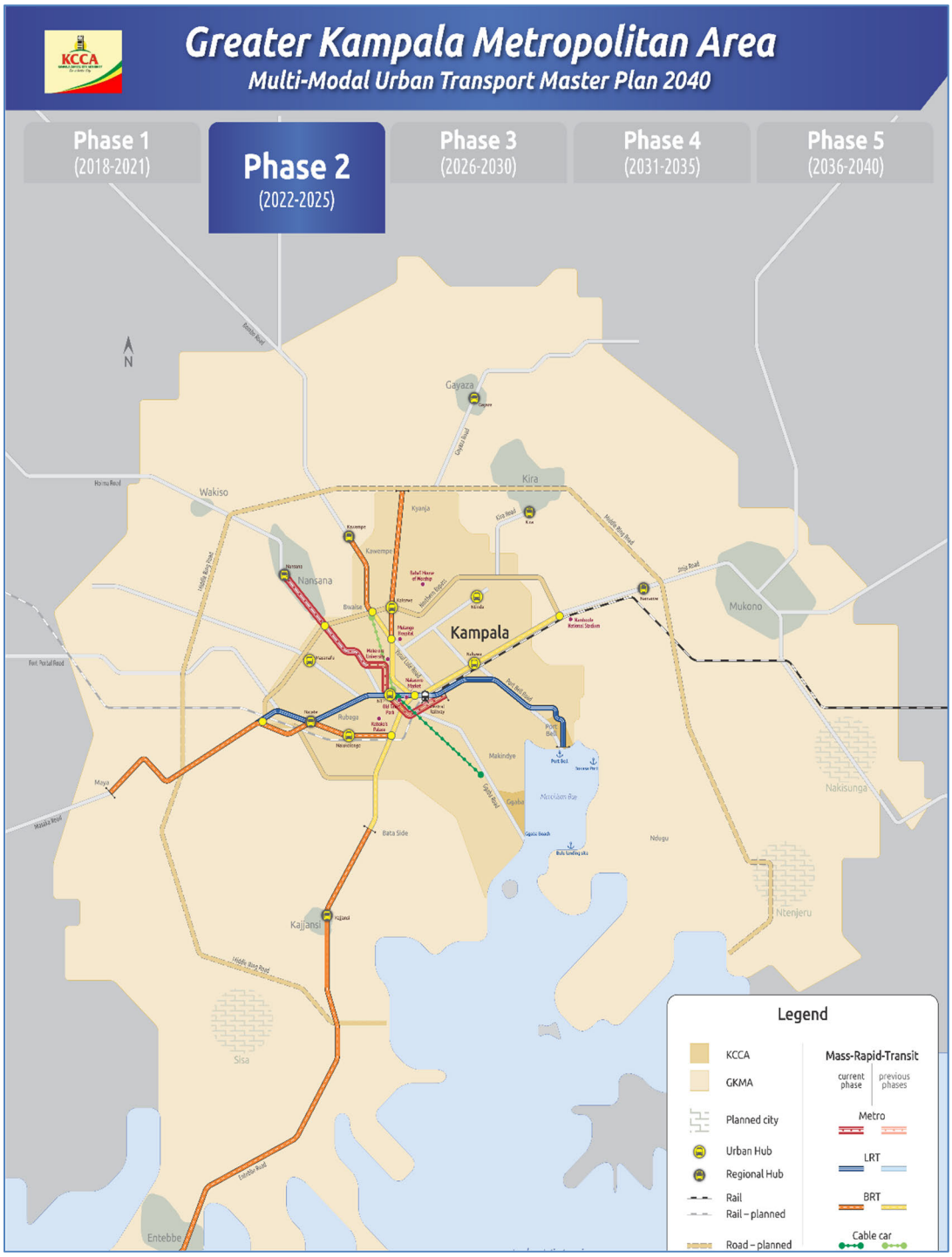


Source: Multimodal Urban Transport Master Plan for GKMA, Final Report

Figure 3-11 Investment Plan Map under Pilot Phase (2018-2021)

b) Short-Term (2022-2025)

The short term phase was designed to directly continue the foundations laid by the pilot phase and include the operational and maintenance investments for the projects included in it. As part of the phased concept of the master plan, this phase also includes major progress in the design and build parts of the BRT system extensions, as well as piloting the design for heavy rail infrastructure and building of others including two LRT routes and one Metro route.

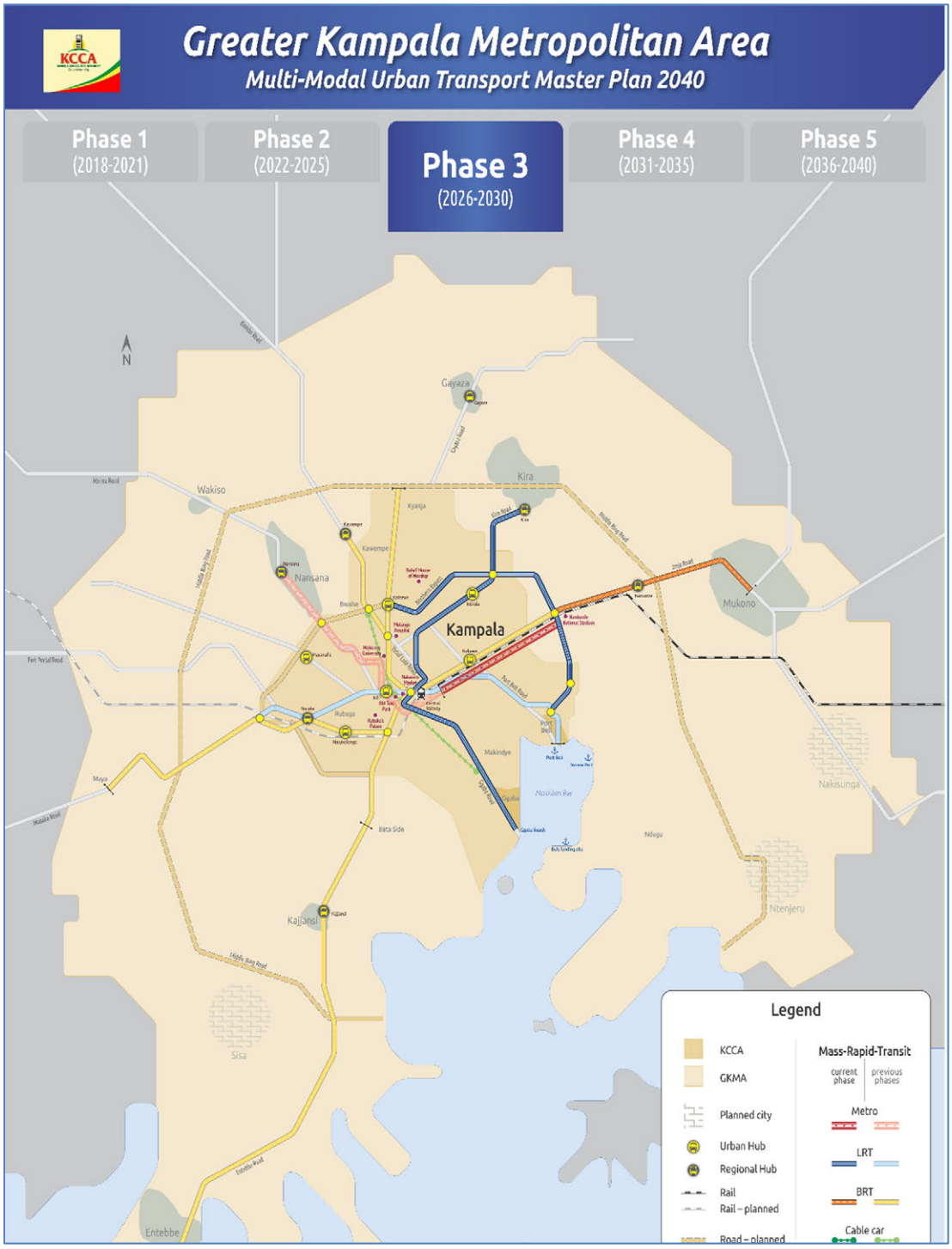


Source: Multimodal Urban Transport Master Plan for GKMA, Final Report

Figure 3-12 Investment Plan Map under Short-Term (2022-2025)

c) Mid-Term (2026-2030)

The mid-term phase puts focus on three important aspects: the operation costs of the first metro route and the first LRT route, the finalization of the BRT build and design, and the intense building of the rail based MRT to create a network for the next phase.

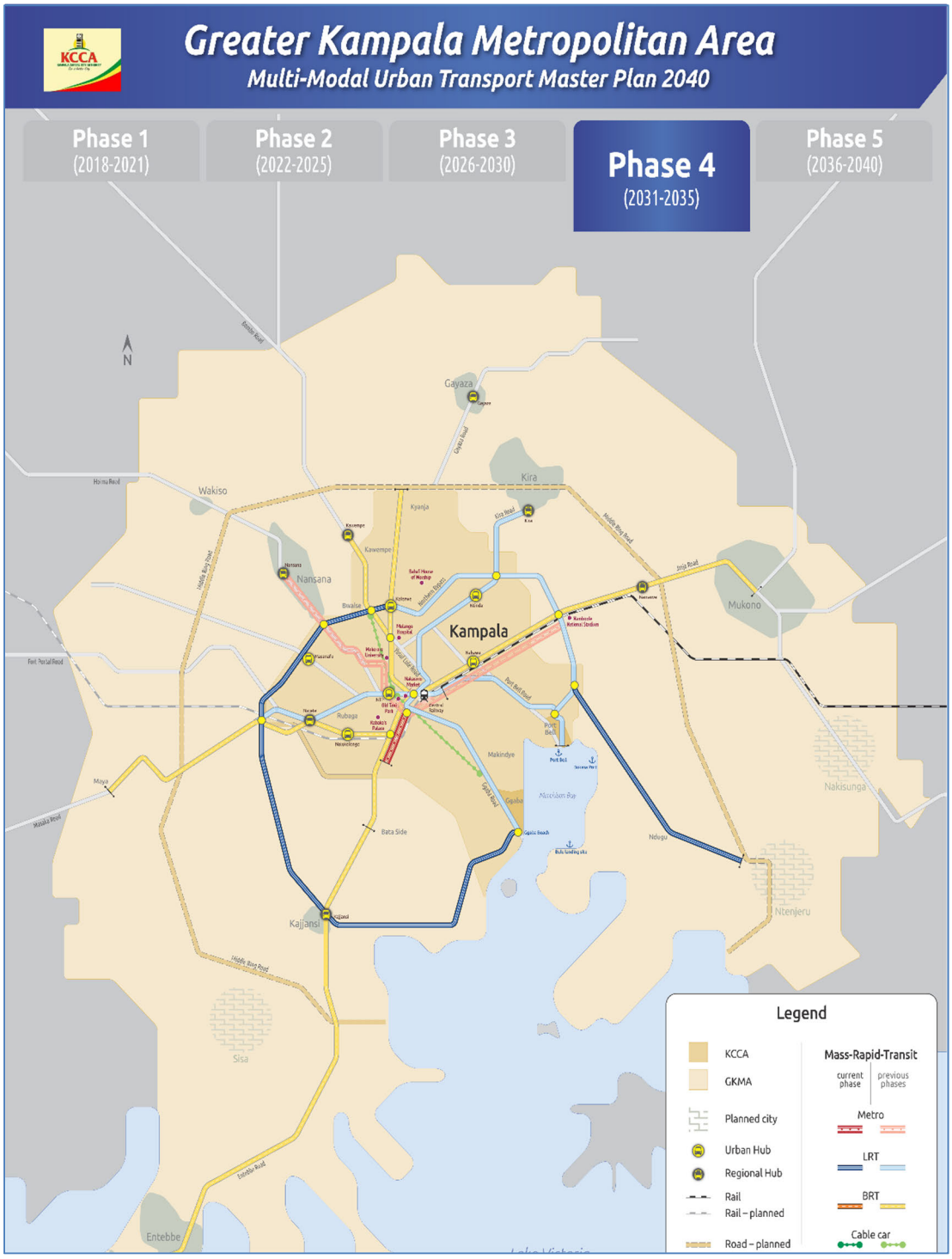


Source: Multimodal Urban Transport Master Plan for GKMA, Final Report

Figure 3-13 Investment Plan Map under Mid-Term (2026-2030)

d) Long-Term (2031-2035)

The long term phase includes the operation of 3 LRT routes and 2 metro routes as well as all BRT routes. Furthermore, it includes the final design stages of all the remaining MRT routes.

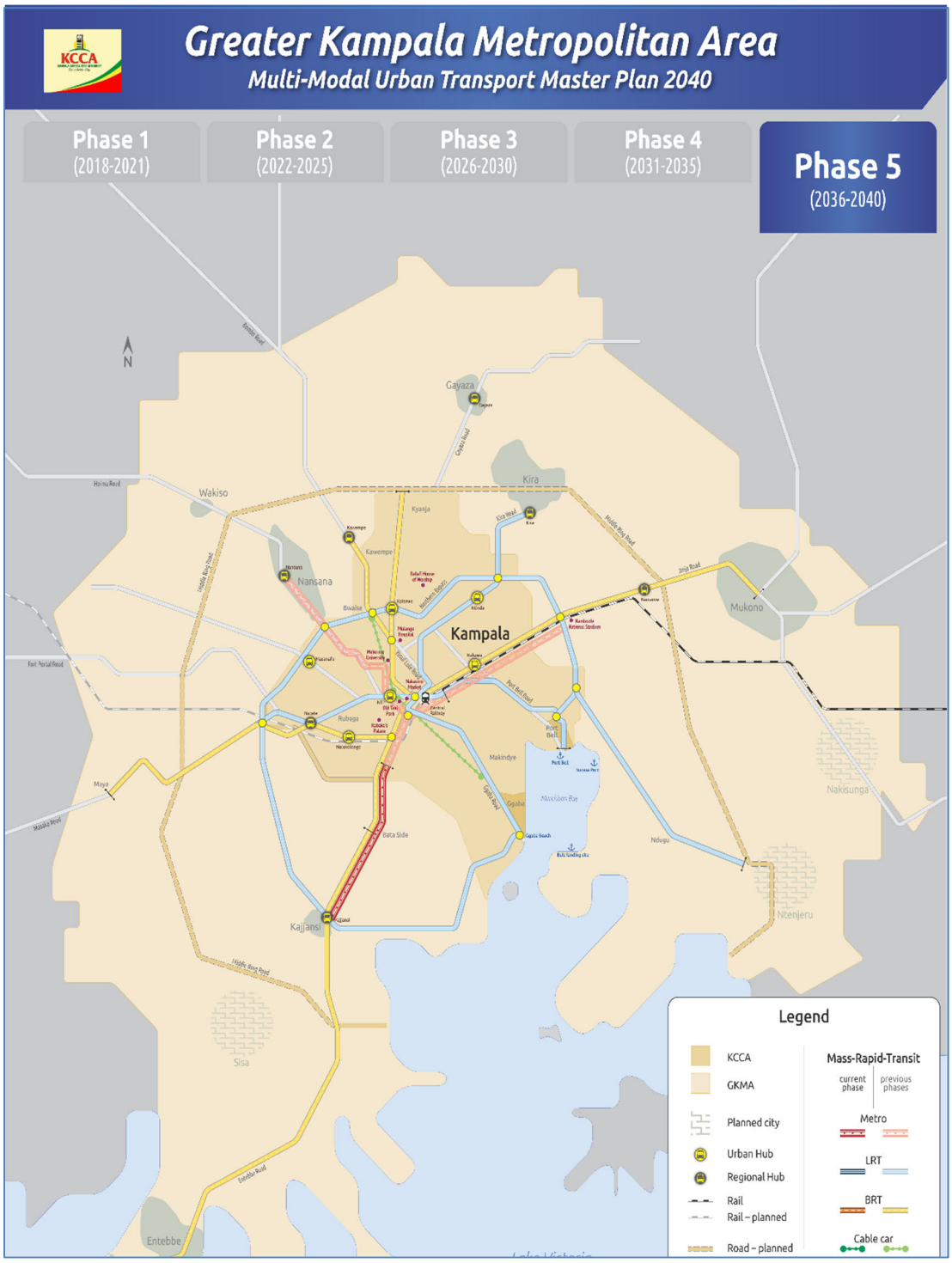


Source: Multimodal Urban Transport Master Plan for GKMA, Final Report

Figure 3-14 Investment Plan Map under Long-Term (2031-2035)

e) Horizon (2036-2040)

This phase includes all operational costs as well as the finalization of the metro network.



Source: Multimodal Urban Transport Master Plan for GKMA, Final Report

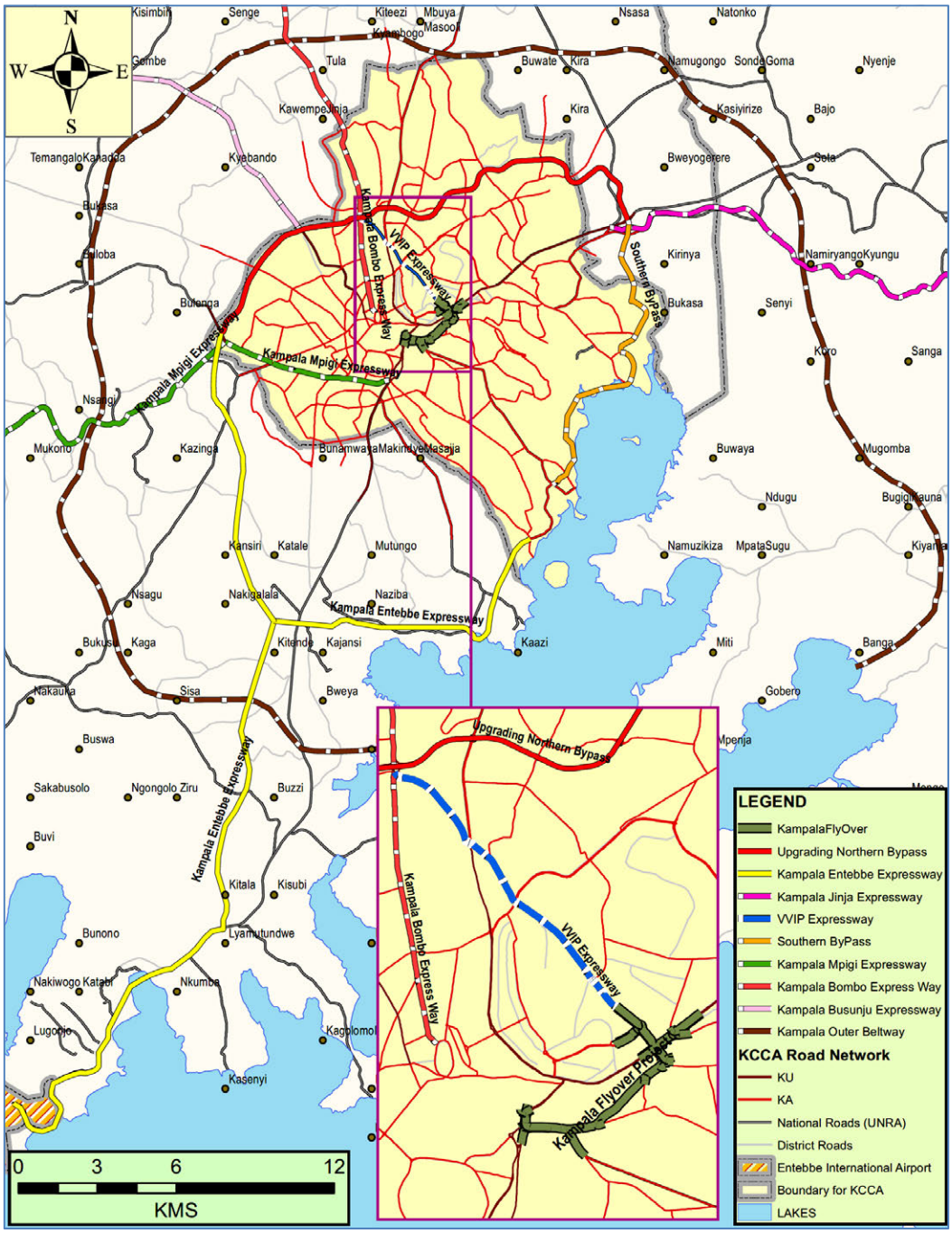
Figure 3-15 Investment Plan Map under Horizon (2036-2040)

3.4 Road Network Development Projects

3.4.1 Overall Road Projects

1) There are number of road projects, which are ongoing and planned for upcoming years aiming to decongest Kampala city. The most important projects are KIIDP2 by KCCA, Kampala Flyover

Construction and Road Upgrading Project by UNRA, and Expressway & other road improvement projects by UNRA.



Source: KSTP

Figure 3-16 Expressway Projects Planned at Present

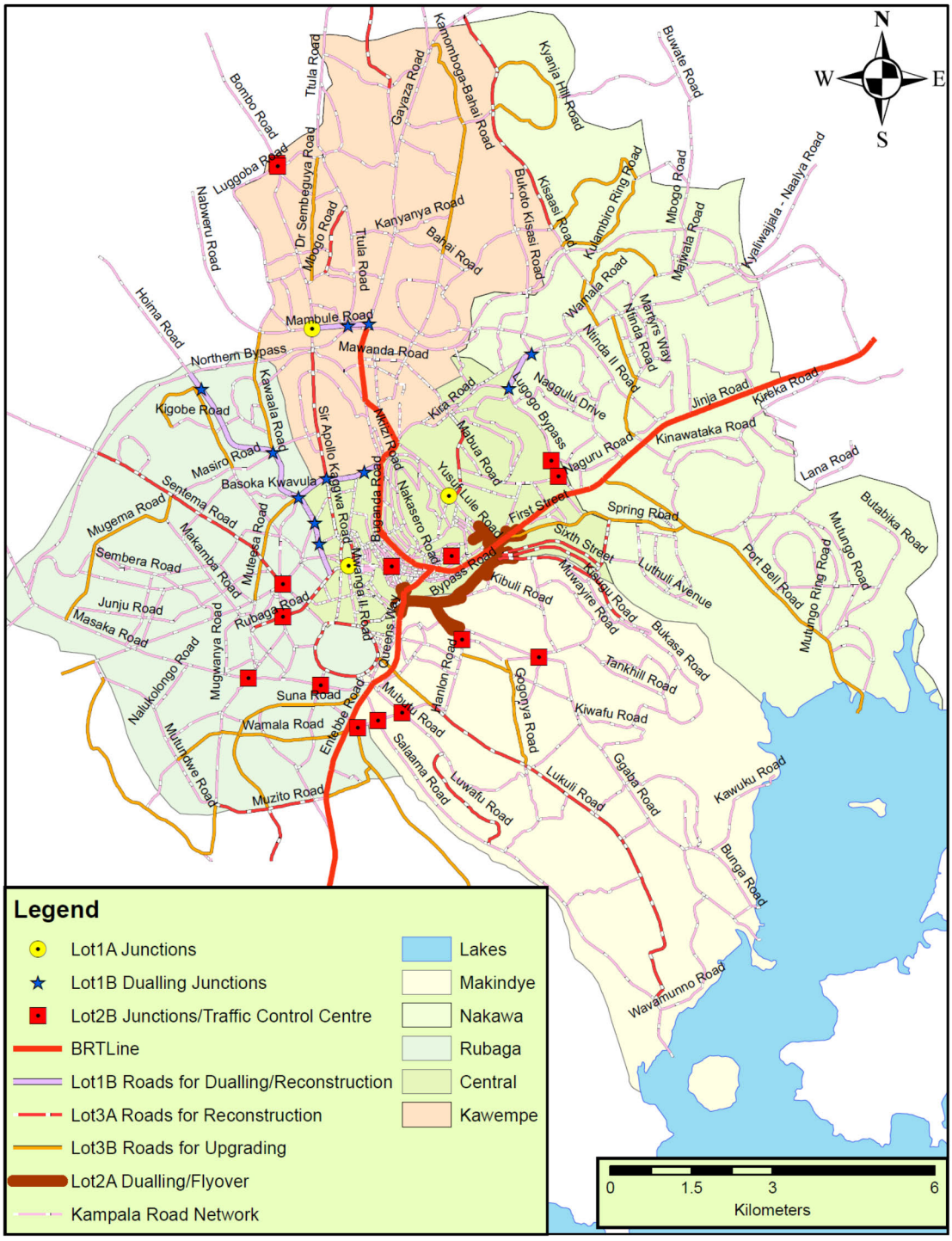
2) All the ongoing and planned expressway and flyover which will effect the traffic flow of Kampala are shown in Figure 3 16.

3.4.2 Kampala Institutional and Infrastructure Development Programme Phase 2 - KIIDP2

1) KCCA has developed a programme for the second phase of the Kampala Institutional and Infrastructure Development Programme (KIIDP2) of the in line with the new 5-Year Development Plan (FY2013/14-

FY2017/18). The Plan sets out an ambitious capital investment programme aimed at transforming service delivery in the City. KIIDP2 is a five year project, which is worth about US$183.7 Million and its implementation started in May 2015. The project is funded by the World Bank and the Government of Uganda, and is implemented by Kampala Capital City Authority-KCCA.

2) This programme has two components: one is widen, upgrade and construct city roads, junctions, drainage and associated infrastructure and the other is institutional and systems development support which aims to strengthen the capacity of KCCA to deliver on its mandate.
3) Road projects under KIIDP2 are divided into 2 batches. Under Batch1, about 21Km of city roads have been expanded to dual carriageway along the most congested links of Makerere Hill Road, Hoima Road and 12 junctions (2 pedestrian crossing lights) are signalized in 2 years. The list of signalized junctions are described in Table 2-5 .
4) Designing of several kilometre of road and 37 junctions are also completed as a part of Batch 2 as shown in Table 3-1. Out of 37 junctions, 11 are already tendered along with the improvement of the carriageway. KCCA is now in the process of securing additional funding for the implementation of designed junctions.



Source: KSTP

Figure 3-17 Project Location Map of Junctions and Roads of KIIDP2 (will be replaced by new one)

Table 3-1 Scope of Work for Batch 2 of KIIDP2

No.	Name of the Junctions	Status
1	Lukuli Road/ Kayemba Road Junction	Tendered
2	Acacia Avenue/ Lower Kololo Terrace	Tendered
3	Acacia Avenue/ Elgon Terrace	Tendered
4	Acacia Avenue/ Upper Kololo Terrace	Tendered
5	Acacia Avenue/ Mabua Road	Tendered
6	Acacia Avenue/ Sturrock Road Junction	Tendered
7	Acacia Avenue/ Kira Road Junction	Tendered
8	Ntinda Road/ Martyrs Way Junction	Tendered
9	Naguru Junction (Ntinda Rd/ Ntinda II Rd Junction)	Tendered
10	Bukoto-Ntinda Road/ Magambo Road Junction	Designed only
11	Ntinda Road/ Semawata Road/ Salim Bay Road	Tendered
12	Hanlon Nsambya Junction (Nsambya Estate Road/ Gaba Road/ Hanlon Road Junction)	Designed only
13	Military Police Junction (Namasole Road/ Mobutu Road Junction)	Designed only
14	Calendar Rest-1 Junction (Namasole Road/ Mobutu Road Junction)	Designed only
15	Calendar Rest-2 Junction (Namasole Road/ Busabala Road Junction)	Designed only
16	Kayemba Road/ Katwe Road Junction	Designed only
17	New Portbell Road/ Chwa Road Junction (Mbuya Barracks)	Designed only
18	New Portbell Road/ Spring Road Junction (MTN Bugolobi)	Designed only
19	Portbell Road/ Kireka Rd Junction (Super Oil Petrol Station Bugolobi)	Designed only
20	Portbell Road/ Mutungo Ring Road Junction (Bank of Africa Luzira)	Designed only
21	Spring Road/ Luthuli Avenue Junction (Shell Bugolobi)	Designed only
22	Spring Road/ Fifth Street Junction (Tuskys Bugolobi)	Designed only
23	Ntinda Trading Centre Junction (ie Ntinda -Kisaasi Road/ Kigobe Road Crossroads)	Tendered
24	Sentema Road/ Balintuma Road Junction	Designed only
25	Sentema Road/ Albert Cook Road	Designed only
26	Ndeeba Junction (Masaka Road/ Weraga Road)	Designed only
27	Kabuusu Junction (Masaka Road/ Wankulukuku Road Junction)	Designed only
28	Bombo Road/ Tula Road (Kawempe Junction)	Designed only
29	Bombo Road/ Kawala Road (Kawempe Junction)	Designed only
30	Gaba Road/ Muyenga Road Junction	Designed only
31	Gaba Road/ Nsambya Estate Road Junction	Designed only
32	Albert Cook Road/ Kisingiri Road Junction	Designed only
33	Canon Apollo Kivebulaya Road/ Albert Cook Road Junction	Designed only
34	Canon Apollo Kivebulaya Road/ Rubaga Road/ Nabunya Road Junction	Designed only
35	Kabega Road/ Hanlon Road Junction	Designed only
36	Gogonya Road (a.k.a Kirombe Road) / Kabega Road Junction	Designed only
37	Gogonya Road/ Nsambya Estate Road Junction	Designed only

Source: KCCA KIIDP Office, May 2019

3.4.3 Kampala Flyover Construction and Road Upgrading Project

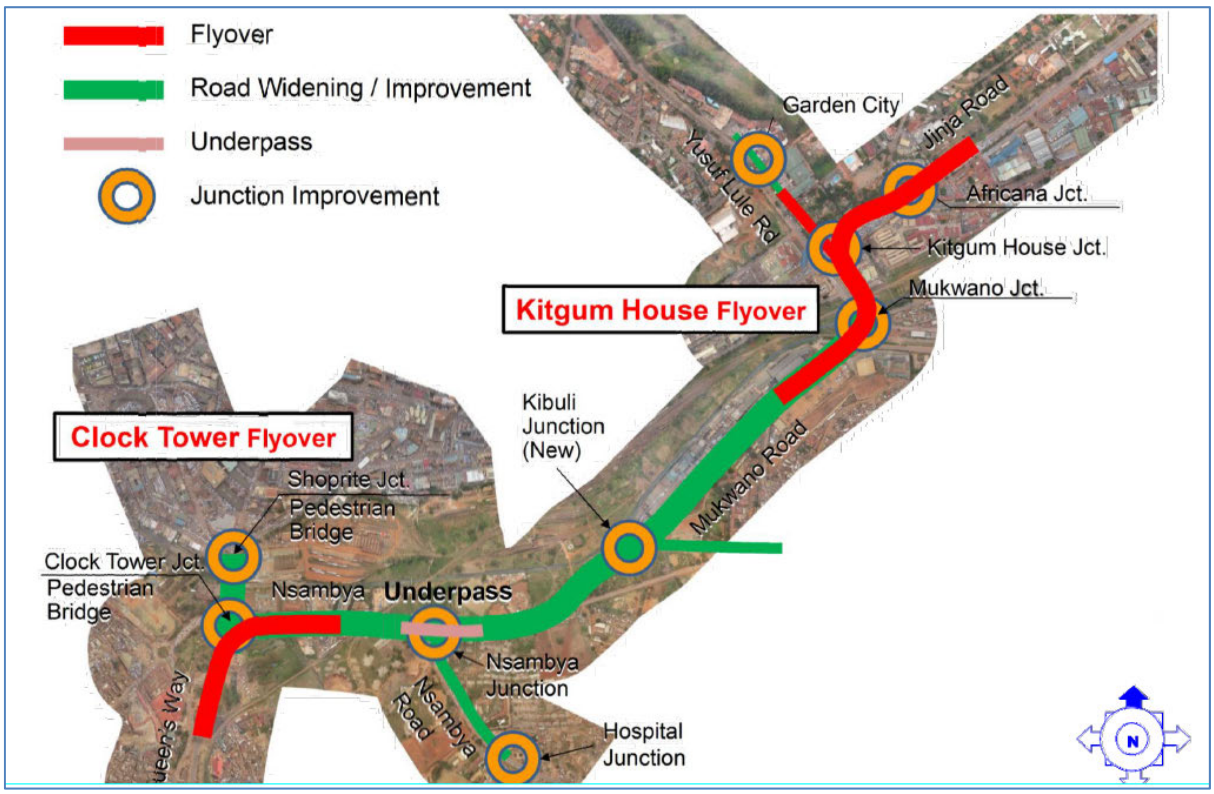
1) Kampala Flyover Construction and Road Upgrading Project is the traffic bottleneck improvement programme focusing on busiest junctions at Central Division in Kampala. The programme includes 2 flyovers, 1 underpass and expansion and improvement of several road sections. The Government of Japan provides technical and financial intervention for its implementation with a loan scheme of US$180 million.

2) UNRA is the responsible authority for managing the construction work of Kampala Flyover and KCCA will play a key role in the construction phase in preparation for the Flyover Operation & Maintenance.
3) The project consists of several transport facilities for both motorized and non-motorized vehicles as well as pedestrian. The main components are shown in Table 3-2 and Figure 3-18. One of the major structures of Lot 1 is a 2-lane wide flyover at Clock Tower total length of which is 584 m. This enables road users to pass through the Clock Tower between the Queen's way and the Nsambya Road without stopping for a signal, because of the grade-separated system. Lot 1 also includes of 6 roads upgrading, 3 pedestrian bridges construction, 5 junctions upgrading and 1 underpass construction. The detailed design for those structures has already been completed and the Service starts from the review of the D/D and construction supervision simultaneously. The ground breaking ceremony was held in December 2018 and the contractor has been in mobilization from May 2019.
4) Lot 2 also has a flyover at Kitgum House Junction as well as upgrading of 5 road sections and 4 junctions. However, the components of Lot 2 are subject to change depending on the result of the F/S review and D/D.

Table 3-2 Main Components of Kampala Flyover Project

Lot 1		
1) Flyover	Clock Tower Flyover, Total L = 584m (Bridge L = 366m), 2-lane	
2) Road Upgrading (including walkways and drainage)	Queen's Way Widening, L = 500m, 4-lane (existing 2-lane) Entebbe Road Improvement, L = 200m, 6-lane Nsambya Road Widening L = 420m, 6-lane (existing 4-lane) Mukwano Road Widening, L = 900m, 4-lane (existing 2-lane) Gaba Road Widening, L = 500m, 4-lane (existing 2-lane) New Link Road connecting Hospital Junction and New Kibuli, L = 630m, 2-lane	
3) Pedestrian Bridge	Clock Tower Pedestrian Bridge, L = 220m Shoprite Pedestrian Bridge, L = 72m Kibuli Junction Pedestrian Bridge, L = 72m	
4) Junction Upgrading	Shoprite Junction Clock Tower Junction Nsambya Junction	Hospital Junction New Kibuli Junction
5) Underpass	Nsambya Underpass, Total L = 430m (Tunnel L = 130m), 4-lane	
Lot 2		
1) Flyover	Kitgum House Flyover	
2) Road Upgrading (including walkways and drainage)	Mukwano Road Widening Access Road Improvement Jinja Road Upgrading	Yusuf Lule Road Improvement Nile Avenue Improvement
3) Junction Upgrading (with NMT provisions)	Mukwano Junction Kitgum House Junction	Africana Junction Garden City Junction

Source: KSTP

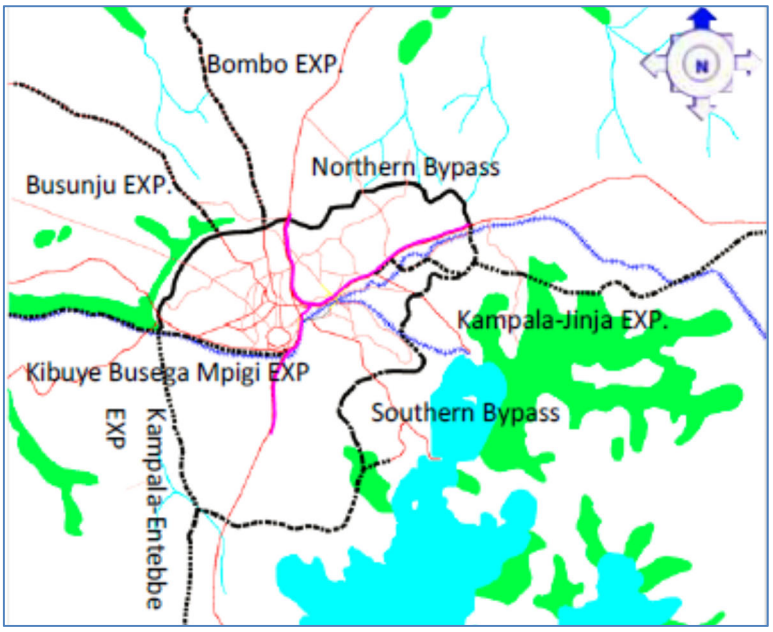


Source: KCCA

Figure 3-18 Outline of Kampala Flyover Project

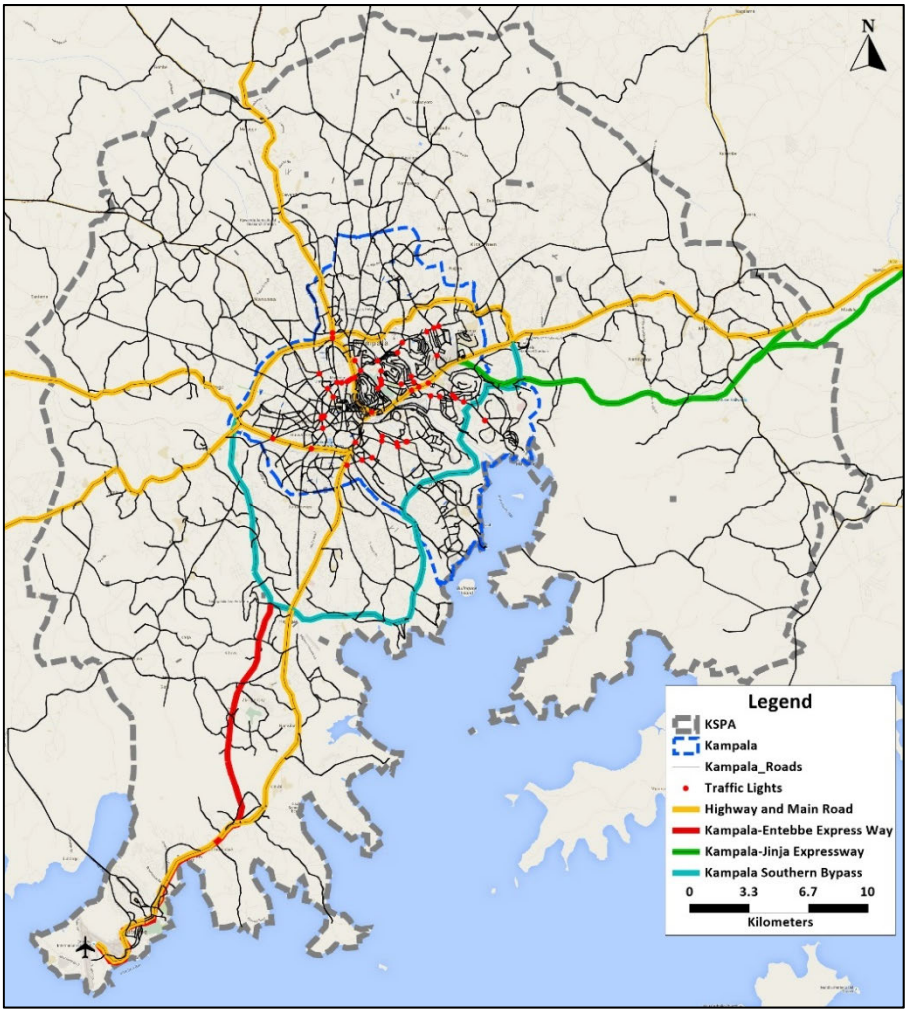
3.4.4 Urban Expressway Network Programme

UNRA proceeds with Urban Expressway Network Programme including number of Expressways. Those includes Kampala-Entebbe Expressway, Upgrading of Northern Bypass, Kampala Southern Bypass, Kibuye-Busega-Mpigi Expressway, Kampala-Jinja Expressway, and Kampala –Bombo Expressway, Kampala Outer Beltway, Kampala – Busunju Expressway and VVIP Expressway. The programme covers the radial road network centred from Kampala, consequently as expressway network is shown in Figure 3-19. Foreseeable future road network completed by 2025 and 2040 as per MMUTMP are provided in Figure 3-20 and Figure 3-21.



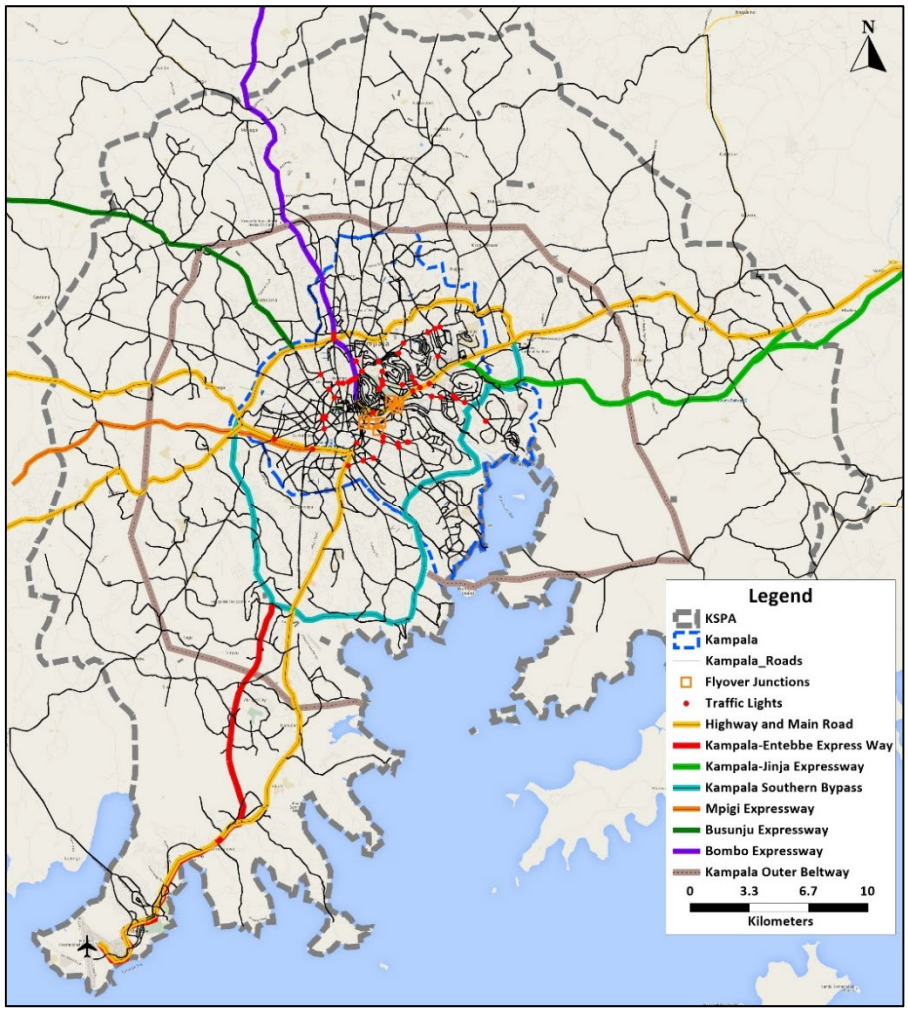
Source: KSTP

Figure 3-19 Future Expressway Network in GKMA



Source: Multimodal Urban Transport Master Plan for GKMA, Final Report, 2018

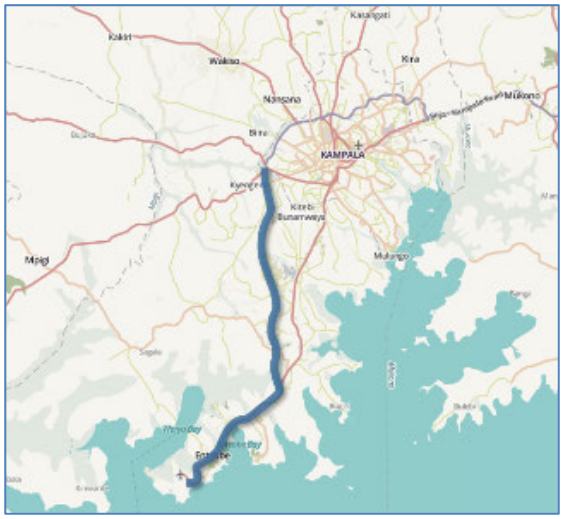
Figure 3-20 Reference Road Network in the Year 2025



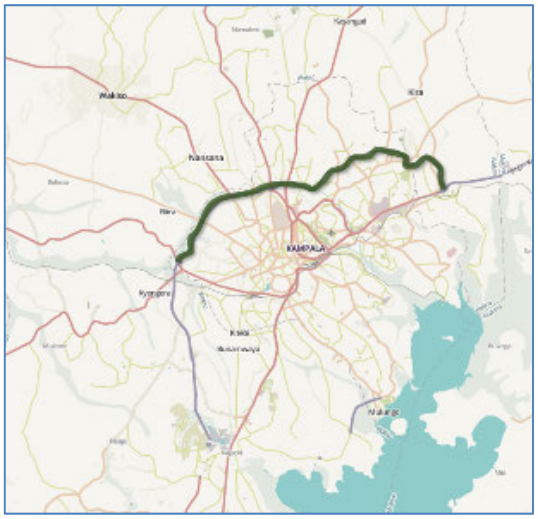
Source: Multimodal Urban Transport Master Plan for GKMA, Final Report, 2018

Figure 3-21 Reference Road Network in the Year 2040

1) Kampala - Entebbe Expressway: The Kampala-Entebbe Expressway is going to be a 51 km long four-lane toll expressway connecting Busega Junction on Mityana Road in Kampala and Entebbe International Airport. The objective of this road is to be a part of the measures to decongest the Central Business District and enhance trade movement through, within and out of the Greater Kampala Metropolitan Area. The project is under construction with financial assistance by China Exim Bank with loan for construction and PPP schemes for operation.



Kampala - Entebbe Expressway



Kampala Northern Bypass

Source: Multimodal Urban Transport Master Plan for GKMA, Final Report, 2018

Figure 3-22 Alignment of Kampala - Entebbe Expressway and Kampala Northern Bypass

2) Upgrading of Northern Bypass: The Northern Bypass was constructed aiming to relieve severe traffic congestion in the city centre by detouring through traffic. GOU intends to upgrade the bypass through installing dual carriageway along its entire length of 21 km from Busega on Mityana Road to Kireka on Jinja Road. Currently, only the section between Hoima Road and Gayaza Road has a dual carriageway. After the upgradation, it is expected that the bypass will carry the increasing heavy traffic heading to the northern and western parts of the country. The widening of the bypass will involve removal of roundabouts and replacing them with flyovers to improve traffic flow.

3) Kampala Southern Bypass: The Southern Bypass Express Highway is a proposed bypass which will be 18 km long, will start at Butabika, on the eastern outskirts of Kampala, where it will connect with the New Kampala-Jinja Express Highway and connect in Munyonyo with the new Kampala-Entebbe Highway. This road eventually will be a part of the ring road around Kampala. It shall link Kampala-Jinja Expressway to Kampala–Entebbe Expressway and the southern part of Kampala City by way of Munyonyo Spur Road (part of the Kampala–Entebbe Expressway Project). The feasibility study for Southern Bypass was undertaken for UNRA by URS in 2012. The proposed route starts at Bukasa Junction along the southern route option of the proposed Kampala–Jinja Expressway. From Nambole Junction, the route runs in a southwestern direction up to Luwafu where it joins and runs along the existing Salama Road in a southeastern direction to Munyonyo. From Munyongo, the route will be connected to the existing road network via Munyonyo Spur Road, which will be constructed as a part of the Kampala–Entebbe Expressway Project.

Kampala Southern Bypass **Kampala – Mpigi Expressway**

Source: Multimodal Urban Transport Master Plan for GKMA, Final Report, 2018

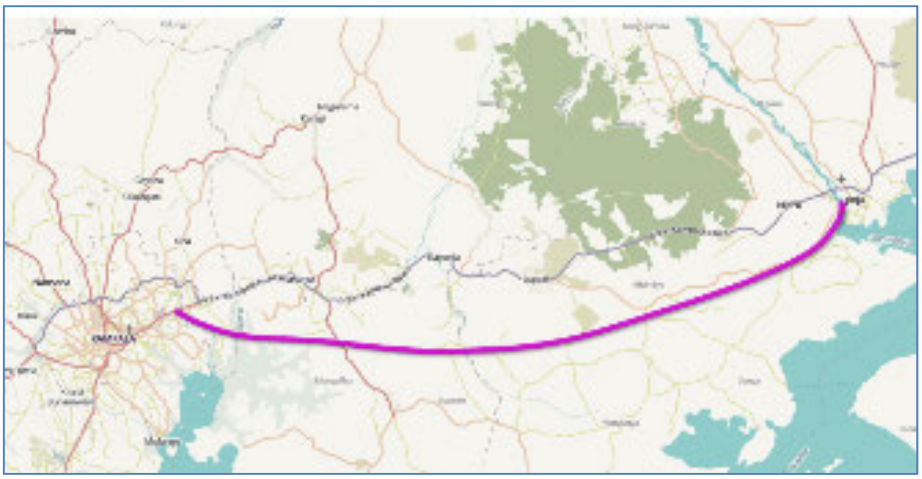
Figure 3-23 Alignment of Kampala Southern Bypass and Kampala – Mpigi Expressway

4) Kibuye-Busega-Mpigi Expressway: The Kibuye-Busega-Mpigi Expressway is a planned 32 kilometre length Project aims to improve the corridor connecting Kibuye Roundabout to Mpigi via Busega Junction on Masaka Road. The feasibility study for Kibuye-Busega-Mpigi Expressway was undertaken for UNRA by Gauff Ingenieure in association with Gauff Consultants (U) Ltd. in 2012. The project is expected to be designed in 2016 and completed by 2018 under PPP.

5) Kampala-Jinja Expressway: Kampala-Jinja Expressway is a proposed expressway which connects Nakawa in Kampala and New Nile Bridge to be constructed in Jinja. The feasibility study for Kampala-Jinja Expressway was completed for UNRA in 2011. At present, The Uganda National Roads Authority (UNRA) is seeking to partner with the private sector to Design, Build, Finance, Operate and Transfer a Greenfield limited access tolled expressway with a design speed of up to 120kph between Kampala and Jinja, inclusive of an urban Expressway section of design speed up to 100kph. The Kampala Jinja Mainline and the Kampala Southern Bypass section collectively form the project. The 95km road will comprise of two distinct sections:

a) Kampala Jinja Mainline- The 77km Expressway section will comprise of 4+4 lanes for the first 3km, 3+3 lanes for the next 14km and 2+2 lanes for the last 57km.

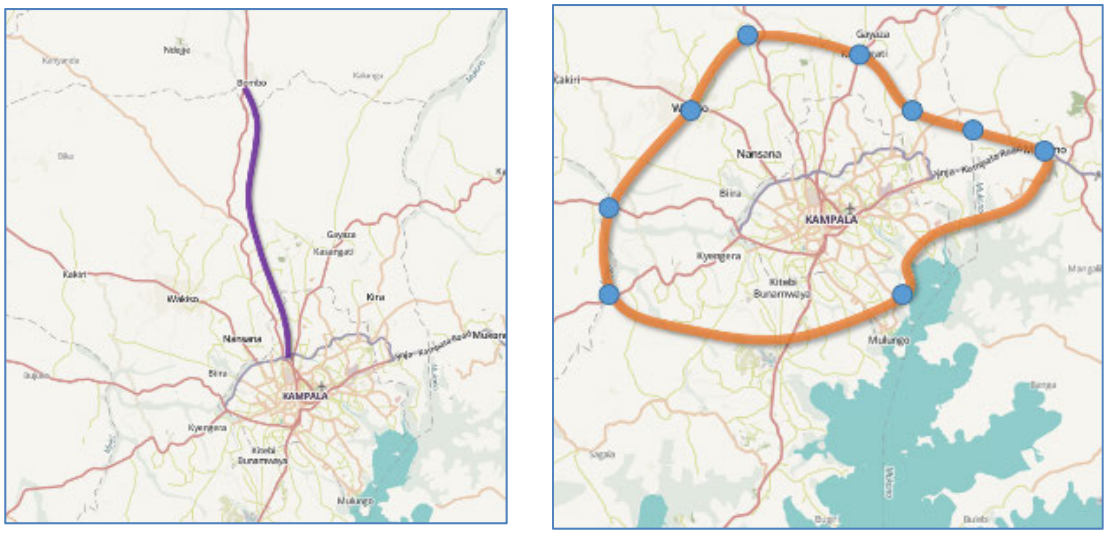
b) Kampala Southern Bypass- The 18km Urban Expressway section will comprise 2+2 lanes for the entire 18km.



Source: Multimodal Urban Transport Master Plan for GKMA, Final Report, 2018

Figure 3-24 Alignment of Kampala-Jinja Expressway

6) Kampala-Bombo Expressway: The Kampala–Bombo Expressway is a proposed four-lane expressway in the Central Region of Kampala and Bombo of Luweero District. The approximate distance of the road is 32 kilometre. At present UNRA is considering constructing the road under PPP.



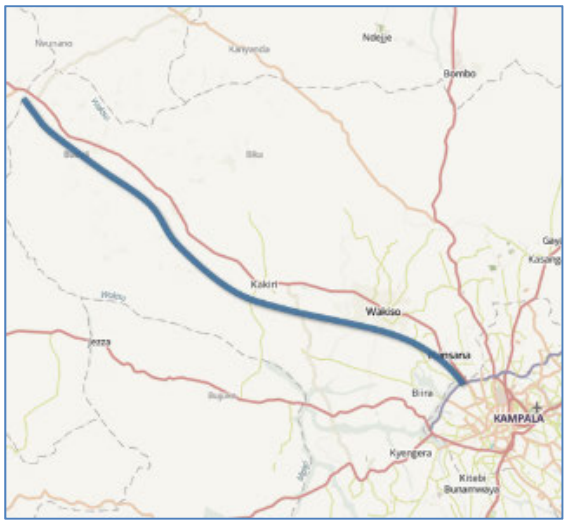
Kampala-Bombo Expressway **Kampala Outer Beltway**

Source: Multimodal Urban Transport Master Plan for GKMA, Final Report, 2018

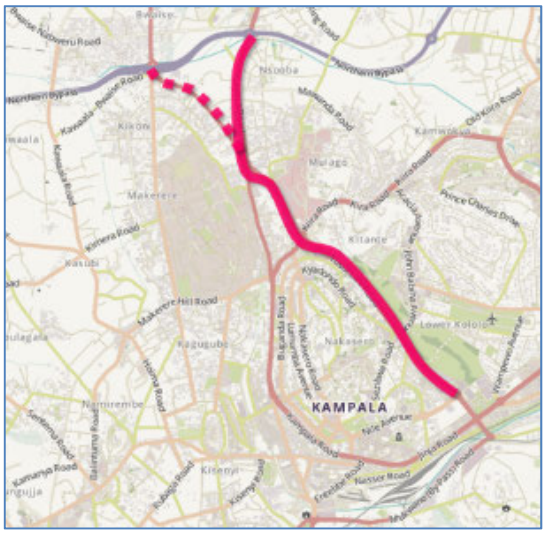
Figure 3-25 Alignment of Kampala-Bombo Expressway and Kampala Outer Beltway

7) Kampala Outer Beltway: This is a 100km road project linking through Ggaba, Mukono, Seeta, Namugongo, Kiira, Kasangati, Mutugga, Wakiso, Buloba and Nsangi. Ring roads are designed to funnel traffic out of the city center and benefit long distance trips with an emphasis on freight. Ring roads also create urban sprawl, allowing the city to continue to expand within and out-side of the roadway which is a negative development for the region.

8) Kampala – Busunju Expressway: A 56km expressway connecting Kampala with the Busunju area. This road will replace the poor quality existing Hoima-Kampala Road with a focus on increased mobility and improved safety. The current road is very prone to accidents.



Kampala – Busunju Expressway



VVIP Expressway

Source: Multimodal Urban Transport Master Plan for GKMA, Final Report, 2018

Figure 3-26 Alignment of Kampala – Busunju Expressway and VVIP Expressway

9) VVIP Expressway: UNRA also implements FS/DD of VVIP Expressway which connects between a point at Northern Bypass and Nakasero, the centre of Kampala. Its primary objective is to provide fast access between centre and suburban of Kampala. There is another objective that is to introduce truck access between centre of Kampala and Entebbe via this VVIP, Northern Bypass and Kampala Entebbe Expressway. It is expected to call more traffic on the Kampala –Entebbe Expressway which will help the Expressway project financially viable, eventually.

10) Others: Except these Expressway projects there are several additional projects are also waiting for implementation. Those are:

a) Zana – Kajjansi Road Rehabilitation: The project is mainly to rehabilitate the existing section of the Kampala – Entebbe corridor. Congestion along this section of the roadway is currently very heavy and this project means to improve road geometry and relieve congestion.

b) Nambole – Mukono Road Upgrade: UNRA has already completed the design, awaiting allocation of funds for implementation. This will provide an alternate route between Eastern Kampala to Mukono in place of the Jinja – Kampala Expressway.

c) Nsambya - Rosebury Road: This road is planned between Nsamya traffic junction to Rosebury road which may be an overpass.

d) Kayemba - Katwe Tunnel: There is an existing small tunnel which can only be used by motorists and pedestrians but not vehicles. The plan is to expand the tunnel so that the vehicles can also cross from Katwe to Kayemba.

3.4.5 Kampala City Roads Rehabilitation Project

1) The Government of Uganda (GOU) has solicited financial assistance from the African Development Bank for the rehabilitation and upgrading of 80km of Kampala city roads project in June 2018. The Bank has agrred to carry out a project with KCCA named ‘Kampala City Roads Rehabilitation Project’. KCCA will be the executing agency for the project under the oversight of the Principal Secretary,

Ministry of Works and Transport.

2) Basically, Kampala City Roads Rehabilitation Project will entail reconstruction/ and or upgrading of 80km of roads with NMT tracks, and associated on-street and off-street parking areas/ stands. The parking facilities are to facilitate orderly loading and off-loading by trucks, streamline operations of bodaboda to optimize utilization of the road space. Other aspects of the works shall include junction improvements (including signalization) and provision of roadside market stalls to mostly women vendors currently selling fruits and merchandise along the prioritized road sections.

3) The main project components are:

a) Road Civil Works: This component involves construction of 80km long road sections complete with sidewalks and/ or cycling tracks, on-street and off-street parking areas, and market stalls where appropriate, and associated drainage works. Other civil works elements consist of Tree Planting and landscaping/ beautification works along the prioritized road sections. The civil works will be packaged into 4-5 lots in order to facilitate timely execution.

b) Consulting Services: This component shall include:

- Construction supervision services for the civil works in two lots;
- Consultancy services for the development of Urban Design Standards for Uganda including provisions for urban transport and related infrastructural elements;
- Public transport advisory services;
- Institutional capacity building in project management and procurement; and
- Project monitoring & evaluation and technical audit.

c) Goods: This component shall include supply of 100 eco-buses to pilot scheduled public transport services along two identified radial transit routes within the city of Kampala, which are to form the backbone of modern transit operations in the city in the subsequent stages.

4) The estimated project cost and including provisions for physical and price contingencies is USD 213 million (UGX 766.64 billion). However, the final amounts are subject to the final project cost estimate to be determined at appraisal.

5) AfDB Bank Group, GOU, and Global Environmental Fund (GEF) will jointly finance the project components. The Bank loan will come from the Uganda AfDB Country Allocation of USD 172.5million. The ADB will thus provide 72.5% and GEF to provide a grant of USD 10 million constituting 4.2% of the total estimated project costs. The GOU will finance 23.3% to cover the remaining local costs excluding tax (estimated at 18%).

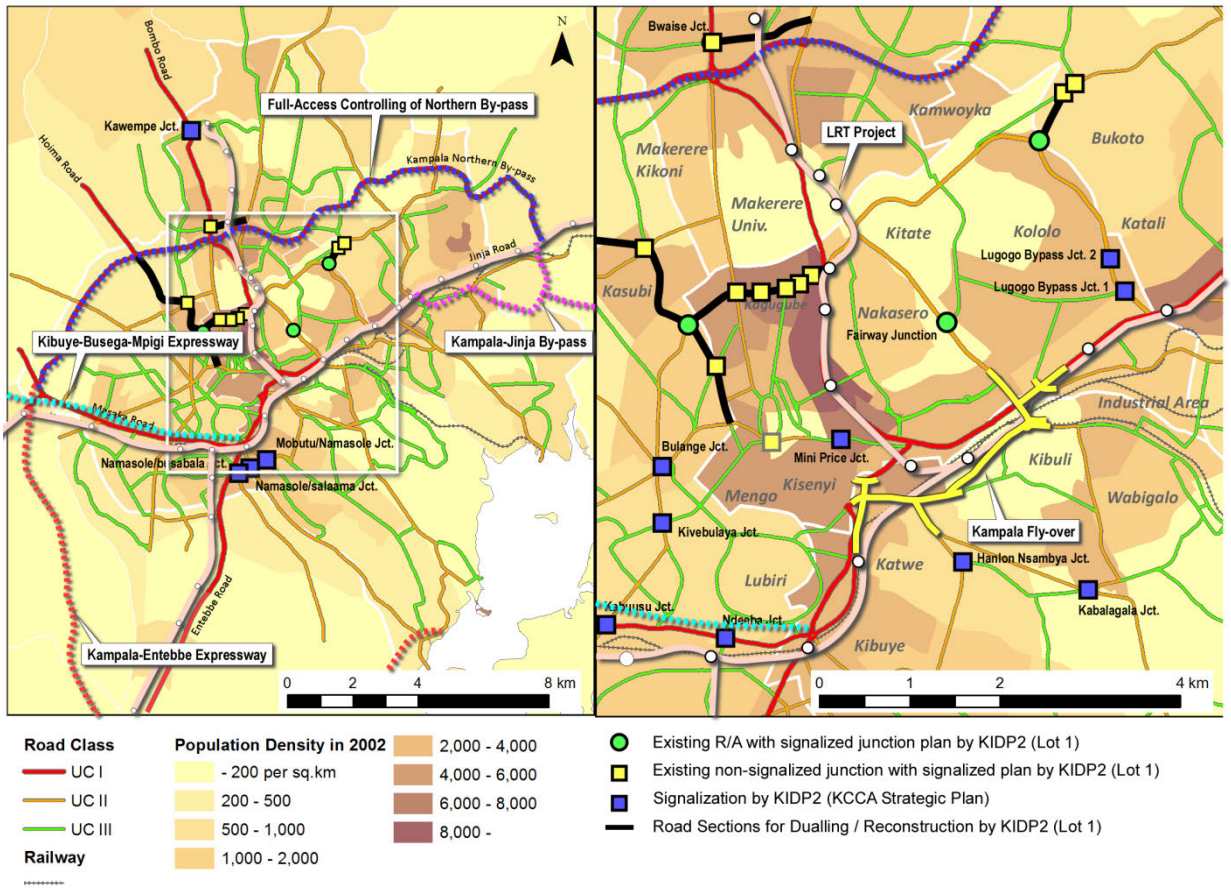
3.5 Traffic Management Projects

3.5.1 Traffic Signal Installation under Different Projects

1) In addition to the existing and on-going signalized junctions, KIIDP2 project and KCCA's plan for junction improvement including signalization, and Kampala Flyover project includes junction improvement and signalization. Kampala Flyover Project considers the installation of traffic signal with a compatibility with Area Traffic Control (ATC) system, so that these also can be controlled from Traffic

Control Centre. The details about ATC is described is section 5.4.1.

2) Existing expressway project and plan such as Northern Bypass improvement, Kampala –Entebbe Expressway are basically full-access controlled and improvement of junctions connect to ramps of each expressway are expected to be included.
3) While BRT project initially supported by the World Bank has been suspended because of difficulties of establishment of operation and management organization for BRT for several years, the study on social aspect of the BRT followed by design review will be commenced with assistance from French Development Agency (AFD, *Agence Française de Développement*) as of May 2019.
4) LRT project, instead of the BRT, is proposed by Chinese company along almost same routes with BRT. Proposed LRT project is expected to be designed as no-level crossing with road, therefore, priority signal for LRT is not required. However, proposed LRT project have several issues to be discussed including conflict with existing fly-over and proposed expressway project, standard gauge railway project and land acquisition for piers at no-median arterial roads etc.



Source: KSTP

Figure 3-27 Existing Major Transport Project in Kampala

Table 3-3 Outline of Relevant Project to Traffic Signalization

Project	Location	Organization	Outline and progress
KIIDP2	Batch 1: 21 kilometre road expansion; signalization of 12 junctions Batch 2: signalization of 22 junctions and road improvement	KCCA	In accordance with dualling / reconstruction of road (21km) in batch 1 of 11 junctions are already improved and signalized as of May 2019.
Kampala-Entebbe Expressway	Kampala – Entebbe Highway (36.94km), Kajjansi Interchange – Munyonyo Highway (12.62km).	UNRA	Full access controlled dual carriageway toll road. Under construction and partially open in 2018. Now in operation without toll as of May 2019.
Kampala Fly-over	Central Kampala where Clock Tower junction, Kitgum junction, Queen's Way.	UNRA	Construction has started in May 2019.
Kampala Northern Bypass	Northern Bypass	UNRA	Duelling of Northern Bypass is underway.
Kampala-Jinja Expressway	Kampala-Jinja	UNRA	Community consultation, land acquisition, procurement through PPP started in 2017
The Project for the Improvement of Traffic Control in Kampala City	Central Traffic Control Centre construction and signalization of 32 junctions	KCCA	Junctions will be signalized using Area Traffic Control (ATC) system and will be centrally controlled by MODERATO system from CTCC located in KCCA premise. Detailed design is expected to start from June 2019.

Source: KSTP

3.5.2 The Project for the Improvement of Traffic Control in Kampala City

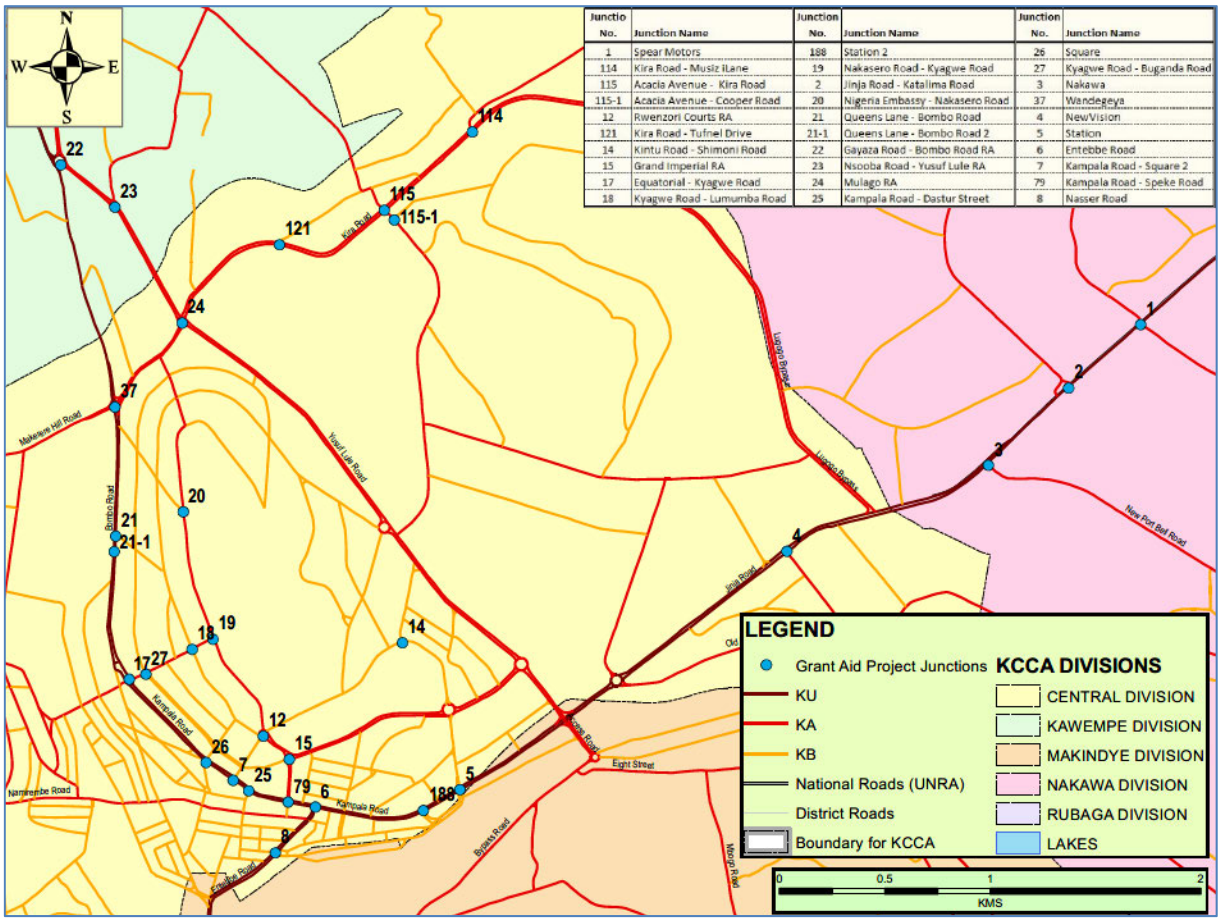
1) As of December 2018, the number of operational traffic signals in Kampala were 25, which is quite small comparing the traffic load of a city of 1.65 million dwellers. Another big issue is Kampala's traffic signals are mostly work as stand-alone. Due to incapability to response to the demand real time basis and lack of coordination in between junctions, it is common to have congestion during peak time.
2) Considering the above limitations, KSTP planned to conduct a pilot project of installation of traffic signals at 4 junctions, which will have traffic detectors and therefore, the signal timings will be changed according to real demand, also establish a coordination between the 4 junctions. The concept is described as Area Traffic Control (ATC), where the signals will be controlled from KCCA, using a Japanese signal control system called MODERATO. The details of MODERATO system is described in Section 5.4.1.
3) In 2017, KCCA has expressed its interest to have a fully functional traffic control centre, which will be capable of controlling all the traffic signals in Kampala. The Japanese Government has agreed to KCCA's request and signed a Minute of Discussions during September 2017 in order to carry out a feasibility study.
4) The feasibility study has been completed in 2018, which recommends the construction of a traffic control centre, signalization of 30 junctions and installation of necessary communication network up to KCCA. The proposed traffic control centre building will be located in KCCA premise, as shown at Figure 3-28. The detailed design of the project is scheduled to start from June 2019 and the construction of centre and installation of necessary equipment supposed to be completed by April 2022.

Source: Preparatory Survey for the Project for Improvement of Traffic Control in Kampala City, Final Report

Figure 3-28 Proposed site of Traffic Control Centre at KCCA Premise

5) The target junctions planned to be signalized under this project are shown at 29. The project is expected to have synchronization of traffic control of Kampala road and therefore, the traffic flow on the main carriageway of Kampala should be improved. However, some less important junctions will still be non-signalized, which would be manually controlled by the traffic police.

6) In addition to signal installation, the geometric alignment of the junctions will also be improved. At some junctions, the roundabouts will be removed and others will be improved mostly installation of left/right turning lanes and widening of the legs.



Source: Preparatory Survey for the Project for Improvement of Traffic Control in Kampala City, Final Report

Figure 3-29 Proposed Junctions to be Signalized under The Project for the Improvement of Traffic Control in Kampala City

3.5.3 Regeneration of the Central Business District of Kampala City

1) The downtown area of Kampala is an important part of the CBD with its many commercial and shopping attractions. The project was formulated in order to improve the area's transport prospects, regenerate the Old Taxi Park area and therefore strengthen downtown as a public transport hub and a focal point for retail and leisure uses. The European Union supports this KCCA initiative and therefore wishes to procure the services of a multi-disciplinary team of specialist consultants, led by a transport planner, to prepare an area transport plan for downtown including the remodelling/ restructuring of the Old Taxi Park area.
2) KCCA management has identified this as a priority area for transport investment in order to address the existing transport problems including:
   a) Traffic Congestion;
   b) Poor Accessibility for all travel modes;
   c) Overcrowding in the Old Taxi Park;
   d) Poor connectivity;
   e) Poor provision for vulnerable road users (pedestrians and cyclists);

f) Excessive on-street parking and

g) Poor interchange between travel modes.

3) The project area is Kampala's downtown area which is bound by Entebbe Road, Kampala Road, Kyaggwe Road, Mackay Road, Kisenyi Road and Kafumbe Mukasa Road, as shown in Figure 3-30. It encompasses major public facilities such as the Old Taxi Park, the New Taxi Park, several markets and Nakivubo Football Stadium.

Source: Regeneration CBD, Area Transport Plan, Progress Report

Figure 3-30 Study Area under Regeneration of the Central Business District of Kampala City in Uganda

4) As of October 2018, KCCA has received a fund from the Netherlands Enterprise Agency (RVO) under the Develop2Build (D2B) programme to a tune of EUR(€) 920,000 for the consultancy services to carry out the feasibility study for the redevelopment of the Old Taxi Park in Kampala. The output of this project such as the design of entrance and exit of vehicles might need to consider the ongoing NMT pilot project design.

3.6 Public Transport Projects

3.6.1 Bus

1) Operation of Pioneer Easy Bus (PEB) was resumed in May, 2015 as modal shift challenge. KCCA intends to allocate a lane exclusively to the bus during peak hours, to encourage the challenge which will however result in the disturbance of normal passenger traffic. The design of the exclusive lane is prepared by the engineer of KCCA. However, the exclusive lane system is not in place as of end of February, 2016.

2) Another modal shift challenge was that Uganda Taxis Operators and Drivers Association (UTODA)

Awakula Ennume has launched its first batch of buses from Tata Uganda called Awakula Ennume on June 2015. Awakula Ennume is a co-operative society that is taking up a new role to provide better services in the transportation sector for the Kampala city and the area surrounding it. It also provides the much needed competition to the sector. There are 240 buses to be released on the Ugandan roads as per this launch; these have a 40 and 60 capacity in seating.

3) KCCA has a plan to introduce a new bus service called 'Green Bus Project' on Kampala roads, as a part of its intension to transform the city's public transport sector by encouraging the introduction of high capacity public transport vehicles (capacity of 64 passengers and above). The overall objective of the assignment is to provide public transport advisory services to KCCA and to design pilot city bus services along two routes described as follows:

a) Route 1 starts and ends at City Square. It runs past Centenary Park, Lugogo Cricket Oval, Kololo Secondary School, Kira Road Police Station, Kamwokya Market, Mulago Hospital- Wandegeya and Watoto Church.

b) Route 2 also starts and ends at City Square, but goes via Watoto Church, Wandegeya, Mulago Hospital, Kamwokya Market, Kira Road Police Station, Bukoto Kisaasi Junction, Ntinda Primary School, Ntinda New Market, Spear Motors Junctions, Nakawa market, Lugogo Cricket Oval, and Centenary Park.

3.6.2 Commuter Railway

1) An experimental commuter rail service was launched in Kampala on December 2015 under an agreement between Government of Uganda/ Uganda Railways Corporation and Rift Valley Railways (RVR) Uganda and overseen by KCCA. The three partners agreed to run the pilot service for 12 months, following the signing of an initial contract in October 2013.

2) RVR provided five refurbished coaches with maximum capacity of 200 passengers for the service, and is currently running four trips a day between Kampala and Namanve. The service was being offered between Kampala and Namanve with three stopovers at Namboole, Kireka and Nakawa. The journey time is around 40 min and the daily schedule is shown at Table 3-4. The fare originating from Kampala or Namanve is UGX1,500, whereas, originating from Namboole, Kireka and Nakawa halts is UGX1, 000.

Table 3-4 Daily Time Schedule of Passenger Service Train

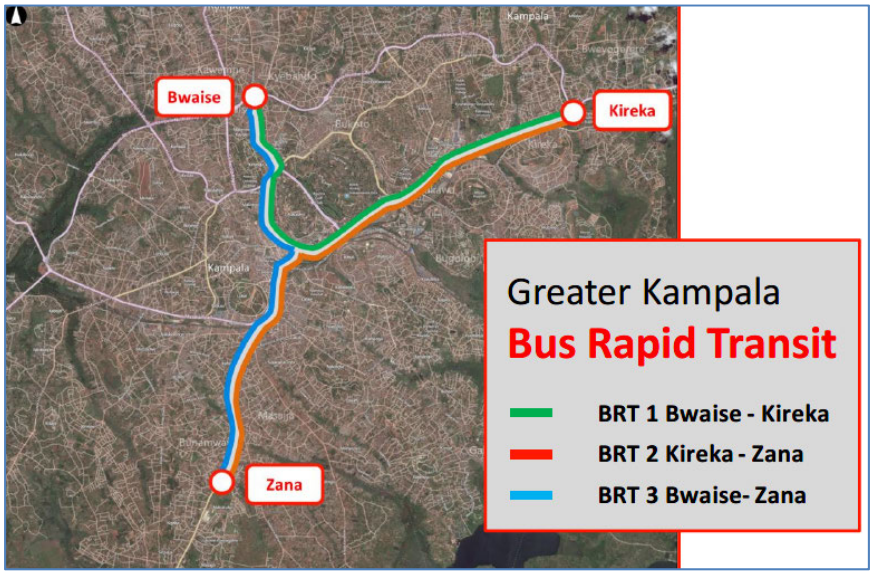
Trip	From	Departure	To	Arrival
1	Namanve	7.00 AM	Kampala	7.45 AM
2	Kampala	5.30 PM	Namanve	6.15 PM
3	Namanve	6.40 PM	Kampala	7.25 PM
4	Kampala	7.50 PM	Namanve	8.35 PM

Source: Uganda Railway Corporation Leaflet

3) It was a challenge to convince commuters to change their modes of travel at the start, but it has currently picked up and the number of passengers continues to grow steadily.

3.6.3 Bus Rapid Transit (BRT)

1) Bus Rapid Transit (BRT) is a high-quality bus-based transit system that delivers fast, comfortable, and cost-effective services at metro-level capacities. It does this through the provision of dedicated lanes, with busways and iconic stations typically aligned to the centre of the road, off-board fare collection, and fast and frequent operations. (Source: Institute for Transportation & Development Policy; www.itdp.org)
2) According to the Kampala BRT Project Study, 3 BRT lines are proposed as pilot project lines (Line1: Bwaise – Kireka; Line 2: Kireka – Zana; Line 3: Bwaise – Zana). The pilot project comprises a Y-shaped corridor that runs from Bwaise via Gayaza Road, Bombo Road and Jinja Road to Kireka, with a branch to the south via Entebbe Road to Zana. As it currently stands, the total length of the scheme is 22.3 Km; an additional 1.0 Km has been earmarked at each of the three end points of the scheme. This results in nominal scheme length to 25.3 Km. Thus, the BRT does not terminate in the centre and offers direct connections between the three branches of the Y-shaped corridor. The detailed engineering design has been completed in 2014 with the support from the World Bank.
3) In addition to 3 pilot project lines, 5 feeder lines were also proposed in order to achieve better mobility. As per the study, forecasted daily passenger was 410 thousand in 3 major lines and 166 thousand in feeder lines in 2018. It means more than 566 thousand passengers could travel using BRT, if it is in operation in 2018.
4) KCCA worked together with MOWT to ensure that the BRT Pilot project design was completed. The World Bank insisted that construction and operation of BRT may only be carried out by an implementing agency with the responsibility for Transport in the Metropolitan Area.

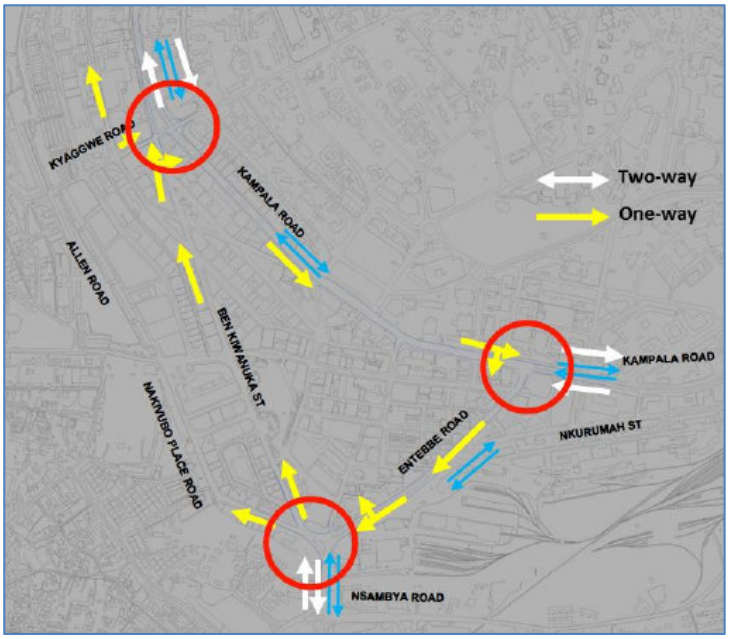


Source: Bus Rapid Transit for Greater Kampala, Ministry of Works & Transport

Figure 3-31 Proposed BRT Pilot Corridor

5) The BRT project now requires an implementing agency that can be guided by MOFPED to source funding for the project. The MOWT has acquired a certificate of financial implication from MOFPED for the formation of Metropolitan Area Transport Authority (MATA).

6) BRT design concept were decided as dedicated bus lanes in the centre of the road, redesign and signalling of all major junctions and introduction of one-way system in city-centre. One-way system is proposed in the city centre for the smooth circulation of the BRT, as well as other traffic, as shown in Figure 3-32.



Source: Bus Rapid Transit for Greater Kampala, Ministry of Works & Transport

Figure 3-32 Proposed One-Way System for BRT in CBD

7) While BRT project initially supported by the World Bank has been suspended because of difficulties of establishment of operation and management organization for BRT for several years. The study on social aspect of the BRT followed by design review will be commenced with assistance from French Development Agency (AFD, *Agence Française de Développement*) as of May 2019. AFD, the World Bank (WB) and the European Union (EU) has shown interests in co-financing the BRT project.

8) In addition to BRT pilot routes, MMUTMP proposed additional 5 BRT lines which are described in Figure 3-33 and the operation plan is proposed as Table 3-7.

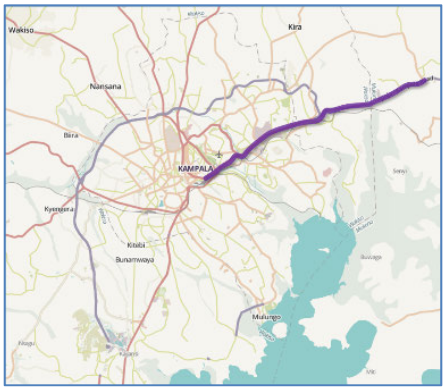
Table 3-5 Recommended BRT Operation by MMUTMP

BRT Infrastructure	Length (Km)	Pilot (2018-2021)	Short (2022-2025)	Mid (2026-2030)	Long (2031-2035)	Horizon (2036-2040)
BRT-Pilot	22	Design+Build	Operation	Operation	Operation	Operation
Duallization of BRT corridor	22		Design+Build	Operation	Operation	Operation
BRT-Entebbe extension	31.6		Design+Build	Operation	Operation	Operation
BRT-Masaka extension	18.2		Design+Build	Operation	Operation	Operation
BRT-Bombo extension	5.6		Design+Build	Operation	Operation	Operation
BRT-Gayaza extension	5.2		Design+Build	Operation	Operation	Operation
BRT-Jinja extension	13.4			Design+Build	Operation	Operation

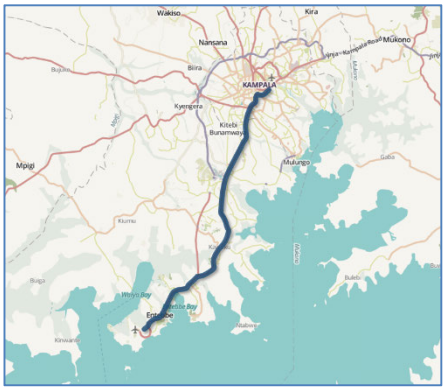
Source: Multimodal Urban Transport Master Plan for GKMA, Final Report, 2018

9) As per MMUTMP, BRT routes provide service to similar to the metro network. However, as the BRT

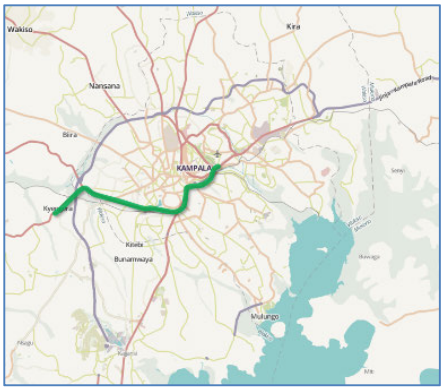
routes have a higher frequency of stations providing higher accessibility. BRT 1 provides direct access from Mukono to the CBD. BRT 2 provides direct access from the CBD to Entebbe International Airport. As the southern neighbourhoods of the GKMA are rapidly growing and will be served by this route. BRT 3 provides direct access from the CBD to Maya and the Western neighbourhoods of the GKMA. BRT 4a provides direct access from the CBD to Kawempe and northern neighbourhoods of GKMA and a connection through the Northern Bypass. BRT 4b provides direct access from the CBD to Kayanja and northern neighbourhoods of GKMA and a connection through the Northern Bypass.



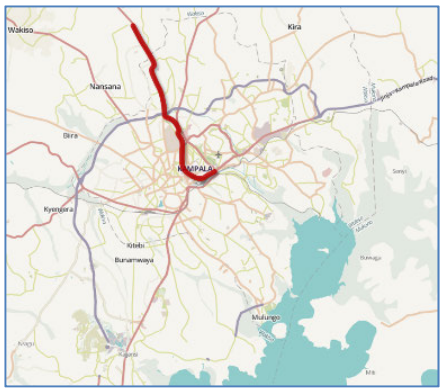
BRT 1



BRT 2



BRT 3

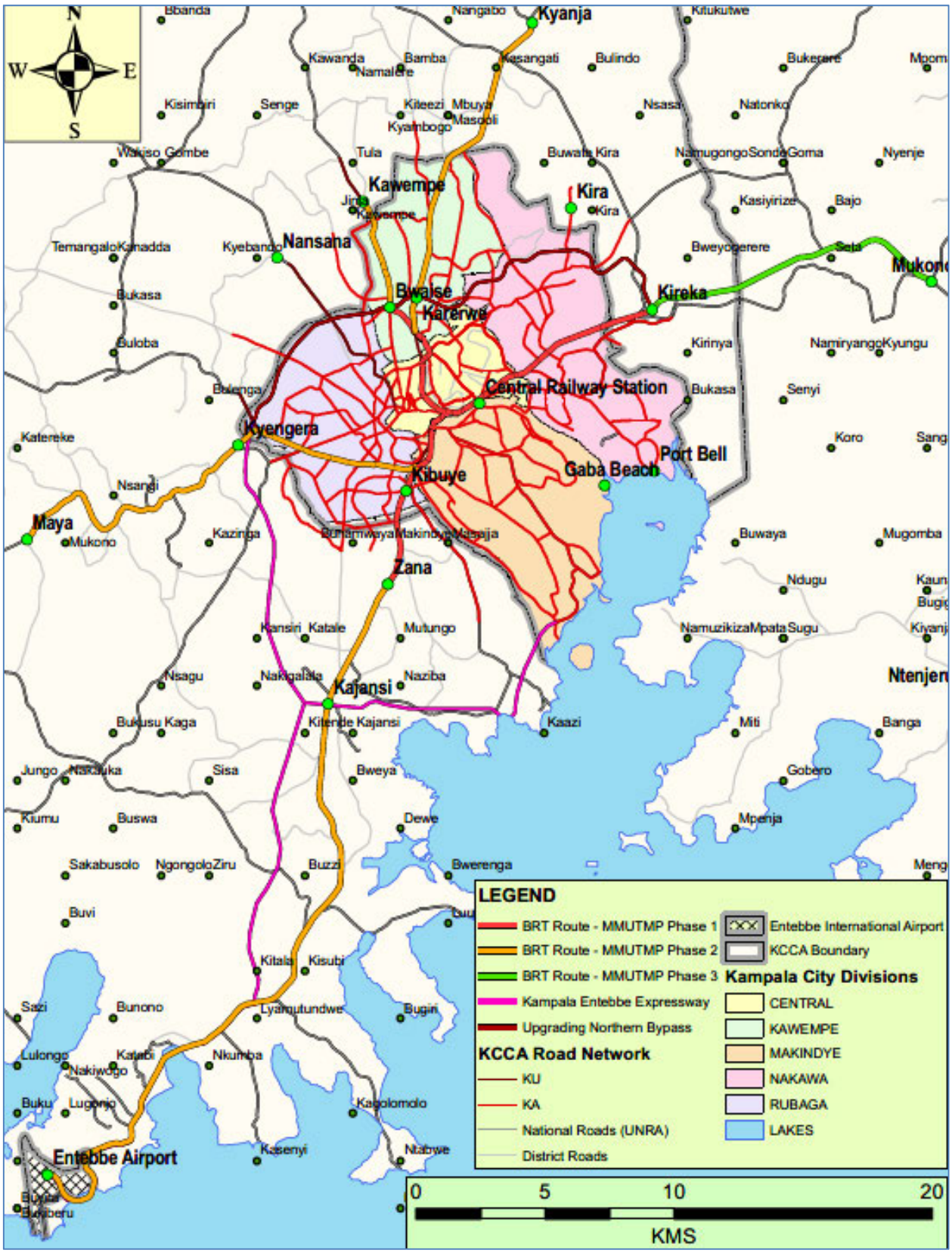


BRT 4a

BRT 4b

Source: Multimodal Urban Transport Master Plan for GKMA, Final Report, 2018

Figure 3-33 Recommended Additional BRT Lines by MMUTMP

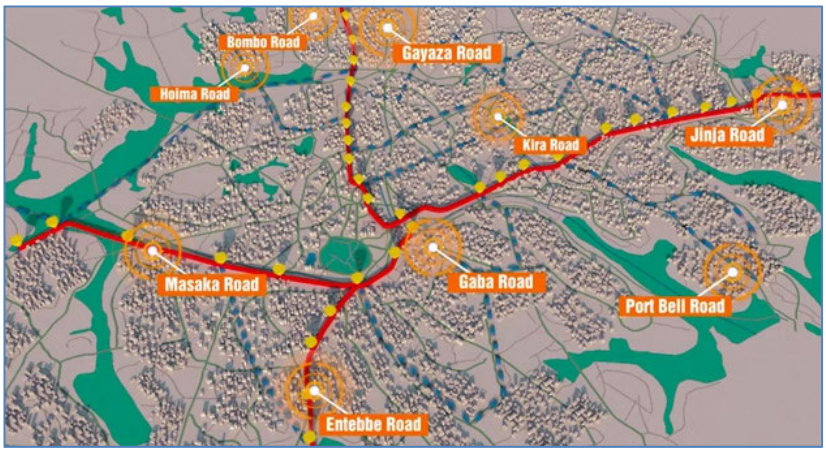


Source: KSTP

Figure 3-34 Whole BRT Network Recommended by MMUTMP

3.6.4 Light Rail Transit (LRT)

1) Light rail transit (LRT) is an electric rail-borne form of transport which can be developed in stages from a tramway to a rapid transit system operated partially on its own right-of-way. The general term 'light transit' covers those systems whose role and performance lie between a conventional bus service running on the highway at one extreme and an urban heavy rail or underground metropolitan railway at the other. Light rail systems are thus flexible and expandable. (Source: International Association of Public Transport).
2) In Kampala, MOWT originally announced "The Greater Kampala Light Mass Transit Project" of which proposed route is almost duplicated with that of BRT pilot corridor. A Memorandum of Understanding regarding the construction of LRT was also signed in between MOWT and the Government of China in December 2015.
3) The first phase of the project was proposed to cover the following routes:
   a) Kampala-Namanve via Nakawa, spear motors, Kyambogo, Banda, Kireka and Bweyogerere (12 km)
   b) Kampala-Kajjansi via Kibuye, Najjanankumbi and Zana, Lubowa, Seguku and Lweza (12 Km);
   c) Kampala-Kyengera via Katwe, Kibuye, Ndeeba, Nalukolongo and Natete (7 km)
   d) Kampala-Kawempe via Nakivubo, Kisekka, Wandegeya, Mulago, Kubbiri and Kalerwe (9 Km).



Source: https://www.sgr.go.ug/light-rail-transit

Figure 3-35 Proposed LRT Routes by MOWT

4) However, according to the MMUTMP, LRT has been recommended for three (3) routes in Kampala for optimal scenario of 2040 as shown in Figure 3-37. Out of 3 routes, two are recommended to design as a part of short term (2022-2025) and all three routes should be operational in the long term (2031-2035). The LRT routes in this scenario will provide feeder services for the metro network. Phase wise detailed implementation plan is described in Table 3-6.

Table 3-6 Recommended LRT Operation by MMUTMP

LRT Infrastructure	Stations	Length (Km)	Pilot (2018-2021)	Short (2022-2025)	Mid (2026-2030)	Long (2031-2035)	Horizon (2036-2040)
LRT-Busega/Port Bell	36	17.94	Design	Build	Operation	Operation	Operation
LRT-Kira/Gaba	47	23.5		Design	Build	Operation	Operation
LRT-East Ring	40	19.6		Design	Build	Operation	Operation
LRT-Completion of Ring	71	35.3				Design+Build	Operation
LRT-Extension to new neighbourhood	18	9				Design+Build	Operation

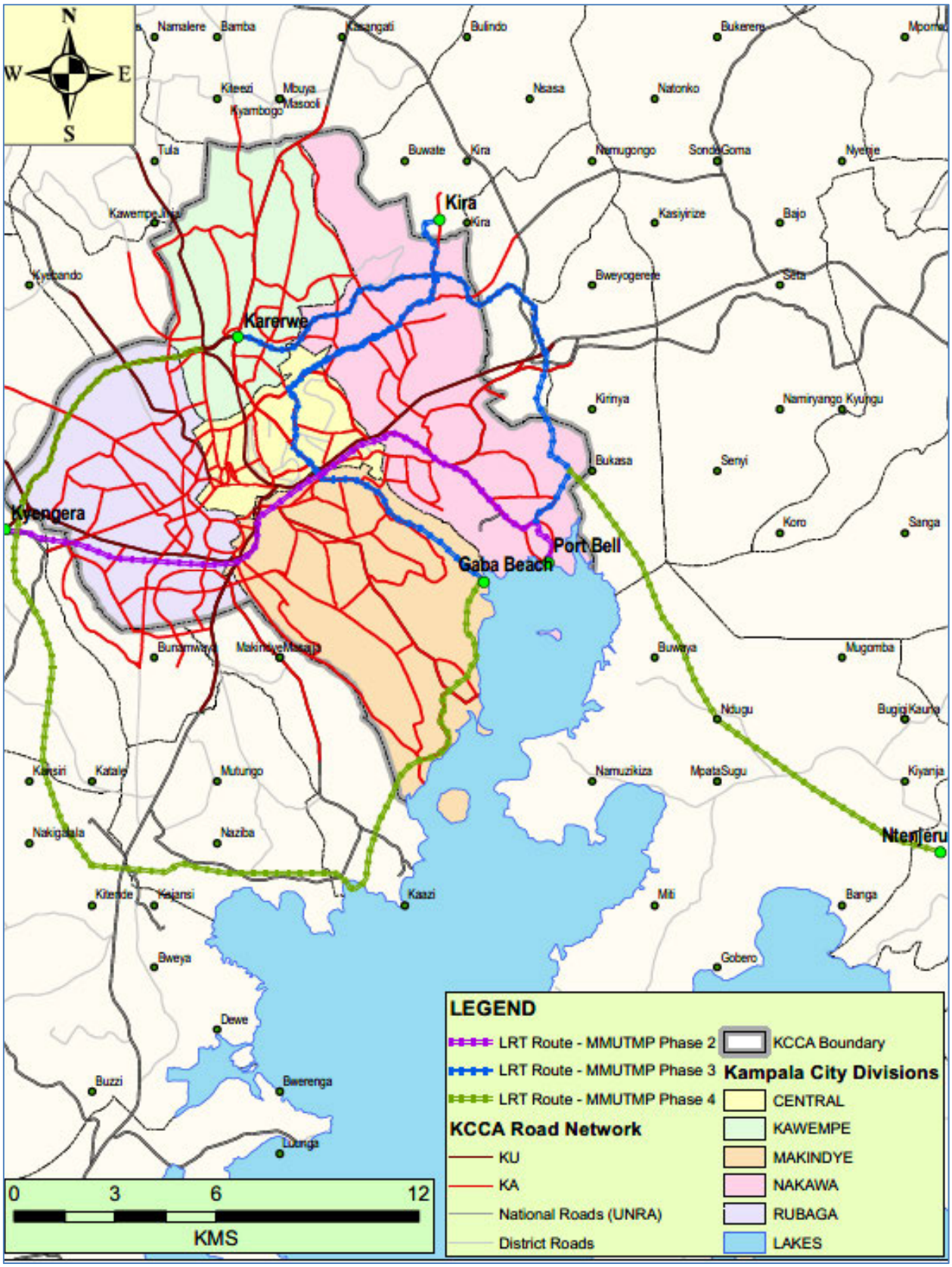
Source: Multimodal Urban Transport Master Plan for GKMA, Final Report, 2018

5) LRT 4 line provides an essential West-East service which connects Port Bell and the Kyengera area to the city centre. Line 5 provides North-South service which connects Kira (which is considered as a future focal point of growth) and Ggaba on the Lake which has a large residential base in addition to commercial nodes via the city centre and Line 7 provides service along the Northern Bypass.

LRT 4 **LRT 5** **LRT 7**

Source: Multimodal Urban Transport Master Plan for GKMA, Final Report, 2018

Figure 3-36 Recommended LRT Line by MMUTMP



Source: KSTP

Figure 3-37 Whole LRT Network Recommended by MMUTMP

3.6.5 Metro

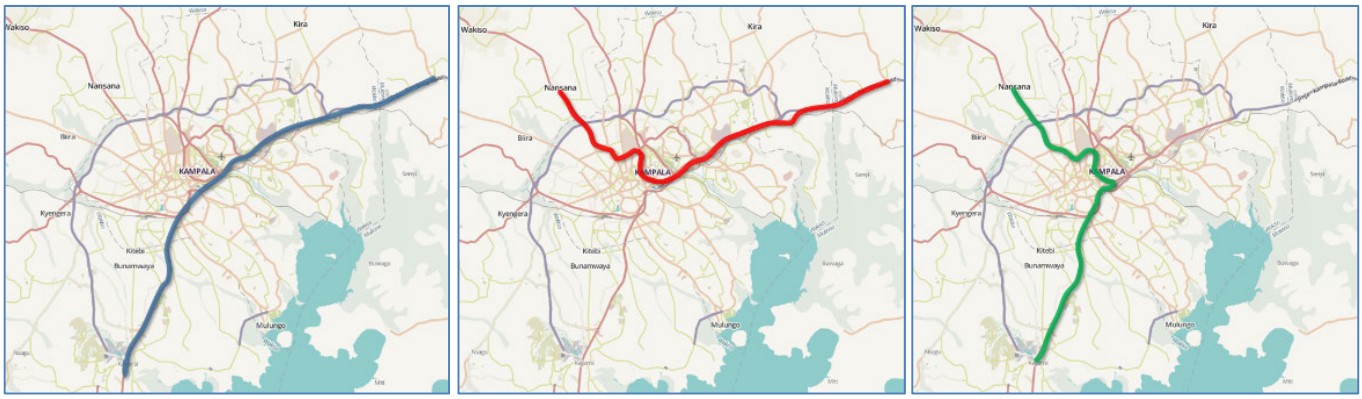
1) Metropolitan railways are urban, electric transport systems with high capacity and a high frequency of service are known as Metros. Metros are totally independent from other traffic, road or pedestrians. They are consequently designed in tunnel (underground), viaducts (overhead) or at-grade level but with physical separation. Metros are the optimal public transport mode for a high capacity line or network service. (Source: International Association of Public Transport)
2) According to per MMUTMP, Metro service is recommended for three (3) routes in Kampala for optimal scenario of 2040. Out of 3 routes, one is recommended to build as a part of short term (2022-2025) and another two are recommended for long term (2031-2035) construction project. However, the plan is implement the operation, phase by phase. Proposed 3 Metro routes are divided into 4 phases as shown in Table 3-7 and Figure 3-38.

Table 3-7 Recommended Metro Operation by MMUTMP

Metro Infrastructure	Stations	Length (Km)	Pilot (2018-2021)	Short (2022-2025)	Mid (2026-2030)	Long (2031-2035)	Horizon (2036-2040)
Metro-Kololo CBD/Nansana	12	12.8	Design	Build	Operation	Operation	Operation
Metro-Namanve/CBD	7	12.9		Design	Build	Operation	Operation
Metro-CBD/Queensway	3	2.3			Design	Build	Operation
Metro-Queensway/Kajjansi	7	9.5				Design	Build

Source: Multimodal Urban Transport Master Plan for GKMA, Final Report, 2018

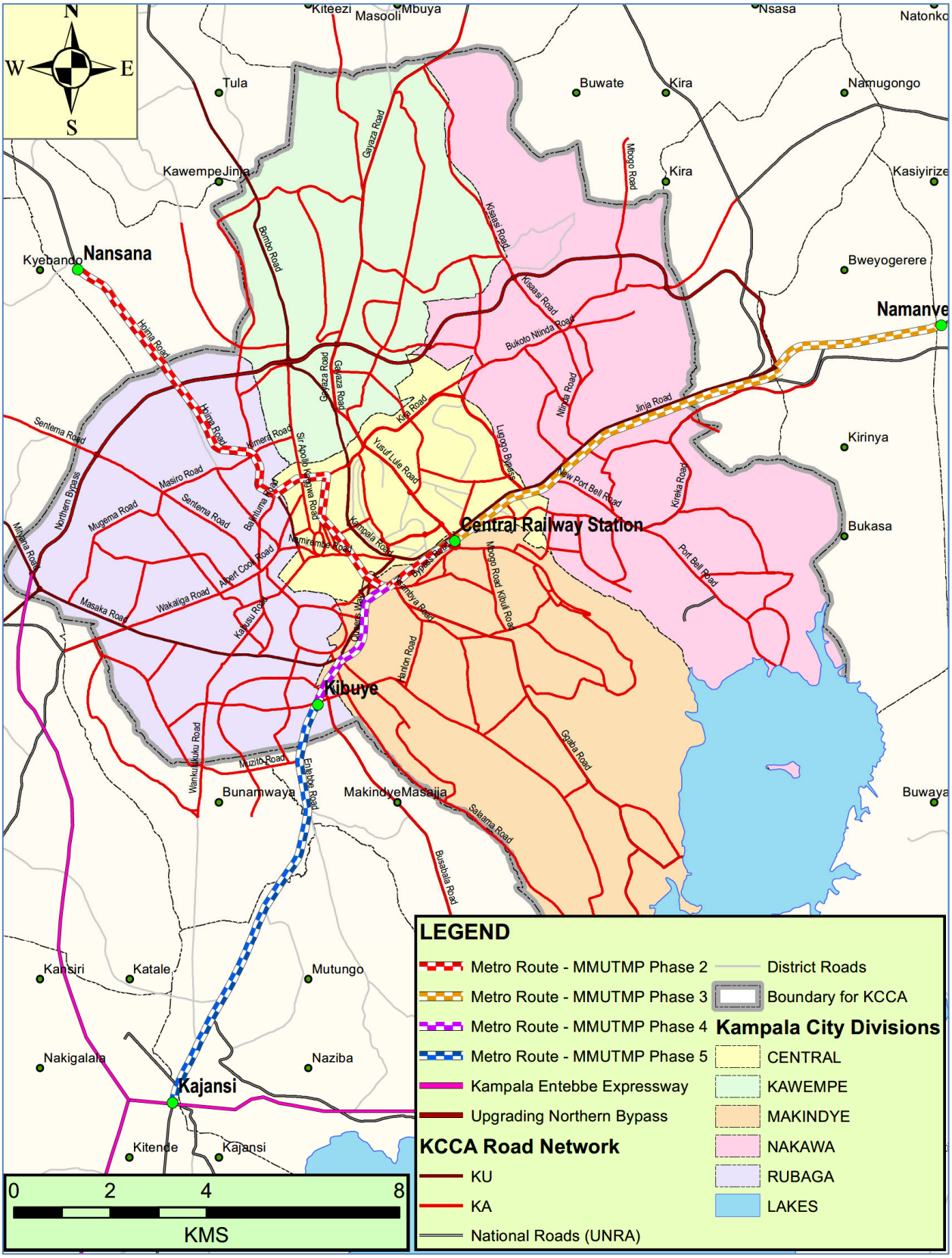
3) Metro 1 provides high capacity service along the congested axis of the city. The route connects two of the most populated areas of the GKMA to the city centre. The line has the operational potential for a shorter pocket route serving stops within the GKMA ring road. Metro 2 serves the rapidly growing town of Nansana in addition to Bweyogerere area. Metro 3 provides service along the Entebbe corridor as well as service to the growing town of Nansana.



Metro 1 **Metro 2** **Metro 3**

Source: Multimodal Urban Transport Master Plan for GKMA, Final Report, 2018

Figure 3-38 Recommended Metro Line by MMUTMP



Source: KSTP

Figure 3-39 Whole Metro Network Recommended by MMUTMP

3.6.6 Cable Car

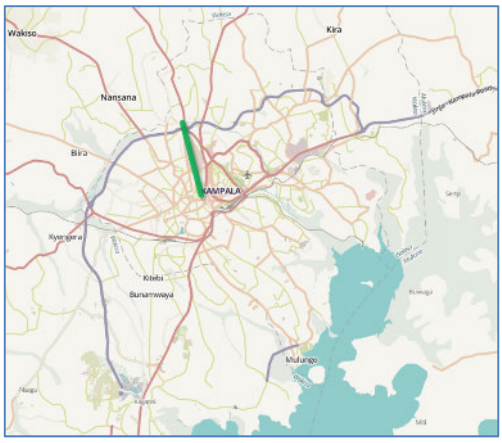
1) Cable car is a transit technology that moves people and/or goods on a continuous moving cable propelled by a steel cable driven by a bull wheel/electric motor at one end of the route and supported by intermediary trestles along a transit route.
2) KCCA plans to implement Cable Car Transportation in Kampala and this comes with an ambitious goal of exploring the cable car development as a catalyst that shall chart a sustainable path to modernization of a city that delivers the greatest transport benefits for her residents.
3) A feasibility study for cable car introduction has been carried out in 2016, which reviewed the demand for public transit in Kampala and review of the KCCA plans for mass public transportation. In doing so, the study assessed the programs within the current city development and expansion portfolio (such as KPDP); considered capabilities and technologies of future transportation system might require; and considered the roles of commercial industry and the city's international partners in this enterprise. The study concluded with the recommendation to implement the cable car system as a flexible path to achieving sustainable transportation in the city.
4) However, it should be noted that, Cable Propelled Transit is a technology that has always been used only for ski resorts, leisure parks and other tourism sites. With few cities in the world operating cable cars for public transport, KCCA is optimistic that the Cable Car project will make a positive contribution in supporting the current and future public transportation system in the city.
5) MMUTMP recommended Cable Car for two routes called as Cable Car – North and Cable Car – South. North route is recommended to start operation in short term (2022-2025) and the other one is in mid-term (2026-2030).

Table 3-8 Recommended Cable Car Operation by MMUTMP

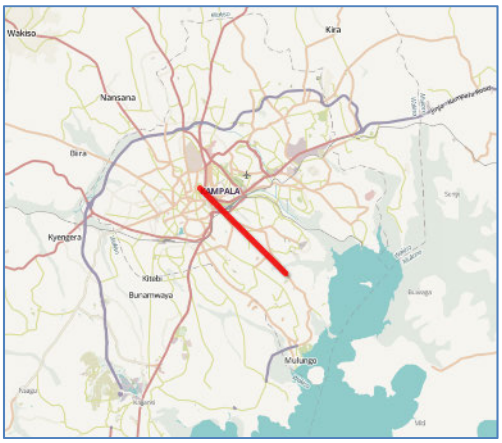
Cable Car Infrastructure	Length (Km)	Pilot (2018-2021)	Short (2022-2025)	Mid (2026-2030)	Long (2031-2035)	Horizon (2036-2040)
Cable Car-North	4.2	Design+Build	Operation	Operation	Operation	Operation
Cable Car-South	6.1		Design+Build	Operation	Operation	Operation

Source: Multimodal Urban Transport Master Plan for GKMA, Final Report, 2018

6) In MMUTP, Cable Cars are recommended to provide services which are able to traverse diverse topography. Cable Car 1 connects the neighbourhood of Bwaise to the city centre via Makerere University, whereas, Cable Car 2 connects the neighbourhood of Makindye to the city centre.



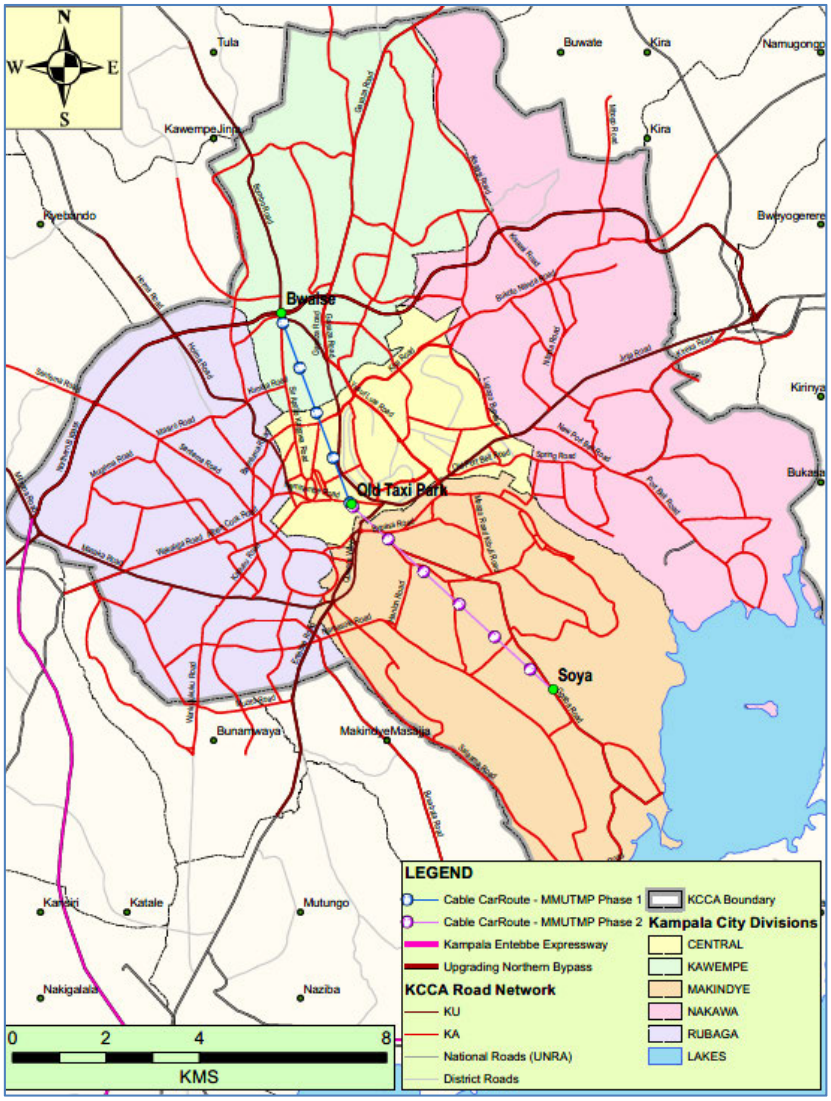
Cable Car - 1



Cable Car - 2

Source: Multimodal Urban Transport Master Plan for GKMA, Final Report, 2018

Figure 3-40 Recommended Cable Car Line by MMUTMP



Source: KSTP

Figure 3-41 Cable Car Network Recommended by MMUTMP

3.6.7 Standard Gauge Railway

1) In order to exploit the abundant resources, reduce the cost of doing business, increase regional connectivity and enhance regional integration, the Governments of Kenya, Uganda, Rwanda and South Sudan are committed to the development of a new seamless railway transport system within the framework of the Northern Corridor Integration Projects (NCIP) regional initiative.
2) The four NCIP partner states have entered into an SGR Protocol that will ensure development of the SGR with the same design standards from Mombasa to Nairobi, Kampala, Kigali and Juba. In Uganda the SGR will connect to the DR Congo through Kasese District and Arua District, to Rwanda through Mirama Hills in Ntungamo District to South Sudan through Nimule in Amuru District.
3) In Uganda, the SGR network will comprise of three major routes with a total route length of 1,614 Km. The Eastern Route will start from Malaba to Kampala, the Northern Route will start from Tororo to Gulu to Nimule with a spur to Pakwach and the western Route will start from Kampala to Mpondwe (at the DRC border) through Mityana, Kamwenge and Kasese, and a line from Bihanga southwards to Mirama Hills (at the Uganda- Rwanda border) through Mbarara and Ntungamo with a spur to the Muko iron ore deposits through Kabale. The Ugandan SGR has been designed to China Class 1 railway of 1.435 m wide. Some other major design specifications are: overhead AC electric traction, design speed of 120 Km/hr for passenger train, 100 Km/hr for containerized freight, maximum 1.2% of gradient and existence of no level crossings.

Source: Standard Gauge Railway Uganda website, www.sgr.go.ug

Figure 3-42 Proposed SGR Connectivity with Uganda

3.7 Non-Motorized Transport Projects

3.7.1 NMT Pilot Project

1) KCCA with the funding from UN-Habitat, undertook a pilot project to implement Non-Motorized Transport in Kampala. The pilot project site was identified as Namirembe road under this study. This

site was located based on the fact that, there is heavy commercial activity, it is in the centre of the transportation hub for the city and there is an existing high volume of pedestrians along this corridor.

2) The project involves redesigning of the existing motorized route to a Non-Motorized Transport route. During the design stage, minimum design standards for the NMT lanes were developed. These standards will be adopted in other roads design projects. Furthermore, the project scope was extended to include Speke Road and Shimoni Road. This construction cost is estimated at Three billion three hundred ninety million Uganda Shillings (UGX3.39billion) for the Namirembe Pilot corridor.

3) The proposed design concept shall deter all motorized transport from using the aforementioned streets. Only the bicycles and pedestrians will be expected to utilize this space. Access by the existing and affected commercial blocks shall be in accordance with the HGV regulatory restrictions.

4) The concept designs have been completed for the Namirembe road pilot and the Shimoni/Speke extension under the study. Later, the detailed design has been completed by different consultant and the project is now under construction using KCCA's own budget.

Source: Smart Moving Kampala

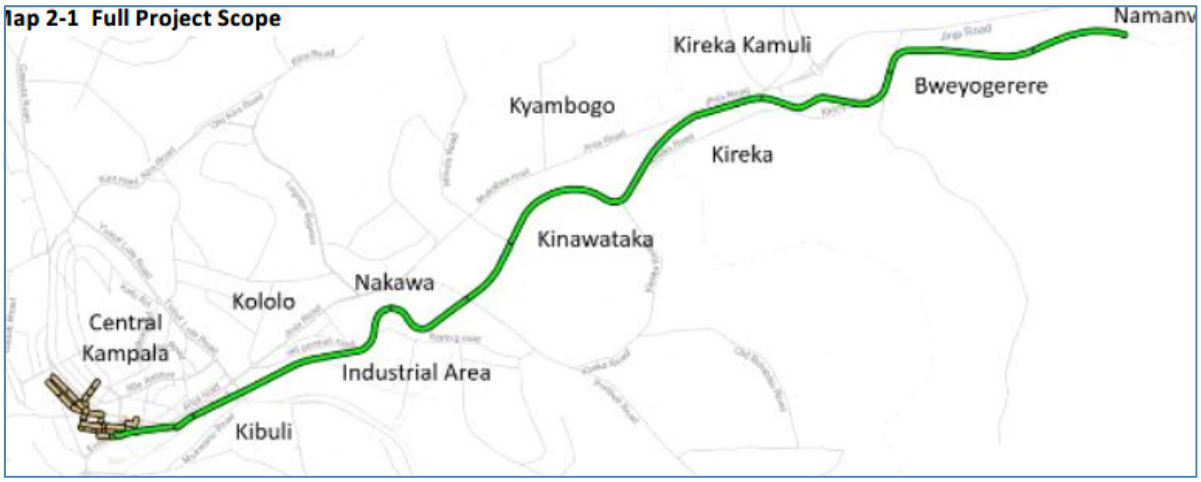
Figure 3-43 NMT Pilot Project Route

3.7.2 Detailed Design of NMT Scheme for Kampala City

1) As an extension of Multi-Modal Urban Transport Master Plan, detailed design of Non-Motorized Transport scheme for Kampala is under implementation. Detailed design report is scheduled to submit by April 2020. The project's main purpose is to develop detailed NMT schemes which include:

a) Design of 15 Km of path(s) for pedestrians and cyclists along the Kampala – Namanve railway reserve. The path will be segregated where available space permits and shared where there are space constraints;

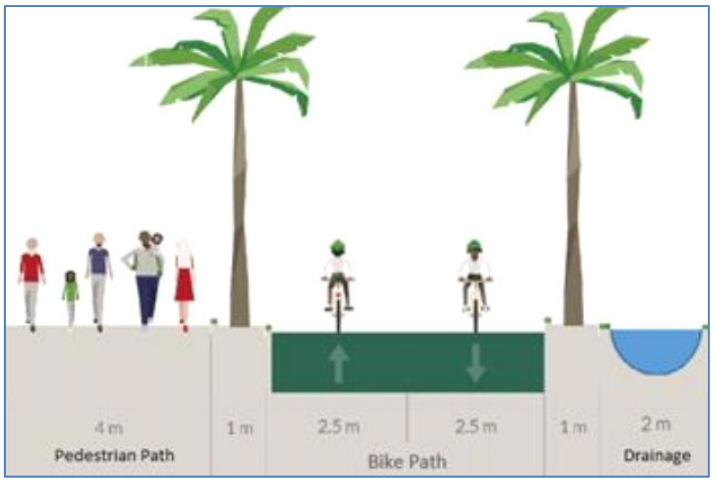
b) Design of 4 Km of pedestrianized streets within Kampala, some of which will include those proposed in the EU funded study: Regeneration of the Central Business District of Kampala City in Uganda. The specific streets/ sections for design will be agreed with KCCA prior to commencement.



Source: Detailed Design of Non-Motorized Transport Scheme for Kampala City, Technical Feasibility Report

Figure 3-44 Proposed NMT Corridor (Kampala – Namanve)

2) The conceptual design of NMT corridor cross section as shown in Figure 3-45 is approved by KCCA. The design principal is confirmed as dual 2.5 m wide bike paths divided by markings only, 4 m wide pedestrian walkway and allowance for single 3 m bike path as well as 2 m pedestrian path in narrow sections.



Source: Detailed Design of Non-Motorized Transport Scheme for Kampala City, Technical Feasibility Report

Figure 3-45 Conceptual Design of a Typical NMT Corridor Cross Section

3) Rest areas should be provide at every 1.5-2.5 Km distance. Rain shelter of 60 m^2 will be provided at every 500-1000 m interval. In addition, bike parking, proper signage and markings, lighting will be ensured as per design guidelines of NMT project.

4) As natural, NMT corridor will not be allowed for Bodaboda. It is critical to determine a method for restricting their access that will protect the NMT environment for pedestrians and bicyclists.

5) Due to the plans for significant removal of parking areas in the area of Central Kampala, reduced parking revenue is a negative consequence of this project. Penalty of illegal trespass (basically bodaboda), revenue collection from advertising along the route and providing licence to offer concessions of small business such as vending shops in addition to other services such as providing water, management of trash are under consideration.

4 ISSUES OF TRAFFIC MANAGEMENT

4.1 What Should be Managed?

4.1.1 "Urban Transport Policy and Strategy for Greater Kampala Metropolitan Area" prepared in 2014 provides the overall transport policy directions for Kampala. "Enhancement of Traffic Management and Safety" is highlighted along with other themes on urban transport.

4.1.2 In order to find the issues regarding Kampala traffic management at first the viewpoint to achieve the objectives are identified. Those are:

1) Traffic Flow
2) Transport Demand
3) Road Safety

4.1.3 By participatory approach, issues related with each of these viewpoints are identified which are explained in the later sections.

4.2 Issues on Traffic Flow

4.2.1 Engineering Related

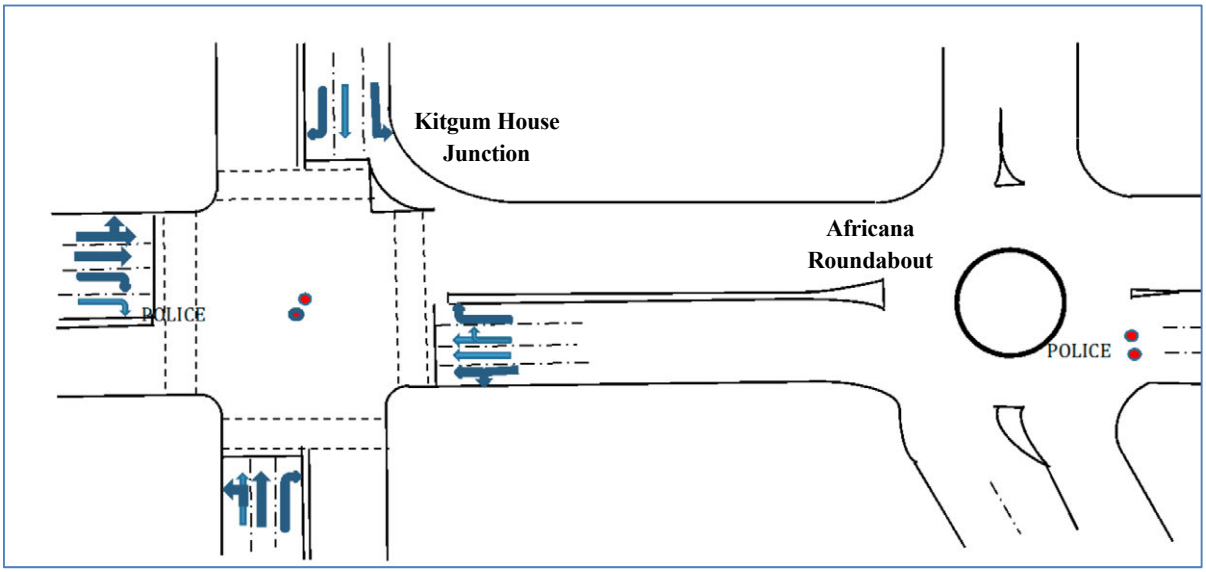
1) Improper Traffic Management

a) When the VVIP's vehicles pass through the city, all other vehicles from all direction need to stop, which create a delay to traffic flow and naturally smooth traffic flow is disturbed. In addition, emergency vehicles like ambulance, fire fighting vehicles etc. need to pass faster, when the emergency arises. In many cases, it is observed that the emergency vehicles are stuck in the middle of the route due to improper traffic management.

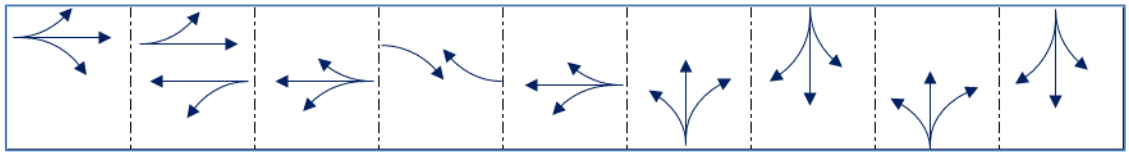
Source: KSTP

Figure 4-1 Ambulance Stuck in Traffic Jam

b) Manual traffic control by the Police has been studied by the KSTP team at Kitgum House Junction on 24 April 2015 for 1 hour from 2:30PM to 3:30PM. At one time, the cycle time was recorded as 17.5 minutes, details of the observation are presented in Figure 4-2.

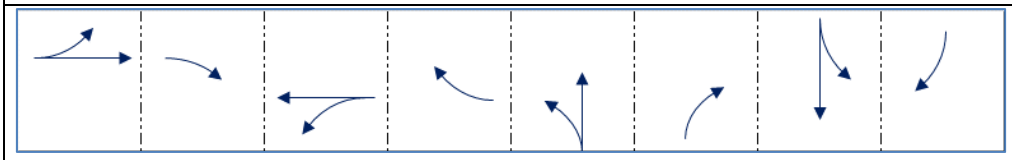


Directional Movement



1	8	1	0.5	1.5	1	2	2	0.5	Total 17.5

Directional Wise Share



9	1.5	10	3	3	3	2.5	2.5		
51%	9%	57%	17%	17%	17%	14%	14%		

Source: KSTP

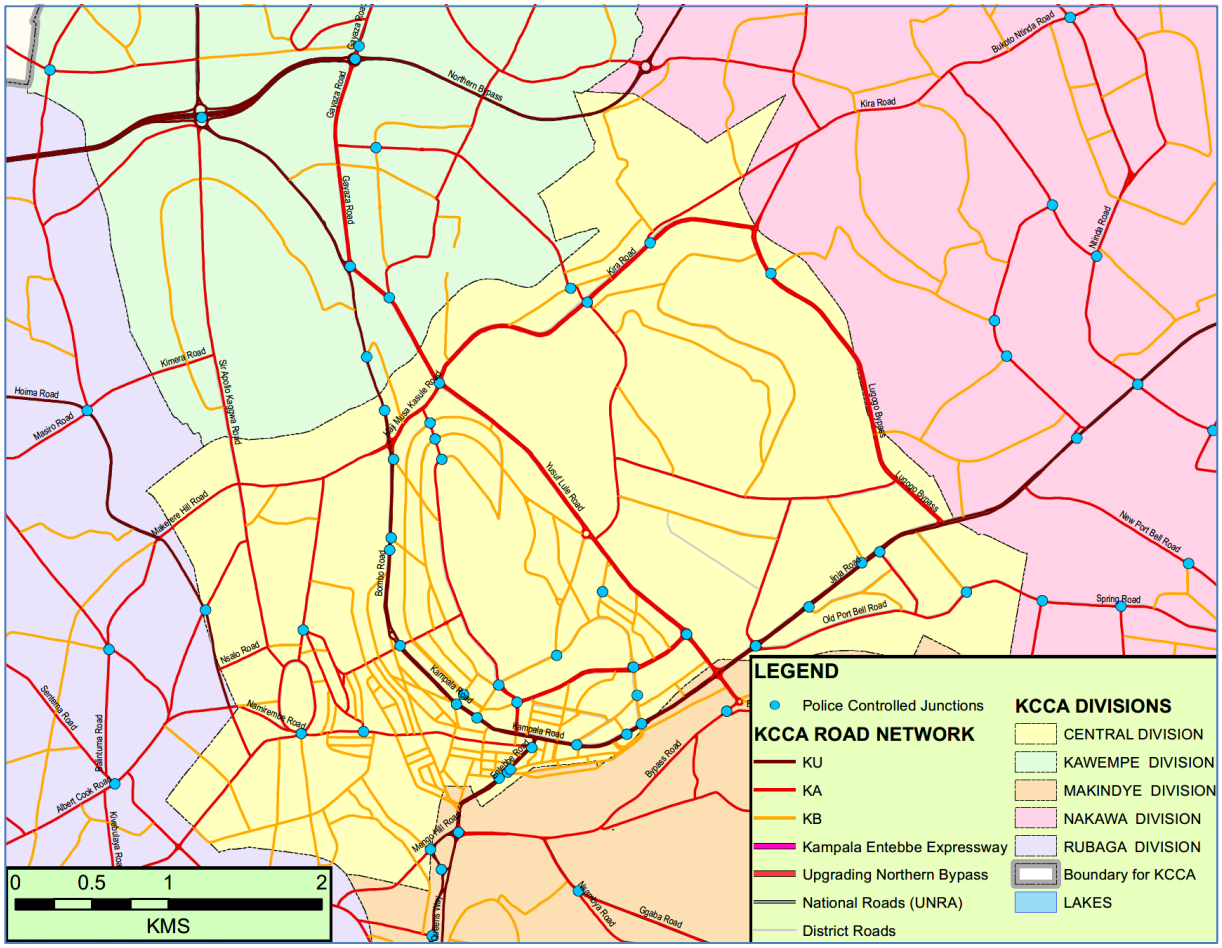
Figure 4-2 Schematic and Control Situation at Kitgum House Junction

c) The identified challenges arising out of the traffic control are:

- There is a split between the direct effects of the possible controllable traffic volumes since its non-dependent on the cycle length. But generally, there is a tendency of excessive dependence of cycle length on traffic control.
- The Kitgum House Junction and the Africana Roundabout are not necessarily linked to work together.
- When the Africana Roundabout exceeds the normal traffic volume, the roundabout gets closed out and this effects the Kitgum House Junction leading to reduced efficiency.
- Since the roundabout is made for the right turn, when right turn traffic exceeds half of the roundabout, it interferes with each other's course thus causing a gridlock.
- In some places where there is manual traffic control, it's difficult to view all the traffic, and due to different variations of manual control, there is a big fluctuation in congestion/traffic conditions.

d) As of May 2019, there are only 25 signalized junctions in Kampala. Other congested junctions and

roundabouts are controlled by traffic police officers. Figure 4-3 shows the major junctions and roundabouts controlled by police officers in peak period, which are approximately 100. In line with motorization, the number of congested junctions and roundabout are expected to be increased.



Source: KSTP

Figure 4-3 Major Junctions and Roundabout Controlled by Traffic Police

e) In order to have synchronization to traffic flow, it is decided to set up a central traffic control centre and control the traffic management using a central system.

2) Inflexible Signal Phase/ Cycle

a) At present, the traffic signals are not intelligent enough to change their cycle times depending on the traffic flow of the area. The reconstructed signals are splitting their timings based on the required time to clear each direction.

b) To get rid of this type of problem, Area Traffic Control (ATC) type signal control is recommended for Kampala, which will be intelligent enough to analyze the overall demand of sub-area and change the ratio of green time accordingly.

3) Inadequate Junction Geometry

a) Junction without right-turn lane/ exclusive U-turn lane: There are hardly any junctions in Kampala with right turn lane or dedicated U-turn lane. Therefore, most of the junctions are suffering from the issue when vehicles stop for the right turn or U-turn. In some occasions, the right turning vehicles do not stop

for its turn and enter inside the core junction area and obstacle the opposite direction traffic.

b) Too wide turning area in junction: Some of the junctions consist of very wide core junction area, which allows the drivers to drive their vehicles using more area. This type of liberty creates obstacle to other vehicles from opposite directions as the turning radius is not guided and drivers think they can drive anywhere as the space is empty.

c) Junction without or faded markings: Most of the junctions in Kampala are lacking of proper road markings. The junctions that have markings are also in very poor condition, such as faint the marking, color become brown due to dust etc. Therefore, the drivers have difficulties to recognize, where to stop and which is the limit of their traffic lane.

Source: KSTP

Figure 4-4 Faded out Road Markings and Lack of Road Marking

d) Road surface problems: The surface of the road is not always maintained properly, therefore potholes are created on the main carriageway which creates the cause of traffic congestion as the design speed of the road cannot be achieved.

Source: KSTP

Figure 4-5 Poor Road Surface Condition of Kampala

e) In order to get rid of these issues, it is necessary to prepare the design guidelines and maintenance scheme for KCCA.

4.2.2 Education Related

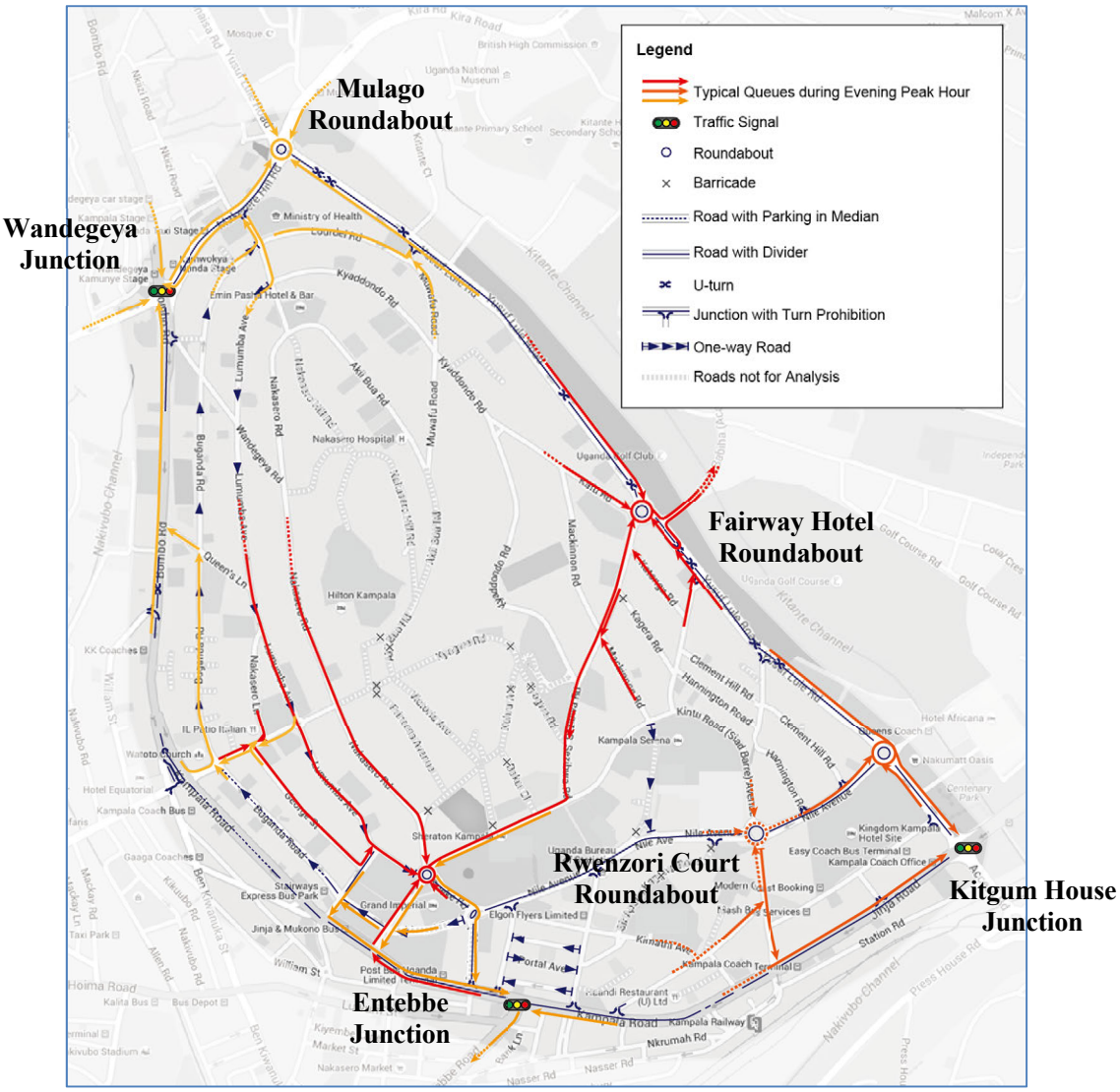
1) Gridlock/Deadlock Phenomenon Occurred by the Drivers

a) At roundabouts and non-signalized junctions, many drivers and riders especially Bodaboda riders ignore stop lines, yield markings and give way rule. As mentioned in the Highway Code, “roundabouts only work if everybody obeys the rules and shows care for others”. Ignorance of the Highway Code and aggressive driving behaviour tangle junctions and roundabouts without traffic control.

b) In addition, gridlock at a junction or a roundabout aggravates traffic flow of other adjacent junctions due to long queues caused by the gridlock. Figure 4-7 is a schematic diagram of queues during typical evening peak hour observed in October and November 2015 by the KSTP members at Nakasero area, Kampala. For instance, queues from Fairway Hotel Roundabout reaches Rwenzori Court Roundabout and even further north and south directions. This queue tangled with queues from Entebbe Junction and Wandegeya Junction. This means that queues are interrelated, and, identification of critical bottleneck junction/roundabout which affects congestion of wider area is the key point analyzing traffic flows.

Source: KSTP

Figure 4-6 Traffic Congestion at Roundabout



Source: KSTP, Field Observation October and November, 2015

Figure 4-7 Schematic Image of Queues during Evening Peak Hour at Nakasero Area

2) Lack of Proper Enforcement

a) Heavy Goods Vehicles (HGVs) are not officially allowed to drive through city centre during day time (In principle 6AM to 10PM in weekdays). However, it was observed some vehicles used the prohibited roads due to improper enforcement.

Source: KSTP

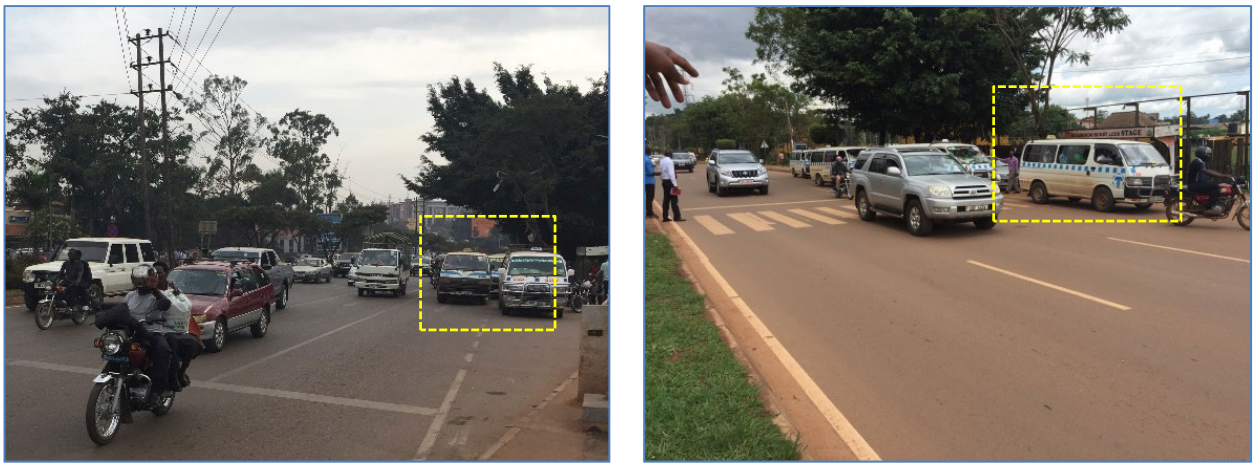
Figure 4-8 Heavy Vehicles Running in Prohibited Time inside Kampala

b) The Bodaboda drivers do not usually follow any rules and disturb through traffic by ignoring signal. When waiting for the green light or green signal from police they wait well in advance of the junction which obstacle free movement of the vehicles.

Source: KSTP

Figure 4-9 Bodaboda & Car Drivers Waiting Ahead of Stop Line/ on Pedestrian Crossing

c) Taxi drivers of Kampala park the vehicle and wait for the passengers as his wish. This causes the side friction to the general traffic flow and creates traffic congestion.



Source: KSTP

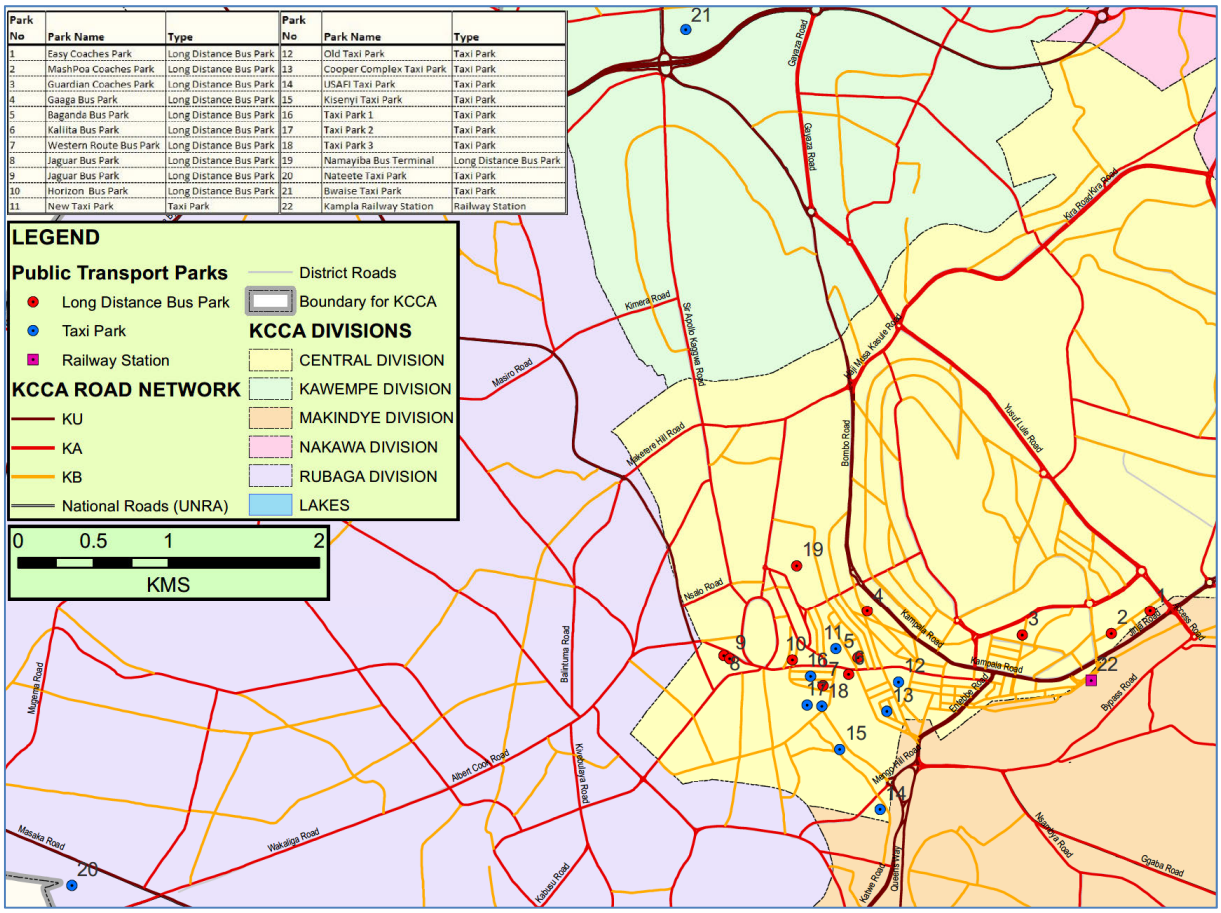
Figure 4-10 Taxis Waiting for Passengers Obstacle the Main Road Traffic

d) It is necessary to execute the Statutory Instrument for Heavy Goods Vehicles and strong enforcement against the Bodabodas and Taxis which will violate the traffic law and create obstruction against smooth traffic and pedestrian flow.

4.2.3 Land Use Regulation Related

1) Inadequate Distributions of Transport Infrastructure

a) Important transport node infrastructure such as Bus terminal, taxi stands all are located inside CBD of Kampala which is not recommendable at all in traffic management point of view.



Park No	Park Name	Type	Park No	Park Name	Type
1	Easy Coaches Park	Long Distance Bus Park	12	Old Taxi Park	Taxi Park
2	MashPoa Coaches Park	Long Distance Bus Park	13	Cooper Complex Taxi Park	Taxi Park
3	Guardian Coaches Park	Long Distance Bus Park	14	USAFI Taxi Park	Taxi Park
4	Gaaga Bus Park	Long Distance Bus Park	15	Kisenyi Taxi Park	Taxi Park
5	Baganda Bus Park	Long Distance Bus Park	16	Taxi Park 1	Taxi Park
6	Kaliita Bus Park	Long Distance Bus Park	17	Taxi Park 2	Taxi Park
7	Western Route Bus Park	Long Distance Bus Park	18	Taxi Park 3	Taxi Park
8	Jaguar Bus Park	Long Distance Bus Park	19	Namayiba Bus Terminal	Long Distance Bus Park
9	Jaguar Bus Park	Long Distance Bus Park	20	Nateete Taxi Park	Taxi Park
10	Horizon Bus Park	Long Distance Bus Park	21	Bwaise Taxi Park	Taxi Park
11	New Taxi Park	Taxi Park	22	Kampla Railway Station	Railway Station

Source: KSTP

Figure 4-11 Long Distance Bus Parking and Taxi Park of Kampala

b) As it is seen in Figure 4-11, the concentration of long distance services are in the heart of Kampala. In order to get rid of this issue, a proper urban transport management plan is necessary to prepare and implement.

2) Inadequate Parking Policy and Management

a) As Kampala city is growing rapidly in order to keep pace with its urbanization many new buildings are constructed. However, in many cases it is found the allotted number of parking lots are not sufficient in most of the cases and which creates problems in that area.

b) KCCA engaged a contractor to manage the on-street toll parking. However, it is observed that, the contractor do not have sufficient legal support to enforce the illegal parking. According to the contract, KCCA needs to support the contractor by providing legal officers, who are holding the right to take action against illegal parking.

Source: KSTP

Figure 4-12 Illegal Parking along the Main Road and on Pedestrian Walkway

4.3 Issues on Traffic Management

4.3.1 Absence of Time Management

1) The starting and closing time of all the offices are almost same, which naturally creates the peak hour to be more challenging to control. Almost all office opens at 8-9AM and close at 5-6PM. All the schools in Kampala also start to open and close at the same time.
2) In order to get rid of the issue, there is always a necessity of time management TDM

4.3.2 Absence of Reliable Public Transport

1) Due to non-availability of fast, safe, reliable, affordable and comfort public transports, many people use their own transports and Bodaboda. Taxis are widely used as public transport by most of the people. The service is not affordable to many people; however it cannot be called as safe, reliable and comfortable. The proper establishment to ride on non-motorized vehicles like bicycles is not present.
2) Kampala is experiencing the need of Mode Shift TDM and to support this implement reliable public transport.

4.3.3 No Practical Land Use Regulation

All the commercial and public offices are concentrated in CBD of Kampala which creates the demand towards the city centre. At present, shops can be opened at any locations up to any time. This can have immediate affect over the demand management of traffic flow of that particular area. Therefore, a practical land use policy is needed to prepare immediately.

4.4 Issue on Road Safety

4.4.1 Lack of Discipline

1) Various types of lack of discipline are observed on the roads of Kampala. The driving pattern of the Bodabodas is a real threat to road safety, due to their dangerous driving behaviour. It is a common

scenario in Kampala, when the carriageway is congested, the Bodaboda drivers drive their motorcycle on the pedestrian walkways, which create disturbance to the pedestrians.

Source: KSTP

Figure 4-13 Bodabodas Driving On the Pedestrian Walkways

2) A good percentage of the drivers in Kampala do not follow lane behaviour. It is also true that many of Kampala roads do not have proper lane markings. Even where the lane markings are present, it is observed that many drivers drive their vehicles in the middle of 2 lanes.
3) Many motor vehicle drivers change their lanes frequently, without any putting any indicators, which is a concern not only for smooth traffic flow, but also for road safety. The taxi drivers wait for the passengers in the middle of the road, however, when it comes to reach a destination, they do compete with their fellow drivers, which is also a cause of traffic accident.
4) Continuous traffic safety awareness campaign and law enforcement measures are necessary, in order to improve the situation.

4.4.2 Lack of Education

1) As per Traffic Safety Awareness Survey by KSTP (2015), 40% of the pedestrians do not understand the traffic signals, even though 95% of them have received traffic safety education in school. Therefore, even if the junctions are signalized, education is also necessary to educate the pedestrians about traffic signals and how to cross the junctions.
2) It is understood that in Uganda, the drivers get the driving licence mostly because of they know how to drive a vehicle. However, the knowledge regarding traffic rules and proper driving regulations are missing in order to obtain a license. According to the Traffic Safety Awareness Survey by KSTP (2015), only 25% of the drivers responded they slow down their vehicles. Proper education can improve the road safety situation.
3) Continuous traffic safety awareness campaign and improvement of traffic safety education for the school students and obtaining the driving license is recommended to improve the situation.

Source: KSTP

Figure 4-14 Vulnerable Road Crossing by the Pedestrians due to Lack of Education

4.4.3 Insufficient Non-Motorized Transport (NMT) Facilities

1) There are very few roads in Kampala which properly allocate the walkways for the pedestrians. Previously facilities for the NMTs were neglected here just like other developing countries. Even for the maintenance issue, carriageway is always having priority compared to walkway. Therefore, the walkways which are not very inconvenient to use are still not under the consideration.

Source: KSTP

Figure 4-15 Poor Condition of Pedestrian Walkway and Absence of Walkway

2) It is highly recommended to construct and improve proper walkway facilities and crossing facilities at junctions or midblock sections for NMT users.

5 URBAN TRAFFIC MANAGEMENT PLAN

5.1 Vision of UTMP

The vision of KCCA is to have a vibrant, attractive and sustainable city in near future. Without proper traffic management which is quite impossible to achieve, therefore, the vision of the traffic management is set as to make Kampala a vibrant, attractive and sustainable city.

5.1.1 Vibrant City: The traffic management system will be in proper order and people living in this city as well as the tourists will feel comfort to move in different places.

5.1.2 Attractive City: Kampala has been ranked as East Africa's highest quality of living and attractive destinations for expanding business operations ahead of Nairobi, Kigali and Dar-es-Salaam, according to the 20th quality of living ranking survey of the world's top 230 cities in 2018, conducted by Mercer, a global development consulting agency based in New York, USA. As the population of this city is increasing every year, it should have proper traffic management in order to continue its charm as an attractive city.

5.1.3 Sustainable City: The projects which are carrying on in Kampala, should be sustainable in the long run. The UTMP should also be administered in a sustainable way. This plan provides the guidance for future sustainable transport management of KCCA.

5.2 Strategy of UTMP

Planning Strategy of the UTMP is decided to achieve 3S, "Smooth Flow", "Safety" and "Shifting Demand" by improving 3E, "Engineering", "Enforcement" and "Education''. In order to achieve this strategy, the planning approach is set as shown in Table 5-1.

Table 5-1 Planning Approach Matrix of UTMP

<table>
<tr><th rowspan="2">Management Target</th><th colspan="3">Management Measures</th></tr>
<tr><th>Engineering</th><th>Enforcement</th><th>Education</th></tr>
<tr><td>Smooth Flow</td><td rowspan="2">◆ Preparation of Road/Junction Design Standards
◆ Junction Geometry Improvement
◆ Signalization
◆ Central Traffic Control
◆ Improvement of Miscellaneous Road Infrastructure (i.e. Signage, Road Marking)</td><td rowspan="2">◆ New Regulation for Vehicular Traffic
◆ Strengthening of Banning Heavy Vehicle Free (Time) Zone
◆ One Way Traffic</td><td rowspan="2">◆ Preparation of Official Road Safety Book
◆ Promoting Road Safety Education Curriculum
◆ Regular Traffic Safety Campaign
◆ Review of Driving License System</td></tr>
<tr><td>Safety</td></tr>
<tr><td>Shifting Demand</td><td>◆ Support and Encouragement for Improvement of Service Standard of Pubic Transport</td><td>◆ Priority to Public Transport
◆ Bodaboda Free Zone</td><td>◆ Improvement of Public Relation for Demand Management
◆ Capacity/Skill Development in Transport Planning for KCCA</td></tr>
</table>

5.3 Management Plan

5.3.1 Based on 3S-3E planning approaches, 6 Management Plans (MPs) have been proposed in this UTMP. Those are:

1) MP1 Bottle-Neck Removing Plan: To realize smooth traffic flow with engineering approach.
2) MP2 ITS Utilization Plan: To realize smooth traffic flow with providing information to drivers.
3) MP3 Peak Demand Movement Plan: To reduce peak traffic demand by various enforcement and engineering solutions.
4) MP4 Enforcement Strengthening Plan: To ensure safe, efficient traffic flow condition by proper enforcement program.
5) MP5 Public Involvement/ Awareness Plan: To educate road users for safety environments, efficient driving and reasonable modal choice.
6) MP6 Creating Sustainable Funding Plan: To ensure all activities of MP1 to MP5 by dedicated financial resources.

5.3.2 For each of the Management Plans tentative proposals are prepared with activities and schedule over 6 years fiscal year. The Tentative Proposal for Management Activities are described in Table 5-2 and the details about the activities are described in the following sections.

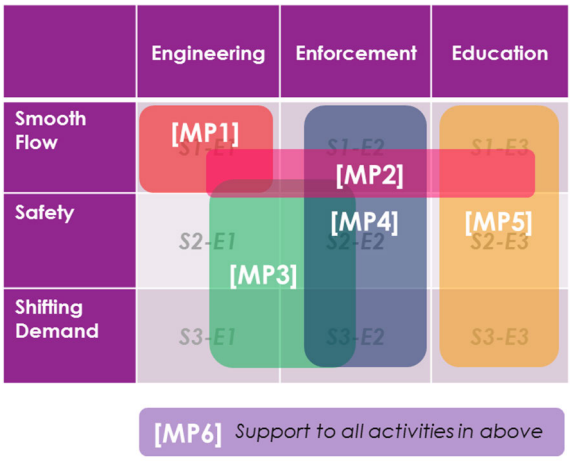


Figure 5-1 3S-3E Approach for Proposed Management Plans

Table 5-2 Tentative Proposal for Management Activities and Schedule

ID	Name of Management Plan	Objective	Activities	FY 2019-20				FY 2020-21				FY 2021-22				FY 2022-23				FY 2023-24				FY 2024-25			
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
[MP1]	Bottle-Neck Removing Plan	To realize smooth traffic flow with engineering approach.	1-1 Identification of Bottle-neck																								
			1-2 Physical Improvements (Junction, road pavement)																								
			1-3 Traffic Signal Installation																								
			1-4 Pilot Project for ATC																								
			1-5 Area-wide Traffic Control (ATC) Installation																								
			1-6 Establishment of Central Traffic Control System																								
			1-7 Maintenance of Traffic Management Infrastructures and Facilities																								
[MP2]	ITS utilization plan	To realize smooth traffic flow with providing information to drivers.	2-1 Research on Necessity Information to be Provided																								
			2-2 Research on Data collection and Processing																								
			2-3 Integration to ATC Centre																								
[MP3]	Peak Demand Movement Plan	To reduce peak traffic demand by various enforcement and engineering solutions.	3-1 Road Pricing and Other Area Restriction Managements																								
			3-2 Time Management (Flexible Office Hours)																								
			3-3 Study on Parking Supply/Demand and Formulation of Parking Policy																								
			3-4 Revision of On-Street Parking Policy																								
			3-5 Parking Taxi in CBC																								
			3-6 Parking Management for Park & Ride																								
			3-7 Promoting and Regulating Shared Mobility																								
			3-8 Improvement of NMT Environment																								
[MP4]	Enforcement Strengthening Plan	To ensure safe, efficient traffic flow condition by proper enforcement program.	4-1 Traffic Signal Violations																								
			4-2 Time Violation by HGVs																								
			4-5 Violation of Driving (Illegal stopping, lane changing, give-way at RA)																								
			4-4 Illegal Parking																								
			4-5 One-way Traffic Flow																								
			4-6 Strengthening of TIA Process																								
			4-7 Improvement of Road Signs and Markings																								
[MP5]	Public Involvement/ Awareness	To educate road users for safety environments, efficient driving and reasonable modal choice.	5-1 Road Safety Awareness Campaign (school, CBD)																								
			5-2 Media Campaign																								
			5-3 Traffic Congestion Map (statistical, real-time)																								
[MP6]	Creating Sustainable Funding Plan	To ensure all activities of MP1 to MP5 by dedicated financial resources.	6-1 Dedicated Funds for Traffic Signal Control and ATC Operation																								
			6-2 Dedicated Funds for Road Maintenance																								
			6-3 Trials for New Type of Revenue Related to Traffic Management																								

Preparation Implementation Continious Implementation

5.4 Activities under Management Plan

5.4.1 MP1 Bottle-Neck Removing Plan

1) MP 1-1 Identification of Bottle-neck

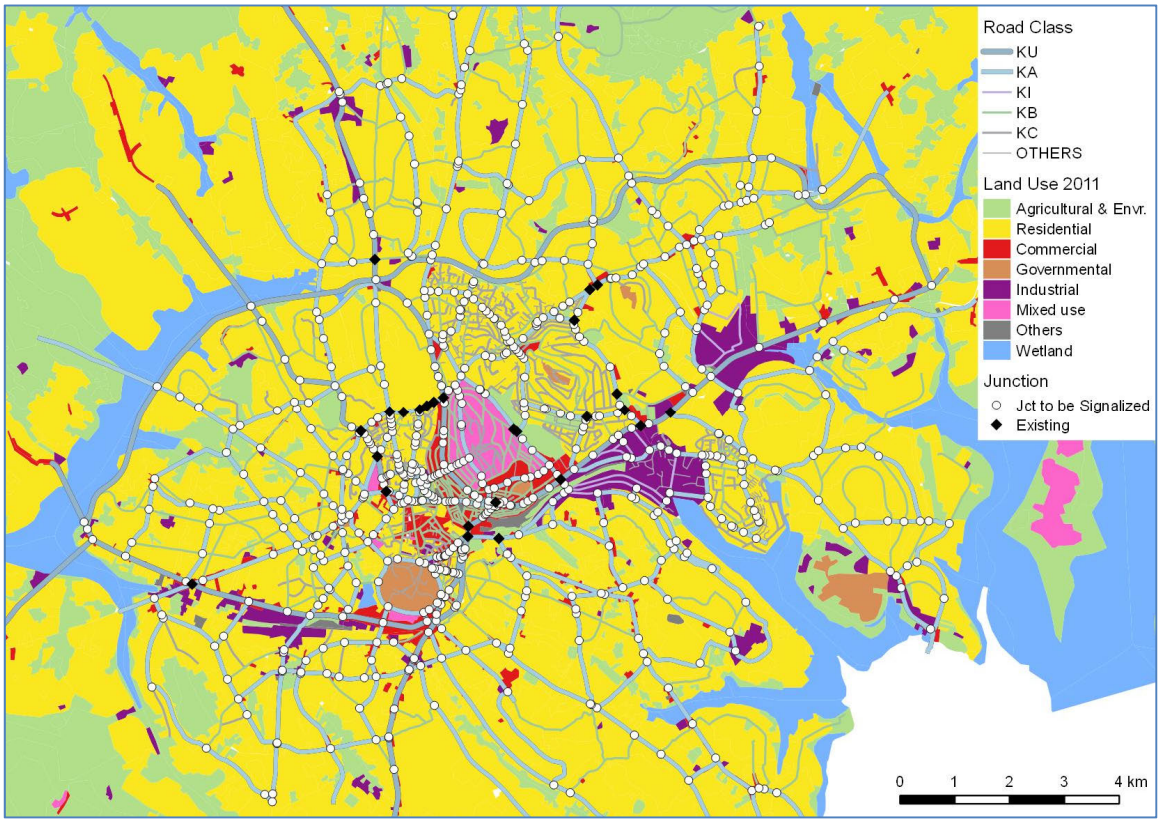
The bottlenecks of Kampala road networks should be identified and will be prioritized for improvement. Otherwise, the traffic flow cannot be improved and the overall objective will not be achieved. At this moment, some bottleneck junctions are identified by travel speed survey and manual traffic control in peak hour by traffic police. However, to implement the MP1 the list should be updated and checked with having field visits.

2) MP 1-2 Physical Improvement

All the junctions and the midblock sections should be improved by proper road pavement. The unpaved roads should be paved and road markings, necessary signs will be installed.

3) MP 1-3 Traffic Signal Installation

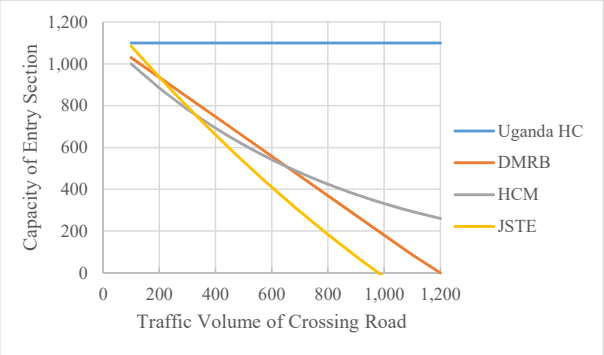
a) In general, junctions to be signalized should be decided using several factors such as road classification, traffic volume and degree of saturation in peak hour, current land use and land use plan around a junction, road safety concern, volume of pedestrian crossing, facilities close to junction and generate considerable traffic or pedestrian and distance between neighbouring signalized junctions. Road class are defined by KCCA considering these aspects. Junctions on KU, KA, KB and KI are recommended to be signalized considering their function as a trunk road as shown in Figure 5-2.

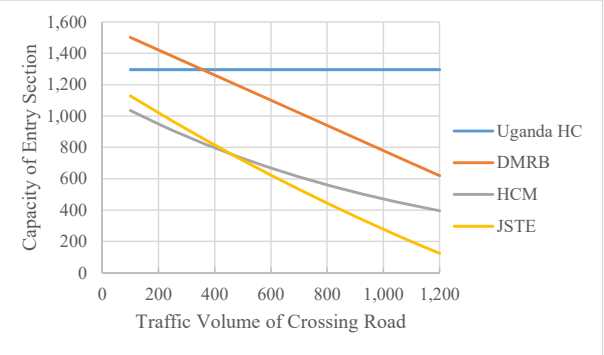


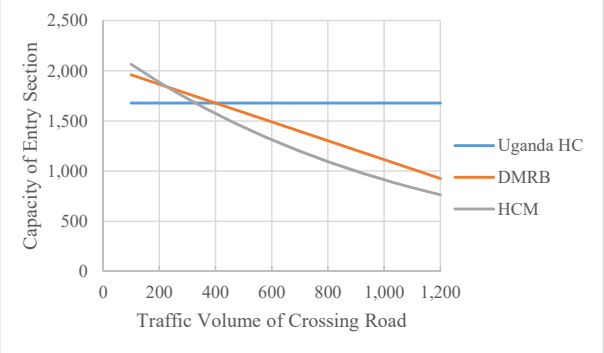
Source: KSTP

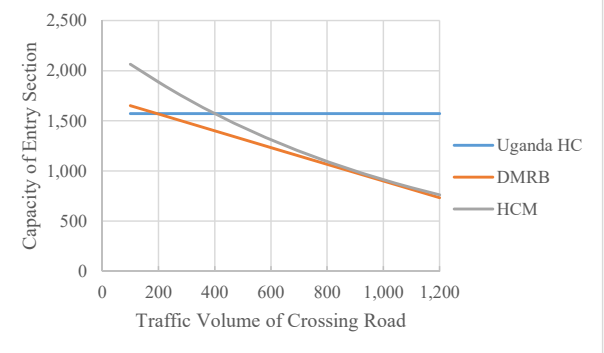
Figure 5-2 Junctions of KU, KA, KB and KI Roads

b) The capacity of junction without a traffic signal is limited compared with a signalized junction. While there are several types of junctions without a traffic signal, non-signalized roundabout has the highest capacity. Theoretical capacity of typical roundabouts in Kampala has been estimated with various references from Uganda, UK, US and Japan as shown in Figure 5-3. Although fluctuations are observed by references and traffic volumes of crossing roads, maximum capacity is around 1,000 pcu/hour in case of single-lane entry. The capacity of single-lane capacity can reduce to around 500 pcu/hour depending on the traffic volume of crossing roads. Capacity of double-lane entry is in the rage of 1,000 to 2,000 pcu/hour. Typical double-lane entry capacity of major roundabout might be limited around 1,000 to 1,500 pcu/hour due to traffic volume of crossing roads. If entry traffic volume of a junction reaches these range, there is no option but to choose a signalized intersection. In the jurisdiction of KCCA, there are 46 junctions over 1,000 pcu/hour during morning or evening peak hour according to the travel demand model of multimodal urban transport master plan in 2016 while only 9 junctions among them have been signalized as of June 2019 as shown in Figure 5-4. Considering economic growth of Uganda and Kampala, it is assumed that most of junctions will reach capacity in the near future.

<table>
<tr>
<td> 

Entry from Ternan Ave., Rwenzori Court Roundabout
Single-lane entry, Double circulating lanes, Major Rd.</td>
<td> 

Entry from Nakasero Rd., Rwenzori Court Roundabout
Single-lane entry, Double circulating lanes, Major Rd.</td>
</tr>
<tr>
<td> 

Entry from Kira Rd., Mulago Roundabout
Double-lane entry, Double circulating lanes</td>
<td> 

Entry from Haji Musa Kasule Rd., Mulago Roundabout
Double-lane entry, Double circulating lanes</td>
</tr>
</table>

Note:

'Uganda HC' means Ugandan Highway Code.

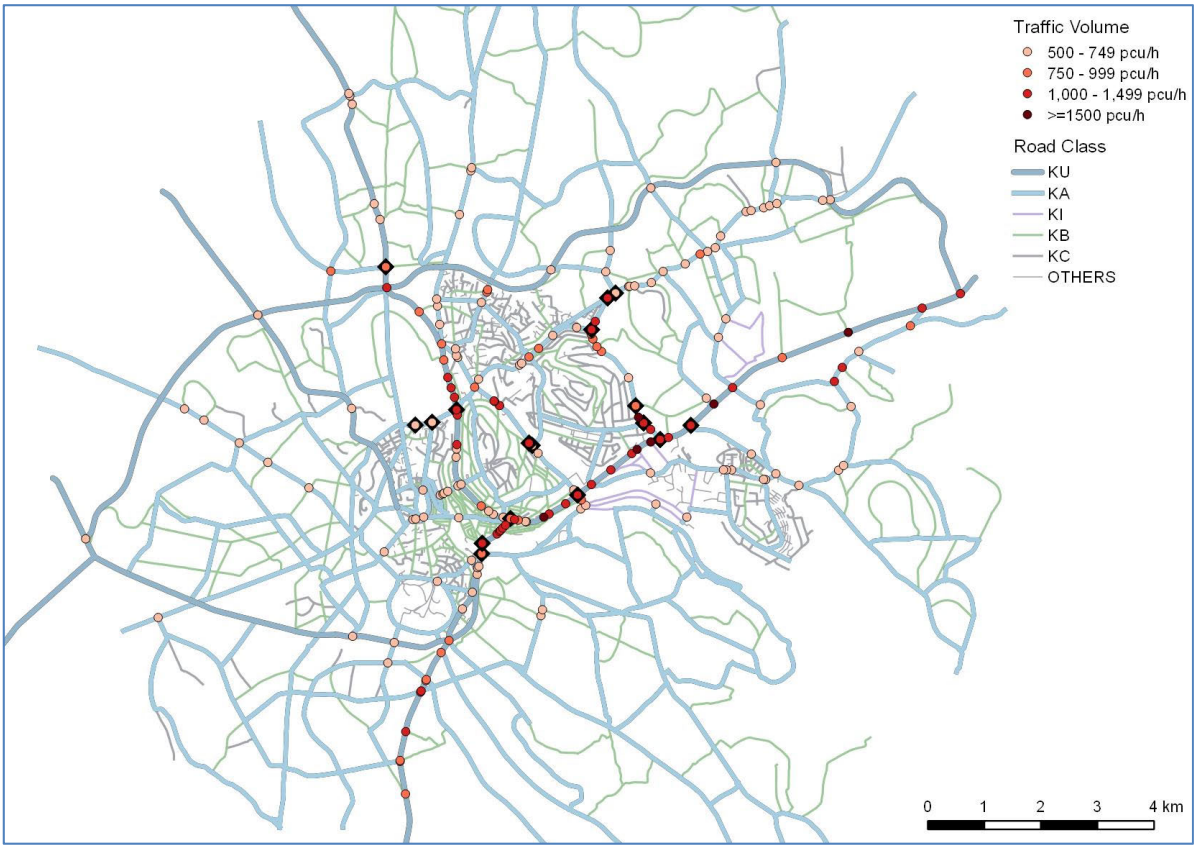
'DMRB' means estimation with Design Manual for Roads and Bridges based on The Highway Agency, The Scottish Office Development Department, The Welsh Office, The Department of the Environment for Northern Ireland (1981) Design Manual for Roads and Bridges (DMRB), Vol. 6, Section 2, TA 23/81, 'Road Geometry Junctions', Appendix 1

'HCM' means estimation with US Highway Capacity Manual based on Rodegerdts, L. et., al. (2010) 'Roundabouts: An Informational Guide Second Edition', NCHRP Report 672, Chapter 4, page 4-11 - 4-12.

'JSTE' means estimation with Japan Society of Traffic Engineers (2016) 'Roundabout Manual', Maruzen, page 25-26. [In Japansese]

Source: KSTP based on the above references.

Figure 5-3 Example of Estimated Capacity of Roundabout Entry Section in Kampala



Source: KSTP based on the travel demand model of the year 2016 developed by the multimodal urban transport master plan

Figure 5-4 Junctions with High Entry Traffic in Kampala

The type of traffic signal control is classified in four major types as shown in Table 5-3. Existing traffic signals in Kampala are classified into pre-timed multi timing plan and responsive control with infrared vehicle detector. Pre-timed multi timing plan is adopted by the old Japanese signals, which select adequate signal pattern from prepared signal patterns in accordance with time and day. Responsive control with infrared detectors is adopted by replaced traffic signals by KCCA which selects adequate signal pattern from prepared signal patterns in accordance with actual traffic flow. Both type of signal control require tuning of pre-timed signal timing plan such as cycle length and signal phases which consists of combination of allowed traffic movement in green, length of green, yellow and red in accordance with actual traffic flow in the junction.

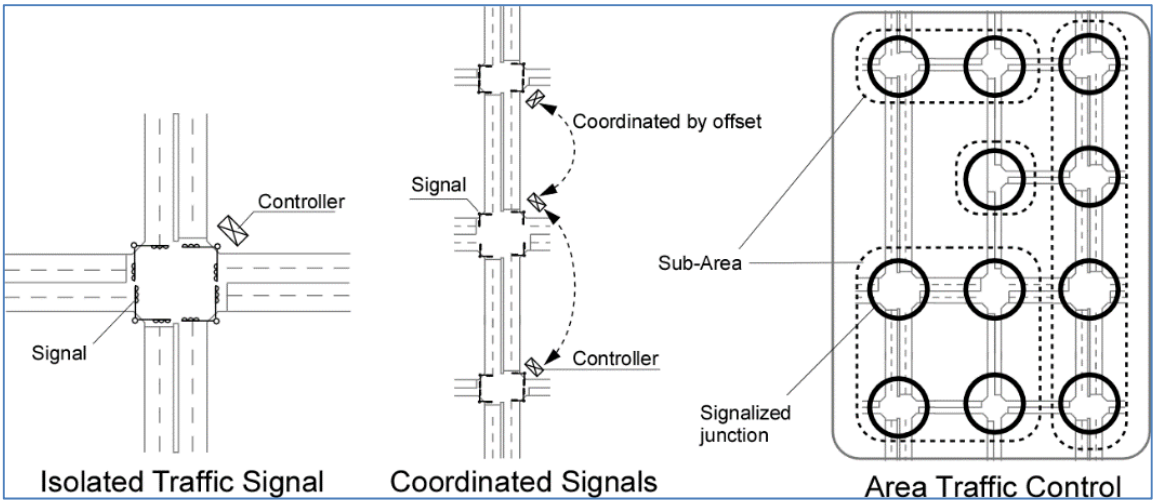
Table 5-3 Type of Traffic Signal Control Method

	Single Timing Plan	Multi Timing Plan (Time of day)	Responsive Control	Adaptive Control
			SCOOT, SCATS, MODERATO etc.	
Number of Signal Timing Pattern	Single	Multiple		
Vehicle Detector	Not required		Required (Vehicle Actuated Control)	
Switch of Signal Timing Pattern	None	Time and day	Using vehicle detection	
Signal Timing Plan	Pre-timed (prepared in advance)			Actuated

Table 5-4 Advantage and Disadvantage of Different Types of Signal Control

	Advantage	Disadvantage
Single Timing Plan	◆ Simplest. ◆ Suitable for fail-safe in local controller.	◆ Effective for traffic demand in certain range only.
Multi-Timing Plan (TOD)	◆ Effective if daily traffic demand is not varied. ◆ Able to cope with variation by day of the week. ◆ No detector is required. ◆ Can be incorporated in local controller (control centre is not required).	◆ Not effective if traffic demand diverges from daily pattern. ◆ Requires periodic update for long term change in demand pattern. ◆ Requires clock and calendar particularly for coordinated operation.
Responsive Control	◆ Able to cope with different traffic conditions if timing plans for such condition are prepared in advance. ◆ Less number of vehicle detectors required than adaptive control. ◆ Easy to operate in comparison with adaptive control.	◆ Cannot response to sudden traffic change. ◆ Cannot adapt to gradual change in traffic over time. ◆ Requires periodic review and updating of timing plans.
Adaptive Control	◆ Most efficient signal operation if properly tuned. ◆ Fast response to unexpected change of traffic condition. ◆ Possible to withstand gradual change in traffic over time. ◆ No need to prepare many timing plans.	◆ Does not work under saturated traffic condition. ◆ Requires experts to operate and maintain. ◆ Requires large number of vehicle detectors. ◆ Considerable number of parameters to be set and adjusted.

c) Traffic signal control technology can be classified into following three types, namely, isolated control, coordinated control and area traffic control (ATC), in terms of the number of traffic signals controlled and their configuration.



Source: KSTP

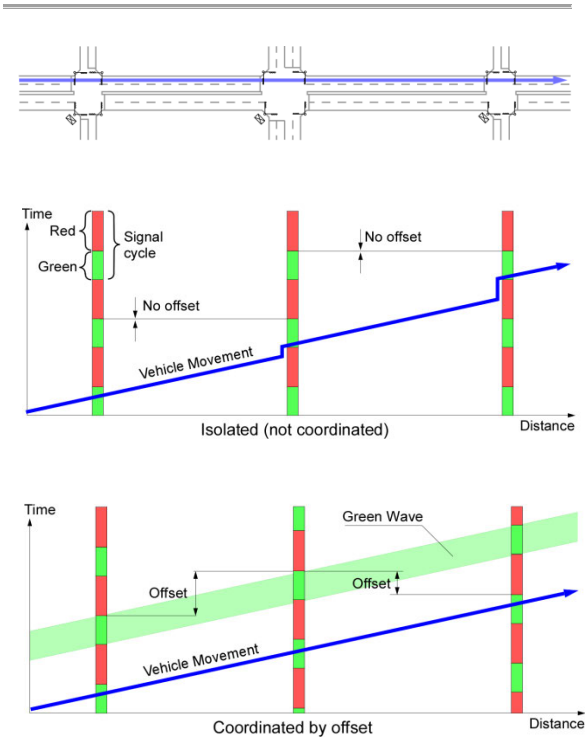
Figure 5-5 Types of Traffic Signal Configuration

d) To achieve smooth traffic flow in an arterial road or in urbanized area, coordinated signal or area traffic control is recommended. The coordinated signal control is applied to a group of signalized junctions in

the target section to provide green wave for drivers by using offset.

e) Fluctuation of traffic flow by time and day and spatial fluctuation have been observed occasionally in Kampala. ATC manages a group of traffic signal junctions, called "sub-area" which has similar profile of traffic flow such as same peak period. ATC is controlled by vehicle actuated, namely, responsive signal control or adaptive signal control system which requires vehicle detectors. In general, ATC requires a central computer in the control centre to select adequate signal timings, in the case of responsive signal control or generate optimized signal parameters in the case of adaptive signal control.

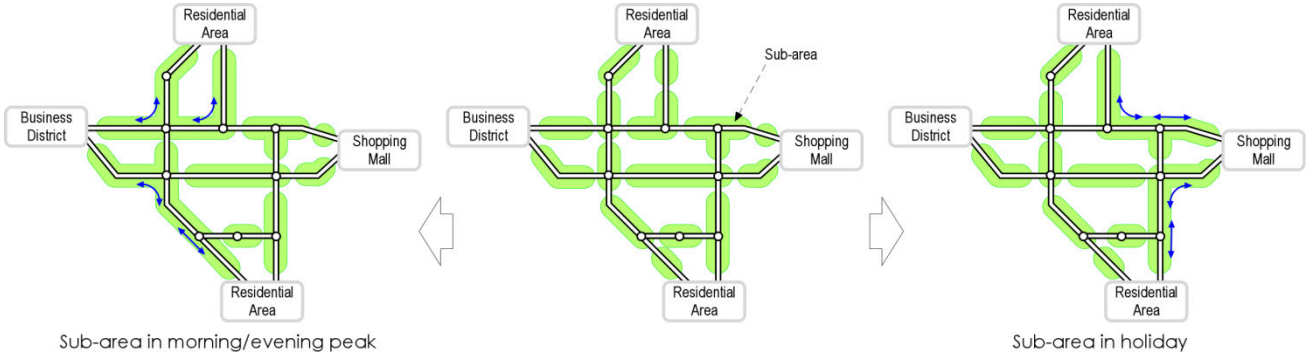
f) The methodology of optimization of traffic signals by sub-area is depends on the traffic signal system. Some of the widely used ATC system are SCOOT developed by Germany, SCATS developed by Australia and MODERATO developed by Japan.



Source: KSTP

Figure 5-6 Coordinated Signal Control by Offset

g) To manage traffic fluctuations of traffic demand caused by time, weather and incident, adaptive signal control is recommended. Adaptive signal control generates traffic signal parameters in accordance with actual traffic situation and it is able to cope with sudden incident rather than responsive control based on the pre-timed signal plan.



Source: KSTP

Figure 5-7 Example of Coordination of Sub-Area

h) Considerable inbound traffic in morning peak and outbound traffic in evening peak on radius arterial road are considered causes of traffic congestion in Kampala. In general, ATC optimizes traffic signal parameters by sub-area which is a group of several signalized junctions with similar traffic profile, and coordination of sub-areas along radius arterial roads is expected to reduce delay and waiting time at

junctions. The coordination between sub-areas should be modifiable in accordance with traffic pattern such as morning peak, evening peak, off-peak on weekday and holiday.

i) In Kampala, some traffic signals using SCOOT system have already been installed under KIIDP2. These signals have an overhead radar type stop-line detector, adjusted at the top of the traffic light, therefore, the control of the junction as per demand is slightly difficult to forecast.

j) MODERATO is basically the abbreviation of Management of Origin-Destination Related Adaptation for Traffic Optimization, the algorithm is developed in Japan. MODERATO technology is capable of calculating the green time phase for each direction, based on the traffic data collected by several detectors. The system calculates the green time split in every 2.5 or 5 minutes and cycle length in every 5 or 15 minutes depending on the settings. The main purpose to introduce the system is to reduce overall delay of the network, which cannot be achieved by traditional traffic signal.

k) Based on considering all the factors, it is decided to install MODERATO type area traffic control in Kampala.

4) MP 1-4 Pilot Project for ATC

a) In order to check the reliability of theory of ATC for Kampala, the KSTP team came up with an idea of a Pilot Project containing small scale traffic control system, which will train KCCA for practical operation. Therefore, it was proposed to implement a pilot project by installing ATC in certain road sections, which are comprised of 4 junctions. With experience from the small scale system, KCCA can realize what is necessary in terms of institutional, human resources and budgetary arrangements for full scale Central Traffic Control System. It is also expected to avoid miss-selection of the system.

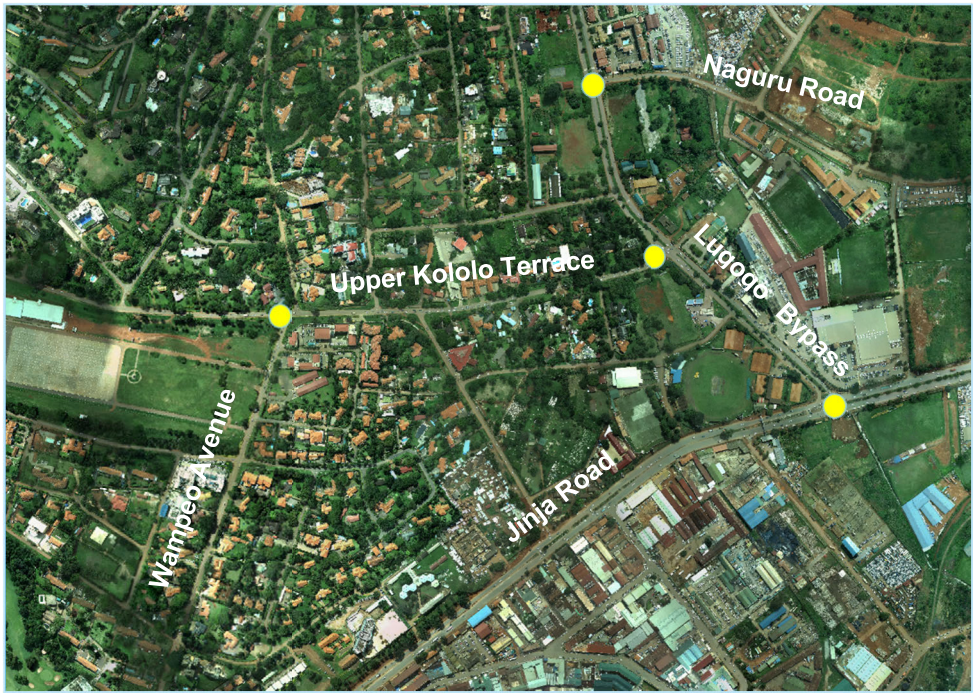
b) For the pilot project, an area in central Kampala was selected, where the junctions are closed located and where congestion is an issue during peak hour. The selection criteria of the planned area for the pilot project were decided as:

- Area where junctions covering multiple routes and with high traffic demand
- Junctions with significant congestion during peak hour
- Junctions where safety is a concern at present
- Junctions with minimum geometric design improvement civil works required
- Junctions which are not covered by any existing improvement plan under another projects

c) The area which fulfilled the criteria is located in Upper Kololo and Lugogo bypass area. The targeted junctions are named as (1) Upper Kololo, (2) Naguru, (3) Katikati, and (4) Game Jinja Road.

d) Geometric improvement for these 4 junctions has been completed by December 2017, based on the drawings prepared by the KSTP Team. In February 2018, traffic signal lights have been installed and stand-alone traffic control has started for all 4 junctions. Since then, considering the traffic situation in field, fine tuning for signal phase timings and additional geometrical improvement at Naguru Junction have been carried out.

e) The pilot project is designed, so that these 4 junctions can be controlled under the Area Traffic Control system remotely from KCCA. Installation of necessary equipment for ATC system has been started from June 2019 and the system is expected to be in operation any time in August 2019.



Source: KSTP

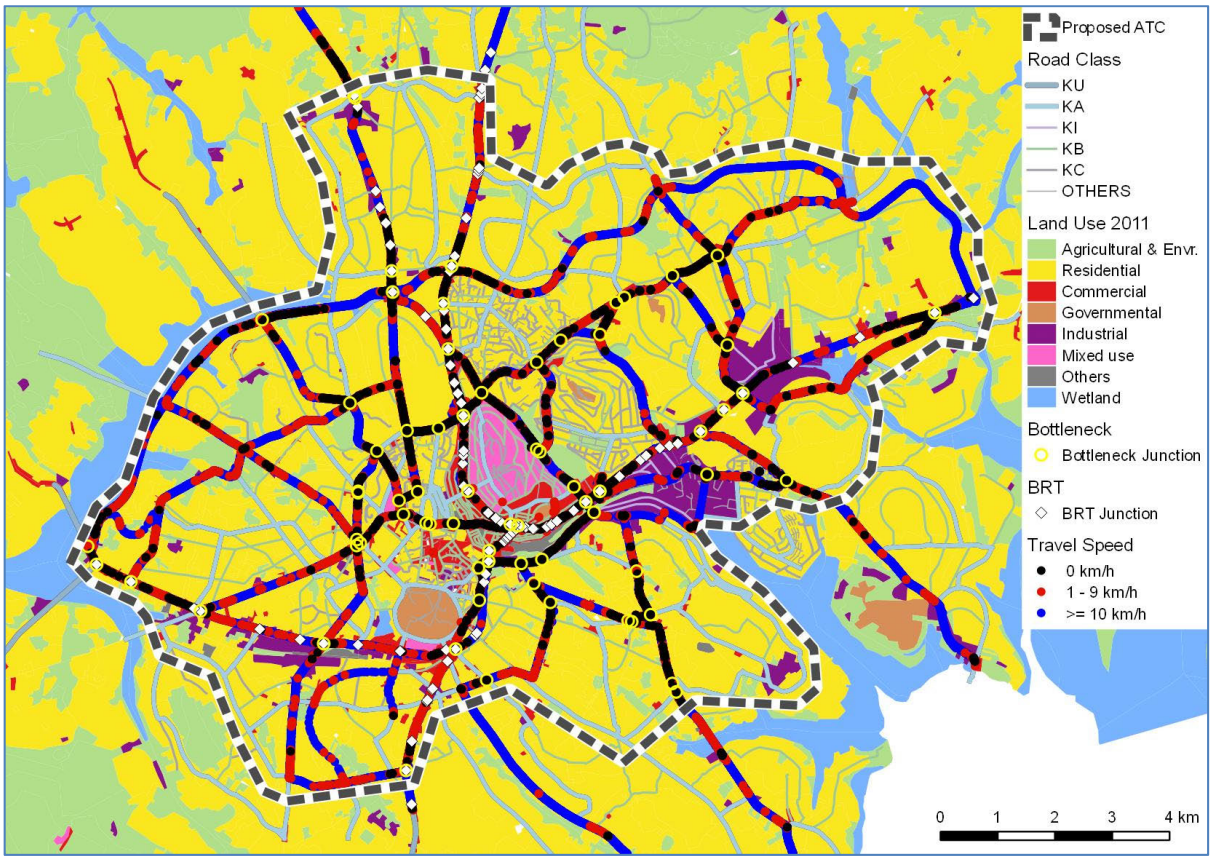
Figure 5-8 Target Junctions for the Pilot Project

f) Once the signals are installed in these 4 junctions, traffic congestion situation of this area has improved a lot. Before the installation of the traffic lights, these junctions were controlled by the traffic police manually and overall capacity of the junctions has improved. Once the ATC system is under operation, it is expected the unnecessary green time for a direction when the traffic flow is less, will be taken into consideration and the system will adjust the ratio of green light. Therefore, overall efficiency of the junction should be improved, compared to stand-alone traffic signal.

5) MP 1-5 Area-wide Traffic Control (ATC) Installation

a) Considering land use, bottleneck junctions, plan of the BRT and road network, area to be managed by ATC is proposed as shown in Figure 5-9. Major junctions outside of proposed ATC area are proposed to install isolated or coordinated signal control.

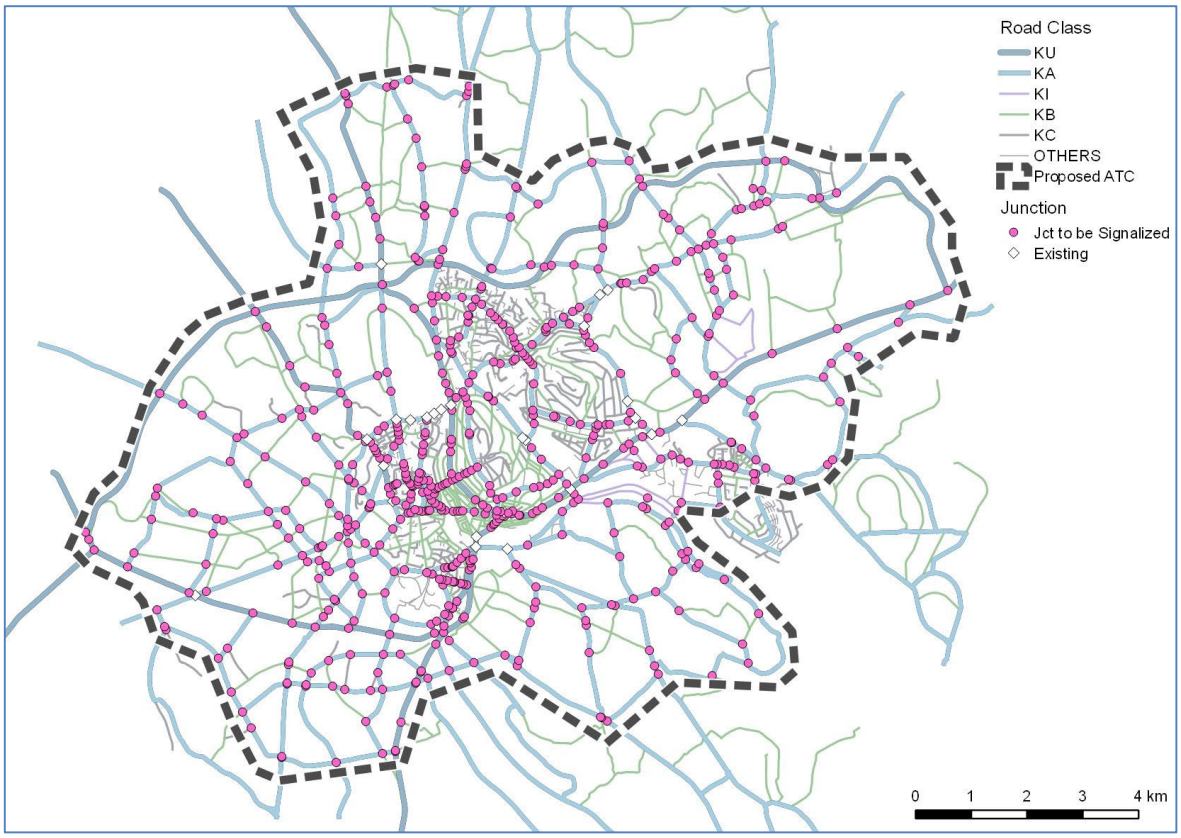
b) In mega cities, Area Traffic Control (ATC) is common approach which requires smart technologies and sophisticated devices. Publicity of traffic information is also common in the developed countries and its communication was conventionally radio and television which have less advantage of immediacy. As satellite communication progresses, Inelegant Transport System (ITS) is developed making user device possible to acquire real time information as user demands.



Source: KSTP

Figure 5-9 Proposed Area for ATC

c) Figure 5-10 and Table 5-5 show the junctions on Road Class KU, KA, KB and KI inside of the proposed ATC area. The junctions include minor junctions such as junction on KB with KC or Others. The number of junctions without existing transport improvement project relevant to junction and traffic signal, without existing signal and on the paved road is 485 junctions including 2 merging and 12 roundabouts.



Source: KSTP

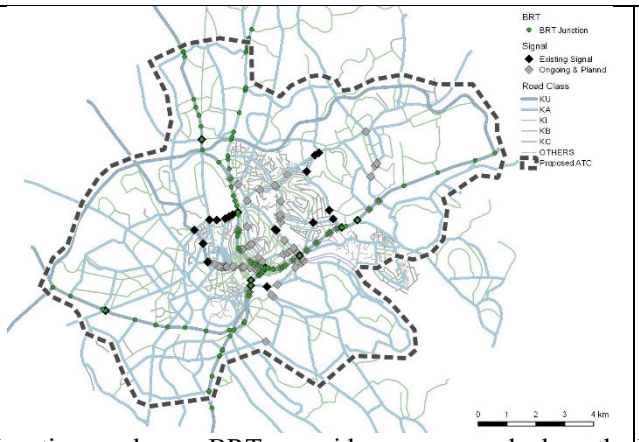
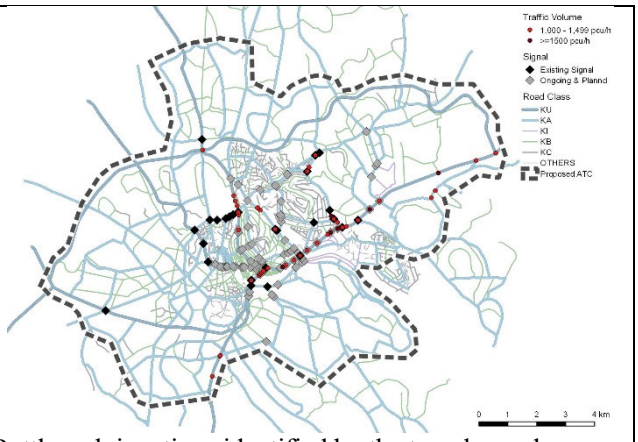
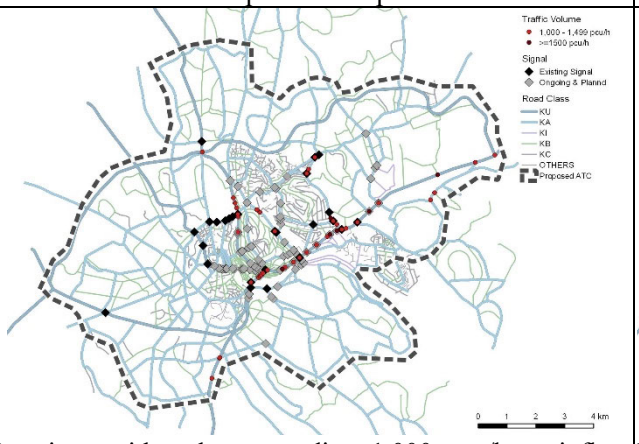
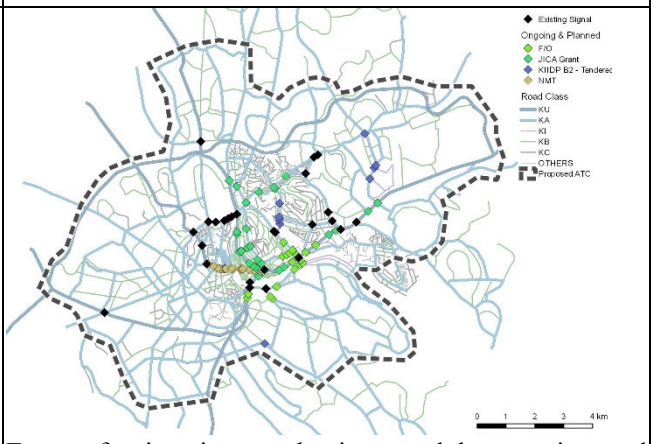
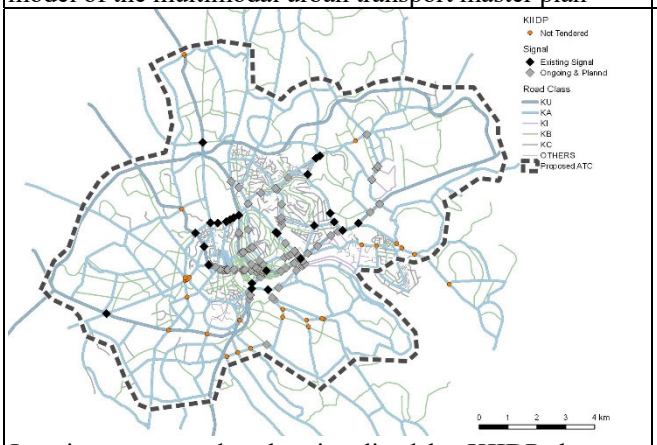
Figure 5-10 Proposed Signalized junctions Controlled by ATC

Table 5-5 Number of Junctions in Proposed ATC Area (Summary)

Relevant Projects	Existing Signal	Surface	3 Legs	4 Legs	5 Legs	R/A	Merging	Total
No	No	Paved	406	65	0	12	2	485
No	No	Unpaved	28	7	0	0	0	35
No	Existing	Paved	11	7	0	1	0	19
Existing	No	Paved	42	18	2	9	0	71
Existing	Existing	Paved	3	4	0	0	0	7
Total			490	101	2	22	2	617

Source: KSTP

d) As the total number of junctions to be controlled by the proposed ATC exceeds 600, phase development plan of signal installation is required. A total of 109 junctions are proposed to be signalized immediately as Phase 1 taking aspects described in Figure 5-11 into consideration. Summary of selected junctions for Phase 1 is shown in Figure 5-12 and Table 5-6.

	
Junctions along BRT corridors proposed by the multimodal urban transport master plan	Bottleneck junctions identified by the travel speed survey
	
Junctions with a leg exceeding 1,000 pcu/hour inflow traffic during peak hour[1] according to the travel demand model of the multimodal urban transport master plan	Except for junctions to be improved by ongoing and committed projects such as the JICA Flyover Project, JICA Grant project and tendered KIIDP junctions
	
Junctions proposed to be signalized by KIIDP, but, not tendered	

Source: KSTP

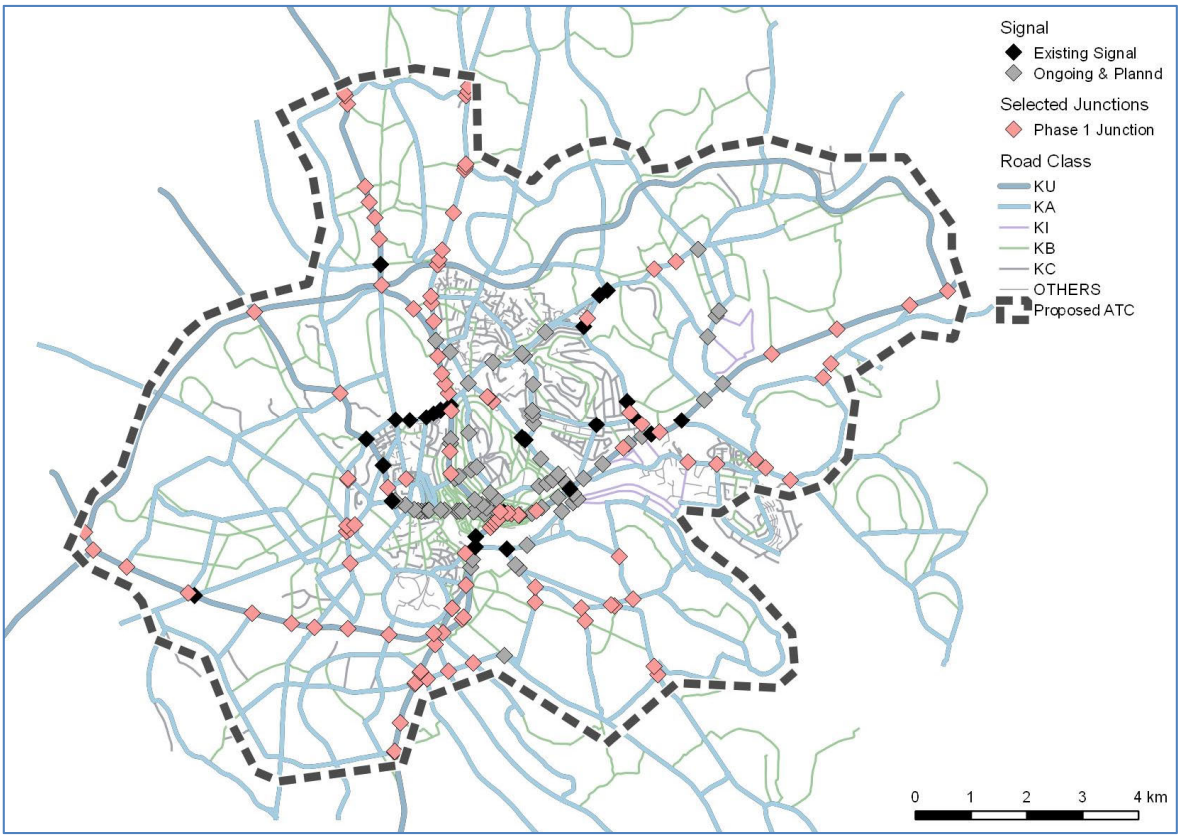
Figure 5-11 Selection of Phase 1 Junctions to be Signalized

[1] Peak hour inflow traffic volume is based on the travel demand model of the year 2016 developed by Multimodal Urban Transport Plan. According to Ugandan Highway Code, Design Manual for Roads and Bridges (UK), Highway Capacity Manual (U.S.) and Roundabout Manual of Japan Society of Traffic Engineers, maximum capacity of roundabout entry is around 1,000 pcu/hour in case of single entry lane roundabout assuming typical geometric condition in Kampala as discussed in the section 5.4.1, 3) a).

Table 5-6 Number of Junctions for Phase 1 by Classification

Major Road	3 Legs	4 Legs	5 Legs	R/A	Merging	Total
KU	48	5	0	7	0	60
KA	41	8	0	0	0	49
KB	0	0	0	0	0	0
KI	0	0	0	0	0	0
Total	89	13	0	7	0	109

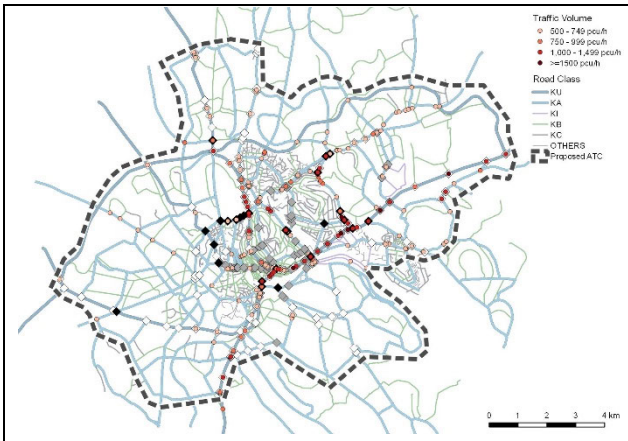
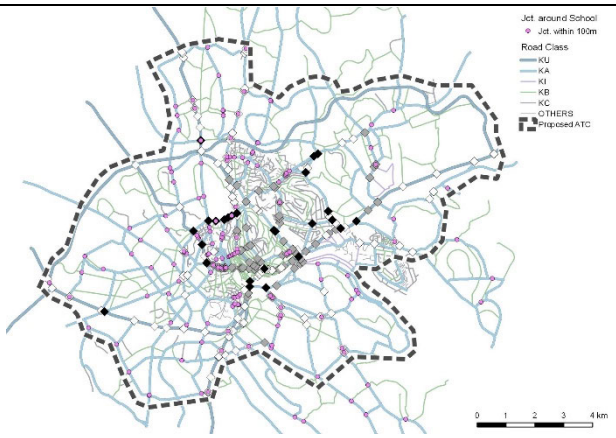
Source: KSTP



Source: KSTP

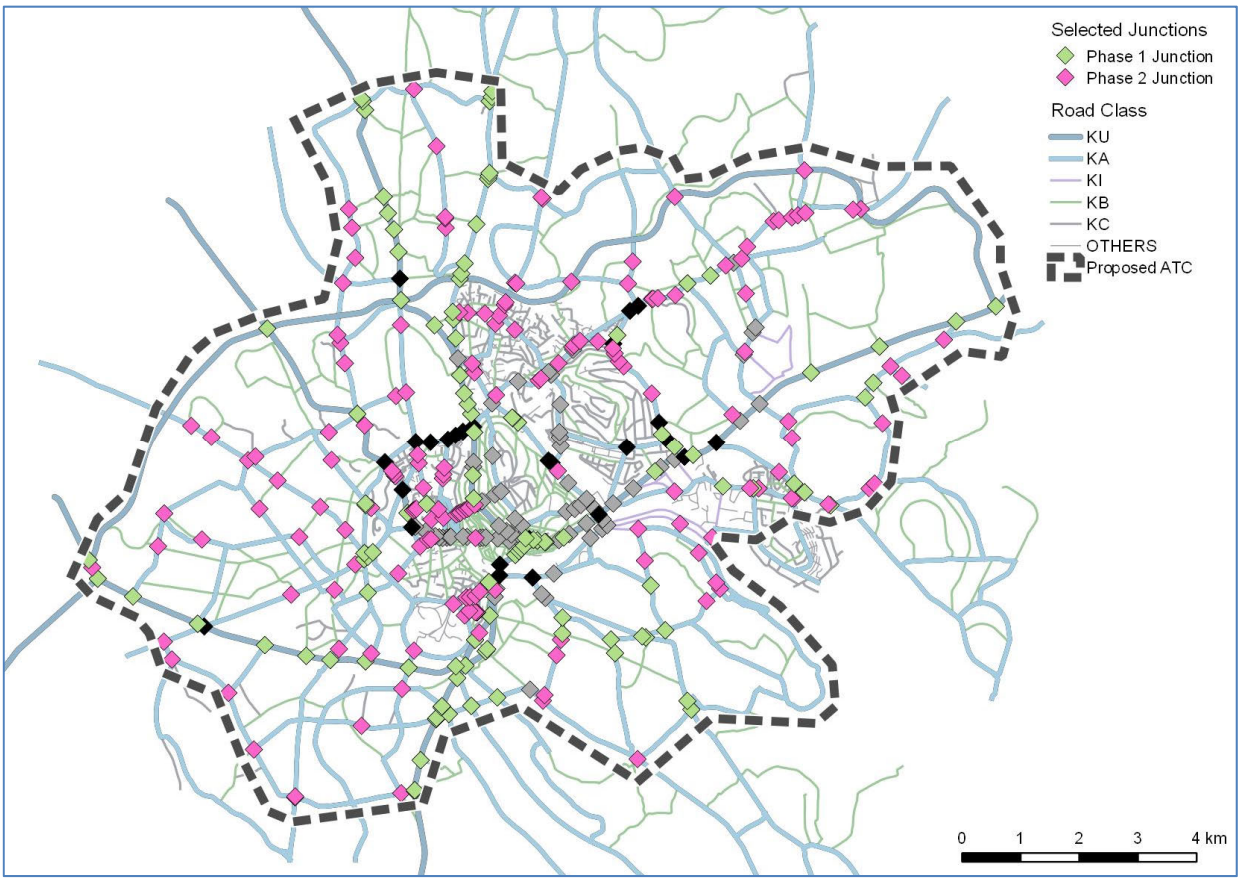
Figure 5-12 Proposed Junctions for Phase 1

e) Considering traffic volume and vicinity to schools, Phase 2 junctions are selected as shown in Figure 5-13. Summary of selected 164 junction for Phase 2 is shown in Figure 5-13 and Table 5-7.

	
Junctions with a leg exceeding 500 pcu/hour inflow traffic during peak hour according to the travel demand model of the multimodal urban transport master plan	Junctions within 100 m from existing schools

Source: KSTP

Figure 5-13 Selection of Phase 2 Junctions to be Signalized



Source: KSTP

Figure 5-14 Proposed Junctions for Phase

Table 5-7 Number of Junctions for Phase 2 by Classification

Major Road	3 Legs	4 Legs	5 Legs	R/A	Merging	Total
KU	6	2	0	3	1	12
KA	133	19	0	0	0	152
KB	0	0	0	0	0	0
KI	0	0	0	0	0	0
Total	139	21	0	3	1	164

Source: KSTP

6) MP 1-6 Establishment of Central Traffic Control Centre (CTCC)

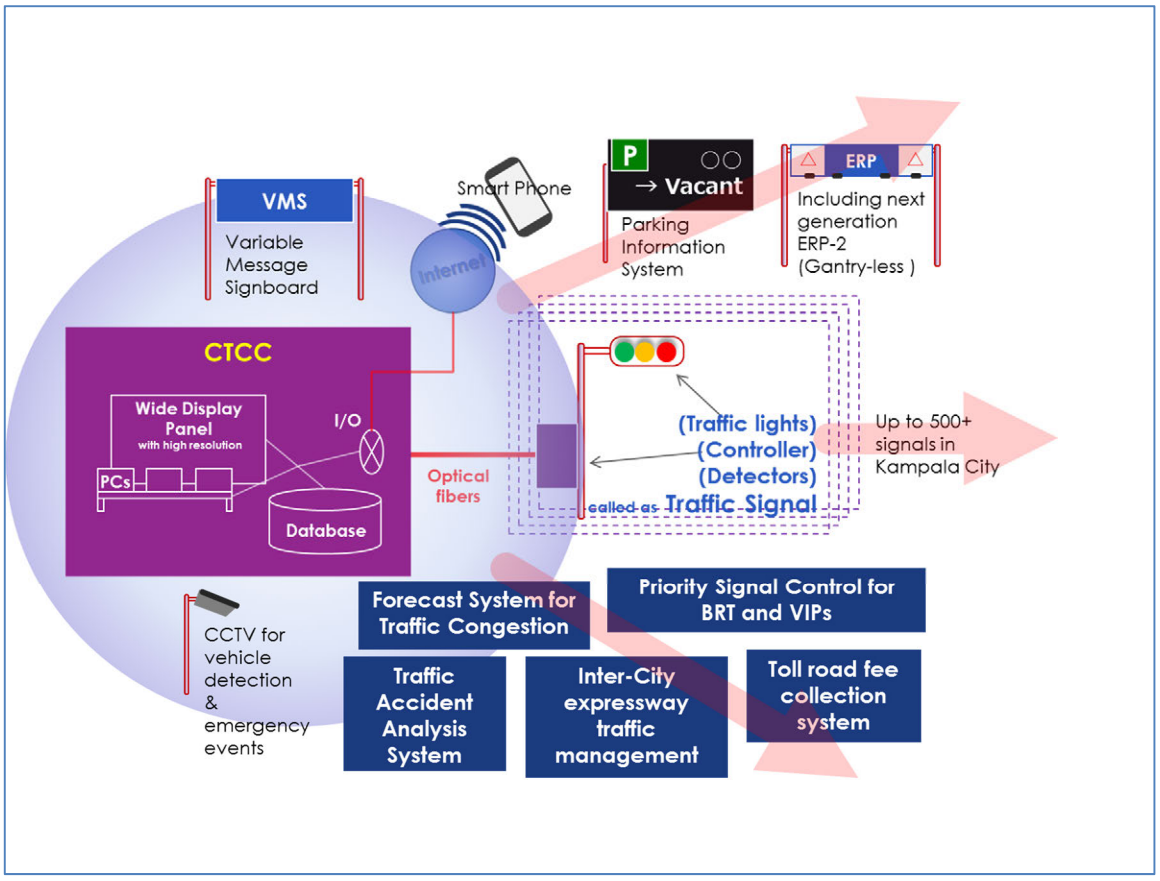
a) In order to control all the signals of Kampala Central Traffic Control Centre (CTCC) is needed. All the signals need to supervise from the centre and proper algorithm should be delivered. In addition, during emergency like VIP movements, ambulance or fire brigade the signals can be controlled according to the needs from this centre.

b) At this moment, CTCC can be established focusing traffic signal controls and disseminating messages to the users by internet to mobile phone or variable message signs etc. In future, it can be expanded and use for many other purposes such as, parking control, toll collection for city roads, and priority for BRTs etc. In addition, various relative traffic data such as, traffic volume data, accident data also can be collected which will be very useful for traffic planning in future and can save a lot of time and cost of additional surveys.

c) To have some preliminary idea of set up cost and O&M cost of CTCC it is assumed that out of 500 junctions, in the first phase approximately 200 most important junctions will be controlled under CTCC. App. 50 junctions out of 200 junctions will be controlled by MODERATO technology and adaptive type control will be installed at the rest of 150 junctions.

d) Vehicle detectors need to be placed at 300m intervals of the 200 Km length of the management area. This gives us about 665 detectors for one direction this about 1300 detectors, when considering both directions at any given junction for adaptive control system. For the MODERATO system, on average 3 detectors will be places at each leg of all the 50 junctions, thus 600 detectors will be required. This gives a total of about 1900 detectors for the 200 essential junctions.

e) Variable Message Signs (VMS) will be placed at 21 different locations; 2 VMSs on 8 major corridors (16) and 5 for CBD. Closed Circuit Television (CCTV) cameras with be places at 26 locations. 21 will be mounted on each of the VMSs (21 cameras) and 5 at 5 important junctions for VVIP movement.



Source: KSTP

Figure 5-15 Idea for Future Expansion of CTCC Related Functions

f) The proposed preliminary configuration system of the CTCC will be as shown in Table 5-8.

Table 5-8 Preliminary Concept of CTCC for 200 Junctions

Display	100 inches X 4	◆ Monitoring of traffic conditions on the 200km length with 200 signals collected by 1,900 detectors
	100 inches X 2	◆ Monitoring and surveillance of traffic flow and junctions by 26 CCTVs
Control Desk	2 desks	◆ Operations and control, command to signal control server and processing serves ◆ Manipulation of monitors
	1 desk	◆ Communication for radios and landlines for various organisations
Server/ Computer	6 servers	◆ Server side: Traffic signal control, traffic information processing, system security & control, data archiving. ◆ Client side: traffic signal control, traffic information provision.

Source: KSTP

g) The staffing of CTCC for 200 junctions is proposed as follows;

- Director, Central Traffic Control Centre: The director will be assisted by one person.
- CTCC Operators (3): These are Traffic Engineering Specialists who will operate from 06:00 to 20:00hrs, in 3 shifts for the 8hrs.
- System Management (2): These are System Engineering Specialists who will work from 08:00 to 17:00 (8hrs)

- Signal Control Management (MODERATO, Other) (2):These are Traffic Engineering Specialists who will also work from 08:00 to 17:00 (8hrs)
- Detector Management (2): This team will consist of Telecommunication Specialists who will work from 08:00 to 17:00 (8hrs)
- Contract Management/Accountant (1): She/he will also be working from 08:00 to 17:00 (8hrs)

h) With a team of 12 people, the estimated annual CTCC operations cost has been placed as US$1.12 million. The CTCC might also need outsourcing of some services and the estimated figure has been put at US$550,000 per year.

Table 5-9 Team Composition of CTCC Maintenance

Lights/ Controller	200 signals/ Controllers	◆ Inspection team: 1 engineer, 2 workers (1 team) ◆ Inspection time: 1 signal per day ◆ Monthly report (20 signals); 5 days for Chief Engineer
	1 inspection per year	◆ Chief Engineer (3m per month) ◆ Engineer (12m per month) ◆ Worker (24m per month)
Detector	1900 detectors	◆ Inspection team: 1 engineer, 1 worker (3 teams) ◆ Inspection time: 3 detectors per day. ◆ Monthly report (180 detectors): 5 days for Chief Engineer
	1 inspection per year	◆ Chief engineer: 3m per month ◆ Engineers: 36m per month ◆ Workers: 36m per month
VMS/ CCTV	21 VMS/CCTV 5 CCTV	◆ Inspection team: 1 engineer, 2 workers (1 team) ◆ Inspection time: 3 VMS-CCTV per day, 1 CCTV per day. ◆ Monthly report (min 2 VMS-CCTV): 2 days for Chief Engineer
	1 inspection per year	◆ Chief Engineer: 1.2m per month ◆ Engineers: 1.2m per month ◆ Workers; 2.4m per month

Source: KSTP

i) Emergency Repairs: 1 team of 1 engineer and 2 workers on 24hr standby in 3 shifts of 8hours. This team can be sufficient for such events as shown in Table 5-10. This team will require; 12m per month for the Chief Engineer, 36m per month for the Engineers and 72m per month for the workers.

Table 5-10 Estimated Trouble Shooting Events for CTCC

Estimated trouble shooting events (per year)*	Avg. 3.2 times for 200 signals	◆ Traffic signal lights and controllers will need to be checked and repaired. (including any small electrical faults)
	Avg. 51.8 times for 1900 detectors	◆ Detector heads and control units will require checking and repairing. (This includes electrical faults and dusting)
	Avg. 14.4 times for 26 VMS-CCTV	◆ Includes brightness adjustment, lens clearing and any minor repairs.

* Estimated by the nos. of trouble shooting events in Tokyo Metropolitan area with averaged one month periods.

Source: KSTP

7) MP 1-7 Maintenance of Traffic Management Infrastructures and Facilities

a) Maintenance of Traffic Signal: Traffic signal maintenance manual is developed under the KSTP, which will be followed for signal maintenance work of KCCA. The signal maintenance manual has provided

the guidance of general requirement of traffic signal maintenance system and the operation manual for each type of traffic signals in Kampala are also available.

b) Traffic Signal Operation & Maintenance (O&M) Cost: Among the O&M cost item of traffic signals major items are the electricity cost, network cost and regular maintenance cost (this portion is outsourced by KCCA). For example, the O&M cost of one TCC controlled junction in Japan is about 3,400USD/year. The breakdown cost is 250USD electricity cost, 2,600USD network cost, 550USD for outsourced maintenance cost. Outsourced maintenance cost is estimated by dividing the total cost for failure responses by the number of terminal device (signals, detectors, CCTV, etc.) failures detected and 2 regular inspections.

c) Maintenance of Road Signs and Markings: Kampala road lengths are increasing every year and the quality of the new roads are also quite good. New road signs and markings are also installing along the roads. In order to maintain these properly, a comprehensive manual for the maintenance of road signs and markings also need to be developed. MOWT has developed a road sign and marking manual in 2004, this can be followed until a complete manual for urban road has not been prepared.

5.4.2 MP2 ITS Utilization Plan

1) MP 2-1 Research on Necessity Information to be Provided

Intelligent Transport Systems (ITS) is a soft measure to alleviate traffic congestion using Information Communication Technology (ICT). ITS includes various type of services such as Electric Toll Collection (ETC) system, information providing of road congestion or public transport operation in real time. Road congestion information is, especially, useful to alleviate traffic congestion by staggered commuting or dispersion to alternative routes. As ITS is a vast area, it is necessary to research over what are the required items for Kampala at this stage.

2) MP 2-2 Research on Data Collection and Processing

In relation to MP2-1 it is necessary to identify the required data collection and processing. At this stage, how the data will be processed is also necessary to decide. Due to technical advance concerning ICT, considerable people including vehicle driver and public transport user have mobile phone and enable to access to information provided through internet. Thus, data collection and data processing for information providing are considered critical issue to realize ITS service.

3) MP 2-3 Integration to Traffic Control Centre

Some of ATC products have optional ITS system in accordance with their ATC system, therefore, expected services of ITS such as traffic congestion information providing should be considered and discussed simultaneously with ATC.

Source: KSTP

Figure 5-16 Variable Message Signs in Ahmedabad, India

5.4.3 MP3 Peak Demand Movement Plan

1) MP 3-1 Road Pricing and Other Area Restriction Managements

Some countries like Singapore where the road is very much limited, to control the peak hour traffic road pricing are in practise. At this process, the driver needs to pay certain amount in order to use some specific roads in peak hour. KCCA is in a process to collect toll from the commercial vehicles which will use KCCA roads in future. However, it is also necessary to control general traffic to enter the city road pricing can be applied for certain roads or not.

2) MP 3-2 Time Management

In order to manage the peak hour traffic demand in the city centre, one of the widely used options can be introduction of flexible office hour. An example of flexible office hour is as follows.

a) General government offices like the ministries can be operational from 8:30AM to 5:30PM.
b) Service oriented government organizations like KCCA can start from 8:00AM to 5:00PM.
c) Private offices can be operated from 9AM to 6PM.
d) Banks can be operated from 10AM.
e) Schools can be opened from 7AM to 3PM.

3) MP 3-3 Study on Parking Supply/Demand and Formulation of Parking Policy

Under KSTP, a parking supply study was conducted in 2016 only for Nakasero area. In order to grasp the overall demand supply of the parking spaces of the city, a comprehensive study needs to be carried out for all Kampala. In addition, a parking policy also should be prepared, which will also cover how the illegal parking can be tackled.

4) MP 3-4 Revision of On-Street Parking Policy

On-Street Parking Policy for Kampala roads need to be revised based on the outcomes of the parking survey of MP 3-3. The result of the study on supply-demand needs to analyse by time group of each area, to understand how to manage the demand. The analysis result will be used to determine the addition or removal of present on-street parking spaces. The ongoing concession contract with Multiplex Limited is

going to be expired in 2020. Therefore, it is necessary to revise the condition, price, revenue collection method for next parking concession contract.

5) MP 3-5 Parking Tax in CBD

Imposing parking tax in CBD area can be an effective way to control demand and also to produce an income source for traffic management for KCCA. In order to impose parking tax, target roads which are very much on high demand during peak hour should be listed first. Then the amount of tax needs to be decided in such a way, the parking concession contract will not have any kind of conflict.

6) MP 3-6 Parking Management for Park & Ride

Park and ride system is recommended to discourage the people who drive their vehicle from outskirts of Kampala to city centre. These users will be encouraged to park their car outside the city centre where the parking fee will be minimal or free and ride the public transports.

7) MP 3-7 Promoting and Regulating Shared Mobility

As the public transport system is not developed in Kampala, this option can be proposed in order to decrease the demand in peak hour. If from same area 3-4 persons are commuting to city centre, they can share the car and share the cost as well. Some of the on-demand ride services like Uber, Safe Boda are in business in Kampala, however, a policy for administering this kind services is necessary. The policy will ensure the safety of both the passenger and the driver. Some South-East Asian cities like Jakarta, Hanoi has been facing huge traffic congestion during peak hour mostly due to massive number of motorcycle, therefore, while allowing the shared mobility the number of permitted motorcycles also need to be administered carefully.

8) MP 3-8 Improvement of NMT Environment

To get rid of traffic congestion it is necessary to encourage the residents to use NMT options. To encourage them to walk or using bicycles to travel short distances, it is necessary to improve the walkways with comfortable and usable for all people. As the NMT users are expecting to increase day by day in Kampala, bicycle lane can be installed in parallel to normal carriageway where dedicated NMT corridor is difficult to construct.

5.4.4 MP4 Enforcement Strengthening Plan

1) MP 4-1 Traffic Signal Violation

In order to encourage the users to follow the traffic signals, it is important to ensure proper enforcement against traffic signal violations.

2) MP 4-2 Time Violation by HGVs

As HGVs are identified one of the issues of traffic flow, once the Statutory Instrument is approved law and enforcement should be applied against all the time violators.

3) MP 4-3 Violation of Driving Rule

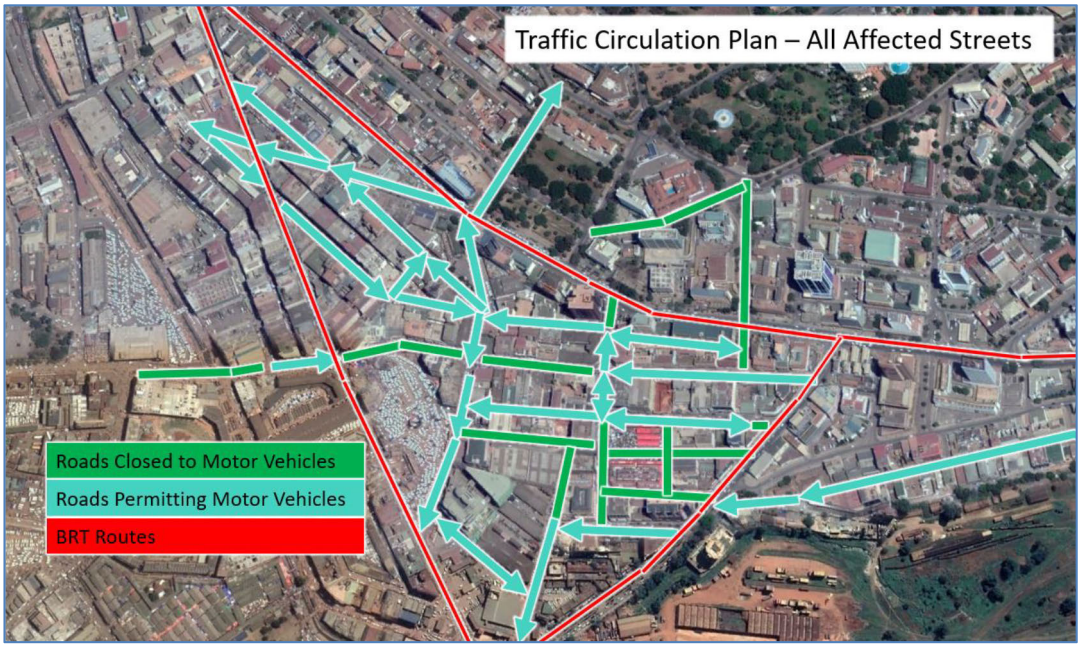
Enforcement should also be strong against all traffic violation such as illegal stopping, sudden lane changing without proper indication, overtaking a vehicle where it is not allowed, not to give-way at roundabout, not to honour pedestrians priority at zebra crossings, etc.

4) MP 4-4 Illegal parking

As in Kampala road spaces are limited and there are on-street parking facilities on some roads, illegal on-street parking reduce the capacity of the carriageway. Therefore, it is also important to apply strong enforcement against illegal parking.

5) MP 4-5 One-way Traffic Flow

It was observed that, deadlock phenomenon is occurred more frequently in roundabouts and the non-signalized junctions in Kampala. One of the ideas to reduce traffic flow from different directions is to propose some roads as one-way and observe the traffic flow situation over the area. It is highly challenging as to propose one way traffic advanced public meetings and PR activities should be done. In addition, when it will be implemented, enforcement should be ensured against the rule violators.



Source: Technical Feasibility Report, DD of NMT Scheme for Kampala City, MMUTMP for GKMA (2019)

Figure 5-17 Study on Traffic Circulation for NMT Scheme

6) MP 4-6 Strengthening of TIA Process

The decision on which developments should undertake TIA, needs to be made by transport engineers/planners from the transport planning team of KCCA, and not by architects/urban-planners in the Draft Project Proposal. A legal framework should be set up that allows the developers to contribute for the measurements by KCCA to mitigate the future impacts on the road network due to the developed project.

7) MP 4-7 Improvement of Road Signs and Markings

Overall road signs and markings need to be maintained regularly. Proposed bicycle lanes also need to be properly marked and necessary road signs need to be installed. As still most of the junctions in Kampala are non-signalized, road markings such as introduction of 'Yellow Box' at junction area can also be implemented as a part of traffic control. The education for the drivers regarding the implications of the Yellow Box is also necessary prior to applying strict enforcement. For residential area, '30Km/hr Zone' also can be introduced, which means highest allowable speed along all the roads of a residential area will

be 30Km/hr.

5.4.5 MP5 Public Involvement/ Awareness Plan

1) MP 5-1 Road Safety Awareness Campaign

In order to increase the safety awareness of the residents it is a good strategy to arrange the road safety awareness campaign in regular basis in important locations of Kampala. The schools, CBD Area, Pilot Project Junctions can be the primary targets which can be expanded to all over Kampala.

2) MP 5-2 Media Campaign

As KCCA is very much active in social media like Facebook and Twitter, it is a good idea to receive the complaints directly from the users and consider to solve within shortest possible time. Moreover, to check the public opinion regarding any issues, it can be posted online and receive the comments from the city dwellers.

3) MP 5-3 Traffic Congestion Map

Since 2016, google map is reflecting the traffic congestion scenario of Kampala and this real time data can be used for guiding the road users regarding traffic congestion. As good percentage of residents are using smartphone, anybody can check the traffic congestion information. For those who do not use internet quite frequently this information can be broadcasted through other media such as radio.

5.4.6 MP6 Creating Sustainable Funding Plan

1) MP 6-1 Dedicated Funds for Traffic Signal Control and ATC Operation

a) When there is a special requirement for addition funding for newly developed system or established facilities, URF will allocate more budget in addition to 20 billion UGX. For example, KCCA already requested URF for the maintenance budget of Kampala Flyover which is now under construction. KCCA has already requested for 2 types of budget: routine maintenance (yearly) and periodic maintenance (every 5 years).

b) However, in order to create a sustainable and self-depending Transport Management Body, DETS of KCCA should have its own way of fund management. It is necessary to create sustainable dedicated funding for traffic signal control and ATC operation for its proper operation. It the control centre stops for a single day, the traffic flow will be much worse than at present. Therefore, KCCA cannot afford to stop the operation for a single day.

2) MP 6-2 Dedicated Funds for Road Maintenance: In order to ensure proper traffic flow roads should be maintained regularly. This not only elevates the traffic flow, but also acts as a positive factor to enhance traffic safety. Therefore, dedicated fund also need to ensure proper road maintenance including signals, road surface, signage, markings etc.

3) MP 6-3 Trials for New Type of Revenue Collection Related to Traffic Management

a) Regarding the possible source of funding in order to accommodate the operational and maintenance cost of central traffic control system, KCCA can request for additional budget from URF. If URF is unable to ensure the required budget KCCA's Non Tax Revenue also can be used.

b) KCCA is going to collect commercial road users' fee from the commercial vehicles operating within or

transiting through the Kampala city area under Commercial Road Users Regulations (2015). In addition, KCCA is also collecting parking fees and advertisement fees from the city dwellers.

c) DETS may request to KCCA management to use certain portion of the total revenues collected from transport oriented facilities or total revenues of any of these sectors for maintain the central traffic control system.

d) As the central control system will also be also be used to identify the violation of traffic laws, the fine supposed to be collected from those offenders can also be secured as earmark fund for the central traffic control system. Some of potential revenue earning methods are:

- HGV tax or fine for using KCCA road other than prescribed hour
- Advertisement revenue from VMS
- Introducing modern parking management system
- Revenue from bus/ taxi/ bodaboda route permits
- Advertisement revenue from Transport Service permitted by KCCA

5.5 Evaluation and Monitoring of the Plan

The activities mentioned in section 5.4 should have some key performance indicators; so that once the activities are finished the performance can be evaluated. At the end of certain time, the overall evaluation of the monitoring plan needs to be performed.

6 STEP FORWARD

UTMP provides the direction of overall traffic management to KCCA. As there was no traffic management plan in Kampala so far, KCCA will follow as this as the guideline of traffic management.

This time UTMP is updated as version 2. It is the final version as an output of Kampala Smart Traffic Project (KSTP). However, even after the completion of the project, KCCA will update the UTMP in regular basis, based on the necessity. The vision and strategy will be remained same to solve all the traffic issues with suitable and pragmatic combination of 3S-3E.

The Management Plan provided at this version of UTMP is planned as a tentative plan considering current situation. However, KCCA need to consider updating the management plan, based on the necessity. Whenever some other relative projects will come into action, the management plan is needed to be reviewed and if necessary, will be revised. The corresponding activities will also be revised accordingly.