Kisumu Sustainable Mobility Plan

Institute for Transportation and Development Policy

June 2020

Foreword by the Governor

Kisumu, like many cities in Africa, is starting to experience mobility challenges characterised by increasing car traffic, inefficient public transport, inadequate walking and cycling facilities, and poor parking management. These challenges contribute to congestion, air, noise pollution, and safety concerns, impacting the city's attractiveness and liveability. Too often, transport planning has concentrated on infrastructure and traffic while ignoring the real impacts on citizens. Kisumu has witnessed a surge in large infrastructure projects by the national government in the last few years, and more are in the pipeline. There is an urgent need to recalibrate transport investments so that they benefit all road users. My government is committed to ensuring a more equitable allocation of road space by shifting focus to sustainable modes, including walking, cycling, and public transport.

My government acknowledges that mobility is one of the essential cornerstones for the social and economic growth of Kisumu. The city, being the commercial, administrative, and educational hub in the western region of Kenya, hosts several centres of higher learning, banks, industries, and other businesses. Tackling climate change, facilitating trade, and improving access to education, health, and jobs are all issues of crucial importance for my administration. Urbanisation brings with it many opportunities in terms of employment, services, and improved quality of life, and efficient mobility and people-friendly streets are at the heart of realising these opportunities. Our vision is for Kisumu to be a beautiful city with an integrated, efficient, inclusive, and sustainable transport system.

The Kisumu Sustainable Mobility Plan (KSMP) aims to foster increased accessibility by prioritising walking, cycling, and public transport. The Plan first assesses conditions in our existing transport system, identify existing gaps in transport facilities and service provision. It then offers a roadmap for improved mobility and living conditions to maximise the contribution of transport to improving the city's quality of life. It also addresses the need for orderly urban expansion and enhanced connectivity between Kisumu and surrounding rural centres. The KSMP comes under the umbrella of the Kisumu Integrated Sustainable Urban Plan (ISUD), which identifies mobility as one of the essential keystones towards the growth of the city. The plan recommends prioritisation of efficient public transport and enhanced mobility through road design incentives. The KSMP is also guided by the Governor's manifesto (2017-2022), which highlights the need to integrate and improve various modes of transport to foster the development for Kisumu county.

This document is a significant desk resource for transport planners, road engineers, urban planners, consultants, and policymakers who are involved in the planning and implementation of transport projects in Kisumu. As we plan, design, and implement a truly integrated transport system, we should never lose sight of the fact that we do this for our constituents, the people of Kisumu.

As the Governor of Kisumu County, it is my great pleasure to launch the Kisumu Sustainable Mobility Plan, 2020.

H.E. Prof. Peter Anyang' Nyong'o
Governor, Kisumu County Government

Foreword by the City Manager

The City of Kisumu is experiencing rapid economic and population growth, resulting in high rates of urbanisation and motorisation. Conventional planning solutions have focused more on addressing the needs of motorists, neglecting the needs of pedestrians, cyclists, and public transport. Increasing reliance on private motorised mobility is making transport in Kisumu increasingly unaffordable for the majority of our residents. It is also contributing to a range of externalities, including traffic congestion, road fatalities, air pollution, noise pollution, and productivity loss. Despite the continued growth in demand for public transport, the city lacks organised, safe, and reliable public transport. These trends are unsustainable, and residents of Kisumu deserve better.

Kisumu is now at a pivotal point in its modern history. As the city's strategic importance grows, significant investments will be required to maintain the steady flow of goods, people and information. Setting the city along a more sustainable path will require well planned and ambitious efforts towards rebalancing the transport mix. It is time we revolutionise how we plan to accommodate our growing population and higher demand for travel in a manner that achieves economic, social, and environmental gains simultaneously.

Careful integration of land use and transport planning will be fundamental to improving the quality of life for Kisumu residents. Efficient transport and easy access to jobs, shopping, education, and leisure facilities will be the path to a strong, prosperous, and equitable economy. This can be achieved by actively shaping the pattern of our urban growth around transport with a focus on sustainable access. We need to influence the location, density, design, and mix of land uses to bring jobs, housing, and services closer and make it safer and easier to walk, cycle, and use public transport.

Transformation of Kisumu calls for not only better design but also for collaboration from county departments, national agencies, stakeholder groups, and residents to shape a mobility system that maximises shared value for all. Formulation of the Kisumu Sustainable Mobility Plan (KSMP) has been transparent and participatory, often engaging as many stakeholders as we could reach in workshops, meetings, and focus groups. The implementation of the KSMP will require appropriate institutional structures and capacity enhancement at all levels of government.

I take this opportunity to thank all the county and city staff, board members, consultants, stakeholders and partners who participated in the development of the KSMP. I also wish to thank the Institute for Transportation and Development Policy (ITDP) and the United Nations Human Settlements Programme (UN-Habitat) for providing technical support during the formulation of the KSMP. Special gratitude goes to the International Climate Initiative and Ford Foundation for funding the development of the KSMP and to H.E. the Governor of Kisumu County, Prof. Anyang' Nyong'o, for providing a clear vision and leadership that guided the development of the Plan.

I now take this opportunity to call upon all the stakeholders to play their rightful role in supporting the implementation of the KSMP for the betterment of Kisumu residents.

Thank you.

Doris Ombara
City Manager, Kisumu

Contents

Funding support

Supported by:

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

based on a decision of the German Bundestag

FORD
FOUNDATION

1. Executive summary

Kisumu is the third-largest city in Kenya, after Nairobi and Mombasa. As the city grows, connectivity to education, employment, and social opportunities will be fundamental to Kisumu's development. Yet today, residents face severe challenges stemming from the lack of adequate transport facilities and services. Despite high reliance on non-motorised transport (NMT) and public transport, most streets in the City of Kisumu are designed for motorised traffic. As a result, there has been an upsurge in private vehicle ownership and use in recent years. Residents face difficulty in accessing economic, educational, and social opportunities, while the city faces growing traffic, an unacceptable rate of fatal road crashes, and increasing emissions of toxic air pollution.

Responding to these issues, the Kisumu County Government, in partnership with the Institute for Transportation and Development Policy (ITDP) and the United Nations Human Settlements Programme (UN-Habitat), with support from Ford Foundation and the International Climate Initiative, has prepared the Kisumu Sustainable Mobility Plan (KSMP), a ten-year plan providing a roadmap for improving mobility needs of the residents and businesses in Kisumu and its environs. The Plan has been developed through a participatory process with the city residents and various stakeholders including matatu operators, boda-boda operators, tuk-tuk operators, cyclists, persons with disabilities, and the business community, among others. The KSMP is anchored on existing policies, plans, and regulations, including the Integrated Strategic Urban Development Plan (ISUD) for Kisumu, which aims to guide the development of Kisumu up to 2030.

From the household survey conducted to inform the KSMP, 53 percent of daily trips are by foot, 4 percent are by bicycle or bicycle boda-boda, 13 percent are by matatu, 3 percent are by tuk-tuk, 13 percent are by motorcycle boda-boda, 6 percent are by motorcycle, and 6 percent are by car. The distribution of transport modes differs significantly between men and women, with women making significantly more walk trips and fewer trips by private motorised modes such as car and motorcycle. Peak hour pedestrian volumes exceed 2,000 pedestrians per hour on major streets in the city centre, while cycle volumes on are well over 200 cycles per hour. Unfortunately, the designs of most streets are inclined to motorised transport, with little investment in footpaths and cycle tracks. Where footpaths exist, there is poor maintenance and substantial encroachment by motor vehicles. Vulnerable groups, including women, persons with disabilities, and school children, experience a high risk of crashes due to inadequate provision of pedestrian crossings.

The public transport system consists of matatus and shared tuk-tuks, carrying volumes as high as 4,500 passengers per hour per direction on the busiest corridor, Kenyatta Highway. While these modes provide basic access for medium and long-distance trips, public transport services experience several challenges including overcrowding and unsafe driving, both of which stem from the current business model where operator income is directly tied to the number of passengers carried. Most public transport stages lack bus shelters, and terminal and depot facilities are lacking. Responding to the absence of NMT facilities and reliable public transport, motorcycle boda-boda services have seen tremendous growth. Boda-bodas offer quick access but pose a safety risk for NMT users. Urgent interventions are needed to improve the safety of all modes and improve the experiences for pedestrians, cyclists, and public transport users.

The KSMP envisions a high-quality, cost-effective, and user-friendly public transport system, integrated with accessible pedestrian and cycling networks to enhance mobility and access for all residents. The Plan sets out several goals: increasing the mode share for walking, cycling, and public

transport; improving public transport coverage; capping the growth of trips by personal motor vehicles at no more than 10 percent above current vehicle kilometres travelled; reducing pedestrian and cyclist fatalities; and improving air quality. To achieve these goals, the plan presents a holistic package of measures, including the following:

- Non-motorised transport infrastructure:
    - Implementation of road safety improvements in 40 school zones
    - Provision of a continuous pedestrian realm on 100 km of streets.
    - Construction of 31 km of cycle tracks.
    - Road safety improvements on 28 km of KeNHA corridors that experience the majority of the city's fatal traffic crashes, including the redesign of 20 unsafe intersections.
    - Construction of a 3.7 km lakefront greenway.
- Introduction of a first-phase bikeshare system with 400 cycles.
- Public transport:
    - Modernisation of the public transport system including industry consolidation, a transition from the target system to salaried employment, electronic fare collection, and
    - Introduction of 450 modern, accessible public transport vehicles that meet at least the Euro 4 standard, with an eventual transition to e-vehicles.
    - Installation of shelters at 167 public transport stages.
    - Implementation of a first-phase BRT corridor along Kenyatta Highway.
- Installation of 100 km of street lights.
- Construction of 100 km of stormwater drains.
- Adoption of measure to improve safety and service quality on boda-bodas and other hail services, including licensing, meters, and GPS tracking.
- Introduction of an enhanced IT-based on-street parking management system with demand-based fees.
- Review of planning regulations to facilitate land use-transport integration.
- Introduction of monthly car-free days and an annual road safety week.
- Monthly sustainable commuting days for county/city staff.

To realise the stated recommendations, the plan outlines an implementation plan indicating the timelines, cost, and responsible agency for each project. Coordination with various agencies such as KURA, KeNHA, NTSA, and the county government transport department is crucial in achieving the vision of the KSMP. To manage mobility systems, a dedicated unit should be established within the city government, reporting to the city manager. Finally, monitoring and evaluation against baseline information is critical to ensure that the KSMP is not only implemented but also brings social, economic, and environmental transformation to Kisumu.

2. Introduction

Kisumu is the third-largest city in Kenya, after Nairobi and Mombasa.[1] As the city grows, connectivity to education, employment, and social opportunities will be fundamental to Kisumu's development. Yet today, residents face severe challenges stemming from the lack of adequate transport facilities and services. Despite high reliance on non-motorised transport (NMT) and public transport, most streets in the City of Kisumu are designed for motorised traffic. Kisumu has witnessed a surge in infrastructure development in the last few years, but many of these interventions focus on heavy infrastructure improvements such as road widenings and flyovers. Little effort has been made to address the mobility needs of the urban poor, who depend on non-motorised modes and public transport. As a result, residents face difficulty in accessing economic, educational, and social opportunities, while the city is seeing growing traffic, an unacceptable rate of fatal road crashes, and increasing emissions of toxic air pollution.

There is an urgent need to recalibrate transport investments so that they benefit all urban residents, not just those who own personal cars. Affordable, efficient, convenient, and sustainable transport facilities can help alleviate the critical mobility challenges facing Kisumu. Also, as a port city, Kisumu links Kenya to other land-locked countries, including Uganda. With major planned and ongoing investments in revitalising Kisumu port, freight movement is expected to rise. While goods movement can have a positive economic impact, there is a need to have a clear freight transport strategy to avoid negative externalities such as safety challenges and air pollution.

To enhance efficient and seamless integration of all modes of transport, the County Government of Kisumu (CGK) in partnership the Institute for Transportation and Development Policy (ITDP) and United Nations Human Settlements Programme (UN-Habitat), with support from Ford Foundation and the International Climate Initiative, has developed this Kisumu Sustainable Mobility Plan (KSMP). The KSMP aims to improve mobility in the city by making it more inclusive, efficient, effective, and people-centred. CGK seeks to achieve a more equitable allocation of road space by incorporating a focus on NMT and public transport, in the planning, design, management, and budgeting stages of transport projects. The KSMP first discusses the existing transport conditions and the extent to which the requirements of the users are met. Next, the plan seeks to develop a roadmap for an improved urban mobility system in Kisumu.

3. Transport in Kisumu

3.1 City overview

The City of Kisumu is located in western Kenya, 350 km from Nairobi. It is the third-largest city in Kenya after Nairobi and Mombasa.[2] According to the 2019 Census, the city has a population of 567,983.[3] Kisumu is one of the fastest-growing regions in the country and has an annual urbanisation rate of 2.8 percent.[4] With Kisumu's population expected to grow to 769,563 people by 2030, connectivity to education, employment, and social opportunities is fundamental to the city's development.

[1] Kisumu County. (2019). Kisumu County Urban Institutional Strategy.
[2] In this report, "Kisumu" is used to refer to the City of Kisumu.
[3] Kenya National Bureau of Statistics. (2019). Kenya Population and Housing Census.
[4] County Government of Kisumu. (2019). Kisumu County Urban Institutional Development Strategy (CUIDS).

Kisumu is the commercial and political headquarters for Kisumu County.[5] Located on the shores of Lake Victoria, the largest freshwater lake in Africa, Kisumu serves as a critical gateway to Kenya from the neighbouring countries in the Great Lakes region. It is a vital commercial centre and transport hub for the Western region of Kenya.[6] Being one of Kenya's Vision 2030 flagship cities, Kisumu has been assigned specific roles in the national strategic plan. The city is therefore expected to receive national government investments to facilitate its role in the Vision 2030.[7]

Kisumu is the regional headquarters for trade for thirteen Counties located around the lake, including Homa Bay, Siaya, Migori, Kisumu, Kisii, Busia, Kakamega, Bungoma, Kericho, Nyamira, Kisii, Vihiga, and Bomet.[8] Key economic drivers in Kisumu include trade, transport, agriculture, and fishing. Kisumu's location on Lake Victoria presents an opportunity for fishing and the fish processing industry. However, the use of outdated technology combined with the challenges of hyacinth have made it difficult for the fishing industry to develop.[9] Rice and sugarcane growing thrive along the river Nyando in the Kano plains. Maize, beans, poultry, sweet potatoes, and fresh vegetables are produced across the Kisumu County.[10]

Kisumu is quickly developing into a major tourist destination in the western circuit. In addition to the sunset view across the lake, other tourist attractions include Ndere Island National Park, God Mesa Viewpoint with a panoramic view of Nyando plains and the lake, Kisumu Museum, and Impala Park. Kisumu International Airport connects the city to the rest of the country and other international destinations, enhancing connectivity to the city.[11]

Kisumu and its environs are home to three sugar factories, Muhoroni, Chemelil, and Kibos, with plans underway for a fourth mill. Also, numerous light industries and cottage industries such as handicrafts, boat building, and tailoring thrive in the city.[12] Key service industries include wholesale and retail, banking services, car and bicycle repairs, and entertainment.

Higher education institutions with campuses in Kisumu include the University of Maseno, University of Nairobi, and Great Lakes University. In addition, there are several teaching and nursing colleges. Kisumu county has 173 public secondary schools and 706 primary schools.[13]

Rapid urbanisation has come with development challenges that impact living conditions, human dignity, and environmental sustainability. Due to ineffective urban planning and a weak legal and policy framework, investments in urban infrastructure in Kisumu have not matched population growth, resulting in inadequate access to housing and efficient transport services. According to the County Government of Kisumu (2019), fully 40 percent of urban residents in Kisumu live in informal settlements such as Manyatta A and B, Nyalenda A and B, and Obunga.[14] These areas are

---

[5] County Government of Kisumu. (2019). Kisumu County Urban Institutional Development Strategy (CUIDS)
[6] County Government of Kisumu. (2018). County Integrated Development Plan, 2018-2022.
[7] Government of the Republic of Kenya. (2007). Kenya Vision 2030. http://vision2030.go.ke/inc/uploads/2018/05/Vision-2030-Popular-Version.pdf
[8] County Government of Kisumu. (2019). Kisumu Urban Institutional Development Strategy (CUIDS).
[9] County Government of Kisumu. (2019). County Government of Kisumu Booklet. http://www.commonwealthofnations.org/wp-content/uploads/2014/02/KISUMU_BOOKLET1.pdf
[10] County Government of Kisumu. (2019). County Government of Kisumu Booklet. http://www.commonwealthofnations.org/wp-content/uploads/2014/02/KISUMU_BOOKLET1.pdf
[11] Wikipedia. (2019). Kisumu County. https://en.wikipedia.org/wiki/Kisumu_County
[12] County Government of Kisumu. (2019). County Government of Kisumu Booklet. http://www.commonwealthofnations.org/wp-content/uploads/2014/02/KISUMU_BOOKLET1.pdf
[13] Wikipedia. (2019). Kisumu County. https://en.wikipedia.org/wiki/Kisumu_County
[14] Ibid.

characterised by dense, low-rise residential development and inadequate social and physical infrastructure such as access roads, public transport services, public spaces, and sewer systems. Land ownership disputes are a further contributor to sprawling development patterns in Kisumu as they limit the use and subdivision of land.[15] Land reforms are key to achieving the goals of the Kenya Government's Big 4 Agenda, which aims to reduce the housing deficit through the provision of affordable housing, including 10,000 units in Kisumu County.[16]

Low-density development patterns also increase travel distances beyond walking or cycling thresholds, leading to increased demand for motorised mobility. Without quality public transport to fulfil this demand, boda-bodas and tuk-tuks are the options available for many residents in Kisumu. Growing dependence on motorised modes raises transport costs and contributes to air pollution, a significant cause of heart attacks, asthma, premature deaths and delayed early childhood development. Rapid and unplanned urbanisation is thus very unsustainable and calls for intervention through the integration of land use and transport planning to realise sustainable development.

3.2 Street network and connectivity

Kisumu's network of formal streets is concentrated in the city centre, with a few main roads emanating outwards. Main streets in the city typically consist of two to four lanes, with dual carriageways or wide single carriageways and rights of way (ROW) ranging from 20-30 m. Kisumu is an important node on the Northern Corridor, and arterial roads such as Nairobi Road, Kisumu-Kakamega Highway and Kisumu-Busia Highway, function as important urban streets while also catering to through movement. The dual role played by these corridors paired with highway-oriented street designs have contributed to significant road safety challenges, as discussed later in this report.

Jurisdiction over Kisumu's street network falls under three agencies: Kenya National Highways Authority (KeNHA), Kenya Urban Roads Authority (KURA), and County Government of Kisumu. All these agencies have autonomous responsibilities but collectively oversee the management, development, rehabilitation, and maintenance of road infrastructure in the country.[17]

[15] Oudia, Rushdie. "Land wrangles choke growth of Kisumu city." Daily Nation. Retrieved from https://www.nation.co.ke/lifestyle/dn2/The-top-impediment-to-Kisumu-housing-growth/957860-5116628-8ocpgoz/index.html
[16] Ibid.
[17] Kenya Roads Act, 2007.

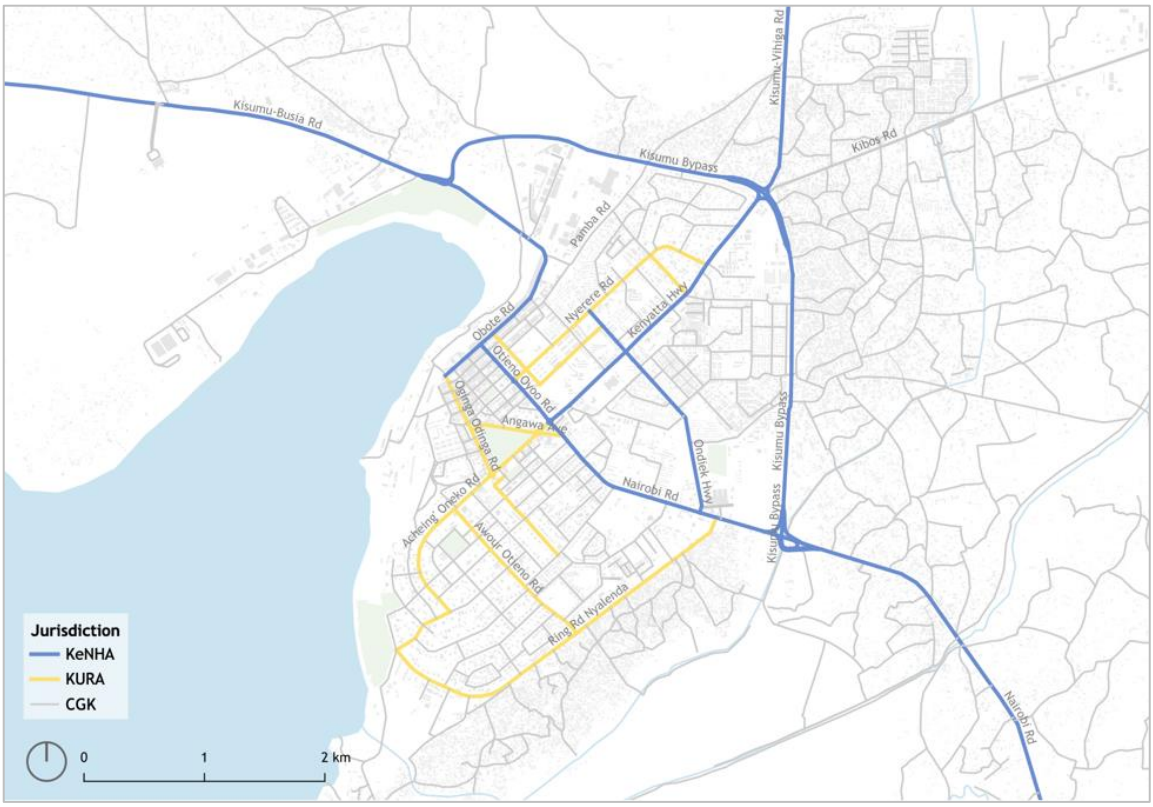


Figure 1: Street jurisdiction in Kisumu.

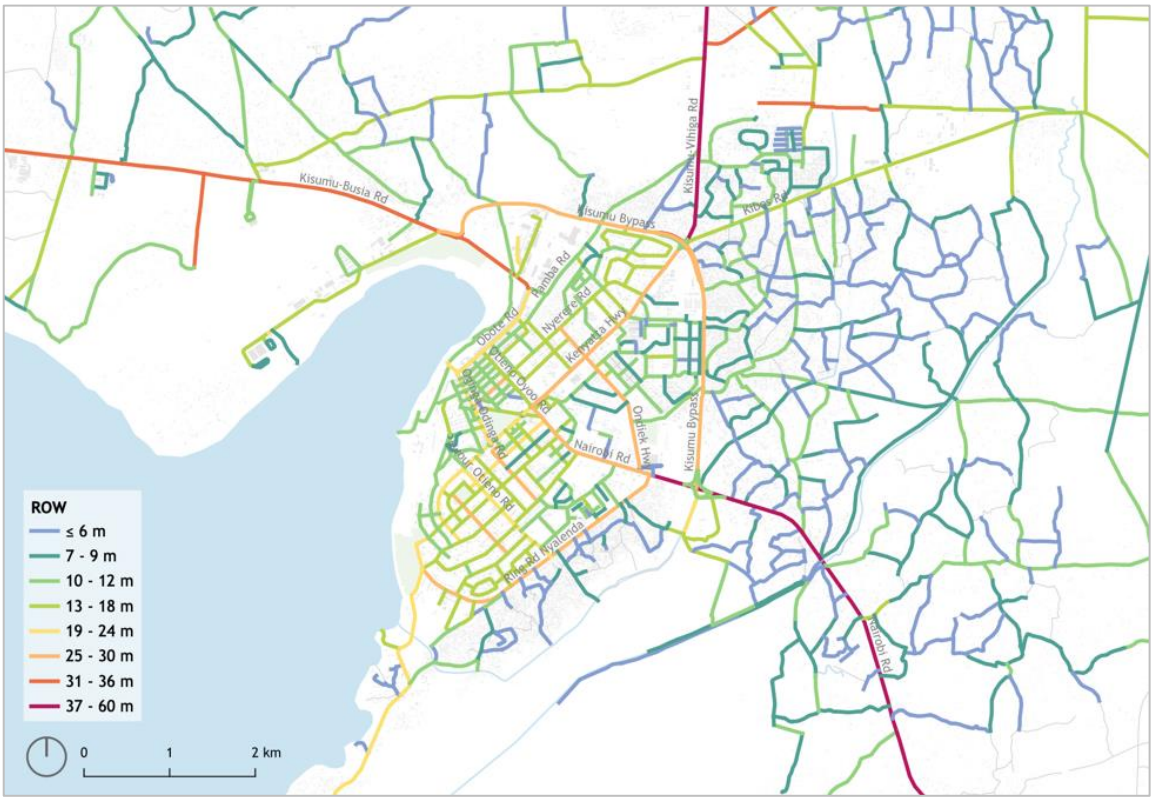


Figure 2: Available road right-of-way.

3.3 Mode share

Results from the household survey indicate that the largest share, 53 percent, of daily trips in Kisumu are pedestrian trips. After walking, significant modes include matatus (13 percent), motorcycle boda-bodas (13 percent). Other modes include private motorcycles (6 percent), car (6 percent), bicycle (3 percent), tuk-tuk (3 percent), and bicycle boda (1 percent).

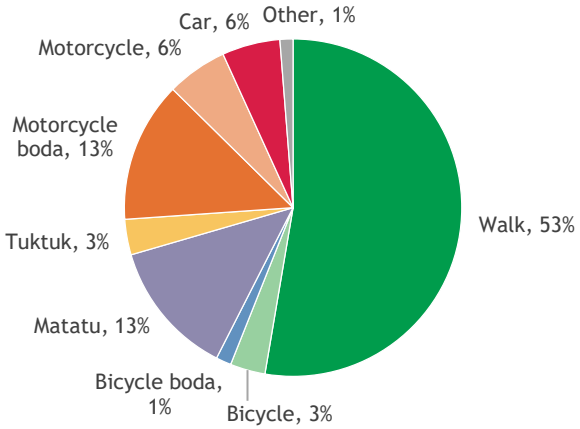


Figure 3. Mode share in Kisumu.

Travel patterns differ significantly by gender. Women are more likely to travel by foot, matatu, or motorcycle, while private vehicles such as cars, motorcycles, and bicycles account for a larger share of trips made by men.

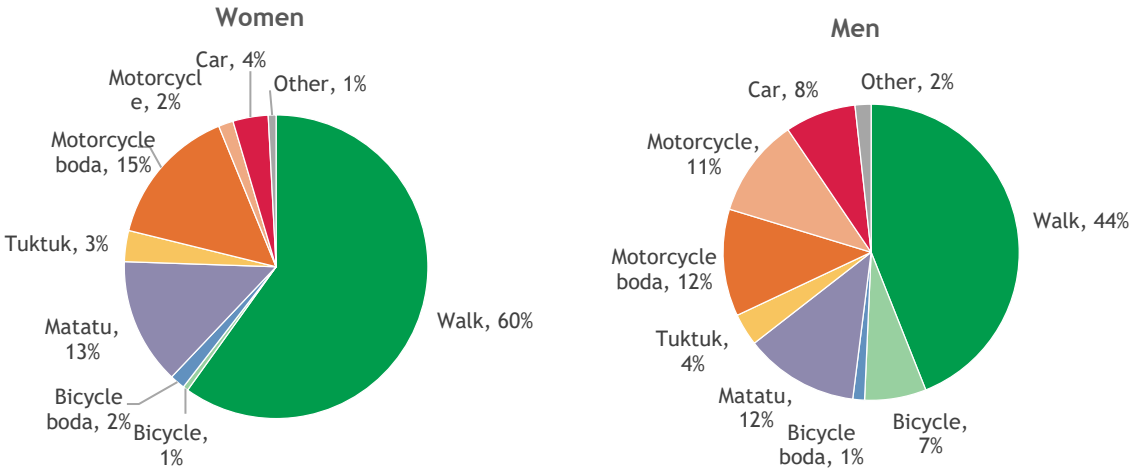


Figure 4. Mode share by gender.

Based on gender-disaggregated NMT and vehicle counts conducted along major streets in Kisumu, women account for 30-40 percent of observed commuters. The most significant disparity in user volumes by gender is observed among cyclists, with men accounting for 96 percent of cyclists.

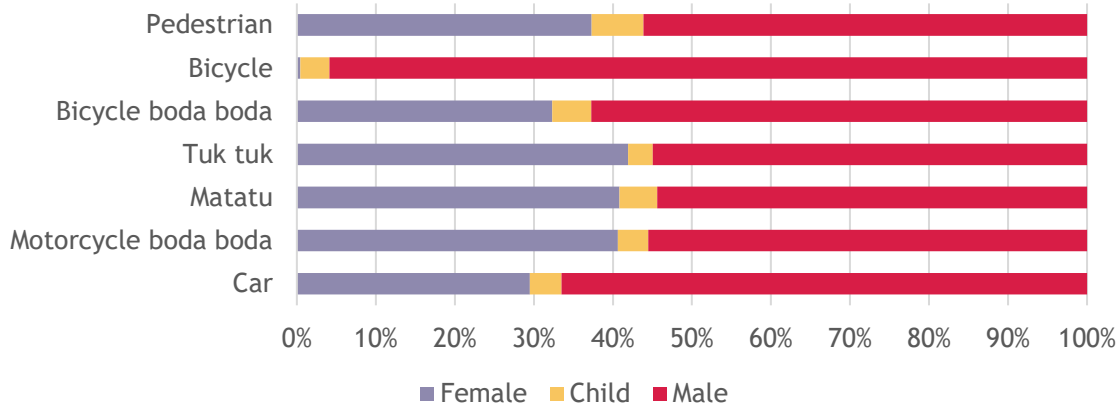


Figure 5: Composition of public transport passengers by gender.

Among transport facilities and services, close to 90 percent of Kisumu residents agree that boda-bodas are accessible, compared to 59 percent of residents who feel that public transport is easy to access. Although 53 percent of trips are done by foot, only 35 percent of residents report having access to good footpaths. Similarly, only 28 percent of Kisumu residents agree that there is sufficient street lighting. Fully 58 percent of residents say that robberies occur frequently. These findings point to the urgent need for the provision of a higher-quality and more secure walking environment in the city. Interestingly, few residents cited traffic congestion as an issue in Kisumu.

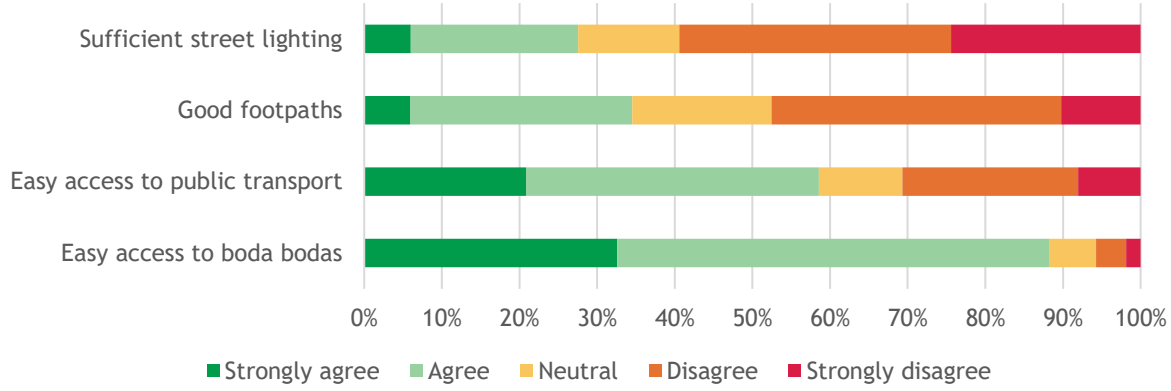


Figure 6: Presence of transport facilities.

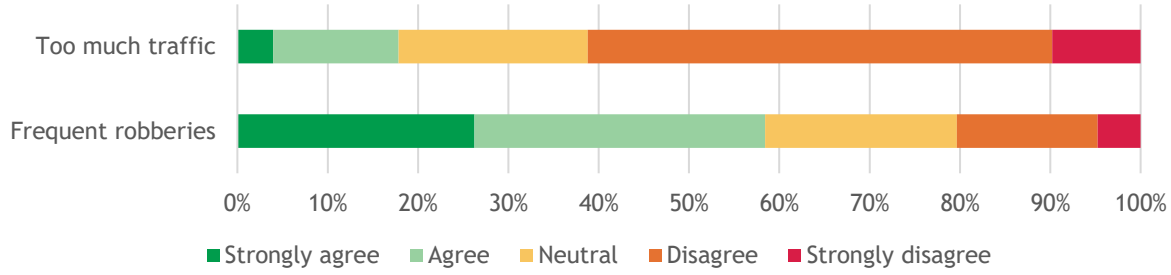


Figure 7. Presence of challenges.

3.4 Non-motorised transport

3.4.1 Walking

Pedestrian counts indicate that the greater CBD area in Kisumu has the highest pedestrian volumes, with 2,300 pedestrians per hour on Jomo Kenyatta Highway, 2,200 pedestrians per hour on Nairobi Road, 1,000 pedestrians per hour on Angawa Ave, and 1,800 pedestrians per hour on Oginga Odinga St. These findings point to the need for ample walking facilities in the city to cater to the high pedestrian volumes.

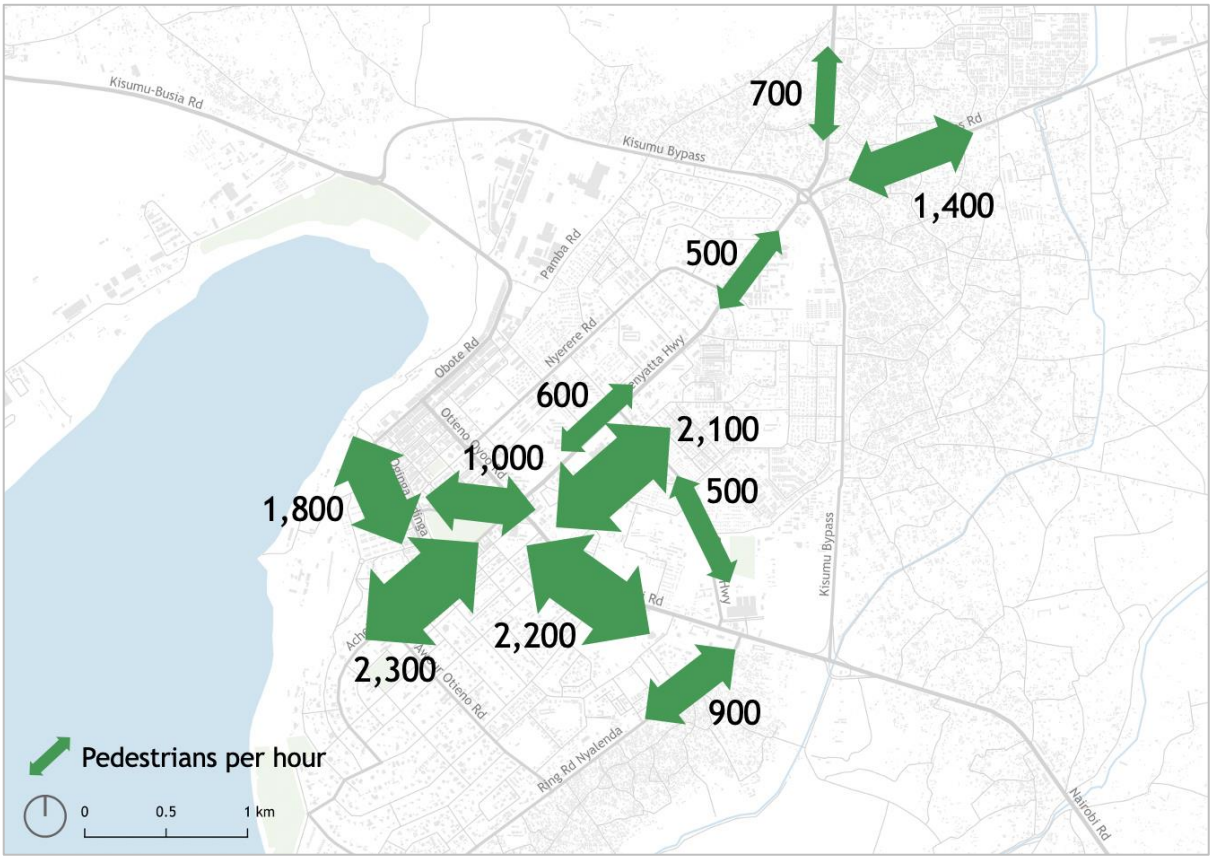


Figure 8: Pedestrians per hour.

Most areas in Kisumu are characterised by a mix of land uses including commercial, public purpose, recreational, and residential uses, contributing to heavy pedestrian movement. Despite the high pedestrian volumes and the fact that over half of trips are by foot, an inventory carried out by ITDP revealed that out of the city's existing street network, Kisumu only had 6.1 km of streets with footpaths on both sides out of approximately 336 km of streets within the city boundary.

Footpaths are multifunctional spaces that include space for walking, street furniture, street lighting, utility boxes, and green infrastructure. Accessible and convenient footpaths should enable continuous and unobstructed mobility of pedestrians even during peak hours. This is best achieved when footpaths include a designated space free of fixed objects, major gaps or deformities. This usable space is referred to as the clear width, to be contrasted with the total footpath width from the building frontage to the kerbside. Streets should be designed with a minimum clear width of 2 m so that two wheelchairs can pass each other.

Where decent footpaths exist, they are often encroached by parked cars or interrupted by steps, open drains, utility poles, and stop extensions. Also, the lack of continuity of footpaths across the city makes walking difficult where footpaths end. Poor maintenance of footpaths is also evident as footpath quality has deteriorated over time and needs repair or reconstruction.

Figure 9: High-quality walkways have been established as part of the Kisumu Triangle project (left). Wide, well-maintained walkways are also found within the Sports Ground (right).

Figure 10: Most streets in Kisumu have well-paved carriageways but lack footpaths and other pedestrian facilities.

Figure 11: Few streets in Kisumu have footpaths (top). Even fewer streets have footpaths of 2 m or wider (bottom).

Figure 12: Some existing footpaths lack continuity and universal access features.

Figure 13: The quality of many footpaths has deteriorated over time due to inadequate maintenance.

Figure 14: Nairobi Highway and the Kisumu Bypass are newly constructed roads that failed to provide safe facilities for pedestrians.

Figure 15: Wide shared lanes for pedestrians and cyclists along Nairobi-Busia highway. The NMT facilities are often encroached by motor vehicles, introducing safety risks for pedestrians.

Crossings are a primary cause of pedestrian deaths on urban streets. Pedestrian crossing points can be made safer by installing traffic calming features, signals, pedestrian islands, curb extensions that minimise crossing distances, and other pedestrian safety measures. These features are particularly useful to people who move at slower speeds, such as the elderly, disabled, and children. Well-designed pedestrian crossing facilities allow pedestrians and cyclists to cross busy urban streets safely and conveniently. A formal pedestrian crossing should be located at locations where most pedestrians prefer to cross the street, e.g. next to a bus stop, at a mall entrance, or intersection. In busy commercial areas, pedestrian crossings should be spaced at frequent intervals along the street.

Similarly, intersection designs should be as self-enforcing as possible. Universal access principles dictate that crossings be built so that pedestrians in wheelchairs can cross without any detours. This can be done through ramps to bring pedestrians from the sidewalk down to the street level crosswalk, or with raised crosswalks that remain at sidewalk level across the intersection.

Most streets in Kisumu lack designated crossing facilities and paved refuge islands. Pedestrians, in most cases, are forced to run across the street to avoid being hit by fast-moving vehicles. There are a handful of painted pedestrian crossings on a few streets in the CBD, but these crossings lack traffic calming elements to slow down vehicles and allow for safe crossing. Also, most crossings are not universally accessible and therefore not comfortable to most users. People in wheelchairs often require assistance to cross roads in Kisumu.

Figure 16: The lack of traffic calming and universal access hinder safety at crossing points (left). A traffic-calmed and accessible crossing is present at United Mall (right).

Figure 17: Many intersections lack safe pedestrian crossings.

Figure 18: Wide turning radii at intersections encourage speeding by vehicles, thus making it unsafe for pedestrians to cross the road.

Figure 19: Kisumu-Mamboleo highway, a newly constructed road, is very unsafe for pedestrians to cross (left). Children crossing Nairobi highway are exposed to untold safety hazards (right).

At-grade pedestrian crossings should be encouraged and footbridges avoided, especially in developing cities like Kisumu. KeNHA constructed a footbridge along the Nairobi-Kisumu road near the Mega City mall. Despite the heavy investment, the majority of pedestrians do not use the footbridge and prefer to cross at street level.

Footbridges are inaccessible to many pedestrians, including those carrying heavy luggage or children, expectant mothers, the sick, elderly and people with disabilities. Footbridges typically increase pedestrian travel distances and time, thereby inconveniencing intended users and thus discouraging walking. Pedestrians dislike having to climb a stairway to cross a street so most times they avoid the bridges and cross at grade at the risk of being hit by speeding vehicles. As a result, most footbridges and tunnels are grossly underutilised and do not represent the best use of limited public resources.

Figure 20: A pedestrian crossing road under the footbridge along the Nairobi-Kisumu Highway.

An inventory of educational institutions in Kisumu revealed that a substantial number of schools are concentrated along major transport corridors such as Jomo Kenyatta Highway. Several schools appeared to be adjacent to the road while some were just a few meters from the road. The streets that surround most of these schools are characterised by poorly designed or missing footpaths, insufficient shade cover, a lack of safe pedestrian crossings, and an absence of traffic calming elements. In place of dedicated footpaths, drainage covers are used as walking spaces. The poor quality of the drainage covers poses a threat to the wellbeing of school children.

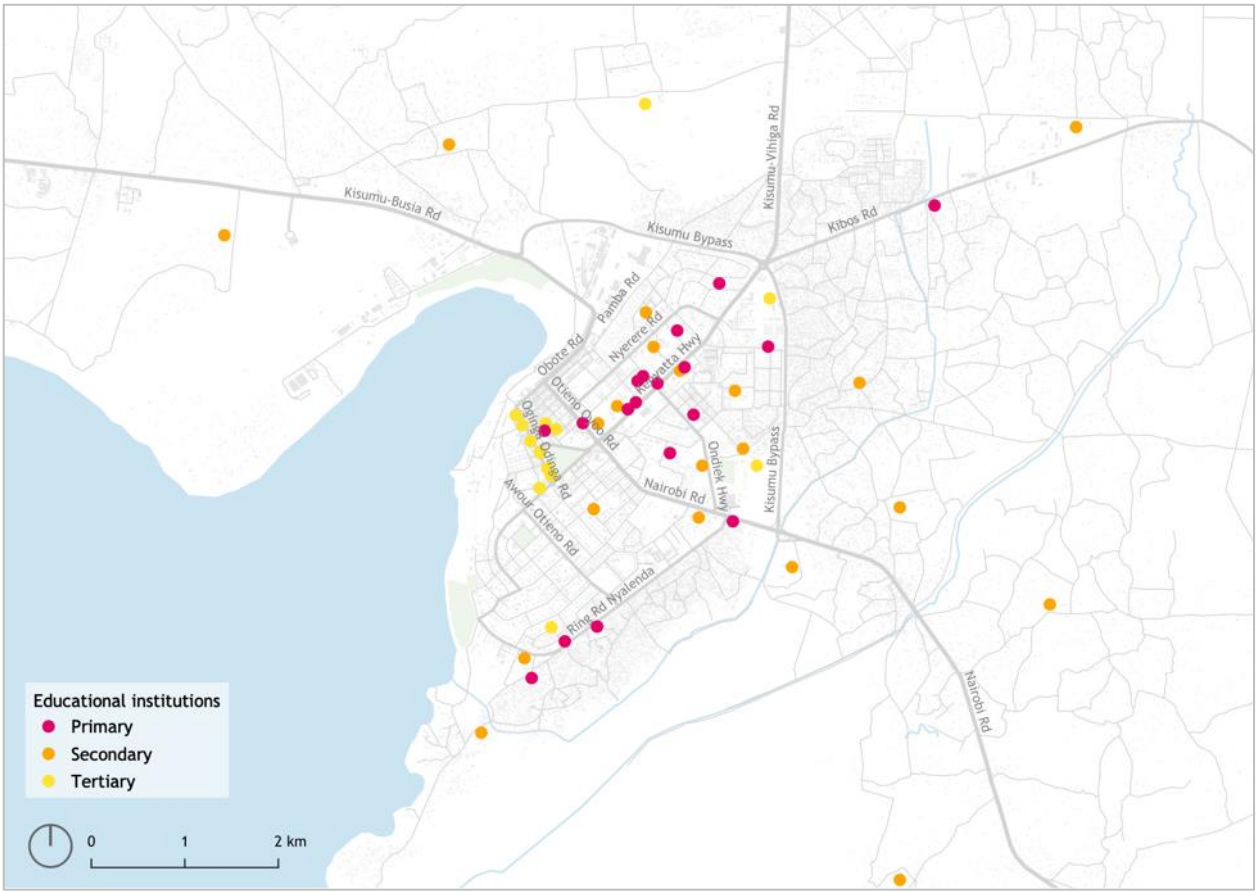


Figure 21: Educational institutions.

Where footpaths exist, there are no bollards to prevent vehicles from parking on footpaths. As a result, some sections of the footpaths are used for car and truck parking, pushing children and other pedestrians into the carriageway next to motor vehicle traffic. In some school zones, a significant number of people vend along the school walls, occupying walking spaces and leaving little or no effective width for children to use. School zones also lack bus shelters and organised waiting areas. This poses a threat to the safety of children.

The household survey sought respondents' opinions on how walkability can be improved in Kisumu. A majority of the respondents expressed the need to provide better footpaths to enhance walkability. Further, safer crossings were cited as another key priority to enhance the safety of pedestrians. Better lighting could significantly improve walkability in Kisumu as it could not only improve safety for

pedestrians but also enhance security at night. Residents also cited the need for more courteous driving behaviour on the part of motorists.

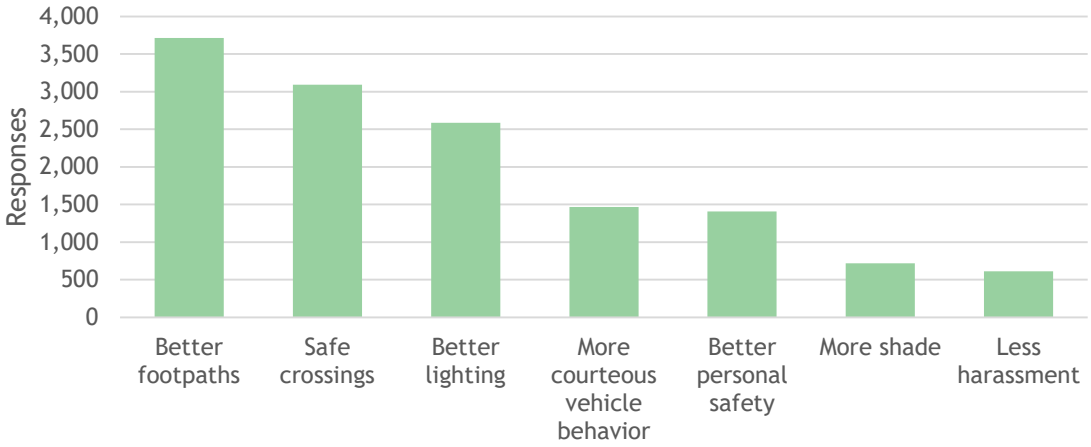


Figure 22: How walkability can be improved in Kisumu.

3.4.2 *Cycling*

Kisumu sees significant cycle volumes on several streets, especially in the greater CBD, with 230 cycles per hour on Angawa St, 220 cycles per hour on Jomo Kenyatta Hwy, 260 cycles per hour on Gumbi Rd, and 340 cycles per hour on Ondiek Highway.

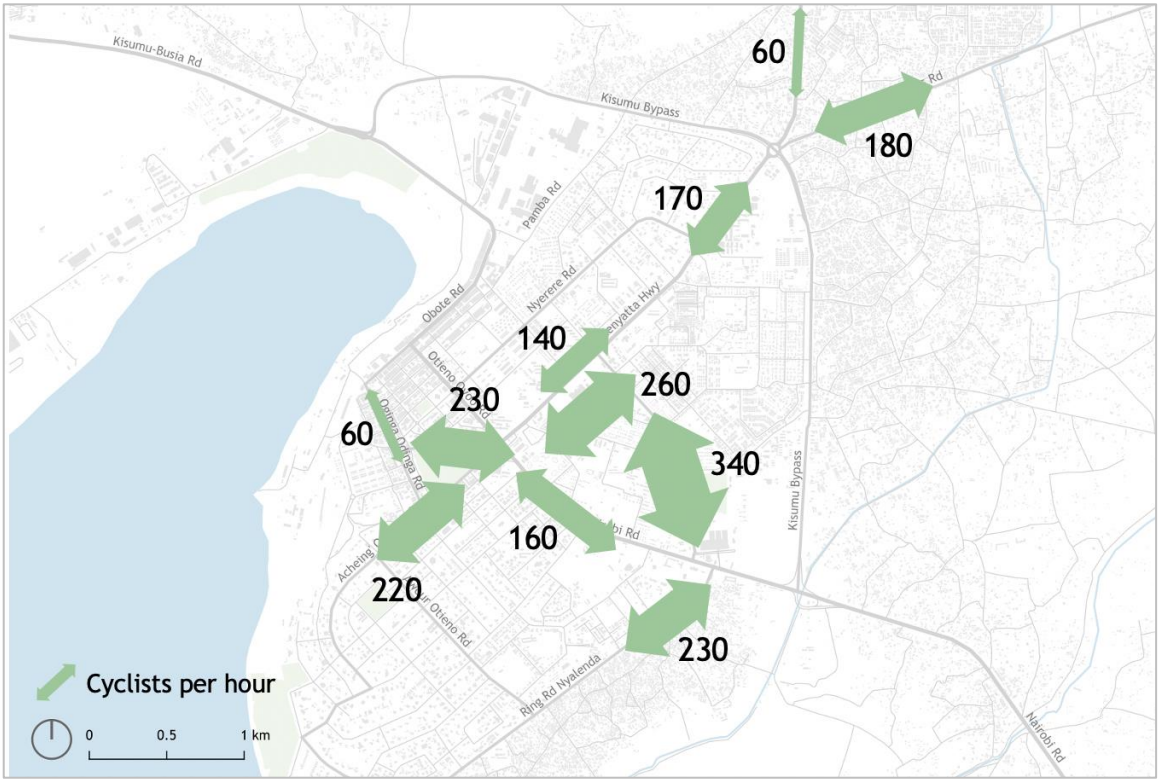


Figure 23. Cycles per hour.

Streets with fast-moving vehicles should be fitted with dedicated cycle facilities to reduce conflict between cyclists and motorised traffic, but despite the presence of a considerable number of cyclists, cycling infrastructure is largely absent in Kisumu. New road improvement projects, including Nairobi Road and Kisumu Bypass, incorporate shared lanes ostensibly meant to serve pedestrians and cyclists. While these shared lanes function reasonably well on some stretches, in many cases the space has been taken over by tuk-tuks and boda-bodas, in turn limiting the use by cyclists. As a result, cyclists are often observed riding on the carriageway where they are exposed to various risks including fast motor vehicle speeds, pollution from exhaust fumes, and hostility from motorists.

Figure 24: Cyclists on the carriageway due to lack of dedicated cycle facilities in Kisumu.

Kisumu has provided a few cycle parking racks spread across the city. The steel cycle parking racks allow cyclists to secure their bicycles safely. Due to the high number of cyclists in Kisumu, the bike racks do not meet the demand. This forces most cyclists to park their bicycles in informal street spaces such as next to trees, building poles and pillars. Few buildings in Kisumu, including government buildings, institutions, and schools include designated cycle parking. This limits the use of bicycles as a daily mode of transport due to the lack of bicycle safety.

Figure 25: Some streets have bicycle parking racks, but most cycle parking is informal.

To improve the cycling conditions in Kisumu, a majority of the respondents called for separate cycle tracks. Better lighting was another key priority among the respondents alluding that improved street lighting will improve their safety, security and visibility when cycling. Better road conditions, as well as more respect from other road users, especially the motorist, was also highlighted. Other areas of improvement include better access to cycle repair shops and better shade to enable cyclists to cycle even during hot weather, as shown in the chart below.

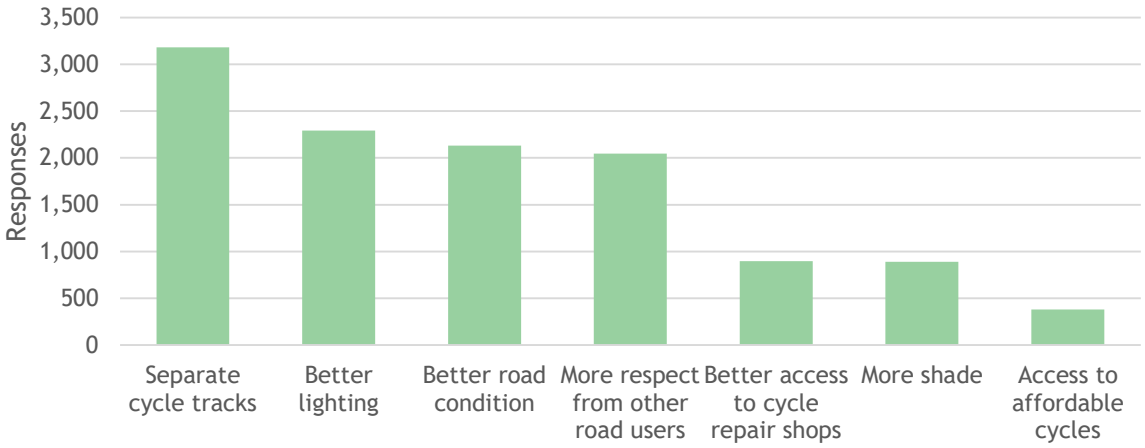


Figure 26: How the cycling experience can be improved in Kisumu.

3.5 Road safety

Crash data received from the Kisumu Traffic Police Department and NTSA reveal that most crashes in Kisumu occur on major roads including the Kisumu-Nairobi Road and Kisumu-Busia Road. In the city centre, Otieno Oyoo Rd, Obote Rd, and the beginning of Gumbi Rd near the bus park see a high rate of crashes. KeNHA recently upgraded Nairobi Rd, Busia Rd, Otieno Oyoo Rd, and Obote Rd as part of a road expansion project on the main national highway corridors in Kisumu (see section 4.1). A stretch of Ring Road Nyalenda near Simba stage also sees a high rate of crashes.

Urgent measures such as traffic calming and provision of well-designed footpaths, cycle tracks, and pedestrian crossings are necessary to bring down fatality rates on Kisumu roads. Research has shown that safe road infrastructure with adequate provision for public transport, alongside adequate and well-designed non-motorised transport facilities can lead to a significant reduction in road fatalities.[18]

[18] World Health Organisation (WHO). (2018). Global Status Report on Road Safety.

Figure 27. Locations of crashes from 2016-2018.

3.6 Street lighting

Street lighting improves visibility and enhances safety for all road users, including motor vehicle drivers, cyclists, and pedestrians. Well-illuminated streets improve perceived and real safety and security of a place, thus encouraging more people to walk. The presence of street lights also increases the hours of street commerce and leisure activities, in turn bringing economic and social benefits.

Street lighting is generally missing along many streets in Kisumu, leaving the streets dark and insecure for road users, particularly pedestrians, public transport users, and vendors. ITDP conducted a street lighting survey at night to establish the presence of street lighting. The survey revealed a patchwork of lighting facilities, with many streets characterised by poor lighting or a complete absence of lights.

Figure 28: Street lighting on Oginga Odinga St (left) and Ring Road Nyalenda (right) enhances safety and security for all road users.

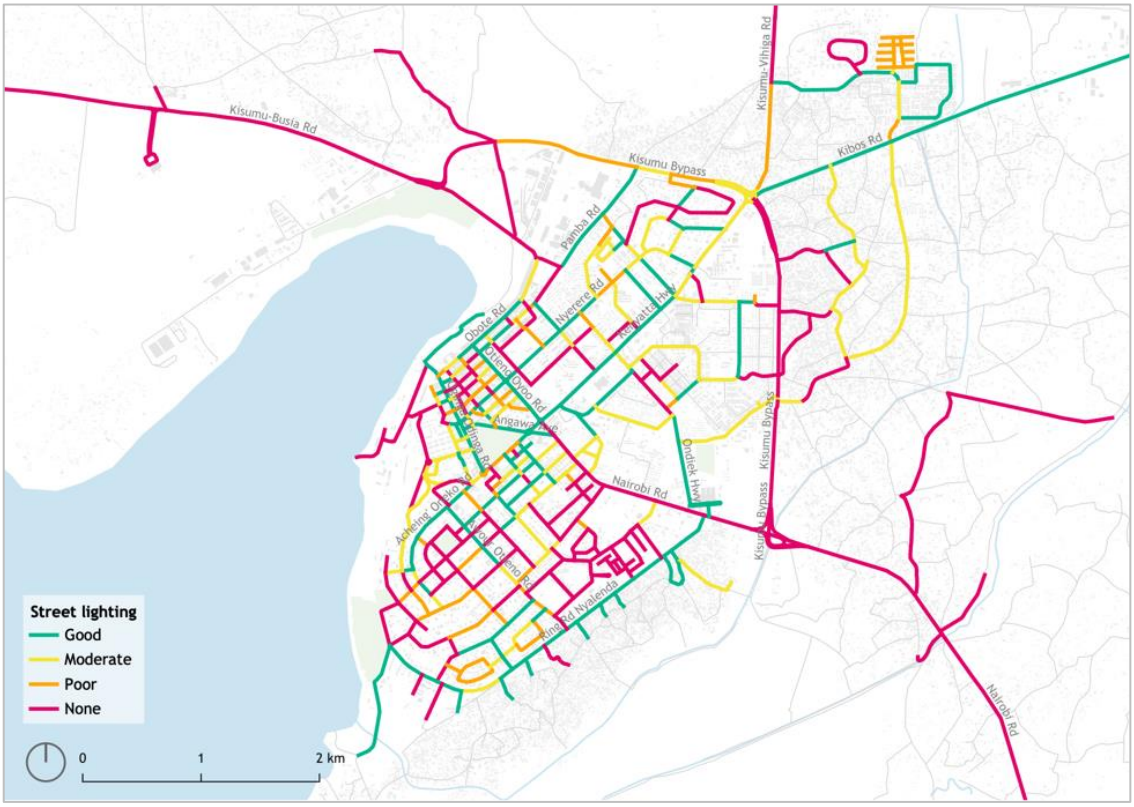


Figure 29: Street lighting quality.

3.7 Street vending

Commerce is a part of every city, and streets should be designed to accommodate both formal and informal commercial activity. Apart from providing essential goods and services at a low cost, street vendors increase activity on the streets, making them livelier and safer. However, due to the informal nature of vending, streets are often poorly adapted to integrate vending activities, and vending then becomes an obstruction that reduces the effective footpath width.

A lot of vending activity is observed on Kisumu streets. While vending on Jomo Kenyatta Ave seems well contained in its dedicated space, vending on other streets tends to spill into pedestrian space, thus obstructing free movement. This indicates the need to reorganise vending to ensure the smooth flow of pedestrians while facilitating street commerce.

Recently, the Kisumu has received support from the national government to facilitate the management of vending. The Government of Kenya allocated 23 acres of KRC land for the development of Uhuru Business Park, which aims to accommodate 10,000 vendors upon completion. Further, the Principal Secretary to the State Department of Housing and Urban Development Mr Charles Hinga announced the allocation of KES 350 million from the slum upgrading program for the construction of 2,500 jua kali stalls, a bus station, and boda-boda and tuk-tuk sheds. The goal is to ensure that vendors displaced from the street get ample and decent space to continue with their businesses. To facilitate successful relocation, the process needs to be highly participatory to ensure that the new sites have facilities needed by the vendors and that the design of the stalls guarantees comfort and functionality.

Figure 30: Well-planned vending can enhance security and make streets more vibrant, but in the absence of designated space, vending can obstruct pedestrian movement.

3.8 Public transport

Public transport service in Kisumu is provided by privately owned matatus with a capacity of 8 to 33 seats as well as three-wheeled tuk-tuks. From the household survey, 13 percent of trips in Kisumu are made using matatus, while another 3 percent of trips are made using tuk-tuks, which collectively make up the city's public transport system. Frequency-occupancy counts were conducted to assess the volume of public transport passengers on major corridors in the city (including both matatu and shared tuk-tuk passengers). The counts revealed major public transport routes such as Kenyatta Highway, with approximately 4,500 passengers per hour per direction (pphpd), Kibos Rd with 2,500 pphpd, and Nairobi-Kisumu highway with approximately 2,400 pphpd on one section.

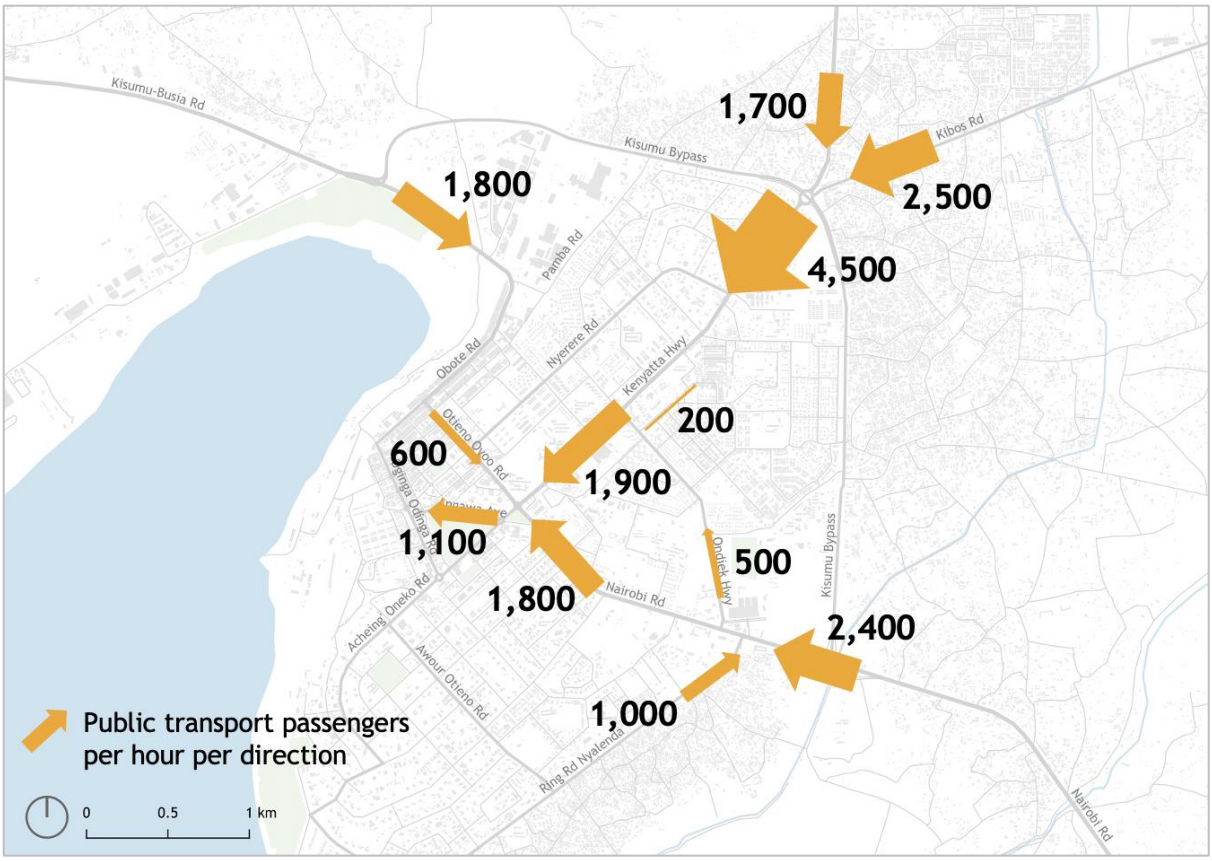


Figure 31: Public transport passengers per hour per direction (pphpd) along major corridors.

Most matatu and tuk-tuk routes extend from the greater CBD along major corridors such as Kenyatta Highway, Kibos Rd, Kakamega Rd, Nairobi Rd, and Busia Rd. Matatus serve the northern areas of the city and some routes to the south such as Kisumu-Ahero. A typical fare charged a local trip in Kisumu is KES 30. The fares are constant on most routes, except for a few routes with high passenger volumes where the fare fluctuates from KES 20 during off-peak periods to KES 30 during the peak. Most matatus operate along fixed routes, but some change from one route to the other depending on the demand and time of the day.

Under the national regulation, all tuk-tuks should operate as taxis. However, the majority of tuk-tuk service in Kisumu takes the form of fixed-route services, particularly during the morning and evening peak periods. On these fixed-route services, tuk-tuks typically charge lower fares and offer lower wait times than matatus due to the smaller vehicle capacity. As a result, they have managed to edge out matatus in some parts of the city, including the routes to Nyalenda and Nyamasaria. A few tuk-tuks serve the initial stretch of Busia Rd up to Bandani and Riat. Although most tuk-tuks terminate in the CBD, there are a few cross-town services to Kibuye Market. The number of tuk-tuks in Kisumu has been rising steadily, straining available parking spaces and stands. In focus group discussions, tuk-tuk operators expressed concern about the lack of designated parking and staging locations.

While most areas of Kisumu have some public transport service, one third of city residents do not have access to public transport within 500 m (i.e., a 6-minute walk). Areas lacking coverage include Obunga, eastern Manyatta, Riat, western Nyalenda, and central Milimani, as shown in the diagram below.

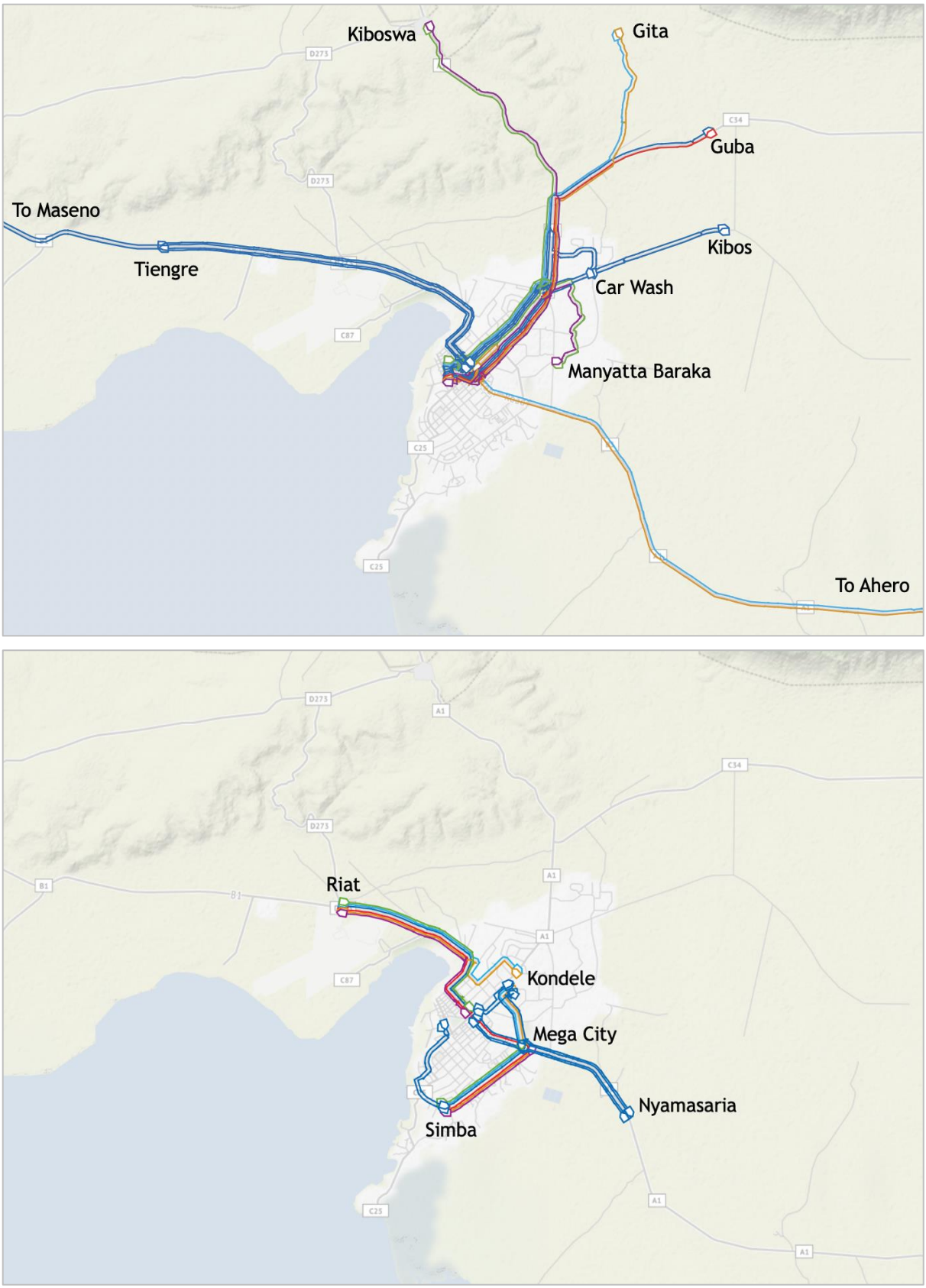


Figure 32. Public transport routes in Kisumu: routes operated by matatus (top) and tuk-tuks (bottom).

Table 1. Principal routes operating in greater Kisumu.

Route	Vehicle type	Distance (km)
Bus Park-Ahero	Matatu	21.8
Angawa-Manyatta Baraka	Matatu	6.7
Angawa-Kibos	Matatu	8.0
Angawa-Car Wash	Matatu	7.1
Angawa-Guba	Matatu	9.9
Angawa-Gita	Matatu	10.8
Angawa-Kiboswa	Matatu	11.4
Tiengre-Kisumu Boys	Matatu	9.6
Maseno-Kisumu Boys	Matatu	25.1
Simba-KCC	Tuk-tuk	4.1
Simba-Kondele	Tuk-tuk	4.4
Simba-Mega City	Tuk-tuk	2.6
KCC-Nyamasaria	Tuk-tuk	4.6
Kondele-Nyamasaria	Tuk-tuk	5.0
Riat-Kisumu Boys	Tuk-tuk	5.1
Riat-Kondele	Tuk-tuk	5.7
Bus Park-Kondele	Tuk-tuk	1.1
Simba-Nakumatt	Tuk-tuk	2.8

Figure 33: Matatus found in Kisumu: (14-seat minivan and 33-seat buses).

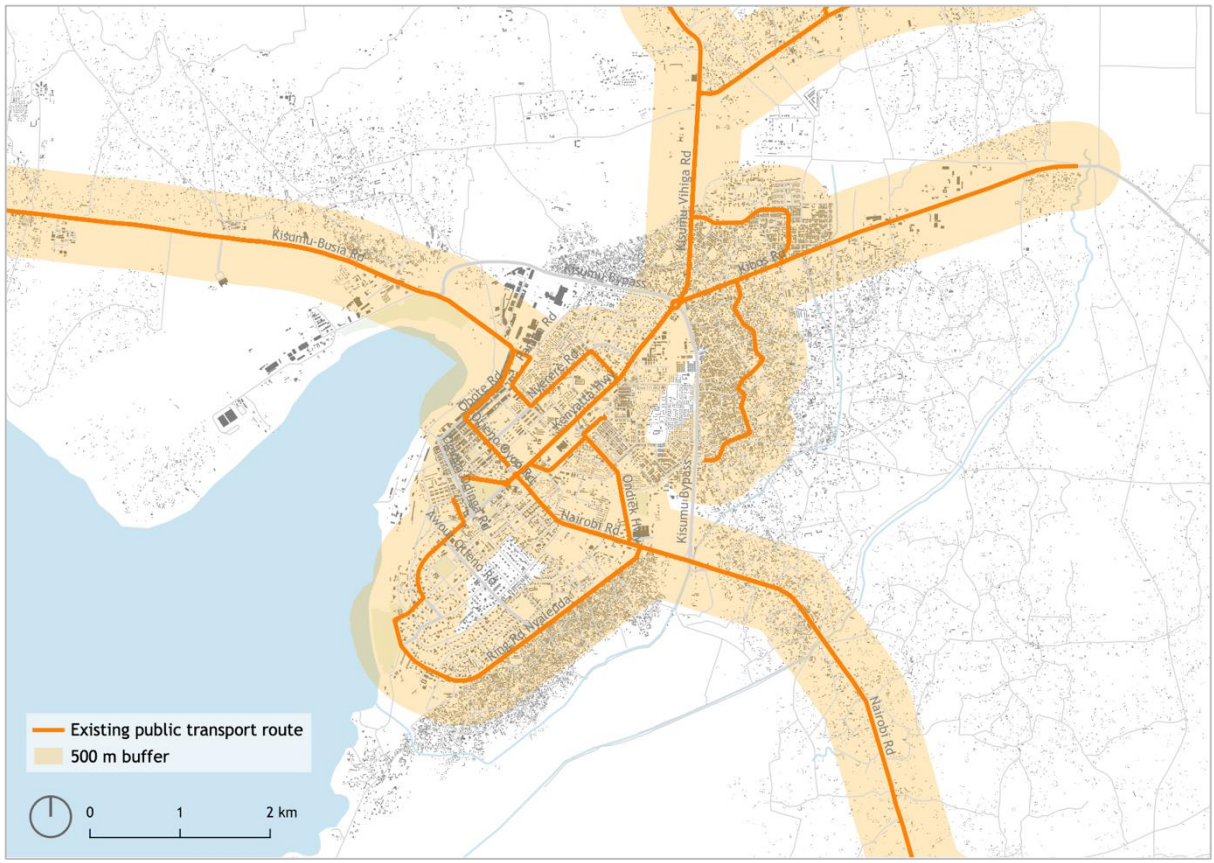


Figure 34. Central Kisumu has good public transport access, but built-up areas such as Obunga, eastern Manyatta, Riat, western Nyalenda, and central Milimani lack service.

Matatus are registered, licenced, and regulated by NTSA but operate with little formal oversight. Matatus are required to join a savings and credit cooperative society, or "sacco" as a condition of the registration process. There are 17 saccos that operate in Kisumu. The public transport industry is characterised by challenges including overloading, inconsistent fares, and low compliance with the traffic code. Fourteen-seat matatu vehicles often carry as many 18 to 20 passengers. Similarly, tuk-tuks are officially permitted to carry up to three seated passengers, but often exceed this number to carry six to eight passengers. Busy routes have an excessive number of vehicles and are sometimes over-traded, while on other routes service is unreliable and is therefore supplemented by tuk-tuks and boda-bodas.

Due to the informal industry structure, matatu drivers and conductors typically work under the "daily target" system, where they are responsible for paying a fixed rate to the vehicle owner each day and retain the rest of the fare revenue, net of refuelling and other expenses. During focus group discussions, the majority of the matatu operators explained that they work every day without leave. During the off-peak hours, operators sometimes rest and leave the vehicle to another driver and conductor, popularly referred to as a "squad." The decision to engage the squad is at the discretion of the operators, and the squad is paid at an agreed rate. Peak hours are from 5:30 to 9:30 and 17:00 to 20:00.

Table 2: Matatu saccos and fleets.[19]

SACCO	Intercity fleet	Intracity fleet	Total fleet
KAMTCO	200	-	200
KISTAG	95	5	100
Lakebelt	108	12	120
Ebenezer Sacco	90	30	120
Mamakon	80	120	200
K2BU	44	6	50
Mamboline	4	56	60
Kitoma	29	106	135
Makoma	42	43	85
Nile Perch	82	5	87
Victoria Shuttle	30	35	65
MOA Reliant	-	39	39
Uyoma Kisumu SACCO	32	-	32
Kikasa	21	7	26
Kihomi	19	3	22
Great Nyanza	31	-	31
Total	907	467	1,372

There is one bus terminal in the CBD, Kisumu Bus Park, located along Kenyatta Highway at the junction with Nairobi Rd. The County Government of Kisumu manages the bus park. To use the bus terminal, each matatu is required to pay KES upon entry at the cash and ticketing office. In the financial year 2016/2017, the County Government of Kisumu collected about KES 136,848,485 in parking fees from the bus park.[20] The bus park only supports the inter-county services, and hence local city services do not have designated locations for operation. For this reason, the town service matatus pick and drop passengers along the road and with no designated bus stops. This puts the matatu operators in frequent conflict with the traffic police due to alleged obstruction violations. Township services are charged KES 2,000 per month, except for those that operate from town to Tiengre, which pay KES 2,400.

[19] County Government of Kisumu. (2016).
[20] County Government of Kisumu. (2016). Kisumu County Budget for 2016/2017.

Figure 35: Intercity matatus in the Kisumu Bus Park.

Table 3: Intercity routes operating from the bus park[21]

Route	Vehicle type	Fleet size
Nairobi	Bus	33
Mombasa	Bus	8
Busia	Bus	4
Busia	Minibus	23
Kakamega	Minibus	20
Migori	Minibus	17
Kakamega	Matatu	160
Busia	Matatu	150
Migori	Matatu	134
Ahero	Matatu	74

New roads such as Busia Road, Nairobi Road, and the Kisumu Bypass have poorly designed bus stops that interfere with the movement of NMT users and the comfort of those waiting for or alighting from the vehicles. Also, most bus stops in Kisumu lack shelters.

[21] County Government of Kisumu, Bus Park Section (2020).

Figure 36: In the absence of city centre terminal facilities for local services, matatus stop on the carriageway or footpath to pick or drop passengers.

Figure 37: There are no officials terminals or staging areas for tuk-tuks. Tuk-tuks have thus appropriated sections of the carriageway or NMT facilities as terminal areas.

Figure 38: A poorly positioned bus shelter on Busia Rd (left) and a bus stop without any passenger facilities in Guba (right).

Figure 39. Many public transport vehicles in Kisumu are heavily polluting.

To improve public transport in Kisumu, the majority of household survey respondents expressed the need to reduce waiting time. The passengers face long wait times at terminals, especially during off-peak periods. A desire for less overcrowding in matatus was also cited as a key priority. Safety of matatus is also crucial. Other areas of improvements are as shown in the chart below.

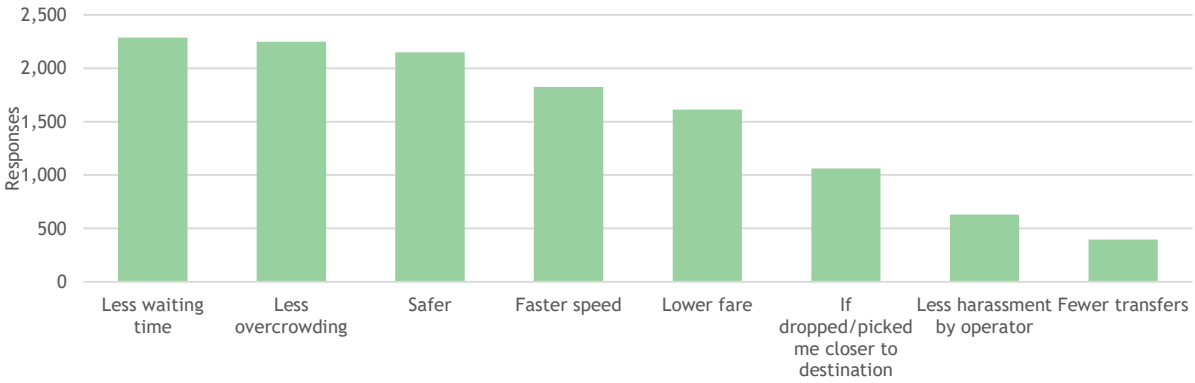


Figure 40: How to improve the public transport experience in Kisumu.

The household survey also asked car and tuk-tuk taxi users what would induce them to switch to public transport. Private vehicle users cited similar factors to those mentioned by public transport users, including less wait time, less overcrowding, enhanced safety, and lower travel times.

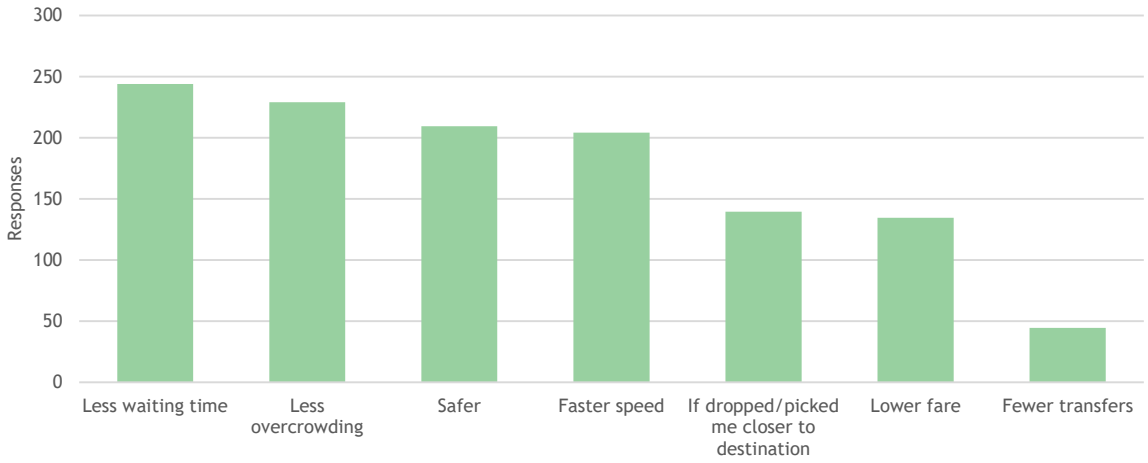


Figure 41. Factors that would induce private vehicle users to switch to public transport.

3.9 Taxi services

Taxi services refer to door-to-door services without intermediate stops. These services include motorcycle taxis, or boda bodas, and bicycle boda bodas. These modes typically serve short trips and offer last-mile connectivity to public transport. Tuk-tuks and cars also provide taxi service in Kisumu.

3.9.1 Motorcycle boda-bodas

Kisumu has seen a surge of motorcycles from the early 2000s, driven in part by the affordable cost of motorbikes and the relative lack of regulations governing passenger operations. From the passenger's perspective, motorcycle boda-bodas are preferred because they have faster speeds and ability to penetrate residential areas even under poor road conditions. Although required to ferry one passenger per trip, motorcycle boda-bodas sometimes ferry as many as four people per trip.

Boda-bodas are popular in areas such as Dunga, Bandani, Obunga, Tom Mboya, Nyalenda, and parts of Milimani that do not have regular public transport service. In some areas, paratransit services begin late or terminate early, leading to demand for boda-boda services. Motorcycle boda-bodas often operate from "stands" in the CBD, residential areas, trading centres, commercial centres, and public transport stops. The stands are operated by informal stage managers, who sometimes manage a queueing system to distribute trips among the drivers operating from the stand. Operators typically pay a stage fee of KES 250-350 per month. Despite the presence of stands, passengers typically hail and ride boda-bodas from anywhere along the road.[22] The boda-boda sector in Kisumu is yet to adopt digital hailing technology such as that employed in services such as Safe Boda and Uber Boda.

[22] Mutiso, W. (2010). Boda-boda bicycle taxis and their role in their transport systems. Case studies of Kisumu and Nakuru, Kenya, Master of Science in Engineering, University of Cape Town.

Figure 42: A lack of motorcycle boda-boda parking facilities has contributed to encroachment on walking and cycling spaces (left). In some cases, the government has created designated parking areas (right).

In Kisumu, motorcycle operators typically make 12-20 trips per day with an average fare of KES 50 per trip. Many operators do not own their vehicles. Operators reported that peak hours range from 6:00-10:00 and 16:00-19:00. Motorcycle boda-bodas are required to pay KES 500 per month as a levy to the county government, yet some operators fail to adhere to this requirement citing poor or lack of infrastructure such as shades and stands.[23] A total of KES 25,000,000 in fees were collected in the financial year 2016/2017, corresponding to a boda-boda fleet of approximately 4,200 vehicles.[24]

In recent years, motorcycle boda-bodas have been linked with criminal activities.[25] The once trusted mode of transport has allegedly been infiltrated by robbery, murder, and mugging, among other heinous crimes.[26] Motorcycle boda-boda operators have been both victims and perpetrators. Some former passengers claim that they no longer use motorcycles after a certain time at night due to fear of criminal activity.

When asked how motorcycle experience can be improved, respondents noted the need for passenger helmets and safer driving. Several respondents also mentioned the need to know the driver identity on the vest and helmet as a means of improving personal safety and security.

[23] County Government of Kisumu. (2018). The Kisumu County Finance Bill.
[24] County Government of Kisumu. (2016). Kisumu County Budget for 2016/2017.
[25] Ojwang, J. (2018). Boda-boda criminal gang put on notice. Retrieved 8 Sep 2018. From https://www.capitalfm.co.ke/news/2018/06/boda-boda-criminal-gang-put-notice-kisumu/
[26] Nation Media. (2018). Gang wielding gangs on motorbikes terrorise Kenyans. Retrieved 8 Sep 2018. From https://www.nation.co.ke/news/Gun-wielding-gangs-on-motorbikes-terrorise-Kenyans/1056-4532380-b7oi9gz/index.html

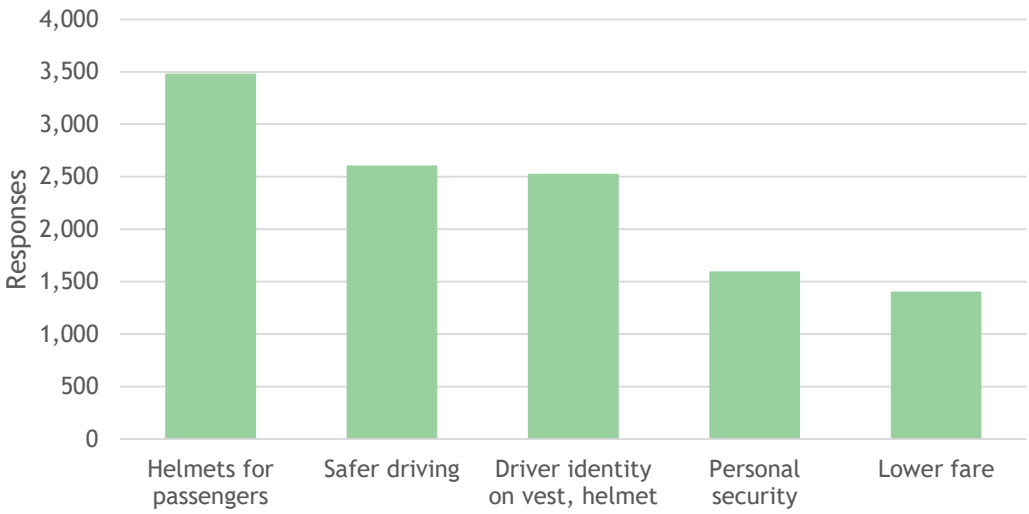


Figure 43: Measures to improve motorcycle boda-boda experience.

3.9.2 Bicycle boda-bodas

Bicycle boda-boda services are provided on "black mamba" bicycles that have been equipped padded cushions fitted over the rear carrier for the comfort of the passengers. Bicycle boda-bodas offer low fares compared to motorcycle boda-bodas. While the number of bicycle boda-bodas has fallen since the early 2000s, a significant market still exists in Kisumu.

Having a bicycle is the sole requirement of cycle boda-boda operation. The current laws and regulations do not require bicycle operators to be registered. Additionally, there are no licenses, training, or insurance needed to operate a bicycle boda-boda. Some operators wear reflective jackets for safety, but none wear a helmet while riding. Bicycle boda-boda operators typically make 12-20 trips per day with an average fare of KES 20 per trip. Boda-boda operators have some established pick-up points, but there are no shade shelters. Given the lack of cycle tracks on many streets, operators need to use carriageway, which subjects them to harassment, hostility, and road safety challenges. There is also a negative perception surrounding boda-boda operators: it is widely assumed that they are extremely poor and given a chance they would buy a motorcycle.

Figure 44: Boda-bodas are used by men and women, but almost all operators are men.

Figure 45: Lack of shelter for bicycle boda-boda operators.

When asked how bicycle boda-bodas can be improved, residents again cited separate bike tracks as the most important point. Additional priorities include better lighting, better road conditions, and operator hygiene.

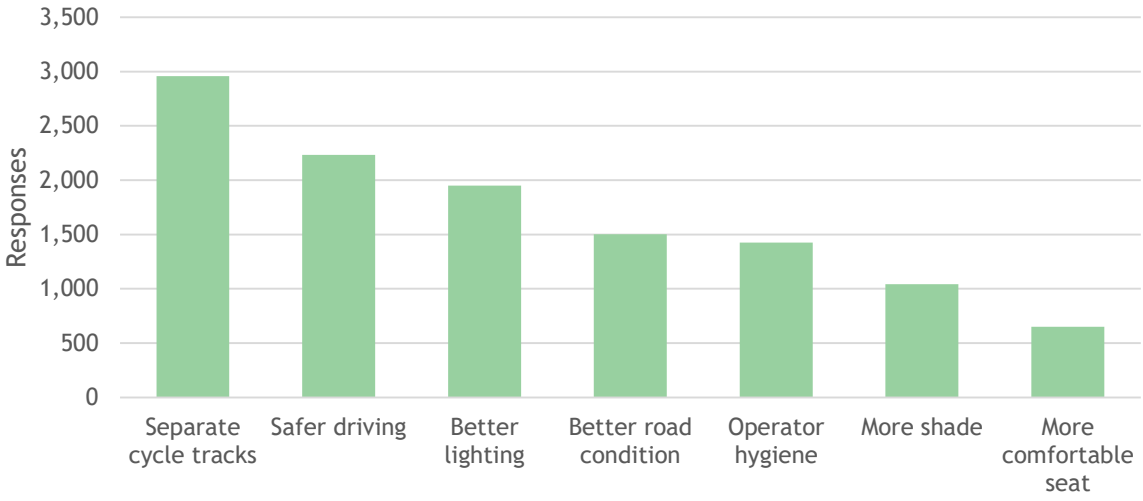


Figure 46: How to improve bicycle boda-boda experience.

3.9.3 Car taxis

Kisumu has a small fleet of car taxis, with bases at the airport and popular hotels in the CBD. There are no meters, so fares are determined through negotiation. The taxi operators have not yet adopted modern technology of taxi services such as Uber, Little Cab, and Bolt. I.T. equipment could help the taxi operators to be more demand responsive and to charge the customers fairly depending on the distance covered.

3.10 Parking

Cities have realised the significant impact of parking on urban land use, transport systems, traffic patterns, pedestrian access, and urban form. Previously, cities focused on parking as a supply issue, making efforts to provide more parking to accommodate "projected" demand. Cities now realise that appropriate parking charges can act as a lever to discourage the use of personal motor vehicles and ensure that personal motor vehicle users compensate the city for occupying valuable street space. Many cities are introducing time-based charges for on-street parking, introducing moratoriums on government-subsidised parking, and setting maximum parking standards in new private developments. The goal of these parking management techniques is to control the supply of parking, especially in areas with good access to public transport, thereby encouraging a shift toward the use of public transport, walking, and cycling.

The increasing number of personal cars in the city of Kisumu has resulted in growing demand for parking. Within the Kisumu CBD, on-street parking is managed by the County Government, which charges a minimum fee of KES 100 per slot per day along gazetted streets, with higher fees for larger vehicles. In fiscal year 2017/2018, parking generated revenue of approximately KES 87,259,106. Parking revenues help fund the overall County budget and are allocated to various projects in the County, including both transport- and non-transport-related projects. The table below shows the gazetted parking fees for various vehicle sizes.[27]

Table 4: Parking fees by vehicle type.[28]

Type of vehicle	Daily fees	Reserved parking (monthly)
Vehicles up to 3 tons	100	2,000
2.1-3 tons	100	2,000
3.1 - 7 tons	200	3,400
Over 7 tones	300	4,500
Trailers & semi-trailers	1,000	-

[27] County Government of Kisumu (2018). Kisumu County Budget for 2017/2018.
[28] County Government of Kisumu. (2018). Finance Bill (2018).

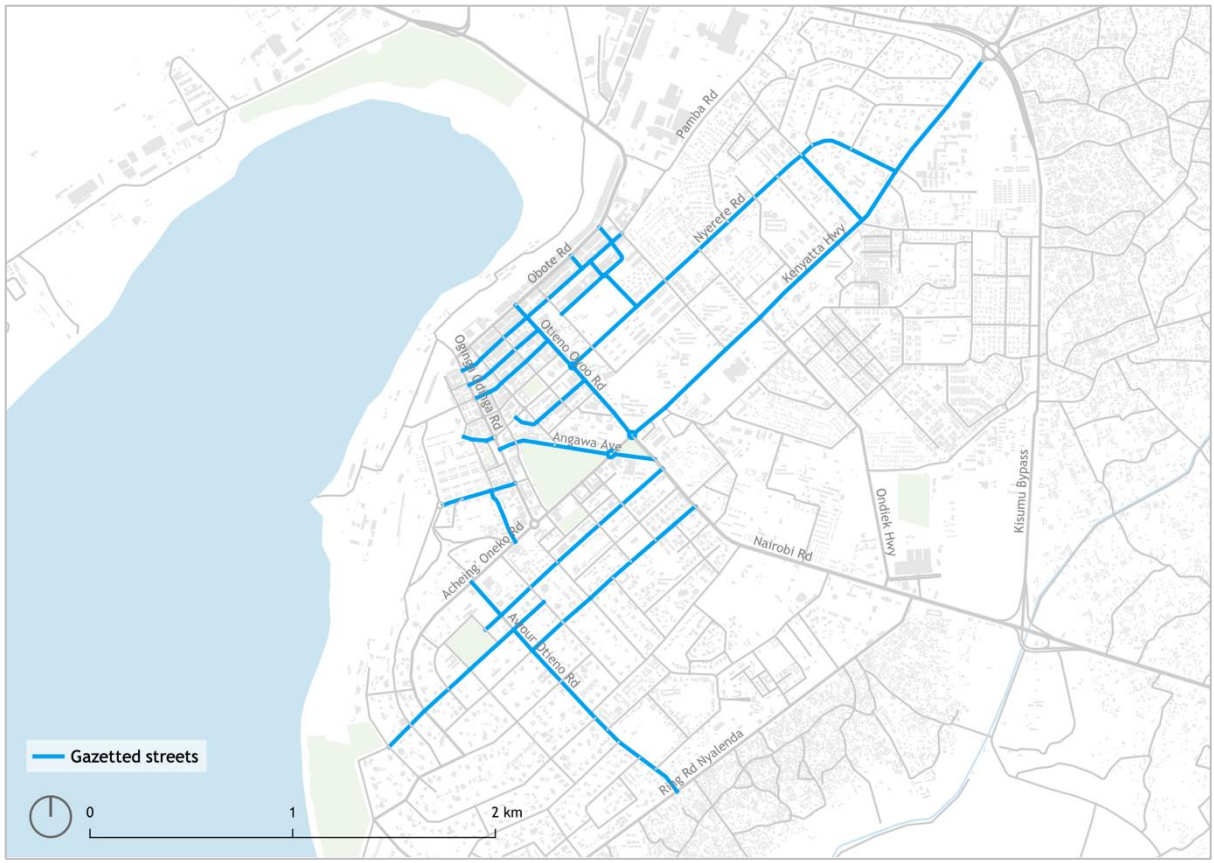


Figure 47: Gazetted on-street parking locations in Kisumu.

Figure 48: Plentiful low-cost on-street parking in the Kisumu city centre promotes the use of private cars, contributing to traffic congestion and air pollution.

Figure 49: On-street parking occupies prime space in the Kisumu CBD.

Figure 50: Handheld device used to monitor parking fee payment.

Most streets outside the CBD are not gazetted and thus subject to haphazard parking. Drivers often park on pedestrian footpaths or shared NMT lanes, forcing pedestrians to walk in the carriageway. Parking on these streets is free.

Figure 51: Ungazetted streets are characterised by haphazard parking behaviour and encroachment of pedestrian spaces.

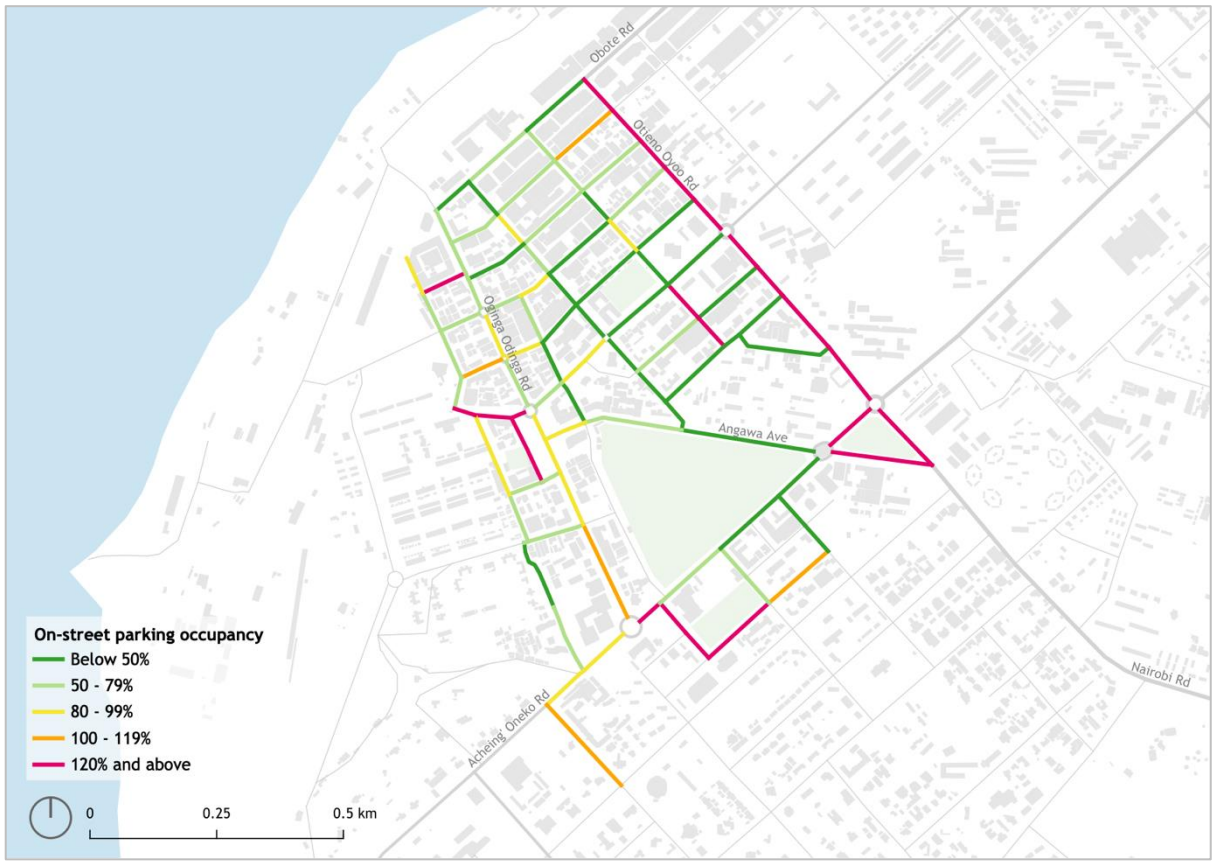


Figure 52. Most streets in the city centre of Kisumu have a parking occupancy rate of less than 50 percent.

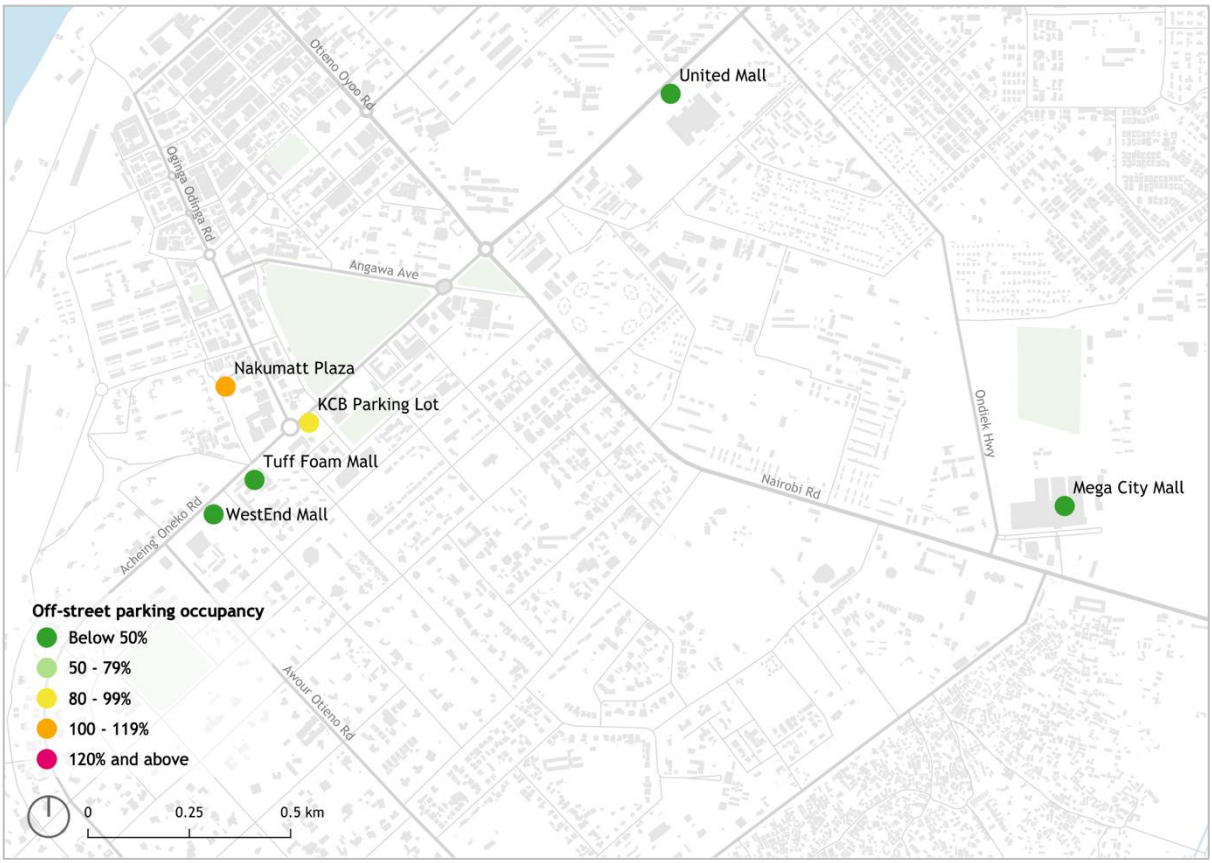


Figure 53. Most off-street parking lots have low to moderate occupancy rates.

3.11 Water transport

Lake Victoria is the second-largest freshwater lake in the world. The lake plays a vital role in linking East Africa block (i.e., Kenya, Uganda, and Tanzania). Water transport in Kisumu has declined due to the advent of higher-speed connections for road-based freight transport. An additional challenge is posed by water hyacinth, which blocks important waterways and landing sites, making movement difficult, especially for small boats.[29] Currently, two water buses operated by the private sector transport passengers from Kisumu to the nearby islands of Rusinga, Mfangano, Luanda, and Kotieno as well to other neighbouring counties of Siaya and Homa Bay.

With the revitalisation of the Kisumu port, Kisumu water transport may see improvement in water transport and an expected increase in goods movement to Uganda. As alluded to in the ISUD, water transport should be integrated with other modes of transport, including public transport and NMT, to enhance efficiency and user convenience.[30] Another opportunity is local water tourism. At present, the lake is not accessible to the public as the port occupies much of the waterfront near the Kisumu CBD. Also, Kenya Railway Corporation (KRC) developments separate the lakeshore from downtown Kisumu. Recently, the KRC land was fenced, thereby preventing the movement of pedestrians and cyclists through the property. This has further limited the access to the lake by the public.

[29] Atieno Mumma, University of Nairobi (1999). The Lake Victoria water hyacinth: its implications for international environmental conflicts (IECS) management and regional relations in East Africa.
[30] County Government of Kisumu. (January 2014). Kisumu ISUD Plan Part 2.

4. Ongoing and planned transport projects

4.1 Improvement of national highways

Over recent years, KeNHA has implemented road improvements along national highway corridors, including Busia Road, Nairobi Road, Kisumu Bypass, and Jomo Kenyatta Highway from Kisumu Boys to the Mamboleo road turnoff). The World Bank has financed some of the works through the National Urban Transport Improvement Project (NUTRIP). While the improvements have brought about travel time savings for motor vehicle users, the design of the corridors poses several challenges to safe, efficient access within the City of Kisumu, particularly for pedestrians, cyclists, and public transport users.

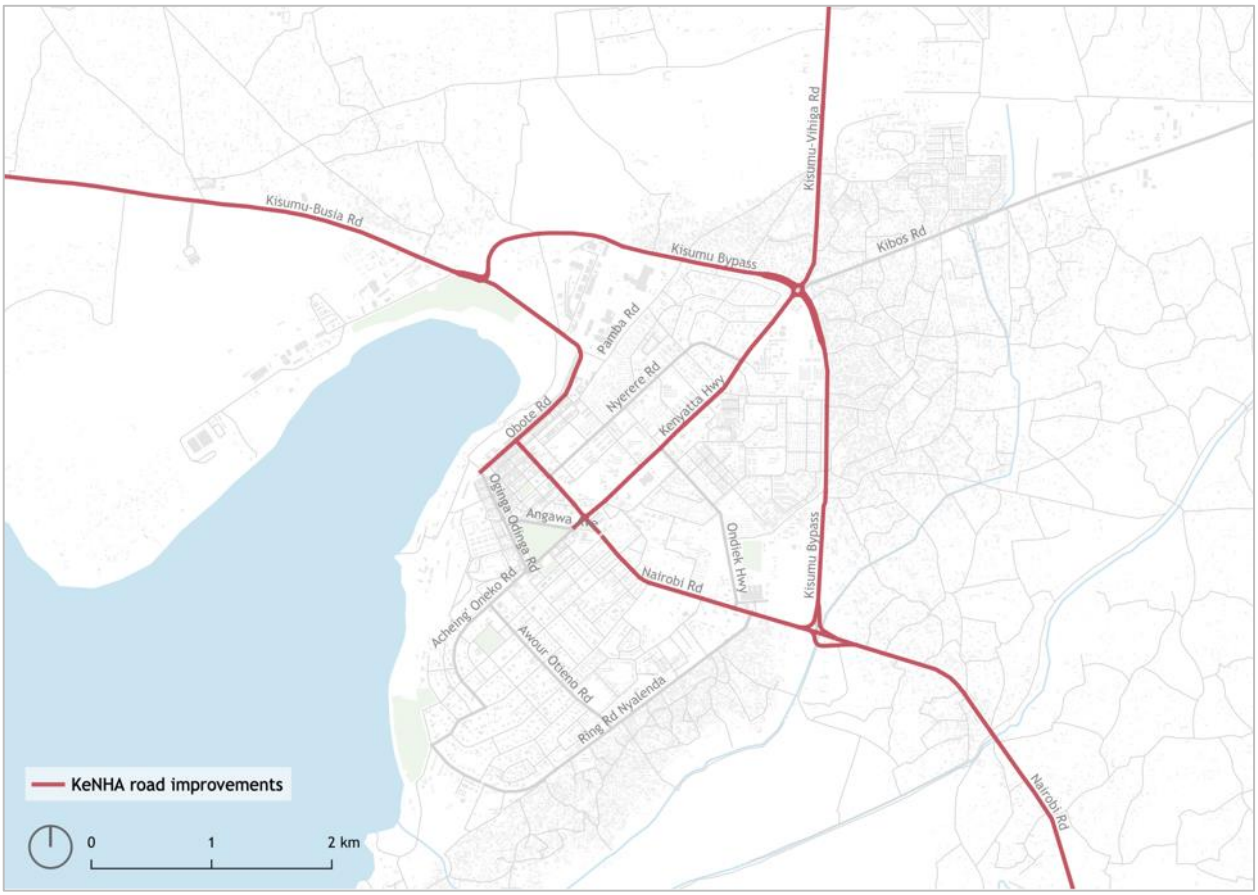


Figure 54: National highway corridors under improvement by KeNHA.

Most of the corridors include 3-4 m wide lanes for NMT users, separated from the carriageway by a low kerb. These outer lanes were meant to be shared spaces for NMT users, and on some stretches, they function adequately as a safe space for walking and cycling, with bollards to prevent cars and tuk-tuks from entering the lanes. However, in other locations, the NMT space has been taken over by tuk-tuks, boda-bodas, and matatus, resulting in numerous conflicts. In some cases, pedestrians and cyclists prefer to travel on the 1.3 m drain covers to avoid conflicts with motor vehicles. Motorcycles use the NMT lanes to avoid the rumble strips and bumps on the main carriageway. Errant motorists

accessing adjacent buildings or plots at times drive over the covers, causing damage and gaping holes where covers have become displaced.

There are few designated at-grade pedestrian crossings on the recently improved corridors. Children and other road users are forced to cross wide expanses of the carriageway. In instances where median refuge islands have been provided, they are too narrow, leaving pedestrians feeling unsafe amidst fast-moving traffic. A footbridge was recently constructed next to the Mega City entrance, but the footbridge is underutilised by pedestrians, who prefer to cross at grade.

There are few formal bus stops and shelters, despite the national highways being major public transport corridors. The chaotic nature of traffic at locations such as Jubilee Market is a result of inadequate facilities for public transport, goods vehicles, and organised on-street parking. As a result, matatus, tuk-tuks, and boda-bodas use the 4 m service lane for boarding and parking. With some vendors displaying their wares on top of the covered drains, pedestrians are often left with the carriageway as the only place to walk.

From a motorist's perspective, a lack of intersections and U-turn opportunities restricts access and increases travel distances. For example, vehicles coming from Nyamasaria need to drive to the Mega City roundabout to access the opposite side of the street. The result has been that tuk-tuks and motorcycles use the 4 m NMT lane, effectively turning it into a service lane. Several crashes have occurred on the stretch as a result of motorcyclists making turns through the drainage spaces along median kerbs to avoid travelling to the next formal U-turn location.

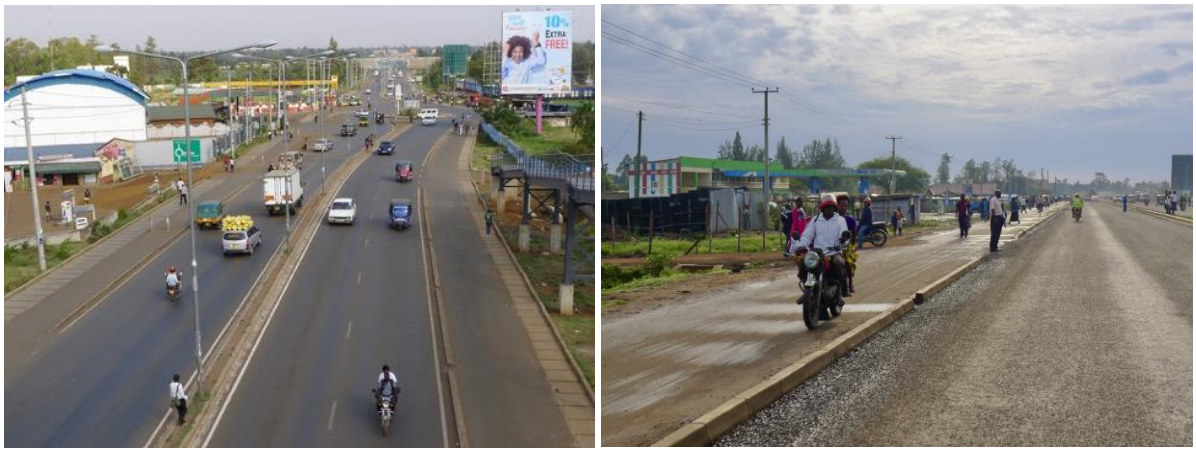


Figure 55: While service lanes on Nairobi Rd sometimes function as shared spaces, most stretches lack traffic calming elements that would make them safe for walking.

KeNHA is currently reconstructing the 5 km stretch of Kenyatta Highway from Kisumu Boys roundabout (A1-B1 junction) to Mamboleo (A1-C34) junction. This road traverses a densely built-up area with major market centres, schools, shopping malls, churches, hospitals, recreation centres, bus parks, hotels, and restaurants. It has approximately 22 main matatu stops and carries intracity paratransit routes from the city centre to Mamboleo, Car Wash, Migosi, Lowe, Kenya Re, Manyatta, Kondele, and Kibos. ITDP, in collaboration with the County Government of Kisumu, has provided input to KeNHA and the World Bank on measures that could enhance access and safety for pedestrians, cyclists, and public transport users. KeNHA has adopted the following design changes:

- Footpaths will be raised above the carriageway on the stretch from Kisumu Boys to Kondele.
- Footbridges are to be replaced with traffic-calmed at-grade crossings.

While these design changes are a welcome improvement, more effort is needed to achieve a complete design that accommodates all users. ITDP and CGK proposed the following additional elements for the Kenyatta Highway designs:

- Protected cycle lanes.
- Safe intersection designs with appropriate turning radii, pedestrian crossings, refuge islands, and traffic calming or signalisation.
- Bus stops with shelters for public transport passengers.
- Universal access at property entrances, intersections, and midblock crossings.
- Trees to provide shade for pedestrians.

Figure 56: The Kenyatta Highway project includes concrete footpaths along some stretches. However, the design does not incorporate universal access features or tree cover.

Figure 57: Wide turning radii at intersections encourage drivers to move at high speeds, thus endangering NMT users.

4.2 Kisumu Triangle NMT project

The City of Kisumu recently implemented high-quality pedestrian and cycling facilities on three main streets in the CBD: Oginga Odinga, Ang'awa Ave, and Jomo Kenyatta Ave. Known as the Kisumu

Triangle, the project is financed by the World Bank through the Kenya Urban Support Program (KUSP). The improved streets are designed to give priority to people through the following elements:

- Wide footpaths (at least 2 m of clear space) raised at 150 mm above the carriageway on either side.
- Safe, universally accessible at-grade pedestrian crossings with signalisation or traffic calming at preferred crossing locations. Pedestrian crosswalks should be designed as tabletop crossings at the same height as nearby footpaths.
- Protected cycle lanes with physical separation from motor vehicle traffic.
- Bollards at pedestrian crossings to prevent vehicles from using the ramps to enter the footpaths.
- Conservation of all existing trees and permeable paving blocks around trees to protect tree roots and expand the usable area of the footpath.
- Street lights to enhance safety and security.
- Bus shelters for the comfort of public transport passengers.
- Public toilets.

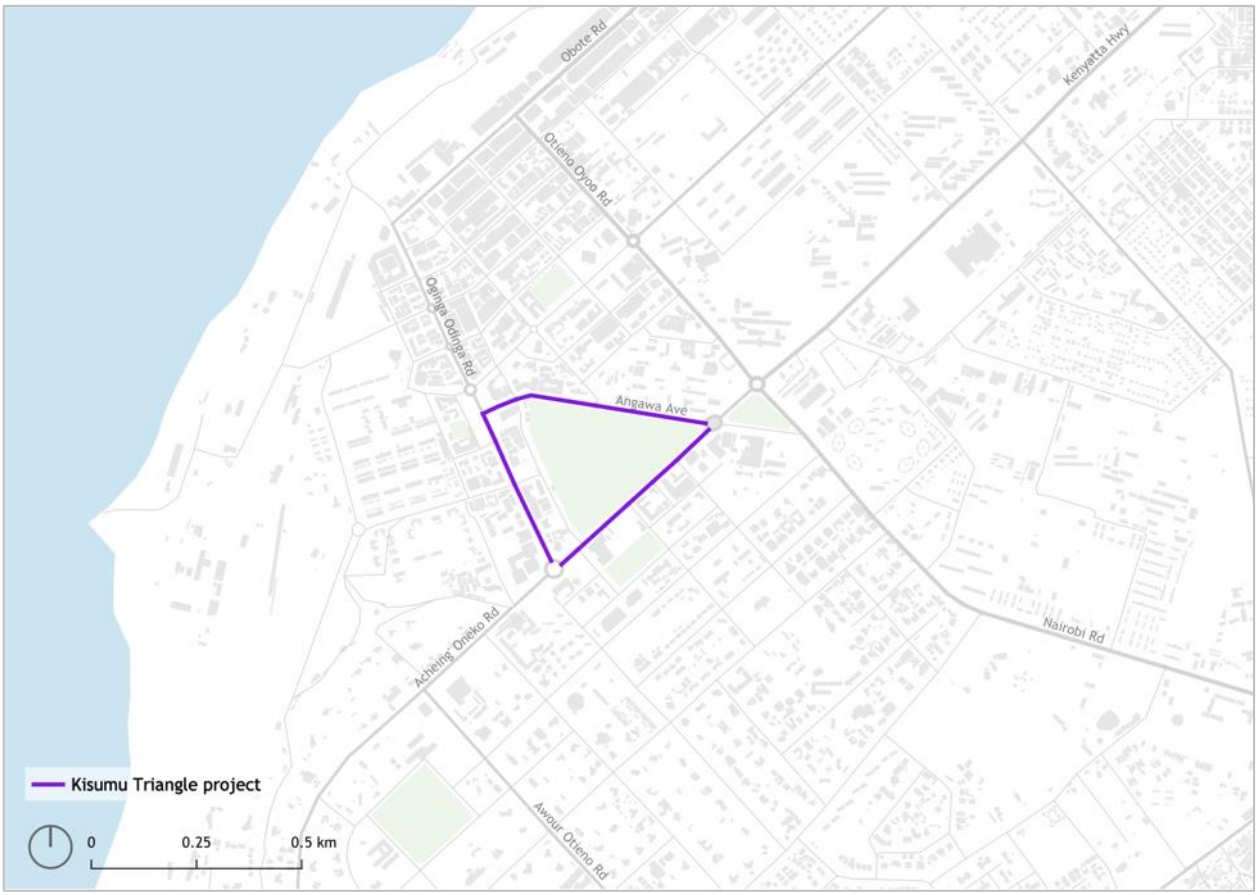


Figure 58: Kisumu Triangle project location.

Figure 59: On-going street improvement along Jomo Kenyatta Avenue (left) and Angawa Avenue (right).

4.3 Lakefront development proposals

The Kisumu city centre is located close to Lake Victoria, but Kenya Railways Corporation (KRC) land acts as a barrier between the city and the lake.[31] Various plans have been prepared for the redevelopment of the Kisumu lakefront, including the following:

- A concept plan prepared by UN-Habitat proposes mixed-use redevelopment with at least 450,000 sq m of new floor area. [32] The plan proposes infrastructure improvements including walkways, solar/waste energy, street lighting, bio-toilets, clean drinking water, and local sewage treatment. The plan envisions a fine-grained pedestrian network, extending the street grid from the Kisumu CBD through what is currently KRC land.
- A plan prepared by KRC proposes the development of three hotels, a refurbished railway station, an office park, a market area, and parking for 2,000 cars.

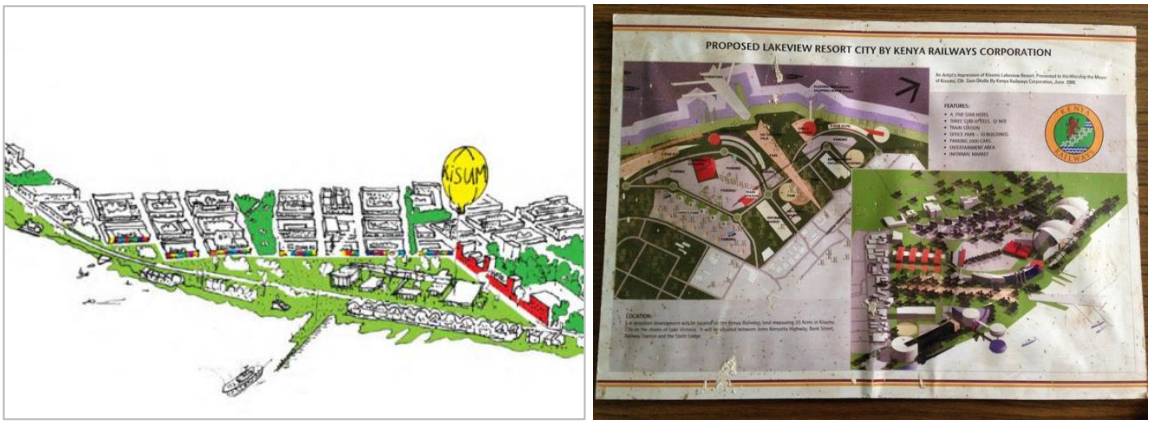


Figure 60: Lakefront development proposals by UN-Habitat (left) and Kenya Railway Corporation (right).

[31] UN-Habitat Urban and Design Lab. (2014). Concept plan for redevelopment of the Kisumu Lakefront.
[32] Ibid.

4.4 Kisumu Port improvements

The Kenya Ports Authority recently commissioned a KES 3 billion upgrade of Kisumu port, which is aimed at reigniting the trade between Kisumu and Port Bell and Jinja in Uganda, Mwanza in Tanzania, and neighbouring counties.[33] The project introduced new handling equipment, including forklifts, mobile cranes, and tractor-trailers, and involved the clearance of water hyacinth.[34]

4.5 Standard Gauge Railway

The Standard Gauge Railway (SGR) is a new railway from Mombasa to Naivasha. Phase 2B of the SGR project was expected to cover 262 km running from Naivasha to Kisumu, while phase 2C covers 107 km from Kisumu to Malaba. The SGR aims to deliver efficient intercity transport for both passengers and goods.[35] Implementation of SGR phases 2B and 2C has been postponed due to the failure to secure financing from China.[36] Instead, the government plans to rehabilitate the old metre-gauge railway from Naivasha to the Uganda border.[37] The planned metre gauge route will not pass through Kisumu.[38]

5. Policy and legal framework

5.1 Policies

The desire for a safe, efficient, and cost-effective urban transport system is reflected in a range of existing transport, planning, and environmental policies and acts in Kenya. These policies advocate for the creation of street spaces that persons of all ages and abilities can enjoy together.

Table 5: Legal and policy framework.

Act of Parliament or policy	Main elements
Climate Change Act of 2016	Provides for a regulatory framework for an enhanced response to climate change. Further, it provides for mechanisms to achieve low-carbon development. It promotes the use of renewable energy sources in all sectors, including transport.

[33] Business Daily. (12 Nov 2019). Retrieved from https://www.businessdailyafrica.com/economy/Kisumu-port-relauch-Sh3-billion-facelift/3946234-5345826-q6nu9oz/index.html
[34] Alal, Maurice. (2019, 11 Oct). "Kisumu Port to revive Nyanza's economic fortunes." The Star. Retrieved from https://www.the-star.co.ke/counties/nyanza/2019-10-11-kisumu-port-to-revive-nyanzas-economic-fortunes/
[35] Derick, J. (2016). "Standard Gauge Railway." Kenya Railways Corporation. Retrieved from http://krc.co.ke/?p=420
[36] Olingo, Allan. (2019, Apr 27). "Kenya fails to secure $3.6b from China for third phase of SGR line to Kisumu." The East African. Retrieved from https://www.theeastafrican.co.ke/business/Kenya-fails-to-secure-loan-from-China-for-third-phase-of-SGR/2560-5090192-2o0y9j/index.html
[37] Miriri, Duncan. (2019, May 8). "Kenya to upgrade old rail track to deliver Uganda link." Reuters. Retrieved from https://www.reuters.com/article/kenya-railway/kenya-to-upgrade-old-rail-track-to-deliver-uganda-link-idUSL5N22K6MC
[38] Ng'etich, Jacob. (2020, Jun 5). "Kisumu's hope for a rail dimmed over change of route." The Standard. Retrieved from https://www.standardmedia.co.ke/article/2001374024/kisumu-s-hope-for-a-rail-dimmed-over-change-of-route

Act of Parliament or policy	Main elements
Constitution of Kenya (CoK, 2010)	COK establishes the devolved system of governance and the formation of county governments. The fourth schedule, Part II, mandates County Governments with: planning, development, and maintenance of county roads; street lighting; traffic; and parking. Functions under the national government include construction and operation of national trunk roads and formulation of standards for the road construction and. Article 39 (1) guarantees all Kenyan citizens the right to freedom of movement, and Article 42 guarantees the right to a clean and healthy environment. All public offices are mandated to respond to the needs of vulnerable members of society, including women, aged, and children, persons with disabilities, and minority /marginalised communities.
County Government Act (2012)	This ACT mandates counties to prepare a five year County Integrated Development Plan upon which sectoral plans are prepared. The Act mandates the Department of Roads, Transport, and Public utilities to prepare ten-year sectoral plans, i.e. a mobility plan and policies to guide budgeting and management of transport systems within their jurisdiction.
Draft National Road Safety Action Plan, 2015-2020	Developed in accordance with the United Nations' Decade of Action for Road Safety 2011, the Plan aims to save lives by building road safety management capacity, improving road infrastructure and vehicles, improving post-crash response, and enhancing the behaviour of road users.
Environmental Management and Coordination Act, 1999	Establishes the National Environment Management Authority (NEMA) and legal framework for the management of the environment and lists all major roads among projects to undergo environmental impact assessment before construction.
Highway Code	The Highway Code offers guidelines on the use of roads by pedestrians, cyclists and motorists. The Code directs pedestrians to cross the road at designated locations. It prohibits them from walking in the carriageway. Cyclists are advised to wear helmets and reflective clothing. The code directs all users to obey traffic signs and signals.
Integrated National Transport Policy of 2009	The policy notes that urban areas are characterised by an inadequate supply of public transport and stiff competition for limited road space among motorists, pedestrians, and cyclists. The policy proposes strict parking policies, access restrictions for private cars, and road pricing to enhance traffic demand management. The policy recognises the important role of NMT and public transport in responding to mobility needs for low-income groups. The policy emphasises the need to integrate NMT into the planning, design, development, and implementation of road infrastructure and calls for efficient, professionally operated public transport.
Kenya Roads Act (2012)	Establishes KeNHA, KURA, and KeRRA and stipulates their functions. Provides road classification, management, construction, and maintenance of public roads in Kenya.
Kenya Roads Board Act of 1999 (Revised Edition 2012)	Establishes Kenya Roads Board, an agency tasked with distributing revenues from fuel levies for use in road maintenance.
Kisumu ISUD Plan, 2014	This is Kisumu's integrated urban development plan, a long-term plan aimed at guiding the development of Kisumu up to 2030. ISUD acknowledges that sprawled and unplanned urban development that have induced the demand for private car use. It further elucidates the informality in the public transport sector and the lack of adequate facilities such as terminals and designated stops. Due to the inefficiency of public transport and lack of pedestrian walkways, modes such as boda-bodas, tuk-tuks, and taxis have increased to respond to the demand. To solve these challenges, the ISUD recommends road designs that favour public transport and NMT as well as road networks that improve urban connectivity.
Land Acquisition Act	An Act of Parliament to make provision for the compulsory acquisition of land for the public benefit, including the acquisition of land for road construction or expansion. The persons affected are subject to compensation either by award or offer based on the current market value of the surrendered land.
National Climate Change Action Plan, 2018-2022	Objective 7b includes the following goals: promote efficient, safe, and affordable public transport, construct at least 150 km of NMT within urban areas, and pilot electric and hybrid vehicles. It further emphasises the need for climate-resilient transport infrastructure that can withstand extreme weather events such as floods.

Act of Parliament or policy	Main elements
National Motorcycle Regulations, 2014	Regulates the operation of two and three-wheeler vehicles in Kenya. The regulation mandates two-wheeler riders to have a valid licence, carry one passenger at a time, have protective gear (i.e., helmet and reflective jacket), and observe all traffic rules.
National Transport & Safety Authority (NTSA) Act, 2012	The National Transport and Safety Authority (NTSA) was established through the NTSA Act 33 of 2012, representing a major step toward ensuring improved safety for all road users. NTSA's functions include harmonising the operations of road transport departments and effective management of the road transport sub-sector to minimise loss of lives through road crashes. The authority is mandated to formulate and implement the National Road Safety Action Plan.
National Urban Development Policy (Draft of 2013)	Recognises that walking and cycling receive inadequate attention despite being key modes of urban transport. The policy calls for strategies and standards that emphasise safe, quality public transport; pedestrian and cycling facilities; and well-designed public spaces in urban areas.
Physical and Land Use Planning Act (2019)	Makes provision for the planning, use, regulation, and development of land. Transport has been identified as part of various development plans, and hence transport systems should be analysed and developed to cater to future demand.
Physical Planning Handbook of 2002:	Provides guidelines and minimum standards for physical planning, including planning for transport infrastructure. The handbook calls for dedicated pedestrian and bicycle facilities and adequate landscaping.
Public Procurement and Disposal Act (2011)	This Act seeks equality on matters procurement of government tenders. It acknowledges disadvantaged groups such as physically challenged, women, and youth.
Street Adoption Act of 1963 (Revised Edition 2012 [1984]):	Regulates the construction, improvement, and adoption of streets by certain local authorities. The Act directs persons intending to layout, form, construct, widen, extend, or alter a street on the requirements including footpaths, carriageway, utilities, and landscaping.
Sustainable Development Goals (SDG)	Kenya is a signatory to the SDGs. Goal 3.6 calls for halving global deaths related to traffic accidents by 2030, while goal 11.2 calls for access to safe, affordable, accessible and sustainable transport, especially by providing improved public transport.
Traffic Act of 1953 (Revised Edition 2015 [2013])	The Traffic Act consolidates the laws relating to traffic on roads. It outlines penalties for driving vehicles at speeds greater than 50 km/h on any road within the boundaries of any urban area. Highway authorities are directed to erect and maintain traffic signs and traffic calming features. The highway authority is also tasked with ensuring that traffic routes in the vicinity of educational institutions are equipped with safe NMT features. This Act also prohibits driving on pedestrian walkways.
Urban Areas and Cities Act of 2011 (Revised Edition 2012)	Provides for the classification, governance, and management of urban areas and cities; the criteria of establishing urban areas; and the principle of governance and participation of residents. Parking, traffic control, public transport, and street lighting are listed as requirements for classification of an area to be a city or a municipality.
Vision 2030	This is the country's new development blueprint covering the period from 2008 to 2030. The vision aims to transform Kenya into an industrialising middle-income country, providing a high-quality life to all citizens. Being one of Kenya's Vision 2030 flagship cities, Kisumu has been assigned specific roles in the national strategic plan. The city is therefore expected to receive national government investments to facilitate its role in the Vision 2030.[39] The Vision calls for the provision of infrastructure including roads, railways, ports, airports, and water and sanitation facilities.

[39] County Government of Kisumu. (2014). Kisumu ISUD Plan. Part II, pg 7.

5.2 Institutional framework

Cities and urban areas must overcome institutional barriers to achieve efficient and safe transport systems and high-quality street environments. These challenges range from a lack of the necessary political will to the need for better coordination among the multiple agencies responsible for different aspects of urban transport. Responsibilities over the planning, design, management, and maintenance of urban roads falls on multiple agencies and levels of government, and uncertainty regarding who is responsible for what hampers the development of transport facilities.

The Ministry of Transport, Infrastructure, Housing, Urban Development, and Public Works (MOTIHUD-PW) is responsible for overall transport policy and road design standards. The three road authorities, namely the Kenya National Highways Authority (KeNHA), Kenya Urban Roads Authority (KURA), and Kenya Rural Roads Authority (KeRRA), are responsible for the management, development, rehabilitation and maintenance of roads, as stipulated by the Kenya Roads Act, 2007.

The Kenya Roads Board (KRB) oversees the road network and coordinates its development, rehabilitation, and maintenance by administering the Fuel Levy. The National Construction Authority (NCA) regulates the construction industry and coordinates its development which includes but is not limited to registering and classifying road contractors.

The National Transport and Safety Authority (NTSA) is responsible for harmonising the operations of road transport departments and managing the road transport sub-sector to minimise loss of lives through road crashes. The authority is mandated to formulate and implement a National Road Safety Action Plan. The Kenya Police Traffic Department is charged with ensuring the free flow of traffic; the prevention and investigation of crashes; the enforcement of laws, rules, and regulations; and initiation of road safety sensitisation programmes for the public. The Traffic Department also plays a role in road safety. The Department is responsible for investigating all road crashes, collecting crash data, filing road crash reports, and sending copies of the reports (P41 Forms) to relevant authorities. Individual police stations prepare daily reports that are sent to the Police Headquarters and are then sent to NTSA for preparation of reports.

The county government under the County Government Act, 2012, has the mandate of preparing a sectoral plan to guide the sustainable development of the county. Through the department of transport, the county oversees the implementation of county roads; the preparation of plans and policies; and budget preparation and approval.

The Urban Areas and Cities Act, 2012, provides for the formation of a city board consisting of eleven members. The Kisumu city board was established on 4 July 2018 after the approval of nominees by the Kisumu County Assembly.[40] The board is mandated to oversee the affairs of the city; develop and adopt policies, plans, strategies, and programmes; and control land use, zoning, and land development within the framework of the spatial plan of the city. Further, the board is mandated to facilitate and regulate public transport and prepare and submit annual budgets for consideration by the county assembly.

[40] Odhiambo, Dickson. (2018, Jul 4). "Kisumu County Assembly approves 11 nominees for City Management Board." The Citizen Voice. Retrieved from http://thecitizenvoice.blogspot.com/2018/07/kisumu-county-assembly-approves-11.html

6. Vision & goals

6.1 Transport scenarios for Kisumu

The transport investments made today in Kisumu will have impacts on access to opportunities, liveability, and equity for decades to come. Kisumu's population is expected to grow from 567,963 in 2019 to 769,563 people by 2030. Due to the population increase, economic growth, and the lack of adequate facilities for walking, cycling, and public transport, use of personal motor vehicles is increasing. Assuming that the use of personal motorised modes, including cars, motorcycles, and motorcycle bodas, grows by 6 percent per year, Kisumu will see at least a doubling in the use of motor vehicles over the next decade, as shown in the chart below. The consequences will include increasing traffic, poor air quality, inefficient public transport, and a rising number of fatal road crashes involving pedestrians and cyclists.

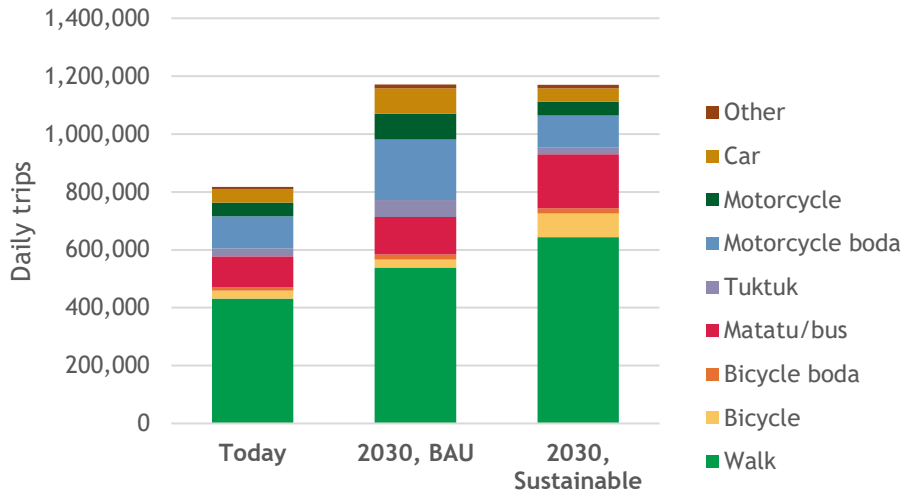


Figure 61. Mobility scenarios for Kisumu.

Kisumu now faces a choice: continue with the current focus on personal motor vehicles and accept that citizens will spend more and more time in polluted, traffic-filled roads; or choose an alternate course that improves equity, reduce environmental impacts, protect public health, improve mobility, and enhance the quality of life for all. To achieve the latter scenario, it is important to invest in transport alternatives that move large numbers of people efficiently, at a low cost, and with low environmental externalities.

Under a "Sustainable" scenario, the city implements initiatives to promote the use of NMT and public transport. The city also will control travel demand by personal motor vehicles. With increased investment in NMT and public transport two outcomes are likely: first, an increase in the public transport and NMT mode shares, and second, a reduction in the mode shares for personal motor vehicle modes. The mode shares under the alternate scenarios are summarised in the table below.

Table 6. Modal split under mobility scenarios for Kisumu.

Mode	Today	2030, BAU	2030, Sustainable
Walk	52.7%	46.0%	55.0%
Bicycle	3.4%	2.4%	7.0%
Bicycle boda	1.5%	1.5%	1.5%
Matatu/bus	13.0%	11.0%	16.0%
Tuktuk	3.4%	5.0%	2.0%
Motorcycle boda	13.5%	17.9%	9.4%
Motorcycle	5.8%	7.7%	4.1%
Car	5.6%	7.4%	3.9%
Other	1.1%	1.1%	1.1%

6.2 Transport vision & goals

In line with the sustainable scenario described above, Kisumu adopts the following vision:

> The City of Kisumu will offer a high-quality, affordable, and user friendly public transport system integrated with pedestrian and cycling networks to enhance access for all city residents, regardless of age, gender, economic status, and physical ability.

To achieve this vision, the Kisumu will focus on people rather than vehicles in mobility planning. The majority of investments will be devoted to sustainable modes, and the city will pursue the following measures:

- **Make walking and cycling safe and attractive**. NMT provides basic mobility, affordable transport, access to public transport, and health and recreation benefits. Improving conditions for NMT increases the convenience, comfort, and safety of walking and cycling and therefore benefit existing users as well as encourage new users.
- **Provide high-quality public transport**. Kisumu needs convenient, reliable public transport that is accessible to all residents. Achieving public transport service improvements will depend on an industry transformation and the introduction of a new business model that incentivises service quality and safety. The public transport system should incorporate high-quality, ergonomic, and low-emissions buses supported by terminals, bus shelters, and dedicated road space to make public transport attractive even to personal vehicle users.
- **Stabilise and/or reducing the use of personal motor vehicles**. Stabilizing the use of personal motor vehicles—cars, motorcycles, and motorcycle boda bodas—at today's level can be achieved by reducing parking supply, charging for parking according to demand, and appropriate travel demand management measures. As the city provides attractive alternatives to personal vehicles in the form of high-quality NMT and public transport facilities, people shift to these alternatives.
- **Adopt a participatory approach**. Public participation in the planning, monitoring, and assessment are key to the development of Kisumu's mobility system. Stakeholders are generally more likely to accept a decision reached in a fair and participatory manner. Therefore, authorities involved in the planning, implementation, and operation of transport

systems should give members of the public opportunities to identify problems, shape decision-making parameters, and influence policy outcomes.

- **Implement supporting measures**, such as enhanced stormwater drainage, organised vending, and enhanced solid waste management.

These measures will yield numerous benefits, including improved road safety for vulnerable road users, enhanced economic vitality, tourist attraction, improved public health, reduced congestion, cleaner air, and lower greenhouse gas emissions. The following table summarises the quantitative goals that the City of Kisumu aims to achieve over the next ten years through the measures outlined above.

Table 7: 10-year goals for mobility in Kisumu

Goal	Contributing Actions	10-year targets
Increased mode share of walking and cycling	• Construction of 100 km of footpaths and 31 km of cycle tracks consistent with SDMUAK guidelines. • Implementation of bikeshare in Kisumu.	• Mode share of NMT remains at or above 55 percent of trips. • Women constitute 50 percent of cyclists.
Increased mode share for public transport	• Paratransit reforms implemented along all key public transport corridors. • Improved last-mile connectivity to public transport. • 5 km phase 1 BRT corridor implemented on the Kisumu Boys-Mamboleo corridor.	• Public transport constitutes 80 percent of all motorised trips • At least 90% of residents live within 500 m of frequent public transport • 100% of public transport vehicles operate under an improved business model
Reduction in the use of personal motor vehicles (PMV)	• Demand-based parking fees adopted and improved parking enforcement instituted. • Monthly car-free day implemented. • Pedestrian-only zones created. • Congestion charging implemented.	• Vehicle kilometres travelled (VKT) by PMVs are no more than 10% above 2020 levels.
Improved road safety	• Well-designed footpaths and cycle tracks. • Safe pedestrian crossings (table-tops) • Improved intersections. • Road safety sensitisation programs.	• Pedestrians and cyclists fatalities reduced by 80 percent below 2020 levels.
Improved air quality	• Better public transport and NMT facilities. • All public transport vehicles are Euro 4 or better. • Introduction of electric vehicles.	• WHO ambient air quality norms are met 350 days a year. • Greenhouse gas emissions within overall targets for Kenya's NCCAP.

7. Planning for the future mobility in Kisumu

This plan envisions a holistic approach to mobility improvements in Kisumu, incorporating improvements to NMT facilities, high-quality public transport, travel demand management, and complementary measures. Kisumu must focus on providing mobility to all people, regardless of age, gender, physical ability, and financial status. The following sections describe the specific projects that can help Kisumu achieve a sustainable, efficient mobility system.

7.1 NMT facilities

With walking and cycling together accounting for well over half of all daily travel in Kisumu, a higher quality walking and cycling environment is urgently needed. Making non-motorised modes of transport viable and convenient requires rebalancing street space so that it caters to all modes transport. The physical design of streets and the provision of sidewalks, crossings, and other infrastructure is crucial to creating a high-quality NMT environment. Accommodating NMT involves two basic techniques:

- **Systematic traffic calming on smaller streets** to reduce motor vehicle speeds and provide safe places for the mixing of pedestrians and other modes (shared lanes); and,
- **Pedestrian and cycle infrastructure that is physically separated from motor vehicle traffic on larger streets**, paired with traffic calming or traffic control to facilitate safe crossings. Pedestrian footpaths should provide clear space for walking, with other elements positioned in a strategic manner. These elements include paving, landscape planting, street lighting, street furniture, public facilities, underground utility access points, and other sidewalk amenities. There are also features that make streets more accessible, including curb ramps, tactile paving, and traffic signs. Similarly, dedicated cycle tracks should be provided, separate from the mixed traffic carriageway. Large streets require signalisation or traffic calming at crossings and intersections to enable pedestrians and cyclists to cross the street safely.

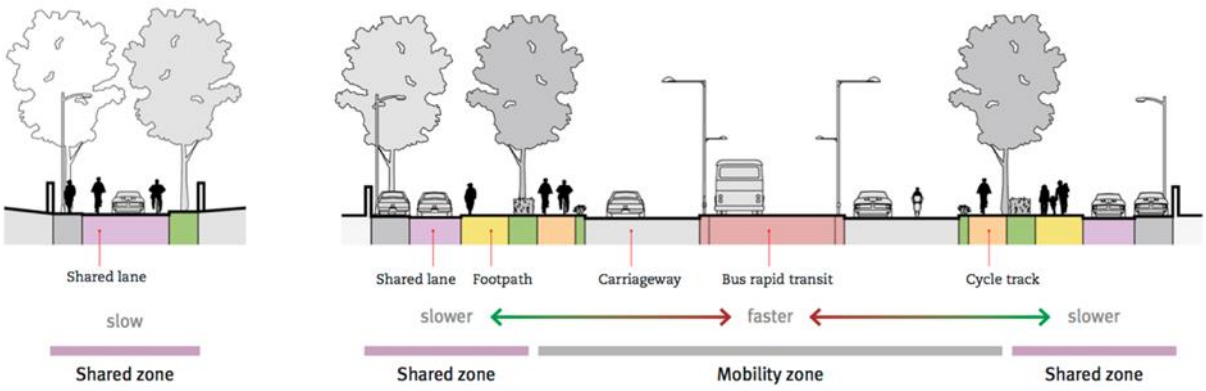


Figure 62: Smaller streets can function as shared spaces where pedestrians walk together with slow-moving vehicles (left). On larger streets with heavy vehicles and faster speeds, separate space for pedestrians and cycles is needed (right).

7.1.1 Pedestrian facilities

Major streets in Kisumu require well-designed footpaths to provide continuous, comfortable, and safe space for walking. Streets also should support vending and public transport access without compromising pedestrian mobility. Footpaths should be continuous, shaded, and well-lit, and free from obstruction. Footpaths should consist of three zones:

- **Frontage zone:** Provides a buffer between street-side activities and the pedestrian zone and should be at least 0.5 m wide.

- **Pedestrian zone:** Provides continuous space for walking. The pedestrian zone should be clear of any obstructions, level differences, or other obstacles to pedestrian movement and should have a clear width of at least 2 m. Larger widths are required in areas with high pedestrian volumes.
- **Furniture zone:** Offers space for landscaping, furniture, lights, bus stops, signs, benches, public toilets, and private property access ramps and should be at least 0.5 m wide.

Footpaths should not be higher than 150 mm above the carriageway level and should have a smooth surface. Footpaths should be designed without abrupt level differences, especially at property entrances. As the primary public space in a city, they should be accessible to all users, regardless of age, gender, or special needs.

Figure 63: A well-designed footpath has three main zones: the frontage zone; pedestrian zone, with a minimum clear width of 2 m; and the furniture zone.

Safe crossings and junctions are essential components of a well-connected street network. When properly designed, crossings and junctions allow pedestrians, cyclists, and other NMT users to cross busy streets safely and conveniently. At points where pedestrians need to cross multiple lanes of traffic, it is important to reduce vehicle speeds to safe levels (e.g. below 15 km/h) or incorporate signals to stop traffic. Pedestrian crossings should be located at the desired crossing locations—for instance, near a bus stop or market entrance. In busy commercial streets, pedestrian crossings should be provided at close intervals to facilitate pedestrian access.

Grade separated crossings such as pedestrian footbridges and tunnels are not desirable as they are not user-friendly. They increase crossing distance and time, and they are not universally accessible. Footbridges and tunnels are often not safe for pedestrians, particularly women and children. These footbridges are therefore not good value for public money as they are often grossly underutilised. Ramps may be installed to accommodate wheelchairs and bicyclists, but long crossing distances and steep slopes still discourage use. Thus, footbridges should be provided only on high-speed expressways where access for pedestrians and cyclists is too dangerous and therefore not permitted. In other cases, street designs should incorporate safe at-grade crossings that are accessible to all.

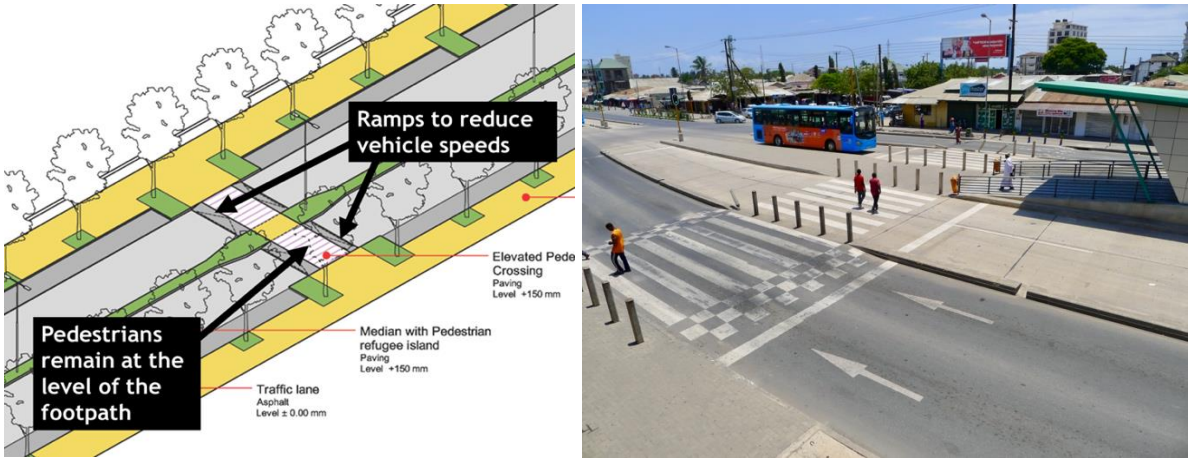


Figure 64: Tabletop crossings that are raised to the level of the footpath (i.e., 150 mm) reduce vehicle speeds and offer universal access for pedestrians.

As discussed in above, smaller streets can offer a safe walking environment in the form of space that is shared among pedestrians, cyclists, and vehicle users—provided that the street design incorporates traffic calming features to reduce vehicle speeds. Many streets in Kisumu can be upgraded to function as shared spaces through paving (in the case of streets that are currently unpaved) and the installation of speed bumps, chicanes, landscaping islands, and other traffic calming elements.

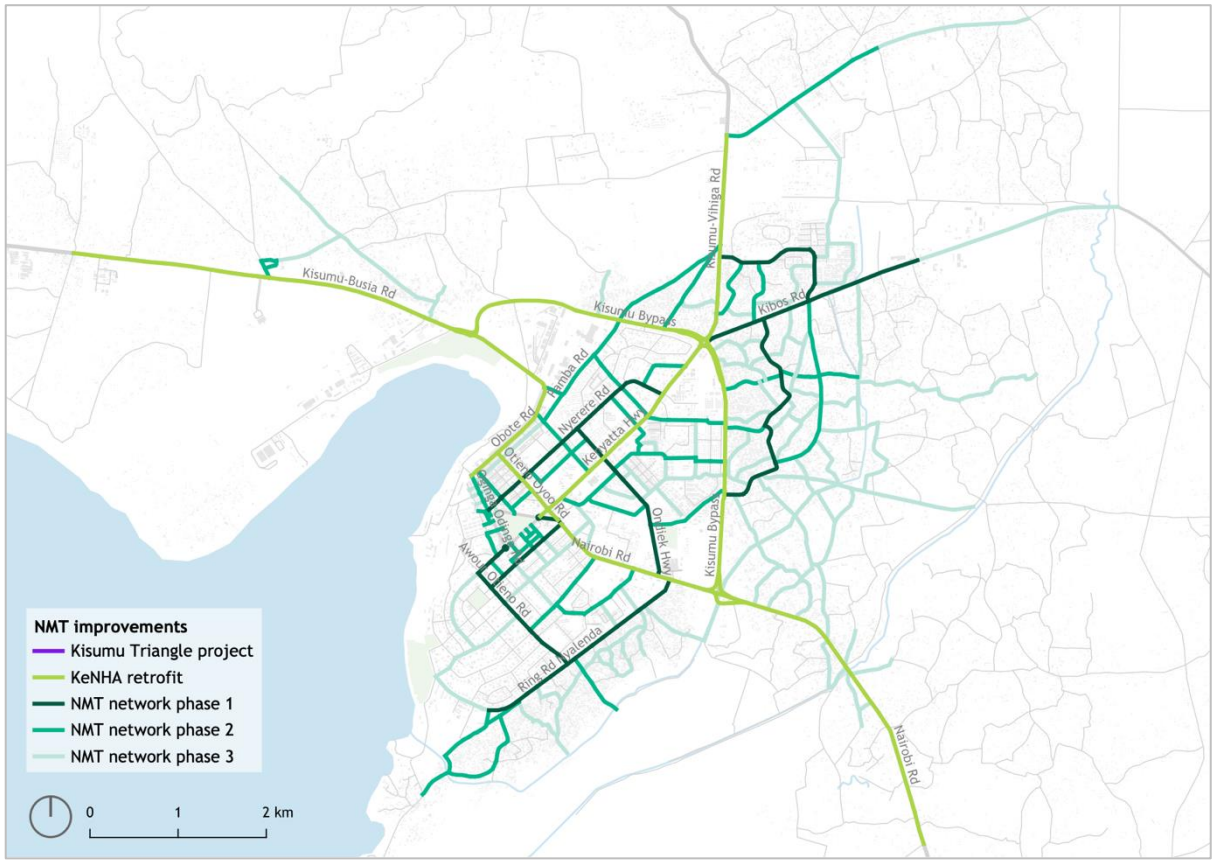


Figure 65: NMT improvements: Phase 1 (20 km), phase 2 (30 km), phase 3 (50 km), and road safety retrofits on recently constructed KeNHA corridors (28 km).

7.1.2 Cycle network

Cycling is a sustainable non-motorised mode of transport. Cycles offer low-cost, pollution-free mobility and occupy just one-tenth of a car space. Cycling in a segregated track is often faster than using a private motor vehicle, particularly for short- to medium-distance trips.

Cyclists face various challenges on the road including lack of cycling infrastructure, hostility from other road users and theft or vandalism of bicycles. To improve the safety and comfort of cyclists and attract new users, Kisumu should plan for networks of dedicated cycle tracks with safe, user-friendly, and convenient infrastructure. Such a network should include cycle tracks along key urban corridors and major streets with two or more lanes of traffic in each direction.

Cycle tracks should be positioned between the footpath and the carriageway, with a minimum width of 2 m for one-way movement and 2.5 m for two-way movement. To enhance the safety of cyclists, a cycle track should be physically separated from the carriageway and raised 150 mm above the carriageway to allow for stormwater runoff and prevent the accumulation of debris. Cycle tracks should be made of a smooth material such as asphalt or concrete to provide a smooth and comfortable ride. Well-designed cycle tracks are safe, convenient, continuous and direct.

On smaller streets, such as streets with a speed limit of 30 km/h or less or on streets designed as shared spaces, separate cycle tracks may not be needed. Instead, traffic calming in the form of speed bumps, chicanes, and other elements can help to reduce motor vehicle speeds, making it easier for cyclists and vehicles to travel together.

To improve security, bicycle parking racks should be installed at public buildings (e.g., Governor's office, City Hall, and Law Courts), public parks, bus stations, primary and high schools, markets, and social halls. Bike rack sizes should be determined based on demand and expanded as need over time.

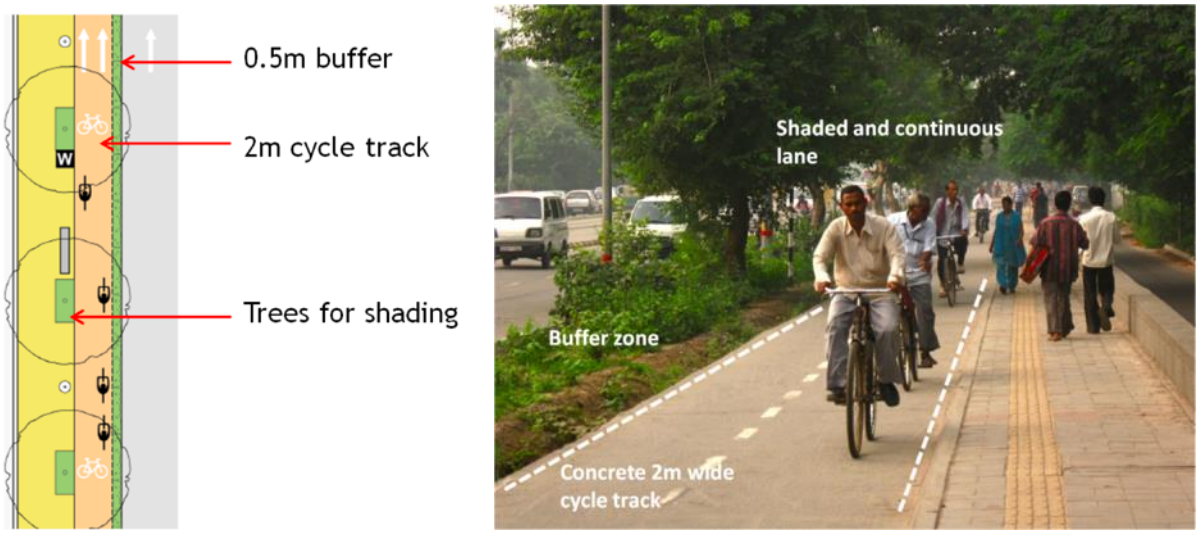


Figure 66: Cycle tracks should have a minimum width of 2 m and an elevation of 100-150 mm above the carriageway. Trees along the cycle track provide shade and comfort for cyclists.

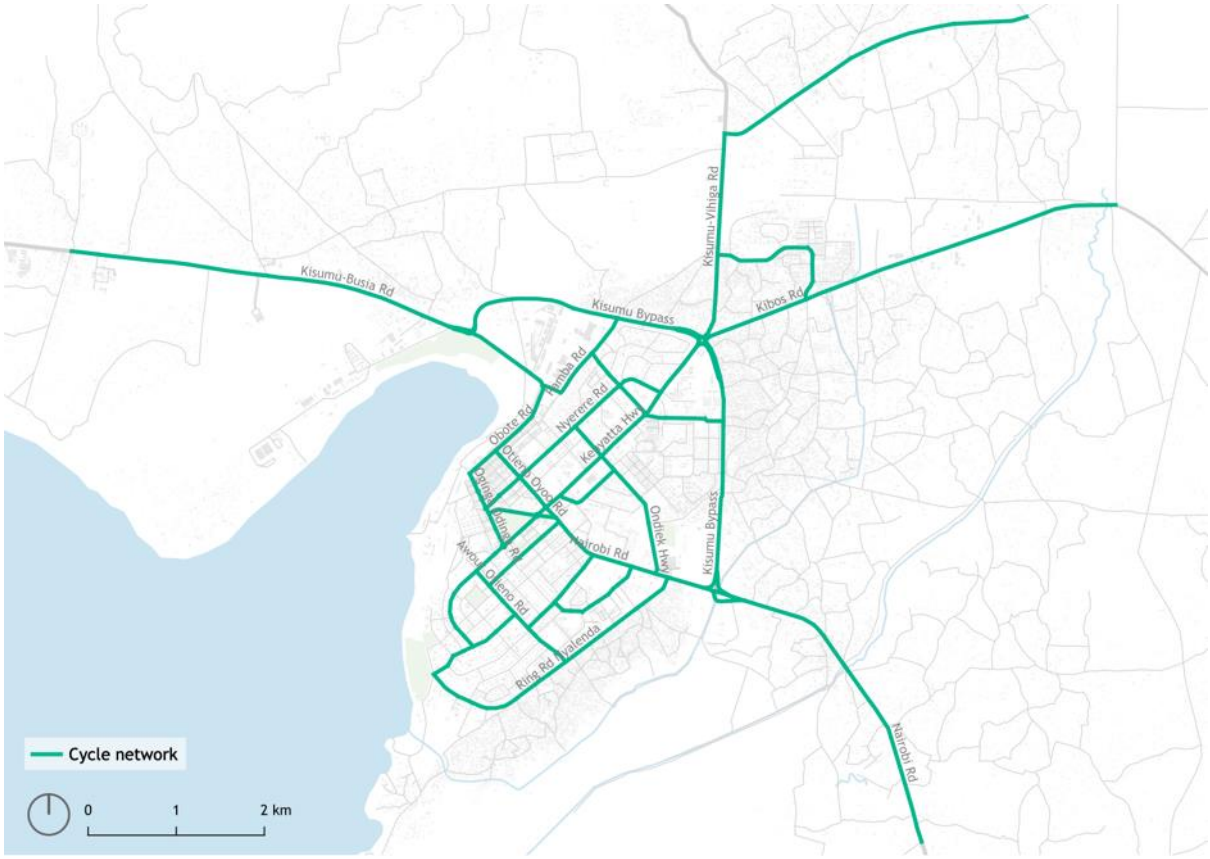


Figure 67: Network of dedicated cycle facilities following the NMT improvements phase 1-3 as well as the KeNHA corridor retrofit project (see Figure 56).

7.1.3 Safety retrofit of KeNHA corridors

Aside from the NMT improvements outlined above, the corridors recently upgraded by KeNHA (Figure 53) should be retrofitted to improve NMT user safety. The newly improved roads incorporate a shared lane ostensibly intended for use by pedestrians and cyclists. While the space could potentially offer a safe space for NMT users, the inconsistent installation of bollards makes the shared lanes accessible to motorised traffic in several locations. The following measures should be implemented to improve safety on approximately 28 km of these corridors:

- Pedestrian crossings should be provided at midblock locations to enhance pedestrian safety.
- Intersection safety should be enhanced through the introduction of pedestrian crossings, accessible refuge islands, and reduced vehicle turning radii.
- The NMT space should be reclaimed through proper use of bollards that prevent encroachment by motor vehicles.
- Traffic calming elements are needed, especially near school zones and market centres.

Well-designed intersections can significantly reduce road crashes, injuries, and fatalities while at the same time improving traffic flow. Dedicated and protected space should be provided for pedestrians to safely cross the street. Each intersection should accommodate throughput of all road users, in particular public transport, cycles, and pedestrians. Vehicle traffic should be controlled through traffic signals to allow ample time for pedestrians to cross a street. Traffic calming measures such as speed

bumps, tighter turns, restrictions on free turns, narrower lanes are equally necessary to improve safety for all road users, particularly pedestrians and cyclists. Bollards are also useful for defining refuge islands and protecting pedestrian spaces from encroachment by motorised traffic.

Figure 68. Before and after images of intersection modifications in Addis Ababa to reduce lane widths and turning radii for motor vehicles in order to improve pedestrian safety.

On the KeNHA corridors, 20 intersections that see a high incidence of fatal and injury crashes should be redesigned with geometric improvements and traffic calming features. The intersections are shown in the map below.

Figure 69: Major intersections on KeNHA corridors to be retrofitted to improve safety.

7.1.4 School zone improvements

Globally, fatalities from road crashes are the leading cause of death for children and young adults from age 5 to 29.[41] This challenge is most critical in Africa, at the moment recording the highest rate of child fatalities from road crashes in the world. In Kenya, children and teenagers constituted 21 percent of fatalities from road crashes from January to October 2017.[42]

Young children are more exposed to road safety risks than adults for the following reasons[43]:

- They are smaller and therefore less visible on the road.
- Their bodies are more delicate than for adults making them more vulnerable.
- They are unlikely to recognise dangerous situations on the road and are unable to make appropriate decisions on their safety.

By introducing punitive fines for violation of school zone regulations, enhancing safety features within school zones, advocacy efforts, enforcing regulations on school buses and reviewing road safety regulations, Korea was able to reduce children road crash fatalities by 95 percent. Sweden has reduced road fatalities by 66 percent through evidence-based interventions, supported by political goodwill, long-term planning with set safety targets and goals for government, businesses and civil society. Similarly, Kisumu should implement strategies to reduce road fatalities among children.

Most children in Kisumu attend schools in the neighbourhoods close to their homes, hence the majority walk to school. Children who attend schools far from their estates depend on matatus or boda-bodas to reach school. Most schools in Kisumu are located along busy arterial streets that lack safe footpaths and pedestrian crossings. In addition, a lack of road signs and traffic calming features encourages vehicle drivers to speed, increasing the chance of injury and exposure to air pollution.

Enhanced road safety can be achieved through improved design of streets within school zones to include the following:

- Footpaths with a minimum 2 m clear width for at least 100 m on either side of the school.
- Raised zebra crossings
- Traffic calming features such as speed bumps, narrower lanes to slow down motorised traffic
- A speed limit of 30 km/h within a 200 m radius.

The interventions should be consistent with the SDMUAK. It is also important to educate children and their caregivers on road safety and special precautions for children.[44] The 40 primary and secondary schools in the City of Kisumu should be targeted for these improvements.

7.1.5 Greenways

To supplement walking and cycling improvements on city streets, open spaces in the city can be developed as NMT corridors that support long-distance commuting as well as recreational uses. The term “greenway” is used to describe walkways and cycle paths that utilise an independent right-of-

[41] World Health Organisation. (2018). Global status report on road safety.
[42] Otieno, Dorothy. (2017, 17 Nov). “Children, teenagers make up a fifth of road deaths this year.” Daily Nation. Retrieved from: https://www.nation.co.ke/newsplex/child-road-deaths/2718262-4191682-kctgmjz/index.html
[43] IRAP. (2020, Feb 12). Road Safety Toolkit. http://toolkit.irap.org/default.asp?page=treatment&id=39
[44] Ibid.

way, such as in a park or water body. In this way, greenways can provide safe, convenient connectivity to important destinations, such as schools, colleges, and markets.

The presence of Lake Victoria presents an opportunity for Kisumu to build high-quality greenway networks along the lake-front to improve mobility for all NMT users while creating beautiful and vibrant public spaces. Waterways can be cleaned through interception sewers and the removal of encroachments. Greenways should incorporate universally accessible walkways and dedicated cycle tracks, both of which should be integrated into NMT networks along adjacent streets. Such developments can have huge economic, social, and environmental benefits.[45]

Currently, much of Kisumu's lakefront is inaccessible and underutilised as the land is owned by Kenya Railways Corporation and private individuals. The city should reclaim this land and transform it into a greenway. This will not only enhance mobility around the lake and the city but also improve tourism activities and general use of Lake Victoria.

Figure 70: Greenways can transform open spaces along clean waterways, creating beautiful public spaces with high-quality pedestrian and cycling facilities.

[45] Rails to Trails Conservancy (2009). Benefits of Trails and Greenways. Retrieved January 20, 2019. From https://www.railstotrails.org/resourcehandler.ashx?id=2988

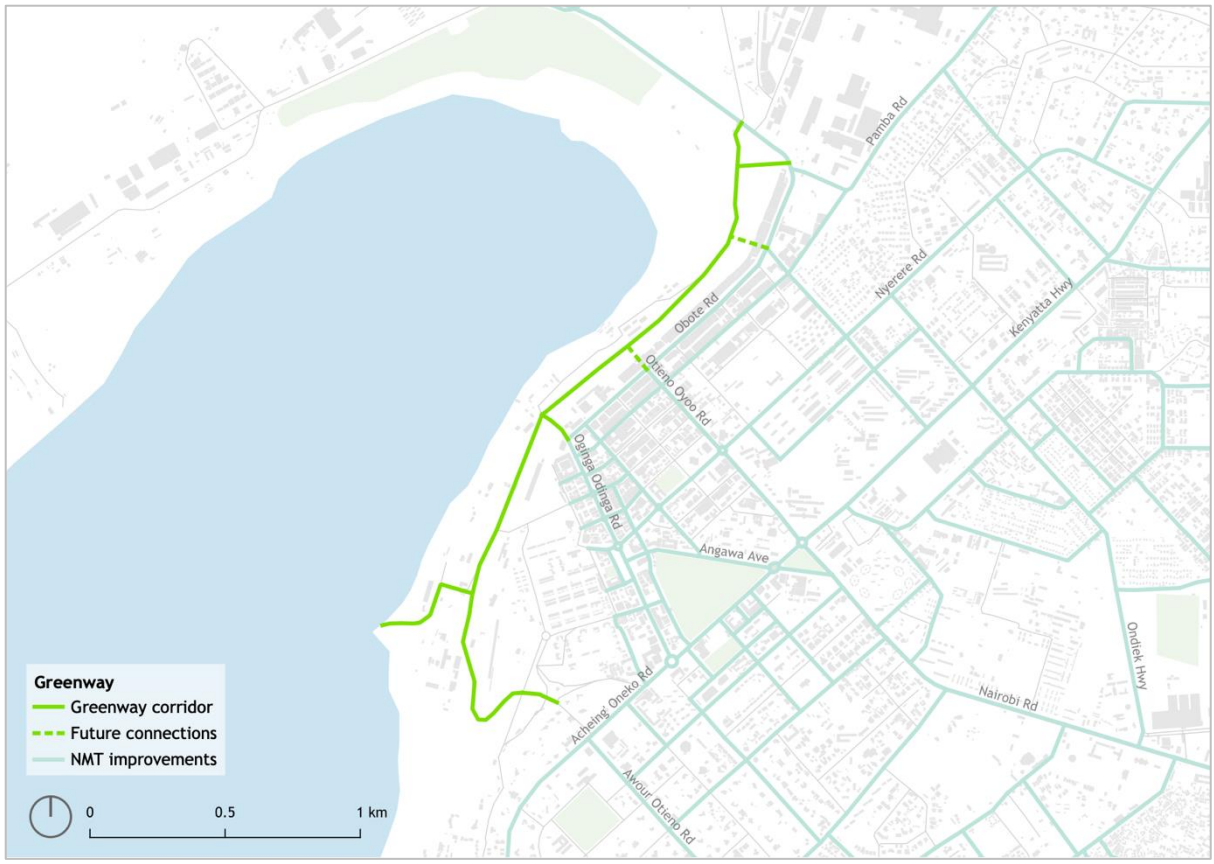


Figure 71: Greenway corridor.

10-year targets for NMT facilities

- Implement pedestrian and road safety elements in 40 school zones by 2022.
- Rehabilitate 28 km of recently constructed KeNHA corridors with road safety improvements, including the redesign of 20 unsafe intersections, by 2022.
- Improve 100 km of streets with a complete pedestrian realm, including footpaths and crossings on major streets and safe shared space on neighbourhood lanes, by 2030 (intermediate milestones: 20 km by 2022; 50 km by 2025).
- Develop 31 km of cycle tracks by 2030 (intermediate milestones: 15 km by 2022; 24 km by 2025).
- Complete the 3.7 km lakefront greenway by 2025.
- Install bicycle parking racks at 50 locations by 2030.
- Design all NMT facilities in compliance with the Street Design Manual for Urban Areas in Kenya (SDMUAK).

7.2 Bikeshare

Bikeshare can serve short trips in Kisumu and improve last-mile connectivity to public transport through a healthy, safe, and environmentally friendly means of transport. Bikeshare will contribute towards the rollout of a truly integrated mobility system, in conjunction with improved public transport services.

Bikeshare systems employ the following best practice features:

- A dense network of stations across the coverage area.
- Cycles with specially designed parts and sizes to discourage theft.
- An automated locking system that allows users to check cycles in or out without the need for staffing the stations.
- IT systems to track where a cycle is picked up, where it is returned, and the user's identity.
- Real-time monitoring of station occupancy rates through general packet radio service (GPRS), used to guide the redistribution of cycles.
- Real-time user information provided through various platforms, including the web, mobile phones, and/or on-site terminals.
- Advertising space on cycles and at stations (provides revenue generation options for system operator or city).
- Pricing structures that incentivise short trips, helping to maximize the number of trips per cycle per day.

Figure 72: Bikeshare can improve last-mile connectivity to public transport. A user checks out a cycle using a smartphone-enabled smart card and can return it to any other station.

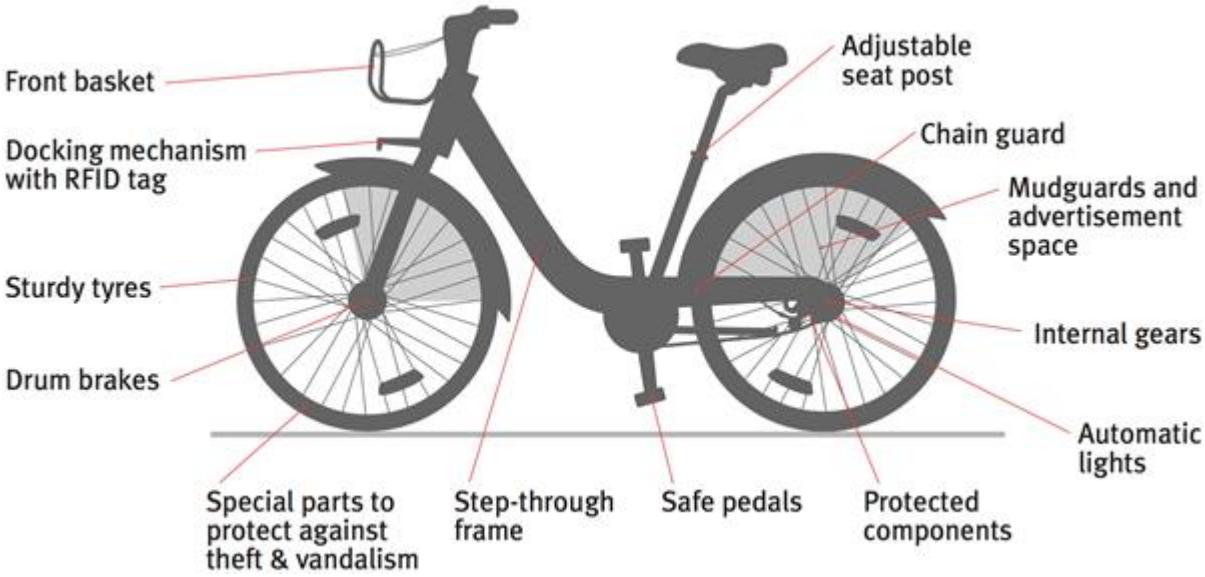


Figure 73: A unique, unisex, robust bicycle design increases brand awareness and allows the bicycle to be used by anyone.

Stations should be placed at frequent intervals, serving public transport hubs; offices and institutions; healthcare facilities; educational institutions; cultural hubs, and tourist destinations. Close station spacing reduces the distance that a user has to walk to access the bicycle sharing system.

Bikeshare can serve commuters who travel by public transport and need a "last mile" option to reach their final destinations; workers and students who need to do short-distance errands during the day; and tourists using the bicycles to explore the city centre. People who already use bicycles will benefit from "safety in numbers" once the system begins to generate a larger number of cycling trips in the city. In addition, bicycle sharing stations can be paired with parking areas for personal cycles. Bikeshare can provide an employment opportunity to the unemployed youth, particularly in the form of the semi-skilled labour in support of system operations.

The registration system should incorporate safeguards to accommodate vulnerable users. While the majority of users can access a bikeshare system through a website or station terminals, it is important to have a face-to-face platform at a central location where users can subscribe to the system and make payments. Through creative approaches to user registration, payment, and system management, bikeshare projects can overcome implementation barriers related to purchasing power, credit card/debit card penetration, smartphone penetration, and security.

Following the completion of preparatory activities, Kisumu can contract a private operator to install the bikeshare system and handle day-to-day operations and maintenance. To ensure long-term sustainability, the city should identify full-time staff to monitor the system. Bikeshare systems can be funded through a combination of revenue sources, including advertising, sponsorships, user fees, and the city budget. The launch of bikeshare systems should be accompanied by communications and outreach activities aimed at encouraging use of the system, particularly among women.

The Kisumu household survey indicated that the vast majority of bicycle trips are made by men, with a few trips made by children. Only 1 percent of cyclists are women. This could be attributed to a lack of safe and dedicated cycle facilities, making women perceive cycling as an unsafe mode of transport. In addition, the design of most bicycles is not female-friendly. The frame is not slanted to enhance the

comfort of women cycling in dresses, and hence women have to choose between style and mobility. Further, the saddle of most bikes is uncomfortable for many women. To bring more women into cycling, there is a need to not only provide the cycling infrastructure but also avail comfortable female friendly bicycles as part of the bikeshare system. In addition, the city can organise dedicated cycle training for women.

10-year target

- Implement a first-phase bikeshare system with at least 400 cycles by December 2024.

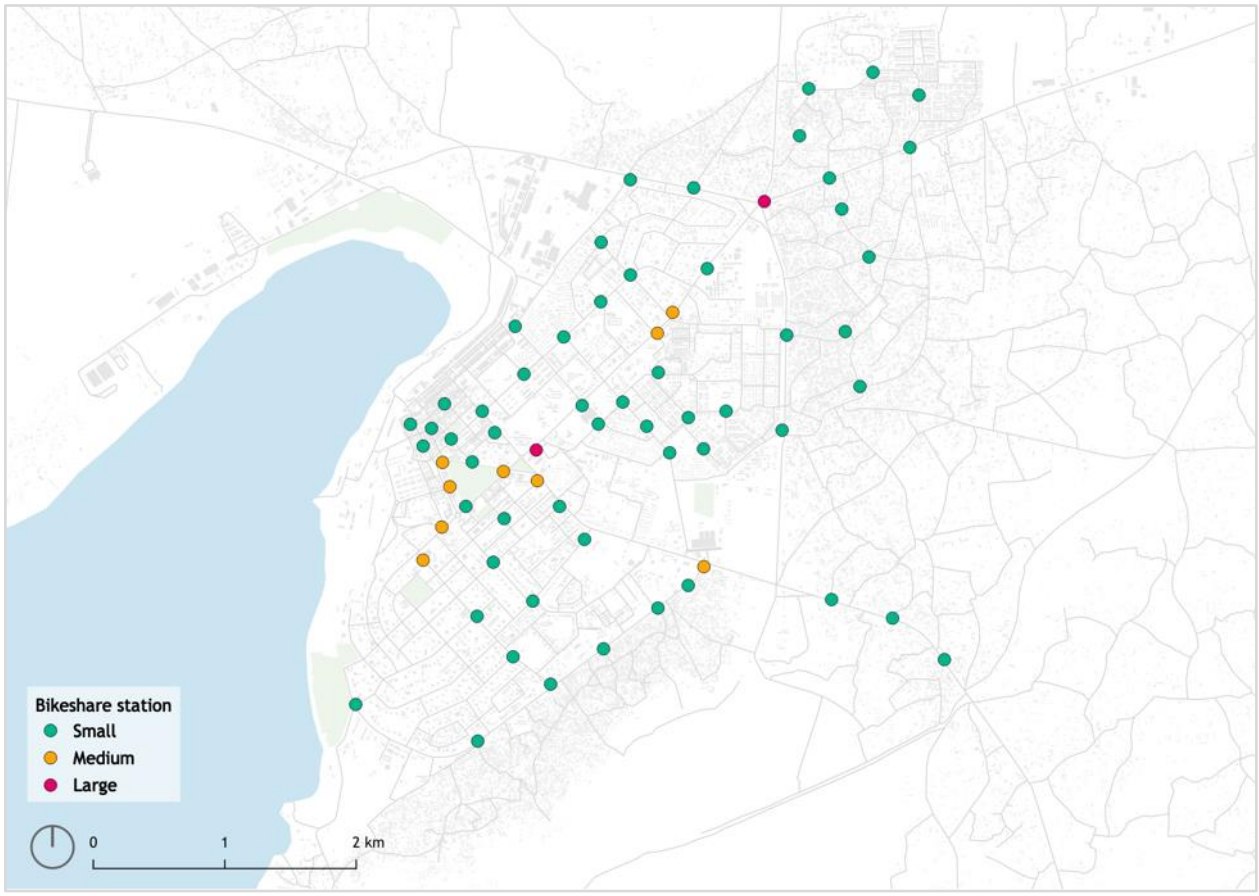


Figure 74: Proposed station locations for a first-phase bikeshare system. Small stations should have 10 docks, medium stations with 20 docks and the large stations with 30 docks.

7.3 Street lighting

Adequate street lighting improves safety and security on the street by enhancing visibility—both NMT users' ability to survey the surroundings and drivers' ability to see pedestrians and cyclists. Street lighting also contributes to the perceived and actual threat of criminal activity. Designing streets with proper lighting, therefore, contributes to safety and security for NMT users at night and encourages NMT use. LED/energy saving bulbs should be used for street lighting to minimises the cost of lighting the city.

10-year targets

- Install 100 km of street lights by 2030.
- Adopt a street lighting maintenance manual by December 2022.

7.4 Vendor management

Street vending is important as it provides essential goods and services at affordable prices. Street vending also improves safety and makes streets more attractive and interesting for city dwellers and visitors. Vendors should be allocated dedicated spaces on the street to minimise conflict with pedestrians and other street users. The furniture zone of the footpath or a bulb-out in the parking lane are ideal locations for vending.

The use of parking lots, furniture zones, and public spaces for organised street vending can help minimise pedestrian-vendor conflict on the streets. City vendors should be encouraged to form organised groups or saccos and elect officials to enhance self-regulation. The city should issue licenses to street vendors, set standards for vending stands, and monitor the upkeep of vending zones. Formalising the relationship between the government and vendors through a vending policy and regulations will facilitate enforcement to ensure that vendors do not become a nuisance in the streets.

10-year targets

- Develop a street vending management system by December 2021.
- Allocate defined vending areas on streets or in markets by 2022.

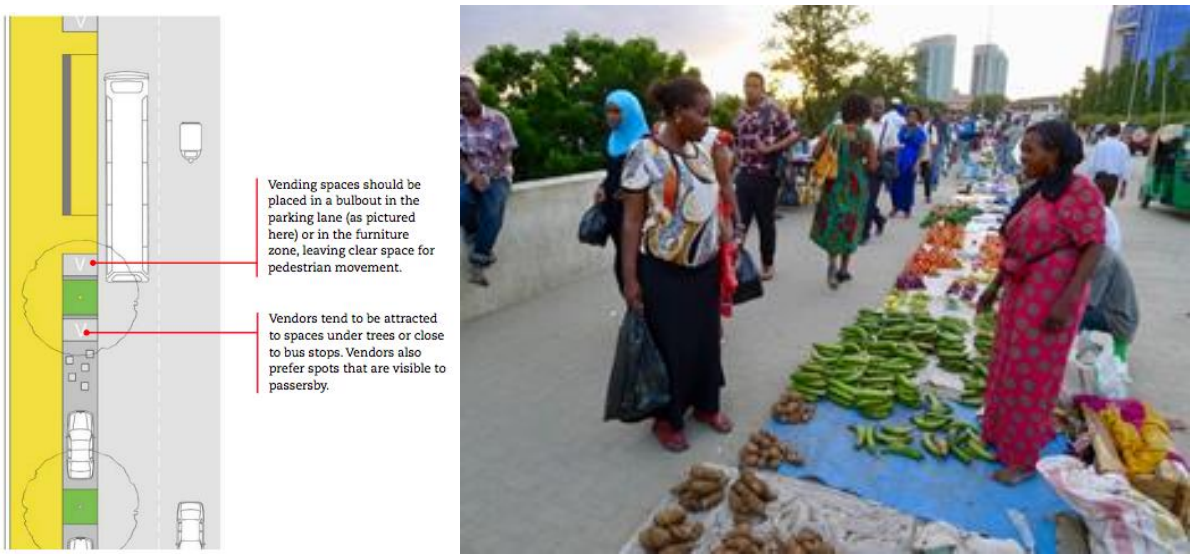


Figure 75: Street vendors should be accommodated to enliven public spaces without compromising the continuity of cycle tracks and footpaths.

7.5 Public transport

7.5.1 Industry modernisation

An efficient public transport system can move passengers from their origins to their desired destinations in a safe, fast, comfortable, reliable, and flexible manner. To improve the efficiency and quality of service of public transport in Kisumu, the city needs to implement reforms in the management and operation of public transport.

Kisumu's current public transport system is largely informal and supplied by a combination of matatu and shared tuk-tuk services. Matatu operators are organised in 17 saccos registered and licensed by NTSA, while tuk-tuks are not formally licensed to operate public transport services. Though reasonably demand-responsive, private informal operators tend to under-supply service, choosing to spread peak demand over a longer period in order to minimise the required vehicle fleet. Services are unpredictable since they do not follow a schedule and vehicles wait until all the seats are occupied to depart from a terminal or stop. Competition for customers leads to unsafe driving and poor customer service. Incentives are defined by the "target system" where a driver has to carry as many passengers and go on as many trips as possible to increase earnings. Besides impacting the quality of service for the passengers, the target system creates unpleasant working conditions as drivers work for long hours without insurance and other employment benefits.

In addition, this atomised public transport system operates at low-profit levels. Revenues are insufficient to cover adequate vehicle maintenance and renewal, so the whole public transport service is provided by vehicles in poor condition. Annual supervision and enforcement of vehicle minimum quality and safety standards by is inefficient and ineffective. As a result, the existing system is uncomfortable, unsafe, and unreliable but operates without subsidies from the government. These factors indicate the need for public transport reforms that ensure convenience, efficiency, safety, and comfort of public transport users while improving working conditions for matatu operators.

In Kisumu, as in most developing cities, the public transport sector not only provides transport service but also creates jobs for the residents. To modernise the public transport in Kisumu, the substitution of the existing system is required: a large number of small entrepreneurs will be substituted by one or two large private companies with the capacity to operate the new system efficiently. Consequently, this will bring high benefits to the overall population, while generating a perceived socio-economical negative impact in the local economy and the current public transport operators.

There have been two main approaches to address the industry transition:

1. Hire new fleet operators (typically large private transport companies) through public tendering, sometimes giving extra points to the bidder that includes existing operators in the proposal.
2. Create large companies run by existing operators and assign the new public transport operation directly to these companies, without a tendering process.

The first approach assures the operation of the system by an experienced transport company, minimising operational risks, but with a significant potential loss of income for existing operators, which can turn into opposition from some political sectors. The second approach minimises (but does not eliminate) social impacts and political opposition, but (1) has operational quality risks (at least for

the first year of operation), (2) requires a lot of work from the government authority overseeing the system, (3) has a fairly high-risk probability of not being 100 percent successful in including all operators (which reduces the possibility of eliminating competition along the new routes). The success of this approach depends on the county's negotiation capabilities and the commitment of other government departments to the reform process.

Innovation in a conservative sector such as the public transport business can face a high degree of opposition, particularly when there is no previous experience in the country and city, as in the case of Kisumu. Consequently, CGK will have two main responsibilities in the industry modernisation process:

1. Convincing the existing operators of the advantages of being incorporated in a formal company or corporation.
2. Advising the existing operators in the constitution of the new company, particularly the company's management structure, the distribution of shares, and the definition of the main processes.

The creation of a new transport company starts in convincing (and in some cases forcing) the existing operators to associate with each other in a formal company. This can include a benchmarking visit to highly successful private companies that operate urban public transport fleets (e.g., in Kigali, Rwanda). Then, the government may act as an advisor for the creation of the new company, recommending the structure, key processes, and procedures to distribute shares and profits. Last, the government may assist in the hiring of employees and training courses for the personnel of the new company. Following are key components of this process:

- **Data gathering.** In order to negotiate with existing operators, a clear understanding of the current route structure is needed. Field data from the demand and service plan studies are very helpful and may be supplemented to ensure the following information is available prior to negotiations: number of route licenses that have been legally issued (including permit holder and type of vehicle); itineraries of all routes; fleet size per legal route; and daily (from fieldwork) and yearly (estimated) passengers for each route. This information will provide an accurate picture of the city's mobility characteristics as the negotiations begin.
- **Training.** The existing operators will need some training about the new operational scheme. The following are a set of topics that should be included in the training courses: business model; operational characteristics; fleet characteristics; passenger demand analysis; administration and finance; legal aspects; and fleet management.
- **Negotiation and company formation.** Once CGK has all detailed data on existing operations, it should promote a number of meetings with the. During those meetings, the operators will be informed of the project details and their participation: the need to be integrated into one of the companies that will operate across the city. During negotiations, CGK must show its willingness to incorporate all the existing operators as the new public transport system, but also let them know that they are only concessionaires of a public service and that their unwillingness to participate in the new project will eliminate their possibility to operate in the corridor for good. Once there is an agreement for the participation in the operation of the public transport system, CGK may start formal assistance for the existing operators, including assistance with the design of the operating company per local regulations; the distribution of shares among shareholders; preparation of an initial financial

plan; and capacity building. The hiring of an experienced implementation consultant is recommended at this stage to assist in the negotiations and to minimise risks at the beginning of operations. The structuring of the new system is a labour-intensive project that requires not only hard work but also leadership and high-level political support.

7.5.2 Key aspects of reformed public transport services

At the end of the industry modernisation process, Kisumu aims to have a high-quality public transport system that is affordable, reliable, convenient, safe, and accessible to all. The system is expected to embody the following characteristics:

- **Services operated by corporatized entities with salaried staff.** Public transport services will be operated by a discrete number of formally registered bus operating companies under contract with the city. Drivers, conductors, and other staff will be hired on a salaried basis with workplace benefits.
- **Effective and efficient fare collection:** Efficient fare collection is an essential component of a modern public transport service. Currently, fare collection in Kisumu public transport is done manually through cash transactions collected by bus or matatu conductors during transit. The fare collection in many instances is unregulated and can change drastically depending on the conductor, the weather, traffic pattern or any other external factors. CGK should define standard distance-based fares. An improved public transport system should adopt off electronic fare collection to minimise revenue leakage and improve the customer experience.
- **Independent revenue management.** Fare collection will be handled by an independent company that is answerable to the government. By shifting responsibility for fare collection to a third party, the city will have the ability to enforce service levels by deducting penalties before the payments are made to the operators. In addition, the government will be the owner of data generated by the fare collection/IT system, making it possible to use this information for service planning.
- **Business model.** Over time, the Kisumu public transport system will transition to a "gross cost" business model where operators receive payments according to the number of bus kilometres operated (compared to the current system where operators receive revenue on a per passenger basis). A gross-cost model would enable the city to deploy public transport services based on passenger demand and social considerations rather than having operators choose what routes to operate based on potential profitability. Similarly, the government would be able to set customer fares based on social considerations without entering a negotiation with the bus operators. For example, the fare structure could offer discounted rides for children and the disabled or to encourage physical distancing during the ongoing COVID-19 pandemic. Where there is a gap between the revenue and operating costs, the government would need to provide operating subsidies. The cost of such subsidies can be offset in part through private vehicle user charges, such as demand-based parking fees.
- **Improved coverage:** Under the regulated service model outlined above, the city can review the public transport route network to ensure that good service is available throughout the city. With the introduction of independent fare collection, revenue from high-demand routes can be used to cross-subsidise service in parts of the city and at times of the day with lower demand. Regulated public transport service should be re-introduced to the Kisumu CBD to reduce travel times.

- **Improved vehicle quality**: Existing public transport vehicles in Kisumu are old and dilapidated. Introduction of newer vans and minibuses designed for urban service is crucial in enhancing the comfort of the passengers. The new vehicles should incorporate improved passenger circulation (e.g., wider doors and aisles); universal access; comfortable seats; ample ventilation; priority seating for people with disabilities, seniors, and mothers with small children, or pregnant women; and audio/visual customer information announcements. To meet current demand, Kisumu requires approximately 250 modern buses (assuming an average capacity of 50 passengers per vehicle). To accommodate an 80 percent increase in public transport ridership under the sustainable scenario outlined above, the city will require a total fleet of 450 buses by 2030. The actual fleet can incorporate a variety of vehicle sizes in accordance with the level of passenger demand on each route. Smaller vehicles can be introduced on routes currently operated by tuk-tuks, while microbuses and minibuses are appropriate for higher demand routes. All vehicles should offer accessible boarding for persons with disabilities. To ensure capacity with the future BRT system and allow for boarding from central station platforms, vehicles should have doors on both sides (see section 7.5.5 below).
- **Vehicle emissions standard and propulsion.** Many existing public transport vehicles in Kisumu are not required to meet any emission standard, resulting in poor air quality at bus stops and significant negative health impacts for riders, operators, and city residents. As an immediate step, all new vehicles should meet a basic emissions standard (i.e., Euro 4). In the medium to long term, electrification of the public transport fleet presents an opportunity to further reduce greenhouse gas emissions and local pollution. A feasibility study for electrification should be conducted to assess the operational viability and business model for e-vehicles.
- **Comprehensive passenger information system:** One of the barriers to public transport use is uncertainty about when the next matatu will arrive. This can be solved by providing real-time information bus departure times at stop and terminals and through SMS- and smartphone-based services. In addition to real-time information, network maps, fare charts, directions, bus stop and station location and an area map with surrounding landmarks can be made available at different locations.

Figure 76: Modern public transport vehicles should offer universal access, improved internal passenger circulation, and lower emissions.

7.5.3 Extending public transport coverage

Residents in areas such as Obunga, eastern Manyatta, Riat, western Nyalenda, and central Milimani do not have access to public transport within a 500 m walking radius (i.e., a 6-minute walk). In some cases, existing roads are unpaved, making it difficult for public transport vehicles to access these areas. To improve public transport coverage, the grid of major streets in Kisumu should be extended to achieve a network of public transport routes at intervals of around 1 km. Approximately 13 km of streets should be upgraded to achieve better access in the main built-up areas of Kisumu (see Figure 77), particularly in eastern Manyatta and Riat. To minimise the need for land acquisition or readjustment, these streets can be designed with a ROW of 12 m, which is sufficient to carry bi-directional traffic movement on a 6 m carriageway, with 3 m footpaths on either side. These new streets will facilitate the densification of the existing built-up area of Kisumu, thereby preventing urban sprawl in the periphery. Existing streets with new public transport routes should be upgraded with proper bus shelters (see next section).

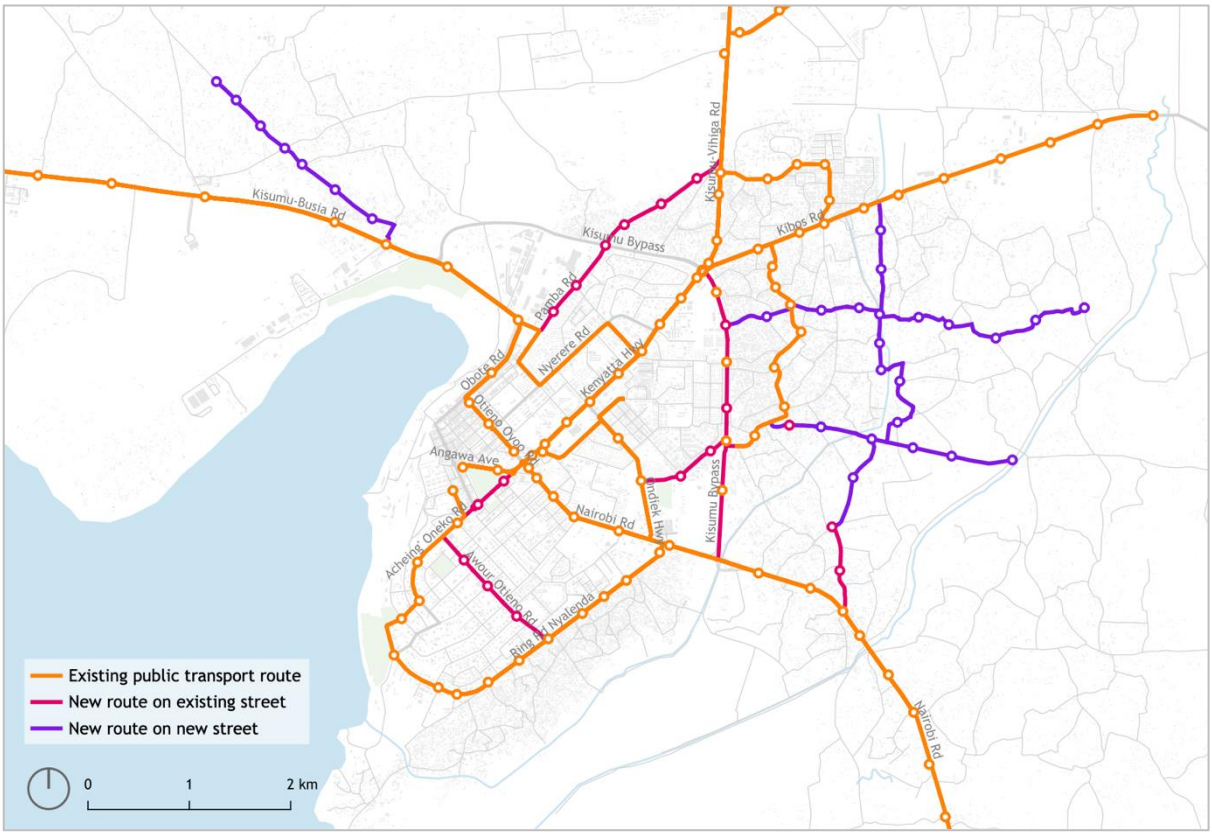


Figure 77. New public transport routes should be extended to areas that currently lack coverage. In some cases, streets will need to be upgraded to facilitate public transport access.

7.5.4 Bus stage shelters

Currently, matatus pick and drop passengers anywhere due to the lack of designated drop-off points and bus shelters. The few defined stages within the Kisumu lack proper facilities, including bus

shelters, lighting, and safe pedestrian crossings. Provision of well-designed bus stops will enhance the usability and attractiveness of public transport.

Bus stops should have a comfortable, weather-protected passenger shelter where public transport users can wait for vehicles. A well-designed bus stop provides unobstructed space for pedestrians and cyclists behind the structure. Pedestrian crossings should be established at each stop to enhance accessibility and safety for pedestrians. Based on existing boarding and alighting locations, 167 locations for improved bus shelters have been identified in Kisumu, as shown in the map below.

Figure 78: Proposed bus shelter locations.

Figure 79: High-quality shelters should be built at all stages to offer protection from the sun and rain and a secure environment at night.

7.5.5 Bus rapid transit

Many cities have realised that expanding urban roads does not provide a lasting solution to growing traffic congestion. Wider roads tend to attract more traffic creating a worse traffic situation. The only viable long-term solution for ensuring sustainable mobility is to introduce efficient public transport combined with safe and comfortable non-motorised transport. It has been established that a well-designed public transport system can transport large numbers of passengers without an exponential increase in road space requirements. To make public transport service competitive with personal motor vehicles, major corridors in Kisumu require dedicated road space for public transport in the form of bus rapid transit (BRT).

BRT can offer high-capacity and high-quality public transport service at a fraction of the cost of rail systems. BRT is a high quality bus-based public transport system that delivers fast, comfortable and cost-effective urban mobility through the provision of segregated right-of-way infrastructure, rapid and frequent operations, and excellence in marketing and customer service.[46] A well-designed BRT can transport 4,000 to 45,000 people per hour per direction and typically costs 10 to 20 times less than a metro system. Thus, BRT can significantly increase the passenger-carrying capacity of the major roads in Kisumu at a relatively lower cost compared to other MRT systems.

The basic design elements of a BRT system include dedicated median BRT lanes, platform-level boarding at stations, off-board fare collection, and intersection treatments that avoid turns across BRT lanes. Besides good physical design, successful implementation of BRT requires effective system management, operations planning, and traffic control. Per observed passenger demand levels, the highest demand corridor in Kisumu is the Kisumu Boys-Mamboleo corridor, which carries 4,500 pphpd during the morning peak hour. In the medium to long term, this corridor should be developed as a first-phase BRT corridor.

Figure 80. BRT systems, such as the Dar es Salaam BRT system pictured here, incorporate features such as dedicated median bus lanes and level boarding from central stations.

[46] https://www.itdp.org/library/standards-and-guides/the-bus-rapid-transit-standard/what-is-brt/

Table 8: Basic features of high-performance BRT systems.

Design feature	 Dedicated BRT lanes	 Median busway alignment	 Platform-level boarding	 Off-board fare collection	 Intersection treatments
Impact on system performance and service quality	• Faster speeds because buses can bypass congestion in mixed traffic lanes.	• Faster speeds because of avoided interference with property entrances, side streets, on-street parking, and pedestrian movements. • Improved safety due to reduced conflicts with mixed traffic.	• Faster speeds because of avoiding delays during boarding and alighting. • Accessibility for all users, regardless of disability.	• Faster speeds because of multiple-door boarding and avoidance of queues for fare payment and/or validation. • Improved convenience for customers. • Reduced revenue leakage.	• Faster speeds due to reduction in signal phases if right turns across the busway are avoided. Improved safety due to reduction in potential conflict points.

10-year targets for public transport

- Prepare a service plan, financial plan, and business plan for improved public transport services by 2021.
- Initiate the public transport reform process by 2021 and launch regulated services by 2022.
- Introduce a new public transport fleet consisting of 250 vehicles by 2023, growing to 450 vehicles by 2030.
- Install high-quality bus shelters at 30 high-priority bus stops on existing routes by 2021. Install shelters at the remaining 91 bus stops on existing routes by 2023. Install 46 additional bus shelters on new routes by 2030.
- Develop 13 km of new streets and introduce new routes to expand public transport coverage by 2030.
- Implement the 5 km first-phase BRT along the Kisumu Boys-Mamboleo corridor by 2028.
- Ensure that all public transport vehicles introduced after 2022 meet the Euro 4 standard or better. Conduct a feasibility study on electrification by 2022. Transition to a fully electric bus fleet by 2030.

7.6 Boda-boda, tuk-tuk taxis, and car taxis

Hail services such as boda-bodas, tuk-tuk taxis, and car taxis are an important part of the transport system in Kisumu. Boda-bodas, in particular, play a key role in providing last-mile connectivity, especially in areas where public transport is not yet available. Yet with increased demand, taxi

services of various forms contribute to road safety challenges (particularly conflicts between boda-bodas and NMT users), congestion, local air pollution, and greenhouse gas pollution.

The success of hail services at addressing the mobility and environmental challenges in Kisumu will depend on their role in the mobility system. As complements to public transport, they may be beneficial by enabling car-free lifestyles. However, if they draw trips from public transport, walking, and cycling, they may increase pollution, congestion, and associated challenges. Many cities around the world have experienced an increase in traffic because trips have shifted from sustainable modes to ride-hailing services.[47,48]

To address these challenges, the city should adopt regulations to ensure that hail services contribute to the city's mobility goals. In the case of boda-bodas, a reformed system can incorporate the following measures:

- **Electronic meters** for the calculation of customer fares.
- **Mandatory provision of helmets** for operators and passengers.
- **Licensing of vehicles and drivers**.
- **GPS-based vehicle tracking.** Each operator will be required to sign up with one of an empanelled set of technology providers who offer vehicle tracking and driver monitoring services. The technology providers can offer additional services such as electronic ride-hailing and workforce benefits for drivers.
- **Electric vehicles** to reduce local pollution and greenhouse gas emissions.

Similar measures can be adopted for tuk-tuks that continue to operate as taxis (after most tuk-tuk services transition to being part of the reformed public transport system).

Transport planning requires accurate data on current travel patterns. The adoption of GPS-based vehicle tracking for all types of hail service vehicles presents a great opportunity to obtain data on travel patterns, particularly on the question of whether boda bodas are complementing or substituting for public transport. While developing the regulations for the empanelled companies, a policy for data sharing with the city should be incorporated. For example, Vancouver made data sharing a condition of Uber and Lyft's entry to the local market.[49] All associations should be required to share real-time anonymised data, including the following:

- **Passenger data:** Trip data, including the origin, destination, timing, fare, and route number. The passenger information should be anonymised to address privacy concerns.
- **Vehicle data:** The GPS track, route number, average passenger load, and other relevant data for each trip.

[47] See for example: Bliss, Laura. (2019, Aug 5). How much traffic do Uber and Lyft cause? CityLab. Retrieved from https://www.citylab.com/transportation/2019/08/uber-lyft-traffic-congestion-ride-hailing-cities-drivers-vmt/595393/

[48] Brinklow, Adam. (2018, Jul 27). Lyft, Uber increase traffic 180% in major cities. Curbed SF. Retrieved from https://sf.curbed.com/2018/7/27/17622178/uber-lyft-cause-traffic-streets-congestion-bruce-schaller-tnc-report

[49] Marshall, Aarian. (2020, Feb 1). "Vancouver wants to avoid other cities' mistakes with Uber and Lyft." Wired. Retrieved from https://www.wired.com/story/vancouver-wants-avoid-other-cities-mistakes-uber-lyft/

- **Safety-related data:** Information on all incidents related to the operator's services, including flags for unsafe driving, traffic crashes, traffic citations, fatalities, injuries, cases of sexual harassment, and theft.

10-year targets for boda-bodas, tuk-tuk taxis, and car taxis

- Adopt driver and vehicle licensing, meters, and GPS tracking for boda-bodas, tuk-tuk taxis, and car taxis by 2021.
- Institute incentives for electrification, with a goal of electrifying 50 percent of Kisumu boda-bodas and tuk-tuks by 2025.

Figure 81: Electric tuk-tuks operating in Kisumu.

7.7 Parking management

On-street parking should be provided only after adequate provision has been made for higher priority transport modes, including walking, cycling, and public transport. Where on-street parking is provided, market-based parking fees can help manage demand. In addition, robust parking enforcement mechanisms are needed to ensure that walking and cycling facilities, once built, remain free of motor vehicle encroachments. Over time, the rationalisation of on-street parking can help reclaim street space for sustainable modes and manage the use of personal motor vehicles.

Clear and consistent customer information on parking rules and fee levels is necessary for efficient parking management. Parking fees should be based on demand. Parking charges for areas with higher demand should be higher than those where demand is lower. Income generated from parking fees can be used for street improvement including the construction of new NMT and maintenance of existing NMT facilities, road furniture, tree planting and landscaping.

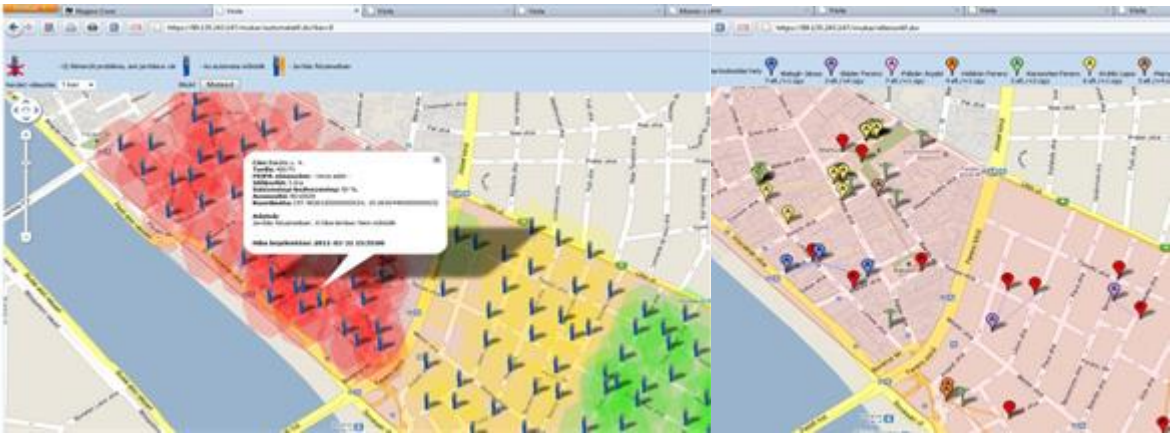


Figure 82. Budapest's parking management system provides real-time information on the status of parking fee collection (left) and enforcement personnel (right).

Efficient and effective parking management systems should have the following features:

- **Handheld devices** for use by parking field officers to administer and enforce parking fees.
- **Management software** that serves as the interface between the field officers, system managers, and the local authority.
- **On-street signage**, consisting of static signs informing drivers of parking regulations on each street and live message boards alerting drivers concerning available parking spaces nearby.
- **Customer service kiosks** in strategic locations to provide any necessary assistance or information to vehicle owners.
- **A telephone hotline** to facilitate communication between vehicle owners and city management.
- **Mobile apps** to provide live information on available parking spaces and information on parking fees.

Figure 83: Clear signage explaining parking rules, such as that used in New York (left), is essential. Shown at right is the customer website operated by Mexico City's EcoParq system.

10-year targets

- Notify all streets in central Kisumu to regularise parking fee collection by 2021.
- Introduce an enhanced IT-based on-street parking management systems with demand-based fees by 2022.

7.8 Freight and emergency services

As the population in Kisumu increases, there will be higher demand for movement of goods and services. To facilitate the movement of freight and minimise the congestion, the city can allow small goods vehicles to access the city at given times. The city should also provide space for loading at business premises.

With the reopening of the Kisumu port, it is key that freight routes are identified so that the heavy trucks are able to exit the city with ease and without creating risky situations for pedestrians and cyclists.

Emergency services, including fire engines and ambulance services, are critical to a thriving town such as Kisumu. The vehicles should be facilitated to access their destinations quickly but safely. Police and city security should control traffic to facilitate ease of movement of these vehicles while ensuring the safety of NMT users at all times.

10-year targets

- Adopt regulations defining permitted times of entry and freight routes by 2022.
- Adopt emergency response protocols by 2022.

7.9 Review of building control & planning regulations

The built environment surrounding pedestrian routes must be conducive to walking. Walking is safer and more enjoyable when sidewalks are populated, animated, and lined with vibrant and open ground-floor activities such as storefronts and restaurants. In turn, being closer to passing pedestrians and cyclists increases the exposure and vitality of local retail, bringing significant economic benefits.

Architectural design elements such as building setbacks, the ratio of building height to street width, and the articulation and permeability of building-street interface (i.e., the number of doors and windows) have a major impact on the quality and safety of pedestrians on the street. Compound walls tend to isolate the street from private uses creating an unsafe pedestrian environment. Similarly, parking setbacks diminish the connection between pedestrian activity on a footpath and activity inside adjacent buildings. They also increase the risk of parking encroachments on footpaths. In Kisumu, many traditional developments in the CBD have active edges, but newer developments elsewhere in the city have large setbacks or compound walls. Building control regulations should be updated to

ensure that private developments contribute to improving the public realm rather than functioning as isolated islands of activity.

Besides active façades, another key aspect to the mobility of NMT users is a high ratio of intersection nodes to road links so that streets and pathways are well connected. The maximum recommended block size for people-friendly streets is 100 m. Prioritised connectivity creates finer-grained networks for walking, including pedestrian-only streets. A fine-grained walking and cycling network helps to reduce trip distances and improves access to public transport.

Currently, Kisumu is in the process of preparing a Local Physical Development Plan (LPDP) to guide the development of Kisumu over the next ten years. The preparation of the KSMP and LPDP has been integrated to ensure harmony in the proposed policies and regulations. Land use policies should encourage transit-oriented development (TOD) within walking distance (i.e., 500 m) of mass rapid transit lines. TOD policies can include affordable housing mandates, incentives for mixed use, and restrictions on off-street parking. All of these principles should be taken into account when preparing the designs for new developments.

Figure 84. Buildings in the CBD have active façades, but many properties elsewhere are lined by compound walls that disrupt the visual connection between interior and exterior spaces.

Figure 85: A fine-grained network of streets improves access for NMT users.

10-year targets

- Update Kisumu County building control regulations and land use policies to align with TOD concepts by 2022.

7.10 Storm water drainage

Adequate and efficient stormwater drainage prevents waterlogging and erosion. Many street designs presently place pedestrians and cyclists at the lowest point of the cross section, forcing them to wade through water and mud during the rainy season. This makes the NMT environment unpleasant and unsafe to use. Instead, footpaths and cycle-tracks should be raised to permit stormwater runoff. Stormwater should be carried through closed drains to free up road space for pedestrian and cycle facilities. A stormwater management plan should be prepared to prioritise stormwater improvements.

Figure 86: Loose drain covers make for a poor walking surface (left). A well-finished footpath on top of a major stormwater drain provides a comfortable walking surface (right).

10-year targets

- Adopt a stormwater maintenance manual by 2022.
- Develop a citywide stormwater management plan by 2022.
- Repair or construct stormwater drains on 100 km of streets by 2030 (milestones: 20 km by 2022; 50 km by 2025).

7.11 Communications and outreach

Communications and engagement activities can play a key role in building public support for the initiatives outlined in this plan. Effective messaging about sustainable transport can build enthusiasm for public transport and NMT use and foster a changed culture that embraces walking and cycling as integral modes of transport. In addition, the participation of local residents, businesses, and other stakeholders in the planning and design of streets can help improve transparency and foster the

community's active use and sense of ownership of public spaces. Communications and outreach activities can include the following:

- **Car-free events** can help introduce the idea of streets as spaces that provide equitable access for all users. During such events, private motor vehicles are temporarily banned, and streets are opened for exclusive access by pedestrians and cyclists. Programmed activities during open streets events can include health and fitness activities, dance classes, bicycle maintenance clinics, inclusive recreation, and arts activities.
- **Marketing campaigns** can raise the profile of public transport, walking, and cycling; encourage usage of the city's bikeshare system; and encourage safe driving among motor vehicle drivers. To reach a diverse audience, such campaigns should make use of multiple channels, including television, radio, print media, and social media.

Figure 87: Car-free days in Mexico City (left) and Kigali (right) repurpose streets for walking, cycling, and other healthy activities.

- **Cycle trainings** can introduce safe cycling techniques and encourage ridership among new users, especially women and youth.
- **Sustainable commuting days** for city and government staff can expose city senior and technical staff to daily challenges faced by NMT and public transport users and give an opportunity for staff to lead by example.
- **Use of bicycles by local officials**, including the police, can help change the image of cycling.
- **Participatory planning activities** will give community members a chance to offer input on plans and designs for public transport systems, NMT and public space projects. Kisumu will adopt an open data policy to improve access to information. Stakeholder engagement should call on even non-NMT and public transport users to contribute to and support the implementation of the Kisumu KSMP because the social and environmental benefits go beyond the direct benefits to the users themselves.

10-year targets

- Hold a car-free day at least one Sunday per month starting in January 2021.
- Hold monthly sustainable commuting (walking, cycling, or public transport) days for county/city staff from January 2021.
- Document the various ongoing and planned initiatives under KSMP and prepare outreach materials by June 2021.
- Organise an annual road safety week every first week of November starting in 2021 to sensitise pedestrians, children, and drivers on road safety.

8. Implementation

Achieving the ambitious goals outlined in the Kisumu Mobility Plan will require steady progress over time, strong political will, an adequate budget, and public support. One way to build stakeholder buy-in is to implement demonstration projects to highlight the benefits of complete streets. For example, streets that experience high pedestrian volumes and serve as important access routes to public transport have the potential for significant impact. By initially focusing on projects with a high probability of success, the city of Kisumu can build public enthusiasm for more widespread transformations. While change may be difficult at the beginning, determined efforts can help the City of Kisumu create the necessary shift towards efficient public transport and safe and user-friendly NMT.

8.1 Capacity building

Capacity building is vital in ensuring continuity and maintenance of projects. In the case of Kisumu, there is a deficit in knowledge and experience in sustainable transport. As such, capacity building will ensure that city and county staff and various national agencies working in the city are trained and equipped with knowledge and skills on street design, public transport, travel demand management, and other facets of mobility planning. This will ensure that KSMP is implemented as planned to realise an efficient, convenient, affordable, and integrated transport system.

Key actions for capacity building

- Train technical staff (County, City, KURA, KeNHA, KeRRA, and consultants) on the use of SDMUAK by 2020.
- Train technical staff (County, City, KURA, KeNHA, KeRRA, and consultants) on community participation techniques in infrastructure project planning and implementation by 2021.
- Train technical staff (County, City, KURA, KeNHA, KeRRA, and consultants) on public transport modernisation by 2022.
- Train technical staff (County, City, KURA, KeNHA, KeRRA, and consultants) on BRT by 2023.

- Train technical staff (County, City, KURA, KeNHA, KeRRA, and consultants) on bikeshare by 2023.

8.2 Institutional framework

Innovative ideas and policies geared towards sustainable mobility require strong institutional and governance structures to oversee their successful implementation. Political will, sound leadership, transparency, and accountability are essential in building public trust.[50] To enable the successful implementation of the KSMP, the County Government of Kisumu will set up a Kisumu Sustainable Mobility Steering Committee comprised of both county and national government representatives. Successful implementation of Kisumu Mobility Plan will involve cooperation among multiple stakeholders. The following table displays the respective responsibilities of different agencies in implementing the mobility plan.

Table 9: Key agencies and their responsibilities in the implementation of the KSMP.

Institution	Responsibility
County Government of Kisumu	• Provide political leadership and general oversight toward dissemination and implementation of the mobility plan
City of Kisumu	• Design and implement high-quality walking and cycling facilities • Plan and implement bicycle sharing systems • Develop greenway corridors with continuous walking and cycling facilities • Oversee operations of the on-street parking management system • Manage street vending • Prevent encroachments on NMT facilities • Conduct audits and surveys to monitor progress on implementation • Manage stormwater systems in built-up areas, and water and sanitation services
Ministry of Transport, Infrastructure, Housing, Urban Development, and Public Works (MOTIHUD-PW)	• Formulate favourable national transport and land use policies • Develop and manage transport infrastructure • Manage and coordinate national transport safety, registration, insurance and inspection of motor vehicles amongst other responsibilities • Develop model building control rules and planning regulations
Kenya National Highways Authority (KeNHA)	• Design and implement high-quality roads with walking, cycling, and public transport facilities, including BRT • Ensure allocation of adequate budget for NMT development and maintenance. • Partner with academic institutions and technical organisations to conduct training programs for engineers, planners and other technical staff in the basics of street design.
Kenya Urban Roads Authority (KURA)	• Design and implement high-quality roads with walking, cycling, and public transport facilities, including BRT • Ensure allocation of adequate budget for NMT development and maintenance • Partner with academic institutions and technical organisations to conduct training programs for engineers, planners, and other technical staff in the basics of street design

[50] UN-Habitat. (2013). Global Report on Human Settlements: Towards Sustainable Urban Mobility.

Institution	Responsibility
National Transport and Safety Authority (NTSA)	• Enforce traffic rules, educate street users, and identify where improvements are required to improve safety • Develop and implement road safety strategies • Conduct regular road safety audits/inspections
Kenya Police Traffic Department	• Control and manage traffic operations.
Kenya Ports Authority	• Manage water transport in Lake Victoria

8.3 Implementation investment plan

The table below shows the capital cost of the projects suggested in the KSMP.

Table 10: KSMP Investment plan 2021-2030.

Initiative	Action item	Implementing Agency	Quantity	Unit	Cost / unit (m KES)	Total cost (m KES)
NMT	School zone improvements	CGK	40.0	No of schools	4.18	167.4
NMT	KeNHA corridor safety - Midblock tabletops	KeNHA	100.0	No	0.53	52.5
NMT	KeNHA corridor safety - Intersection redesign	KeNHA	20.0	No	1.00	20.0
NMT	Pedestrian realm	CGK, KURA, KeNHA	100.0	km	40.00	4,000.0
NMT	Cycle tracks	CGK, KURA, KeNHA	31.0	km	30.00	930.0
NMT	Lakefront greenway project	CGK	3.7	km	30.00	111.0
NMT	Bicycle parking	CGK, KURA, KeNHA	50.0	Locations	0.50	25.0
NMT	Annual maintenance for NMT facilities @ 10% of capital cost	CGK, KURA, KeNHA	1.0	Lump-sum	530.59	530.6
Bikeshare	Bike-share implementation	CGK	8.0	Years	30.00	240.0
Lighting	Street lights	CGK, KURA, KeNHA	100.0	km	4.00	400.0
Lighting	Annual maintenance for street lights @ 10% of capital cost		1.0	Lump-sum	40.00	40.0
Public transport	Public transport studies	CGK	1.0	No of studies	20.00	20.0
Public transport	Industry transition negotiations & bus operating company establishment	CGK	12.0	No of months	1.50	18.0
Public transport	Driver training	CGK, NTSA	1,000.0	No of drivers	0.02	15.0

Initiative	Action item	Implementing Agency	Quantity	Unit	Cost / unit (m KES)	Total cost (m KES)
Public transport	Bus shelters	CGK, KURA, KeNHA	167.0	No	0.25	41.8
Public transport	Public transport fleet replacement	CGK, NTSA	450.0	No of vehicles	5.50	2,475.0
Public transport	New streets for public transport	CGK, KURA	13.0	km	50.00	650.0
Public transport	BRT phase 1 designs & tender documents	KeNHA	1.0	No of studies	20.00	20.0
Public transport	BRT phase 1 construction	KeNHA	5.0	Km	250.00	1,250.0
Public transport	Annual maintenance for public transport facilities @ 10% of capital cost	CGK, KURA, KeNHA	1.0	Lump-sum	194.18	194.2
Taxi	Improve boda-boda behaviour and safety (annual activities)	CGK and NTSA	10.0	No	1.00	10.0
Parking management	Introduce enhanced IT-based parking system	CGK	1.0	No	-	-
Storm water	Storm water drains	CGK, KURA, KeNHA	100.0	km	0.03	2.5
Storm water	Annual maintenance for storm water @ 10% of capital cost		1.0	Lump-sum	0.25	0.3
Communications	Monthly car-free days	CGK	120.0	Months	0.25	30.0
Communications	Annual road safety campaign	CGK, NTSA	10.0	Years	1.50	15.0
Communications	Public engagement workshops	CGK	40.0	No of meetings	0.20	8.0
Capacity building	Trainings on street design, public transport, TDM, and TOD	CGK	10.0	No of meetings	0.20	2.0
Capacity building	Development of university curriculum on sustainable mobility	Universities	1.0	No of studies	10.00	10.0
Capacity building	Study visits for senior officials, decision-makers, and technical staff	CGK	50.0	No of participants	0.35	17.5
Monitoring and evaluation	Kisumu Sustainable Mobility Steering Committee	CGK	40.0	No of meetings	0.05	1.8
Monitoring and review	Annual mobility indicator tracking	CGK	10.0	Years	2.00	20.0
Total						11,317.4

8.4 Monitoring and evaluation

To monitor the improvement of the NMT and public transport facilities and facilitate access to information, Kisumu Government will conduct annual assessments of the public transport, walking, cycling, street vending, street lighting, and storm water drainage to establish the progress made and compare with expected targets. The assessment results will be used to identify the gaps between existing and desirable public transport, walking and cycling facilities and can inform the prioritisation of urban transport projects. Data on the physical environment should be supplemented by citywide information on mode shares and travel patterns obtained from periodic household surveys.

8.4.1 Implementation targets

The following table summarises the implementation targets contained in the KSMP. The projects are split into three phases:

- Short term: 2021-2022.
- Medium term: 2023-2025.
- Long term: 2026-2030.

Table 11: Implementation targets.

Initiative	Implementation targets	2021-2022	2023-2025	2026-2030
NMT	Implement road safety improvements in 40 school zones			
	Improve safety on 28 km of KeNHA corridors by adding pedestrian crossings and redesigning 20 intersections			
	Improve 20 km of streets with a complete pedestrian realm			
	Improve 30 km of streets with a complete pedestrian realm			
	Improve 50 km of streets with a complete pedestrian realm			
	Develop 15 km of cycle tracks			
	Develop 9 km of cycle tracks			
	Develop 7 km of cycle tracks			
	Complete the 3.7 km lakefront greenway			
	Install bicycle parking racks at 50 locations by 2030			
Bikeshare	Implement a first-phase bikeshare system with 400 cycles			
Lighting	Adopt a street lighting maintenance manual			
	Install 20 km of street lights			
	Install 30 km of street lights			
	Install 50 km of street lights			
Vending	Develop a street vending management system			
	Allocate defined vending areas on streets or in markets.			
Public transport	Prepare a service plan, financial plan, and business plan for improved public transport services			

Initiative	Implementation targets	2021-2022	2023-2025	2026-2030
	Initiate the public transport reform process and launch regulated services			
	install shelters at 30 bus stops			
	Install shelters at 91 bus stops			
	Install shelters at 46 bus stops			
	Introduce a new public transport fleet (250 vehicles). Ensure that all vehicles are at least Euro 4			
	Expand public transport fleet to 450 buses			
	Develop 13 km of new streets and introduce new routes to expand public transport coverage			
	Implement the 5 km first-phase BRT			
	Conduct a feasibility study on electrification			
	Transition to a fully electric bus fleet			
Hail services	Adopt driver and vehicle licensing, meters, and GPS tracking for boda-bodas, tuk-tuk taxis, and car taxis			
	Electrify 50 percent of Kisumu boda-bodas and tuk-tuks			
Parking management	Notify all streets in central Kisumu for parking fee collection			
	Introduce an enhanced IT-based on-street parking management systems with demand-based fees.			
Freight & emergency	Adopt regulations defining permitted times of entry and freight routes			
	Adopt emergency response protocols			
TOD	Update Kisumu County building control regulations and land use policies to align with TOD concepts			
Storm water	Adopt a storm water maintenance manual			
	Develop a citywide storm water management plan			
	Construct storm water drains on 20 km of streets			
	Construct storm water drains on 30 km of streets			
	Construct storm water drains on 50 km of streets			
Communications	Hold a car-free day at least one Sunday per month starting in January 2021			
	Hold monthly sustainable commuting (walking, cycling, or public transport) days for county/city staff from January 2021			
	Document the various ongoing and planned initiatives under KSMP and prepare outreach materials			
	Organise an annual road safety week every first week of November starting in 2021			
Monitoring and evaluation	Hold quarterly meetings of the Kisumu Sustainable Mobility Steering Committee starting 2020 Q3			
	Collect data on mobility indicators starting 2020 Q3			

8.4.2 Performance indicators

The City of Kisumu will measure the effectiveness of the KSMP using the indicators listed below.

Table 12: Performance indicators.

Indicator	Type of indicator	Data source(s)
Length of street with footpaths, cycle tracks, traffic calming, universal access, rapid transit, and storm water drains	Implementation target	Street audits and government records
Number of bus shelters	Implementation target	Government records
Fraction of schools with school zone elements.	Implementation target	Government records
Number of managed parking spaces	Implementation target	Government records
Number of bicycles available in bicycle sharing systems	Implementation target	Government records
Adoption of TOD policies	Implementation target	Government records
Communication campaigns launched	Implementation target	Government records
Fraction of public transport vehicles that meet modern specifications	Implementation target	Operator & government records
Fraction of vehicles (of various types) that are at least Euro 4; fraction of vehicles that are electric	Implementation target	Operator & government records
Fraction of public transport boardings under reformed system	Implementation target	Government records & public transport surveys
Fatalities of pedestrians and cyclists	Outcome	Traffic Police records
Mode share of NMT, PT, and motorised trips	Outcome	Household surveys
Fraction of residents living with 500 m of frequent public transport	Outcome	Census, public transport route map
Vehicle kilometres travelled (VKT) by PMVs	Outcome	Household surveys
Fraction of cyclists who are women	Outcome	Traffic counts
Ambient air pollution levels	Outcome	Pollution monitoring devices
Greenhouse gas emissions from transport	Outcome	Emissions inventory

To inform measurement of these indicators, information on footpaths, cycle tracks, public transport, and other elements of the mobility system should be stored in citywide asset management system built on a Geographic Information Systems (GIS) platform. Over time, this database can be updated when street improvement projects are implemented on particular corridors. Other implementation target indicators can be measured directly through government data and records.

For the outcome indicators, some new data collection efforts will be required. In particular, information on mode shares and travel patterns can be obtained from household surveys conducted on a regular basis (e.g., every 5 years). In addition, gender disaggregated counts will be required to document volumes of NMT and public transport users, including the fraction of users who are women. Air pollution monitoring devices will be needed to measure ambient concentrations of local pollutants.

9. Appendices

9.1 Study methodology

To inform the KSMP, ITDP collected various types of data to establish the existing conditions and assess mobility challenges and opportunities in Kisumu. ITDP carried out a series of primary surveys from 2016-2019 covering:

- Provision of NMT facilities.
- Public transport services, including routes, stops, and frequencies.
- Volumes of NMT users and public transport users on major corridors.
- Volumes of non-motorised, public, and personal vehicles on major corridors.
- The supply of on-street and off-street parking facilities and usage at current prices.

In addition, ITDP collected secondary source information from agencies such as the National Transport Safety Authority (NTSA) and the Kisumu traffic police.

9.1.1 Pedestrian and cycle screen-line counts

Pedestrian and cyclist counts were conducted to determine the volume of NMT users on major corridors. The counts were undertaken on weekdays during the evening peak period, from 16:00 to 18:00 capturing pedestrian volumes at their peak, coinciding with closing periods for schools, shops, and offices.

ITDP Institute for Transportation & Development Policy	KISUMU NMT SURVEY										
	Screenline Count Survey						Sheet Number				
							___ of ___				
DATE (day/month):			Location								
Trip ID			SURVEYOR:								
Start time		End time			Weather						
	Pedestrians				Bicyclists						
Time	School Children		Other Pedestrians		Cyclists		Taxi-Bodaboda				
0:00	Male	Female	Male	Female	Male	Female	0	F	M	FC	MC

Figure 88: Screen line NMT count form.

9.1.2 Footpath inventory

ITDP conducted an inventory of footpaths on streets with a ROW above 18 m as well as all the streets within Kisumu CBD. Surveyors walked along each street, recording the presence of pedestrian facilities on each block. In locations where facilities exist, detailed information was captured on the

quality of the facilities, including width, surface, accessibility, presence of shade, and presence of obstructions.

ITDP Institute for Transportation & Development Policy	KISUMU NMT SURVEY				
					Sheet Number
	Serial number	NMT (Footpath) Inventory Sheet			___ of ___
DATE (day/month):		Location			
Trip ID		SURVEYOR:			
Start time		End time		Weather	
SEGMENT	Width of Road	Presence of footpath			
		N/W	Width of FP	S/E	Width of FP

Figure 89: Footpath inventory form.

9.1.3 Traffic volume counts

Traffic counts were conducted to assess the volume of motor vehicles on major corridors in the city. Video cameras were placed at the locations listed in the following figure to record traffic movements from 6:00 to 20:00. Classified counts were conducted from the videos.

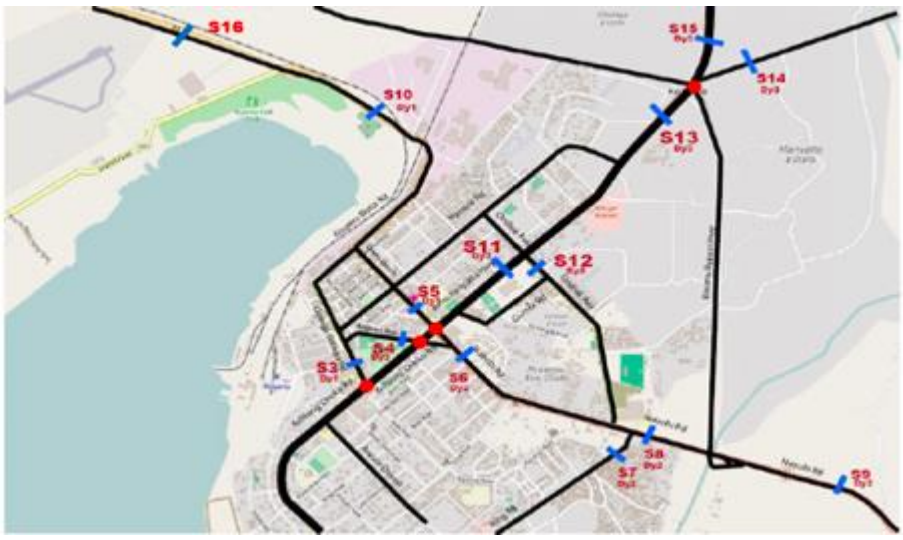


Figure 90: Traffic count locations.

9.1.4 Route inventory

As a preliminary step toward documenting existing paratransit services in the city, ITDP conducted a survey to identify the itineraries of all the intra-city matatu and tuk-tuk routes that operate in Kisumu. The routes to be surveyed were determined on the first day of the scoping survey period by conducting interviews with the operators and other stakeholders. The surveyor boarded the matatu or tuk-tuk and recorded the location and time at the beginning of the trip; bus stops and lay-bys (both formal bus shelters and informal stops); and the trip end time. The recording was done on a GPS receiver, and this information was later downloaded. During the trip, the surveyor noted the name of each stop and the number of the associated GPS waypoint.

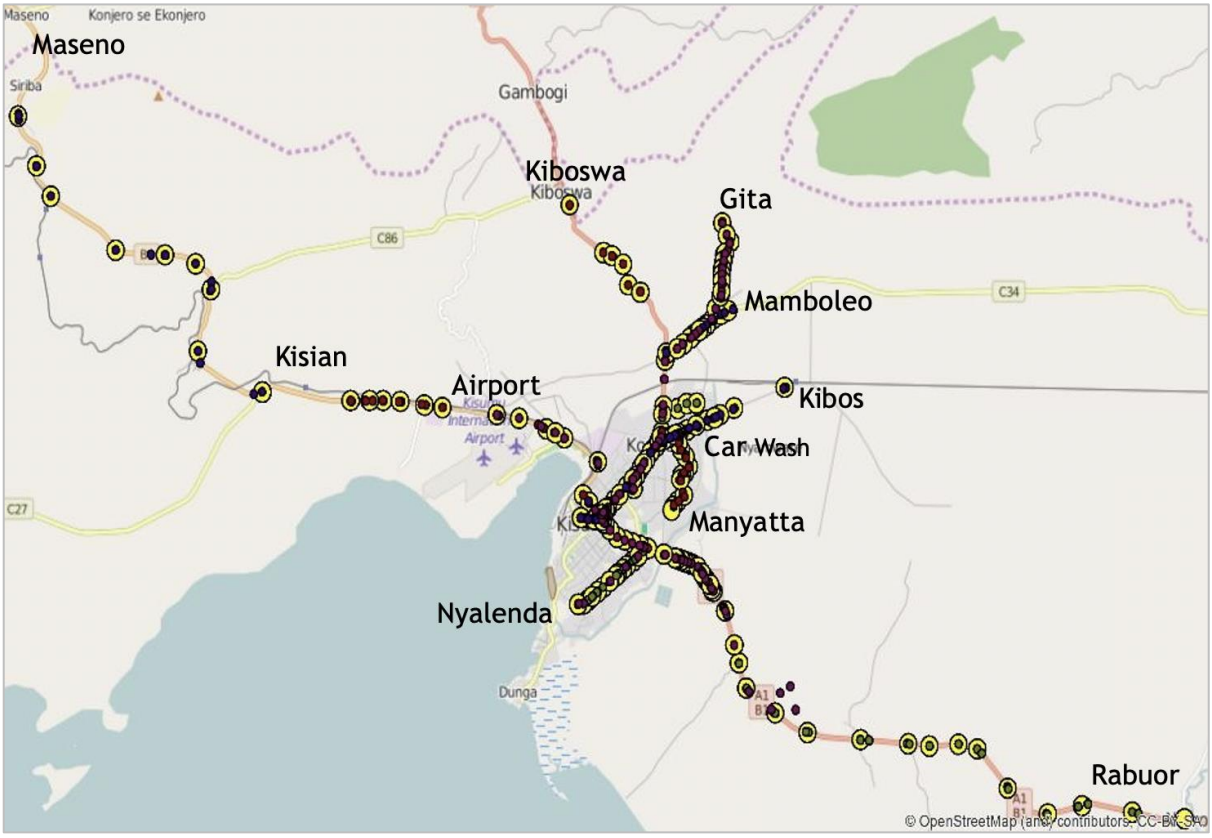


Figure 91. Stop locations observed in the public transport route inventory.

9.1.5 Frequency-occupancy survey

A frequency-occupancy (FO) survey is a survey of how frequent each bus, matatu, or tuk-tuk route runs and the number of passengers of each vehicle. This survey helped reveal the existing demand in the public transport network. For this survey, one or two surveyors record data for particular locations and assessed the capacity and occupancy level of each vehicle. A further FO survey was conducted at a subset of the locations to determine the number of passengers on each vehicle by gender. Passengers were classified as female, male, or child.

ITDP

Kisumu public transport survey

Frequency-Occupancy Survey

Sheet Number:
___ of ___

Date:	
Surveyor:	
Supervisor:	

Location number:	
Location landmark:	
Direction:	

Vehicle type (Circle one)	Occupancy	Route	Time	
			Hr	Min
T 8 11 11N 14 33 40+	32	18	7	46
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				

Vehicle type (Circle one)	Occupancy	Route	Time	
			Hr	Min
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				
T 8 11 11N 14 33 40+				

Figure 92: FO survey form.

Figure 93. FO survey locations.

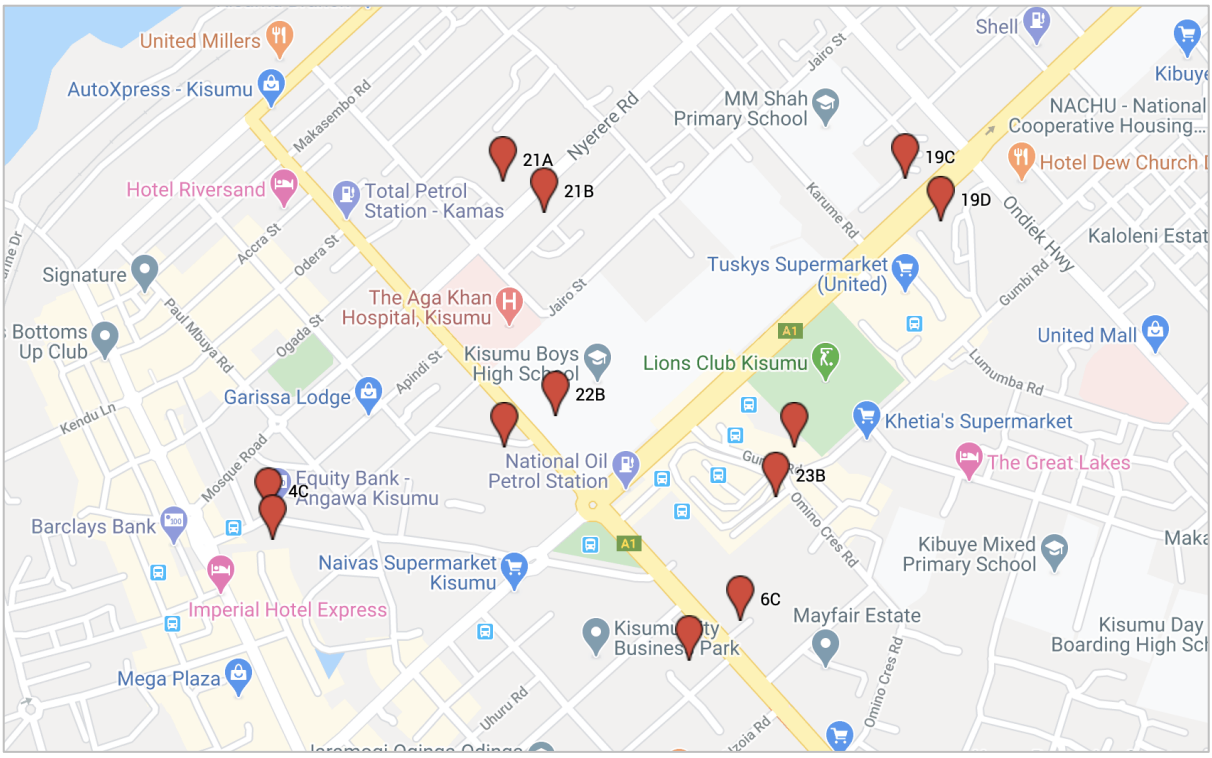


Figure 94. FO gender survey locations.

9.1.6 Parking survey

To help inform city centre parking management strategies, ITDP carried out a survey to quantify the demand and supply for parking. Parking inventory data were gathered from CGK and supplemented through a physical count of the number of parking spaces on each street and in each off-street parking lot.

9.1.7 Household survey

To gain a comprehensive understanding of travel patterns in the city, ITDP conducted a household mobility survey. The household survey aimed at understanding the daily household travel patterns and the mode used per trip. Data were collected from 2,762 households in 103 zones across greater Kisumu, ensuring that the demographic distribution of the sample reflected the city's varying population density. It also ensured that the sample represents the city in terms of gender, age, and income levels. Survey results were expanded in proportion to the population in each zone from the 2009 census.

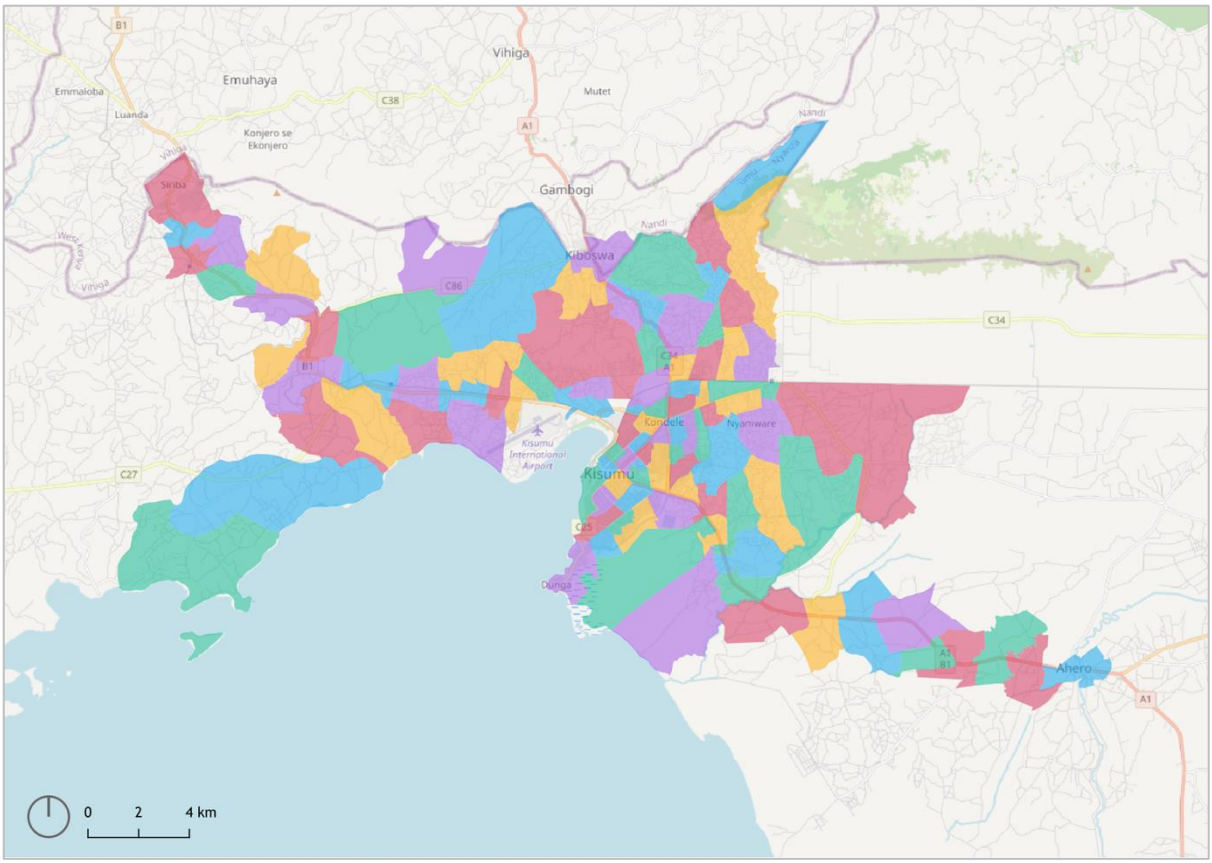


Figure 95. Zoning for the household survey.

9.1.8 Focus groups

Focus group discussions were carried out to understand the conditions and challenges faced by operators of specific transport modes, such as tuk-tuks, motorbikes, cycles, and matatus. The focus group involved a small group discussion (9-16 people). The survey covered topics such as operator demographics, working hours and conditions, quality of terminal amenities, operating costs, and potential areas of improvement.

9.1.9 Stakeholder consultations

Stakeholder engagement is a key step in the development of the Kisumu Sustainable Mobility plan. ITDP in liaison with CGK organized four workshops which were attended by stakeholders from diverse backgrounds including national and county governments, civil society groups, educational institutions, and trade associations. The interactive sessions sought to gather input and enable smooth and equitable implementation of the mobility plan.

Table 13: Stakeholder workshops

Date	Venue	No of participants	Organisations represented
23 Mar 2016	Jumuia Hotel	22	CGK, consulting firms, the private sector, parastatals, matatu sector, and boda-boda sector
15 Sep 2016	Social Hall	97	CGK, consulting firms, civil society organisations, educational institutions, private sector, parastatals, bus park management, matatu sector, tuk-tuk sector, boda-boda sector, and vendors
20 Jun 2018	Acacia Premier hotel	90	Governor of Kisumu County Prof Anyang Nyong'o, CGK, consulting firms, educational institutions, private sector, parastatals, matatu sector, and boda-boda sector
20 Nov 2018	Acacia Premier Hotel	106	Governor of Kisumu County prof Anyang Nyong'o, representatives from CGK, representatives from the City of Kisumu, consulting firms, private sector, parastatals, matatu sector, boda-boda sector, tuk-tuk sector, and street vendors

An initial workshop began with a presentation from Michael King, a non-motorised transport (NMT) expert, who gave an introduction to street design principles. Participants later went to the field for a site visit to observe and analyse the condition of NMT facilities and NMT user behaviour. Afterwards, the participants developed design proposals for the study areas.

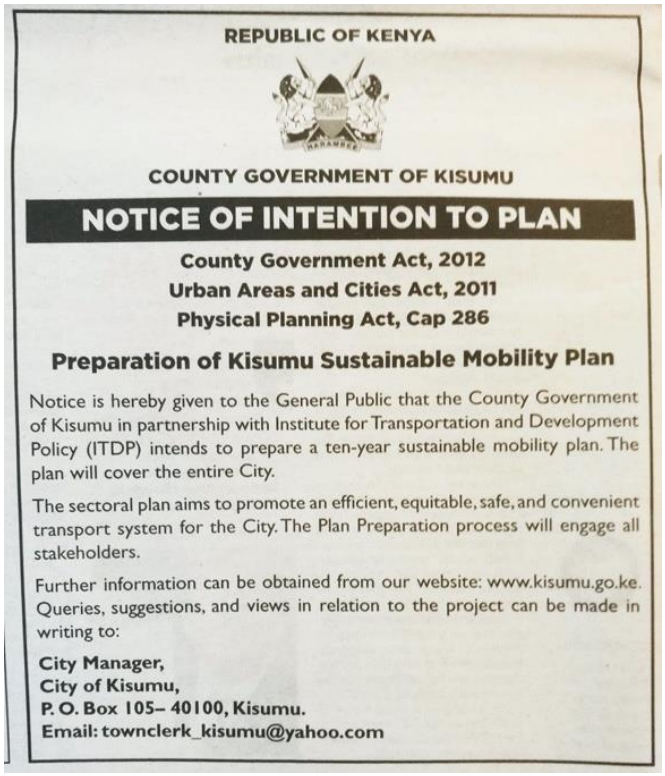
Figure 96: Workshop participants made presentations for proposed design improvement for Angawa Avenue and Oginga Odinga St.

Figure 97: Planner Sule (left) and City Manager, Madam Doris Ombara (right), addressing participants during workshops held in Kisumu.

Additional stakeholder workshops were held in September 2016 and June 2018. The final workshop was held at the Acacia Premier Hotel on 20 November 2018. During this workshop, ITDP made a presentation of a more refined mobility plan plus some design concepts for three streets that were identified for the initial phase of NMT improvements in the mobility plan. There were 106 participants in attendance, including the Governor of Kisumu and representatives from CGK, representatives from the City of Kisumu, consulting firms, the private sector, parastatals, matatu associations, boda-boda operators' representatives, tuk-tuk operators representatives, and street vendors representatives.

Figure 98: The Governor of Kisumu, Prof. Peter Anyang' Nyong'o, addressing workshop participants during a stakeholders workshop held in Kisumu.

9.2 KSMP gazette notice



REPUBLIC OF KENYA

COUNTY GOVERNMENT OF KISUMU

NOTICE OF INTENTION TO PLAN

County Government Act, 2012
Urban Areas and Cities Act, 2011
Physical Planning Act, Cap 286

Preparation of Kisumu Sustainable Mobility Plan

Notice is hereby given to the General Public that the County Government of Kisumu in partnership with Institute for Transportation and Development Policy (ITDP) intends to prepare a ten-year sustainable mobility plan. The plan will cover the entire City.

The sectoral plan aims to promote an efficient, equitable, safe, and convenient transport system for the City. The Plan Preparation process will engage all stakeholders.

Further information can be obtained from our website: www.kisumu.go.ke. Queries, suggestions, and views in relation to the project can be made in writing to:

City Manager,
City of Kisumu,
P. O. Box 105– 40100, Kisumu.
Email: townclerk_kisumu@yahoo.com

10. Definitions

Accessibility: Facilities offered to people to reach social and economic opportunities, measured in terms of the time, money, comfort, and safety that is associated with reaching such opportunities.

Average trip length: The average distance covered by a transport mode for a trip, measured in kilometres.

Bus rapid transit (BRT): High-quality bus-based mass transit system that delivers fast, comfortable, reliable, and cost-effective urban mobility through the provision of segregated right-of-way infrastructure, rapid and frequent operations, and excellence in marketing and customer service.

Complete streets: Streets that are designed for all users, including pedestrians, cyclists, public transport passengers, and personal motor vehicles, including all modes of mobility as well as street vending, trees, street furniture, and other elements.

Greenway: A waterway or strip of land with exclusive facilities for cycling and walking.

Mobility: Conditions under which an individual is capable of moving in the urban environment.

Mode share: The share of total trips carried out by a particular mode of urban transport, including walking, cycling, bus, paratransit, rail, two-wheeler, or car.

Non-motorised transport (NMT): Human-powered transport such as walking and cycling.

Nationally Determined Contribution (NDC): National pledge to reduce greenhouse gas emissions per the provisions of the 2015 United Nations Framework Convention on Climate Change Conference of the Parties in Paris.

On-street parking: The space occupied by vehicles to park along the edge of the street.

Paratransit: Service operated by the private sector on a shared or per seat basis along informally organised routes with intermediate stops. The service may or may not have a predefined fare structure.

Public transport (PT): Shared passenger vehicles that are publicly available for multiple users. In this document, the term "public transport" is used to refer to paratransit and formal road-based public transport services.

Parking management: Pricing, enforcement, and other mechanisms used to guide parking operations to ensure the efficient use of street space.

Right-of-way (ROW): The width of the road, taken from the compound wall/property edge on one side of the road to the compound wall/property edge on the other side of the road.

School zone: All streets and greenways within a 200 m radius of a school.

Sustainable transport modes: The following modes are categorized as "sustainable modes" of urban transport because when compared with personal motor vehicles, they consume the least amount of road space and fuel per person-km and also entail lower infrastructure costs: walking, cycling, and public transport (including a regular bus service as well as BRT systems).

Traffic calming: Traffic calming measures ensure pedestrian safety by reducing speed and potentially also the volume of motor vehicles. Traffic calming slows down vehicles through vertical displacement, horizontal displacement, real or perceived narrowing of the carriageway, material/colour changes that signal conflict points, or the complete closure of a street.

Vehicle kilometres travelled (VKT): Vehicle kilometres travelled by all the personal motor vehicles (in a city) in one day.

11. Acronyms

ADP	Annual Development Plan
BRT	Bus rapid transit
CGK	County Government of Kisumu
CIDP	Kisumu County Integrated Development Plan II 2018-2022
COK	Constitution of Kenya, 2010
ISUD	Kisumu Integrated Sustainable Urban Development Plan
KeNHA	Kenya National Highways Authority
KeRRA	Kenya Rural Roads Authority
KISIP	Kenya Informal Settlement Improvement Project
KRB	Kenya Roads Board
KUP	Kisumu Urban Project
KURA	Kenya Urban Road Authority
KUSP	Kenya Urban Services Program
MOTHUD-PW	Ministry of Transport, Infrastructure, Housing, Urban Development, and Public Works
NMT	Non-motorised transport

NTSA	National Transport and Safety Authority
ROW	Right of way
SDG	Sustainable Development Goal
SDMUAK	Street Design Manual for Urban Areas in Kenya
SUMP	Sustainable Urban Mobility Plan