The Project on Integrated Urban Development Master Plan for the City of Nairobi in the Republic of Kenya

Final Report

Part I: Current Conditions

December 2014

Nairobi City County
(NCC)

Technical Support From
Japan International Cooperation Agency (JICA)

Nippon Koei Co., Ltd.
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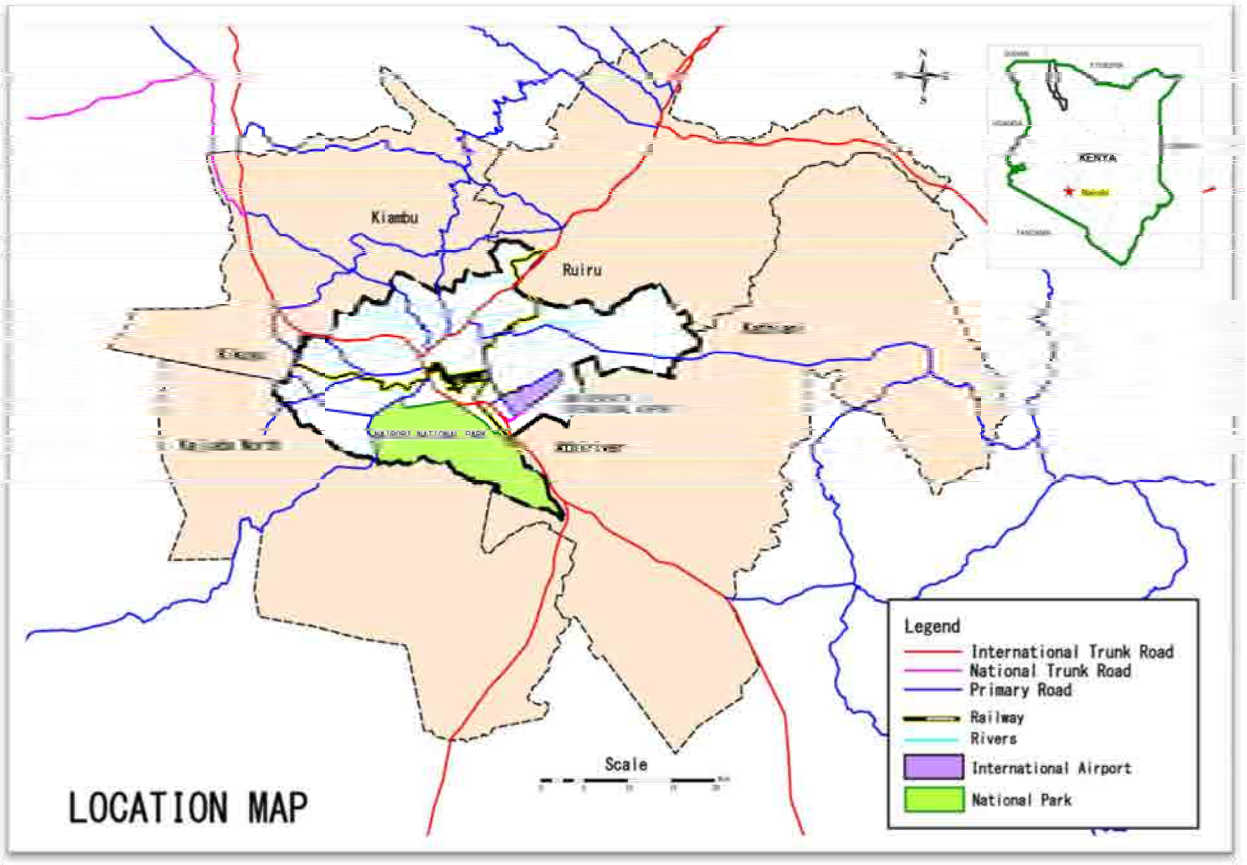
CONVERSION RATE　(AT JULY 2014)

1 KES	=	1.180 JPY,	1 JPY	=	0.847 KES
1 USD	=	103.41 JPY,	1 JPY	=	0.0967 USD

source：JICA HP

LOCATION MAP



Foreword

Preparation of the Nairobi Integrated Urban Development Master Plan (NIUPLAN) is a major milestone for Nairobi City County (NCC) and the country at large. This is because Nairobi City is not only the capital city of Kenya but also an important commercial and industrial hub for East and Central African Region. The finalization of NIUPLAN marks an important phase for the development of the City and provides us a comprehensive and integrated urban development framework that has been missing since the expiry of the 1973 Nairobi Metropolitan Growth Strategy in year 2000. Ever since, the urban problems such as the chronic traffic congestion, poor housing characterized by the expanding slum areas, environmental degradation, insecurity, unemployment and deterioration of the City's infrastructure-both physical and social have continued to pose great challenges to the City's management and delayed Nairobi City's transition to a truly modern and globally competitive center.

My administration has prioritized the preparation of NIUPLAN as the first step towards resolving the challenges that have stood in the way of achieving a planned and orderly urban environment. The Formulation process has ensured the plan is aligned to global commitments to sustainable development as well as best practices whereas locally, the plan is referenced to Kenya's Vision 2030, Nairobi Metro 2030 (2008), and The Spatial Planning Concept for Nairobi Metropolitan Region (2013). The Constitution of Kenya (2010), The Physical Planning Act, The County Government Act (2012), The Urban Areas and Cities Act (2011) and other applicable statutes form the legislative framework within which NIUPLAN is prepared.

The plan provides an integrated framework based on a comprehensive and holistic view of urban development. This has been achieved through a thoroughly participatory and inclusive process marked by stakeholder participation from inception to validation of the Final report. The development vision contained in the plan **"Nairobi 2030: An Iconic and Globally-attractive City Aimed at Regional Integration and Sustainability"** is anchored on four pillars: i) Economy, ii) Environment, iii) Governance, and iv) Social Culture capturing the views and aspirations of the city residents, and is as a result of numerous grassroots meetings and consultations held in each of the nine sub-counties of the City. NIUPLAN has also been subjected to Strategic Environmental Assessment (SEA) process to identify environmental, social and economic impacts of the plan and elicit related concerns from a broad spectrum of stakeholders thus able to formulate the necessary social and environmental safeguards into the master plan.

The plan has extensive recommendations on measures to tackle the perennial challenges being experienced in the city, such as traffic congestion, unemployment, inadequate housing, and poor infrastructure, among others. Reordering of the city's urban structure through creating multiple sub centers will decentralize employment and service delivery to mwananchi and also reduce the need to come to the CBD for similar functions. NIUPLAN envisages a compact city with multiple core centers and a revitalized Central Business District. The objective is to have an inclusive city, thus ensuring spatial and social equity.

Nairobi City County Government acknowledges with gratitude the support of the Government of Japan through the technical support of Japanese International Cooperation Agency (JICA) and the JICA study Team (JST) for the technical support in preparing NIUPLAN. I want also to extend my appreciation to National Government ministries and line regulatory and implementing agencies for the support in drawing up the plan for Nairobi City. My staff led by the CEC Urban Planning, Lands and Housing Tom Odongo and Chief Officer Urban Planning and Housing, Rose Muema deserve special mention for steering the planning team towards finalization of NIUPLAN. Other stakeholders whose cooperation and technical input is invaluable include International Finance Institutions, UN Agencies, Universities,

Professional Bodies, Resident Associations and the city residents.

I would also like to commend the County Assembly led by the speaker for playing their part during the preparation and approval of this plan. They should be proud for being the first assembly under the new constitution to debate and pass the first Integrated Urban Development Plan in the Country.

My government acknowledges the need for continued stakeholder involvement and collaborative implementation process that requires all of us to work together to achieve this shared vision.

It is my sincere hope that the implementation of the plan will unlock the city's development potential and make Nairobi City a true icon of sustainable urban development.

Dr. Evans Kidero

Governor, Nairobi City County

EXECUTIVE SUMMARY

1 BACKGROUND AND OBJECTIVE

Background

1.1 Nairobi is the capital city of Kenya and one of the most important economic centres in East and Central Africa. It accounts for 50% of formal employment in Kenya and generates over 50% of the country's gross domestic product (GDP). Nairobi plays an important role not only as a political centre but also as a model for economic and social development.

1.2 The following are some pertinent facts about Nairobi and why a new urban development plan is required:

- Population of Nairobi has grown to over 3.1 million.
- Urban problems have been left unsolved and are causing negative impacts like perennial traffic congestion, expansion of slum areas, insecurity, poor urban governance, and environment deterioration.
- In order to accelerate sound and sustainable development, an integrated urban master plan has to be prepared to improve infrastructure such as transport network, water supply, sewerage reticulationenergy, etc.

1.3 In response to the request of the Government of Kenya, the Government of Japan dispatched a Study Team (hereinafter referred to as JST) for the Integrated Urban Development Master Plan for the City of Nairobi (hereinafter referred by the acronym NIUPLAN or the Project), and signed the Record of Discussion (RD) with the then Ministry of Local Government and City Council of Nairobi for the implementation of the Project.

Outline of the Project

1.4 The objective of the Project is to review and develop concepts on sustainable urban development and improvement of living conditions based on an integrated urban development plan for Nairobi City.

1.5 The scope of work of the JST include:: to formulate an integrated urban development master plan to 2030; to formulate an implementation and management program; to select priority areas and priority projects; to review and formulate policies, rules and guidelines for local government; and to conduct technical transfer to the counterparts in the course of the Project.

1.6 The project area consists of the entire area of the City County of Nairobi (approximately 700 km^2).

Organisational Arrangement

1.7 Stakeholders of the Project include the various organisations as stipulated in the two RDs, but the key responsible and implementing agencies are as shown in the table below:

List of RDs

Date of Signing of RD	Responsible Agency	Implementing Agency
23 July 2012	MoLG	City Council of Nairobi
24 September 2013	MoLHUD	Nairobi City County

Source: JICA Study Team (JST)

1.8 For execution of the master plan formulation, a Joint Coordinating Committee (JCC), Technical Working Group (TWG), and Secretariat were organised

2. SOCIO ECONOMIC AND URBAN CONDITIONS

2.1 The city of Nairobi is bounded by Kajiado County to the south and south west, Kiambu County to the north and north-west and Machakos County to the east and south-east. Nairobi is characterised by undulating hilly topography with elevations ranging from 1,460 m to 1,920 m above sea level, rising from the plains in the east to the hills in the west.

2.2 Kenya generally experiences two seasonal rainfall peaks in most places. The first peak or "long-rains" from March to May, while the second peak or "short-rains" is observed from October to December.

2.3 According to the Kenya Population and Housing Census, the total population of Kenya in 2009 was approximately 38,610,000, and that of Nairobi City was approximately 3,138,000. The average population density, excluding Nairobi National Park, is 5,429 per km^2. The Central Division and Kamukunji Division have higher population densities than other divisions

2.4 The age structure of the population of Kenya in 2009 forms a pyramid while that of Nairobi City has a pair of wings with a large share of the population around the twenties.

2.5 The population growth rate of Nairobi City has been higher than that of Kenya. During the 1999–2009 period, the growth rate for the city was 3.9% while the national average was 3.0%. The dominant reason for the difference is judged to be the high in-migration rate to the city.

2.6 Nairobi City is positioned higher than the national average in social indicators such as main source of water, main mode of human waste disposal, main type of lighting fuel, and ownership of household assets.

2.7 The gross regional domestic product (GRDP) per capita of Nairobi City varies on sources of data, although it is assumed to be three times the national GDP per capita. In 2011, GDP per capita of Kenya is estimated at KSh73,988 at current prices while the GRDP of Nairobi City is estimated at KSh221,965.

2.8 Among the wage employment in 2012, the community, social and personal services sector (52.1%), agriculture and forestry sector (24.1%) and wholesale and retail trade, restaurants and hotels sector (7.2%) rank first, second and third, respectively. Commercial and service businesses are more concentrated in the central business district (CBD) while manufacturing businesses are located more in Makadara Division. Informal employments are distributed throughout the city.

2.9 The land use composition, as studied by Columbia University's Centre for Sustainable Urban Development (CSUD), shows that open space is 47.8% and comprises the highest land use area, followed by residential use (15.1%), and national park (13.9%).

2.10 A lot of land use changes has taken place between 2003 and 2012. Typical land use changes in Nairobi are summarised as: i) soil rich farmland to residential area, ii) grassland to residential area, iii) detached house to apartment or office, and iv) river bank to informal settlements.

2.11 For urban services, the current data on the distribution of social services and facilities throughout Nairobi City's nine districts suggests that there are still inequalities between Nairobi East and West emanating from the colonial days.

3. INSTITUTIONS AND REGULATORY CONDITIONS

3.1 The Constitution of Kenya (2010), now in force, replaced the 1969 Constitution, that itself had replaced the 1963 Independence Constitution. The acts and policies under the constitutions related with NIUPLAN are the Environmental and Management Coordination Act 1999, National Urban Development Policy (draft), Urban Areas and Cities Act 2011, Physical Planning Act 1996, Building Code 1968 (under revision), National Land Commission Act 2012, County Government Act 2012, and National Government Coordination Act.

3.2 Most of the functions and responsibilities for urban development are now under the Ministry of Land, Housing, and Urban Development. Since the national government is still in a transition stage, details on the national government structure are yet to be announced.

3.3 Nairobi City is also in a transitional stage from the City Council of Nairobi to Nairobi City County (NCC), through which 17 departments are now restructured to 10 sectors. The City Planning Department of NCC remains responsible for urban development management from forward planning to development control.

3.4 The last zoning review was carried out in 2004 and resulted in subdividing 20 zones into smaller zones and prescribed ground coverage ratios (GC) and plot ratios (PR), and defined the minimum plot size for each zone. This revision allowed developers a maximum of four floors for apartments in Westlands, Parklands, Woodley, Kilimani and Kileleshwa. However, it just followed the situation in these areas and the current development activities did not seem to follow much of the revised regulations.

3.5 Nairobi Metro 2030 (prepared in 2008) and the Spatial Planning Concept for Nairobi Metropolitan Region (prepared in 2013) are considered umbrella plans for the present NIUPLAN. Some important contents of the Spatial Planning Concept for Nairobi Metropolitan Region such as population framework, settlement pattern (build up area and new town), settlements hierarchy, land use/land cover, and design intervention of Nairobi City County, will be the basis for the NIUPLAN Spatial Planning Concept for Nairobi Metropolitan Region.

3.6 For effective management and sustainability of urban development, capacity development is a crucial instrument.. To solve the capacity development issues in Nairobi City County, the basic direction of the capacity development plan was established to include: i) keeping the momentum for capacity development in NCC, ii) identifying target groups for capacity development, iii) encouraging internal training including on-the-job training (OJT), and iv) acquiring fundamental skills of urban development.

4. INFRASTRUCTURE CONDITION AND DONOR ACTIVITIES

Donor Activities

4.1 Multi-sector programmes for improvement of infrastructure in operation include the following: i) Kenya Municipal Program (KMP), ii) Kenya Informal Settlements Improvement Project (KISIP), iii) Nairobi Metropolitan Service Improvement Project (NaMSIP), and iv) Kenya Infrastructure Finance/PPP project.

4.2 Moreover, various donors, including WB, AfDB, JICA, USAID, UNDP, and UNEP have assisted infrastructure development for sectors such as urban transport, airport, water supply, sewerage and drainage, solid waste, power supply, and telecommunications in Nairobi City. There is need therefore, for improved coordination amongst the donors for effective and efficient urban development.

Road/Public Transport

4.3 The importance of the northern corridor as the city's trunk road as well as an international trunk road is emphasised, and traffic flow along the northern corridor is given more priority than other crossing roads. Therefore, the northern corridor becomes a kind of barrier for the local traffic flow in the west-east direction.

4.4 As the densely populated area of Nairobi City mainly stretches to the west and east, the traffic demand in the west-east direction is larger than that in the north-south. Therefore, roads in west-east direction across the northern corridor are always congested.

4.5 The road length density is 0.98 km/km^2 over all of Nairobi City, which includes some low population density areas. The Japanese standard density of a trunk road in the urban area is 4.0 km/km^2, and only the centre of Nairobi City is in this range. The road length density by population for the entire Nairobi City is 0.22 km/1000 people.

4.6 Since Kenyan people walk a lot along the arterial roads and in the urban streets, walking occupies a large proportion among the travel modes. Therefore, non-motorised transport (NMT) facilities for safe, comfortable and easy movement are necessary especially in traffic congested areas.

4.7 Most of bus and *matatu* (mini-buses used for the citywide transport) terminals are located around the Nairobi railway station, but are not systematically located by direction or destination. Outside the city centre, lay-bys for bus stops are found on the trunk roads, but

along minor roads, *matatu*s and buses often stop at roadsides or intersections to pick up passengers, which cause obstacles in the traffic flow of the roads.

Railway

4.8 The main line of the Kenyan Railways Corporation (KRC) is the line from Mombasa to Uganda through Nairobi. Many railway commuters are using this line from the Athi River (south-east direction) to Nairobi, and from Kikuyu, (north-west direction) to Nairobi. Many passengers are also commuting from Ruiru, (north-east direction) to Nairobi, on a branch line towards Thika Town. A short branch line towards Embakashi Village is also used by commuters.

4.9 Due to the increasing severe traffic congestion in the city, the need for mass transit systems is widely recognised. There are two approaches for the development of a rail-based mass transit system in Nairobi: 1) utilisation of the existing KRC facilities and 2) construction of a new light rail transit (LRT) line or mass rapid transit (MRT) line.

Airport

4.10 Nairobi has two civil airports which are the Jomo Kenyatta International Airport (JKIA) and Wilson Airport. JKIA is conveniently located 18 km from the city centre to serve as a domestic hub and international gateway in Kenya. JKIA is the 7th busiest airport in Africa and a major hub in East and Central Africa for tourist and cargo movement. Wilson Airport is located 5 km south of the city and neighbours the Nairobi National Park. Wilson Airport is used mostly for both domestic and international general aviation traffic. This airport lies approximately 18 km west of JKIA.

Water Supply

4.11 The existing water sources for the water supply system to Nairobi City are Sasumua Dam, Thika Dam, Ruiru Dam and Mwagu Intake on the Chania River, Kikuyu Springs and groundwater.

4.12 There are four water supply systems to Nairobi City as per water source, namely the Sasumua system, Ruiru system, Mwagu system and Kikuyu system. Some of the facilities of the systems, such as the raw/treated water transmission pipelines of Sasumua WTP and Ngethu WTP, exist outside of Nairobi City. The distribution network for Nairobi City receives treated water from four reservoirs, namely Kabete, Kyuna, Kiambu and Gigiri reservoirs. The distribution area is segmented into 13 zones based on the reservoir supplying the water to the zone. About the distribution network, pipes are high densely installed in the western area of Nairobi City and low densely installed in the eastern area.

Storm-water Drainage

4.13 In Nairobi City, the existing storm-water drainage system is developed mainly in the central business district (CBD) and part of neighbouring areas. The system is composed of roadside drains along the existing urban roads, storm sewers and canalised trunk drains to collect

storm-water from the catchment areas and discharge the water to the tributaries mentioned above. Because the topography is generally sloping from west to east, the storm-water is drained by gravity. In the suburbs of Nairobi City, it is observed that storm-water is collected and discharged through roadside drains and small natural streams which network are not well-developed as a whole.

4.1 The main points of the observations as to causes of inundation are described below:

i) Roadside drains are not functioning effectively due to improper design and/or construction, structural deterioration, and non-removal of sediment and garbage.

ii) The storm-water drainage network is not functioning effectively. Many drainage sections and/or outfalls remain blocked/clogged, due mainly to the difficulty in identifying such locations in densely built-up areas (e.g. informal settlements).

iii) In general, there is no systematic identification of problems on the storm-water drainage system, and localised works are done on ad-hoc basis, only to create another problem elsewhere.

Sewerage System

4.15 There are 24 existing sewerage treatment plants (STPs) in Nairobi City, but most of them are localised STPs with small capacity of less than 2,000 m^3/day. The major STPs are the Dandora STP (capacity 120,000 m^3/day) and the Kariobangi STP (32,000 m^3/day). A report by the Nairobi City Water and Sewerage Company (NCWSC) indicates that these STPs are not functioning well in terms of actual sewerage treatment volume and water quality of treated outflow.

4.16 Majority of existing sewers are the combined sewers, collecting both storm-water and wastewater, and are developed in the CBD and other recent development areas. The total length of existing trunk sewers is about 162 km, collecting wastewaters from the sewerage service areas totalling about 208 km^2, which accounts for approximately 40% of the total area covered by the water supply service.

Power Supply

4.17 The number of power supply customers in Nairobi has increased by more than 100,000 annually from the 2009/10 financial year. Moreover, according to the New Connections Report 2012 to 2013 of Kenya Power, the recorded number of customers in Nairobi totals 1,062,329 in April 2013.

4.18 The Nairobi region is one of areas with unreliable electricity. Blackout incidences per 1000 customers as of 29th April 2013 show that, by comparison; Nairobi North and Nairobi West are particularly higher than other regions. For Nairobi South, blackout incidence is also high. In many cases, blackouts occur when a tree comes into contact with a distribution line or falls on the line causing interruption of electricity supply.. In Nairobi City, vandalism of the electricity system such as electricity theft, stealing oil or copper from transformers, and eventually stealing the transformers sometimes happens.

Solid Waste Management

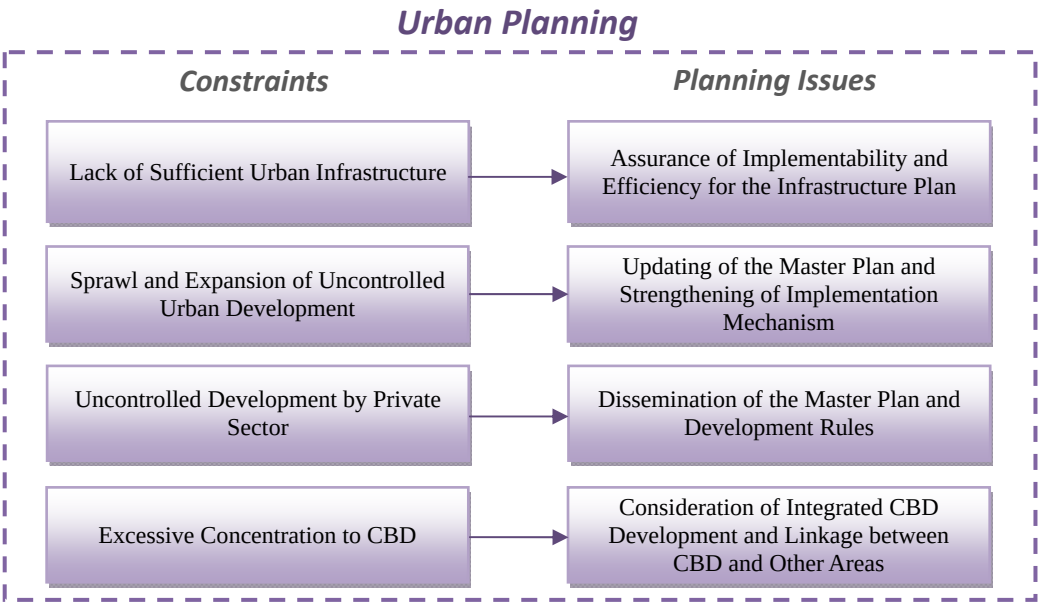
4.19 The Department of Environment (DOE) in NCC collects solid waste by themselves or contracts out the work with a private company. On the other hand, the private company collects the solid waste through contracts with households or public or private enterprises. The collected waste is transported toDandora dumpsite or other dumping sites. Some of the collected waste is illegally dumped. There are some areas where solid waste cannot be collected by NCC or a private company due to insufficient width of access road or generally poor accessibility. In these areas, community-based organisations collect the waste.

Telecommunications

4.20 In 2011/12, there was a rapid growth of mobile telephone users against a decline in the number of fixed subscribers of 30% from the previous fiscal year. Kenya Broadcasting Corporation (KBC), the government-managed broadcaster, operates FM radio broadcast and middle-wave radio broadcast throughout the nation in English and Kiswahili for 24 hours. Over 100 FM broadcasters, including local broadcasting, are also licensed to broadcast. As of 2012, the Communications Commission of Kenya (CCK) licensed 190 postal/courier operators, an increase of 14 new postal/courier operators compared with the previous year. This was due to a successful public awareness campaign on postal and courier services regulatory requirements.

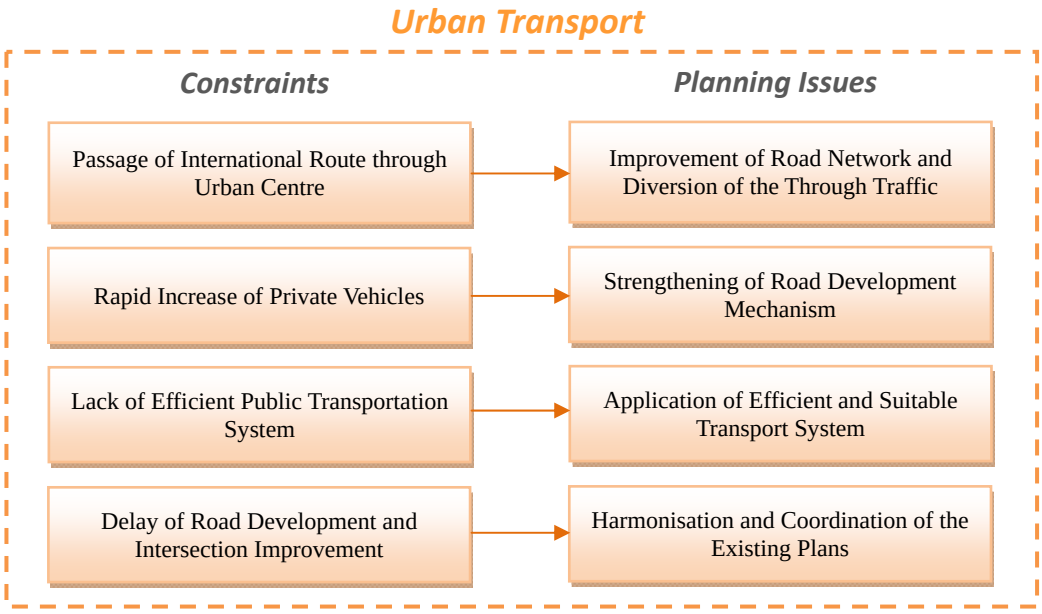
5. CONSTRAINTS AND PLANNING ISSUES

5.1 Figures below illustrate constraints and planning issues for urban planning, urban transport, and the socioeconomy, compiled based on the current conditions.



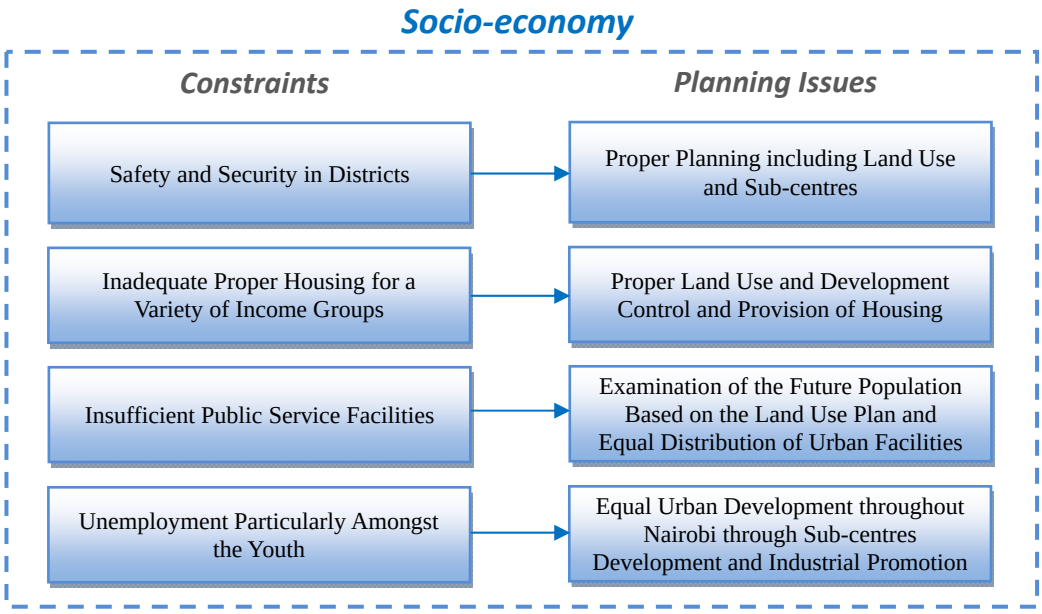
Source: JICA Study Team (JST)

Constraints and Planning Issues for Urban Planning



Source: JICA Study Team (JST)

Constraints and Planning Issues for Urban Transport



Source: JICA Study Team (JST)

Constraints and Planning Issues for Socio Economy

6. DEVELOPMENT VISION AND STRUCTURE PLAN

6.1 The population of Kenya, Nairobi City and its environs are projected for the target year of 2030 as well as the intermediate years of 2013, 2018, and 2023. Three alternatives have been prepared: i) Past Trend Scenario, ii) Rapidly Decelerating Scenario toward a Middle-Income Country, iii) Gradually Decelerating Scenario. Among the alternatives, the "Gradually Decelerating Scenario" was recommended.

6.2 The population growth of Greater Nairobi has been considerably higher than the national

average.. Within Greater Nairobi, Nairobi City was growing faster in the 1990s than the environs, then in the 2000s the environs were conversely growing faster. Considering the past trends and future development ideas of the area, five alternative scenarios including "Containing City Population Scenario" and "Nairobi Metropolitan Development Scenario" are defined.

6.3 In conclusion, in view of the basic concept that Nairobi City should contain its population growth while its environs should rapidly develop to function as part of the expanding national capital to be called the Greater Nairobi, the "Nairobi Metropolitan Development Scenario" is adopted. The estimated population of Nairobi City in 2030 is 5,212,500.

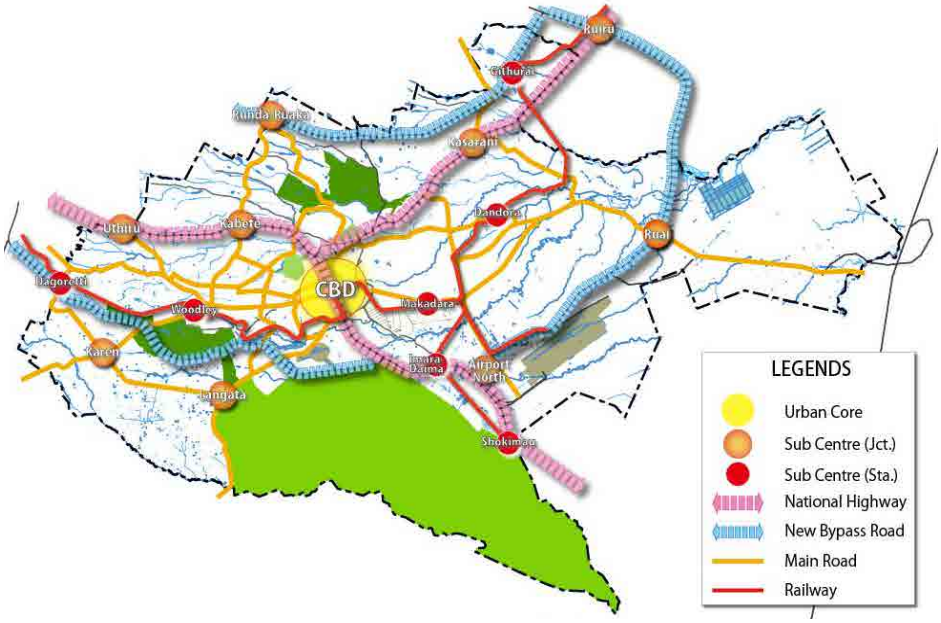
6.4 The day-time population of Nairobi City is estimated to grow from 3,280,000 in 2009 to 5,468,000 in 2030, by simply adding the net inflow of commuters from outside of the city to the night-time population. It is also equal to the total of the number of jobs, school enrolment and others.

6.5 Three sets of cases of future GDP per capita of Kenya and GRDP per capita of Nairobi City are examined assuming that the GRDP per capita will continue to be three times the GDP per capita of Kenya. The "GDP 7% Growth Case" is adopted because it is thought to be a realistic and appropriate target.

- Average GRDP growth rate: 6.8%
- Average GRDP per capita growth rate: 4.4%
- GRDP per capita in 2030 at 2011 prices: KSh500,200 (2.3 times the 2011 level)

6.6 A technical working group attended by Nairobi City County staff, experts from university, consultants and national government organisations was held to discuss development visions. Based on the discussion at technical working groups and stakeholder meetings, the development vision "Nairobi 2030: An Iconic and Globally-attractive City Aimed at Regional Integration and Sustainability" is proposed. The vision consists of four pillars: i) Economy, ii) Environment, iii) Governance, and iv) Social Culture.

6.7 Several prototypes of the structure plan can be conceived for Nairobi City County. For the purpose of discussion, typical prototypes are introduced. Considering the urban development trend and problems that Nairobi is facing, the sub-centre system (bi-polar corridor development), was adopted as the type of structure plan for Nairobi.



Source: JICA Study Team (JST)

Sub-centre System (Bi-polar Corridor Development)

6.8 Majority of governmental institutions have their headquarters in the CBD and Upper Hill area. For this reason, the current land use of this area is of mixed use with predominantly institutional and others. Some new office buildings for private companies, however, tend to be located outside the CBD, principally along major roads, which is assumed to change the distribution of institutional use within the city. The Karen-Langata area, located in the south-western part of Nairobi, still keeps low-rise and low density residential profile with ample open space. On the other hand, housing developments in and around Ruai are undertaken by private developers without a clearly defined comprehensive development concept to become high density and low open space area.

6.9 Based on the existing regulation entitled “A Guide of Nairobi City Development Ordinances and Zones” and the population densities in each sub-location, JST made an estimate of the population capacity of Nairobi City County. Based on the above conditions, the maximum capacity of population of Nairobi City County is estimated to be approximately five million. This result means that if Nairobi City County needs to accommodate more than five million population, the existing regulation in the development ordinance should be revised to change land use. The revision should convert some of non-residential land use to residential use, and also to increase plot ratio in order to promote higher population density and accommodate the future population.

6.10 The number of employment will increase by approximately one million up to 2030. Among the forecast increase, office-employed population in priority industries becomes around 583,900. Approximately 600 ha of land will be necessary for the office demand.

6.11 Public institutions and facilities in Nairobi City County, including KRC and NCC, occupy a large size of lands. Most of these lands are not efficiently utilised. These public lands can be utilised partly for urban development, transportation facilities or public activities by way of redevelopment or agglomeration.

6.12 The following are the principal policies for the Nairobi land use plan 2030.

Principal Policies for Nairobi Land Use Plan 2030

1 **Decentralise business,administrative and commerce functions**	• Sub-centre system will be adopted with new urban transport network to disperse business functions from the centre. • Land use regulation for sub-centre areas will be revised to activate its function and to accommodate growing population. • CBD should be re-developed to revitalise the city centre.
2 **Expand and renovate CBD**	• KRC's railway yard to be developed as new urban core
3 **Preserve and restore green and water environment to create ecological network**	• Existing forests and woods should be preserved. • River and river banks will be restored to open recreational space.
4 **Conserve agricultural activities**	• Agricultural activities should be conserved for diversification of the land use.
5 **Restructure industrial area**	• New industrial areas will be allocated in the southern part of the city.. • Existing industrial area should be re-developed for new urban function.
6 **Beautify the city for Kenyan pride**	• Urban landscape regulation should be established to keep historical beauty for the citizen.

Source: JICA Study Team (JST)

6.13 As discussed in the Development Vision of Nairobi City County 2030, Nairobi is not only the capital city of Kenya but also one of the leading economic centres of the East Africa Region. The strengthening of the CBD is also critical to support an efficient urban transport system. The current condition of the CBD is not as efficient as it should be, due mainly to a lack of coordination among stakeholders, including the proposed Railway City Development and concentration of transport modes around the Nairobi Station area.

6.14 The current CBD boundary is marked by roads such as Uhuru Highway on the west, University Avenue on the north and Haile Selassie Avenue. Under the influence of the current economic growth, the expanded CBD was proposed as "the Spatial Planning Concept for Nairobi Metropolitan Region" to consider collective development strategy.

6.15 The development visions for the CBD were discussed by members of a Thematic Working Group (Land use and Human settlement). Based on the discussions, the development vision and four pillars of development were formulated. The vision for the CBD is a "Compact urban centre that is innovative, livable, green, efficient, competitive and inclusive." The four pillars are: i) Economy, ii) Environment, iii) Urban Space, and iv) Transport. The function of the CBD was proposed to include business & commerce, residential, public, transport, art and culture, and academic functions.

6.16 In order to strengthen the CBD function, a comprehensive approach is necessary, including enhancing the road network, possible introduction of a monorail, installation of new urban

facilities, and promoting spatial development. In addition, surrounding areas of the CBD, including Upper Hill and the area along Lusaka road, should be consolidated to the existing CBD to create a greater and stronger area for this comprehensive approach. For this reason, the JST proposed a greater CBD.

6.18 The following components are proposed for the CBD development.

- Road network to strengthen linkage in CBD and in the hierarchy of types of roads;
- New urban transport system (loop monorail line) to reduce traffic to the existing CBD;
- Urban facilities such as bus terminal, Nairobi station square, and open space and green corridor;
- Future land use concept and development ordinance to encourage optimum utilisation of the current development ordinance; and
- Spatial development such as urban development in selected areas, land re-adjustment project, and urban renewal projects.

6.19 The TWG'smain recommendations including (1) recognition of development restrictions/constraints and challenges in areas such as Karen, and (2) provision of more nodes for the Eastlands areas. Based on the TWG discussions, development concepts including key issues and proposed urban function structure were formulated for eight sub-centres: Upper Hill South, Karen-Langata, Runda-Ruaka, Dandora, Imara-Daima, Makadara, Kasarani, and Ruai.

7. URBAN TRANSPORT DEVELOPMENT PLAN

Road

7.1 Road development/improvement shall be implemented based on a consistent programme. The implementation schedule is proposed in this study for the efficient and effective solution of the traffic issues, which is the most essential output of the study. Therefore, the establishment of consensus among the stakeholders is expected in the next stage.

7.2 Currently, through traffic of heavy vehicles are passing through international highways, and obstructing the traffic inside the city. After the completion of the Southern Bypass, heavy vehicles should be restricted from entering into the area surrounded by the Eastern Bypass, Northern Bypass, and Southern Bypass.

7.3 At many spots on many roads in Nairobi City, traffic is hampered by deteriorating road conditions. In order to secure smooth traffic flow, maintenance of road surfaces in good condition is crucial.

Public Transport

7.4 At present, relevant organisations are conducting studies individually for the introduction of

new public transport. However, a consistent policy for the development has not been established, such as priority mode, priority corridor, physical standard for each mode and financial method to attract investment. A comprehensive study for the introduction of new public transport is required.

7.5 In order for the Mass Rapid Transit System (MRTS) plan to materialise, not only the physical infrastructure but also the institutional framework, especially the setting up of an operator, is the most crucial challenge to be overcome by therelevant authorities.

7.6 For the improvement of the transport network, especially the introduction of a Bus Rapid Transit (BRT), obtaining general consensus among the passengers and operators of buses/*matatu*s is highly recommended

7.7 Since the beneficiaries and the most affected participants by the public transport projects are the citizens of Nairobi City County, a deeper and more committed involvement of NCC to the projects is essential. Moreover, NCC established the land use plan which should harmonise with the transport system. Therefore, NCC should be a prime member of the transport development project team and the opinions from NCC should be reflected into the project.

7.8 In order to demonstrate the effectiveness of the introduction of a new system for public transport and to obtain the consensus among the citizens, a pilot experiment is an effective way which was introduced in many countries. For the introduction of the BRT system, a pilot experiment shall be implemented for a certain period, and effects will be evaluated after the implementation.

8. URBAN INFASTRUCTURE DEVELOPMENT STRATEGY

Water Supply

8.1 The development plan of water resources and facilities for intake, raw water transmission, water treatment plant and treated water transmission has been established with five phases already.

8.2 Phase I of the well field development in Kiunyu and Ruiru and Phase II of the northern collector and water supply system including Ngorongo WTP have been commenced with funding from WB and AFD. Although the development includes raw water transmission, water treatment plant and treated water transmission, the distribution network to cover the expanded capacity of water supply has not been included in the proposed plan under Feasibility Study and Master Plan for Developing New Water Sources for Nairobi Satellite Town (FSMPNWS). Thus, the development plan of the distribution network needs to be studied separately

8.3 Phase III of the S. Mathioya River transfer, Maragua Dam and Ndunyu Chege WTP is under planning stage. Expanding the capacity through the development is necessary to cover the

water demand after 2020. Water resources and facilities are located outside Nairobi City. Thus, an agreement of counties on the development of water supply facilities for Nairobi City is indispensable. Phase IV and Phase V of the northern collector second phase and Ndarugu Dam, Ndarugu WTP, three pump stations and pipelines are planned on the basis of the demand projection by WB for 2030 and 2035, respectively. Phases IV and V could be postponed after 2035 subject to the improvement/decrease of water loss. The projected demand with 20% of the water loss will be below the total capacity of Phases I, II, and III. Depending on the improvement level of the water loss decrease, the revised master development plan needs to be studied further.

Storm-water Drainage

8.4 The storm-water drainage in Nairobi City should be developed in such a manner thatensuresintegration of the river and localised drainage networks. Within the catchment area of the river, the development and maintenance of the river should be planned and implemented to ensure the required hydraulic capacity for storm-water drainage as well as the riparian reserves maintain better water environment. Local drainage networks should be developed under the conditions, provided for in the plan for development and maintenance of the rivers.

Sewerage

8.5 Sewerage development is implemented currently to expand the capacity of treatment. Besides, the sewerage system in Nairobi City needs to improve its performance in terms of the effluent quality from the STWs and sewerage collection/conveyance.

8.6 The comprehensive framework for the water environment management in Nairobi City was elaborated by the former Nairobi River Basin Program (NRBP) supported by UNEP in the last decade. Under the said framework, the development of storm-water drainage and sewerage should be recognised as part of the subsequent activities being taken by the Nairobi Rivers Basin Rehabilitation and Restoration Program. At present, the activities relevant to the water environment management in Nairobi City are taken by the initiatives of the government organisations in charge. For further enhancement of the activities, the Nairobi City County should increase its involvement with such activities through its capacity development.

Power Supply

8.7 The recommendation to the power sector is to review the demand projection with the setting of the GDP growth rate and the future population forecast. It may be important to ensure adequate power equipment, but excess forecast may lead to an excess construction of power equipment and, as a result, increase in electricity cost. From the demand and gap analysis, two points are set as the development policy for the power sector: appropriate planning for

energy sector and development based on the concept of sub-centres.

8.8 Appropriate Planning for Energy Sector: This is the policy for effective and appropriate planning, that is, not to plan with excess design. From the previous section, there seems to be excessive capacity in planning and designing. For example, according to the analysis of demand forecast, the existing demand forecast is substantially higher than the Project Demand Forecast (PDF). As another example, wayleaves and minimum clearance of overhead line are higher than in other countries

8.9 Development based on the Concept of Sub-centres: The main overall objective of the NIUPLAN is to implement sustainable urban development and the improvement of living conditions for Nairobi city. Hence, the energy sector needs to achieve part of the objective. For example, as already mentioned, Dandora's development can be revised through the power sector by review of the current generous provision for power line way leaves.. Dandora area is set to become a sub centre under this plan and it's recommended that effective use of the lands now used for the power line be considered.

Solid Waste Management

8.10 The development policy for the solid waste management sector is set as follows:

1) Application of feasible methods of waste management in terms of environmental, social, economic and technical aspects to keep a clean and safe environment for the people;
2) Development of the system to manage various stakeholders including private contractors, licensed private company, waste dischargers, and waste pickers; and
3) Implementation of capacity development in a suitable manner for target organisations and staff.

8.11 One of the priority projects for solid waste management is the new sanitary landfill in Ruai. However, Kenya Airport Authority (KAA) and Kenya Civil Aviation Authority (KCAA) were opposed to the proposed Ruai site, as it is on the flight path of the Jomo Kenyatta International Airport.

8.12 JST suggested the importance of the methods of soil cover during landfill operation for the sanitary landfill site to protect the disposed waste from birds. Additionally, JST recommended the introduction of semi-aerobic landfill method such as leachate collection and treatment system, and lining system at the bottom of the site by using black cotton soil, gas collection system, and dividing the landfill areas into six sections.

8.13 There are various methods to prevent birds in landfill sites. JST suggested that a pilot project for sanitary landfill operation should be implemented by NCC with relevant stakeholders, including NEMA, KAA and KCAA, as well as the preparation of site visit to the best practices in other areas and holding workshops with relevant stakeholders related to sanitary landfill and airport operation.

Telecommunications

8.14 Based on the study of the current conditions, JST set up the five development policies for the telecommunications sector in NCC to achieve Kenya Vision 2030 and the National Broadband Strategy: i) high speed and reliable communications network and its connectivity, ii) collaboration among governmental players and operators, iii) policy, regulation and institution development, iv) promotion of e-government, and v) protecting citizens from disasters and emergencies.

9. CROSS CUTTING ISSUES

9.1 The basic policies for institutional strengthening include strengthening development control, implementing urban (spatial) development projects and enhancing infrastructure development management. Conducting community awareness and carrying out private sector promotion are also two of the basic policies.

9.2 Strategies for institutional strengthening are as follows: i) Strengthening of development control: formulation of a comprehensive development control mechanism, ii) Facilitation of urban development schemes, iii) Infrastructure development management mechanism, iv) Private sector promotion scheme, v) Development of an information dissemination mechanism, and vi) strengthening of organisations for urban management.

9.3 The Working Group members have formulated the capacity development plan. The core target group for capacity development are officials of the City Planning Department of NCC. The goal of capacity development is for the officials "to be able to implement urban development and management consistent with the NIUPLAN." This is to be achieved through the six approaches: i) to fully understand the NIUPLAN, ii) to acquire fundamental skills in urban development and management, iii) to adapt ICT skills to urban development and management, iv) to encourage internal training programs including on-the-job training, v) to apply participatory methods to trainings, and vi) to strengthen monitoring and evaluation for capacity development.

10. SOCIAL AND ENVIRONMENTAL CONSIDERATIONS

10.1 The environmental and social considerations related with the implementation of NIUPLAN are achieved through a series of intensive participatory and information disclosure processes based on the Constitution of Kenya (2010), County Government Act (hereinafter referred to as CGA) No. 12 of 2012, Urban Areas and Cities Act No. 13 of 2011, NEMA's SEA Guideline (2012), the JICA Guidelines for Environmental and Social Considerations (2010), and other enabling legislation on civic education.

10.2 The Environmental (Impact Assessment and Audit) Regulations, 2003 provides that lead agencies should subject all public policies, plans and programs (PPP) to SEA. During the

SEA process, the likely significant effects of a PPP on the environment shall be identified, described, evaluated, and reported. The full range of potential effects and impacts including cumulative, synergistic, and/or temporary impacts, are covered.

10.3 In order to conduct the evaluation of five proposed development structure alternative strategies as shown in table below, compound and "risk and opportunity" matrices were developed. The evaluation results support the adoption of the “sub-centre system (bi-polar corridor development)” as mentioned in Item 6.7.

Five Proposed Development Structure Alternatives

Structure Plan	Characteristics
STR-1: CBD one core system (mono core) (present trend)	Regarded as “No Action” plan. Only one strong nuclei which develops and there is no existence or important function of other centres
STR-2: Sub-centre system (poly nucleated development)	There is no dominating single settlement; all nodes of the polycentric network have the same relevance of “spatial participation”
STR-3: Sub-centre system (bi-polar corridor development)	Development of minor settlements along the transport corridor connecting two strong nodes
STR-4: Sub-centre system (corridor cum ring development)	Development of settlements along the corridor and ring
STR-5: Diffused development system	Development of two level of corridor (within Nairobi city county and Greater Nairobi)

Source: JICA Study Team (JST)

10.4 Specific negative risks, associated with the implementation of each development structure alternative, are identified for the above four sub-categories from STR-2 o STR-5. No positive impact can be recognised for STR-1 scenario, because the current city traffic congestion and its resultant roadside environmental conditions such as the air quality and noise are getting worse. By implementing either of STR-2 to STR-5, certain amounts of alleviation of traffic congestions and the improvement of related roadside environment are expected.

10.5 Each development structure alternative has its own advantages and disadvantages in its implementation, and preparation of the relevant environmental and social management plan or program would be essential to implement environmentally and socially sound options. In STR-1, current countywide issues such as disorganised land use conditions, traffic congestion, illegal settlement, improper waste treatment system, and deforestation will not be changed (most likely to be worsened).

10.6 Potential advantages to lessen the difficulties for implementation of urban development and/or improvement programs in the future would be significant. Besides, it can be expected that the chronic shortage of basic infrastructure facilities such as waste disposal sites would be solved by the implementation of the NIUPLAN. It is noted that temporary environmental degradations would be inevitable during construction activities due to its implementation. It would be beneficial to prepare medium-term or long-term comprehensive regional management plans or strategies for the implementation of future urban development program,

based on any development structure alternative.

10.7 Based on stakeholder meetings held during the SEA study of NIUPLAN, NCC organised 23 public consultations across the city county (equivalent to have one consultation per one constituency) to encourage the citizens to contribute and share their desired aspirations in the development of the city. It is noted that the findings and remarks, as mentioned above, are incorporated into NIUPLAN.

11. PRIORITY PROJECTS

11.1 Priority programs are proposed as a first step of implementation of the Master Plan which is expected to be implemented (start) in the short term (~2018). Instead of implementing individual projects, projects are compiled as a "program" to clarify objectives and promote efficient implementation. Five programs are proposed to be implemented in the short run: (i) urban development program, (ii) urban transport development program, (iii) urban infrastructure development program, (iv) environment improvement program, and (v) urban development management strengthening program.

11.2 JST proposed 37 priority projects to be carried out by 2030 to solve the gaps between the current supply and demand forecast. From these projects, 16 high priority projects are selected as shown in the table below, in consideration of "readiness of the program", "NCC's involvement" and "range of beneficiaries of the projects".

List of High Priority Projects

Program	Project Title	Possible Fund Source
Urban Development Program		
CBD Development Program	Railway City Development	ODA (Loan, Technical Cooperation)
Sub-centre Development Program (priority area)	Dandora Sub-centre Development	ODA (Technical Cooperation)
	Eastlands Urban Renewal Project	ODA (Technical Cooperation)
Urban Transport Development Program		
Road Network Development Program	Flyover in CBD for Railway City	ODA (Grant Aid / Loan)
	Widening of Enterprise Road	ODA (Grant Aid)
	Construction of Northern Part of Circumferential Road C-2	ODA (Grant Aid)
Public Transport Development Program	Development of New Bus and *Matatu* Terminal in Railway City	ODA (Grant Aid)
	Vitalisation of Commuter Train Operation	ODA (Technical Cooperation)
	Feasibility Study on Nairobi Loop Line	ODA (Technical Cooperation)
ITS Development Program	Formulation of ITS City Master Plan	ODA (Technical Cooperation)
Infrastructure Development Program		
Water supply	Master Plan of Distribution Network in Nairobi	ODA (Technical Cooperation)
Power	Amendment for Technical Criteria of Overhead Line	ODA (Technical Cooperation)
Telecommunications	Fiber Optic Trunk Communication Network in Nairobi City	ODA (Loan)
Environment Improvement Program		
Stormwater drainage and sewerage	Capacity Development for Stormwater Drainage System in Nairobi City	ODA (Technical Cooperation)
	Capacity Development for Sewerage System in Nairobi City	ODA (Technical Cooperation)
Solid waste management	Development of New Landfill Site	ODA (Loan)
City-wide Air Quality Management Program	City-wide Air Quality Management Program	ODA (Technical Cooperation)
Urban Development Management Strengthening Program		
Urban Development Management Strengthening Program	Urban Development Management Strengthening	ODA (Technical Cooperation)

Source: JICA Study Team (JST)

12. CONCLUSIONS AND RECOMMENDATIONS

12.1 The Integrated Urban Master Plan covers development vision, structure plan, sub-centre development, urban transport development, infrastructure development, and capacity development. Through the process of the master plan formulation, a series of technical working group and stakeholder meetings was conducted. In addition, a GIS database was developed and priority programs are proposed.

12.2 The following are the main points of the NIUPLAN.

Main Points of the NIUPLAN

Item	Contents
1. Vision	● Development vision is proposed for Nairobi City County to become not only the centre of Kenya but also the centre of the East African Region.
2. Sub-centre System	● Sub-centre system (multi core development) is proposed, which includes strengthening of the CBD and development of seven sub-centres.
3. Urban Transport Development	● Urban transport development proposes multi-modal development including road network, public transport network, and traffic management.
4. Infrastructure	● Infrastructure covers water supply, storm-water drainage and sewerage, power supply, solid waste management, and telecommunications in which development policy is proposed.
5. Capacity Development	● Capacity development proposes to strengthen urban development management from planning, control and development.
6. GIS Database	● GIS database covers land use, infrastructure and urban facilities.
7. Priority Programs	● Priority programs are proposed to be implemented in the short term.

Source: JICA Study Team (JST)

12.3 In order to ensure the smooth transition or implementation of the master plan, recommendations were prepared as shown in the table below.

Recommendations

Recommendation	Necessary Action
Institutional Aspects	
1. Dissemination of the NIUPLAN to NCC	● NCC and NCC assembly have to understand the contents of NIUPLAN in order to secure consistency of the master plan and other related plans. ● The City Planning Department of NCC should take the initiative in disseminating the NIUPLAN to NCC staff and assembly.
2. Organisational strengthening for the NIUPLAN implementation	● Technical aspect covering land use control, urban development, and infrastructure development should be strengthened. ● Coordinating aspect should be strengthened. It covers coordination within NCC, coordination between NCC and the national government, and coordination among county governments.
4. Capacity Development	● To fully understand the master plan. ● To acquire fundamental skills of urban development and management. ● To adapt ICT skills to urban development and management. ● To put in place capacity development methods including OJT, participatory method, monitoring and evaluation.
5. Sustainable stakeholder involvement for the NIUPLAN implementation	● NCC has to encourage changes in the public pattern and adherence to rules such as obtaining building permits and development permits.
Technical Aspects	
1. Development of CBD and Sub-centres	● Establish urban development mechanism including roles and responsibilities between the public sector and private sector. ● Conduct detailed survey for implementation, including traffic volume and land ownership in the target area. ● Prepare detail plan for CBD and for selected sub-centres as a part of urban development implementation. ● Develop urban development implementation scheme such as land re-adjustment and urban re-development that matches the conditions in Nairobi.
2. Implement urban transport in accordance with development plan proposed as short term measures	● System signal control for the radial trunk road in the city and system signal control in the whole city. ● Introduction of bus-exclusive lane which is effective even before introduction of BRT. ● Staggered working hours to ease morning peak hour. ● Streamline fleet carriers to decrease vehicle trips in the business area. ● Relocation of bus terminal in sub-centres.
3. Infrastructure development to form Nairobi urban structure and support urban development	● Establish coordination mechanism among concerned agencies. Infrastructure development is the responsibility of national government. NCC should be able to coordinate concerned agencies for efficient infrastructure development. ● Conduct survey or study (feasibility study, detailed design) for implementation.

Source: JICA Study Team (JST)

The Project on Integrated Urban Development Master Plan for the City of Nairobi in the Republic of Kenya

Final Report

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ABBREVIATIONS

AAK	Architectural Association of Kenya
ADC	Austrian Development Corporation
AFD	Agence Francaise Developpement (French development agency)
AfDB	African Development Bank
AMRF	Africa Medical and Research Foundation
APL	Adaptable Program Lending
ASAL	Arid and Semi-Arid Land
ASCAS	Accumulated Savings and Credit Associations
AWSB	Athi Water Services Board
BADEA	Arab Bank for Economic Development in Africa
BOD	Biochemical Oxygen Demand
BPO	Business Process Outsourcing
BPO	Business Process Off-shoring
BRT	Bus Rapid Transit
C/R	Circumferential/Radial
CAA	Civil Aviation Authority
CBD	Central Business District
CCK	Communications Commission of Kenya
CCN	City Council of Nairobi
CFAs	Community Forest Associations
CGA	County Government Act
CMA	Capital Market Authority
COD	Chemical Oxygen Demand
COK	Constitution of Kenya
CPD	City Planning Department
CSUD	Centre of Sustainable Urban Development
CWSB	Coast Water Services Board
DANIDA	Danish International Development Agency
DC	Development Control
DCG	Donor Coordination Group
DESTW	Dandora Estate STW
DfID	UK Department of International Development
DFIs	Development Finance Institutions
DGIS	Netherlands Ministry of Foreign Affairs (of Netherland)
DID	Department of International Development (of UK)
DMU	Diesel Multiple-Units
DOE	Department of Environment
DRSRS	Department of Resource Surveys and Remote Sensing
DSL	Digital Subscriber Line
EA	Environmental Audit
EAC	East African Community
EC	European Commission
ECM	Executive Committee Member
EEPCO	Ethiopia Electric Power Corporation
EIA	Environmental Impact Assessment
EMCA	Environment Management Coordination Act
EOI	Expressions of Interest
EPZA	Export Processing Zones Authority
ERC	Energy Regulation Commission
ERSWEC	Economic Recovery Strategy for Wealth and Employment Creation
EU	European Union
FAO	Food and Agriculture Organization
FSMPNWS	Feasibility Study and Master Plan for Developing New Water Sources for Nairobi and Satellite Towns
GC	Gross Coverage Ratio

GCCN	Government Common Core Network
GDC	Geothermal Development Company
GDP	Gross National Product
GIS	Geographical Information System
GNI	Gross National Income
GOK	Government of Kenya
GRDP	Gross Regional Domestic Product
HAC	Harmonization Alignment and Coordination
ICB	International Competitive Bidding
ICT	Information Communication Technology
IDA	International Development Association
IPP	Independent Power Producers
ITCZ	Inter Tropical Convergence Zone
ITS	Intelligent Transport System
JCC	Joint Coordinating Committee
JDA	Joint Development Agreement
JICA	Japan International Corporation Agency
JKIA	Jomo Kenyatta International Airport
JKUAT	Jomo Kenyatta University of Agriculture and Technology
JST	JICA Study Team
KAA	Kenya Airport Authority
KAM	Kenya Association of Manufacturers
KBC	Kenya Broadcasting Corporation
KCAA	Kenya Civil Aviation Authority
KDN	Kenya Data Network
KDN	Kenya Data Network
KEBS	Kenya Bureau of Standards
Ken Gen	Kenya Power Generating Company
KeNHA	Kenya National Highways Authority
KENIC	Kenya Network Information Center
KENSUP	Kenya Slum Upgrading Program
KEPSA	Kenya Private Sector Alliance
KETRACO	Kenya Electricity Transmission Company
KFS	Kenya Forest Service
KfW	Kreditanstalt für Wiederaufbau (German government-owned development bank)
KIA	Kenya Investment Authority
KIE	Kenya Industrial Estate Ltd
KIP	Kenya Institute of Planners
KIPI	Kenya Industrial Property Institute
KIPPRA	Kenya Institute of Public Policy Research an Analysis
KIRDI	Kenya Industrial Research and Development Institute
KISIP	Kenya Informal Settlements Improvement Project
KMP	Kenya Municipal Program
KNBS	Kenya National Bureau of Statistics
KNCC&I	Kenya National Chamber of Commerce and Industry
KPC	Kenya Pipeline Corporation
KPDA	Kenya Property Developers Association
KPLC	Kenya Power and Lighting Company
KPPRA	Kenya Institute of Public Policy Research an Analysis
KPTC	Kenya Post and Telecommunication Company's
KRC	Kenya Railways Corporation
KTB	Kenya Tourist Board
KTDC	Kenya Tourist Development Corporation
KURA	Kenya Urban Roads Authority
KWS	Kenya Wildlife Service
LCPDP	Least Cost Power Development Plan
LPDP	Local Physical Development Plan

LRT	Light Rail Transit
MAF	Mission Aviation Fellowship
MEMR	Ministry of Environment and Mineral Resources
MEWNR	Ministry of Environment, Water and Natural Resources
MFIs	Microfinance Institutions
MLH&UD	Ministry of Lands, housing and Urban Development
MNPDV2030	Ministry of National Planning and Vision 2030
MODP	Ministry of Development and Planning
MOE	Ministry of Energy
MOE&P	Ministry of Energy and Petroleum
MOH	Ministry of Health
MOIC	Ministry of Information and Communication
MOICT	Ministry of ICT
MOL	Ministry of Land
MOLG	Ministry of Local Government
MOLHUD	Ministry Of Lands, Housing And Urban Development
MONMD	Ministry of Nairobi Metropolitan Development
MOPHS	Ministry of Public Health and Sanitation
MOR	Ministry of Roads
MORPW	Ministry of Roads and Public Works
MOTI	Ministry of Transport and Infrastructure
MOW&I	Ministry of Water and Irrigation
MRF	Material Recovery Facility
MRTS	Mass Rapid Transit System
MSD	Medium Speed Diesel
MSEA	Micro and Small Enterprises Authority
MSMEs	Micro Small and Medium Enterprises
MSL	Mean Sea Level
MWI	Ministry of Water and Irrigation
NaMSIP	Nairobi Metropolitan Service Improvement Project
NaRSIP	Nairobi Rivers Rehabilitation and Restoration Program: Sewerage Improvement Project
NASP	National Airports System Plan
NBS	National Broad Band Strategy
NCBA	Nairobi County Business Association
NCBDA	Nairobi Central Business District Association
NCC	Nairobi City County
NCWSC	Nairobi City Water and Sewerage Company
NEMA	National Environment Management Authority
NES	National Environment Secretariat
NESC	Nairobi City Water and Sewerage Company
NHC	National Housing Corporation
NIUPLAN	Nairobi Integrated Urban Development Master Plan
NMR	Nairobi Metropolitan Region
NMT	Non-Motorized Transport
NOFBI	National Optic Fiber Backbone Infrastructure
NRS	Nairobi Rail Station
NSSF	National Social Security Fund
NTSA	National Transport and Safety Authority
NUTRANS	The Study on Master Plan for Urban Transport in the Nairobi Metropolitan Area in the Republic of Kenya, March 2006
NUTRIP	National Urban Transport Improvement Project
O&M	Operation and Maintenance
OD	Origin Destination
OJT	On-the-Job Training
OPM	Office of the Prime Minister
PCU	Passenger Car Unit
PDF	Project Demand Forecast

PDP	Project Development Plan
PHPDT	Peak Hour Peak Direction Traffic
PID	Project Information Document
PIDG	Private Infrastructure Development Group Trust
PIS	Policy Implementation Section
PMU	Project Management Unit
PPCSCA	Permanent Presidential Commission on Soil Conservation and Afforestation
PPP	Public-Private Partnership
PR	Plot Ratio
PS	Permanent Secretary
PSP	Private Service Provider
PT	Person Trip
PVSs	Public Service Vehicles
QCBS	Quality- and Cost-Based Selection
RD	Record of Discussion
REA	Rural Electricity Authority
RFC	Regional Financial Centre
ROSCAs	Rotating Savings and Credit Associations
ROW	Right of Way
RTA	Research Triangle Africa
RVR	Rift Valley Railways
SACCOs	Savings and Credit Cooperative Societies
SEA	Strategic Environmental Assessment
SECE	Swiss State Secretariat for Foreign Affairs
SHM	Stakeholder Meetings
SIDA	Swedish International Development Cooperation
SMEs	Small and Medium Enterprises
SOK	Survey of Kenya
SSL	Salary Scale Level
STI	Science, technology and innovation
STP	Sewerage Treatment Plant
STRADA	System for Traffic Demand Analysis
STW	Sewerage Treatment Work
SWM	Solid Waste Management
SWPC	Solid Waste Public Corporation
TOD	Transit Oriented Development
TSS	Total Suspended Solids
TWG	Technical Working Group
UfW	Unaccounted for Water
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UN-HABITAT	United Nations Human Settlements Programme
UNHCR	Office of the United Nations High Commissioner for Refugees
UON	University of Nairobi
USAID	United States Agency for International Development
VCR	Vehicle Capacity Ratio
VRC	Volume Capacity Ratio
WASP	Wien Automatic Simulation Package
WaSSIP	Water and Sanitation Service Improvement Project
WATSAN	Kibera Integrated Water, Sanitation and Waste Management Project
WB	World Bank
WRMA	Water Resources Management Authority
WSB	Water Service Board
WSP	Water Service Providers
WSRB	Water Service Regulatory Board
WTP	Water Treatment Plant
WVK	World Vision Kenya

CHAPTER1 BACKGROUND AND OBJECTIVE

1.1 Background

Nairobi is the capital city and the largest city of Kenya, as well as, one of the most important economic centres in the East and Central African Regions. Nairobi City accounts for 50% of formal employment in Kenya and generates over 50% of the gross domestic product (GDP). The Vision 2030, which shows the long-term national development strategy of Kenya, aims at becoming a middle income country by 2030 and provides the baseline of the economic, social, and political frameworks. It also shows the actions to be taken to achieve the development goals such as the millennium development goals (MDGs). Nairobi City plays an important role not only as a political centre but also as a model for economic and social development. The urban development plan of Nairobi City, on the other hand, has not been updated since 1973 and its direction is not clearly defined.

The population of Nairobi City was 800,000 in 1980. Due mainly to population migration from rural area, its population has grown to 3.1 million in 2009 and is expected to grow further. In addition, urban problems such as perennial traffic congestion, expansion of slum area, and environment deterioration have been left unsolved for a long time and are already causing negative impact on the economic activities and daily lives of the people in Nairobi City. In order to accelerate sound and sustainable development, an integrated urban master plan has to be prepared, and thus, transport network, water supply and sewerage, solid waste management, and living environment have to be improved.

In response to the request of the Government of Kenya, the Government of Japan has dispatched a Study Team for "the Integrated Urban Development Master Plan for the City of Nairobi" (hereafter referred to as the Project) in July 2012 and signed the Record of Discussion with the Ministry of Local Government (MOLG) and City Council of Nairobi for the implementation of the Project. (City Council of Nairobi has since been changed to Nairobi City County (NCC) because of organizational restructuring occasioned by passing of the Constitution of Kenya in 2010 and general elections of March, 2012)

1.2 Outline of the Project

(1) Objective of the Project (Overall Goals)

The objective of the Project is to review and develop concepts on sustainable urban development and improvement of living condition based on the integrated urban development plan for Nairobi City.

(2) Expected Outputs

(i) To formulate an integrated urban development master plan for 2030;

(ii) To formulate an implementation and management program;

(iii) To select priority areas and priority projects;

(iv) To review and formulate policies, rules, and guidelines for local government; and

(v) To conduct technical transfer to the counterparts in the course of the Project.

(3) Concerned Agency

(i) Responsible Agency: MOLG

(ii) Implementing Agency: NCC

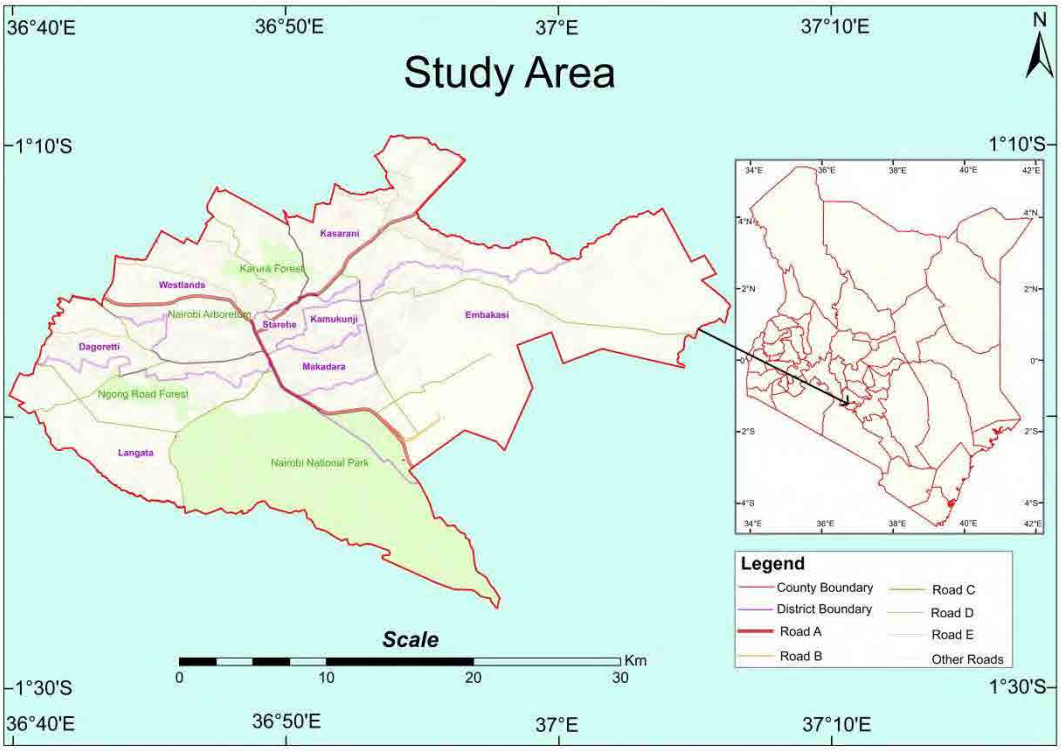
(4) Acronym of the Project

The acronym of the Project on Integrated Urban Development Master Plan for the City of Nairobi in the Republic of Kenya is NIUPLAN.

1.3 Project Area

(1) Nairobi City

The Project area is the entire area of the City County of Nairobi (approximately 700 km^2) with a population of 3.1 million (2009 Kenya Population and Housing Census).

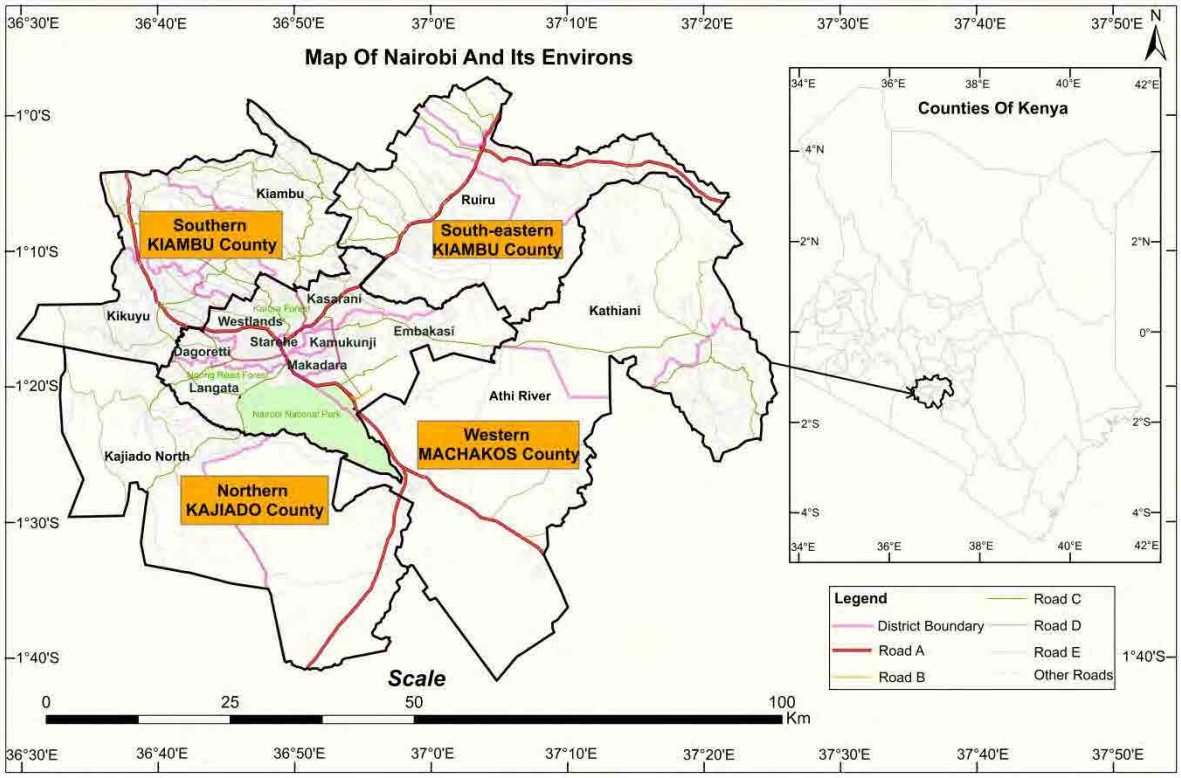


Source: JICA Study Team (JST)

Figure 1.3.1 Location Map

(2) The Greater Nairobi Area

Since urbanisation of NCC is expanding outside the city boundary and the condition of the surrounding area has to be considered, Greater Nairobi is set at about 20 km from the City of Nairobi, which is based on "The Master Plan and Feasibility Study to Alleviate Traffic Congestion and Improve Traffic Safety in the Nairobi Metropolitan Area" prepared by JICA in 2006 and recent urbanisation trend, and census data in 2009. Traffic survey and population analysis have been conducted based on Greater Nairobi. The following Figure 1.3.2 and Table 1.3.1 show the coverage of the Greater Nairobi area.



Source: JICA Study Team (JST)

Figure 1.3.2 Greater Nairobi Boundary

Table 1.3.1 Greater Nairobi (Division List)

	Division	Area(km^2)	Division	Area (km^2)
City of Nairobi	(i) Central	695.1	South-eastern Kiambu County	801.5
	(ii) Makadara			
	(iii) Kasarani		Southern Kiambu County	706.6
	(iv) Embakasi			
	(v) Pumwani		Northern Kajiado County	1,050.9
	(vi) Westlands			
	(vii) Dagoretti		Western Machakos County	1,598.0
	(viii) Kibera			

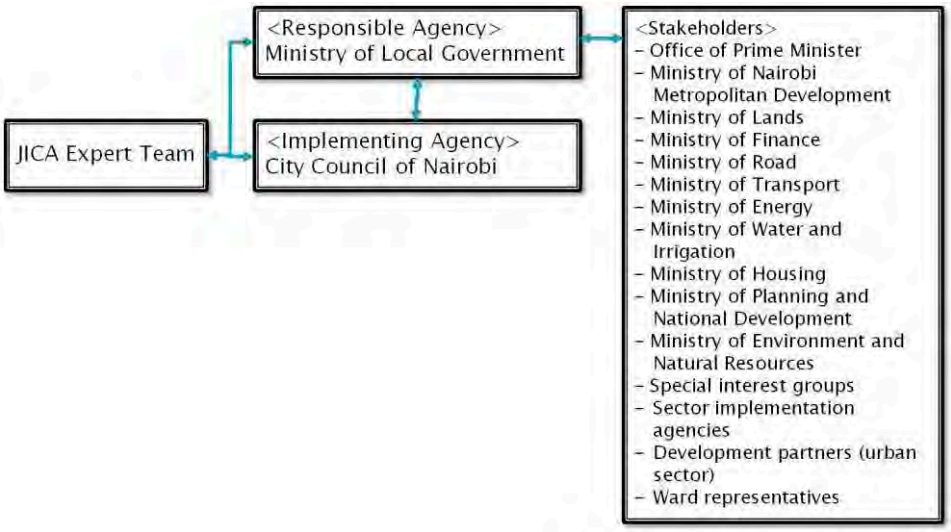
Source: JICA Study Team (JST)

1.4 Organisational Arrangements

For the implementation of the Project, the following organisational setting is established.

1.4.1 Overall Organisational Arrangements

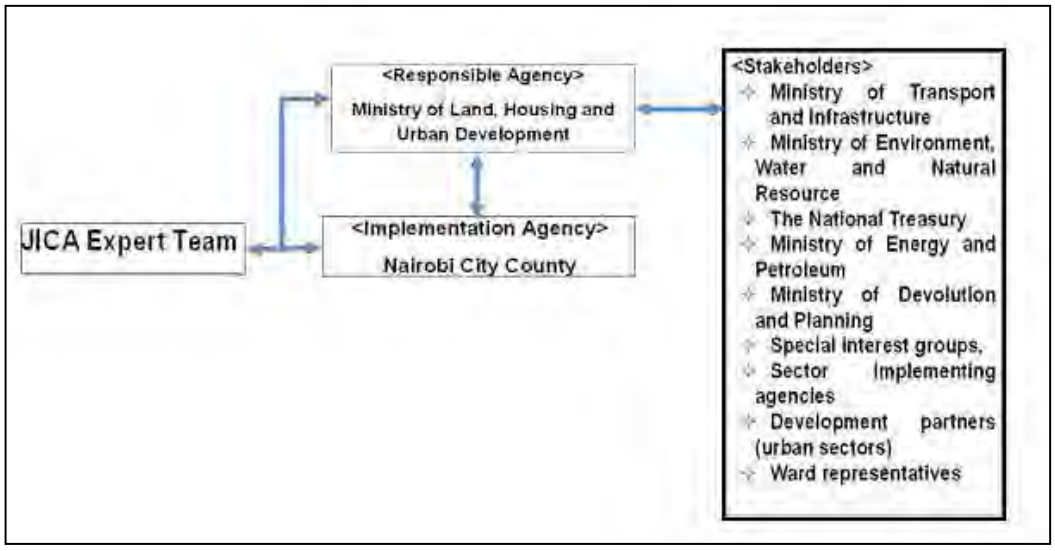
The Project is composed of a number of stakeholders coming from the JICA Study Team, MOLG as Responsible Agency, Nairobi City County as Implementing Agency, and stakeholders from the central government and concerned agencies. Figure 1.4.1 shows the Project organisational chart according to the Record of Discussion (RD) signed in July 2012.



Source: Record of Discussion (RD) signed by MOLG and the City Council of Nairobi and Japan International Cooperation Agency on 23 July 2013

Figure 1.4.1 Project Organisational Chart Based on 1st RD

Due to changes in the ministerial structure in the early part of 2013, the Joint Coordinating Committee (JCC) and working group have been realigned, and the revision of RD is in progress. The new organisational chart is shown in Figure 1.4.2 as per the revised RD signed in September 2013.

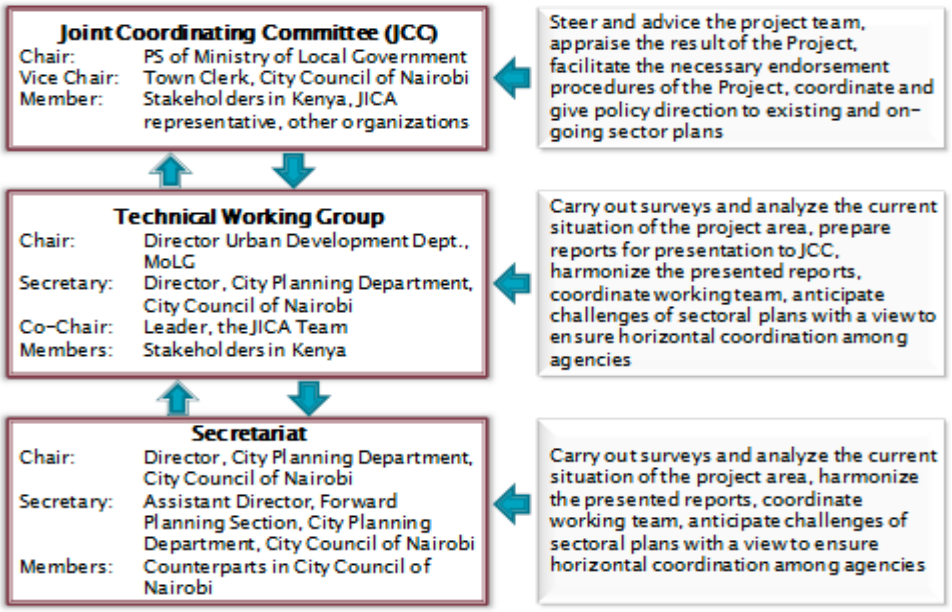


Source: Record of Discussion signed by the Ministry of Lands, Housing and Urban Development, Nairobi City County, Ministry of Devolution and Planning, and Japan International Cooperation Agency on 24 September 2013

Figure 1.4.2 Project Organisation Chart based on the Revised RD

1.4.2 Individual Organisational Arrangements

For the execution of the master plan formulation, the JCC, Technical Working Group, and Secretariat Meeting were organised. The following chart shows the outline of the organisational arrangements.



Source: JICA Study Team (JST)

Figure 1.4.3 Tiers of Discussion Structure

(1) Joint Coordinating Committee (JCC)

JCC is a high level decision-making body composed of the national government agencies represented by the Permanent Secretary Level. The functions of JCC are shown below:

- To steer and advice the project team;
- To appraise the results of the Project;
- To facilitate the necessary endorsement procedure of the Project outputs; and
- To coordinate and give policy direction to existing and ongoing sector plans.

The first JCC was held on 11 December 2012 to discuss the Inception Report. The contents of the Inception Report were approved by the JCC.

Table 1.4.1 JCC Meeting Record

Date	Discussion Topic	Participants
11 December 2012	Topics: Inception report discussion • Remarks from the MOLG, Ministry of Nairobi Metropolitan Development, Town Clerk of NCC, JICA Kenya Office. • Briefing on integrated urban development master plan (NCC) • Explanation of inception report • Discussion	• NCC (Town Clerk, Directors, and staff) • MOLG (PS, Director of Urban Planning) • Ministry of Health (MOH) • Ministry of National Planning and Vision 2030 (MNPDV2030) • Ministry of Nairobi Metropolitan Development (MONMD) • Ministry of Water and Irrigation (MOW&I) • Office of the Prime Minister (OPM) • Ministry of Finance • Ministry of Environment and Mineral Resources (MEMR) • JICA Kenya Office • JICA Study Team

Source: JICA Study Team (JST)

Because of the organisational restructure both in the national government and NCC levels, structure of JCC will be changed to represent the new government structure. The new JCC structure will be proposed at the next JCC for approval.

(2) Technical Working Group

The Technical Working Group is organised as:

- To carry out surveys and analyse the current situation of the project area;
- To prepare reports for presentation to the JCC;
- To harmonise the presented reports;
- To coordinate the working team; and
- To anticipate challenges of sectoral plans with a view to ensure horizontal coordination among agencies.

Six thematic technical working groups were proposed in the first Technical Working Group in January 2013 for sector discussion. Six groups are shown in Table1.4.2 below:

Table 1.4.2 Thematic Working Group

Thematic Working Group	
(i)	Land use and human settlements
(ii)	Governance and institution
(iii)	Population and social system/urban economy
(iv)	Urban transport (road, railway, airport)
(v)	Environment
(vi)	Infrastructure (water supply, wastewater, power, solid waste and disaster prevention, Information Communication Technology (ICT) and telecommunication)

Source: JICA Study Team (JST)

A list of Technical Working Group meetings conducted until March 2014 is shown in Table 1.4.3 below:

Table 1.4.3 Technical Working Group Meeting Record

Date	Discussion Topic	Participants
January 30, 2013	Topics: Introduction of the Project and group discussion • Briefing on the preparation of the Integrated Urban Development Plan (Ms. Rose K. Muema, Director of City Planning, Secretary of Technical Working Group) • Presentation of the inception report for the Integrated Urban Development Master Plan (JICA Study Team) • Formation of Thematic Working Group (Mr. Adolwa, Deputy Director, Urban Development Department (Chairman of the Technical Working Group)), JICA Project Team • Thematic group discussion on activity and presentation.	• NCC (concerned departments) • Ministry of Agriculture • MOLG • National Environment Management Authority (NEMA) • Kenya Railways Corporation (KRC) • National Housing Corporation (NHC) • Kenya Urban Roads Authority (KURA) • Kenya Institute of Public Policy Research and Analysis (KIPPRA) • Kenya National Bureau of Statistics • National Economic and Social Council (NESC) • Athi Water Services Board • Nairobi City Water and Sewerage Company (NCWSC) • Communications Commission of Kenya (CCK) • Research Triangle Africa (RTA) • University of Nairobi (UON) • Kenya Institute of Planners (KIP) • Architectural Association of Kenya (AAK) • Urban Designer Consultant • World Bank • United Nations Environment Programme (UNEP) • UN-HABITAT

Date	Discussion Topic	Participants
		• Ministry of Public Health and Sanitation (MOPHS) • Jomo Kenyatta University of Agriculture and Technology (JKUAT) • Kenya Electricity Transmission Company Ltd. (KETRACO)
April 24, 2013	Thematic Technical Working Group: • Urban transport (road, railway, and airport) • Infrastructure (water supply, waste water, and drainage) • Population and social system/urban economy • Environment	• Ministry of Health (MoH) • NEMA • Athi Water Services Board (AWSB) • KURA • KETRACO • KIP • GIBB (Consultant) • NCC
April 30, 2013	Thematic Technical Working Group: • Land use and human settlements (development vision, structure plan) • Governance and institution • Infrastructure (solid waste management)	• RTA • JICA Study Team (JST) • NCC • AAK • UON
May 6, 2013	Thematic Technical Working Group: • Infrastructure (telecommunication, power)	• NCC • KETRACO
May 8, 2013	Thematic Technical Working Group: • Land use and human settlements (development vision, structure plan, Central Business District (CBD)) • Land use and human settlements (GIS database: confirmation of boundary, data required, and issues)	• KRC • JST • NCC • Ministry of Nairobi Metropolitan Development (MONMD) • Ministry of Lands, Department of Physical Planning (MOL) • GODOWN Arts Centre • Survey of Kenya, Ministry of Lands (SOK) • UON
May 16, 2013	Thematic Technical Working Group: • Infrastructure (power)	• Ministry of Energy • MOLG • KETRACO • Geothermal Development Company (GDC) • NCWSC • Kenya Association of Manufacturers (KAM) • Kenya Power and Lighting Company (KPLC) • NCC • JST
May 21, 2013	Thematic Technical Working Group: • Infrastructure (solid waste management)	• NEMA • Kenya Civil Aviation Authority (KCAA) • World Bank • REDI International • UON • GIBB Africa Ltd. • NCC • JST
May 28, 2013	Thematic Technical Working Group: • Land use and human settlements (Vision)	• MOL • Ministry of Roads • MOLG • Ministry of Agriculture • Kenya National Highways Authority (KeNHA) • KRC

Date	Discussion Topic	Participants
		• National Museums of Kenya (NMK) • Kenya Roads Board (KRB) • UN-HABITAT • Urban Design Consultant • Townscape Consultants Planners Ltd. • NCC • JST
June 7, 2013	Thematic Technical Working Group: • Governance and institution (capacity development plan and technology transfer)	• NCC • JST
June 19, 2013	Thematic Technical Working Group: • Governance and institution (capacity development plan and technology transfer)	• Planning Systems • Safer Nairobi Initiative (SNI) • RTA • Triscope • NCC • JST
June 20, 2013	Thematic Technical Working Group: • Land use and human settlements (District Plan for CBD and Land Use Plan for NCC, and GIS data requirements)	• MOL • KRC • NMK • UON • Institute Surveyors of Kenya (ISK) • AAK • KIP • ESRI Eastern Africa • Geomaps • Triscope • Planning Systems • Dakar Services • Kenya Property Developers Association (KPDA) • Renaissance Planning • NCC • JST
July 4, 2013	Thematic Technical Working Group: • Land use and human settlements (Development Vision for CBD)	• KIPPRA • KRC • NCWSC • UON • KPDA • Triscope • ESRI Eastern Africa • GIBB Africa Ltd. • Urban Design Consultant • NCC • JST
July 25, 2013	Thematic Technical Working Group: • Land use and human settlements (land demand forecast, structure plan, discussion on sub-centres.	• UN-HABITAT • Jomo Kenyatta University of Technology (JKUAT) • KURA • AAK • UON • Spatial Collective • Muungano Support Trust/Slum Dwellers International • Townscope Consulting Planners • NCC • JST

Date	Discussion Topic	Participants
July 26, 2013	Thematic Technical Working Group: • Urban transport (road, railway, and airport)	• Ministry of Lands, Housing and Urban Development (MLH&UD) • Ministry of Transport and Infrastructure (MOTI) • KRC • KURA • UN-HABITAT • NCC • JST
August 16, 2013	Thematic Technical Working Group: • Governance and institutions	• RTA • NCC • JST
August 20, 2013	ITR presentation	• MLH&UD • KeNHA • KURA • KETRACO • NCWSC • NEMA • KRC • World Bank • UON • Architectural Association of Kenya (AAK/NEOPOLITANS) • Godown Arts Centre • RTA • Planning Systems • GIBB Africa Ltd. • Townscope Consultants • Ochieng Abuodha Consulting Engineers • Oakas Services Ltd. • NCC • JST
August 23, 2013	Thematic Technical Working Group: • Environment (air pollution and SEA progress)	• UNEP • NCC • JST
August 27, 2013	Thematic Technical Working Group: • Land use and human settlements (Sub-centres and GIS data update)	• KIPPRA • UON • Renaissance Planning • UN-HABITAT • KRB • Muungano Support Trust • KRC • NCC • JST
September 5, 2013	Thematic Technical Working Group: • Land Use and human settlement	• MLH&UD • KURA • KeNHA • KRC • UON • World Bank • ESRI EA • AAK/NEOPOLITANS • RTA • Planning Systems • Mwacharo and Associate Architects

Date	Discussion Topic	Participants
September 5-7, 2013	Thematic Technical Working Group: (Retreat in Nyeri Outspan Hotel) • Urban transport • Infrastructure • Environment • Population, urban economy and socio-cultural issues • Governance and institutions • Land use and human settlements	• MLH&UD • Ministry of Devolution and Planning (MOD&P) • Ministry of ICT (MOICT) • Ministry of Energy (MOE) • Ministry of Environment, Water and Natural Resources (MEW&NR) • NEMA • SOK • Kenya Airports Authority (KAA) • CCK • KRC • KURA • NCSWC • KPLC • KIPPRA • World Vision Kenya (WVK) • National Youth Council (NYC) • RTA • KIP • AAK • ITEC Engineering Company • Mwacharo and Associate Architects • Townscope Consultants • NCC • JST
September 11, 2013	Thematic Technical Working Group: • Environment (solid waste management)	• NEMA • Kenya Forest Service (KFS) • RTA • NCC • JST
September 18, 2013	Thematic Technical Working Group: • Land use and human settlements (building survey result and district plan) • Transportation (railway)	• MLH&UD • KURA • KIPPRA • UN-HABITAT • Kenya Property Developers Association (KPDA) • University of Tsukuba • Mwacharo and Associate Architects • NCC • JST
September 20, 2013	Thematic Technical Working Group: • Infrastructure (water sector-water supply, sewerage, and drainage)	• MEW&NR • Water Resource Management Authority (WRMA) • NCWSC • NCC • JST
September 23, 2013	Thematic Technical Working Group: • Infrastructure (power)-Power forecast and recommendations	• Ministry of Energy and Petroleum (MOE&P) • NCWSC • Kenya Power and Lighting Company (KPLC) (Kenya Power) • NCC • JST
September 26, 2013	Thematic Technical Working Group: • Infrastructure (telecommunication)- Current condition of telecommunication sector and draft master plan	• CCK • Jamii Telcoms • Wananchi Group • Iway Africa • Frontier optical Networks • Telkom Kenya Ltd.

Date	Discussion Topic	Participants
		• Virtual City • MTN Business • Simbanet • Access Kenya • JST • NCC
October 31, 2013	Thematic Working Group • Joint infrastructure (solid waste management) and Land Use and Human Settlements Technical Working Group (cross-cutting issue on location of new sanitary landfill site discussions)	• KAA • KCAA • GIBB Africa Ltd. • NEMA • ITEC Engineering • MLH&UD • Kenya Roads Board • Survey of Kenya • UON • Kenya Railways Corporation • Kenya Property Developers Association • Townscape Consultants • REDI • Pleng Ltd. • Renaissance Planners • RTA • Real Plan Consultants • UN-HABITAT • Kenya Forest Services • JST • NCC
November 13, 2013	Thematic Technical Working Group: • Urban transport (road). Contents of the presentation include: ✓ Progress of the study ✓ Future transport network plan ✓ Transport demand forecast result ✓ Analysis and evaluation of traffic demand forecast ✓ Preliminary ideas or staging plan	• MLH&UD • MOTI • UON • KRC • KeNHA • UN-HABITAT • JST • NCC
December 3, 2013	Stakeholders' Workshop: Presentation and review of the progress report	• KAA • AAK • NCWSC • MOE&P • MOD&P • MLH&UD • KURA • KIPPRA • KRC • JST • NCC
March 25- 28, 2014	Thematic Technical Working Group: (Retreat in Naivasha Great Rift Valley Hotel)- Review of the draft final report and feedback from public consultations) • Urban transport • Infrastructure • Environment • Population, urban economy and socio-cultural issues	• MLH&UD • MOICT • MEWNR • MOE&P • NEMA • SOK • KAA • CCK

Date	Discussion Topic	Participants
	• Governance and institutions • Land use and human settlements	• KRC • NCSWC • UON • KIPPRA • UN HABITAT • WVK • NYC • RTA • Godown Arts Centre • KIP • AAK • ITEC Engineering Company • Townscope Consultants • NCC • JST
April 2, 2014	Thematic Technical Working Group: • Land use and human settlements (Urban Structure Plan and Draft SEA Report)	• SOK • UON • GIBB Africa Ltd. • AAK • NCC

Source: JICA Study Team (JST)

(3) Secretariat Meeting

In addition to JCC and the Technical Working Group agreed in the RD, a Secretariat Meeting was organised in NCC for the purpose of coordinating relevant departments, carrying out daily activities with the JICA Study Team, and coordination with agencies outside NCC. The Secretariat Meeting is conducted prior to the Technical Working Group. Confirmed participants from NCC and the JICA Study Team can share views to have mutual understanding of the Nairobi urban development. After the organisation and works of the Technical Working Groups have become routinary and counterpart staff becomes familiar of each task, the Secretariat Meeting was routinely conducted instead of ad hoc basis.

Table 1.4.4 Secretariat Meeting Record

Date	Discussion Topic	Participants
January 21, 2013	Topics: Introduction of the Project • Introduction of the members • Update on master plan (Director, City Planning Department) • Outline of the study and activity until March	• NCC • NEMA • KAA • NCWSC • JICA Study Team
February 6, 2013	Topics: Follow up the Technical Working Group • Confirmation of activity and data needed • Thematic working group activity discussion	• NCC • NCWSC • JICA Study Team
April 18, 2013	Topic: Confirmation of activity until May and working group schedule • Explanation of activity (land use, urban transport infrastructure, environment) • Confirmation of thematic working group topics and schedule	• NCC • NCWSC • NCC (ICT) • GIBB (Consultant)

Source: JICA Study Team (JST)

1.4.3 List of Members for JCC, Thematic Working Group, and Secretariat

The list of members for JCC, Thematic Working Group, and Secretariat is summarised in the following tables. When there is a modification in JCC, a working group will be modified as mentioned in Subsection 1.4.1, likewise with its memberships.

Table 1.4.5 JCC Members

JCC		Organisation
1st (Old) JCC (Refer to 1ST RD)	1	Permanent Secretary (PS), MOLG
	2	PS, MONMD
	3	SLAA MOLG
	4	Town Clerk, City Council of Nairobi
	5	Ministry of Health
	6	Ministry of National Development & Vision 2030
	7	D/ Director, UDD, MOLG
	8	Director, CPD
	9	AMP&E, MONMD
	10	D/Director W&S
	11	Secretary Infrastructure, OPM
	12	Deputy Director, CPD
	13	Chief Economist, MOLG
	14	Deputy AS, Pacif, Treasury
	15	JST, Deputy Team Leader
	16	JST
	17	JICA Representative
	18	Planner, CPD
	19	Infrastructure Expert
	20	SPSE, (M)
	21	Senior Rep., JICA
	22	MEMR
New JCC (Refer to Revised RD) Members	23	Chair: Governor, NCC
	24	Co-chair : MLH&UD
	25	MLH&UD
	26	MOD&P
	27	MOTI
	28	MOE&P
	29	MEWNR
	30	Chair of the Technical Working Group
	31	Chair of the Secretariat
	32	JICA
	33	Other organisations can participate in JCC, if necessary

Source: JICA Study Team (JST)

Table 1.4.6 NIUPLAN Secretariat

Organisation		Position
NCC	1	Director, CPD
	2	Deputy Director, CPD
	3	Assistant Director, DC/CPD
	4	Assistant Director FP/CPD
	5	Planner, CPD
	6	Planner, CPD
	7	Planner, CPD
	8	Planner, CPD
	9	Planner, CPD
	10	Planner, CPD
	11	Planner/ CPD
	12	Assistant Director UDD/ CPD
	13	Deputy City Engineer
	14	City Engineers
	15	City Engineers
	16	City Engineers
	17	Social Services
	18	Assistant Director PIS/CPD
	19	Environment
JICA Study Team (JST)	20	Team Leader, Land Use Expert
	21	Deputy Team Leader, Urban Planning Expert
	22	Urban Transport Expert
	23	Traffic Survey Expert
	24	Environment Expert

Organisation	Position	
	25	Urban Planning Expert
	26	Industrial Promotion/ Socioeconomic Expert
	27	Capacity Development Expert
	28	Water Supply Planning
	29	Solid Waste Management
	30	District Planning Expert
	31	Traffic Demand Projection Expert
	32	Sewerage/ Drainage System Expert
	33	GIS/ Traffic Condition Survey (DBM) Expert
	34	Telecommunication Planning Expert
	35	Power Planning Expert
	36	Railway Planning Expert
	37	Airport Planning Expert
	38	Planner
	39	Planner
	40	GIS Analyst

Source: JICA Study Team (JST)

Table 1.4.7 Technical Working Group Members

TWG	DESIGNATION/ORGANISATION	
Overall Joint Chairmen	1	MLH&UD
	2	NCC Executive Committee Member (L,PP & H)
	3	Deputy Team Leader JST
Land Use and Human Settlements	4	UON
	5	JST Expert
	6	JST Expert
	7	Kenya Railways Corporation
	8	MLH&UD
	9	MLH&UD
	10	MLH&UD
	11	ESRI East Africa
	12	Muungano Support Trust
	13	Pleng Ltd.
	14	Real Plan Consultants
	15	The Godown Arts Centre
	16	The Godown Arts Centre
	17	Kenya Railways
	18	Planning Systems
	19	Oakas Services Ltd.
	20	World Bank
	21	JST
	22	JST
	23	Townscape Consultants
Socioeconomic	24	UON
	25	JST - Industrial Promotion/Socioeconomic Expert
	26	NCC – Social Services
	27	NCC – City Education
Urban Transport	28	UON
	29	NCC - CPD
	30	NCC - CPD
	31	NCC - City Engineers
	32	NCC - City Engineers
	33	NCC- City Engineers
	34	NCC - City Engineers
	35	NCC - City Engineers
	36	KeNHA
	37	KRC
	38	KRC
	39	KURA
	40	MOTI
	41	KRC

TWG	DESIGNATION/ORGANISATION	
	42	JST
	43	JST
	44	JST
	45	JST
	46	UN-HABITAT - SUSTRAN
Capacity Development	47	Capacity Development Expert
	48	RTA
	49	JST
	50	NCC – Human Resources
	51	NCC - CPD
	52	World Vision
Infrastructure	53	Sewerage/Drainage System Expert
	54	Water Supply Planning
	55	NCC - CPD
	56	NCC - CPD
	57	NCC - CPD
	58	NCC - CPD
	59	JST
	60	I-Way Africa
	61	Telkom Kenya
	62	CCK
	63	NCC - ICT
	64	JST
	65	Safaricom Ltd.
	66	IWAY Africa
	67	Safaricom Ltd.
	68	Wananchi/ Zuku
	69	Media Council of Kenya
	70	Jamii Telcom
	71	MTN Business
	72	MTN Business
	73	MTN Business
	74	Safaricom Ltd.
	75	Telkom Kenya
	76	Access Kenya
	77	Solid Waste Management
	78	Nairobi Water
Environment	79	Environment Expert
	80	Planner
	81	NEMA
	82	NCC
	83	UN-HABITAT
	84	UON, Geography
	85	KCAA
	86	JST
	87	NCC
	88	NCC - Environment
	89	UNEP

Source: JICA Study Team (JST)

Gabriel Kamau, Mbagathi Road Primary School (Rank 3 of Class 6)

CHAPTER2 SOCIO-ECONOMIC AND URBAN CONDITIONS

2.1 Review of Current Natural and Socioeconomic Conditions

2.1.1 Current Natural Conditions

(1) Geography

The Republic of Kenya is located in the east coast of Africa, with the equator running almost straight through the middle part of the country, and borders with the countries of Somalia, Ethiopia, and South Sudan in the north, Uganda in the west, Tanzania in the south, and the Indian Ocean in the east.

The total area of the country is 610,000 km^2 comprising land areas of approximately 590,000 km^2 and water surface areas of 20,000 km^2. A major part of the inland water surface areas is covered by portions of Lake Victoria and Lake Turkana. Of the land areas, approximately 510,000 km^2 (more than 85% of the land area) is classified as arid and semi-arid land (ASAL). The remaining area of about 80,000 km^2 is classified as non-arid and arable lands, sustaining a substantial portion of the Kenyan economy and providing shelter to the human population.

Nairobi City with its administrative area of approximately 700 km^2 is the capital of the Republic of Kenya and also the centre of administration, politics, economy, and culture. The city is bounded by Kajiado County in the south and south west, Kiambu County in the north and north west and Machakos County in the east and south east. Such adjacent areas are now absorbing increasing population and economic activities.

(2) Topography

The territory of Kenya is characterised by a wide topographical diversity, ranging from glaciated mountains to the deserts. The elevation varies from the sea level of the Indian Ocean to 5,199 m of the Batian Peak of Mount Kenya.

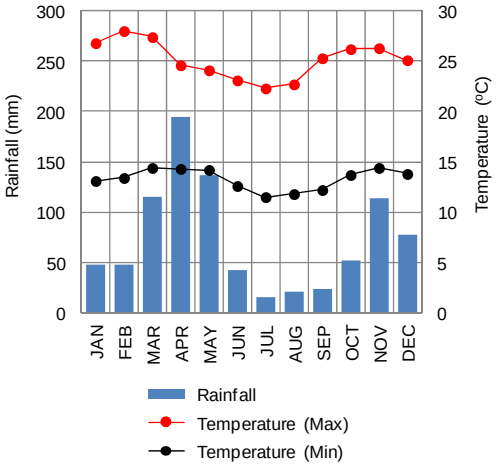
The Nairobi City is characterised by undulating hilly topography with an elevation ranging from 1,460 m to 1,920 m. Lowest elevation occurs in the Athi River at the eastern boundary of the city while its highest is at the western rim of the city. It is unique that it has the Nairobi National Park with an area of 117 km^2 within its administrative area, extending along the western boundary and attracting a large number of international and domestic tourists annually.

(3) Climate

The climate in Kenya is primarily influenced by the movement of the Intertropical Convergence Zone (ITCZ) and by a topographic relief, especially at various elevations. The rainfall in Kenya is affected by large bodies of water like Lake Victoria, complex topography with the Great Rift Valley, and high mountains, which include Mt. Kenya and Mt. Elgon. A relatively wet but narrow tropical belt lies along the Indian Ocean Coast. Behind the coastline stretches large areas of semi-arid and arid lands. Mean annual rainfall over the country is 680 mm and varies from about 200 mm in the ASAL zone to about 1,800 mm in a humid zone.

Kenya generally experiences two seasonal rainfall peaks in most places. The first peak or a season termed as the "long-rains" in the East African Region occurs from March to May, while the second peak or a season termed as the "short-rains" is observed from October to December.

The climate in Nairobi City is usually dry and cool between July and August but hot and dry between January and February. The average annual rainfall in Nairobi City is about 900 mm. The first peak of monthly rainfall occurs in April and the second peak takes place in November. The mean daily maximum temperature by month ranges from 28 °C to 22 °C and the minimum ranges from 14 °C to 12 °C.



Source: KMD

Figure 2.1.1 Rainfall and Temperature in Nairobi City

2.1.2 Population and Demography

(1) Night-time Population

According to the Kenya Population and Housing Census conducted in 2009, the total population of Kenya was approximately 38,610,000, and that of Nairobi City was approximately 3,138,000, accounting for 8.1% of the national population.

The average population density excluding Nairobi National Park, which occupies 117 km^2 or 16.8% of the city's total area, is 5,429 per km^2. The Central Division and Kamukunji Division located at the centre have a much higher density than the others in excess of 20,000 per km^2.

Table 2.1.1 Population, Area, and Density of Nairobi City and its Environs in 2009

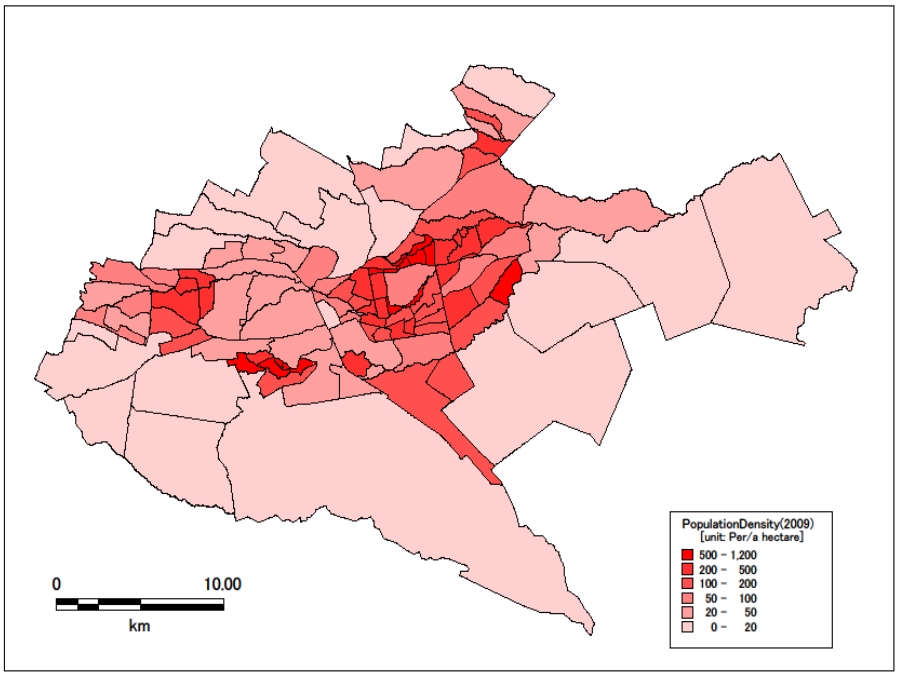
Division	Population	Area in km^2	Density per km^2
Nairobi City excluding Nairobi National Park (117 km^2)			
Central/Starehe	274,607	11	25,640
Kamukunji/Pumwani	261,855	12	21,623
Makadara	218,641	23	9,481
Dagoretti	329,577	39	8,532
Kasarani	525,624	86	6,081
Embakasi including Njiru	925,775	204	4,546
Langata/Kibera	355,188	106	3,346
Westlands	247,102	97	2,538
Nairobi City	3,138,369	578	5,429
Outside Niarobi City	1,877,652	4,206	446
Greater Nairobi	5,016,021	4,784	1,049
Kenya	38,610,097	581,313	66

Source: 2009 Census

The population growth rate of Greater Nairobi has been considerably higher than that of Kenya. The average annual growth rate of Greater Nairobi was 4.2% based from the 1989 Census to the 1999 Census and 4.0% based from the 1999 Census to the 2009 Census, while that of Kenya was 3.0% in both periods.

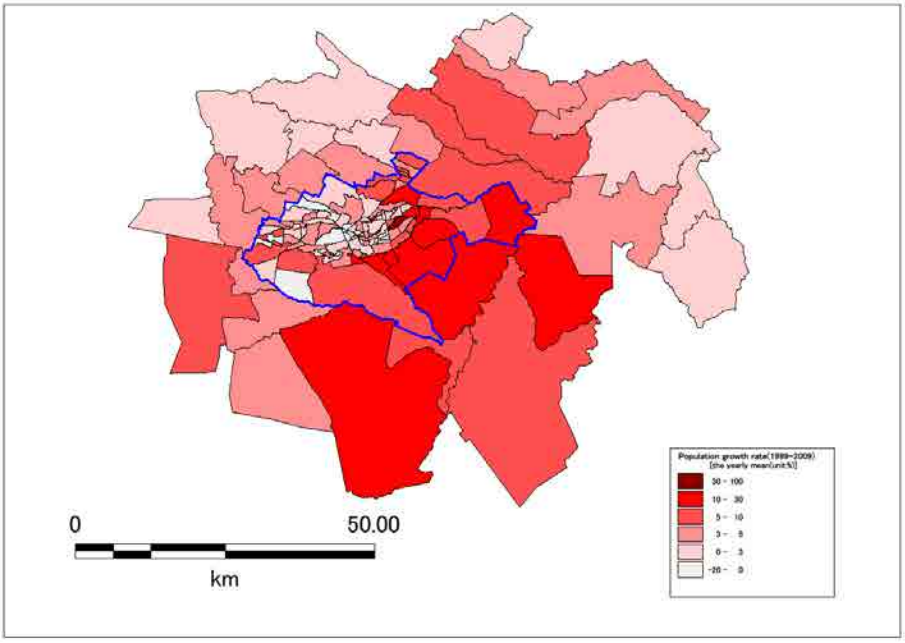
In the Greater Nairobi, Nairobi City had grown faster from 1989 to 1999, when the city grew at 4.9% while the environs outside the city at 3.0%. But from 1999 to 2009, the environs grew faster as it grew at 4.1% while the city at 3.9% as detailed in Chapter 3.3. The change seems to be a signal of Nairobi City's urban expansion.

Within the city, Embakasi Division has the highest growth rate, while out of the city in Greater Nairobi, Ruiru area to the north of the city and Mavoko and Kitengela areas to the south are the fastest growing municipalities.



Source: 2009 Census

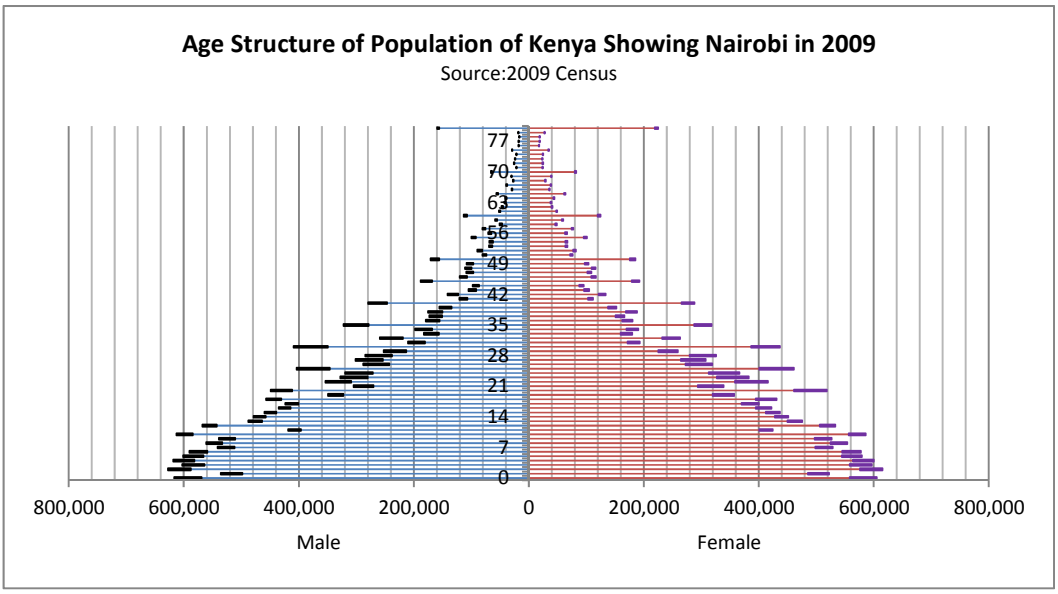
Figure 2.1.2 Population Density per Hectare of Nairobi City in 2009



Sources: 1999 Census and 2009 Census

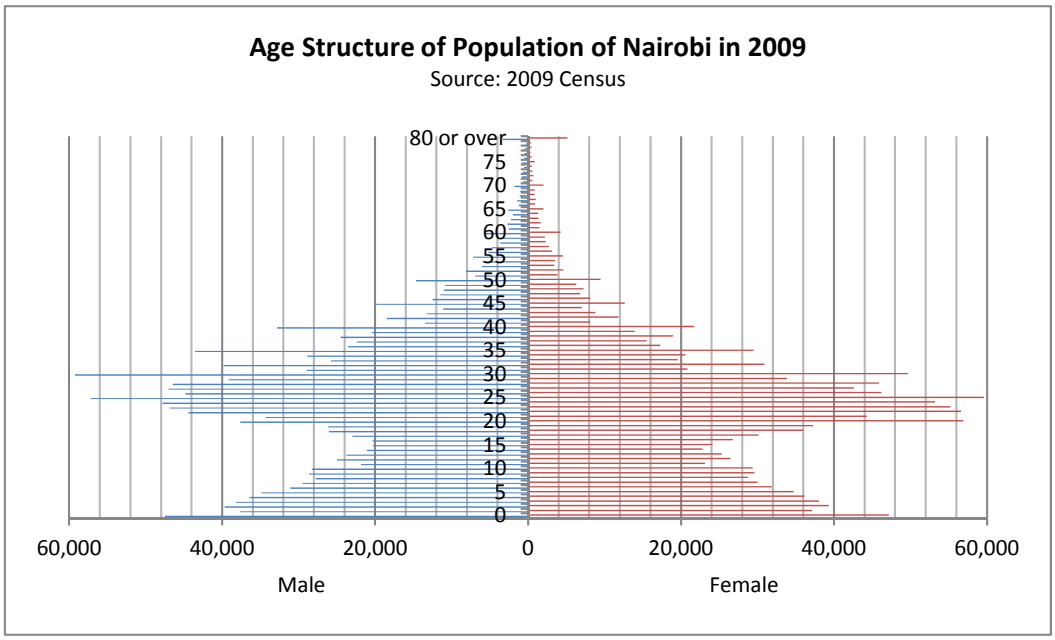
Figure 2.1.3 Average Annual Population Growth Rate of Nairobi City and its Environs in Greater Nairobi from 1999 to 2009 (%)

The age structure of the population of Kenya in 2009 formed a shape of a pyramid while that of Nairobi City showed a pair of wings with large share of population consisting of people around their twenties. It is noted in the figures that the apparent larger population at every five years of age indicates a limited precision of responses to the census questionnaire.



Note: Thick parts of lines represent Nairobi City's population.
Source: 2009 Census

Figure 2.1.4 Age Structure of the Population of Kenya Showing Nairobi in 2009



Source: 2009 Census

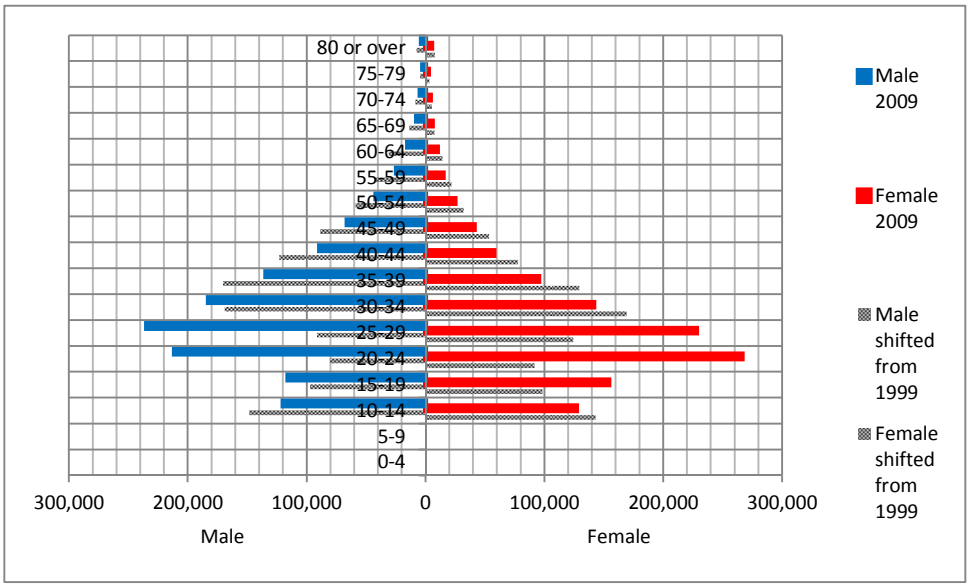
Figure 2.1.5 Age Structure of the Population of Nairobi in 2009

Population growth of an area depends on the births, deaths, in-migration, and out-migration. The population growth rate can be expressed as follows:

Population Growth Rate
= Natural Growth Rate + Social Growth Rate
= (Birth Rate – Death Rate) + (In-migration Rate – Out-migration Rate)

The population growth rate of Nairobi City has been higher than that of Kenya. For example, during the 1999–2009 period, the growth rate of the city was 3.9% while that of Kenya was 3.0%. The dominant reason for the difference is thought to be the high in-migration rate of the city.

In Figure 2.1.6, the age structure of the population of Nairobi City in the 1999 Census is shifted upwards by ten years and overlaid with the population over ten years of age in the 2009 Census. The shifted 1999 data shows the maximum possible population without migration in each sex and age group in 2009, because no death is assumed. If the actual 2009 population is greater than the shifted 1999 data, the difference is the minimum possible net in-migration of the group. The in-migration between 15 years old and 30 years old as of 2009 is remarkably large. This means that between 1999 and 2009 the net in-migration of an age cohort between five years old, the age of the people in 1999 who are 15 years old in 2009, and 30 years old is large. At least some 700,000 people in this age group migrated to the city during the decade.



Sources: Kenya Censuses in 1999 and 2009, and the JICA Study Team (JST)

Figure 2.1.6 Nairobi City's Age Structure Shifted by Ten Years from 1999 and Corresponding Actual Population in 2009

(2) Day-time Population

The number of pupils and students at schools and the number of workers at work places are studied as follows:

1) School Enrolment

According to the 2009 Census, the number of children attending pre-primary schools was 155,936, which was 71.4% (gross enrolment rate) of the 3 to 5 age cohort population. Similarly, that of primary schools was 490,314 or 111.3% of the 6 to 13 age cohort population, while that of secondary schools was 176,837, or 93.8% of the 14 to 17 age cohort population.

On the other hand, according to the 2011 data of the Education Department of the Nairobi City County (NCC) and Ministry of Education, the total enrolment of pre-primary schools was 72,165 indicating the gross enrolment rate was less than 33.0% because of the population increase since 2009. While that of the primary schools was 336,723 with a rate of less than 76.5%, and that of secondary schools was 69,314 with a rate of less than 36.8%.

The gaps between the home-based data and school-based data can be interpreted as follows:

i) The census data of children attending schools may be overestimated, as the respondents tend to think that actual situation may appear to be inappropriate to disclose.

ii) The school data of enrolment may be underestimated, as some schools do not reply properly or some private schools present understated figures because they think that the enrolment is linked to taxation.

iii) Some children are studying in boarding secondary schools situated out of Nairobi City. In this case, these children lived outside the city during their school periods may be enumerated in Nairobi City.

Therefore, it is assumed that the enrolment rates were 50% for the pre-primary schools, 90% for the primary schools, and 65% for the secondary schools in 2009. Then the total number of pupils and students including the tertiary education data of the 2009 census is estimated at 780,000. Although a number of pupils and students schooling across the city boundaries are observed, they are neglected, for the net movement is thought to be marginal compared to the total enrolment.

Table 2.1.2 Distribution of Enrolment of Primary Schools, Pre-Schools, Special Units, and Secondary Schools in Nairobi City by Division in 2012 (Preliminary)

Division	Primary, etc	Secondary	Total
1 Dagoretti	46,181	10,507	56,688
2 Embakasi including Njiru	104,566	13,236	117,802
3 Kamukunji/Pumwani	18,825	4,905	23,730
4 Kasarani	87,791	6,337	94,128
5 Langata/Kibera	38,050	8,037	46,087
6 Makadara	26,489	7,898	34,387
7 Central/Starehe	44,685	9,220	53,905
8 Westlands	42,301	9,174	51,475
Total	408,888	69,314	478,202

Note: As of July 2013, the total enrolment of pre-primary and primary schools is 442,074, instead of 408,888. However, its breakdown into divisions is not fully available.
Sources: City Education Department, -, Nairobi City County
Unit: Number of pupils and students

2) Work Places

Based on the business registration data of NCC in 2013, the total number of formal workers was estimated at approximately one million. On the other hand, based on the 2009 census, the number of active employees who lived in the city was estimated at 1,648,000 in 2013. By assuming a net in-flow of 165,000 commuters from outside the city based on the cordon line survey, the total number of jobs in the city was estimated at 1,813,000 and the number of informal workers was estimated at 813,000.

The basic definitions of the formal workers and the non-formal workers are as follows:

Formal workers are those working at businesses registered as formal in NCC and wage workers in agriculture and forestry, electricity and water, and in the public sector.

Non-formal workers are those working at businesses registered as informal in NCC and unregistered workers except the wage workers mentioned above.

3) Day-time Population

Assuming the above mentioned commuters from outside the city boundary, the day population of Nairobi City was estimated approximately at 3,280,000 in 2009 and 3,766,000 in 2013. It is noted that much higher day population than night population of the city's central areas is largely attributed to the commuters from the suburban areas inside the city boundary.

2.1.3 Socioeconomy

(1) Nairobi City's Position in Kenya

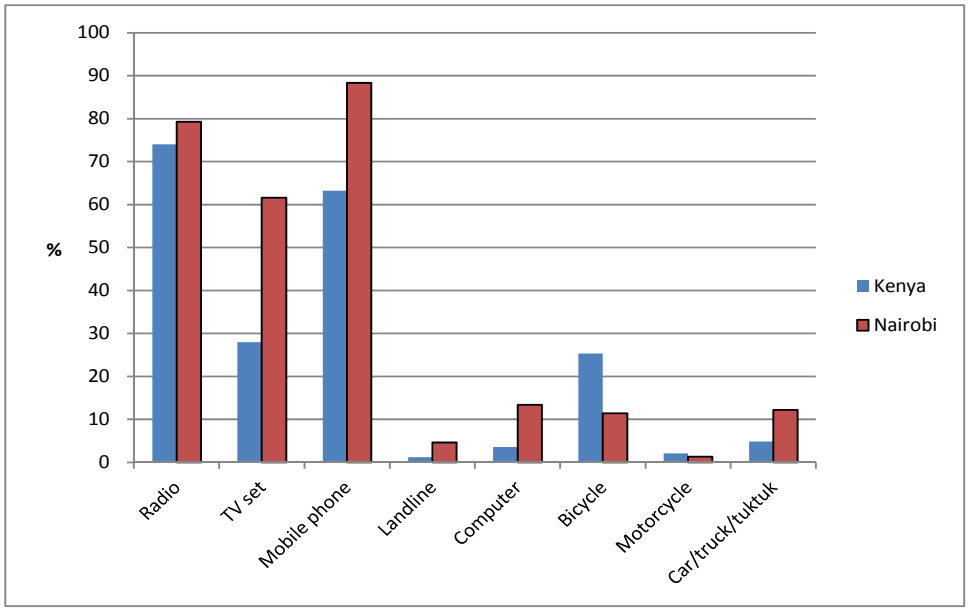
1) Social Indicators

In most social indicators, Nairobi City is positioned higher than the average of Kenya.

Table 2.1.3 Position of Nairobi City in Comparison with Kenya

Social Indicators	Kenya	Nairobi City
Main Source of Water	Share of spring/well/borehole is the highest (35.4%).	Share of piped water is the highest (52.3%).
Main Mode of Human Waste Disposal	Share of pit latrine (covered/ uncovered) is the highest (69.6%).	Share of main sewer is the highest (47.7%).
Main Type of Lighting Fuel	Share of tin lamp is the highest (38.5%).	Share of electricity is the highest (72.4%).
Ownership of Household Assets	Kenya has higher ownership in bicycle and motorcycle.	Nairobi City has higher ownership in radio, TV set, mobile phone, landline, computer, and car/truck/*tuk tuk*.

Source: 2009 Census



Source: 2009 Census

Figure 2.1.7 Percentage of Households of Ownership by Household Assets

2) Gross Regional Domestic Product (GRDP) per Capita

Although estimated GRDP per capita of Nairobi City varies on sources of data, it is assumed to be triple the national Gross Domestic Product (GDP) per capita, because it is the average of the collected estimates excluding an exceptionally high figure. The assumption made for 2009 is that the GDP share of Nairobi is 24.4% of Kenya.

In 2011, GDP per capita of Kenya was estimated at KSh73,988 at current prices of 2011 and GRDP of Nairobi City is estimated at KSh221,965.

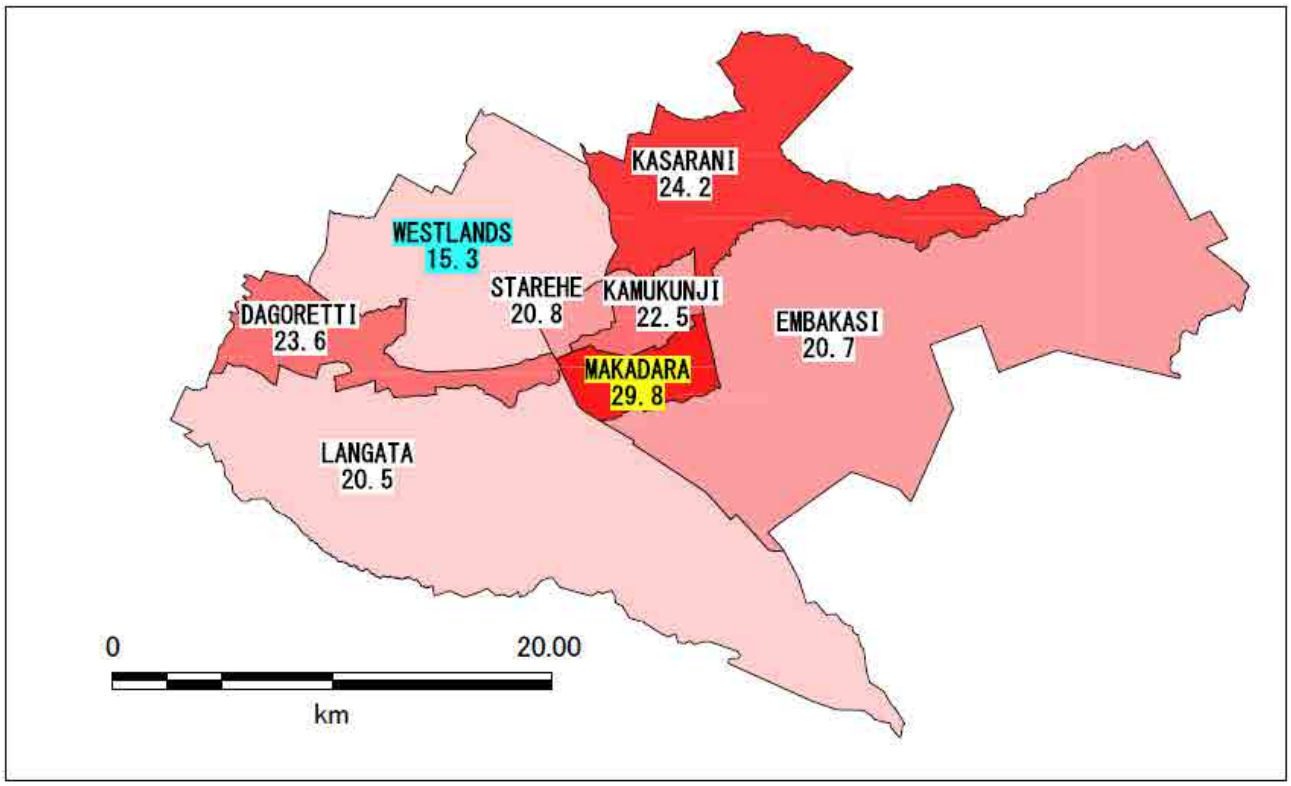
Table 2.1.4 References and their Implications

Reference	Implications
Labour Force Analytical Report based on the Kenya Integrated Household Budget Survey 2005/06	In the mean monthly household expenditure per capita, Nairobi City's level is 3.1 times of Kenya's level.
Basic Report on Well-being in Kenya based on the Kenya Integrated Household Budget Survey 2005/06	In the mean monthly food and non-food consumption per capita, Nairobi City's level is 2.5 times of Kenya's level.
Statistical Abstract 2012	In the earnings per capita, Nairobi City's level is 3.7 times of Kenya's level.
Global City GDP Rankings 2008-2025 Pricewaterhouse Coopers	In GDP at PPP per capita, Nairobi City's level is 2.5 times of Kenya's level.
Appraisal Document of Kenya Municipal Program, World Bank, April 2010	In GDP/GRDP per capita, Nairobi City's level is more than 6.2 times of Kenya's level.

Source: JICA Study Team (JST)

(2) Socioeconomic Conditions in Nairobi City

The Kenya Integrated Household Budget Survey 2005-2006 estimated the poverty line at KSh2,913 per person per month for urban households. According to the survey, the share of individuals below the poverty line was the highest at 29.8% in Makadara Division and lowest at 15.3% in Westlands Division. As a very broad trend, a larger number of relatively high income households are found in the west of the Central Business District (CBD) than in the east, although there are a number of low income informal settlement areas in the western areas such Kibera and Kawangware.



Source: Kenya Integrated Household Budget Survey 2005-2006

Figure 2.1.8 Share of Individuals below Poverty Line

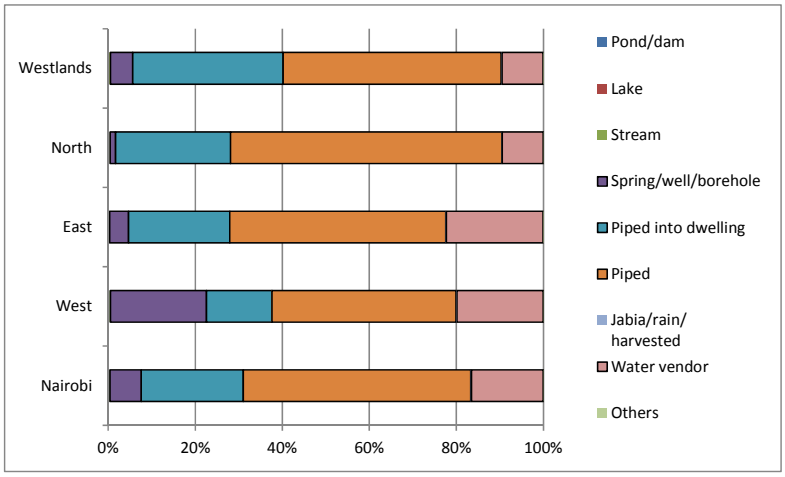
Socioeconomic characteristics of households in the four districts of Nairobi City can be compared based on the 2009 Census Volume 2 "Population and Household Distribution by Socioeconomic Characteristics".

Table 2.1.5 Definitions of the Four Districts in Nairobi City According to 2009 Census

District	Division	Remarks
Nairobi West	Dagoretti, Langata/Kibera	Kibera here means a division, not a location.
Nairobi East	Embakasi including Njiru, Makadara	
Nairobi North	Central/Starehe, Kasarani, Kamukunji/Pumwani	
Westlands	Westlands	Westlands here is a district and also a division.

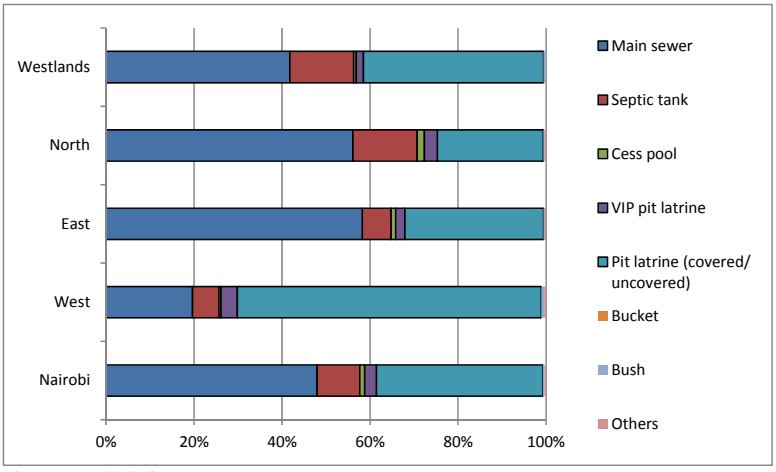
Sources: 2009 Census and the JICA Study Team (JST)

Regarding water supply, the piped water supply system is the most common source in all the districts. Westland has the highest rate (34.5%) of the system of piped into dwelling, while Nairobi East and Nairobi West have the highest rates (22.2% and 19.8%) of water from vendors. Regarding human waste disposal, Nairobi East and Nairobi North have the highest rates (58.0% and 55.7%) of the main sewer system, while Nairobi West has the highest rate (68.6%) of the pit latrine system. Regarding main type of lighting fuel, Westlands has the highest rate (79.0%) of electricity, while Nairobi West has the highest rate (18.3%) of tin lamp. In Nairobi City, mobile phones, radios, and TV sets are common in this order. The ownership of computer, car/truck/*tuk tuk* and bicycle is 13.4%, 12.2%, and 11.4%, respectively. The ownership of landline and motorcycle is less than 5%. In all cases, the shares of Westlands are the highest.



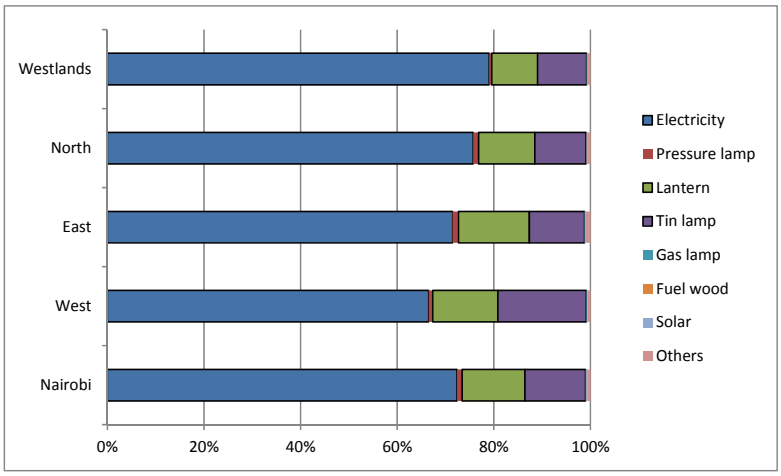
Source: 2009 Census

Figure 2.1.9 Households by Main Source of Water and District



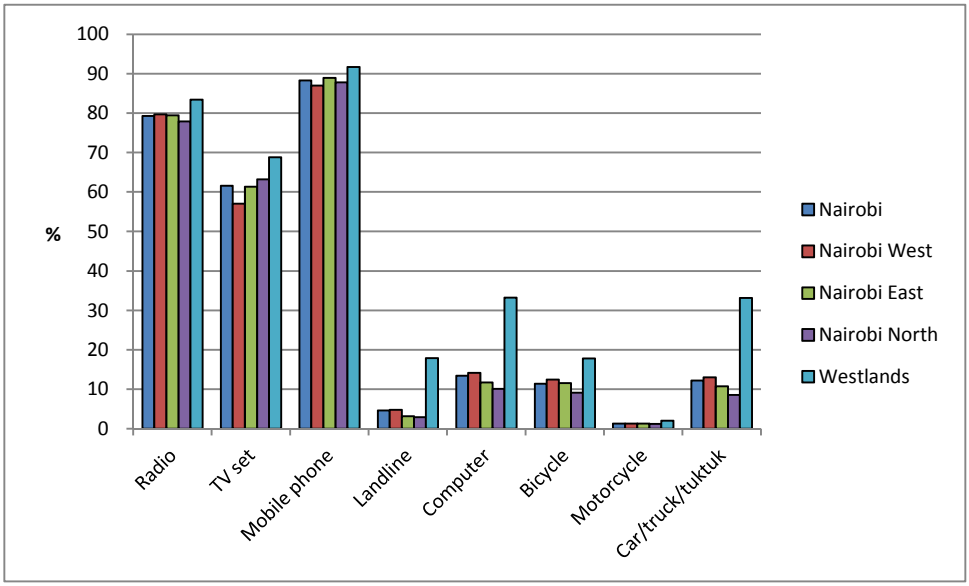
Source: 2009 Census

Figure 2.1.10 Households by Main Mode of Human Waste Disposal and District



Source: 2009 Census

Figure 2.1.11 Households by Main Type of Lighting Fuel and District



Source: 2009 Census

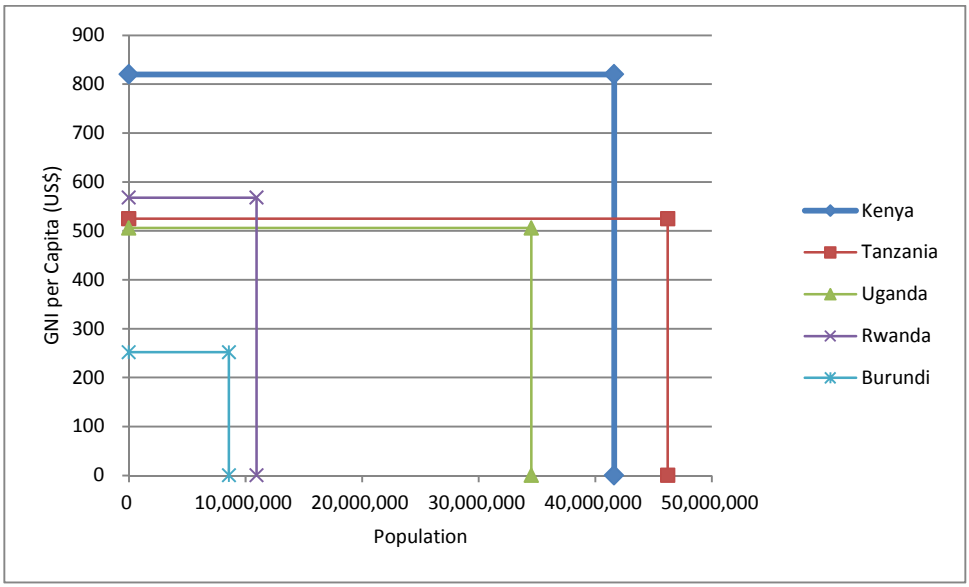
Figure 2.1.12 Percentage of Households by Ownership of Household Assets and District

Safety and security issue has been raised as priority social concern during stakeholder meetings. Various socioeconomic factors can be attributed to the increasing insecurity in NCC. Such factors including increasing population leading to congestion in some residential areas, unemployment, poverty, poor living standards, lack of education, and civic responsibility have overtime made safety and security a key issue of concern. Poor planning, design, and management are some of the numerous factors that give rise to crime and violence in the cities.

(3) Position of Nairobi City's Industries

In the East African Community (EAC), Kenya's Gross National Income (GNI) was the largest accounting for 40.5% while the second largest Tanzania's share at 28.8% in 2011. Kenya's GNI per capita is also the highest at US$820 in the same year as shown in Figure 2.1.13, although it is still below the threshold of the lower middle income countries of US$1,026 at 2011 prices.

GRDP per capita of Nairobi City is estimated 3 times of Kenya's average GDP per capita, and its GRDP is estimated at 24.4% of Kenya's GDP. The GRDP is larger than Rwanda's GDP.



Source: World Development Indicators website (2013)

Figure 2.1.13 Population and GNI per Capita in 2011

The EAC started a common market system in 2010 and moving toward further integration, while issues remain in harmonisation of domestic systems to the EAC rules, elimination of non-tariff barriers, and relations with other international communities. Integration of the EAC member countries provides Kenya with an opportunity for expansion of its industries although it requires their competitiveness.

(4) Outline of Kenya's Industries

As shown in Tables 2.1.6-2.1.9, agriculture and forestry has the largest share at 24.0% in GDP, followed by wholesale and retail (10.6%), transportation and communications (9.7%), and manufacturing (9.4%) in 2011. In terms of growth rate, financial business is fastest growing at 7.8% per annum followed by wholesale and retail (7.3%) and mining and quarrying (7.1%) in the same year. The top two export earners are tea (21.2% of the total export value) and horticultural produce including cut flowers (17.3%). The fastest growing export commodities are tobacco and tobacco products (76.4% per annum), leather products (71.9%), and soda ash (70.3%) but the share of each of them is less than 4%.

Table 2.1.6 GDP Shares in 2011 (Provisional)

Rank	Sector	Share (%)
1	Agriculture and forestry	24.0
2	Wholesale and retail	10.6
3	Transportation and communications	9.7
4	Manufacturing	9.4
5	Financial business	6.4
6	Education	5.8

Source: Economic Survey 2012

Table 2.1.7 Real GDP Growth Rates in 2011 (Provisional)

Rank	Sector	Growth Rate (%)
1	Financial business	7.8
2	Wholesale and retail	7.3
3	Mining and quarrying	7.1
4	Hotels and restaurants	5.0
5	Education	4.9
6	Transportation and communications	4.5

Source: Economic Survey 2012

Table 2.1.8 Shares in Export in 2011 (Provisional)

Rank	Sector	Share (%)
1	Tea	21.2
2	Flowers	17.3
3	Garments and accessories	4.6
4	Coffee	4.0
5	Tobacco and tobacco products	3.9
6	Steel	3.8

Source: Economic Survey 2012

Table 2.1.9 Growth Rates in Export in 2011 (Provisional)

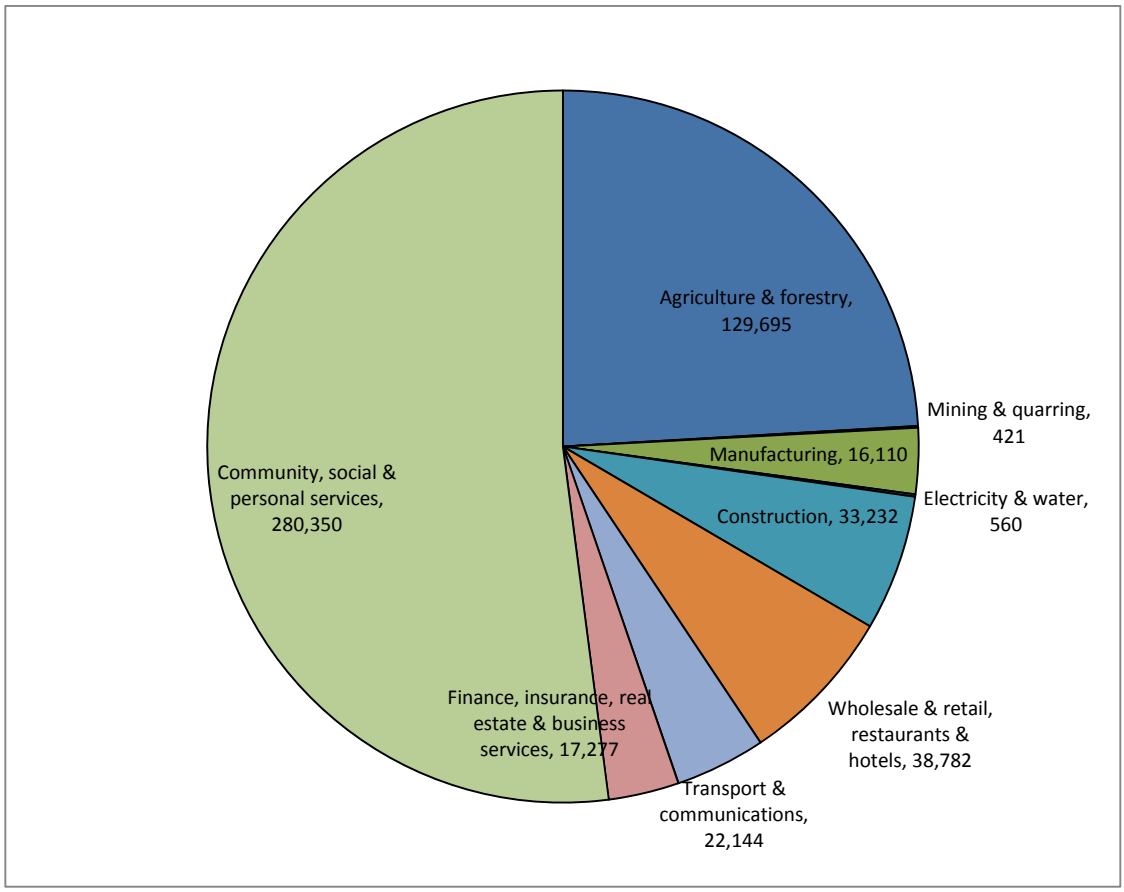
Rank	Sector	Growth Rate (%)
1	Tobacco and tobacco products	76.4
2	Leather products	71.9
3	Soda ash	70.3
4	Steel	49.8
5	Essential oil	43.6
6	Organic oil	43.2

Source: Economic Survey 2012

(5) Overall Situation and General Issues of the Industries of Nairobi City

1) Overall Situation of Industries

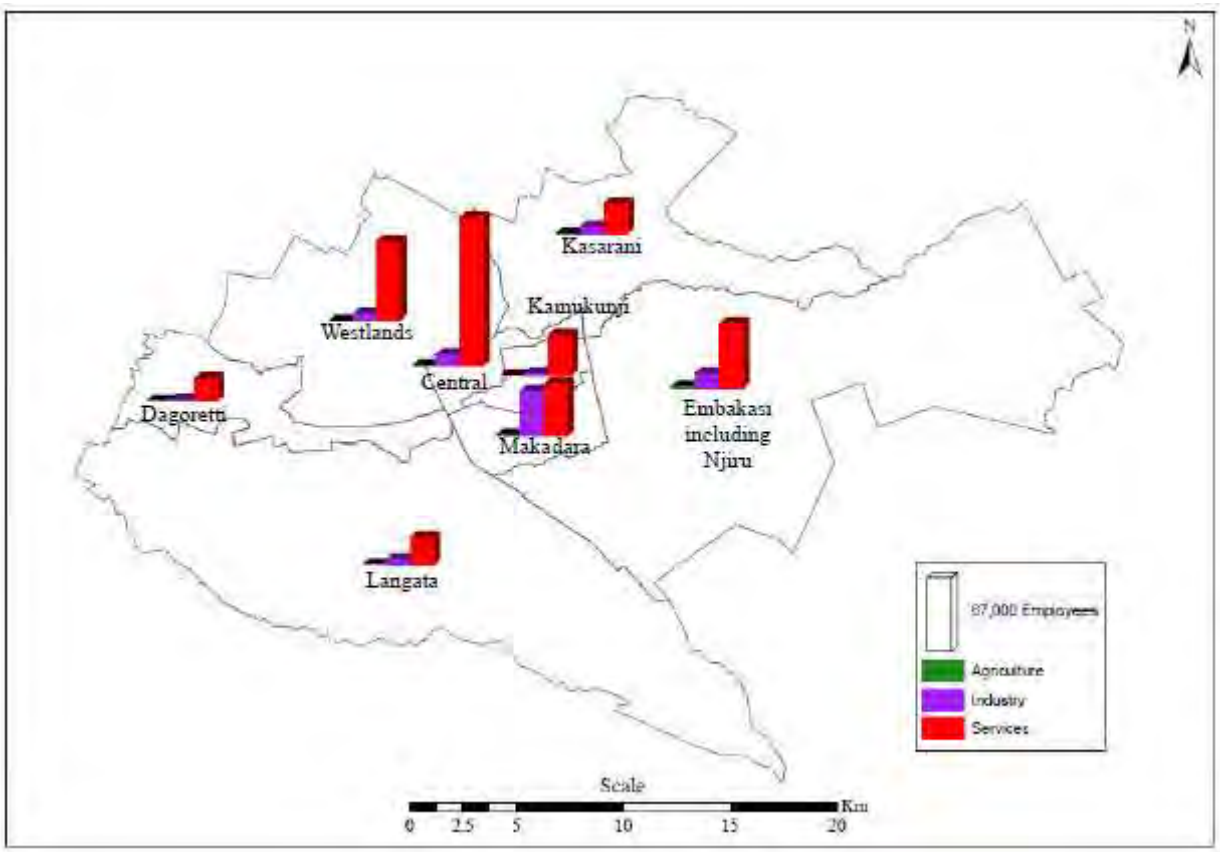
Among the wage employment in 2012, the community, social, and personal services sector has the highest share (52.1%), the agriculture and forestry sector has the second share (24.1%), while the wholesale and retail trade, restaurants and hotels sector has the third share (7.2%) according to the Statistical Abstract 2012. The manufacturing sector accounts for only 3.0%. It seems that the total wage employment of 538,571 is too small, and the share of agriculture and forestry is too large, while that of manufacturing is too small. However the apparent incompatibility of the data may be due to the definition of the wage employment. (Figure 2.1.14)



Source: Statistical Abstract 2012, Kenya National Bureau of Statistics (KNBS)

Figure 2.1.14 Wage Employment by Industry in 2011 (Provisional)

The estimated distribution of employees of business establishments registered in NCC reflects the concentration of commercial and service businesses in the relatively small area of CBD and that of manufacturing businesses in Makadara Division, as well as an overall dominance of the services sector (Figure 2.1.15). In addition, the informal employments are thought to be partly distributed according to formal employment and to the population distribution.



Note: "Agriculture" includes forestry and fishing, "industry" comprises mining, manufacturing, construction, electricity and water, and "services" means the rest, as in the World Development Report. Businesses not registered in NCC are not included.

Source: Business Registration Data of NCC

Figure 2.1.15 Estimated Distribution of Employees of Business Establishments Registered in NCC

2) General Issues and Directions for Improvement of Industries

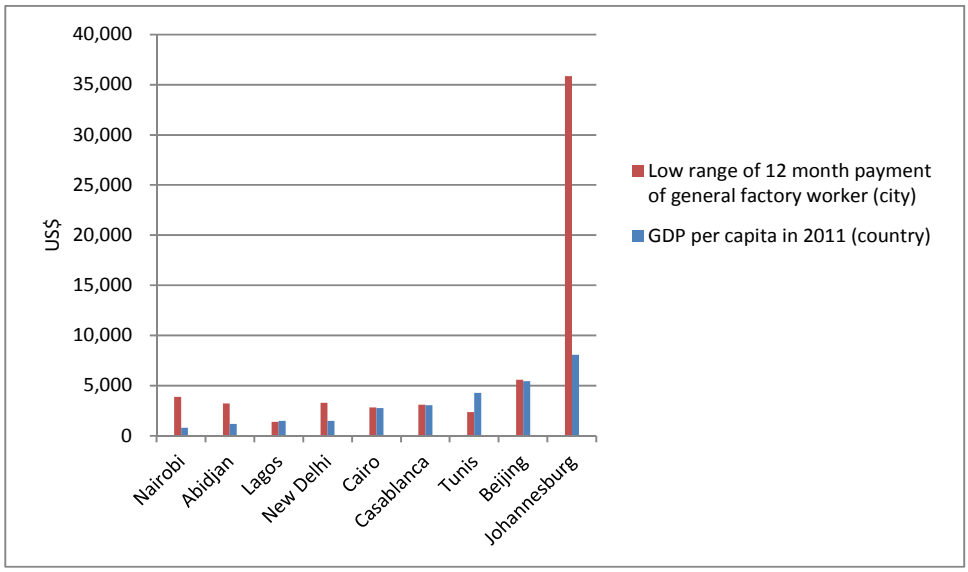
General issues and directions for improvement of industries in Nairobi City are summarised in Table 2.1.10.

Table 2.1.10 General Issues and Directions for Improvement of Industries in Nairobi City

General Issues		Directions for Improvement
(i) Industrial structure		
Lack of competitive skills	Skill levels vary a lot. The informal light manufacturing (Jua Kali) is yet to improve its product quality; otherwise they cannot maintain the market share.	Nairobi City needs a larger number of highly skilled and specialised small enterprises. Improve the skills mainly through business linkages and by responding to market needs.
High cost structure	Extra costs are incurred due to costly power supply, traffic congestion, and insecurity in addition to not-so-low labour costs. (Figure 2.1.16)	Improve efficiency of the economic system including efficiency of labour, infrastructure, and utilities.
Lack of linkages	Due to mismatch of quality, costs, etc., inter-business linkages are weak. Figure 2.1.17 shows gaps between large, medium, small, and micro/individual businesses. It also shows general supporting organisations and their major targets. Line agencies and NCC should support directly or indirectly businesses in various sizes.	Deepen inter-business linkages as well as linkages with major buyers such as government organisations and supermarkets.
Weak competitiveness	Freer importation including in-flow of counterfeits is dominating the market and destroying local businesses.	Overall efforts to strengthen competitiveness and to find areas with relative advantages, so that protectionism is not necessary.

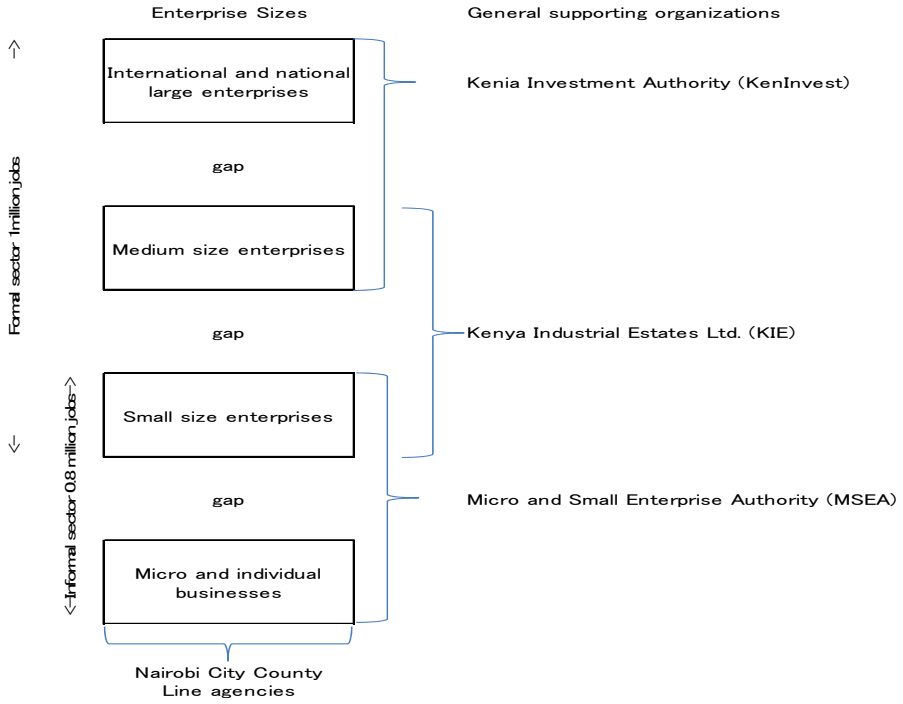
General Issues		Directions for Improvement
(ii) Basic and socioeconomic conditions		
Lack of available land	Given the current land use and transportation conditions, the land of Nairobi City appears to be mostly saturated, although a lot of spaces are underutilised.	Efficient land use at selected locations and relocation of space-intensive functions to the environs. Open up new spaces for various business activities by such means as vertical mixed use.
Lack of public safety	Lack of safety and its reputation are destroying Kenya's tourism potential. It also incurs extra costs and impedes many business activities.	A full set of measures ranging from immediate countermeasures to longer-term socioeconomic bottom-up strategies. (Table 2.1.11)
(iii) Infrastructure		
Traffic congestion	Traffic congestion wastes a huge amount of time cost and fuel cost, deteriorating Kenya's business climate.	A full set of measures ranging from immediate countermeasures including traffic management by ICT to longer-term structural measures such as shift to multi-centric urban structure.
Unreliable and costly power supply	Unreliable power supply necessitates generators of each business incurring additional investment and operation costs.	Power development can be regarded as a private business opportunity as PPP. Develop new large and small energy sources and optimise energy operation.
Insufficient waste management service	Coupled with lack of public safety, wastes have invaded many potentially attractive streets.	Clean Nairobi City campaign linked with safe tourism development.
(iv) Institutional system		
Lack of finance	Small enterprises in need of financial support such as ICT entrepreneurs have difficulties in obtaining loans with concern about unpredictable outcome.	Open up various financial channels at various levels ranging from integration of loan provision and consulting services for micro, small, and medium enterprises (MSMEs) to PPP schemes for larger enterprises.
Inefficient administrative procedure	"An Investment Guide to Kenya" (2012) points out that investors may face delays on refunds of VAT, withholding taxes, and customs clearance. Doing Business Rank of Kenya in 2013 placed at 121, out of the 185 economies.	Improve the doing business rank by efficient administrative, tax, and custom procedures, and also smooth inter-agency collaboration to support businesses. NCC can play expanded roles in an efficient way.

Source: JICA Study Team (JST)



Sources: World Development Indicators website (2013) and Japan External Trade Organisation (JETRO) website (2013)

Figure 2.1.16 Comparison of GDP per Capita and Typical Labour Cost



Note: MSEA under the Ministry of Industrialisation and Enterprise Development is the former Department of Micro and Small Enterprise Development (DMSED) of the Ministry of Labour.
Source: JICA Study Team (JST)

Figure 2.1.17 Gap Structure of Industries of Nairobi City

Table 2.1.11 Some Causes for Lack of Public Safety and Candidate Measures

Causes	Candidate Measures	Remarks
Lack of safety services and equipment - Insufficient police service and police posts. - Lack of street lights. - Lack of CCTV. - Public facilities without safety considerations. - High fences of parks.	- Enhance police activities, police posts, and community policing. - Increase street lights. - Enhance CCTV system. - Equip public toilets with safety measures, e.g., CCTV and siren. - Establish safe public transport system. - Lower fences of parks.	
Exclusion of people from public facilities, amenities, and services - Worsened access to public facilities, amenities and services, e.g., social/community halls, open spaces and parks, etc.	- Improve public facilities, amenities, and services; and its access including temporary pedestrian or play zones. - Involve the youth and the community in improving and sustaining them.	
Socioeconomic conditions - Unemployment, underemployment, working poverty. - Gap between rich and poor (privileged and underprivileged). - Incidence of corruption. - Lack of hope. - Lack of family care and education at home, schools and communities.	- Generate employment. - Seek inclusive and bottom-up development (as well as top-up). - Strengthen anti-corruption measures. - Shift from vested interest to meritocracy. - Enhance community care and safety campaigns.	Kenya ranks at 107 out of 134 countries in Gini index that shows inequality in income or expenditure within each country (Table 2.1.12).
External conditions - Domestic and international in-migration of underprivileged people.	- Balance support measures and enforcement of rules to address such migration.	

Note: Accidents, pollution, disasters, and terrorism are not explicitly considered here.
Source: JICA Study Team (JST) based on interviews with the Nairobi County Business Association (NCBA) (2013) and Mr. Elijah Agevi (2013)

Table 2.1.12 Gini Index of Selected Countries

Rank	Country	2000-	Rank	Country	2000-
1	Sweden	25.0	68	Israel	39.2
2	Norway	25.8	69	Guinea	39.4
3	Finland	26.9	70	Kyrgyz Republic	39.5
4	Afghanistan	27.8	71	Burkina Faso	39.6
5	Belarus	27.9	72	Chad	39.8
6	Bulgaria	28.2	73	Djibouti	40.0
7	Ukraine	28.2	74	Sri Lanka	40.3
8	Germany	28.3	75	Nicaragua	40.5
9	Croatia	29.0	76	United States	40.8
10	Austria	29.2	77	Morocco	40.9
11	Ethiopia	29.8	78	Georgia	41.1
12	Slovak Republic	29.8	79	Qatar	41.1
13	Hungary	30.0	80	Mauritania	41.3
14	Montenegro	30.1	81	Tunisia	41.4
15	Kazakhstan	30.8	82	Gabon	41.5
16	Luxembourg	30.8	83	Cote d'Ivoire	41.5
17	Iraq	30.9	84	Cambodia	41.9
18	Slovenia	31.2	85	Thailand	42.4
19	Pakistan	31.2	86	China	42.5
20	Romania	31.6	87	Sierra Leone	42.5
21	Egypt, Arab Rep.	32.1	88	Turkey	42.6
22	Canada	32.6	89	Uganda	42.6
23	Belgium	33.0	90	Angola	42.7
24	Albania	33.0	91	Ghana	42.8
25	Bangladesh	33.2	92	Nigeria	42.9
26	Burundi	33.3	93	Central African Republic	43.6
27	India	33.4	94	Nepal	43.8
28	Serbia	33.4	95	Niger	43.9
29	Tajikistan	33.6	96	Philippines	44.0
30	Switzerland	33.7	97	Congo, Dem. Rep.	44.4
31	Azerbaijan	33.7	98	Jamaica	45.5
32	Indonesia	34.0	99	South Sudan	45.5
33	Greece	34.3	100	Uruguay	45.9
34	Ireland	34.3	101	Fiji	46.8
35	Togo	34.4	102	Mozambique	47.1
36	Spain	34.7	103	Madagascar	47.2
37	Poland	34.9	104	Gambia, The	47.3
38	Sudan	35.3	105	Congo, Rep.	47.3
39	Guinea-Bissau	35.5	106	Costa Rica	47.6
40	Latvia	35.7	**107**	**Kenya**	**47.7**
41	Vietnam	35.8	108	Argentina	49.3
42	Bosnia and Herzegovina	35.8	109	Venezuela, RB	49.5
43	Syrian Arab Republic	35.8	110	El Salvador	50.3
44	Lithuania	35.8	111	Cape Verde	50.5
45	Estonia	36.0	112	Swaziland	50.7
46	Italy	36.0	113	Sao Tome and Principe	50.8
47	Armenia	36.2	114	Dominican Republic	51.1
48	Moldova	36.3	115	Peru	51.1
49	Mongolia	36.5	116	Mexico	51.2
50	Uzbekistan	36.7	117	Chile	51.8
51	Lao PDR	36.7	118	Paraguay	52.5
52	Maldives	37.4	119	Lesotho	52.5
53	Russian Federation	37.5	120	Rwanda	53.1
54	Tanzania	37.6	121	Panama	54.0
55	Yemen, Rep.	37.7	122	Ecuador	54.1
56	Jordan	37.7	123	Zambia	54.6
57	Malaysia	37.9	124	Guatemala	55.9
58	Bhutan	38.1	125	Colombia	56.1
59	Liberia	38.2	126	Brazil	57.4
60	Iran, Islamic Rep.	38.3	127	Bolivia	57.8
61	Benin	38.6	128	Haiti	59.2
62	West Bank and Gaza	38.7	129	Honduras	59.7
63	Cameroon	38.9	130	Micronesia, Fed. Sts.	61.1
64	Mali	39.0	131	Namibia	63.9
65	Malawi	39.0	132	Comoros	64.3
66	Macedonia, FYR	39.1	133	Seychelles	65.8
67	Senegal	39.2	134	South Africa	67.4

Note: Gini index in 2005 or in the 2000s.
Gini index measures inequality of income or consumption expenditure among individuals or households within an economy. A Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality

Source: World Development Indicators website (2013)

(6) Current Situation of Industries in the Environs

Based on the District Development Plans (2008-2012), industries of the surrounding districts of Nairobi City can be outlined as follows. It is noted that the description of each district is for the whole district and not limited to the parts within the Greater Nairobi.

1) Thika District (Gatanga Division, Githurai Division, Kakuzi Division, Ruiru Division, Thika Municipality)

Outline	Around the urban centre of Thika and Ruiru along Thika Highway, a number of factories are located as well as the Jomo Kenyatta University of Agriculture and Technology (JKUAT). Historically, Thika District is one of the leading industrial districts in Kenya besides undertaking agricultural activities on both large and small scales. Its proximity to Nairobi City provides a ready market to the agricultural produce.
Primary industry	The main cash crops are coffee, tea, pineapple, and macadamia while the main food crops are maize, beans, Irish potatoes, and pigeon peas. Most of the farming areas in the district are rainfed except for large-scale pineapple production by the multinationals and coffee estates. Besides crop farming, livestock farming is undertaken in the district. The main livestock are dairy cattle, dairy goat, meat goat, poultry, and beekeeping. The cooperative sector is central in marketing of agricultural produce and products. It also assists in provision of credit and farm inputs.
Secondary and tertiary industries	There are small-, medium-, and large-scale businesses including 16 chemical and 15 engineering industries.

2) Kiambu East District (Githunguri Division, Kiambu Municipality, Kiambaa Division)

Outline	Due to close proximity to Nairobi City and jobs at coffee and tea estates among others, the district is well populated and the land has been fragmented into small and inefficient pieces.
Primary industry	The main food crops grown are maize, beans, Irish potatoes, and vegetables whereas the major cash crops are coffee, tea, and horticultural crops. Due to the emphasis on cash crops, the district is importing food from neighbouring districts. Several agro-processing factories can be accessed and so production of livestock and livestock products has been increasing.
Secondary and tertiary industries	The industries are mostly operated by the informal sector. The district's tourist attractions include the house of the first president Jomo Kenyatta.

3) Kiambu West District (Limuru Division, Kikuyu Division, Lari Division, Ndeiya Division)

Outline	The growing population working in the district or commuting to Nairobi City is leading to the reduction of arable land.
Primary industry	The district has been predominantly agricultural. The main food crops are maize, beans, Irish potatoes, and vegetables, whereas the major cash crops are coffee, tea, pyrethrum, horticultural products, and flowers. Several agro-processing factories can be accessed and so production of livestock and livestock products has been increasing.
Secondary and tertiary industries	The district has agro-industries such as milk processing firms and large tea factories.

4) Kajiado District (Ngong Division, Central Division, Magadi Division, Isinya Division, Namanga Division, Mashuru Division, Ewaso Kendong Division)

Outline	With the change from group ranches to the individual land tenure system and owing to either agricultural potential or proximity to Nairobi City, immigration has increased to some locations such as Ngong and Kitengela.
Primary industry	Kajiado is an arid and semi-arid lands (ASAL) district and livestock keeping has been the dominant economic activity although there has been a reduction in livestock population due to droughts.
Secondary and tertiary industries	The vast mineral deposit around Lake Magadi is a main source of soda ash. The largest deposits at Mile 46 and Loodikalani area can be exploited for commercial purposes. Proximity to Athi River Export Processing Zone is an advantage.

5) Machakos District (Athi River/Mavoko Division, Central Division, Kalama Division, Kathiani Division)

Outline	The district has relatively high population density along the hills in Kathiani Division, in the Athi River, along Mombasa Road and in Machakos Town due to fertile soils and high rainfall for agriculture. Low plains where ranching and dairy farming are carried out are sparsely populated.
Primary industry	Agriculture contributes majority of household income. Livestock rearing is generally practiced in small scale.
Secondary and tertiary industries	Athi River Export Processing Zone was established in 1990. Besides that, the sector is not well developed due partly to over reliance on rainfed agriculture.

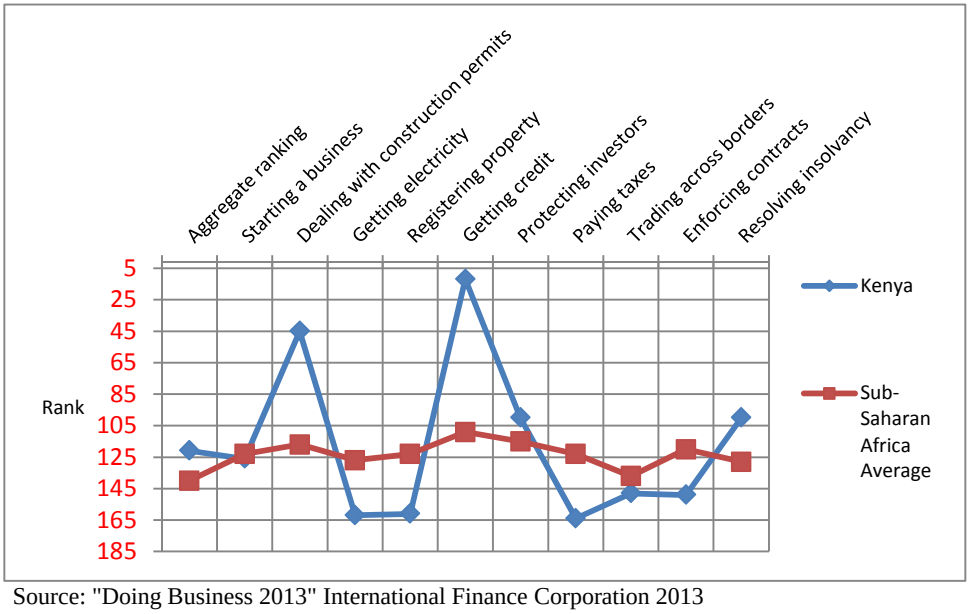
6) Kangundo District (Matungulu Division, Kangundo Division)

Outline	Agriculture, livestock production, and informal sector businesses are major economic activities.
Primary industry	The production of main crops in the district, including maize, has been fluctuating over the years due to low, unpredictable, erratic, and inadequate rainfall. This has created food insecurity among the general population. Other key issues affecting farmers in the district include declining soil fertility and high percentage of post harvest crop losses. All these factors have been influenced by the use of poor quality seeds, inadequate farm inputs, frequent droughts, and poor storage as well as lack of market, transportation, and processing. The major cash crops grown in the district are coffee and horticultural products in some parts. Of the forests areas, the district has a total of 7,420 ha of gazetted forests. The major threat is the forest destruction for timber and firewood. The revitalisation of Kenya Meat Commission (KMC) has provided a ready market for livestock.
Secondary and tertiary industries	Most retail and wholesale traders are small scale and in the informal sector. Ndonyo Sambuk National Park has tourism development potential.

(7) Doing Business Procedures

According to "Doing Business 2013" International Finance Corporation 2013, Kenya's aggregate ranking on the ease of doing business is 121 out of 185 countries. Kenya ranks high at 12 in "getting credit" for strong legal rights and deep credit information, while low at 164 in paying taxes mainly for time taken for the procedure (Figure 2.1.18).

NCC is related to starting a business, dealing with construction permits, getting electricity, registering property, and paying taxes. It is required to raise the aggregate ranking by concerted efforts of the responsible agencies (Table 2.1.13).



Source: "Doing Business 2013" International Finance Corporation 2013

Figure 2.1.18 Doing Business Ranks of Kenya in 185 Economies in 2013

Table 2.1.13 Doing Business Ranks of Kenya in 185 Economies in 2013

Topic	Kenya	Sub-Saharan Africa Average	Tasks of CCN	Department of NCC in charge	Major factors of low ranking
Aggregate ranking in 185 economies in 2013	121	140			
1 Starting a business	126	123	Issuing business permits	Business licensing Department	
2 Dealing with construction permits	45	117	Approval of architectural plans	Technical Committee	
			Approval of structural plans and final building permits	City Planning Department (Development Control Section) and City Engineer Department (Structural Section)	
			Inspection after construction	City Planning Department (Enforcement Section)	
			Occupancy certificates	City Planning Department (Enforcement Section)	
			Water and sewerage connection	Nairobi City Water and Sewerage Company	
3 Getting electricity	162	127	Excavation permits	City Engineer Department	Typical total time taken is 146 days.
4 Registering property	161	123	Issuing rates clearance certificates	Ministry of Lands (National Land Commission) is in charge but Nairobi City County (Department of Legal Affairs) facilitates the procedure.	Typical total time taken is 73 days.
5 Getting credit	12	109			
6 Protecting investors	100	115			
7 Paying taxes	164	123	Property tax/Rents	Privately-owned land : Ground rates annually paid to Niaorbi City County (City Treasurery) Ground rents annually paid to Ministry of Lands (National Land Commission) NCC-owned land : Rents monthly paid to Nairobi City County (Department of Social Services and Housing)	Typical time taken per year is 340 hours.
8 Trading across borders	148	137			Time and cost for trade are burdens.
9 Enforcing contracts	149	120			Typical number of procedures is 44.
10 Resolving insolvancy	100	128			

Source: "Doing Business 2013" International Finance Corporation 2013

2.1.4 Current Environmental Status of Nairobi City

(1) Baseline Descriptions of Current Nairobi City

Nairobi City, located at 1,600 m to 1,850 m above sea level, covers an area of about 700 km^2 in the south-eastern end of Kenya's agricultural heartland, and has tolerable climate throughout the year. The western part of the city is the highest, with a mountainous topography, while the eastern side is lower and generally flat terrain. The Nairobi, Ngong, and Mathare rivers run through the city area, and most of household and industrial effluents are directly discharged into those rives without any proper treatments. Minor earthquakes and tremors occasionally shake the city since Nairobi City exists next to the Rift Valley, which is active due to the tectonic movement therein.

In 1901, there were only 8,000 people living in Nairobi City. By 1948, the population number had grown to 118,000 and reached 343,500 habitants by 1962. Currently, that number is projected to be 3.8 million by 2015.

Much of Nairobi City's urban area is classified as unplanned settlement, driven by the rapid population growth, and urban poverty. Sprawling informal settlements hamper the spread of city's baseline social services and eventually leading to deterioration of quality of life therein. In the early 1990s, it was reported that over half of the city's population lived in those unplanned settlements. Recently, this large and rapid growing population of Nairobi City has begun to trigger environmental degradation and cause some negative impacts on human health and the economy.

(2) Major Environmental Issues

The following table is a summary of the recent environmental issues raised for the entire city [NCC, 2007]:

Table 2.1.14 Environmental Issues of Nairobi City

1. Rapid Urbanisation Nairobi City's physical expansion has come at the expense of natural environment. Urban sprawl and construction of roads and other city infrastructure have led to the loss of forests and other natural areas. As a result, forest coverage has receded and replaced by coffee plantations. Later, demand for food of the growing population led to the transformation of the city's outskirts to other agricultural uses, which in turn were threatened by further urban growth.
2. Protected Ecosystem or Green Spaces Nairobi City has managed to retain a number of green spaces within and close to the city, which provide its residents with shady recreation areas and visitors with a glimpse of Kenya's wildlife and vegetation. They also help in maintaining the biodiversity, filter pollutants from air, and act as minor water catchments within and outskirt of the city. Although these green spaces have been protected, much of the natural vegetation surrounding the City was lost as Nairobi City's boundaries were extended numerous times to accommodate the growing population and other associated need for more land. As city expanded after its founding, much of the new settlements are unplanned.
3. Informal Settlement Nairobi City's rapid growth increased the demand for land and led to inappropriate land allocation, forcing poor people to settle in fragile and unsavoury areas where they face hardships due to lack of proper housing and public services and where they are vulnerable to environmental change. Urban poverty, lack of employment opportunities, and inadequate urban planning also conspired in gradual growth of informal settlements in Nairobi City since its founding. People living in Nairobi City's informal settlements, particularly slums, usually find themselves in city's most fragile areas, such as flood plains, steep slopes, river valleys, or adjacent to sewers or dump sites. The Dandora Municipal Dumping site, which receives most of city's solid waste, is only about 8 kilometers from Nairobi City's centre and is surrounded by low-income residential area. This situation exposes slum residents to floods, landslides, and health risks from contaminants. In addition, they lived in overcrowded conditions with poor sanitation, inadequate and unsafe water, make-shift shelters, and unstable social networks. They also face high degree of tenure insecurity since most of these settlements are illegal, exposing them to constant threat of harassment and eviction.
4. Air Pollution Main sources of atmospheric pollution are vehicles, industries, emissions from use of charcoal and firewood, and other municipal sources such as open burning of waste. Increasing number of cars in the city intensifies traffic and pollution problems. Vehicles emit significant levels of air pollutants, including greenhouse gases and precursors of smog. Charcoal burning, which is the very prevalent energy source in the city, emits methane (CH4) and carbon monoxide (CO) and sends tiny particulates into the air. Air pollution adversely affects human health and environment. Particulates are associated with respiratory and eye diseases such as asthma, lung cancer, and conjunctivitis, especially in young and elderly who are more vulnerable. Air pollution is also major contributor to create such effects like acid rain, which has been responsible for much damage to soil, fish resources, and vegetation, often very far from the emission sources.
5. Water Pollution The city's wastewater management has not kept up with the increasing demands of the growing population and is inadequate to treat the amount of industrial and municipal effluent entering the Nairobi River and other surface waters. Nairobi City has changed from a "place of cool waters" to one in which the water is no longer potable or fit for many other useful purposes. A number of factories in Nairobi City's industrial area discharge waste directly into the Ngong River, making it the most polluted river in Kenya. Industrial waste effluents include petrochemicals and metals from micro-enterprises and "Jua-kali", as well as, oil and

grease from busy roads which run off into adjacent waters. The Nairobi River also receives improperly treated effluents from Dandora Sewage Treatment Plant and several drainage channels that gather stormwater from Nairobi City. Domestic garbage from informal settlements that have no public waste collection services also finds itself into the river similarly does sewage from pit latrines and other on-site sewerage-disposal methods. Sanitation facilities are very basic in many informal settlements, consisting of earth drains, communal water points, pit latrines shared by many people, and no systematic solid-waste disposal. Improperly treated sewerage and uncollected garbage have contributed to the vicious cycle of water pollution, water-borne diseases, poverty, and environmental degradation. Water pollution carries environmental and health risks to communities within Nairobi City, especially the poor who may use untreated water in their homes and irrigate their gardens. Farmers along the Nairobi River and its tributaries commonly use polluted waters and raw sewage for irrigation, exposing both farm workers and customers who consume the food crops to potential health problems. Almost half of the vegetables consumed within Nairobi City are grown on the banks of polluted rivers. All these impacts affect human health and productivity and challenge Kenya's ability to reach the targets under the Millennium Development Goals (MDG).
6. Sanitation Nairobi City faces enormous challenges in providing adequate public sanitation facilities and sewage disposal, and refuse collection; these problems are compounded as the population increases. Improperly treated sewerage and uncollected garbage have contributed to vicious cycle of water pollution, water-borne diseases, poverty, and environmental degradation.
7. Solid Waste Management Waste management is a growing problem in Nairobi City. Increasing urbanisation, rural-urban migration, rising standards of living, and rapid development associated with population growth have resulted in increased solid waste generation by industrial, domestic, and other activities. This increase has not been accompanied by equivalent growth in capacity to address the problem. Proper management of waste has thus become one of most pressing and challenging environmental problems in the city.

Among them, listed in above table, Issues 1 (rapid urbanisation), 3 (informal settlement), 5 (water pollution), 6 (sanitation), and 7 (solid waste management) are addressed by other sections of this study report. So, the main focal points are addressed to Issues 2 (protected ecosystem/or green spaces) and 4 (air quality) within the environmental sector of this proposed MP study, and the specific issues to be addressed for the selection of the priority project within the environmental sector are summarised in Chapter 5 of this proposed MP study.

(3) Recent Air Quality Degradation of Nairobi City

Currently, some parts of Nairobi City, with heavy traffic volumes, are facing severe urban air quality degradation, and current reports and/or available data indicate that the local air quality along several major roads has rapidly deteriorated. These are mainly the results of human activities in the transport as well as energy and industrial sectors. The situation is getting worse with the increasing population and relevant growth in vehicle number, growing industrial area, deforestation on the city's fringes, and increased construction works.

The impacts of air pollution range from the ecological to the socioeconomic one. These include loss of the biodiversity, damages to vegetation, buildings and animal health due to acid rain; and eventually lead to climate change in the long term. It also affects not only the human health but also the visibility which may result in increased traffic accidents or create unpleasant living environments. The growing incidence of pollution is thus creating new challenges for the environmental integrity.

(4) On-Site Urban Air Quality Survey

In the past, several on-site roadside air quality studies were conducted around the CBD of Nairobi City. The ffollowing are the major results of these studies:

Air Quality Survey 1 (Odhiambo et. al, 2010).

Survey Period: February-April 2003

Survey Results

Lead (0.051 - 1.106 μg/m3)

NO2 (0.011-0.976 ppm)

NO (0.001-0.2628 ppm)

PM10 (66.66 - 444.45 μg/m3)

WHO Air Quality Guideline	
PM10: 20 μg/m3	Annual mean
50 μg/m3	24-hour mean

Remarks

Study results showed strong correlation between fine (0.4 μm) particulates, NOx, and motor vehicle density, indicating urban traffic as major source for both fine particulates and NOx air quality. It is noted that specific description of this survey program was not provided; therefore, direct comparison with WHO Guideline values is not possible but comparable for this preliminary evaluation.

Air Quality Survey 2 (Kinney et.al., 2012)

PM2.5 is a concern

Survey Period: July 2009

Survey Results

Measured values ranging between 128.7 and 18.7 μg/m3 were observed at 100 m downwind of major intersections in Nairobi City.

WHO Air Quality Guideline	
PM2.5: 10 μg/m3	Annual mean
25 μg/m3	24-hour mean

Remarks

Vertical dispersion experiment revealed a decrease from 119.5 μg/m3 on the street level to 42.8 μg/m3 on a 3rd-floor rooftop in CBD. It is noted that specific description of this survey program was not provided, so that direct comparison with WHO Guideline values is not possible but comparable for this preliminary evaluation.

It is noted that no long-term continuous air quality survey and/or monitoring work has been conducted across the Nairobi City yet. However, the total number of vehicles circulating inside the city has been increasing continuously, and the entire traffic condition such as the local traffic jams, is getting worse without any significant improvement in the city's infrastructure. So, it is most likely that

current city-wide air quality condition has deteriorated further from the time when those two air quality studies were conducted.

Currently, the Ministry of Land, Housing, and Urban Development (MLH&UD) (former Ministry of Nairobi Metropolitan Development) is preparing for the study report in collaboration with the University of Nairobi (UON).

(5) Vehicle Inspection and Maintenance (I/M) System

1) Current Vehicle I/M Framework

In Kenya, the vehicle inspection and maintenance is administrated by the National Transport and Safety Authority (NTSA), the Ministry of Transport and Infrastructure (MOTI) after October 2013 (Note: it was previously organised by the Motor Vehicle Inspection Unit of Kenya Police). According to the Traffic Act, Chapter 403 Law of Kenya, owners of public service vehicles (PVSs) and/or commercial vehicles have to take their vehicles for inspection every year for renewal of their registrations. However, the legal enforcement of this law does not seem to be appropriate and most PVSs and commercial vehicles circulating across the city are ill-conditioned, and emitting black smokes frequently. It is noted that there is no specific regulation yet for I/M for passenger cars.

2) Vehicle I/M for Imported Used Vehicles

In Nairobi City, certain number of vehicles circulating are imported used vehicles. Those imported used vehicles are inspected before the shipping from designated countries such as Japan, UAE, UK, Singapore, and South Africa under the Kenya Bureau of Standards (KEBS) Regulation (Legal Notice 78 of 15/07/2005). KEBS has signed contracts with several overseas inspection organisations such as Auto Terminal Japan Ltd. (ATJ), Japan Export Vehicle Inspection Center Co. Ltd. (JEVIC), and Quality Inspection Services Inc. Japan (QISJ) for pre-export verifications of the conformity to standards for used vehicles. Basically, those international inspection companies are paying respect to KEBS rules, therefore, most of the imported used vehicles are relatively well-conditioned in the beginning, but tend to be in ill-conditioned after a long run usage with improper vehicle inspection and maintenance [Toyotsu, Personal Communication, 2013] due to the weak legal enforcement of the current Vehicle Inspection Law.

(6) Air Pollution and Human Health

Good health is a basic component of a sound human society and a necessity for earning a livelihood. The main health issues in Nairobi City include access to health facilities, child and maternal mortality, and incidences of certain diseases such as HIV/AIDS, tuberculosis and malaria, and others, and most of these diseases are closely related to the state of the natural and social environment.

Recent data shows that the leading cause of mortality is due to respiratory ailments. In 2000, respiratory diseases and malaria accounted for over 50% of all deaths in the city. The five most important causes of mortality in children under five years old include the acute respiratory infection (ARI), diarrhea, measles, malaria, malnutrition, and anemia (see Table 2.1.15). All these are closely related to the living environment.

Table 2.1.15 Top Ten Major Causes of Mortality in Nairobi City (1998- 2000)

	1998	1999	2000
Respiratory diseases	37.0	27.0	35.5
Malaria	23.1	18.8	14.7
Accident	-	14.2	10.0
Skin disease	14.4	6.6	7.7

	1998	1999	2000
Diarrhea	9.3	8.3	9.5
Urinary tract infection	4.6	Not indicated	6.0
Intestinal worms	4.1	Not indicated	Not indicated
Disease of puerperium and child birth	3.9	7.3	Not indicated
Eye infections	3.2	7.9	6.7
Ear infections	-	9.4	0.8

Source: City of Nairobi Outlook, 2007

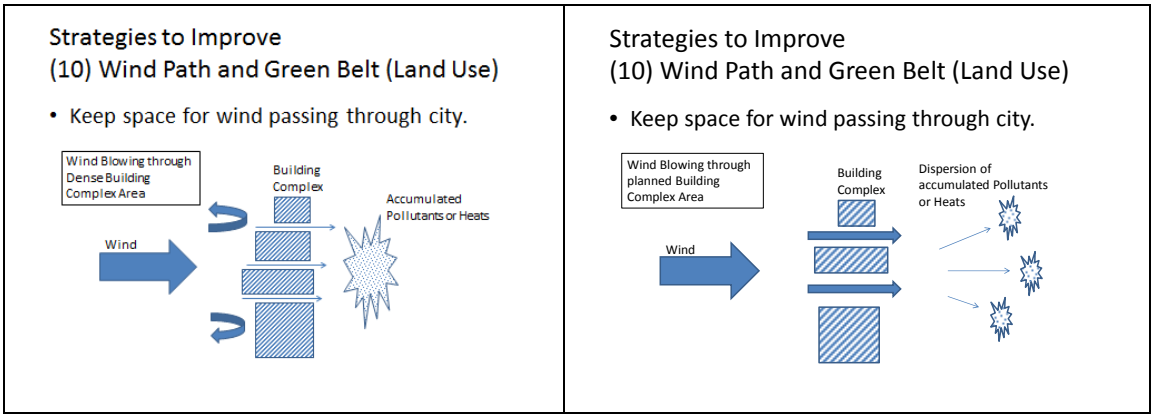
(7) Heat Island and Green Space

Importance of the conservation of several ecosystems such as forest reserves and the national park is already mentioned in several prominent study reports [e.g., UNEP, 2009], so the interaction between the urban infrastructure and the green spaces/or green belt are mainly focused in order to achieve a sound urban environment in this section.

The urban geometry is one of the important factors leading to the modification of local urban climate. Specifically, the urban land use pattern and its building/or housing complex geometry that relates to the urban canopy layer (UCL) influences aspects like increased substrate heat storage due to greater thermal admittance of the surface materials and decreased latent heat fluxes arising from the replacement of the soil and vegetated surfaces such as the green spaces with impervious materials. It also leads to increase in the solar radiation absorption due to lower albedo of urban materials and reduced wind speeds caused by the aerodynamically rougher urban fabric. There is also the release of human activity-related heat from domestic, commercial, industrial, and transport energy sources and increased atmospheric radiation absorption from greenhouse gases.

According to the current report [Makokha and Shisanya, 2010], it is reported that the thermal behavior of the several urban landscapes showed noticeable differences in their cooling and warming rates over the four different climatic periods of Nairobi City. The largest cooling and warming rates were generally found during the hot-dry period while the lowest during the cool-dry period. Except for the cool-dry period, all the remaining three periods had the urban canyon and the urban park and green space sites recorded lower cooling rates than the suburban site. Also, it is reported that the highest cooling rates were recorded at the suburban site while the lowest at the urban site. The reduced cooling rates at the urban site were attributed to the increased heat absorption by urban fabric.

Generally, urban park sites and/or green spaces show relatively moderate cooling and warming rates, due to the moderating effects of these vegetations. Therefore, to reduce excessive nocturnal heat loads and increase nocturnal cooling, the urban landscape shall have adequate open and green spaces, which will enhance air circulation and less radiation absorption during the day. Furthermore, it would be beneficial to establish a wind path through an appropriate location of urban green spaces leading to the establishment of a smooth citywide air circulation that would sweep away the accumulated pollutants inside of CBD, as mentioned in the previous section (Figure 2.1.19).



Source: JICA Study Team (JST)

Figure 2.1.19 Creation of Urban Wind Path through Design of Sustainable Urban Land Use Pattern

(8) Summary

From this review, it can be said that the current environmental and social issues that Nairobi City is facing are regarded as a compound one, therefore, these issues shall be addressed through a comprehensive and integrated approach addressing not only environmental factors but also other relevant aspects such as city-wide land use, transport policy, energy, the social system, governance, and enforcement.

2.2 Review of Urban Conditions

2.2.1 Analysis of Present Land Use

(1) Land hold and land tenure

A land hold (land ownership) and a land tenure are distinguished clearly in Kenya. About 80% of the lands in Nairobi City are owned by the government, but those lands are held by several types of users. About 41% of government lands (33% of total land) are alienated to private and other parties.

Table 2.2.1 Land Use by Land Hold in Nairobi City

Category	Subcategory	Area(sq.km)	%
Government land	1) Forest reserve	21	3.1
	2) Other government reserve	77	11.3
	3) Township	93	13.6
	4) Alienated land	225	32.9
	5) Un-alienated land	16	2.3
	6) National parks	117	17.1
	7) Open water	-	-
	Subtotal	549	80.3
Freehold land	8) Smallholder schemes	-	-
	9) Other	135	19.7
	Subtotal	135	19.7
Grand Total		684	100.0

Source: Statistics Abstract 2005

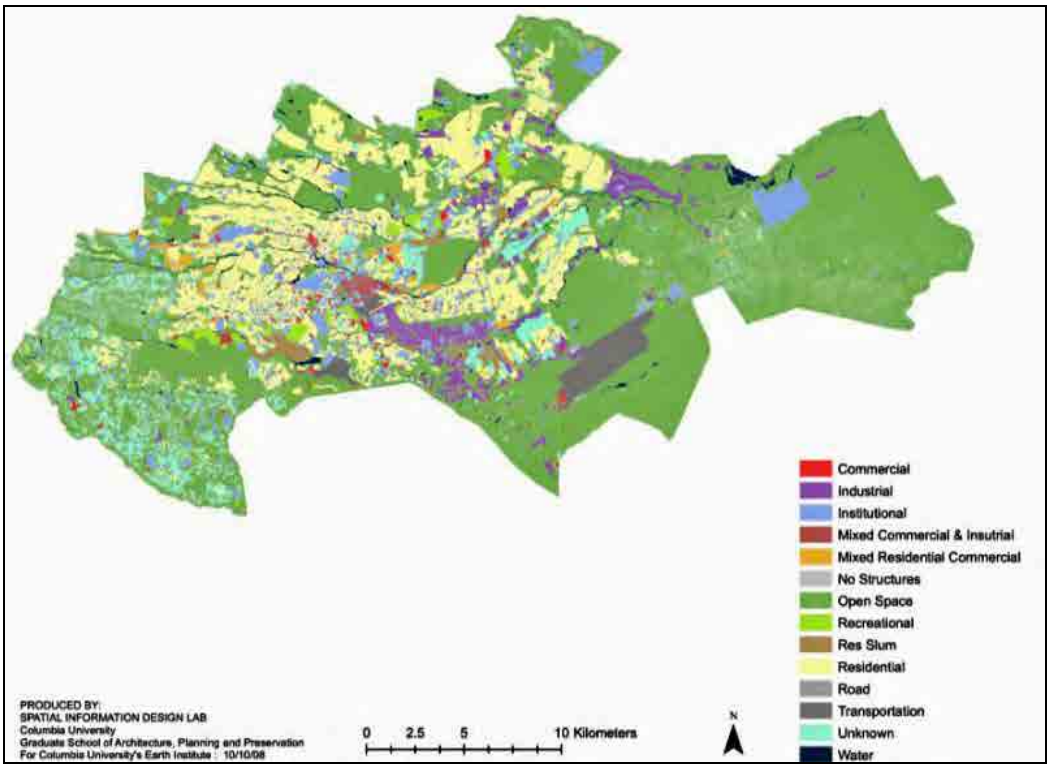
(2) Land use

Land use surveys for the whole area of Nairobi City were conducted by the Centre of Sustainable Urban Development (CSUD) of Colombia University in collaboration with Nairobi University in 2005 and 2010. The land use map was developed from a combination of analysis o satellite images and ground surveys. The composition of land use is summarised as shown below.

Table 2.2.2 Land Use Composition

Land Use	Area (sq. km)	
Residential	105.2	15.1%
Commercial	5.9	0.8%
Industrial	22.2	3.2%
Mixed commercial and industry	3.6	0.5%
Mixed residential and commercial	4.2	0.6%
Institutional	39.8	5.7%
No structures	0.3	0.0%
Open space	332.0	47.8%
Recreational	8.7	1.3%
Res slum	7.8	1.1%
Transportation	15.5	2.2%
Unknown	42.3	6.1%
Water	10.9	1.6%
Total	598.2	86.1%
National Park	96.9	13.9%
Grand Total	695.1	100.0%

Source: JICA Study Team (JST)



Source: JICA Study Team (JST)

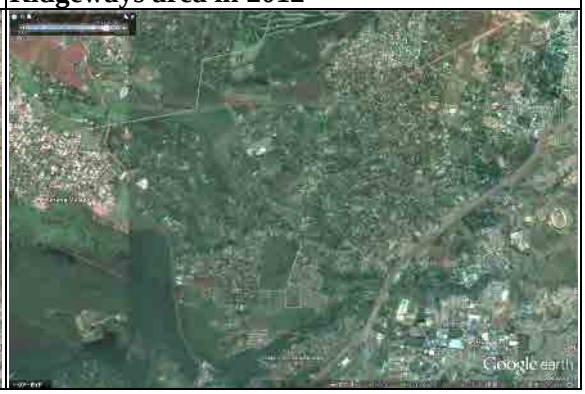
Figure 2.2.1 Land Use Map Done by Columbia University and Nairobi University

The JICA Study Team obtained the satellite images of Nairobi City in 2012, and updated the land use map of Colombia University.

(3) Land use change during the last decade

A lot of changes have taken place between 2003 and 2012. Typical land use change in Nairobi City is summarised as shown below.

1) Soil rich farmland to residential area

Ridgeways area in 2003	**Ridgeways area in 2012**
	

Source: Google Earth

Figure 2.2.2 Satellite Image of Ridgeways Area

The northern and eastern parts of Nairobi City have rich red soil being utilised for tea/coffee plantation or other agricultural activities. These plantations have been recently developed into residential areas.

2) Grassland to residential area

Kasarani, Dandora area in 2003	Kasarani, Dandora area in 2012
	

Source: Google Earth

Figure 2.2.3 Satellite Image of Kasarani, Dandora Area

The eastern part of Nairobi City is mainly lower grassland and is also changed into residential areas.

3) Detached house to apartment or office

Kilimani area in 2003	Kilimani area in 2012
	

Source: Google Earth

Figure 2.2.4 Satellite Image of Kilimani Area

Highlands in the western area of Nairobi City were developed as estates for European settlers before the independence. Recently, low-rise detached houses for single families are converting into high-rise apartments or offices.

4) River bank to informal settlements

Eastleigh South to Uhuru Estate (Nairobi River) in 2003	Eastleigh South to Uhuru Estate (Nairobi River) in 2012
	

Source: Google Earth

Figure 2.2.5 Satellite Image of Eastleigh South to Uhuru Estate

Informal settlements on the river banks are still spreading rapidly. A research paper indicated that half of increased population during the last decade settled in so-called slum areas.

(4) Typical development pattern and population density

These satellite images below show the relationship between typical development patterns at different population densities in Nairobi City. Karen,Muthaiga area showed lowest density in Nairobi City of 5 persons/ha, Lavington and Kilimani areas showed about 20 persons/ha and 30 persons/ha, respectively. Mathare, Huruma area showed the highest density over 1,000 persons/ha.

European average population density is from 50 to 100 person/ha while the United States average is around 10 to 20 persons/ha. The Nairobi Metropolitan Growth Strategy 1973 recommended an average density of 15 persons per acre (equivalent to 37.5 person/ha).

5 person/ha (2 person/acre)
Karen, Muthaiga area

20 person/ha (8 person/acre)
Lavinton area

30 person/ha (12 person/acre)
Kilimani area

70 person/ha (28 person/acre)
Highridge area

100 person/ha (40 person/acre)
Kangemi area

300 person/ha (120 person/acre)
Kawangware area

500 person/ha (200 person/acre)
Eastleigh North

700 person/ha (280 person/acre)
Kibera

1,200 person/ha (480 person/acre)
Mathare, Huruma area

Source: JICA Study Team

Figure 2.2.6 Typical Development Pattern

2.2.2 Urban Services

(1) Educational Services

According to the NCC Department of Education, the total number of enrolled primary schools students in 2011 was 336,723 compared to 408,888 in 2012, underscoring either a sharp increase in primary school attendance or inconsistency in the data.

Among public primary schools in Nairobi City, the Embakasi-Njiru District has the largest number of schools while Langata and Kamukunji districts have the fewest. Districts such as Starehe and Westlands have almost as many number of schools as Embakasi and Njiru, a district with almost 2.5 times more primary school students. In addition, there are almost as many non-formal schools as public schools in Nairobi City, especially in the Embakasi District and in Kasarani, where there are more non-formal schools than public. Embakasi also covers 35% of the total land area of Nairobi City and has the highest rate of growth among all districts.

The data suggests evidence of a general discrepancy between the school capacity in Nairobi East and Nairobi West, and an indication of possible overpopulation in Eastland schools. Future planning of educational facilities should concentrate on increasing the number of schools in Nairobi East, in order to minimise overpopulation and align with population growth trends.

Table 2.2.3 Number of Schools and Students in Primary Schools in Nairobi City, 2012

	District	Students in the Primary School	No. of Schools
1	Dagoretti	46,181	25
2	Embakasi and Njiru	104,566	39
3	Kamukunji	18,825	16
4	Kasarani	87,791	25
5	Lang'ata	38,050	15
6	Makadara	26,489	30
7	Starehe	44,685	36
8	Westlands	42,301	30
	Total	408,888	216

Source: City Education Department, -, Nairobi City County (NCC)

Table 2.2.4 Percentage of Type of Schools by District in Nairobi City, 2012

	District	Public	Private	Non-formal	Total
1	Dagoretti	5.6	2.0	3.8	11.3
2	Embakasi and Njiru	11.1	3.4	11.0	25.6
3	Kamukunji	3.7	0.7	0.2	4.6
4	Kasarani	7.4	2.6	11.5	21.5
5	Lang'ata	3.6	1.5	4.2	9.3
6	Makadara	5.0	0.7	0.8	6.5
7	Starehe	6.3	0.5	4.1	10.9
8	Westlands	5.5	2.8	2.0	10.3
	Total	48.2	14.2	37.6	100.0

Source: City Education Department, Nairobi City County (NCC)

(2) Health Services

Among the sick population of Nairobi City, approximately 47% preferred private health care providers, including private dispensary hospitals and private clinics. Only 8% preferred major public facilities such as public health care centres and district hospitals, though 13% preferred public dispensaries. This infers that private health care facilities may be more appealing for sick, perhaps for reasons of reliability, quality, or accessibility or others.

Kamukunji and Embakasi have the highest number of major health facilities. Similar to schools, there are almost as many health facilities in Embakasi as in Kasarani and Westlands, though the population of Embakasi is more than both combined districts.

Table 2.2.5 Type of Health Care Providers Preferred by Sick Population in Nairobi City

Health Care Provider	Percentage (%)
Private Dispensary Hospital	23.8
Private Clinic	22.8
Pharmacy/Chemist	14.1
Public Dispensary	13
Missionary Hospital /Dispensary	8.4
Referral Hospital	7.9
Public Health Centre	5.1
District Provincial Hospital	3.3
Other	0.8
Kiosk	0.8
Traditional Healer/Herbalist	N/A

Source: Kenya National Bureau of Statistics (KNBS)

Table 2.2.6 Number of Major Health Facilities by District

Type of Facility	Kamukunji	Makadara	Dagoretti	Langata	Starehe	West.	Kasarani	Embakasi
Medical Clinic	25	37	12	46	54	63	63	101
Dispensary	13	17	31	24	22	17	41	11
Health Centre	7	2	17	7	2	10	16	24
VCT Centre	2	3	9	4	11	2	11	7
Other Hospital	2	3	2	6	4	8	10	5
Nat. Referral Hospital	0	0	1	0	0	1	0	0
District Hospital	0	0	1	0	1	0	0	2
Medical Centre	1	0	0	0	0	2	0	0
Total Facilities	50	62	73	87	94	103	141	150

Source: E-Health Kenya Facilities

According to the World Bank, the Kenyan national average of beds/1,000 people from 2003-2007 was 1.4. However, there is no global target for the number of beds per country, since impatient services vary by several factors, including burden of disease and demographics.

Density of beds per population may not be as accurate at assessing adequate health services as health care affordability. Calculations showed that the average number of beds per 1,000 people in Nairobi City is 0.74, a significant decrease from the estimated Kenyan national average of 1.4. However, as the capital city is expected to have more health facilities than its surrounding cities, there may be some inconsistencies in the data. Similar to schools and major health facilities, Embakasi has many beds per 1,000 people as Dagoretti, which has one-third of the population of the Eastlands District.

Table 2.2.7 Beds/1,000 People for All Health Facilities by District

District	Total No. of Beds	Total Population	Beds/1,000 people
Westlands	1,093	247,102	0.23
Starehe	848	274,607	0.32
Makadara	332	218,641	0.66
Langata	748	355,188	0.47
Kasarani	350	525,624	1.50
Kamukunji	1,061	261,855	0.25
Embakasi	737	925,775	1.26
Dagoretti	1,845	329,577	1.26
Average No. of Beds/1,000 People			0.74

Source: E-Health Kenya Facilities

(3) Community Facilities

Community facilities can be conduits for social activity such as recreational parks, channels for social services such as fire stations or children's homes, and can also have positive economic benefits for an area, including stadiums and markets. There are 45 markets in Nairobi City owned by NCC and 26 community halls.

1) Temporary Community Facilities

It is also important to recognise temporary community facilities, predominantly those that utilise open air parking lots for recreational areas and markets. In the Central Business District, these include skating facilities in Aga Khan Walk and Masaai Market located in the parking lot of Kenya's Supreme Court Building. Their uses are approved by the NCC, however, due to their temporary nature, they may be overlooked among other recreational facilities or more permanent markets. These cultural and recreational areas can serve to provide mixed and changeable uses which stimulate the local economy and social activity within the city.

Table 2.2.8 Stadiums and Sport Facilities

Name of Facility	Location	Division	Seating Capacity
City Stadium	Jogoo Road	Kaloeleni	15, 000
Moi Stadium	Thika Highway	Kasarani	60, 000
Nyayo Stadium	Uhuru Highway	Nairobi West	35, 000
Joseph Kangethe Mini Stadium	Woodley	Kibera	~10, 000
Kamukunji	Kamukunji	Kamukunji	~10, 000
Jericho Lumumba	Jericho	Makadara	~10,000
Desert	California		~1,000

Source: Nairobi City County (NCC)

2) Stadiums and Playgrounds

There are seven stadiums in Nairobi City, which capacity ranges from less than 1,000 spectators at Desert Stadium to 60,000 spectators at Moi Stadium. There are only 18 registered public playgrounds throughout the city, which indicates a severe undersupply of recreational and open spaces for more than 400,000 primary school age children in the city.

Table 2.2.9 Public Playgrounds

	Name of Playground	Location
1.	Hamza	Makadara Jogoo Road
2.	Uhuru	Makadara
3.	Shauri Moyo	Kamukunji
4.	Bahati	Kamukunji
5.	Kaloleni	Nxt to Kaloleni Social Hall
6.	Buruburu Flats (BBF)	Buruburu opp. Police Station
7.	Umeme	Ziwani
8.	Huruma	Huruma
9.	Ngong Road	City Inspectorate Grounds
10.	Canon Apollo	Mbotela
11.	Kariobangi	Next to Kariobangi Social Hall
12.	Kawangware	Dagoretti behind BP
13.	Kinyago	Biafra Slums, Kamukunji
14.	Soweto	Kahawa West, Kasarani
15.	Bomas	Next to Bomas of Kenya
16.	Kibera DO	Next to DO Office, Kibera
17.	Soweto	High Ridge College Ground
18.	Lungalunga	Star of Hope Primary School, Lungalunga Slums

Source: Nairobi City County (NCC)

Table 2.2.10 Community Centres by District and Capacity

	Name of Community Hall	District	Capacity
1	Mbotela Community Centre	Makadara	200
2	Jericho Community Centre	Makadara	1,200
3	Lumumba Community Centre	Makadara	100
4	Bahati Community Centre	Kamukunji	200
5	Shauri Moyo Community Centre	Kamukunji	100
6	Mathare North	Kasarani	700
7	Kariokor Community Centre	Starehe	1,200

	Name of Community Hall	District	Capacity
8	Pumwani Community Centre and Hall	Kamukunji	1,600
9	Muthurwa Community Centre	Kamukunji	1,100
10	Kaloleni Community Centre	Makadara	1,600
11	Kariobangi Community Centre	Kasarani	150
12	Dandora Sports Complex	Embakasi	30
13	Dandora I	Embakasi	100
14	Dandora II Community Centre	Embakasi	100
15	Kayole I Community Centre	Embakasi	700
16	Kayole II Community Centre	Embakasi	700
17	Embakasi Community Centre	Embakasi	130
18	Soweto Community Centre	Embakasi	250
19	Ruai Community Centre	Embakasi	120
20	Kariobangi South Community Centre	Kasarani	(under construction)
21	Karen Community Centre	Langata	110
22	Ngong Road Community Centre	Dagoretti	70
23	Waithaka Community Centre	Dagoretti	130
24	Kangemi Community Centre	Westlands	90
25	Joseph Kangethe Community Centre	Dagoretti	90
26	Ziwani Sports Centre	Starehe	600

Source: Nairobi City County (NCC)

3) Markets

The population of market traders are mostly low income earners, who venture into micro-enterprises activities. This economic sector plays an important role in the city economy in terms of employment generation and delivery of urban services, accounting for about 60% of working population and 20% of GDP. The markets also serve as alternative trading spaces for hawkers, offering a wide variety of choices of goods effectively by lowering the prices of common goods, and are often more conveniently located to traders and buyers than formal stores.

However, a number of the NCC markets were constructed during the colonial era and the market conditions have deteriorated over time. Further, the number of traders and buyers has increased considerably, putting pressure on the infrastructure and capacity of existing facilities. These facilities require upgrading and expansion to remain viable.

Table 2.2.11 Types and Capacity of City Council Markets by Ward

Type of Market	Name	No. of Stalls	Owner	Location/Ward
A. Wholesale Markets	Wakulima Market	8	CCN	Kamukunji
B. Hawkers Markets	Muthurwa Hawkers Market	10,000 (traders)	NCC	Kamukunji
C. Rental Markets	Landhies Road	72	NCC	Kamukunji
	Shauri Moyo	308	NCC	Shauri Moyo
	Jogoo Road	450	NCC	Maringo
	Umoja I	320	NCC	Umoja
	Westlands	109	NCC	High Ridge
	Westland Curio	300	NCC	High Ridge
	Quarry Road	274	NCC	Pumwani/Bondeni
	Ngara	319	NCC	Ngara
	Karen	83	NCC	Karen
	Githurai	298	NCC	Githurai
	New Pumwani	44	NCC	Eastleigh South
	Dandora A-F	392	NCC	Dandora
	Kariokor	206	NCC	Ziwani
	City Market	143	NCC	Central
D. Development Tenant Purchase Markets	Kenyatta	608	NCC	Kenyatta Golf Course
	Kayole	159	NCC	Kayole
	Kahawa West	335	NCC	Kahawa
	Mathare North	53	NCC	Mathare A
	Umoja II (A & B)	72	NCC	Umoja

Type of Market	Name	No. of Stalls	Owner	Location/Ward
E. Self-constructed Markets	Kibera	678	NCC	Kibera
	Jericho	476	NCC	Hamza Lumumba
	Kariobangi North	696	NCC	Kariobangi North
	Kariobangi South	156	NCC	Kariobangi South
F. Open Air Markets	New Ngara	Open air	NCC	Ngara
	Kiamaiko (Goats)	Open air	NCC	Mathare
	Maasai	Open air	NCC	Central
	Sunken (High Court)	Open air	NCC	Central
	Yaya	Open air	NCC	Kibera
	City Stadium	Open air	NCC	Kaloleni
	Maziwa	Open air	NCC	Shaurimoyo
	Jericho	Open air	NCC	Uhuru
	Kahawa	Open air	NCC	Kahawa
	Mutindwa	Open air	NCC	Harambee
	City Park	Open air	NCC	Parklands
	Toi	Open air	NCC	Kibera
	Kangemi	Open air	NCC	Kangemi
	Kawangware	Open air	NCC	Kawangware
	Korogocho	Open air	NCC	Korogocho
	Gikomba	Open air	NCC	Pumwani
	Kayole Soweto	Open air	NCC	Kayole
	Westgate	Open air	NCC	Westlands
	Woodley	Open air	NCC	Woodley
	Dandora Terminus	Open air	NCC	Dandora

Source: Nairobi City County (NCC)

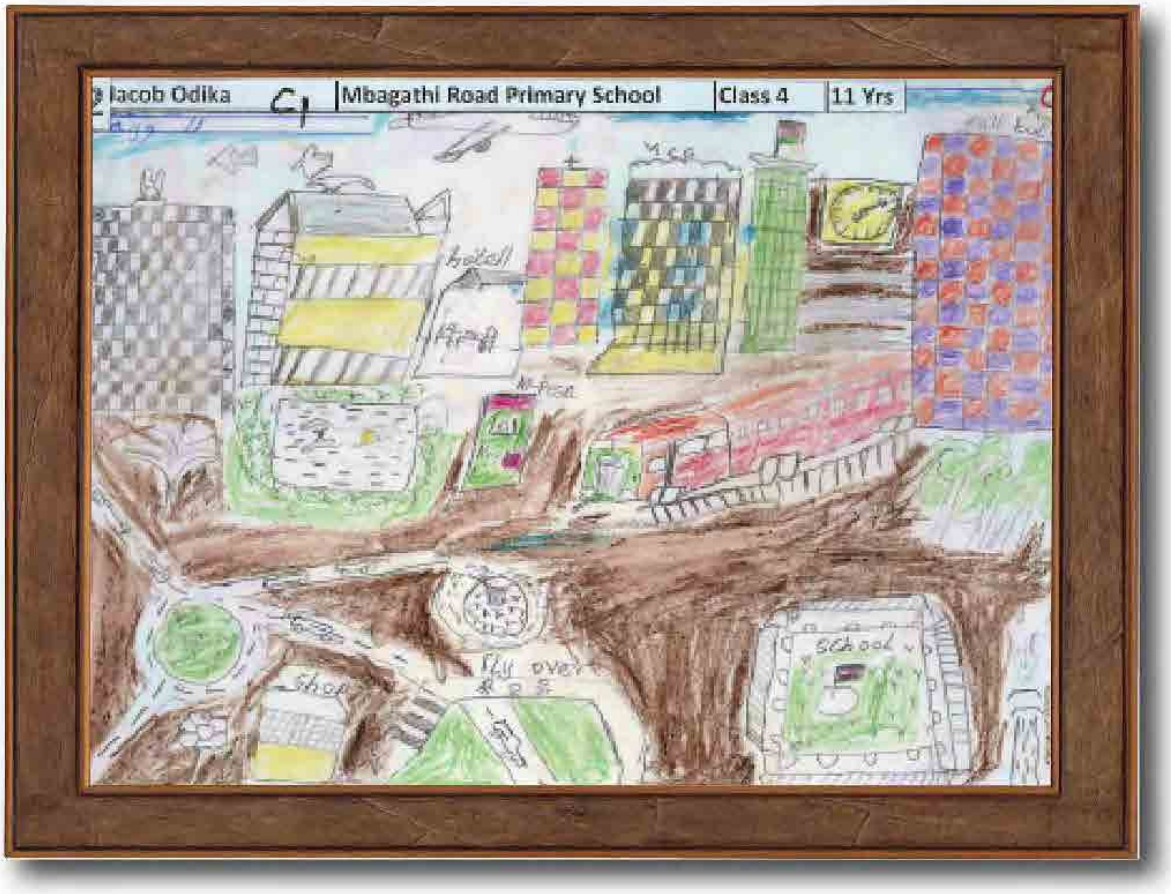
(4) Planning Implications

A main feature of the 1927 Master Plan for Nairobi City is the segregation of racial classes into various zones throughout the city. Particularly, Nairobi East was restricted to African residents, while the Western regions, for European settlers. The current data on the distribution of social services and facilities throughout Nairobi City's nine districts suggests that inequalities in the facilities between Nairobi East and Western regions may be reflective of the disproportionality of resources caused during the earlier period.

Although the Embakasi District constitutes 35% of the county's total land area and has the highest growing population of all the districts, it has many schools, major health facilities, and hospital beds as a district with one half to one third of its population, including Starehe, Westlands, Dagoretti, and Kasarani, respectively. The Embakasi District is also home to Nairobi City's largest informal settlement areas, including Mathare and Mukuru slums. The rising population growth trends in the informal settlements and in the Eastlands area exacerbates the inadequacy of sufficient social services.

It is also important to consider the role of community facilities as a generator of employment and activity and in creating nodes and destinations within the city. Markets, which play a large role in supplying low cost goods to a multitude of residents and employment for a majority of workers, require upgrading and infrastructure improvements while recreational facilities such as playgrounds, stadiums and others must be strategically planned within the urban fabric.

In considering the benefits of socioeconomic and cultural assets to urban development, the Nairobi Integrated Urban Development Master Plan (NIUPLAN) will strategically distribute necessary social services according to the current and anticipated population growth areas, specifically in Nairobi East and plan for social, recreational, and commercial facilities which promote activity, employment, and destinations within the city.



Jacob Odika, Mbagathi Road Primary School l (Rank 2 of Class 4

CHAPTER3 INSTITUTION AND REGULATORY CONDITIONS

3.1 Review of Related Laws and Regulations

3.1.1 Urban Planning

(1) 2010 Constitution of Kenya

The 2010 Constitution of Kenya is the current constitution of the Republic of Kenya, which is now in force, replacing the 1969 Constitution, that itself was amendments of the 1963 Independence Constitution. The constitution was presented to the Attorney General of Kenya in April 2010, officially published in May 2010, and was subjected to a referendum in August 2010. The constitution provides that there shall be a county government for each county, consisting of a county assembly and a county executive.

With regard to land, the constitution provides that land in Kenya shall be held, used, and managed in a manner that is equitable, efficient, productive, and sustainable, and in accordance with the following principles:

(i) Equitable access to land;

(ii) Security of land rights;

(iii) Sustainable and productive management of land resources;

(iv) Transparent and cost effective administration of land;

(v) Sound conservation and protection of ecologically sensitive areas;

(vi) Elimination of gender discrimination in law, customs, and practices related to land and property in land; and

(vii) Encouragement of communities to settle land disputes through recognised local community initiatives consistent with this constitution.

(2) Outline of the laws and regulations for urban planning

After the issuance of the 2010 Constitution of Kenya, laws and regulations have been revised to adjust to the new constitution. Laws related to urban development can be classified into: (i) laws concerning government management, (ii) laws concerning urban and physical development, and (iii) laws concerning environment.

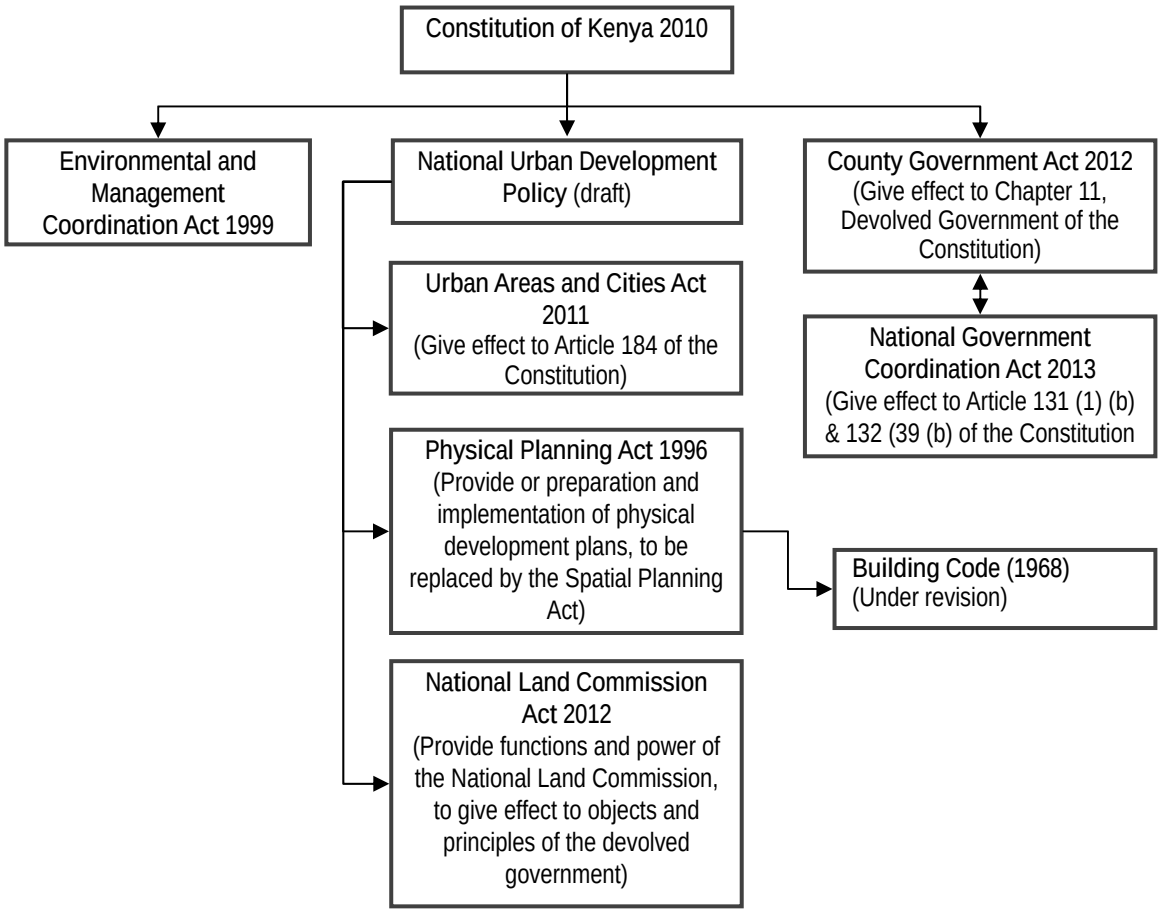
The County Government Act 2012 and National Government Coordination Act 2013 define the role and function of the county government and coordinating function of the national government, respectively.

The National Urban Development Policy (draft), which is considered as an "umbrella policy", aims at strengthening development planning, urban governance, and management, and promotion of urban investment and delivery of social and physical infrastructure in urban areas throughout the country. The Urban Areas and Cities Act 2011 states the definition and management of urban areas and cities. The Physical Planning Act 1996 defines the urban development management. The National Land Commission Act 2012 describes the functions of the National Land Commission and the objects and principles of devolved government in land management and administration. While the Building Code, which specifies the condition of building construction, supplements the development control mentioned in the Physical Planning Act in technical aspects.

The Environment Management Coordination Act (EMCA) provides for the establishment of an appropriate legal and institutional framework for the management of the environment (This act is also described in Section 2.2.2 Environment).

The Integrated Urban Development Master Plan for Nairobi City (NIUPLAN) will be prepared chiefly under the framework of the County Government Act with specification of the Urban Areas and Cities Act, because the entire area of Nairobi City County (NCC) is an urban area.

The following figure shows the relationship of laws.



Source: JICA Study Team (JST)

Figure 3.1.1 Structure of Concerned Laws and Plans

The following table shows the laws and regulations related to urban development management and their characteristics.

Table 3.1.1 Management of Urban Development

Policy, Act	Coverage	Relation with Urban Planning
County Government Act 2012	County	● Part XI County Planning: ● Governance
National Government Coordination Act 2013	National government and county government responsibilities	● To establish an administrative and institutional framework for the coordination of national government functions at the national and county level of governance. ● Chapter IV: Collaboration and dispute resolution between the national and county governments on issues of apparent concurrent mandate
National Urban Development Policy	Urban area management	● Chapter 5: County urban planning ● Governance
Urban Areas and Cities Act 2011	Urban areas and cities management	Planning ● Part V Integrated development planning Controlling ● Integrated development plan will be a basis for development control (36, (1), (g)
Physical Planning Act1996	Physical development for the selected area and selected purpose for the concerned administrative unit	Planning ● Part IV Physical development plans Controlling ● Part V Control of development: physical development: building construction control, development control (change of users, extension of user, subdivision)
National Land Commission Act 2012	Land management mechanism	● Land management by the National Land Commission and devolved government in land management and administration
Building Code 1968	Building construction control	● Supplement the control of development stated in the Physical Planning Act 1996
Environmental Management and Coordination Act 1999	Environmental management	● Describes the legal and institutional framework of environmental management.

Source: JICA Study Team (JST)

1) County Government Act 2012 (former Local Government Act Cap 265)

The County Government Act 2012, which essentially defines the roles and management of "a county government", was newly stipulated to replace the former Local Government Act Cap 265. The act aims at giving effect to Chapter 11 (Devolution) of the 2010 Constitution of Kenya (COK), and more specifically to provide for the county government powers, functions, and responsibilities in the delivery of services and for connected purposes. After the county government is in place, the administration of Kenya has two pillars, namely, "National Government" and "County Government" at the local level.

The County Government Act 2012 is composed of fifteen parts, and states the management of county government from assembly, executive, public service, citizen participation, to county planning. amongst them, Parts VIII and IX provide the fundamental principles regarding the citizen participations and public communication and access to information, respectively. Also, Part X mentions the importance of civic education. Contents of the act are summarised below.

Contents	
Part I	Preliminary
Part II	County governments
Part III	County assembly
Part IV	Electoral wards
Part V	County executive
Part IV	Decentralised units
Part VII	County public service
Part VIII	Citizen participation
Part IX	Public communication and access to information
Part X	Civic education
Part XI	County planning

Contents	
Part XII	Delivery of county public services
Part XIII	Procedure for suspension of county government
Part XIV	Miscellaneous
Part XV	Transitional provision

Some key elements of the County Government Act 2012 in regard to urban management are summarised below.

104.(1) A county government shall plan for the county and no public funds shall be appropriated outside a planning framework developed by the county executive committee and approved by the county assembly.

This means that the county government must have a master plan to receive funds from the national government for project implementation.

107.(1) To guide, harmonise, and facilitate development within each county, there shall be the following plans:
(a) County integrated development plan;
(b) County sectoral plans;
(c) County spatial plan; and
(d) Cities and urban areas plans as provided for under the Urban Areas and Cities Act.

The NIUPLAN is considered as "cities and urban areas plans".

2) National Government Coordination Act 2013

This act establishes an administrative and institutional framework of governance for the coordination of government functions at the national and county levels.

The objectives of this act are as follows:

(i) Facilitate the exercise of executive authority pursuant to Articles 131 (1) (b) (Authority of the President) and 132 (3) (b) and (c) (direct and coordinate the function of ministries and government departments, decision published in the Gazette) of the Constitution;

(ii) Provide for the effective coordination and administration of the national government functions prescribed in the constitution, this act or any other written law; and

(iii) Provide for the establishment of an administrative and institutional framework at the national, county, and decentralised units to ensure access to national government services in all parts of the Republic.

Contents of the act are summarised below.

Contents	
Part I	Preliminary
Part II	National government coordination framework
Part III	Appointment, roles, and responsibilities of the national government administrative officers
Part IV	Collaboration and dispute resolution between the national and county governments on issues of apparent concurrent mandates
Part V	General provision

3) Urban Areas and Cities Act 2011

The Urban Areas and Cities Act 2011 is effective for urban areas and cities. The objective and purpose of the act is to establish a legislative framework for the following:

(i) Classification of areas as urban areas or cities;

(ii) Governance and management of urban areas and cities;

(iii) Participation by the residents in the governance of the urban areas and cities; and

(iv) Other matters for the attainment of the objectives.

Contents	
Part I	Preliminary
Part II	Classification and establishment of urban areas and cities
Part III	Governance and management of urban areas and cities
Part IV	Delivery of services
Part V	Integrated development planning
Part IV	Financial provisions
Part V	Integrated development planning
Part VI	Financial provisions
Part VII	Miscellaneous provisions
Part VIII	Transitional provisions

Since NCC is categorisedas an urban area, formulation of NIUPLAN has to follow this act, which specifies that the integrated development planning shall be the basis for:

(i) The preparation of environmental management plans;

(ii) The preparation of valuation rolls for property taxation;

(iii) Provision of physical and social infrastructure and transportation;

(iv) Preparation of annual strategic plans for a city or municipality;

(v) Disaster preparedness and response;

(vi) Overall delivery of service including provision of water, electricity, health, telecommunications, and solid waste management; and

(vii) Preparation of a geographic information system for a city and municipality.

4) Physical Planning Act Cap 286, 1996 (Revised in 2010)

The Physical Planning Act Cap 286, 1996 (revised in 2010) provides for preparation and implementation of physical development plans and for connected purposes. In regard to urban development management this act is a base for physical planning and development control (building construction permit and land development permit).

Since Physical Planning Act was in effect before the new constitution was in effect, a new law, namely, “Spatial Planning Act” is under preparation. Physical Planning Act is expected to be repealed after the Spatial Planning Act comes to effect.

Contents of the act are summarised below.

Contents	
Part I	Preliminary
Part II	Administration
Part III	Establishment and Composition of Physical Planning and Liaison Committee
Part IV	Physical Development Plans
Part V	Control of Development
Part VI	Miscellaneous

Some key elements of the Physical Planning Act 1996 in regard to urban management are summarised below.

Two types of plans are specified in the act as shown below. The regional physical development plan is prepared for the administrative unit within local authority. While the local physical development plan is prepared for a functional purpose such a plan includes zoning policy for 20 zones in Nairobi City or redevelopment of the railway city.

Regional Physical Development Plan: A regional physical development plan may be prepared by the director with reference to any government land, trust land, or private land within the area of authority of a county council for the purpose of improving the land and providing for the proper physical development of such land, and securing suitable provision for transportation, public purposes, utilities and services, commercial, industrial, residential, and recreational areas, including parks, open spaces, and reserves and also the making of suitable provision for the use of land for building or other purposes.

Local Physical Development Plan: Land, trust land, or private land within the area of authority of a city, municipal, town, or urban council or with reference to any trading or marketing centre, are included in a local physical development plan. A local physical development plan may be a long-term or short-term physical development or for a renewal or redevelopment.

The "Part V Control of Development" shows the powers of local authorities in development permission including application and approval of development. In addition, forms for development application and for approval (P.P.A.1, P.P.A.2) are attached.

Permission will be required for the following four cases of land development:

(i) Change of use: change in the use of land.

(ii) Extension of use: adding other use to the land (20% of the total land).

(iii) Amalgamation: combination of the plot or use of land.

(iv) Subdivision: separating the use of the land.

Building construction control is also based on the Physical Planning Act but execution of building construction permit is done mainly based on the Building Code.

5) National Land Commission Act, 2012

This act makes provision as to the functions and power of the National Land Commission, qualification and procedures for appointments to the Commission, and gives effect to the objects and principles of devolved government in land management and administration,.

The object and purpose of this act is to provide:

(i) For the management and administration of land in accordance with the principles of land policy set out in Article 60 of the Constitution and the national land policy;

(ii) For the operations, powers, responsibilities and additional functions of the Commission pursuant to Article 67 (3) of the Constitution;

(iii) A legal framework for the identification and appointment of the chairperson, members, and secretary of the Commission pursuant to Article 250 (2) and (12) (a) of the Constitution; and

(iv) For a linkage between the Commission, county governments, and other institutions dealing with land and land related resources.

The contents of the act are summarised below.

Contents	
Part I	Preliminary
Part II	Functions and powers
Part III	Composition and administration
Part IV	Financial provisions
Part V	Transitional provision
Part IV	Miscellaneous provision

6) Environment Management and Coordination Act 1999

This act describes the legal and institutional framework of environment management. General principles of the act are that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment. The entitlement to a clean and healthy environment includes access by any person in Kenya to various public elements or segments of the environment for recreational, educational, health, spiritual, and cultural purposes.

The contents of the act are summarised below.

Contents	
Part I	Preliminary
Part II	General principles
Part III	Administration
Part IV	Environmental planning
Part V	Protection and conservation of environment
Part IV	Environmental Impact Assessment
Part VII	Environmental audit and monitoring
Part VIII	Environmental quality standards
Part IX	Environmental restoration orders, environmental conservation, and environmental easements
Part X	Inspection, analysis and records
Part XI	International treaties, conventions, and agreements
Part XII	National environment tribunal
Part XIII	Environmental offices

(3) Policies, Rules, and Regulations

1) National Land Use Policy (Concept Paper)

In March 2011, the Ministry of Lands issued a concept paper for the National Land Use Policy. This concept paper is said to prove a roadmap for a National Land Use Policy in Kenya, as the importance of the land use in the social and economic activities makes it imperative that such a policy is formulated to effectively provide guidelines for managing land as a valuable resource.

To address the issues of optimal utilisation of land-relate resources, the concept paper says that the policy should be guided by objects that includes, amongst others;

(i) Provide guidelines for land-use planning, resource allocation, and resource management;

(ii) Provide principles to promote optimal utilisation of land resources to meet governance, social-economic, political, and cultural obligations of the people of Kenya;

(iii) Develop and strengthen coordinated institutional linkage; and

(iv) Provide framework for the preparation of a national spatial plan and review of various land use plans.

The concept paper states that a national land use policy will be delivered by mid-2011. The status of the policy needs to be confirmed.

2) National Urban Development Policy (Concept Paper)

In December 2008, the Office of the Deputy Prime Minister and the Ministry of Local Government jointly issued a concept paper for a National Urban Development Policy. The Department of Urban Development is in charge of the preparation of the paper. The concept paper that marks a starting point for this process laid out for developing a robust roadmap to guide and encourage meaningful participation and ownership of the whole process and the outcome from therein by all key stakeholders in the sector.

The paper says that a clear, comprehensive, well-articulated, and coherent urban development policy will be developed within the stipulated time frame and based on a predictable and structured engagement framework for all the various stakeholders. The process will be guided by amongst others, the following:

(i) Stakeholder-centeredness and driven and sensitive to gender, youth, and people with disabilities and equality of stakeholders;

(ii) Meaningful consultation, participation, and networking;

(iii) Long-term perspective, comprehensiveness, and sustainability;

(iv) Public-private partnerships; and

(v) Focus on value addition: Process will pay special attention on value for the common good or intended beneficiaries.

The concept paper states that they have set in motion a process that will yield a National Urban Development Policy by June 2009.

3) National Urban Development Policy (Draft)

The National Urban Development Policy, which is under discussion at the Parliament, is the basic policy of urban development in Kenya, which provides a framework under which cities, towns, and metropolitan regions will play a critical role in national socio-economic development.

The policy aims at strengthening development planning, urban governance and management, promote urban investment, and delivery of social and physical infrastructure in urban area under a devolved system of governance.

The key themes addressed by this policy are: urban economy, urban finance, urban governance and management, national and county urban planning, land, environment and climate change, social infrastructure and services, physical infrastructure and services, urban housing, urban safety and disaster risk management, marginalised and vulnerable groups, cross cutting issues, and implementation framework.

The contents of the policy are summarised as shown below.

Vision

Kenya's vision is to have **secure, well governed, competitive, and sustainable cities and urban areas** that contribute to the achievement of the broader national development goals articulated in the Constitution and *Vision 2030*.

Mission

NUDP's mission is to facilitate sustainable urbanisation through good governance and delivery of accessible and efficient infrastructure and services.

Principles

NUDP's guiding principles are:

a. Participatory urban planning, development, and governance;
b. Equity in access to resources and opportunities;
c. Efficiency in resource use and service provision;
d. Social, economic, and environmental sustainability;
e. Inclusivity: cities and urban areas that cater for all segments of urban residents including maginalised and vulnerable groups;
f. Good governance;
g. Connectivity: Urban areas that have synergy between national and county urban areas and their hinterlands and global urban systems; and
h. Livability: Cities and urban areas that have adequate quality services and infrastructure, and are secure, clean and green.

Overall Objective

The overall objective of the policy is to provide a framework for sustainable urban development in Kenya.

Specific Objectives

The specific objectives are to:

a. Mainstream good governance, gender, environment, and HIV/AIDS in all aspects of urban development;
b. Foster timely and adequate delivery/management of land for urban development;
c. Promote integrated environmental planning and management;
d. Promote technological innovation leading to more effective mitigation and adaptation to climate change;
e. Facilitate accessibility to the full range of social services that improve the health, education, skills development, and recreational needs of citizens in urban areas;
f. Foster safe, secure, and liveable urban areas; and
g. Ensure adequate housing for all urban income groups.

(4) Building Code, 1968

In addition to the Physical Planning Act, "Building Code 1968" is used for development permission of building construction. The contents are shown below.

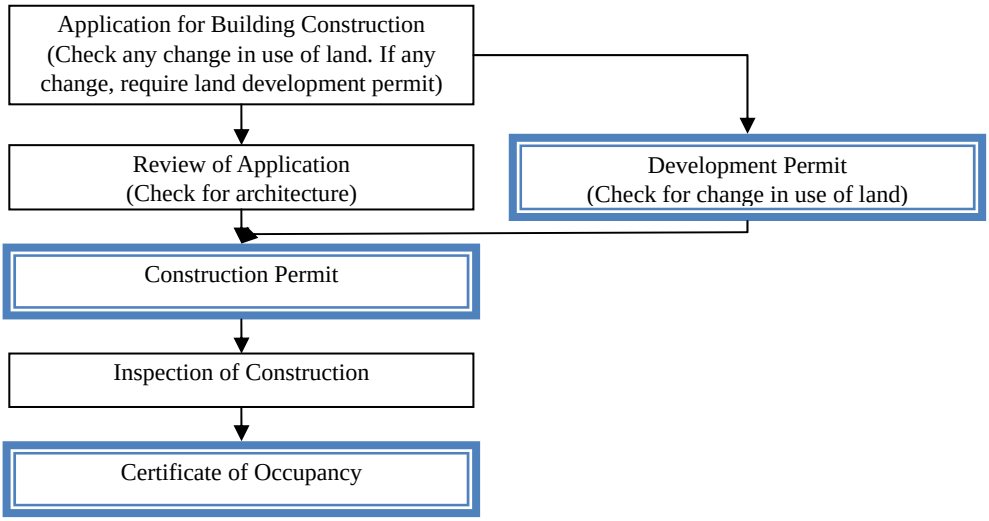
Contents	
Part I	Introductory
Part II	Site and space about buildings
Part III	Building materials
Part IV	Advertisement
Part V	General

Since the existing building code is outdated, a new building code is under preparation. A new building code, namely, "Planning and Building Regulations", is under preparation and to be approved by the Ministry of Lands, Housing and Urban Development and plan to be finalised by the end of 2013. The main change in the building code is to include the aspects of "outdoor advertisement", "painting", and "urban design".

(5) Development Permit

Regarding development control, there are mainly three types of permits: construction permit, certificate of occupancy, and development permit, all of which are executed under the Physical Planning Act. Development permit is required for the land development which requires change in use of land, which is the responsibility of the Policy Implementation Section of NCC. Construction permit

is for building construction for which the Development Control Section of NCC is responsible. Certificate of occupancy is issued when the building construction is completed and is ready for use, which is under the responsibility of the Enforcement Section of NCC. These permits are conducted separately but there is a plan to combine them under NIUPLAN.



Source: JICA Study Team (JST)

Figure 3.1.2 Land Control Scheme

1) Development Permit

The Policy Implementation Section (PIS) is responsible for land development permit. Permission is required for four cases of land development.

- Change of use: change in the use of land
- Extension of use: adding other use to the land (20% of the total land)
- Amalgamation: combination of the plot or use of land
- Subdivision: separating the use of the land

A development application is reviewed from the point of view of zoning plan, types of facility, and minimum plot size required in the zoning policy although it is outdated. The process is the same for the construction permit process, all applications have to go through the Technical Committee to receive an approval.

There are several constraints to obtain a development permit:

- An application is checked with archive data of each land plot record and changes are made manually. The data are still in hard copy, which has a risk of losing documents and takes longer time to process because the data is stored in the other section and will have to find it from a pile of documents.
- Zoning policy is outdated so there is often mismatch of demand and regulation. Because of high demand for land development, the zoning policy has to be reviewed to accommodate the growing demand.
- In order to improve the process, E-permit is expected to be installed as Phase 3 of International Finance Corporation (IFC) support. Utilising the E-permit and GIS database to clarify the zoning policy makes the process more efficient.
- Organisation capacity in terms of the number and skills of the staff are weak. Permit process requires checking application documents and field surveys to examine the conditions at the sites. The number of field surveyors, in particular, is not enough to follow up the process, which can also be applied to construction permit. Monitoring of construction has not been executed due mainly to lack of field surveyors.

2) Construction Permit

The Development Control Section of the City Planning Department is executing construction permits. Even though the building construction permit is required for all building constructions, most buildings are constructed without permits. It is said that 70% (or more) of constructions are without permits in the eastern part of the city where houses for low income households are dominant. The rate is lower (40%~50%) in the Upper Hills area where houses for high income household exist.

The causes of illegal construction can be summarised as follows:

- Slow permit process: Between 2004 and 2006, since permit process was slow (2 to 3 months), the number of applications was also low. After the process was improved, the number of applications has increased.
- Residents and some architects do not know the rule or requirement: Residents and some architects are not even aware that a permit is required for construction.
- Incentive to cut the cost of construction: In order to receive a permit, buildings have to meet the building codes in terms of materials and safety, which imposes additional cost to the developer. In order to reduce the cost of construction, developers have an incentive not to apply for a permit.
- Outdated land use policy: Since urban master plan has not been updated, land use and zoning policy is also outdated and not matching the development needs. Many areas where urbanisation and commercialisation are progressing are still designated as low-rise residential areas. This encourages the developer to avoid obtaining a permit. As a result, many residential areas are converted to commercial use without permits.

In order to reduce the number of illegal construction, Nairobi City has been trying to improve the permit system including change in the evaluation process by establishing the Technical Committees and re-organising the office for efficient process since 2006. A Technical Committee, composed of the departments in Nairobi City and professionals (Architect Association of Kenya, Kenya Institute of Planning, Nairobi City Water Supply Company, etc.), is now holding a meeting every two weeks to discuss and approve the applications. The office was also renovated to improve the working environment. These efforts enable the process duration to be less than 30 days. Before, on average it took 2~3 months, sometimes even more than six months.

Nairobi City is receiving the support from the IFC of the World Bank Group to install an E-Permit system, which is composed of three phases:

- Phase 1: E-permit. Electric building permit system (Development Control Section)
- Phase 2: Inspection (Monitoring and certificate of occupancy) (Enforcement Section)
- Phase 3: Development permit (Policy Implementation Section)

Implementation of the system for Phase 1 has started in 2012. Along with continuous system improvement, introduction of the E-permit system has increased the number of applications drastically. Before the improvement, the number of applications was 400 to 600 per year. After the improvement, the number of applications has jumped to more than 3,000 a year.

3) Certificate of Occupancy

The “Certificate of Occupancy (Certificate of Compliance)” is required after the completion of construction, issuance of which is under the responsibility of the Enforcement Section. The main task of the Enforcement Section is the monitoring and inspection of construction by

checking the construction following the instructions in the construction permit. The developer is also responsible to report the progress of construction to the city but this hardly happens for the same reasons as for the construction permit. The monitoring and inspection part of the process is considered weak and needs improvement.

Nairobi City has a right to demolish illegal buildings but demolition hardly happens because of a financial and security reason. For some cases, developers may organise demonstration to protest the demolition.

IFC is planning to install the E-permit system for monitoring and inspection (Phase 2 of the assistance).

3.1.2 Environment

The Environment Management and Co-ordination Act (EMCA) of 1999, and the Environment Impact Assessment (EIA) and Audit Regulations that followed in 2003, are the core environmental frameworks in Kenya. Based on these laws and regulations, relevant rules such as a series of environmental criteria were developed. Besides, the County Government Act of 2012 plays an important role for public participation and information disclosure regarding any activities of county planning processes. Outlines of major environmental laws and regulations are described as follows:

(1) Environment Management and Coordination Act (EMCA), No. 8 of 1999

This act consists of 13 parts. The importance of a nationwide environmental planning is described in Part IV and the methods of protection and conservation of the environment are specified in Part V. The enactment of EMCA in 1999 was a milestone in promoting the sustainable environmental management in Kenya. This act provides for the harmonisation of about 77 sectoral statutes. EMCA provides an institutional framework and procedures for the environmental management, including provisions for conflict resolution.

(2) Environmental Impact Assessment and Audit Regulations (EIA/EA), No.121 of 2003

An EIA is a critical examination of potential effects to be caused by a project which is to be implemented on the environment. The goal of an EIA is to ensure that decisions on proposed projects and its relevant activities should be environmentally sustainable with proper environmental management program. An EIA is conducted in order to identify potential impacts of a project on the environment, predict likely changes on the environment as a result of the development, evaluate the impacts of various alternatives on the project and propose mitigation measures for significant negative impacts of the project on the environment.

An Environmental Audit (EA) is a systematic documentation and a periodic and objective evaluation of activities and processes of an ongoing project. The goal of an EA is to establish whether proponents are complying with environmental requirements and enforcing legislation. The purpose of an EA is to determine the extent to which the activities and programs conform to the approved environmental management plan. A comprehensive EA ensures safe and healthy environment at all stages of project operations until decommissioning.

Regulation 42 of this EIA/EA Regulations vests the responsibility for carrying out Strategic Environmental Assessment (SEA), and the lead agencies shall work closely with National Environment Management Authority (NEMA) for SEA implementation. Regulation 42 (3) commits the government and all lead agencies to incorporate the principles of SEA in the development of sector or national or regional policy and/or master plan. The objective of SEA is to systematically integrate environmental considerations into policy, planning, and decision-making processes, such that environmental information derived from the examination of proposed policies, plans, programs, or projects are used to support the decision.

According to the series of preliminary discussions with NEMA, conducted in January 2013, it is likely that the proposed urban development master plan needs to conduct the SEA study, based on the SEA Guideline, to be described later in Section 4.3.

(3) Noise: Environment Management and Co-ordination (Noise and Excessive Vibration Pollution Control) Regulations, No. 61 of 2009)

Table 3.1.2 summarises the noise standard, specified within the Environment Management and Coordination (Noise and Excessive vibration Pollution Control) Regulation of 2009 in Kenya.

Table 3.1.2 Maximum Permissible Noise Levels (Leq)

	Day	Night
A. Silent Zone	40	35
B. Places of worship	40	35
C. Residential : Indoor	45	35
Outdoor	50	35
D. Mixed residential (with some commercial and places of entertainment)	55	35
E. Commercial	60	35

Note: Day: 6:01 a.m. – 8:00 p.m., Night: 8:01 p.m. – 6:00 a.m.
Source: Environment Management and Co-ordination (Noise and Excessive Vibration Pollution Control) Regulations, No. 61 of 2009

(4) Water Quality: Environment Management and Co-ordination (Water Quality) Regulations, No. 120 of 2006)

The objective of this regulation is to protect human health and the aquatic environment. The effective enforcement of the water quality regulations will lead to a marked reduction of water-borne diseases and hence, a reduction in the health budget. This water quality regulation applies to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells, and other water sources.

This regulation also provides guidelines and standards for the discharge of poisons, toxins, noxious, radioactive waste, or other pollutants into the aquatic environment in line with the Third Schedule of the regulation. This regulation has standards for discharge of the effluent into the sewerage and the aquatic environment. While it is the responsibility of the sewerage service providers to regulate discharges into sewerage lines based on the given specifications, NEMA regulates the discharge of all effluent into the aquatic environment.

Also, it is specified that any development activities to be planned at the riverbanks of tributaries running through Nairobi City need an environmental permit by conducting EIA from NEMA for the water quality protection. Basically, 6 m to 30 m from the highest water level (flood event) are defined as the protected river bank. Exact configuration of this protected area depends on development natures, surrounding land use, environmental importance, and others.

(5) Waste Management: Environment Management and Co-ordination (Waste Management) Regulations, No. 69 of 2006)

The Waste Management Regulations are meant to streamline the handling, transportation, and disposal of various types of waste. The aim of this Waste Management Regulation is to protect human health and the environment. Currently, various types of wastes are dumped haphazardly, posing serious environmental and health concerns. This regulation places emphasis on the wastes minimisation, cleaner production, and segregation of waste at source.

(6) Wet Land, Lake, and Sea: Environmental Management and Co-ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, No. 19 of 2009

This regulation, consisting of three parts, specifies that any wetland adjacent to the rivers, lakes as well as riverbanks, and lake shores shall be protected. If some development works are planned to be conducted inside such a wetland, a special permit shall be obtained from the Water Resources Management Authority (WRMA) by conducting an appropriate study such as EIA, which will be described later.

(7) Forest Act of 2005

The Forests Act 2005, enacted in 2007, provides for the establishment, development, and sustainable management, including conservation and rational utilisation, of forest resources for the socio-economic development of the country. This act recognises the importance of forests for the benefits of soil conservation, groundwater regulation, and agriculture, and provide for their role in absorbing greenhouse gases. The key elements of the Forests Act are: 1) the inclusion of management of all types of forests; 2) involvement of adjacent forest communities and other stakeholders in forest conservation and management; 3) an ecosystems approach to forest management planning; 4) provision of appropriate incentives to promote sustainable use and management of forest resources; 5) development of a framework for a forest legislation; and 6) establishment of the Kenya Forest Service (KFS). This act also recognises the Community Forest Associations (CFAs), who shall participate in forest conservation and management under KFS. This act has specific provisions related to access rights and benefit sharing arrangements which provide a role for communities in the utilisation of forest resources and protection of forests. This act has four priority areas related to the management of forests, including: 1) reducing pressure to clear forests for agriculture and other uses, 2) promoting the sustainable utilisation of forests, 3) improving governance in the forest sector, and 4) enhancing carbon stocks and reforestation of degraded lands.

(8) Wildlife Conservation and Management Act of 1989

This act, consisting of nine parts, is to strengthen the wildlife conservation and management policy and support relevant activities in Kenya. The legislation of nature conservation began to develop in 1945 in Kenya with the National Park Ordinance. This legislation and the Wild Animal Protection Ordinance of 1953 were not very effective. In 1976, the Wildlife Conservation and Management Act replaced the former ordinances, which brought about some changes in the conservation policies. The 1976 Act was also unable to fully achieve efficient conservation measures. Reforms were made mostly in policies and legislation but there were no major impact on the real world. Credit to the act was that wildlife and natural resources were mentioned to have relevant economical potential. In 1989, when the weakness of existing legislation was finally realised, the Kenya Wildlife Service (KWS) was established by a new act. KWS replaced all the former conservation-aimed organizations and it was secured to have a more independent position on its own field.

3.1.3 Economy and Investment

(1) Companies Act

The Companies Act (Chapter 486, Laws of Kenya) commenced in 1962, is based on the United Kingdom's Companies Act 1948.

The act aimed to regulate all aspects of companies including the following:

- Incorporation of companies
- Share capital
- Registration
- Management and administration

- Winding up
- Companies incorporated outside Kenya
- General provisions as to registration
- Insurance companies, societies, partnerships, etc.

Due to the need to reform the act according to the government's policy objectives such as Vision 2030, the Companies Bill 2010 was proposed as a follow-up of the Companies Bill 2008. The Bill 2010 repealing the act aims to modernise Kenya's business sector by easing investment of domestic and foreign companies in Kenya toward a competitive economy in the East African Community and in the globalizing world. The bill has gone through parliamentary reading stages.

(2) Employment Act

The Employment Act published in 2007 defines the fundamental rights of employees in order to provide basic conditions of employment of employees, to regulate employment of children, and to provide for matters connected with the following:

- Employment relationship
- Protection of wages
- Rights and duties in employment
- Termination and dismissal
- Protection of children
- Insolvency of employer
- Employment records
- Employment management
- Foreign contracts of service
- Disputes settlement procedure

Enforcement of the act is supervised by the Ministry of Labour, Social Security and Services, which also maintains industrial peace, industrial training, and promote safety and health of employees.

(3) Public Private Partnerships Act

The Public Private Partnerships Act 2013 was published in January 2013. It is to provide for the participation of the private sector in the financing, construction, development, operation, or maintenance of infrastructure or development projects of the government through concession or other contractual arrangements; the establishment of the institutions to regulate, monitor, and supervise the implementation of project agreements on infrastructure or development projects and for connected purposes.

The act was in line with the Vision 2030, which is a vision to transform Kenya into a middle income country by 2030. To this end, a number of key projects are required. However, they cannot be funded and implemented by the government alone. Therefore, this act has been proposed to involve the private sector in such projects. The act includes the detailed procedure of projects in public-private partnerships and the following institutional arrangement:

(i) Establishment of the public-private partnership committee for ensuring that each project agreement is consistent with the provisions of this act, formulating policy guidelines on public-private partnerships, and ensure that all projects are consistent with the national priorities, etc.

(ii) Establishment of the public-private partnerships units for serving as the secretariat and technical arm of the committee, and for providing technical, financial, and legal expertise to the committee and any node established under this act.

(iii) Establishment of public-private partnership nodes for identifying, screening and prioritising projects based on guidelines issued by the committee, preparing and appraising each project

agreement to ensure its legal, regulatory, social, economic, and commercial viability, ensuring that the parties to a project agreement comply with the provisions of this act, and undertaking the tendering process in accordance with this act, etc.

(4) Tourism Act

The Tourism Act is to develop, manage, market, and regulate sustainable tourism and tourism-related activities and services by changing the management and structure of related institutions. The act that passed the Parliament in 2011 includes a total of 124 clauses including establishment of various organisations together with formulation of the national tourism strategy as follows:

- Establishment of Authority
- Establishment of the Tourism Protection Service
- Establishment of the Kenya Tourism Board
- Establishment of Kenyatta International Convention Centre
- Establishment of Tourism Research Institute
- Establishment of Tourism Fund
- Establishment of Corporation

(5) Banking Act

The Banking Act revised in 2010 is for regulating the business of banking and for protecting the industry in Kenya.

The banking act covers a wide area in the banking business, as follows:

- Licensing of institutions
- Prohibited business
- Reserves and dividends
- Accounts and audit
- Information and reporting requirements
- Inspection and control of institutions
- The deposit protection fund
- Representative offices of foreign institutions

Based on the act, the Central Bank of Kenya stipulates guidelines, which include:

- Governance and risk management,
- Financial reporting requirements,
- Business continuity management,
- Bank services, and
- Bank data reporting.

3.1.4 Infrastructure

(1) Kenya Roads Act No. 2 of 2007

The Kenya Roads Act No. 2 of 2007 is an act of the Parliament to provide for the establishment of the Kenya National Highways Authority (KeNHA), the Kenya Urban Roads Authority (KURA), and the Kenya Rural Roads Authority, to provide for the powers and functions of the authorities and for connected purposes.

Sections 3, 4, and 5 of the Kenya Roads Act (2007) provide for the establishment and functions of KeNHA, which is responsible for the management, development, rehabilitation, and maintenance of national roads. Functions of KeNHA are discussed in Section 3.2.4.

Sections 9, 10, 11, and 12 of the Roads Act provide for the establishment, functions, and composition of KURA, which is the body corporate in charge of management, development, rehabilitation, and maintenance of all public roads in the cities and municipalities in Kenya except where those roads are national roads. The role of KURA is discussed in Section 3.2.4.

(2) Public Roads and Roads of Access Act Cap 399

This is an Act of Parliament to provide roads of public travel and access to public roads. According to Section 8 (1) of this act, whenever it is made to appear to the Minister that requirements exist for the establishment, alteration, or cancellation of a line of public travel or for the conversion of a road of access into a line of public travel, the Minister may, by order published in the Gazette, dedicate, alter, or cancel such line of public travel or convert such road of access into a line of public travel. For the purposes of the act, Article 8 (3) provides that where an order under this section dedicates a line of public travel or converts a road of access into a line of public travel, such line of public travel shall be absolutely dedicated to the public as a public road within the meaning of any law now or hereafter in force relating to public roads.

However, this act also provides for the procedure for construction of private roads of access. Section 9 (1) provides that where any owner or occupier of land is in respect of his land so situated in relation to a public road which is passable to vehicular traffic, or to a railway station or halt, that he has no reasonable access to the same, he may make an application to the board of the district in which such land is situated for leave to construct a road or roads (hereinafter called a road of access) over any lands lying between his land and such public road or railway station or halt.

Section 13 provides for the right of way, responsibilities of the owner, including direct orders in Section 13 (5) on responsibility of the owner to keep the road in good state of repair at all times to the satisfaction of the board responsible (District Roads Board in this case or any other body as the case may be in the new constitutional dispensation/ order).

(3) Wayleaves Act Cap 292

In Kenya, the Wayleaves Act Cap 292 allows for a right of way (ROW) of transmission lines. The Wayleaves Act provides that a wayleave as ROW over any lands whatsoever but may not in so doing interfere with any existing buildings. In this act, “private land” does not include any land sold or leased under any act dealing with government lands.

Kenya Electricity Transmission Company (KETRACO) defines a wayleave as ROW over the land of another. This ROW is for carrying sewer, drain, power line, or pipeline into, although over or under any lands but in so doing may interfere with the existing buildings. (www.ketraco.co.ke). This is contrary to the Wayleaves Act Cap 292 which consider utilisation of all land for any such functions as outlined above.

The Wayleaves Act Cap 242 in general provides for the power to carry sewers, drains, and pipelines through land, guidelines for legal notification on the intention to use any land, and on the procedures as to lodge objections by owners or occupiers of private land that may be used for ROW. Further, the act provides Section 7 of the Wayleaves Act, which provides in whole that any person in the service of the government and any contractor executing any work for the government, together with his agents and servants, may at any time enter upon any land for the purpose of surveying, setting out, and marking the line of any intended sewer, drain or pipeline, or for the purpose of inspecting, repairing, removing, re-laying or cleansing any sewer, drain or pipeline the property of the government, or for any other purpose under this act. Article 9 lays the penalty for unauthorized building over sewers, drains, or pipelines.

Wayleaves are important in regard to location of the various trunk utilities. For the purposes of NIUPLAN:

(i) There are various areas of trunk utilities to be considered in NIUPLAN whose location should be secured, including, but not limited to power lines (both overhead and underground), sewerage reticulation networks, stormwater drains, water-mains, telephone lines, fibre-optic cables, railway wayleaves, road reserves, etc.;

(ii) Currently, the use of wayleaves is not properly regulated as different utilities companies, some serving competing interests digging up road reserves, posing dangers to human and the quality of the roads, and other existing infrastructure;

(iii) There is a need to open up additional wayleaves for newly proposed trunk utilities, adding to the existing lines and opening new lines in new areas;

(iv) There is a need to limit and restrict the use of the wayleaves to optimise the use of the existing and future wayleaves. Case in hand is through proposed utilities tunnel to be shared by all trunk utilities to limit destruction of roads and existing utilities; and

(v) There is a need to propose the use of some of the secured wayleaves for other allowable urban uses in some of the larger wayleaves.

1) Gaps in the Wayleaves Act

The various gaps in the Wayleaves Act that may constrain the implementation of NIUPLAN include, that the Wayleaves Act:

(i) Is mostly outdated and needs to be extensively reviewed to cater for modern development scenarios;

(ii) Is less detailed on the definition of wayleaves, especially in regard to the types of trunk utilities, users, and actors (sectoral bodies that have/use/need wayleaves);

(iii) Is silent on most types of infrastructure that require wayleaves, but is particular on power, drains, and pipelines;

(iv) The act is silent on the use, management, and protection of the existing wayleaves;

(v) Does not recognise the role of private actors in the use of the wayleaves, which leads the private sector actors to destroy the amenity of the wayleaves as well as the quality of roads;

(vi) Lays a small penalty on contravention of the Wayleaves Act, seeing as to the importance of the wayleaves for the development of the city as well as the value of public good/public interest they carry/possess;

(vii) Does not provide inter-sectoral linkages on the use of wayleaves, including the competing interests of roads, power, telecommunication, water, municipal, and other such sectoral interests for the purposes of harmonisation of functions;

(viii) Does not give the actual measurements of the wayleaves, and the relationship with adjacent land users;

(ix) Does not stipulate allowable temporary users (if any) of the wayleaves; and

(x) Recommendations for Wayleaves Act.

The main recommendation on the Wayleaves Act includes that the act should be overhauled and drafted afresh to take into account current glaring omissions including:

(i) Definition of wayleaves;

(ii) Examples of wayleaves;

(iii) Examples of the land in which the wayleaves operate;

(iv) Inter-sectoral relationships on the use of wayleaves;

(v) Dimensions of wayleaves;

(vi) Use of wayleaves/allowable users of the wayleaves;

(vii) Non-allowable users of wayleaves;

(viii) Mixed use of wayleaves, including allowable temporary users;

(ix) Management plan of wayleaves; and

(x) Optimisation of the use of wayleaves, amongst others.

(4) Energy Act No. 12 of 2006

The Energy Act is an act of the Parliament to amend and consolidate the law relating to energy, to provide for the establishment, powers, and functions of the Energy Regulatory Commission and the Rural Electrification Authority, and for connected purposes. The provisions of this act shall apply to every person or body of persons importing, exporting, generating, transmitting, distributing, supplying, or using electrical energy; importing, exporting, transporting, refining, storing, and selling petroleum or petroleum products; producing, transporting, distributing, and supplying of any other form of energy, and to all works or apparatus for any or all of these purposes.

The Energy Act stipulates conditions for granting licenses for generation, importation, exportation, transmission, or distribution of electrical energy, including certain provisions that are particular to the well-being of the environment.

Sections 46, 47, 48, 49, 50, 51, 52, 53, and 54 provide for procedures for acquisition (whether through willing surrender or compulsorily) of and the use of wayleaves. Specifically, Section 53 (1) provides that for the purpose of the conveyance, transmission, or supply of electrical energy, a licensee may erect, fix, install or lay any poles, wires, electric supply lines, power, or other apparatus in, upon, under, over, or across any public streets, road, railways, tramways, rivers, canals, harbours, or government property, in the manner and on the conditions as provided in this act.

Section 53 (2) stipulates that notwithstanding the provisions of any other written law, but subject to the provisions of this section, a licensee may break up any street within his area of supply, and may erect posts and lay or construct power lines or electric supply lines along, under or over any such street, and may, from time to time, repair, alter, or remove any posts or lines so erected, laid, or constructed:

Provided that the person having the control of such street shall have a prior right to break up and repair such street with reasonable despatch upon payment to him of a reasonable charge by the licensee.

Having completed works on the wayleaves, an operator is obligated under Section 53 (5) to comply with the by-laws, if any, of the local authority concerned and shall complete that work with reasonable despatch and reinstate the street that was broken up and remove any debris or rubbish occasioned thereby and shall, while the street is broken up or obstructed, cause the works to be, at all times, fenced and guarded, and during the night, adequately lit.

The Energy Act also provides for siting of petroleum installations. Section 90 provides that any person intending to construct a pipeline, refinery, bulk storage facility, or retail dispensing site shall, before commencing such construction, apply in writing to the Energy Regulation Commission (ERC) for a permit to do so. Such applications must be accompanied by an EIA report.

Section 98 provides for a compliance with environmental, safety, and health standards for any person engaged in petroleum business. Section 98 (2) stipulates that in the event of a fire, explosion, oil spill, injury, or fatality occurring in the course of operating a petroleum facility or transportation of

petroleum, either by accident or through negligence, the operator or person transporting petroleum shall forthwith clean up the polluted or damaged environment, at his own expense, to the satisfaction of the Commission and other relevant authorities:

Provided that any person engaged in the transportation of petroleum and petroleum products shall have an oil clean-up plan in compliance with the national oil policy.

Important to note for NIUPLAN is the provision of Section 99 which provides that a local authority shall designate a place or places exclusively reserved for parking of petroleum tanker vehicles.

Section 99 (2) provides that a local authority that contravenes Subsection (1) commits an offence and shall be liable, on conviction, to pay a fine of Ksh50,000 for each day or part thereof that the offence continues.

Amongst the conditions highlighted for the granting of permits are compliance to relevant government policies (which the NIUPLAN will be one of), as well compliance with the demands of EMCA (1999).

Part V of the Energy Act provides for use of renewable energy, energy efficiency, and conservation. Section 103, provides, inter alia promotion of the development and use of renewable energy, including, but not limited to:

(i) Research in renewable energy;

(ii) Efficient and sustainable energy;

(iii) Use of municipal waste for energy production;

(iv) Development of appropriate capacity for manufacture, installation, maintenance, and operation of such technologies as bio-digesters and solar systems; and

(v) International cooperation programmes focussing in renewable energy.

1) Application of the Energy Act to NIUPLAN

For purposes of the NIUPLAN, the ERC mandates and responsibilities touch on the various aspects of Nairobi City in the following manner:

(i) Energy is an important component of urban life and a city's wellbeing, tied closely to matters of security and safety, urban transport, economic development (including to a very major extent, industrialisation), power sector, telecommunications sector, utilities, and services availability;

(ii) Energy components are a major consumer of urban space and land, including:

a. Power wayleaves;
b. Pipeline wayleaves;
c. Petrol/service stations
d. Petroleum storage/bulk storage facilities;
e. Road transport of petroleum products; and
f. Petroleum pipeline, etc.;

(iii) Energy wayleaves are important contributor of the amount and quality of open spaces within the urban landscape;

(iv) Security, safety, and health concerns with respect to energy installations in an urban settings are important considerations in planning;

(v) The Energy Act is one of the two acts that clearly stipulate the protection, use, and management of wayleaves;

(vi) The Master Plan provides for various land use guidelines and approval standards, which calls for the implementation of various guidelines and enforcement thereof, including, but not limited to granting of approvals, insistence of environmental impact assessments, and NEMA licenses for approvals, with the intention of ensuring environmental friendliness of activities/developments related to energy;

(vii) Most proposals in the NIUPLAN are directly and indirectly tied to energy availability and tariffs, including on the cost of doing business, cost of transport, cost of setting up industries, location of major business districts, etc;

(viii) In compliance with Section 99, NIUPLAN needs to come with a place(s) exclusively dedicated for parking of petroleum tanker vehicles; and

(ix) Need for the NIUPLAN to suggest strategies of integration of renewable energy into the energy plan of the city with the suggestion of ensuring energy sufficiency and efficiency, including the use of municipal waste for energy production.

2) Weakness of the Energy Act to the NIUPLAN

The promotion, installation, and use of solar water heating systems by the act is a positive move towards renewable energy use in Kenya. However, provisions of Energy (Solar Water Heating) Regulations, 2012 may be deemed too harsh considering the provisions of Sections 3(3) and 11(1) amongst others. Premises may fail to install solar water heating mechanisms because of the incapability of the owners/occupiers, and that should not be a weakness for which to send people to prison. Rather than use threats to encourage people to use renewable energy, the Energy Act Regulations should instead use actual incentives, for example zero-rating of taxes on solar water-heating equipment and other such hardware that will entice people to use the technology.

(5) The National Land Commission Act No. 5 of 2012

This is an act of the Parliament to make further provision as to the functions and powers of the National Land Commission, qualifications and procedures for appointments to the commission; to give effect to the objects and principles of devolved government in land management and administration, and for connected purposes.

In relation to the NIUPLAN, this act provides for the:

(i) For the management and administration of land in accordance with the principles of Land Policy set out in Article 60 of the Constitution and the National Land Policy;

(ii) A linkage between the National Land Commission, county governments, and other institutions dealing with land and land related resources.

Section 18 provides for the establishment of the County Land Management Boards in consultation and cooperation with the national and county governments to establish county land management boards for purposes of managing public land. Section 19 (1) provides that the commission shall, subject to the physical planning and survey requirements, process applications for allocation of land, change and extension of user, subdivision of public land, and renewal of leases. This statute is important in all infrastructure located on the land. Sometimes infrastructure and utilities are located on contested land, or land in which acquisition of wayleaves may be done through compulsory acquisition. This may require the role of the National Land Commission.

(6) Survey Act Cap 299

This act provides for the establishment of the Director of Surveys and such other officers as may be deemed necessary for the purposes of this act. The act provides for the sole role of the surveying works by the Director of Surveys and his agents, and the sole power to authenticate survey plans prepared by any private registered surveyor. This overreaching mandate spans to issues like aerial photography. In terms of infrastructure provision, the survey act is important to help in the production of reliable spatial data, now and in the future. Maps may be prepared by various sectoral bodies in conjunction with the Survey of Kenya but validation needs to be done by the Survey of Kenya.

For purposes of the NIUPLAN, there is a need for cooperation between the Director of Survey with the NIUPLAN team for production of accurate maps and plans for the purposes of planning. The Director of Surveys also has the power to furnish the team with an up-to-date aerial images for preparation of maps. The Director of Surveys will help in authenticating maps, accuracy of maps produced for the reference and use by the NIUPLAN team.

(7) Urban Areas and Cities Act Number 3 of 2011

Urban Areas and Cities Act is an act of Parliament to give effect to Article 184 of the Constitution; to provide for the, classification, governance, and management of urban areas and cities; to provide for the criteria of establishing urban areas, to provide for the principle of governance and participation of residents and for connected purposes.

Subject to Subsection 3 of this act, an urban area may be classified as a city under this act if the urban area satisfies the following criteria—

(i) Has a population of at least 500,000 residents according to the final gazetted results of the last population census carried out by an institution authorised under any written law, preceding the application for grant of city status;

(ii) Has an integrated urban area or city development plan in accordance with this act;

(iii) Has demonstrable capacity to generate sufficient revenue to sustain its operation;

(iv) Has demonstrable good system and records of prudent management;

(v) Has the capacity to effectively and efficiently deliver essential services to its residents as provided in the First Schedule;

(vi) Has institutionalised active participation by its residents in the management of its affairs;

(vii) Has infrastructural facilities, including but not limited to roads, street lighting, markets, and fire stations, and an adequate capacity for disaster management; and

(viii) Has a capacity for functional and effective waste disposal.

Section 6 provides for the establishment of Nairobi City as the capital city of Kenya, and its roles and responsibilities. Following stipulations of Section 5 (1) (b), Nairobi City is in the process of preparing an integrated urban plan called the NIUPLAN, which, amongst others, will provide for the functions outlined in Subsection 3, including improvement of the efficiency of the transport network as well as promotion of commerce and industry.

Part III provides for the governance and administration of cities. Some of the principles outlined for governance and management include institutionalisation of active participation by its residents in the management of the urban area and city affairs, efficient and effective service delivery, and clear assignment of functions which the NIUPLAN is to provide for. Part V provides for Integrated Development Planning. Section 36 stipulates the objectives of the plans which include formation of basis for preparation of environmental management plans, valuation rolls, provision of physical and social infrastructure, preparation of annual strategic plans for the city as well as overall delivery of services and infrastructure. Such an integrated urban plan shall also be the basis for development

control. It further highlights the contents, adoption, approval, and provides for annual reviews for development.

(8) Companies Act Cap 486

Several Kenyan State Corporations are established generally by the Companies Act Cap 486. Some of these institutions with relation to the NIUPLAN including the Kenya Pipeline Corporation (KPC), the Kenya Power and Lighting Company (KPLC), and the KETRACO in Nairobi City which are important infrastructure providers of petroleum, pipeline, and electricity, respectively.

(9) Kenya Railways Corporation Act Cap 397

This is an act of the Parliament for the establishment of the Kenya Railways Corporation, simply called Kenya Railways. The act provides for the Powers of Kenya Railways Corporation being generally, without prejudice, to construct railways, development of roads to access the railways, development of parking, provision of train services, and determination of tariffs and train fares. The other roles include responsibilities to buy and sell property, provision of housing to its employees, and all such related services.

(10) Intergovernmental Relations Act

The Intergovernmental Relations Act of Parliament to establish a framework for consultation and cooperation between the national and county governments and amongst county governments; to establish mechanisms for the resolution of intergovernmental disputes pursuant to Articles 6 and 189 of the Constitution, and for connected purposes.

The objects and purposes of this act are to—

(i) Provide a framework for consultation and cooperation between the national and county governments;

(ii) Provide a framework for consultation and cooperation amongst county governments;

(iii) Establish institutional structures and mechanisms for intergovernmental relations;

(iv) Provide a framework for the inclusive consideration of any matter that affects relations between the two levels of government and amongst county governments;

(v) Give effect to Articles 187 and 200 of the Constitution, in respect of the transfer of functions and powers by one level of government to another, including the transfer of legislative powers from the national government to the county governments; and

(vi) Provide mechanisms for the resolution of intergovernmental disputes where they arise.

It is to be noted that some of the disputes may be in the area of infrastructure provision, including cross-boundary utility mains like roads, petroleum pipelines, railway lines, water pipelines, etc.

(11) The Water Act Cap 372 No 8 of 2002

The Water Act No 8 of 2002 is an act of the Parliament to provide for the management, conservation, use, and control of water resources and for the acquisition and regulation of rights to use water; to provide for the regulation and management of water supply and sewerage services; to repeal the Water Act (Cap. 372) and certain provisions of the Local Government Act; and for related purposes. Being important inter-county resources and important for life, every water resource is hereby vested in the State, subject to any rights of user granted by or under this act or any other written law.

Section 7 establishes the Water Resources Management Authority. Powers and functions of the authority are outlined in Section 8, and included in the regulation of allocation of water resources,

monitoring and assessment of the national water resources management strategy, determination of applications for permits for water use, protection of water resources from adverse use, management of water catchments, amongst other water resource management needs/ strategies.

Section 51 provides for the establishment of Water Services Boards. The roles of these boards include planning for the improvement in provision of water supply and sewerage services, appointment and contracting water service providers as well as being asset holder of central government facilities. The Athi Water is one of the eight water boards under the Ministry of Environment, Water, and Natural Resources created to bring about efficiency, economy, and sustainability in the provision of water and sewerage services in Kenya. Athi Water is created under Section 51 of the Water Act 2002 serving a population of over 4.5million in Nairobi City and its environs.

3.2 Roles and Tasks of Related Organisations

3.2.1 Urban Planning

The Government of Kenya, including national government and local government, is in the transitional stage based on the Constitution 2010 and subordinate legal framework such as the Local Government Act 2012, as well as the new President's policy. The number of ministries will be reduced from 24 in the previous government to reportedly 18 in the new government. The President has been nominating the cabinet members since April and the job description of each ministry will be announced later.

Local government structure has shifted from a variety of status (city, municipality, town) to a county government. NCC is also under transition based on the County Government Act and the policy of the new governor.

(1) National Government

The main ministries related to Nairobi City urban development in the old structure were the Ministry of the Local Government, the Ministry of Lands, and the Ministry of Nairobi Metropolitan Development. Functions of each ministry are summarised in the following table.

Table 3.2.1 Ministries Related to Urban Planning (Old Structure)

Organisations	Functions
Ministry of Local Government (Urban Development Department)	● Responsible for managing local government matters (policy, assist local authority for planning) ● Urban Development Department is responsible for urban development (main organisation for preparing National Urban Development Policy)
Ministry of Lands (Physical Planning Department)	● Responsible for land management ● Physical Planning Department is responsible for physical planning and implementation ● Approval of urban master plan
Ministry of Nairobi Metropolitan Development (Metropolitan Planning and Environment)	● Responsible for providing technical support and resources in areas of planning and implementation of projects (based on the Local Government Act (Cap 265 which was repealed in 2012). ● Prepared Metro Strategy 2030 and Spatial Plan for 2030.

Source: Thematic Working Group

The new government structure has been complied based on the government announcement and input from Thematic Working Group. Most of the functions and responsibilities for urban development have been put together in the Ministry of Land, Housing, and Urban Development. Since the national government is still in a transition stage, detail of the national government structure is yet to be announced, so some of the information in the table is still tentative.

Table 3.2.2 Ministries Related to Urban Planning (New Structure)

Old Government	New Government
Ministry of Local Government	● Mostly shift to the Ministry of Devolution

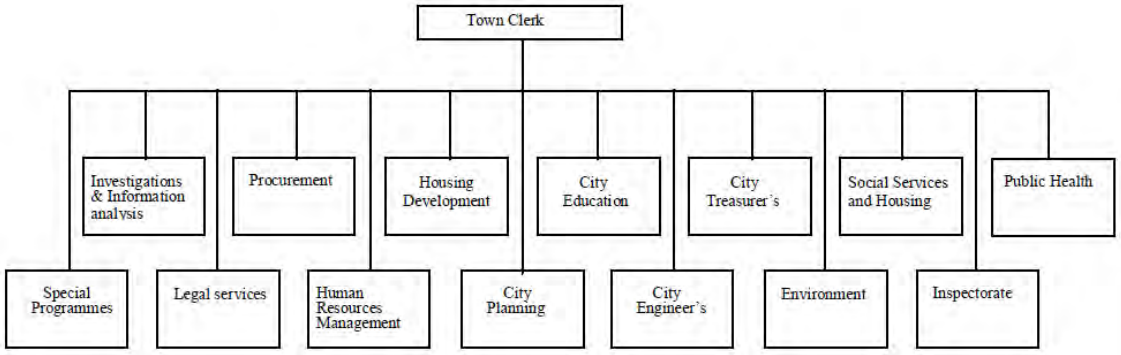
(Urban Development Department)	● Urban Development Department shifts to the Ministry of Lands, Housing, and Urban Development
Ministry of Lands (Physical Planning Department)	● Ministry of Lands, Housing, Urban Development ● Combining Ministry of Lands, Ministry of Housing, and Urban Development sections of other ministries ● Integrated urban development section of the Ministry of Local Government and the Ministry of Nairobi Metropolitan Development
Ministry of Nairobi Metropolitan Development (Metropolitan Planning and Environment)	● Dissolved ● Integrated into the Ministry of Lands, Housing and Urban Development

Source: Government announcement, Thematic Working Group

(2) CCN (City Council of Nairobi)

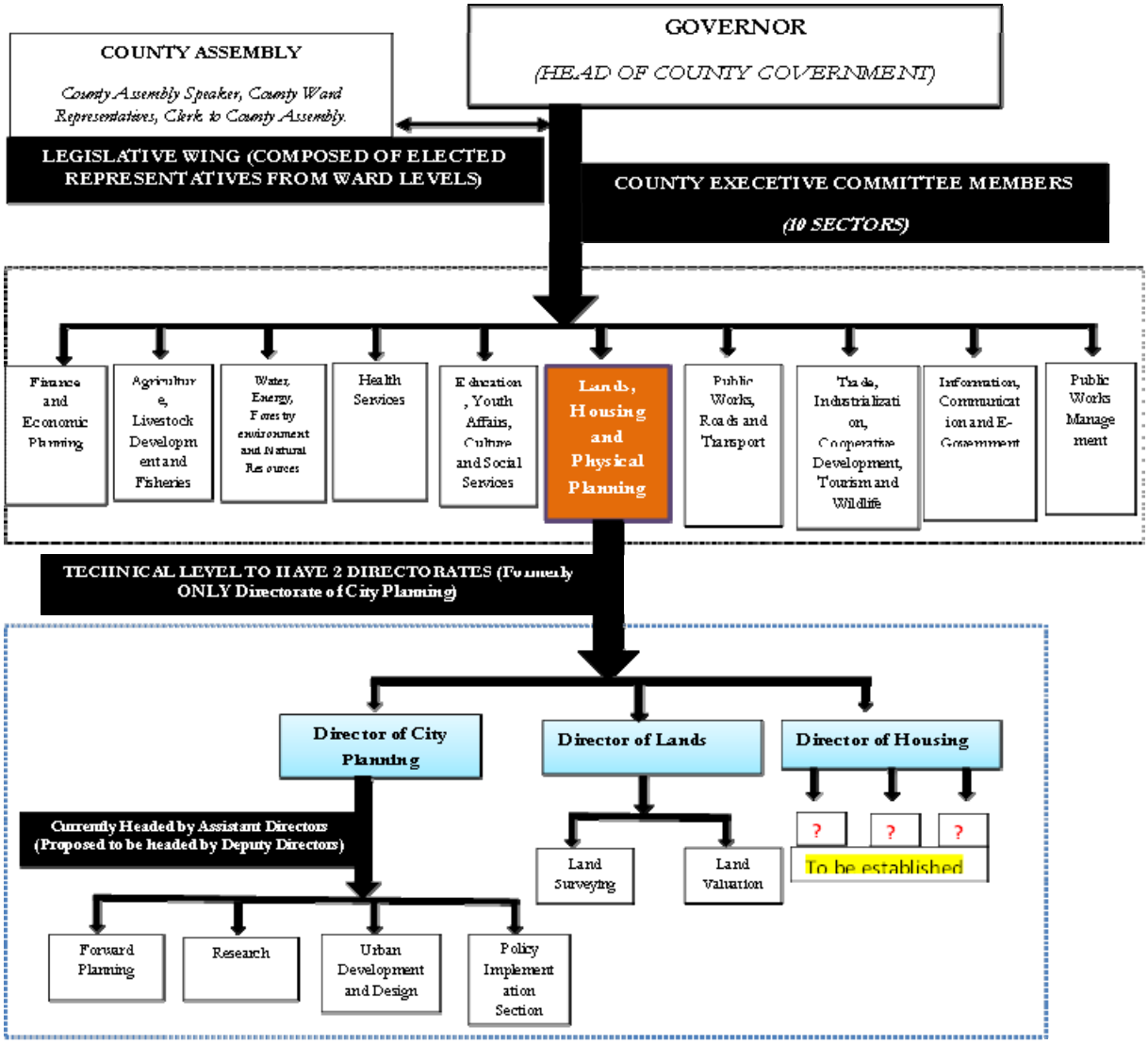
Nairobi City is changed from the City Council of Nairobi to Nairobi City County (NCC), through which seventeen departments were restructured to ten departments.

The City Planning Department of NCC became the Department of Planning and Development, which is an integration of the City Planning Department, City Engineer's, and Housing Development.



Source: JICA Study Team (JST)

Figure 3.2.1 Organisation Chart of NCC (Old System)



Source: JICA Study Team (JST)

Figure 3.2.2 NCC Land, Housing, and Physical Planning Sector Organogram (tentative)

The City Planning Department is composed of eight sections. The following table shows the tasks of each section in the City Planning Department.

Table 3.2.3 Tasks of Sections in the City Planning Department

	Section	Job Description
(1)	Forward Planning Section	Responsible for policy formulation and supporting permit process.
(2)	Research Section	Responsible for supporting section by conducting survey and provide information regarding urban condition, housing, and infrastructure, renew land lease, register private schools, designating street names, and designating physical address.
(3)	Central Administration	Responsible for administrative matter, including staff evaluation, organisation restructure, and other supporting matters.
(4)	Development Control Section	Responsible for building construction permit management
(5)	Policy Implementation Section (PIS)	Responsible for land development permit management. Permit is required for change in land use, division of land plot, and extension (adding) of new and use.
(6)	Urban Design Development Section	Responsible for development of landscape (greenery, bench, bus shelter) and management of advertisement.
(7)	Enforcement Section	Responsible for inspection and monitoring of development approved by the Development Control Section and Policy Implementation Section.
(8)	Land Survey Section	Responsible for conducting land survey that belongs to Nairobi City and develop GIS database.

Source: Official organisational chart, interviews with the assistant directors.

3.2.2 Environment

(1) Ministry of Environment and Mineral Resources (MEMR)

The MEMR (currently, the Ministry of Environment, Water, and Natural Resources (MEWNR) since April 2013) is the environmental administrative body of Kenya. Main vision of MEWNR is to promote, monitor, conserve, protect, and sustainably manage the environment and mineral resources across the nation for national development. MEMR has several departments and state corporations, and the National Environmental Management Authority (NEMA) is one of MEMR's departments. In April 2013, the restructuring plan of the central government was released, and this ministry will become the Ministry of Environment, Water, and Natural Resources.

(2) National Environmental Management Authority (NEMA)

The NEMA is established under EMCA, No. 8 of 1999, as the principal instrument of the government in the implementation of all policies related to the environment. This authority became operational on 1 July 2002 following the merger of three government departments, namely: the National Environment Secretariat (NES), the Permanent Presidential Commission on Soil Conservation and Afforestation (PPCSCA), and the Department of Resource Surveys and Remote Sensing (DRSRS). However, following government restructuring, conducted in March 2003, DRSRS reverted to its departmental status under MEMR.

Kenya is divided into eight main administrative provinces, i.e., (i) Central, (ii) Coast, (iii) Eastern, (iv) North Eastern, (v) Nyanza, (vi) Rift Valley, (vii) Western, and (viii) Nairobi, which is also the capital city. Concerning environmental management, each of these provinces has an office of NEMA. The Kenya's environmental administration and its legal framework are described in the following sections.

(3) Department of Environment (DOE), City Council of Nairobi/NCC

The DOE of the City Council of Nairobi was established in 1996 and still exists under NCC. Main mission of this department is to conduct a sustainable environmental management across Nairobi City, aiming at creating a healthy, clean, and aesthetically pleasant environment to its residents and to formulate and implement suitable policies and tools for the effective management of the environment. This department comprises the following four sections: (i) Cleansing Section, (ii) Parks Section, (iii) Environmental Management and Planning Section, and (iv) Administration Section. Its key responsibilities include:

(i) Garbage collection, transportation, and disposal;
(ii) Street/road sweeping, litter picking and drains clearing;
(iii) Grass cutting and bushes clearing in public parks, open spaces, and road reserves;
(iv) Urban reforestation and beautification;
(v) Management of parks and open spaces;
(vi) Management of solid waste disposal sites;
(vii) Formulation and implementation of effective environmental management policies;
(viii) Creation of public awareness on environmental issues; and
(ix) Establishment of public/private partnership in environment management.

(4) Kenya Forest Service (KFS)

The KFS is a state corporation, established in February 2007 under the Forest Act of 2005. Its main mission is to conserve, develop, and sustainably manage forest resources for Kenya's social-economic development. The KFS management structure comprises ten conservancies that are ecologically demarcated, 76 zonal forest offices, 150 forest stations. About 250 divisional forest extension offices

are working across the country and play critical roles in the forest management and relevant surveillance. To make the forest management more effective, forest adjacent communities have formed registered forest management bodies with assistance from KFS. Those registered groups are currently working with KFS to sustainably manage forest resources. In total, there are 325 community forest associations.

In Nairobi City, there are several forest reserves such as (i) Karura Forest Reserve (1,063 ha) and (ii) Ngong Forest Reserve (638.4 ha), supervised by KWS. Besides, the Nairobi Arboretum (25.0 ha) is also under KFS's supervision.

(5) Kenya Wildlife Service (KWS)

The KWS conserves and manages Kenya's wildlife for the Kenyan people and the world. It is a state corporation established by an Act of Parliament Cap 376 with the mandate to conserve and manage wildlife in Kenya, and to enforce related laws and regulations. KWS undertakes the conservation and the management of wildlife resources outside protected areas in collaboration with stakeholders. The community wildlife program of KWS in collaboration with others encourages communities, located near and/or within important wildlife conservation areas, such as wildlife corridors and dispersal lands outside parks and reserves for the biodiversity conservation. KWS manages about 8% of the total landmass of the country. Kenya has 22 national parks, 28 national reserves and five national sanctuaries. Also under KWS management are four marine national parks and six marine national reserves on the coast. In addition, KWS manages 125 field stations outside the protected areas. The Nairobi National Park (11,640 ha), located within Nairobi City, some 7 km away from the city centre, is conserved and supervised by KWS.

(6) Water Resources Management Authority (WRMA)

The WRMA is a state corporation under the Ministry of Water and Irrigation (now under MEWNR), established under the Water Act 2002. WRMA is the lead agency in nationwide water resources management. Wetlands located along the tributaries running through Nairobi City are protected. If some development works are planned to be conducted inside of those wetlands, a special permit shall be obtained from this organisation.

3.2.3 Economy and Investment

(1) New Ministries

The Ministry of Commerce and Tourism and the Ministry of Industrialisation and Enterprise Development are particularly related to the economic activities and investment promotion in Nairobi City. In addition, the Ministry of Mining may have relevance in the quarrying businesses in the city and the Ministry of Agriculture, Livestock, and Fisheries may play certain roles for the farms in the suburban areas in the city.

(2) Other Public and Private Organisations

The following are the organisations and their major roles, particularly, relevant to businesses.

1) Investment Promotion, Industrial Infrastructure Provision, and Business Promotion

i) Kenya Investment Authority (KenInvest or KIA)

Pre-Investment Services

- Assistance in obtaining any necessary licenses and permits;
- Assisting in obtaining incentives or exemptions under the Income Tax Act, the Customs

and Excise Act, the Value Added Tax Act, or other legislation;
- Providing information to investors on the business climate, operating rules, investment opportunities and sources of capital; and
- Liaison with other government agencies for the issuance of additional licenses and approvals not directly handled by the authority.

Post – Investment Services
- Issuance of Investment Certificate that facilitates the immediate start of a business, and
- Provision of after care services.

ii) Export Processing Zones Authority (EPZA)

The EPZA operates export processing zones (EPZs) in the Athi River and Mombasa.

It is noted that the development of a new strategic plan became necessary to enable the authority transform the areas to special economic zone (SEZ) environment.

iii) Kenya Industrial Estate Ltd (KIE)

The KIE was established in 1967 to provide for the development of industrial estates/sheds, financial support, and entrepreneurship development. It became an independent state corporation in 1978, with the government as the sole shareholder.

KIE's products and services are as follows:

- Industrial estates development and incubation services
  - Industrial shed rehabilitation
- Financial support services
  - Credit facilities
  - Special credit facilities for marginalised areas
  - Top up loan facilities
  - Bid bond facility
  - Performance bond facility
  - Jitahidi group loans (group guarantee scheme)
  - Agency banking
- Business advisory services
  - Facilitating inter-firm linkages
- Special government projects

iv) Micro and Small Enterprise Authority (MSEA)

The MSEA is a newly established authority under the Ministry of Industrialisation and Enterprise Development in order to upgrade micro and small enterprises (MSE) to small and medium enterprises (SME). MSEA coordinates and harmonises all activities for MSE development.

MSEA's specific tasks are as follows: a) financing, b) training, c) infrastructure development, and d) policy development.

MSEA is a successor to the Department of Micro and Small Enterprise Development (DMSED) of the Ministry of Labour. DMSED was responsible for the formulation of policies and coordination of implementation strategies for the development of the MSE sector.

2) Multi-sectoral Private Sector Groups

i) Kenya Private Sector Alliance (KEPSA)

The KEPSA seeks private sector development through advocacy, projects, and partnerships for both local and international, as well as through policy formulation and implementation.

ii) Kenya National Chamber of Commerce and Industry (KNCC&I)

The KNCC&I is an umbrella organisation of businessmen and industrialists in Kenya.

iii) Nairobi County Business Association (NCBA)

The NCBA is a rebranded successor of Nairobi Central Business District Association (NCBDA). Its target area is the whole Nairobi City and no longer limited to the Central Business District (CBD). Its mandate is to be an intermediary between the government and the private sector. It is an umbrella of many private sector organisations. Its core functions are (1) improvement of security of businesses, (2) improvement of environment and beautification, and (3) request and proposals for improvement of the transportation system. Such functions are fulfilled by project implementation, advocacy, and campaigns in collaboration with government organisations, particularly with NCC.

One of the active members of NCBA is the United Business Association (UBA). It supports all types of SMEs.

3) Manufacturing

i) Kenya Industrial Property Institute (KIPI)

The KIPI is a parastatal with the following functions:

- Administer industrial property rights;
- Provision of technological information to the public;
- Promotion of inventiveness in Kenya; and
- Provision of training on industrial property.

ii) Kenya Industrial Research and Development Institute (KIRDI)

The KIRDI was established to promote industrialisation in Kenya by undertaking industrial research, development, and disseminating findings that have a positive impact on national development.

iii) Kenya Association of Manufacturers (KAM)

The KAM is a representative organisation of the manufacturing sector with a wide range of services in advocacy, business services, and communication.

4) Tourism

i) Kenya Tourist Development Corporation (KTDC)

The KTDC is facilitating and providing affordable development funding and advisory services for long-term investment in Kenya's tourism industry.

ii) Kenya Tourist Board (KTB)

To market the country, KTB sensitises the industry players and monitors the standards of the accommodation facilities of tourists in Kenya.

5) Information and Communications Technology (ICT)

i) Kenya ICT Board

- Marketing (positioning and promoting Kenya as an ICT destination (locally and internationally), especially promoting business process outsourcing (BPO) and offshoring);
- Advisory (advise the government on all relevant matters pertaining to the development and promotion of ICT industries in Kenya);
- Capacity building (providing government and other stakeholders with skills, capacity and funding for anchor implementation of ICT projects for development); and
- Project management (coordinating, directing, and implementing anchor ICT projects in development).

6) Financial

i) Capital Market Authority (CMA)

The CMA functions are as follows:

- Licensing and supervising all the capital market intermediaries;
- Ensuring proper conduct of all licensed persons and market institutions;
- Regulating the issuance of the capital market products (bonds, shares, etc.);
- Promoting market development through research on new products and institution;.
- Promoting investor education and public awareness; and
- Protecting investors' interest.

3.2.4 Infrastructure

This section presents an analysis of the key institutions that relate to the infrastructure provision. These institutions are established by the acts of the Parliament which provides for their functions, roles, and operation. The analysis also highlights how the NIUPLAN will help the specific institutions in meeting and executing their specific mandates and vice-versa.

(1) Kenya National Highways Authority (KeNHA)

Sections 3, 4, and 5 of the Kenya Roads Act (2007) provide for the establishment and functions of the Kenya National Highways Authority (KeNHA) which is responsible for the management, development, rehabilitation, and maintenance of the national roads. Functions of KeNHA are as follows:

(i) Constructing, upgrading, rehabilitating, and maintaining roads under its control;

(ii) Controlling national roads and road reserves and access to roadside development;

(iii) Implementing road policies in relation to national roads;

(iv) Ensuring adherence to the rules and guidelines on axle load control prescribed under the Traffic Act (Cap. 403) and under any regulations under this act;

(v) Ensuring that the quality of road works is in accordance with such standards as may be prescribed by the minister;

(vi) In collaboration with the ministry responsible for transport and the Police Department, overseeing the management of traffic and road safety on national roads;

(vii) Collecting and collating all such data related to the use of national roads as may be necessary for efficient forward planning under this act;

(viii) Monitoring and evaluating the use of national roads;

(ix) Planning the development and maintenance of national roads;

(x) Advising the minister on all issues relating to national roads;

(xi) Preparing the road works programmes for all national roads;

(xii) Liaising and coordinating with other road authorities in planning and on operations in respect of roads; and

(xiii) Performing such other functions related to the implementation of this act as may be directed by the minister.

There needs to evolve a clear framework for cooperation between KeNHA and the NIUPLAN team for the formulation of the Urban Transport Plan since the two main highways (Thika Superhighway and Mombasa Highway) that pass through the heart of Nairobi City are under the care of KeNHA. The two roads contain large volumes of traffic passing through Nairobi City, and the major problem associated with them is that they both carry local and through traffic. It is indeed worth noting that key urban transport strategies have to take into consideration the two highway corridors.

(2) Kenya Urban Roads Authority (KURA)

Sections 9, 10, 11 and 12 of the Roads Act provide for the establishment, functions, and composition of KURA which is the body corporate in charge of management, development, rehabilitation, and maintenance of all public roads in the cities and municipalities in Kenya except if these roads are national roads. KURA has the following powers and duties:

(i) Constructing, upgrading, rehabilitating, and maintaining roads under its control;

(ii) Controlling urban road reserves and access to roadside development;

(iii) Implementing roads policies in relation to urban roads;

(iv) Ensuring adherence of motorists to the rules and guidelines on axle load control prescribed under the Traffic Act (Cap. 403) and under any regulations under this act;

(v) Ensuring that the quality of road works is in accordance with such standards as may be defined by the minister;

(vi) In collaboration with the ministry responsible for transport and the Police Department, overseeing the management of traffic and road safety on urban roads;

(vii) Monitoring and evaluating the use of urban roads;

(viii) Planning the development and maintenance of urban roads;

(ix) Collecting and collating all such data related to the use of urban roads as may be necessary for efficient forward planning under this act;

(x) Preparing the road works programmes for all urban roads;

(xi) Liaising and coordinating with other road authorities in planning and on operations in respect of roads;

(xii) Advising the minister on all issues related to urban roads; and

(xiii) Performing such other functions related to the implementation of this act as may be directed by the minister.

Urban transport is an important component of any integrated plan for urban development. In the preparation of the NIUPLAN, there needs to be strong collaboration between KURA and the NIUPLAN team. KURA is currently engaged in the development of all urban roads in Nairobi City with involvement of most roads, including the new ones like the by-passes and the missing links.

(3) Energy Regulatory Commission (ERC)

The Energy Act establishes ERC which is an independent body corporate with the objects and functions to:

(i) Regulate

a. Importation, exportation, generation, transmission, distribution, supply, and use of electrical energy;
b. Importation, exportation, transportation, refining, storage, and sale of petroleum and petroleum products; and
c. Production, distribution, supply, and use of renewable and other forms of energy;

(ii) Protect the interests of consumer, investor, and other stakeholder interests;

(iii) Maintain a list of accredited energy auditors as may be prescribed;

(iv) Monitor, ensure implementation of, and the observance of the principles of fair competition in the energy sector, in coordination with other statutory authorities;

(v) Provide such information and statistics to the minister as he may from time to time require;

(vi) Collect and maintain energy data;

(vii) Prepare indicative national energy plan; and

(viii) Perform any other function that is incidental or consequential to its functions under this act or any other written law.

The Energy Act stipulates the conditions for ERC in granting licenses for generation, importation, exportation, transmission, or distribution of electrical energy, including certain provisions that are particular to the well-being of the environment, including provisions such as:

(i) The impact of the undertaking on the social, cultural, or recreational life of the community;

(ii) The need to protect the environment and to conserve the natural resources in accordance with the Environmental Management and Coordination Act of 1999 (No. 8 of 1990);

(iii) Land use or the location of the undertaking;

(iv) Economic and financial benefits to the country or area of supply of the undertaking;

(v) The economic and energy policies in place from time to time;

(vi) The cost of the undertaking and financing arrangements;

(vii) The ability of the applicant to operate in a manner designed to protect the health and safety of users of the service for which the licence or permit is required and other members of the public who would be affected by the undertaking;

(viii) The technical and financial capacity of the applicant to render the service for which the licence or permit is required;

(ix) Any representations or objections made under Subsection (4) of Section 28 (which provides for the procedures for making representations and/or objections to applications seeking permits);

(x) The proposed tariff offered; and

(xi) Any other matter that the commission may consider likely to have a bearing on the undertaking.

(4) Kenya Pipeline Corporation (KPC)

The KPC is the state corporation in charge of the only pipeline network in Kenya. KPC, alongside with KRC has high controlling stakes in the Nairobi City's wayleaves. One key aspect that needs to be considered is the fact that a large chunk of the KPC wayleaves is occupied other land uses like informal settlements.

KPC needs to contribute to NIUPLAN in order to help in providing information on identification and uses of its facilities, networks, and wayleaves to avert any possible disaster like the Sinai fire tragedy, as well as to improve the efficiency of utilisation of land surrounding them. In the future, management of wayleaves will need to be done in a manner consistent with the Vision of Nairobi City 2030 as it is outlined in the NIUPLAN.

(5) Kenya Power and Lighting Company (KPLC)

The KPLC is the body mandated to supply electricity in Kenya. KPLC buys electric power or energy from Kenya Electricity Generating Company Limited (KENGEN) and sells on their behalf.

For purposes of NIUPLAN, KPLC plays a critical role of enhancing connectivity, distribution, and availability of electricity to consumers. Thus, KPLC involvement in the NIUPLAN preparation is an important factor as they control a large chunk of wayleaves in the city, in addition to the reliable role of the electric power plays in national development.

(6) Kenya Electricity Transmission Company (KETRACO)

The KETRACO was incorporated on 2 December 2008 and registered under the Companies Act, Cap 486 pursuant to Sessional Paper No. 4 of 2004 on Energy. KETRACO is 100% government owned and being a state corporation, it is regulated under the State Corporations Act, Cap 446.

The company was established to develop new high voltage electricity transmission infrastructure that will form the backbone of the National Transmission Grid, in line with Kenya Vision 2030.

In relation to the NIUPLAN, KETRACO is an important organisation in laying the infrastructure for electric power. Some of the infrastructure is substandard and needs to be upgraded. For purposes of the NIUPLAN, if the large power wayleaves are properly utilised by KETRACO, especially through construction of high quality towers, the wayleaves could be utilised safely for some significant urban functions that have limited land.

(7) Kenya Railways Corporation

This is an act of the Parliament for the establishment of the Kenya Railways Corporation, simply called Kenya Railways.

The act provides for the powers of Kenya Railways Corporation being generally, without prejudice, to construct railways, develop roads to access the railways, develop parking, provide train services, and determine tariffs and train fares. The other roles include responsibilities to buy and sell property, provide housing to its employees, and all such related services.

Relating to the NIUPLAN, the KRC remains an important player in delivering sustainable urban transport framework for the whole of Nairobi City. The current train system is not fully integrated with Nairobi City, and is not helping the city to develop effectively. However, the various plans have the KRC facilities at the core of their development. The Urban Transport Strategies are themselves built around those studies, in addition to the current primary studies that have been conducted for NIUPLAN urban strategies. Further, the massive land holdings that the KRC holds around the current CBD are important components in the land use planning of the CBD. The proposed Railway City is just one of the components of this NIUPLAN.

(8) Athi Water Services Board

Section 51 provides for the establishment of water services boards. The role of these boards include planning for the improvement of the provision of water supply and sewerage services, appointment and contracting water service providers as well as being asset holder of the central government facilities. The Athi Water is one of the eight water boards under the Ministry of Environment, Water, and Natural Resources created to bring about efficiency, economy, and sustainability in the provision of water and sewerage services in Kenya. The Athi Water is created under Section 51 of the Water Act 2002 serving a population of over 4.5 million in Nairobi City and its environs.

Under the Act, water service providers are licensed by water service boards to retail water in their jurisdictions. Nairobi City Water and Sewerage Company is one such water service provider, which has been appointed by the Athi Water Service Board to provide water and sewerage services to the residents of Nairobi City and its environs. The Nairobi City Water and Sewerage Company is committed to ensure that all stakeholders receive water regularly and efficiently and that the water reaching the customers is of highest quality.

According to www.nairobiwater.co.ke, currently, of the three million residents of Nairobi City, only 50% have direct access to piped water. The rest obtain water from kiosks, vendors, and illegal connections. Of the existing customers, about 40% receives water on a 24-hour basis. This is a weakness that the NIUPLAN needs to solve in order to increase water availability to all the residents of Nairobi City.

3.3 Review of Existing Urban Master Plans

3.3.1 History of Nairobi City

The history of Nairobi City traces back to the last decade of the 19th century, when the British started the Mombasa Uganda Railway. When the railway tracks were started to be laid, a camp for workers and a depot for construction materials and equipment were established in an elevated land, which later became Nairobi. The first plan of Nairobi was made in 1989, and the population reached 11,000 in 1906. In 1919, Nairobi became a municipality, and the population started to grow. In 1927, the second plan of Nairobi for a Settler Capital was prepared by professionals.

In 1948, shortly after the World War II, a new plan for Nairobi as a colonial town was prepared. The population at this time was 119,000. Then, Nairobi grew as a regional economic centre, and when Kenya achieved her independence in 1963, Nairobi became the capital city of the Republic of Kenya. The population of Nairobi City at the time of independence was 342,000.

In 1969, the National Census was started in Kenya. The population of Kenya in 1969 at the time of the 1st Census was 509,000, but the population reached the one million mark in the 3rd Census in 1989, exceeded the two million mark in the subsequent census in 1999, and then the three million mark in the most recent census in 2009.

In terms of population growth, the annual average growth rates of Nairobi City population have been more than 6% since its birth until the first Census in 1969. The annual growth rate has subsided to a

4% per annum since then until 1999, and now it falls below the 4% per annum mark. This means that the population in Nairobi City is going through a process of rapid growth to a stable one recently.

Table 3.3.1 Historical Population Change of Nairobi City

Year	Population (1,000)	Average Annual Growth Rate (%)	Remark
1906	11		1st Master Plan (1898) 2nd Plan for Settler Capital (1927)
1948	119	6.84	3rd Master Plan (1948)
1963	342	7.29	Independence (1963), Capital of Kenya
1969	509	6.85	1st Census
1979	828	4.99	4th Master Plan (1973), 2nd Census
1989	1,325	4.81	3rd Census
1999	2,143	4.93	4th Census
2009	3,138	3.89	5th Census, New Constitution (2010)

Source: Nairobi City County

3.3.2 Urban Planning History of Nairobi City

(1) First Plan of Nairobi City in 1898

The first plan of Nairobi City was drawn by a young assistant railway engineer by the name of Arthur Frederick Church in 1898. Church was only 30 years old when he was dispatched to assist Chief Engineer George Whitehouse, and was instructed to prepare a town layout for the railway depot in "Nairobi".

The church's plan had the following features:

(i) The Nairobi Station was just about the same location as it is today, and the railway was laid out at the same location where the Uhuru Highway is today;

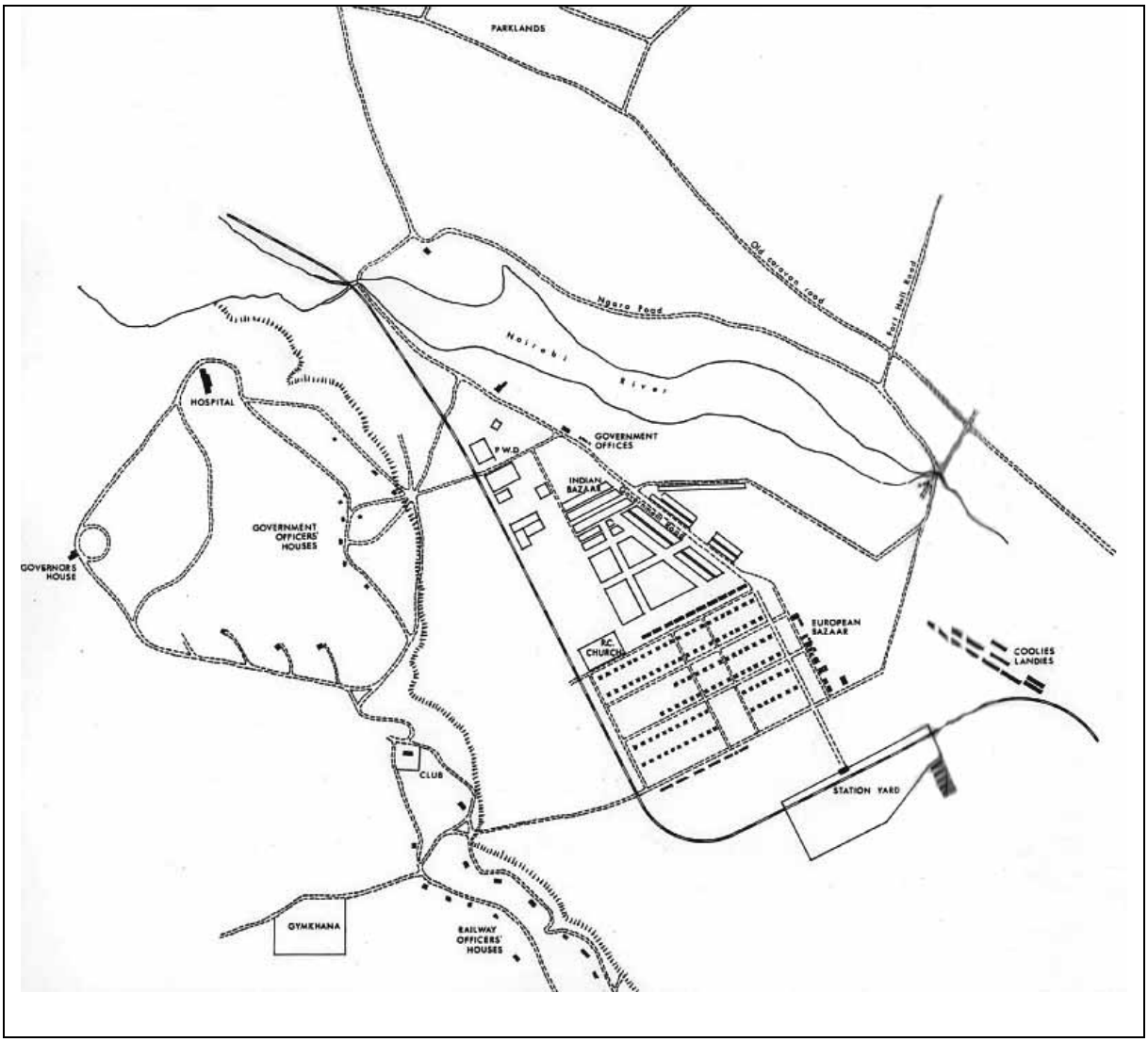
(ii) The main street from the railhead, which was called Station Road (today's Tom Mboya Street), was laid out to the north of the station, with a design to be wide enough for a three-axled oxcart wagons to turn;

(iii) Another street parallel to Station Road called Victoria Street (renamed as Government Street in 1901, and today as Moi Avenue) was laid out with the same width as the Station Road, along with 13 commercial plots called European Bazaar;

(iv) Off Victoria Street were ten streets where the houses for railway workers were built;

(v) Along the rise that bordered the flat land are a half dozen sites for upper grade houses for senior railway men, which is today the location of the railway golf course, and

(vi) The Nairobi River was dammed up to create an impounding pond.



Source: S. Mills, Railway to Nowhere – The Building of the Lunatic Line, Nairobi, 2012

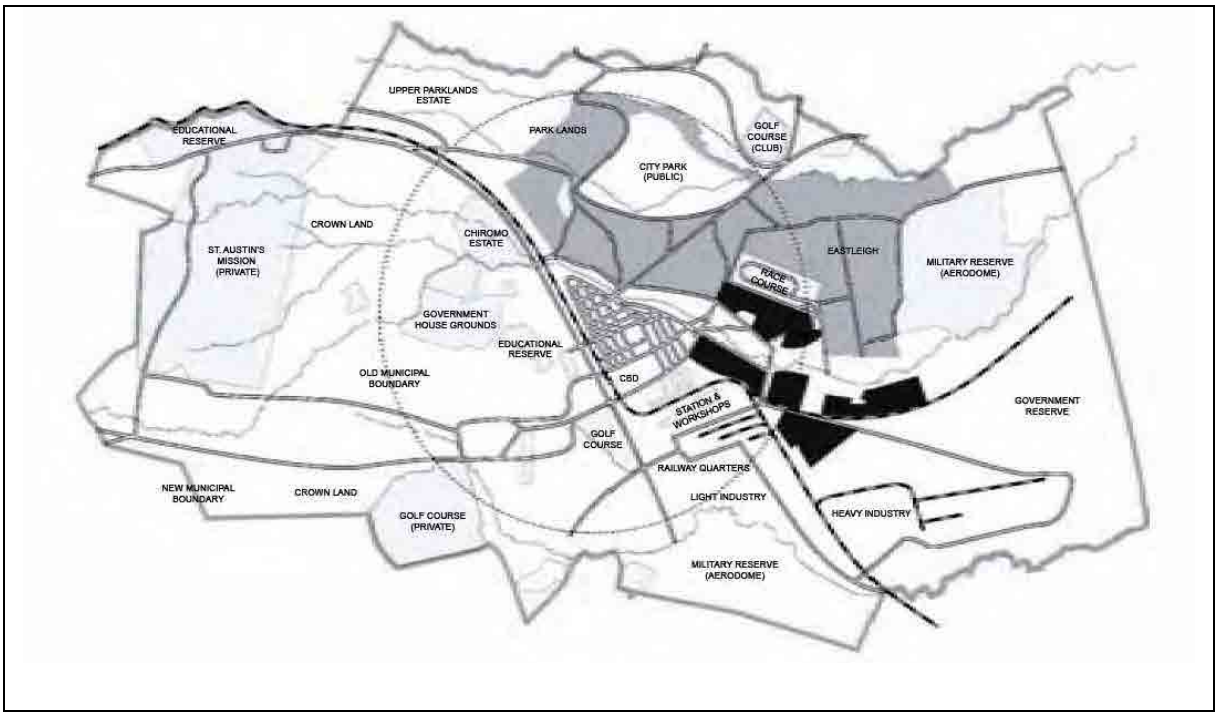
Figure 3.3.1 First Plan of Nairobi City by A. F. Church in 1898

The first town plan was approved by the Chief Engineer Whitehouse on 30 November 1898 and dispatched to London for approval. The spelling of the town was changed by Whitehouse from Nyrobi to Nairobi as is used today before his approval.

The first plan strikingly resembles the town layout of Nairobi City's CBD and its environs today.

(2) Plan for a Settler Capital in 1927

The Plan for a Settler Capital was drawn by F. Walton James and planned by Eric Dutton in 1927 under the British East African rule. The city area was expanded to 77 km^2 to accommodate the growing population. The plan focused on the improvement of drainage and clearing of swamps and regulating building and density. The plan introduced traffic regulations to reach the expanded land for residence, although the residential area was generally segregated by racial groups.



Source: ETH Studio Basel, History of Urban Planning in Nairobi City, 2008

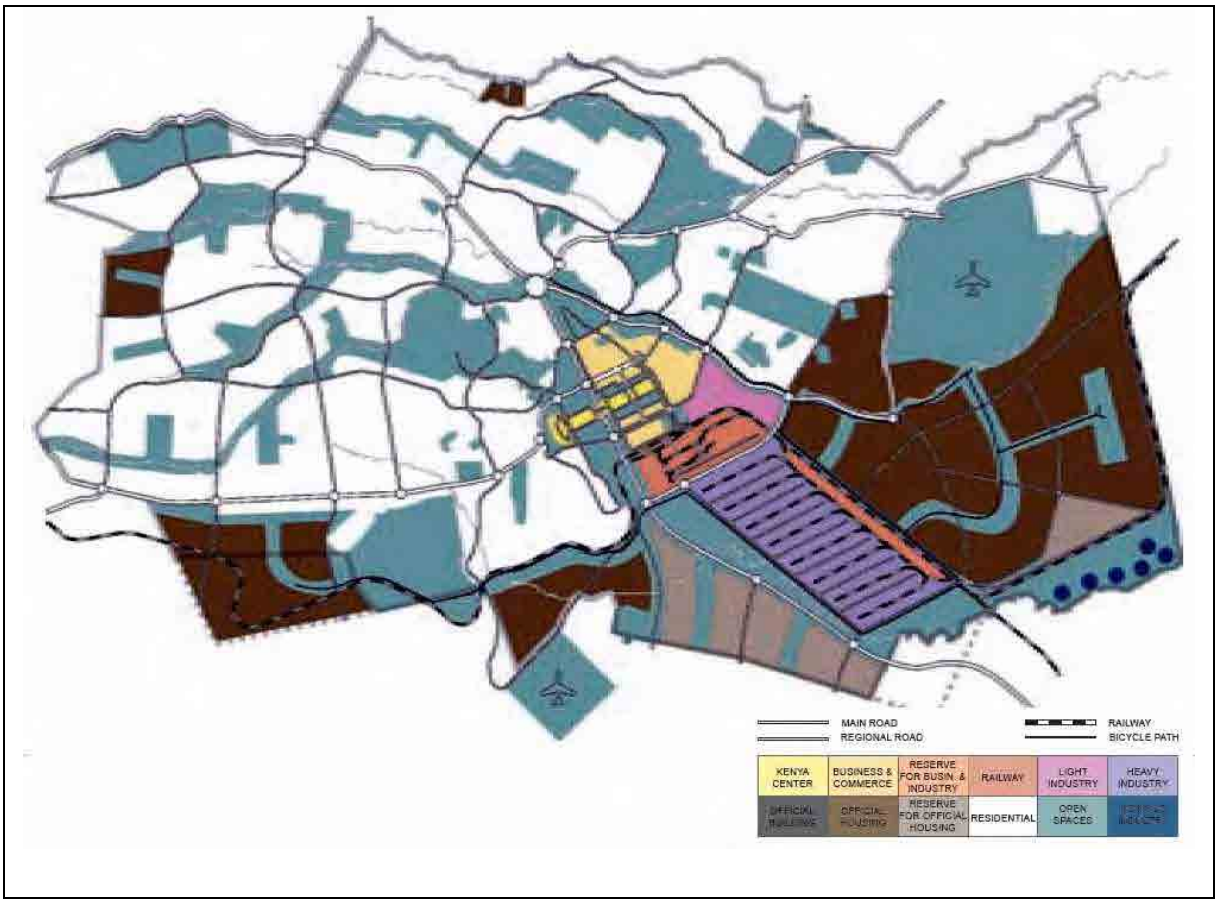
Figure 3.3.2 Plan for Settler Capital in 1927

(3) Master Plan for a Colonial Capital in 1948

The new plan was an experiment in town planning for the colonial Nairobi City, prepared by L. W. T. White, architect and town planner and head of the Department of Architecture, University of Cape Town and others. The master plan was funded by the Municipal Council of Nairobi and the Railway Authorities.

In this plan, a zoning scheme was introduced with zones for official buildings, business and commercial, industry, railway, residential, official housing, open space, forest reserve, and parks. One of the goals of the plan was to establish neighbourhood units for the working class for segregation. Also the plan was expected to make Nairobi more attractive for industrial investments.

It is noteworthy that the alignment of the railway had been changed to the present one along the western part of the town, which gave way for the expansion of the Uhuru Highway today. The area to the south of the railway station was converted to an extensive industrial zone.



Source: ETH Studio Basel, History of Urban Planning in Nairobi City, 2008

Figure 3.3.3 Master Plan for a Colonial Capital in 1948

(4) Nairobi Metropolitan Growth Strategy 1973

In 1971, the United Nations assisted the formulation of the Metropolitan Growth Strategy in collaboration with the UN experts, urban planners in the City Council of Nairobi, and urban planning consultants to form the Nairobi Urban Study Group. In 1973, Nairobi Metropolitan Growth Strategy was published. The team leader was Charu Gupta (1971-72) and Donald Monson (1972-73).

The Metropolitan Strategy set the ultimate target year of 2000, and an intermediate target of 1985. The population of Nairobi City was about 590,000 in 1971, and projected to be 2.88 million in 2000, which was composed of 1.94 million for NCC and the remaining balance in adjoining areas outside of NCC, including Ruiru and Western Shamba. The actual population of NCC was 2.20 million in 2000, so the target was slightly surpassed.

The recommended strategy of the 1973 Plan contains six parts, as listed below:

(i) Regional Strategy

(ii) City Strategy

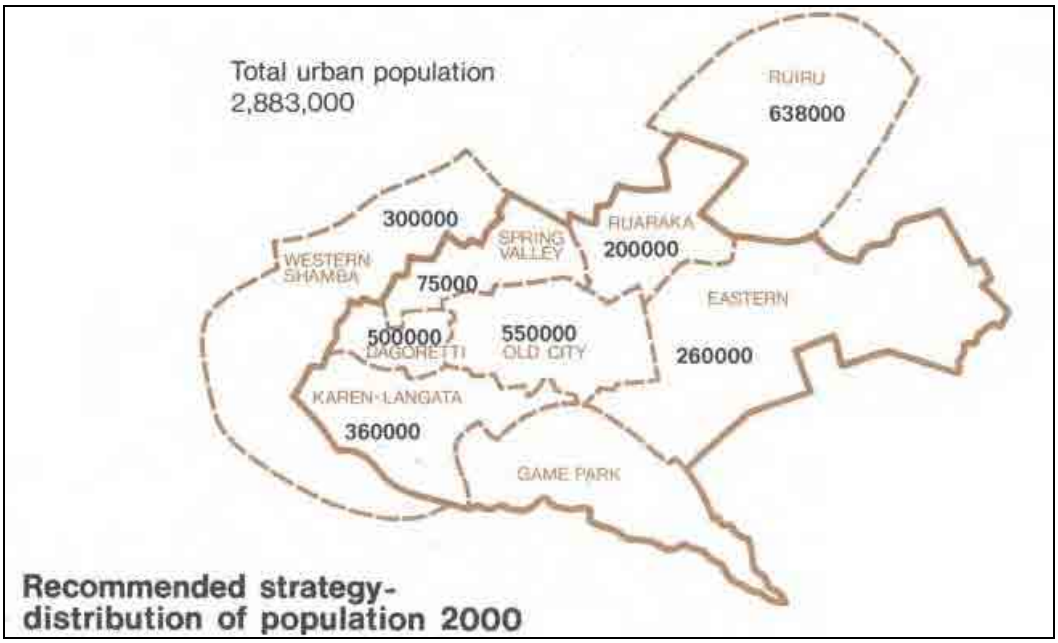
(iii) Description of the Strategy by Area

(iv) Phasing of Development

(v) Recommended Transport Policy

(vi) Implementation Resource

In the section of phasing of development, the distribution of the projected population in 2000 is shown below. Estimated population of Nairobi City was 1,945,000 and urban population including Ruiru and Western Shamba was 2,883,000.



Source : Nairobi City County

Figure 3.3.4 Recommended Distribution of Population in 2000

For the 1973 development plan proposals to be realised, the following are required amongst other factors and conditions:

(i) The 1973 plan was essentially a long-term structure planning policy, recommendation of broad long-term policy directions, strategies, possibilities, and guidelines for the development of Nairobi City. The plan was thus required to be translated into a short-term detailed implementable development programmes and projects, appropriate for each local zone or area of the city.

(ii) The plan required the availability of financial capability and skilled professional personnel resources within the City Council of Nairobi and the Government of Kenya to facilitate the process of detailed planning and implementation of the planned actions at the local level.

(iii) It also required a significant strengthening and streamlining of the City Council of Nairobi and the Government of Kenya institutional decision-making and enforcement machinery and instruments for effective implementation and realisation of the goals and objectives of the 1973 Plan.

It was observed with regret that the above stated conditions were hardly met in the process of subsequent implementation phase of the 1973 Development Plan for Nairobi City. With direct relevance to the planning area, the results are as follows:

(i) Development has continued without the guidance of a detailed localised zonal system; i.e., Physical Development Plan.

(ii) The forces of speculation and private investment that desire to maximise profit have driven the process of development in these areas with minimum control or guidance from the authorities concerned.

(iii) This development has also taken place without regard to the limitations of the existing infrastructural, transport, and utility facilities to support the increased development in the planning area.

(iv) The existing extreme shortage of housing generally prevailing in the whole Nairobi City has only helped to fuel the speculative development process.

In the 1973 Strategy, a variety of proposals were made in relation to the urban planning of Nairobi City, major parts of which are listed below:

(i) The Central Business District (CBD) was already congested, and it was proposed to supplement some of the functions of CBD in some suburban sub-centres to avoid excessive concentration in reference to the experiences of some major metropolitan areas in the world. For Nairobi City, a wide road surrounding CBD was proposed with bus ways to connect residential and industrial areas, and use of private cars was curtailed so that the increasing number of population would shift to public transport.

(ii) The industrial area close to CBD was providing a large number of employments, but was already heavily concentrated. Excessive concentration should be avoided. When necessary, the expansion may be limited to capital-incentive, urban industry type with limited employments. For other existing industries, expansion of production shall be recommendable in suburban locations.

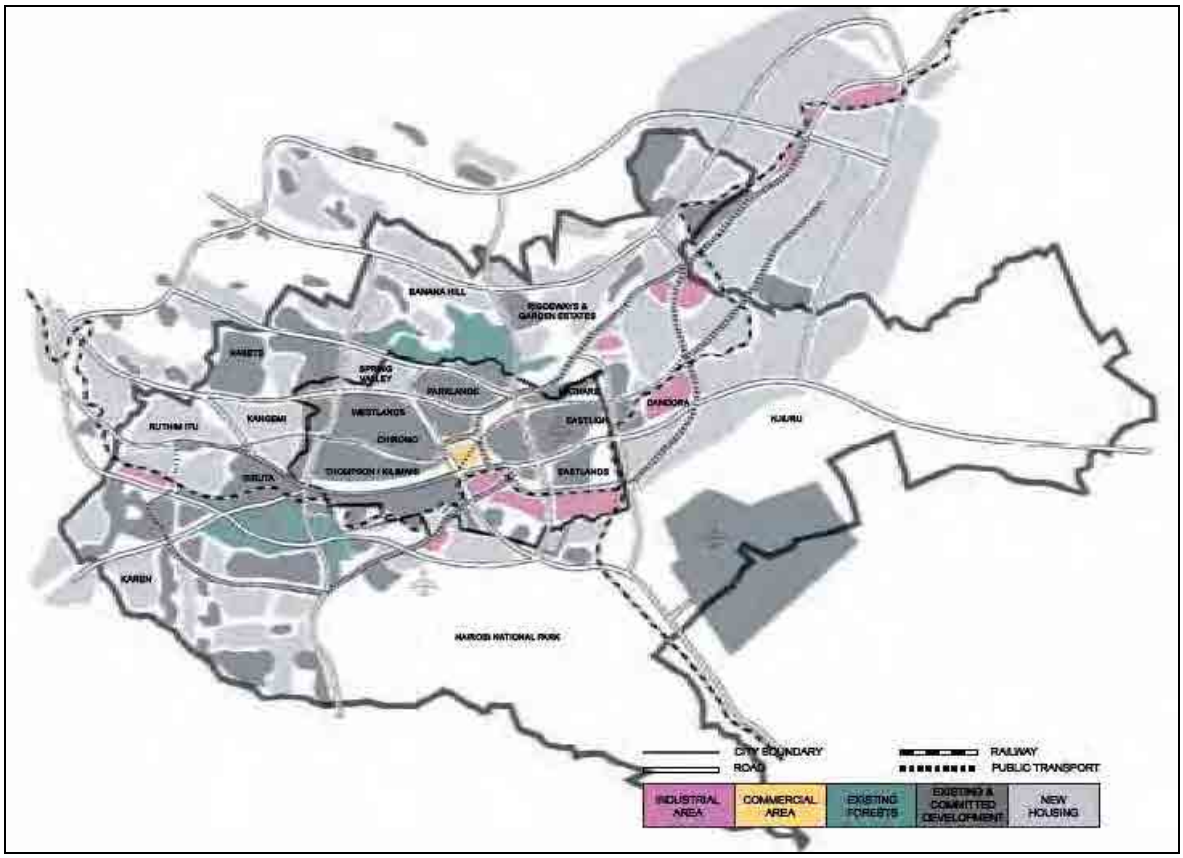
(iii) The northern part of the city, which then had mostly been taken in as coffee plantation and estates, was expected to be an urban area by the turn of the century. As some areas are steep-sided hills that are not easy to convert to high to medium density housing area or industrial area, they will be used mainly for low density housing development.

(iv) The southern part of the city, which includes Kibera and Wilson Airport, was proposed to be used chiefly as residential area for low to medium income population. Wilson Airport was proposed to be relocated to a site outside of Nairobi. The site after relocation may be suitable for industrial area.

(v) Karen and Langata areas continue to be used for middle to high income population.

(vi) Dagoretti is an area located in the west of the city, which was expected to have rapid population growth. In order to absorb employments within the zone, provision of industrial area and commercial centres would be necessary.

(vii) The eastern part of the city continues to serve for low to middle income population except for few high end estates.



Source: ETH Studio Basel, History of Urban Planning in Nairobi, 2008

Figure 3.3.5 Nairobi Metropolitan Growth Strategy 1973

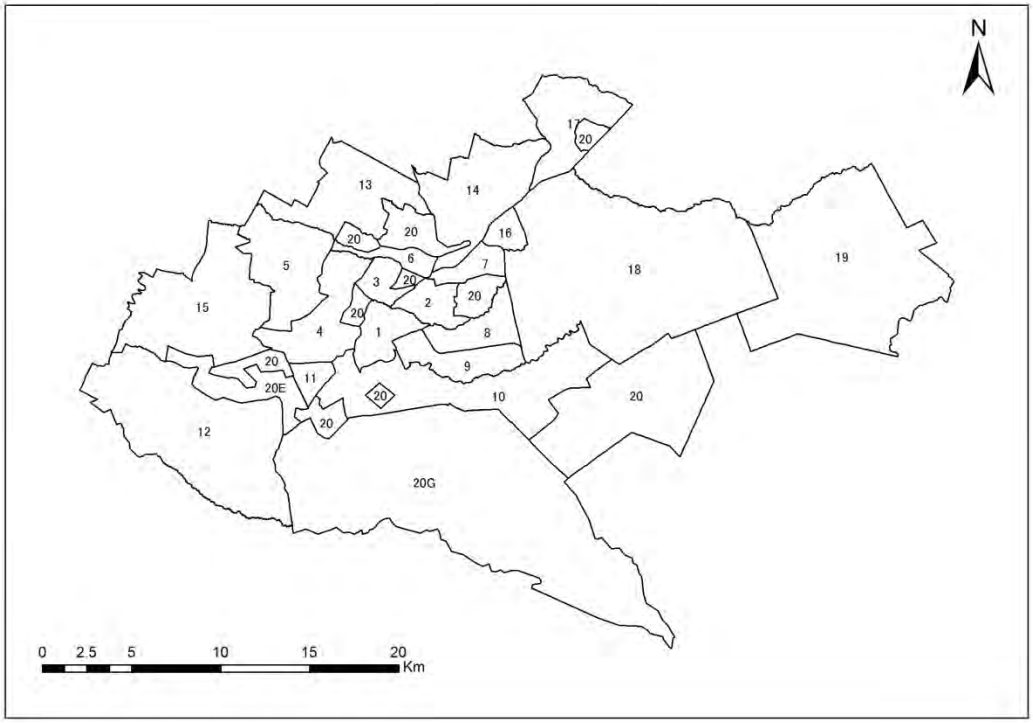
3.3.3 Nairobi City Development Ordinances and Zones

This subsection looks into some of the practices in Nairobi City's regulations on the zoning system, though the system itself is not complete and systematic.

(1) Old Zoning Systems

A preliminary land use zoning was designated for the 1948 master plan in smaller Nairobi boundary in 8,315 km^2 with 20 zones.

Then a new scheme based on the expanded to the existing Nairobi City boundary was introduced in 1968. This zoning system tried to regulate land use and minimum plot size by zones established as below.



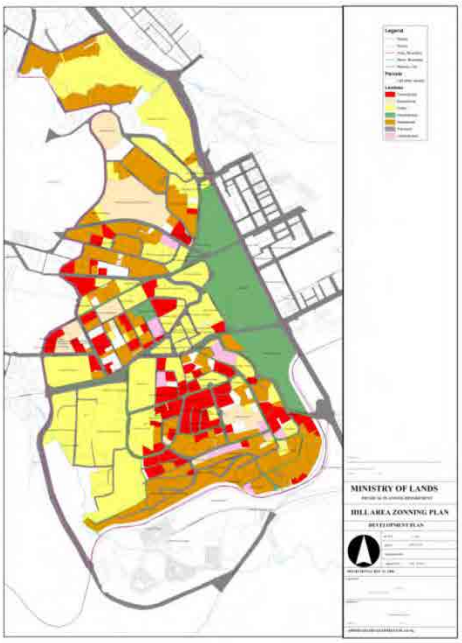
Source: JICA Study Team (JST)

Figure 3.3.6 Zone Map by JST

(2) Revision of Zoning for Upper Hill Area in 1993

The City Council of Nairobi in conjunction with the Physical Planning Department of the Ministry of Lands engaged in a joint study and formulated the Upper Hill Rezoning Plan in 1993. This revision was motivated by the rapid development in the area and the infrastructure services remained mostly unmatched particularly for the roads. In the meanwhile, a number of modern office buildings are built in the Upper Hill area.

One of the challenges that was faced by the City Council of Nairobi in the implementation of the revised plan was the level of infrastructure in place vis-a-vis the magnitude of development being realised. Although the 1993 Rezoning Plan provided for widening and expansion of the roads serving the area, this had not been implemented much afterwards.



Source : Nairobi City County

Figure 3.3.7 Hill Area Zoning Plan

(3) Nairobi City Development Ordinances and Zones

The last zoning review was carried out in 2004 and resulted in subdividing 20 zones into smaller zones and prescribed ground coverage ratios (GC) and plot ratios (PR), and definition of the minimum plot size for each zone.

Table 3.3.2 Part of Nairobi City Development Ordinances and Zones

ZONE	AREAS COVERED	GC %	PR %	Dept Ref. Map	TYPE (S) OF DEVELOPMENT ALLOWED	MIN. AREA (Ha.)	REMARKS/POLICY ISSUES
1A	**Central Business District (CBD)**			CP/F/XXX	Commercial/Residential/Light Industry	0.05	
	• Core CBD	80	600				
	• Peri-CBD	80	500				
	• West of Tom Mboya St	60	600				
	• East Of Tom Mboya St	80	350				
	• Uhuru H/W/ University Way/Kipande Rd	80	500				
1E	**Upper Hill Area**			CP/F/XXX	Commercial/Offices/ Residential	0.05	
	• Block 1 - Offices (Community)	60	300				
	• Block 2 - Comm/Off	60	250				
	• Block 3 - Offices	60	300				
	• Block 4 - Residential	35	150				
	• Block 5 - Institutional (KNH)						
	• Block 6 - (Mixed: Inst;Htls;Offs)	60	200				
2	**Eastleigh**			CP/F/XX XX	Commercial/Residential (High-rise Flats)	0.05	
	• Eastleigh District Centre	80	250				
	• Eastleigh Comm/Residential	60	240				
	Pumwani/Califarnia	60	240	CP/F/XXX	Commercial/Residential (High-rise Flats)	0.05	
	Ziwani/ Starehe						
	• Commercial	80	150				
	• Residential	35	75				

Source : Nairobi City County

This revision allowed developers a maximum of four floors for apartments in Westlands, Parklands, Woodley, Kilimani, and Kileleshwa. However, the situation in those areas and the current development activities did not seem to follow the revised regulation much. These can be observed in incidents of high-rise building of more than five floors and land use mixture in residential areas.

Actual regulation may seem to be more ad-hoc than the adopted scheme. Maps indicating the standing regulations were planned for public reference, but have not been realised. Thus, the zoning itself lacks discipline and strength to control the day-to-day development activities appropriately.

(4) Revision of the Existing Zones and Regulations

The NCC conducted two studies on Land Use Study and Policy Plan for Zones 3, 4, and 5 and Zones 6, 13 and 20B in 2012. And also another study was conducted for the Upper Hill area with stakeholder forums in 2008. These revisions are not yet authorised, and still waiting for the outcome of the NIUPLAN.

3.3.4 Strategy and Spatial Planning Concept for Nairobi Metropolitan Region

The Nairobi Metro 2030 (prepared in 2008) and Spatial Planning Concept for Nairobi Metropolitan Region (prepared in 2013) are considered umbrella plans for the present Nairobi Integrated Urban Development Master Plan (NIUPLAN). Some of the recommendations and proposals in the Spatial Planning Concept for Nairobi Metropolitan Region will be integrated in the NIUPLAN. The components related to the formulation of NIUPLAN were reviewed hereafter.

(1) Nairobi Metro2030

Nairobi Metro 2030 is a part of an overall national development agenda for Kenya towards 2030 and aims at optimising the role of Nairobi Metropolitan Region (NMR) in the national development context.

The Nairobi Metro 2030 is composed of: (i) growth and development framework; (ii) Metropolitan Nairobi's strategic challenges; (iii) vision and goals, (iv) growth management structure, the goals, strategies, and actions; and (v) strategic vision to reality: employing class metropolitan governance systems. The outline of the plan is summarised below.

Delineation of the Nairobi Metro Boundary

The NMR is a much larger area than Nairobi City. The population of NMR was 6.64 million (2009 Kenya Population and Housing Census) and the area is 32,000 km^2, while the population of Nairobi City was 3.1 million and the area is 700 km^2. The following Table 3.3.3 shows the local authorities included in the NMR. Local authorities included in the NMR are listed in the table below.

Table 3.3.3 Delineation of the Nairobi Metro Boundary

Groups	Local Authorities
Core Nairobi City	City Council of Nairobi
Northern Metro	Municipal Council of Kiambu, Municipal Council of Ruiru, Municipal Council of Karuri, Town Council of Kikuyu, County Council of Kiambu
Southern Metro	Town Council of Kajiado, County Council of Olkejuado
Eastern Metro	Town Council of Tala/Kangundo, Municipal Council of Machakos, Municipal Council of Mavoko, County Council of Masaku

Source : JICA Study Team (JST)

The vision, goals, and strategies set in the Nairobi Metro 2030 are summarised below.

Vision

Metropolitan Vision 2030:

To be a world class African metropolis, supportive of the overall national agenda articulated in Kenya Vision 2030

Four principals:

(1) A world class working environment.
(2) A world class living environment.
(3) A world class business environment.
(4) World class metropolitan governance.

Key foundation for Metropolitan Vision 2030

(1) Building an internationally competitive and inclusive economy for prosperity.
(2) Deploying world class infrastructure and utilities in the region.
(3) Optimising mobility through effective transportation.
(4) Enhancing the quality of life and inclusiveness in the region.
(5) Delivering a unique image and identity through effective place branding.
(6) Ensuring a safe and secure region.
(7) Building world class governance system.

Goal, strategies, and actions

Goals	Strategy and Action
Building an internationally competitive and inclusive economy for prosperity.	● Building a regional and global financial services, regional trade and business services hub. ● Regional manufacturing, industrial technology parks initiative. ● Building the Jomo Kenyatta International Airport City. ● Diplomatic initiative. ● Bringing the world to Nairobi Metropolitan Region: a tourism initiative. ● Regional and global research and education hub. ● Enhancing service culture in work organisations.
Deploying world class infrastructure and utilities in the region.	● Service level mapping exercise and benchmark nationally, regionally and globally. ● Energy demand management initiative. ● Water master plan. ● Integrated waste management project. ● A comprehensive stormwater drainage and flood water mitigation plan. ● A metropolitan wide strategic environment assessment. ● Integrated information communication technology infrastructure plan. ● Smart city/villages strategy. ● Develop and integrated metropolitan infrastructure master strategy and plan.

Goals	Strategy and Action
Optimising mobility and accessibility through effective transportation.	● Metropolitan road transport infrastructure measures. ● Metropolitan mass rapid transit program. ● Traffic management strategies. ● Central business district access strategies. ● Demand management. ● Logistics and supply chain management. ● Land use measures. ● Information and communication technology in transport measures. ● Coordination of institutional interventions. ● Metropolitan road safety program.
Enhancing quality of life and inclusiveness in the region.	● Housing and elimination of slum program. ● Environmental management strategy. ● Enhancing access to medical services strategy. ● Enhancing access to and performance of education. ● Enhancing food safety and security. ● Ethnic and race relations. ● Integrated spatial strategy for the Nairobi Metropolitan Region.
Delivering a unique image and identity through effective branding.	● Branding and promoting the Nairobi Metropolitan Region. ● A Nairobi Metropolitan Region heritage and culture strategy. ● An identity building urban design and landscaping strategy.
Ensuring a safe and secure Nairobi Metropolitan Region.	● An effective metropolitan policing strategy. ● Street light program. ● Building an effective metropolitan emergency service. ● Metropolitan street addressing program.

(2) Spatial Planning Concept for Nairobi Metropolitan Region

The "Spatial Planning Concept for Nairobi Metropolitan Region" was prepared by the Ministry of Nairobi Metropolitan Development and approved in March 2013.

According to the staff of the Ministry of Nairobi Metropolitan Development, despite the fact that the Ministry Nairobi Metropolitan Development does not exist in the new government structure, the plan is still valid and the NIUPLAN has to be in line with the Spatial Plan Concept for NMR. Some important contents of the plan, such as population framework, settlement pattern (build up area and new town), settlements hierarchy, land use/land cover, design intervention of NCC, which will be a base for NIUPLAN, are summarised as shown below.

1) Population Framework

The population size of NCC is forecasted under the following assumptions:

- Gradual containment of Nairobi City's growth to be within acceptable, optimum city density.
- Disincentives for location of activities within Nairobi City such as heavy industries, which require large extent of land, cause major environmental pollution, and generate heavy goods traffic.
- Promotion of activities and investments in other parts of the region through incentives. These policies would include favourable land policies, improved accessibility and connectivity, higher levels of physical and social infrastructure, fiscal incentives, differential pricing of services, etc.

The gross density of NCC, by 2030, is proposed to be limited to 75 persons per ha increasing from 52 persons per ha in 2009. The assigned population size of NCC is 5.21 million and housing demand is forecasted at 1,303,125 in 2030.

Table 3.3.4 Population of NMR

Sr. No.	Spatial Units	2009	2030
1	**NMR**	**6,658,000**	**15,131,435**
	Urban	4,924,286	13,073,459
	Rural	1,733,714	2,057,976
2	**Nairobi City**	**3,138,369**	**5,212,500**
3	**ONMR**	**3,519,631**	**9,918,935**
	Urban	1,785,917	7,860,959
	Rural	1,733,714	2,057,976
4a	**Northern Metro**	**1,786,879**	**4,971,173**
	Urban	991,852	4,187,315
	Rural	795,027	783,859
4b	**Eastern Metro**	**1,045,440**	**2,962,187**
	Urban	511,343	2,376,206
	Rural	534,097	585,981
4c	**Southern Metro**	**687,312**	**1,985,575**
	Urban	282,722	1,297,438
	Rural	404,590	688,137

Source: Spatial Planning Concept for Nairobi Metropolitan Region

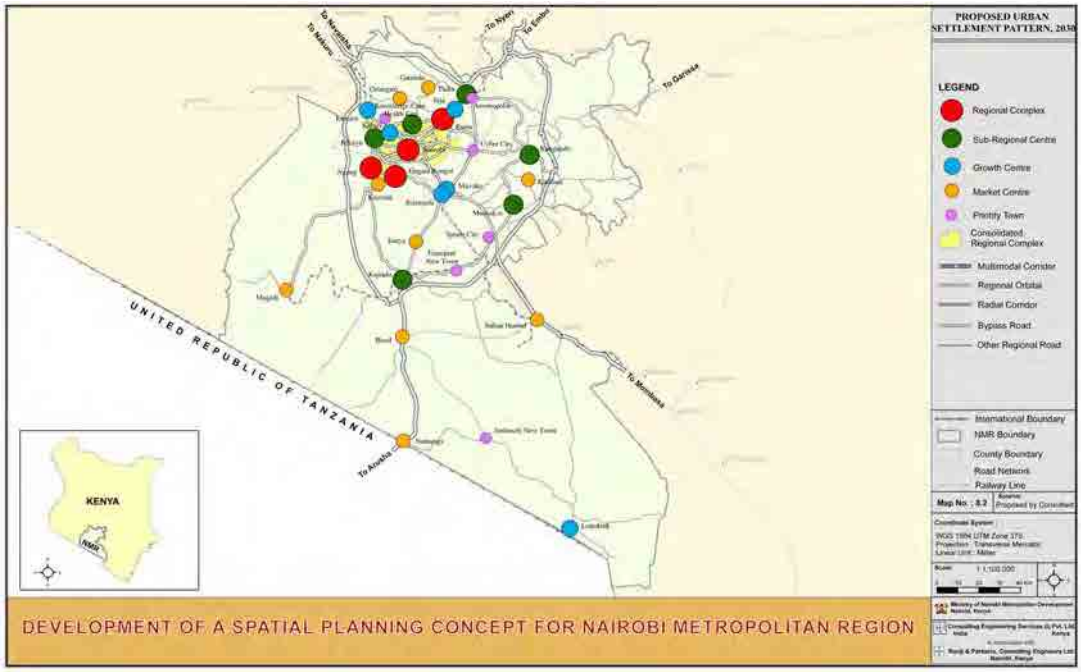
2) Settlements Hierarchy of Settlements

Proposed Settlement Hierarchy for NMR in 2030 is summarised below. NCC is classified in the "Regional Complex".

Table 3.3.5 Settlement Hierarchy of NMR

Level	Settlement Hierarchy	Settlements	Characteristics
I	Regional Complex	Nairobi City-Ngong-Ongata Rongai-Ruiru Complex	● Highest administrative functions ● Specialised and world class facilities ● Tertiary activities
II	Subregional Centre	Thika, Kikuyu, Kiambu, Machakos, Tala/Kangundo, Kajiado	● Administrative functions/county headquarters ● Higher level infrastructure ● Secondary and tertiary activities ● Strong industrial base
IIA	Priority Town	New Towns	● Planned to decongest Nairobi City and developments in the surrounding regions ● Designed with specialised facilities on the basis of world class norms ● To be planned as special packages and special focus for development
III	Growth Centre	Limuru, Karuri, Juja, Mavoko, Kitengela, Loitoktok	● Intermediary towns ● Important role in promoting rural development and in achieving a balanced distribution of urban population ● Provide functional linkages between the smaller towns and subregional centre
IV	Market Centre	Gatundu, Githunguri, Kathiani, Kiserian, Namanga, Isinya, Bissil, Sultan Hamud Magadi	● Small town having linkages with immediate rural hinterlands. ● Is the higher order village having central location and potential for development within its catchment area, with relatively better services and facilities in terms of education, health, communication, accessibility and has the capacity to serve a group of basic villages.
V	Central Village Centre	To be identified as part of subregional plans	● Would cater to the rural hinterland as agro service centre in the collection and distribution of agricultural goods and services with processing, marketing, warehousing, and storage facilities.
VI	Basic Village	All villages	

Source: Spatial Planning Concept for Nairobi Metropolitan Region

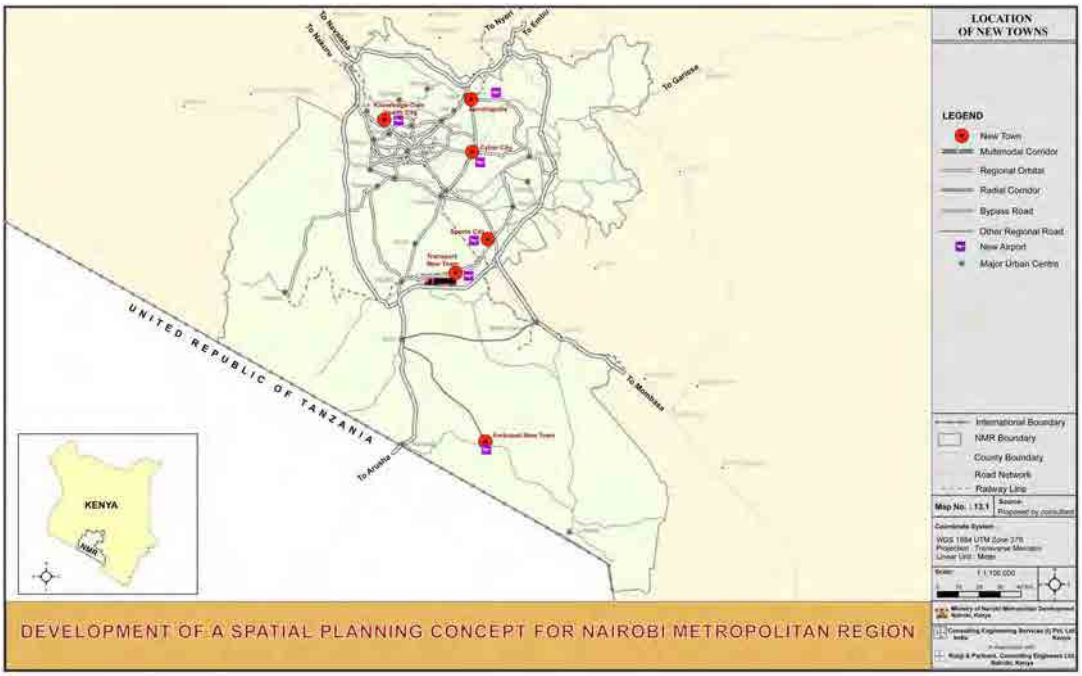


Source: Spatial Planning Concept for Nairobi Metropolitan Region

Figure 3.3.8 Proposed Urban Settlements Pattern

3) New towns

Six new towns are proposed within the NMR such that each county has two new towns. The six proposed new towns are as follows:



Source: Spatial Planning Concept for Nairobi Metropolitan Region

Figure 3.3.9 Location of New Town

Table 3.3.6 List of New Towns Proposed

No	New Towns	Characteristics
1	**Aerotropolis**	**Function** The Aerotropolis will comprise aviation-intensive businesses and related enterprises. Aerotropolis typically attracts industries related to time-sensitive manufacturing, e-commerce fulfilment, telecommunications and logistics, hotels, retail outlets, entertainment complexes, and exhibition centres; and offices for business people who travel frequently by air or engage in global commerce. Clusters of business parks, logistics parks, industrial parks, distribution centres, information technology complexes, and wholesale merchandise marts located around the airport and along the transportation corridors radiating from them. An air transport oriented SEZ to be part of the proposed Aerotropolis. **Location** The Aerotropolis is proposed near Thika Municipality, north of Garissa Road in between the proposed regional orbital and Greater Eastern By-pass extension to Thika at a distance of approximately 40 km from CBD, Nairobi City.
2	**Knowledge-cum-Health City (Nairobi City)**	**Function** The Knowledge-cum-Health City would comprise agricultural research centres, technological university, management institutes, agro-based health centres, hospitals, and other institutions. **Location** The Knowledge-cum-Health City is proposed north of Limuru Road, coffee and tea plantations at a distance of approximately 20 km from CBD, Nairobi City.
3	**Cyber City**	**Function:** The Cyber City would comprise service oriented industries in the field of information technology and information technology enabled services (IT/ITeS) for the region. **Location:** The Cyber City is proposed at the junction of Greater Eastern By-pass and Kangundo Road in Machakos County at a distance of approximately 30 km from CBD, Nairobi City.
4	**Transport New Town**	**Location:** The Transport New Town is proposed along the regional orbital near the transport-cum-logistic hub near Kajiado in Kajiado County at a distance of approximately 60 km from CBD, Nairobi City. **Population and Density** It has been envisaged that by 2030 the Transport New Town will accommodate a population of 100,000 with a population density of 50 ppha
5	**Sports City**	**Function:** The Sports City would incorporate world-class sporting venues and sports academies, as well as residential and commercial properties and all related amenities such as hotels, entertainment outlets, schools, medical facilities, and retail opportunities. It is envisaged that the main sports complex will have a multi-purpose outdoor stadium of a capacity of 60,000 seats. The stadium could be used for athletics, cricket, and football. Also a 25,000 seat cricket ground, a 10,000 seat indoor arena, and a 5,000 seat field hockey stadium are proposed apart from sports academies and institutes. **Location:** The Sports City is proposed on a relatively flat land at the junction of the Mombasa Road and the regional orbital in Machakos County at a distance of approximately 60 km from CBD, Nairobi City.
6	**Amboseli New Town**	**Function:** Amboseli New Town will comprise the hospitality industry to boost tourism in the area. It will consist of hotels, resorts, entertainment outlets, gaming arcades, outdoor activities with plush green landscaped gardens. **Location:** The new town is proposed adjacent to the Amboseli National Park at a distance of approximately 150 km from CBD, Nairobi City.

Source: Spatial Planning Concept for Nairobi Metropolitan Region

4) Land cover/land use

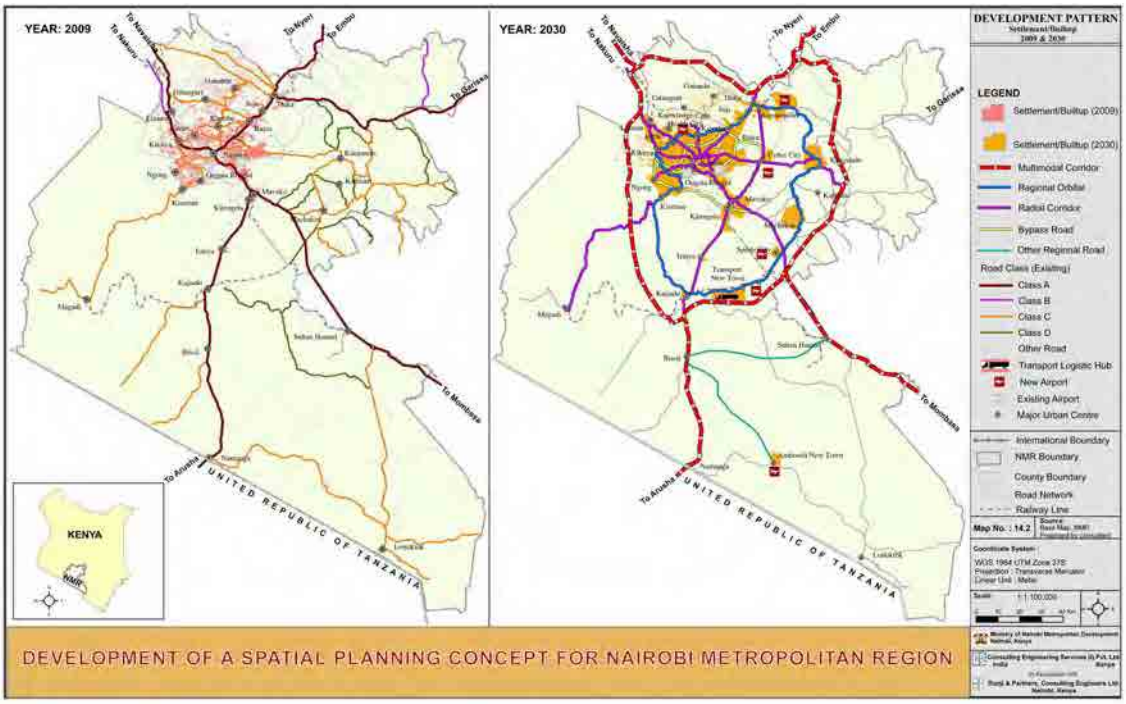
The following land use classification is proposed for NMRs.

Table 3.3.7 Proposed Land Use Classification

No	Land Use Classification	Characteristics
1	Settlement Zone	Settlement zone is the spatial built up area within the region and covers both urban and rural areas.
2	Transport Zone	The transport zone includes road, rail, and airport areas within the region.
3	Forest Zone	It includes all environmentally sensitive areas which are meant to be protected. It includes existing areas under forest, national parks; conservation zone; and open shrubs, plantation, and riverine trees.
4	Water Bodies	The water bodies in the region are divided into three categories: rivers, drainage; swamps and sand; and other water bodies.
5	Agriculture and Rangeland	It includes land used for agriculture and related activities such as grazing, etc.

Source: Spatial Planning Concept for Nairobi Metropolitan Region

Settlement zone is proposed as follows. The entire NCC and six new towns are classified as settlement zones.



Source: Spatial Planning Concept for Nairobi Metropolitan Region

Figure 3.3.10 Development Pattern, Settlement/Build Up 2009 and 2030

Land use classification for urban centres of NMR and distribution for NCC have been proposed as follows:

Table 3.3.8 Proposed Urban Land Use Classification for NMR and Distribution for NCC

No.	Land Use Categories	Area / Activities Included Within the LandUuse	Area	
			(ha)	(%)
1	Residential area	- Primary residential - Mixed residential - Unplanned/informal residential	27,800	40
2	Commercial area	- Retails shopping - General business and commercial district/centres - Wholesale, godowns, warehousing/regulated markets	2,780	4
3	Public and semi-public	- Government/semi government/public offices - Government lands - Educational and research - Medical and health - Social, cultural, and religious - Utilities and services - Cremation and burial grounds	5,560	8
4	Industrial area	- Service and light industry - Extensive and heavy industry - Special industrial, hazardous, noxious, and chemical	6,950	10
5	Transport:	- Roads - Railways - Airport - Seaports and dockyards - Bus depots/truck terminals and freight complexes - Transmission and communication	12,510	18
6	Open spaces	-Playground/stadium/sports complex -Parks and gardens-public open spaces -Special recreational – restricted open spaces -Multiple-purpose open spaces	13,900	20
	Total		69,500	100

Source: Spatial Planning Concept for Nairobi Metropolitan Region

5) Design Interventions for Nairobi City

Urban design and regional landscape is also proposed in the Spatial Planning Concept, particularly in CBD of NCC. The following interventions are recommended in the plan:

(i) Establishment CBD as a City Precinct

(ii) Redevelopment of Moi Avenue

(iii) New square development in the CBD area

(iv) Air force station area reorganisation

(v) Industrial area reorganisation and linkages

(vi) Capitol complex development

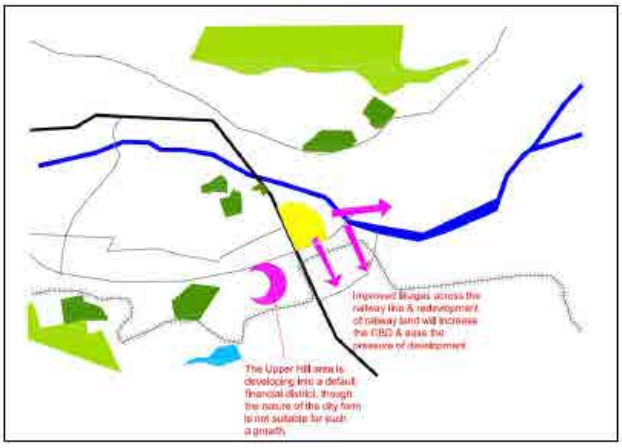
(vii) Nairobi riverfront development

The figures shown below illustrate one of interventions proposed for urban design and regional landscape for CBD. Figure 3.3.11 illustrates the necessity of delineation of CBD boundary based on collective strategies, for the development of the entire area (intervention (i) establishment CBD as City Precinct). The main objective is proposed to make CBD as a City Precinct in order to "create a vibrant commercial centre".

Figure 3.3.12 shows the idea for (v) industrial area recognition and linkages and illustrates the importance of land use upgrading of the industrial area, which allows for the CBD peripheral development for commercial and industrial activities.

Source: Spatial Planning Concept for Nairobi Metropolitan Region

Figure 3.3.11 CBD of Nairobi City County



Source: Spatial Planning Concept for Nairobi Metropolitan Region

Figure 3.3.12 CBD and Its Linkage to Railway, Upper Hills

3.4 Human Resources Development

3.4.1 Introduction

(1) Background of Capacity Development

As seen in earlier parts of the report, i) uncontrolled urban development, ii) insufficient infrastructure, iii) poor living condition, iv) lack of social facilities, and v) transport problems have been identified as major urban problems in Nairobi City. These problems are caused by (i) demand side, which is categorised by a large share of low and middle income group and extensive in-migration from the rural area and by (ii) public sector/supply side, which is categorised into lack of updated urban development plans, lack of comprehensive development management system, and insufficient capacity of urban development management. Amongst these causes, insufficient capacity of urban development management is addressed as a human resources management and capacity development issue. For effective management of urban development, capacity development is a crucial instrument for improvement. To sustain the organisation in the long run, it is also very important to address capacity development.

(2) Output of Capacity Development in the Project

The following outputs for capacity development are to be attained in the Project in order to cater for an effective urban management.

- To formulate mid-long term capacity development plan.
- To formulate technology transfer plan during the project.

Technology transfer will be conducted between the Kenyan counterparts and the Japanese experts in the course of the project. Capacity development plan as a management tool for strengthening of urban management will be formulated through discussion with Working Group members during the Project. The capacity development plan is part of the urban master plan, so the capacity development plan covers not only the short-term capacity development scheme during the project but also extends to mid-long term after the project.

It should be noted that the City Council of Nairobi (CCN) is in transition to NCC, and the following basically pertains to the situation under CCN. In the transition, some changes may occur in relation to human resources development and management, which are yet to be observed.

3.4.2 Current Situation of Human Resources Management

The Human Resources Development Department of CCN is in charge of human resources development. For the department level, administration section of each department plays an important role to execute human resources management and capacity development. With the cooperation of the administration section of the City Planning Department, the JST conducted an interview survey and literature survey to grasp the current situation of capacity development.

(1) Interview Survey

JST had interviews with the chiefs of the sections in the City Planning Department of CCN. Table 3.4.1 shows the results of training needs by each section. Most of the sections see GIS as the most important skill to execute the works. GIS is seen to make things work easily and efficiently. ICT is also effective not only in document preparation and data analysis but also in retrieving information from the database. However, the number of computers and software is too small to meet the needs.

Table 3.4.1 Number of Officials and Training Needs

Section	Number of Officials	Necessary Skills
Policy Implementation	11 (Technical 4, Admin. 7)	GIS
Enforcement	18 (Technical 6, Admin. 12)	Building Control
Development Control	40 (Technical 15, Admin. 25)	ICT Auto CAD
Research	18 (Technical 14, Admin. 4)	ICT GIS
Forward Planning	14(Technical 8, Admin. 6)	GIS
Land and Survey	40 (Technical 15, Admin. 25)	GIS
Urban Design	18 (Technical 6, Admin. 12)	GIS

Source: JICA Study Team based on Interview to City Planning Dept. CCN

The current grading structure in CCN comprises 18 grades altogether, made up of eight management and ten non-management grades. The following table shows the number of staff per grade in the City Planning Department. The share of supporting staff is the largest, which is about 70% of the staff members of the department. Supporting staff include drivers and cleaning staff, who are not engaged in planning works.

Table 3.4.2 Number of Employee in City Planning Dept. CCN

Salary Scale Level	Staff Level	Number of Employees Within the Grade
Scale 1-4	Senior Management	1 (0.5%)
Scale 5-8	Middle level management	21 (9.7%)
Scale 9-10	Non-management	48 (22.1%)
Scale 11-18	Support	147 (67.7%)
	Total	217 (100%)

Source: City Planning Dept. CCN

The officials have taken training courses in the universities, poly techniques, training schools by the Government of Kenya, or technical colleges. Taking the course is the main method of capacity development in the department. An internal training programme such as lectures by senior staff are not frequently conducted. The cost of taking the course in external organisations is shouldered by CCN, but the officials have to pay the tuition first from their own pockets and submit the completion certificate of the course to CCN after the trainings. CCN reimburses the tuition after checking the certificate. This poses difficulty for officers who could not afford to pay their tuition first in order to take the training courses in external organisations. Also, the risk of non-completion is totally burdened by the staff, which makes it more difficult for the staff to enroll.

(2) Literature Survey

1) Skills and Competency Needs Assessment Baseline Survey

The Human Resources Management Department is conducting the “Skills and Competency Needs Assessment Baseline Survey” by outsourcing to a private consultant every year. CCN sees employee’s trainings as the most important factor to provide better administrative services to the public. The Government Recruitment and Training Policy (2005) which the council uses together with the council’s policy on training requires that all trainings be based on comprehensive training needs assessment. In addition, the performance contract for the year 2011/2012 for the council requires that periodic surveys be conducted to determine the skill level.

This periodical survey should be highly evaluated to grasp the status of capacity development in CCN. However, it should be noted that this is not a survey targeting all employees but a

sample survey. From the target population of 11,433 employees of CCN, a sample of 653 respondents was selected using simple random sampling across all departments of the CCN. In all, 25 out of 653 respondents are the officials belonging to the City Planning Department.

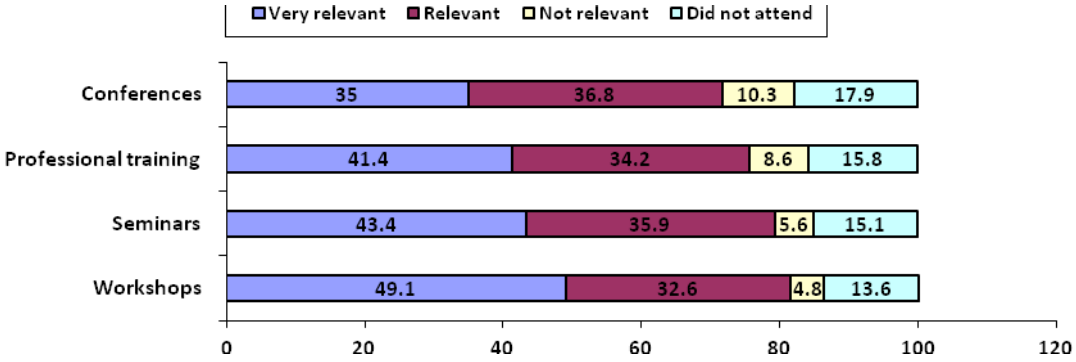
The following skills were assessed as shown in Table 3.4.3. The skills are general and mixed between administrative skills and technical skills.

Table 3.4.3 Critical Skills Identified in Sample Survey

No.	Critical Skill
1	Record keeping/information management
2	Revenue mobilization
3	Financial planning and management
4	Management of public transportation and terminal
5	Urban research/studies/surveys
6	Management and implementation of urban development plans, projects, and programs
7	Computer skills/IT
8	Expenditure, planning, and control
9	Slum upgrading and management
10	Strategic planning
11	Knowledge of government policies
12	Preparation of urban development strategies and guidelines
13	Efficient use of resources
14	Litigation and prosecution
15	Analysing customer feedback and customer care skills
16	Planning and designing for urban housing renewal projects

Source: Skills and Competency Needs Assessment Baseline Survey (2012)

The survey also analysed the style of capacity development. Four functions were listed for rating by the employees, and more than 60% (both very relevant and relevant) had high scores. Workshops had the highest score in terms of relevance from the respondents with a score of 81.8%, followed by seminars at 79.3%, trainings at 75.6%, and conference at 71.8%, as indicated in the graph below. Workshops are worth considering as the effective method of capacity development.



Source: Skills and Competency Needs Assessment Baseline Survey (2012)

Figure 3.4.1 Relevance of Capacity Development Method

2) Human Resources Consultancy Phase 2 City Council Nairobi

Pricewaterhouse Coopers prepared a report of human resources in April 2012. The report is an output of the following activities:

- Review and appraisal of the council's strategic plan,

- Proposal of a new organisation structure,
- Repositioning the council's human resources plan, and
- Develop a staff rationalisation plan.

The report targets all departments of CCN including City Planning Department.

The report also performed a skills assessment. In the study, academic qualifications were taken as an indicator for acquired skills. The highest academic qualifications of officials in all departments of CCN were analysed with eight levels: i) no qualification, ii) primary, iii) high school, iv) trade test, v) certificate, vi) diploma, vii) higher national diploma, and viii) degree. Academic qualifications were more or less correlated with skills, but having qualifications do not always mean having skills. A direct measurement whether the officials have the required skills in his/her daily works or not should be more valued in capacity assessment.

(3) Capacity Assessment

Capacity of necessary skills for the NIUPLAN from planning to management stage has been assessed in October 2013. The target group of the assessment was the officials of Salary Scale Levels 1 to 12 in the City Planning Department of NCC. The assessment sheet consists of 51 skills divided into five categories: 1) Planning, 2) Implementation, 3) Development, 4) Control, and 5) Management. These categories are consistent with the project cycle of project management.

Amongst the target officials, 50 officials answered the five categories using the scale of one to five for each skill. The highest scale is five (5) representing "Very Well", followed by four (4) for "Well", three (3) for "Fair", and two (2) for "Little". The lowest scale is one (1) showing "Not at all".

Table 3.4.4 shows the overview of the capacity assessment results. Amongst the five categories, the average score of "Control" is the highest. The average scores of "Development" and "Management" are the lowest and the second lowest, respectively. NCC officials as a whole are strong in skills for "Control" and weak in skills for both "Development" and "Management".

The table also shows the strengths and weaknesses for each category. The officials well understand the procedures and processes of planning, EIA, land acquisition, etc., but they are weak in ICT related skills such as GIS, website, database, and funding related knowledge.

Table 3.4.4 Overview of Capacity Assessment Results

Category	Average Score/Scale	Strength	Weakness
1. Planning	3.16	• Procedures of plan formulation • Knowledge of necessary information for planning	• Production of GIS maps • Knowledge of possible funding schemes
2. Understanding the Master Plan	3.07	• Understanding the Master Plan	• Formulation of civic education program
3. Development	2.94	• Knowledge of EIA process • Knowledge of land acquisition	• Fund raising • Conducting of public procurement
4. Control	3.86	• Development permission • Respond to applicant	• Control illegal sign/outside advertisement
5. Management	2.95	• Project evaluation	• Database management • Update of website

Source: Source: JICA Study Team (JST) based on the Capacity Assessment to City Planning Department of NCC

Table 3.4.5 shows the strong and weak category of skills by section. Seven sections have strength in "Control". Six sections have weakness in "Management".

Table 3.4.5 Strong and Weak Category of Skills by Section

	Section	Number of Respondents	Average Score/Scale					Strong (S) and Weak (W) Category
			Planning	Und. Of MP	Develop -ment	Control	Manage -ment	
(1)	Forward Planning Section	5	3.27	3.70	3.15	3.56	2.89	(S): Und. of MP (W): Management
(2)	Research Section	4	2.25	2.50	1.84	3.09	1.89	(S): Control (W): Development
(3)	Central Administration	1	3.47	4.50	3.38	4.27	3.14	(S): Und. of MP (W): Management
(4)	Development Control Section	5	2.65	2.60	2.59	3.98	2.20	(S): Control (W): Management
(5)	Policy Implementation Section (PIS)	5	3.44	3.50	3.00	4.05	2.91	(S): Control (W): Management
(6)	Urban Design Development Section	10	3.00	2.90	2.98	4.16	2.80	(S): Control (W): Management
(7)	Enforcement Section	6	3.37	3.25	3.18	4.35	3.52	(S):Control (W): Development
(8)	Land Survey Section	11	3.54	2.95	3.19	3.54	3.53	(S): Planning/Control (W): Und. of MP
	Total/Average	47	3.16	3.07	2.94	3.86	2.95	

Source: JICA Study Team (JST) based on the Capacity Assessment to City Planning Department of NCC

Table 3.4.6 shows the strong and weak skills by section. This table shows more specific strong and weak skills than Table 3.4.5. Table 3.4.6 implies fairly strong correlation between strong skills and tasks for each section. For example, the Land Survey Section, responsible for land survey and development of GIS database, has strength in production of GIS thematic maps and updating information with GIS software. On the other hand, most of the sections have common weaknesses in production of GIS thematic maps, fund raising, and understanding of possible funding schemes.

Table 3.4.6 Strong and Weak Skills by Section

	Section	Job Description	Strong Skills	Weak Skills
(1)	Forward Planning Section	Responsible for policy formulation and supporting permit process.	• Execution of EIA • Acquaintance to the development permission procedures	• Production of GIS thematic maps • Conducting of public procurement • Project management
(2)	Research Section	Responsible for supporting section by conducting survey and provide information regarding urban condition, housing, and infrastructure, renew land lease, register private schools, designating street names, and designating physical address.	• Understanding the planning procedures • Checking the compliance of development/construction at the sites • Responding to land use change application	• Understanding the procedure of availing funds • Fund raising for project implementation • Conducting public procurement
(3)	Central Administration	Responsible for administrative matter, including staff evaluation, organisation re-structure, and other supporting matters.	• Explanation of master plans • Coordination amongst related organisations	• Fund raising for project implementation • Web update
(4)	Development Control Section	Responsible for building construction permit management	• Acquaintance to the development permission procedures • Responding to land use change application	• Understanding the urban issues • Production of GIS thematic maps • Understanding the possible funding schemes

	Section	Job Description	Strong Skills	Weak Skills
(5)	Policy Implementation Section (PIS)	Responsible for land development permit management. Permit is required for change in land use, division of land plot, extension (adding) of new and use.	• Understanding the approval process of master plans • Acquaintance to the development permission procedures • Responding to land use change application	• Production of GIS thematic maps • Understanding the procedures of availing funds • Updating information with GIS software
(6)	Urban Design Development Section	Responsible for development of landscape (greenery, bench, bus shelter) and management of advertisement.	• Checking the compliance of development/construction at the sites • Responding to land use change application • Acquaintance to the sign control and outside advertisement	• Production of GIS thematic maps • Fund raising for project implementation • Web update
(7)	Enforcement Section	Responsible for inspection and monitoring of development approved by the Development Control Section and Policy Implementation Section.	• Acquaintance to the development permission procedures • Control illegal development • Check compliance of sign control	• Understanding the possible funding schemes • Coordination amongst related organisations • Fund raising for project implementation
(8)	Land Survey Section	Responsible for conducting land survey that belongs to Nairobi City and developing GIS database.	• Production of GIS thematic maps • Execution of land acquisition • Updating information with GIS software	• Acquaintance in the development permission procedure • Fund raising for project implementation • Conducting public procurement

Source: JICA Study Team (JST) based on the Capacity Assessment to City Planning Department of NCC

(4) Analysis of Current Situation

As a result of an interview survey, literature survey, and capacity assessment, the following characteristics in the current capacity development were identified:

- The concerned government officials are keen to capacity development.
- Target groups of capacity development are not clarified.
- Capacity assessment items are fairly general.
- Attending trainings conducted by external organisations such as universities are more encouraged than internal trainings conducted by senior officials.
- The needs for GIS/ICT skills are high in most of the sections.

The strength of the City Planning Department of CCN is that the officials are motivated to develop their capacity. The weakness is that the method of capacity development is not balanced as seen in high share of external trainings, high need to GIS/ICT skills, etc. Thus, this project should enhance the strength and improve weakness to formulate a capacity development plan by solving the following issues:

(5) Issues of Capacity Development

Through analysis of the current situation including strength and weakness in above (3), the issues to be tackled for improving capacity development in NCC are identified as shown in Figure 3.4.2. To solve the issues is the basic direction of capacity development plan.

Capacity Development Issues

1. To keep the momentum of capacity development in NCC.

2. To identify the target groups of capacity development.

3. To encourage internal trainings including on-the-job training (OJT).

4. To acquire fundamental skills of urban development.

Source: JICA Study Team (JST)

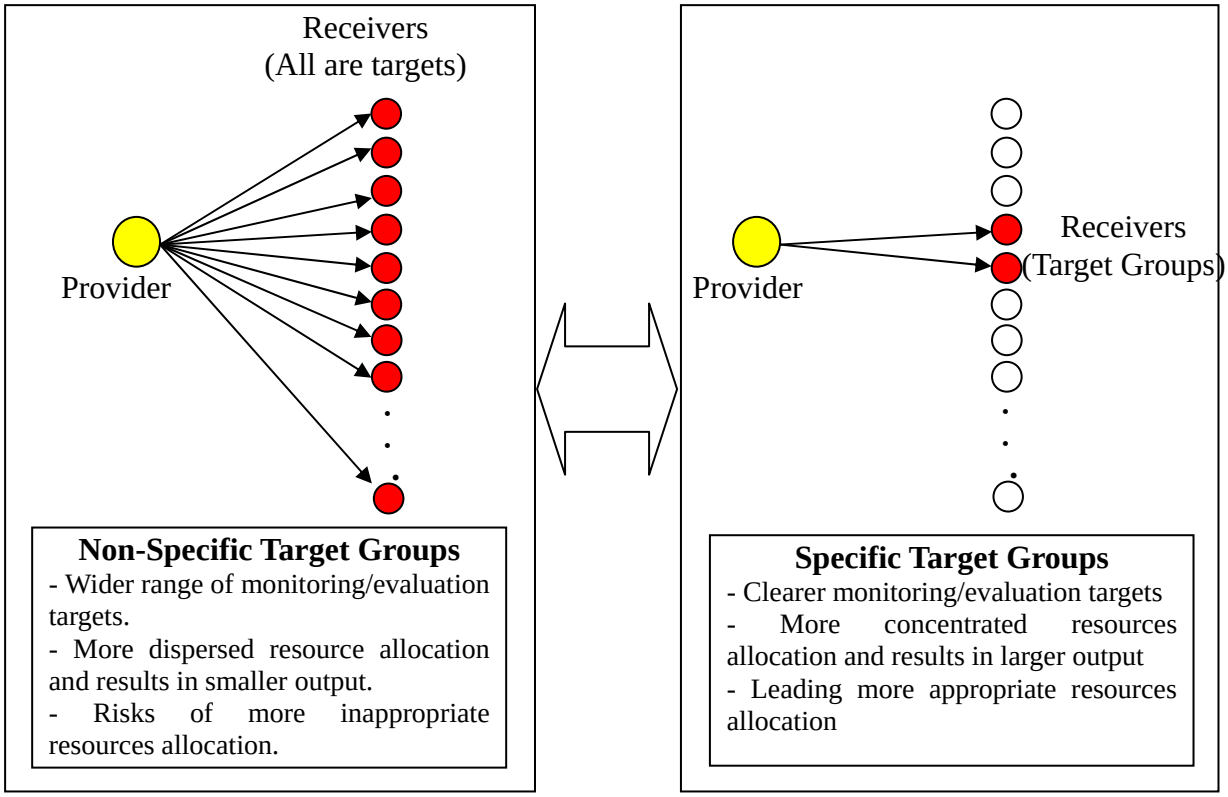
Figure 3.4.2 Capacity Development Issues

1) To keep the momentum of capacity development in NCC

The momentum of capacity development in NCC should be kept in the Capacity Development Plan. NCC sees the capacity development as very important for better urban management. NCC (former CCN) already has had special function for human resources management such as Human Resources Department, as well as the administration section in the City Planning Department. The assessment of the concerned NCC officials has also been conducted periodically. An official of the Human Resources Department was appointed as a Secretariat Meeting member and Working Group member. These existing functions as well as mechanism for the assessment of capacity development should be fully utilised not only in planning but also in the implementation of capacity development.

2) To identify the target groups of capacity development

The merits of setting the target groups are as follows: i) to be able to focus on the activities for important and prioritised stakeholders, ii) to be able to efficiently use available resources and monitor/evaluate activities, and iii) to be able to attain outputs more effectively. Figure 3.4.3 schematically compares non-specific target groups to specific target groups.



Source: JICA Study Team (JST)

Figure 3.4.3 Comparison between Non-Specific Target Groups and Specific Target Groups

3) To encourage internal trainings including On-the-Job Training (OJT)

Internal trainings including on-the-job training (OJT) and lectures by senior officials should be encouraged more. As a result of an interview with the NCC official, the capacity for the concerned government officials has been developed mainly through trainings conducted by outside organisations such as university, technical school, etc.

Under the current system, only limited officials can shoulder the tuition, and thus can take part in trainings outside. It is because NCC is applying a system to reimburse the tuition of the trainings upon submission of the certificates of trainings. This system discourages some officials to take part in the trainings being conducted outside.

4) To acquire fundamental skills of urban development

The target officials should acquire fundamental skills of urban management, including information collection and analysis, planning, implementation of infrastructure development, and inspection and monitoring. The officials are required to develop GIS and ICT skills based on capacity assessment, so that the output produced through GIS and ICT in the context of urban planning and management should be understood better. Knowledge of possible funding schemes and skills of fund raising will also be strengthened. As such, the capacity development should address the development of fundamental skills first. Table 3.4.7 shows the fundamental skills to be acquired by the officials.

Table 3.4.7 Fundamental Skills to be Acquired

	Topics for Capacity Development	Explanation
(i)	**Planning skills**	• Objective of the urban development plan (development oriented plan, control, or conservation oriented plan) • Planning technique: selection of scales, land use category, urban facility allocation (parks, green-open space, schools, hospitals), road network (urban planning road) to be included in urban design. • Possible funding schemes (government budget, aid, loan, private funds, PPP schemes)
(ii)	**Development control:** land development control, and building control	• Objective of the development permit (why permit is necessary, how permit is related to urban development plan). • Relationship between land permit and urban plan.
(iii)	**Implementation of urban development project** : examination of zone development mechanism, PPP	• Zoning development in the urban plan. • Implementation for infrastructure (project approval, fund raising, and implementation organisation)
(iv)	**Socialisation and citizen participation**	• Public awareness to citizens to deepen their understanding on the urban plan, development control, etc. • Collaboration between civil society and government through community participation
(v)	**Management**	• Check consistency between actual development situation and related government policies • Database management

Source: JICA Study Team (JST)

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CHAPTER4 INFRASTRUCTURE CONDITION AND DONOR ACTIVITIES

4.1 Review of Related Projects by the Development Partners

4.1.1 Multi-Sector Programme

(1) Kenya Municipal Program (KMP)

The Ministry of Local Government (MOLG), which is now under the Ministry of Land, Housing and Urban Development(MOLHUD) is implementing the phase 1 of the KMP with the financial assistance of the World Bank (WB), Agence Française de Développement (AFD), and Swedish International Development Cooperation Agency (SIDA). The development objective of phase 1 is to strengthen local governance and improve service delivery in 15 selected municipalities through a combination of institutional reforms, capacity building, and investment in infrastructure. The phase 1 of the KMP is scheduled to be implemented from 2010 to 2015.

The funding for this project consists of US$100 million from the World Bank-International Development Association (IDA), US$45 million from AFD, and US$10 million each from SIDA and the Government of Kenya (GOK), with a total amount of US$165 million.

The 15 selected municipalities (major cities and towns) are (1) Nairobi City, (2) Mombasa, (3) Kisumu, (4) Nakuru, (5) Eldoret, (6) Malindi, (7) Naivasha, (8) Kitui, (9) Machakos, (10) Thika, (11) Nyeri, (12) Garissa, (13) Kericho, (14) Kakamega, and (15) Embu.

The project comprises the following four components:

(i) Component 1: Institutional Strengthening

(ii) Component 2: Participatory Strategic Urban Development Planning

(iii) Component 3: Investment in Infrastructure and Service Delivery

(iv) Component 4: Project Management, Monitoring, and Evaluation

Of the above, Component 3 consists of infrastructure developments, which are considered eligible for financing under the KMP. These include motorised and non-motorised transport facilities (including bus parks, access roads, sidewalks, and paved paths), street lighting, markets, solid waste management, stormwater drainage, disaster management and prevention facilities and equipment, public parks, and green spaces.

The investments for Component 3 are phased into two: (a) year 1–2 investments for implementing the infrastructure developments during 2010-2013 and (b) year 3–5 investments for implementing the infrastructure developments during 2013-2015. The selection of infrastructure developments belonging to year 1–2 or year 3–5 investments is performed based on the criteria established in the process of the project design of the KMP as described in the project appraisal report (World Bank, April 2010).

The procurement plan has been developed for project implementation during the period from July 2012 to June 2013 and was approved by the World Bank in August 2011. This plan includes 33 works projects, 23 goods procurement, and 72 consultancy services. According to the Implementation Status and Result Report in November 2012, there was considerable risk towards meeting the project's development objectives, due primarily to the very slow implementation of the projects. Only one project, which was the Mombasa Stormwater Drain work, was implemented in September 2012.

(2) Kenya Informal Settlements Improvement Project (KISIP)

The Ministry of Housing (MOH) (currently under MOLHUD) is implementing the KISIP with financial assistance from WB. The project development objective is to improve living conditions of informal settlements in 15 selected municipalities in Kenya as shown below. The KISIP is scheduled to be implemented from 2011 to 2016.

The funding for KISIP has the same scheme as for KMP, with the total funding of US$165 million.

The 15 selected municipalities (major towns and cities) are (1) Nairobi City, (2) Mombasa, (3) Kisumu, (4) Nakuru, (5) Eldoret, (6) Malindi, (7) Naivasha, (8) Kitui, (9) Machakos, (10) Thika, (11) Nyeri, (12) Garissa, (13) Kericho, (14) Kakamega, and (15) Embu.

The KISIP comprises the following four components:

(i) Component 1: Strengthening Institutions and Programme Management

This component will support institutional strengthening and capacity building of the MOH (now under MOLHUD), the MOLG (now partly under MOLHUD and Ministry of Devolution and Planning (MODP)), and the participating municipalities (major towns and cities). It will also support the development of policies, frameworks, systems, and guidelines for slum upgrading.

(ii) Component 2: Enhancing Tenure Security

This component will directly support the implementation of the new national land policy in urban informal settlements through refinement, systematisation, and scale-up of ongoing efforts to strengthen tenure security in the slums.

(iii) Component 3: Investing in Infrastructure and Service Delivery

This component will support investments in settlement infrastructures, and if necessary, extension of trunk infrastructure to settlements.

(iv) Component 4: Planning for Urban Growth

This component will support the planning and development of options that facilitate the delivery of infrastructure services, land, and housing for future population growth. The objective is to provide an alternative to the current chaotic practice of informally establishing settlements on any open land.

Of the above, Component 3 supports investments in settlement infrastructures, and, where necessary, extension of trunk infrastructure to settlements. The infrastructure developments considered eligible for financing under the KISIP are roads, bicycle paths, pedestrian walkways, street and security lighting, vending platforms, solid waste management, storm-water drainage, water and sanitation systems, electrification, public parks, and green spaces. The selection of infrastructure developments is performed based on the criteria established in the process of the project design of the KISIP as described in the project appraisal report (World Bank, February 2011).

(3) Nairobi Metropolitan Service Improvement Project (NaMSIP)

NaMSIP is a five-year project, which was approved by the WB Board in May 2012. The Ministry of Nairobi Metropolitan Development (MONMD) (now under MOLHUD) is the responsible agency to implement the Project with the financial assistance by the WB. The project development objective is to strengthen urban services and infrastructure in the Nairobi Metropolitan Region.

The total funding for this project is US$330 million (US$300 million from World Bank-IDA and US$30 million from the GOK). The level of funding for this programme is US$28 million for Nairobi City County, which includes projects in planning, transportation, disaster management, GIS development, and security lighting.

The project comprises the following four components:

(i) Component 1: Institutional reform and planning (US$15 million)

This component will assist existing local authorities within the Nairobi Metropolitan Area, as well as new entities and authorities that will be created once the devolved government aspect of the new constitution takes effect. These new entities possibly include county governments, metropolitan authorities, agencies, and other units of administration. This component will support the capacity enhancement and planning activities of these entities.

(ii) Component 2: Local government infrastructure and services (US$60 million)

This component will finance on a grant basis the priority urban infrastructure in 13 selected urban areas in the Nairobi Metropolitan Area. The 13 selected urban areas are Nairobi City, Ruiru, Kikuyu, Kangundo/Tala, Thika, Mavoko, Karuri, Ngong, Limuru, Kiambu, Kitengela, Juja, Ongata, and Rongai. The investments to be financed under this component are relatively small-scale local projects. The investments to be selected by the local authorities can include drainage systems, local streets, bicycle and foot paths, street and security lighting, public parks, public markets, solid waste management and street cleaning, and firefighting equipment and facilities.

(iii) Component 3: Metropolitan infrastructure and services (US$250 million)

This component will assist in providing large-scale metropolitan infrastructure in the areas of solid waste, transport, and sewerage services. In contrast to those financed under Component 2, these investments will be large scale which is crucial for the development and integration of the metropolitan area as a whole.

(iv) Component 4: Project management and monitoring and evaluation (US$5 million)

This component will finance the management activities associated with project implementation, including establishing and implementing a comprehensive monitoring and evaluation system and training of the implementing agencies in environmental and social management. This component will also provide funds to undertake feasibility studies and prepare designs for implementation of a potential follow-up project in the urban sector in Kenya, and for other studies identified and agreed during implementation.

(4) Kenya Infrastructure Finance/ Public-Private Partnership (PPP) project

The objective of the first phase of this Adaptable Program Lending (APL) initiative is to improve the enabling environment in order to generate a pipeline of bankable PPP projects.

The project comprises the following four components:

(i) Component 1: Technical Support to PPP Institutions for PPP Legal, Regulatory and PPP Financing Environment.

(ii) Component 2: Support for Preparation of Individual PPPs.

(iii) Component 3: Improvements on Fiscal Risk Management Framework.

(iv) Component 4: Support for Programme Management.

4.1.2 Urban Transport

In Kenya, the Roads and Transport Sector Donor Group created the Harmonisation Alignment and Coordination (HAC) initiative consisting of 12 donors (African Development Bank (AfDB), AFD, Arab Bank for Economic Development in Africa (BADEA), China, DANIDA, EC, JICA, KfW, SIDA, USAID, UNDP, and World Bank). Under this framework, transport sector issues are discussed by the donor coordination group regularly. Progress has been made recently towards a new perspective of sector and donor coordination with the Ministry of Roads (currently under Ministry of Transport and Infrastructure (MOTI)) chairing a joint GOK/Donor meeting under its new policy and regulatory role. Review of related projects by other development partners in the urban transport sector is described by the donors.

(1) World Bank

The WB issued two projects on urban transport as shown below.

1) National Urban Transport Improvement Project (NUTRIP, 9 July 2012)

In 2007, the WB and GOK proposed the concept of Nairobi Urban Toll Road Project (NUTRP). This project was to offer a section of the Northern Corridor to the private sector for expansion and tolling through concession. Unfortunately, this offer attracted limited interest from the private sector and circumstances changed significantly, leading the GOK to cancel the project.

In 2011, the Consultancy Services for Feasibility Study and Technical Assistance for Mass Rapid Transit System for the Nairobi Metropolitan Region (MRTS) was issued by MOT (currently MOTI) with assistance by AfDB. Therefore, one aspect of NUTRIP is to enhance the realisation of NMRTS.

The objectives of the project are: (a) improve the efficiency of road transport along the Northern Corridor; (b) improve the institutional capacity and arrangements in the urban transport sub-sector; and (c) promote private sector participation in the operation, financing and management of transport systems. The project has three components, namely: A) support to Kenya National Highways Authority (KeNHA) to upgrade the urban road transport infrastructure; B) support to Kenya Urban Roads Authority (KURA) and Kenya Railways Corporation (KRC) to develop selected mass transit corridors; and C) institutional strengthening and capacity building. The total project cost is estimated to be US$413.11 million, and amongst the total cost, US$300.00 million is WB financing through IDA.

Project component A (support to KeNHA to upgrade the urban road transport infrastructure) includes the following projects:

(i) Expanding and upgrading the Northern Corridor road section through Nairobi City from Jomo Kenyatta International Airport (JKIA) turnoff to Rironi Road, as well as associated service roads and access roads; all through provision of goods, works and services.

(ii) Constructing the Kisumu Northern Bypass Road.

(iii) Constructing and rehabilitating non-motorised transport facilities, including foot paths, cycle tracks, pedestrian bridges, and underpasses.

(iv) Strengthening the capacity of KeNHA

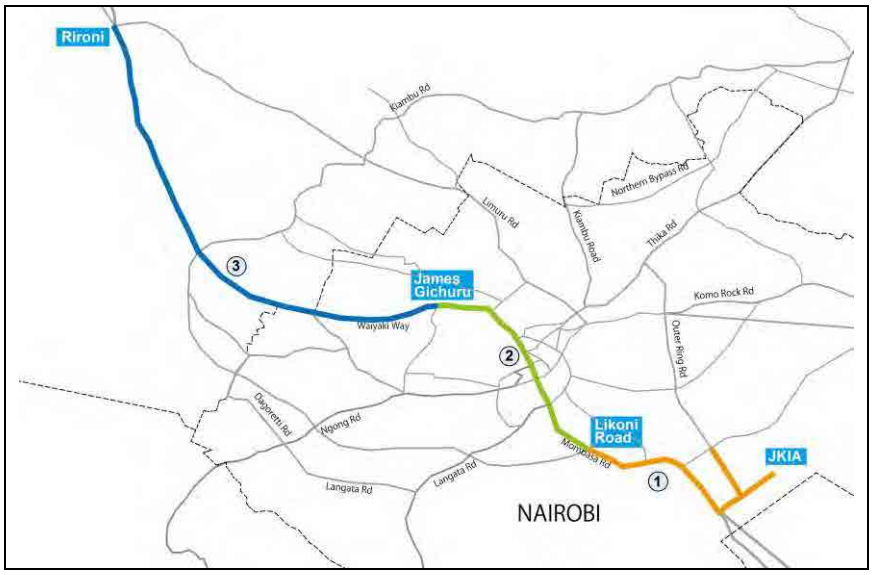
Regarding upgrading of the Northern Corridor (A104), three studies were conducted by KeNHA. Table 4.1.1 shows the name, location, and the length of each study.

Table 4.1.1 Studies Conducted on A104 by KeNHA

No.	Title of the Study	Time of Publication	Section and Length
1	Consultancy Services for Preliminary and Detailed Engineering Design for JKIA Turnoff - Likoni Road (A104) and Link Roads	February 2013	JKIA – Likoni Road Junction (8 km) plus adjoining roads
2	Consultancy Services for Upgrading the A104 from Likoni Road to James Gichuru Road	May 2012	Likoni Road Junction – James Gichuru Road Junction (12 km)
3	Preliminary Design for the Rehabilitation and Capacity Enhancement of A104 from James Gichuru Road Junction to Rironi (A104/ B3 Junction)	November 2012	James Gichuru Road Junction to Rironi (25 km)

Source: Kenya National Highways Authority (KeNHA)

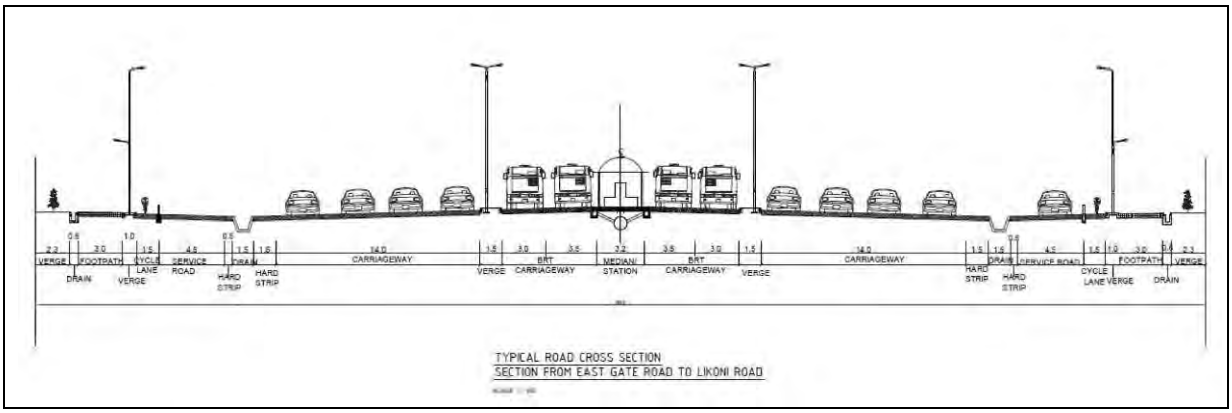
Locations of the study sections are shown in Figure 4.1.1. Numbers shown in the figure correspond to the numbers of the study given in Table 4.1.1.



Source: Kenya National Highways Authority (KeNHA)

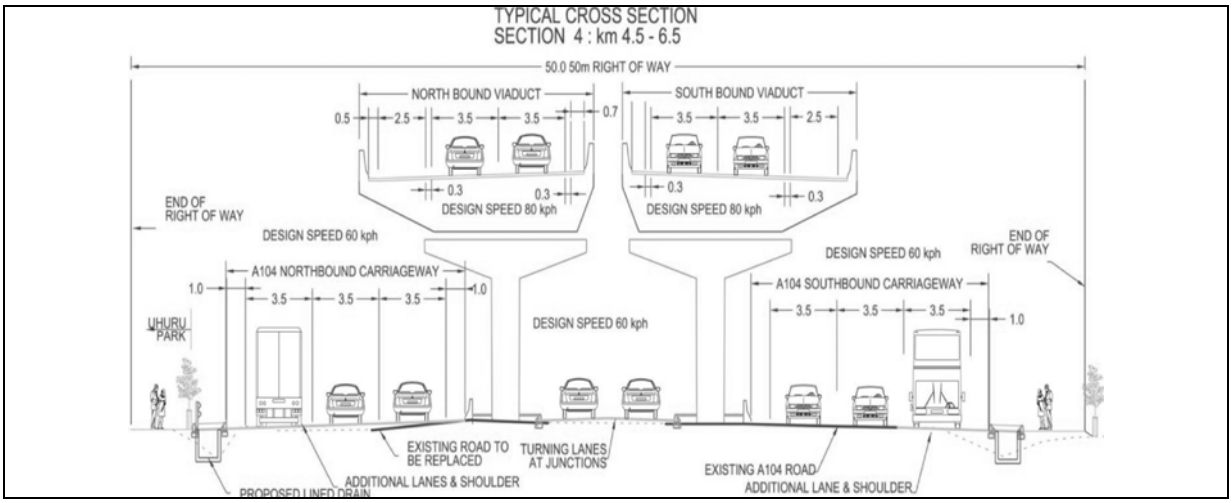
Figure 4.1.1 Location of Study Sections for A104

Figure 4.1.2 - 4.1.4 show the typical cross section of the three studies.



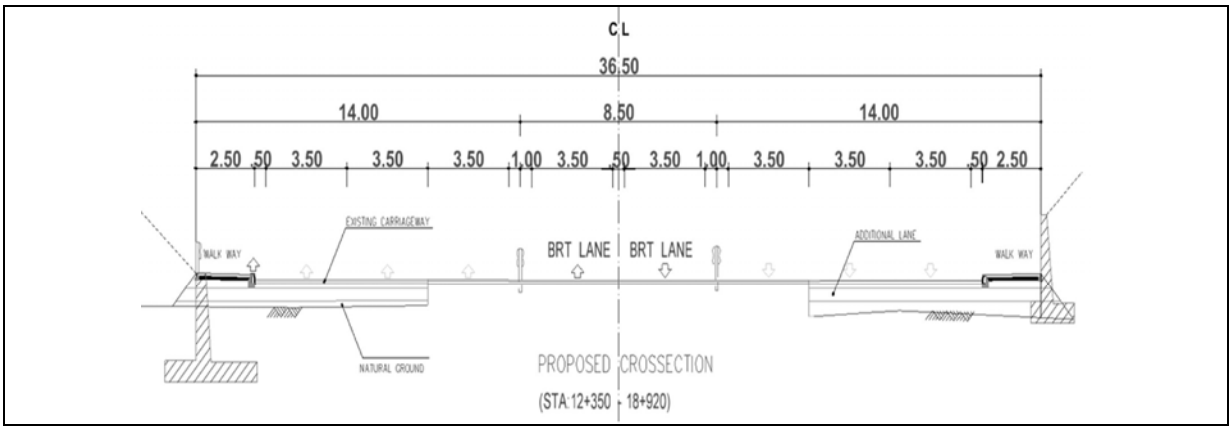
Source: Overview of the Capacity Improvement of JKIA – Rironi Road, KeNHA

Figure 4.1.2 Typical Cross Section JKIA – Haile Selassie Section



Source: Overview of the Capacity Improvement of JKIA – Rironi Road, KeNHA

Figure 4.1.3 Typical Cross Section from Just Before Haile Selassie Junction to Just After the University Way Junction



Source: Overview of the Capacity Improvement of JKIA – Rironi Road, KeNHA

Figure 4.1.4 Typical Cross Section James Gichuru Junction – Uthiru Section and Gitaru - Rironi Section

Component B (supporting KURA and KRC to develop selected mass transit corridors) includes sub-component B1 for Kura and sub-component B2 for KRC. The sub-component B1 includes the following projects:

(i) Carrying out a range of feasibility studies, including detailed designs, and preparing bidding documents for selected bus rapid transit (BRT) road corridors through provision of technical advisory services.

(ii) Providing public transport and associated services through provision of technical assistance.

In Annex 2: Detailed Project Description, the following concepts for BRT are shown:

(i) The MRTS has identified nine BRT corridors which, if developed, will serve the most densely populated and low income parts of the larger Nairobi. The eastern part of Nairobi City is one such area.

(ii) The Jogoo Road corridor with a length of about 21 km has the most dense traffic and passenger demand in Nairobi City, with a forecast travel demand of 424,680 persons in 2030; It is connected to the Juja Road corridor, Outering, and Thika corridors in Nairobi City.

(iii) The other key corridors include Mombasa Road, which would partly serve JKIA and the southern part of Nairobi City, the key growth pole for greater Nairobi

(iv) The BRT corridors that will be considered under this project include Juja Road and Mombasa-Uhuru Highway-Waiyaki Way road segment. NUTRIP will support the preparation of the first comprehensive BRT route and will involve carrying out feasibility and detailed (engineering) design and studies.

Source: Project Appraisal Document on a Proposed Credit to the Republic of Kenya for a National Urban Transport Improvement Project, WB and Project Information Document (PID) Concept Stage

Nairobi Metropolitan Services Improvement Project (NaMSIP, 10 May 2012)

NaMSIP, already described in Section 4.1.1 (3) is deeply related to transportation in its Component 3 "Investing in Infrastructure and Service Delivery".

The document named "Nairobi Metropolitan Leadership" issued at the meeting held by the WB and Nairobi City County (NCC) on 2 July 2013 focuses on the synergy between the commuter train and land development around the stations. Since the document is in its conceptual stage, the detailed method of improvement and operation of the commuter train is not studied, but the number and the location of stations are described. The proposed development/improvement of 12 stations along the NRS-Ruiru section and nine stations along the NRS-Kikuyu section is shown in Figures 4.1.5 and 4.1.6.

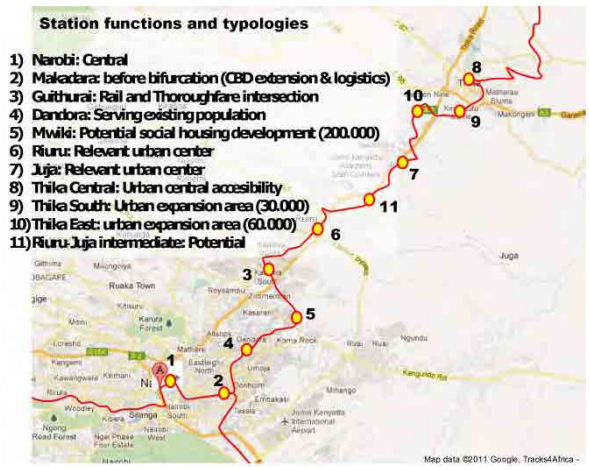


Figure 4.1.5 Proposed Stations in NRS-Ruiru Section

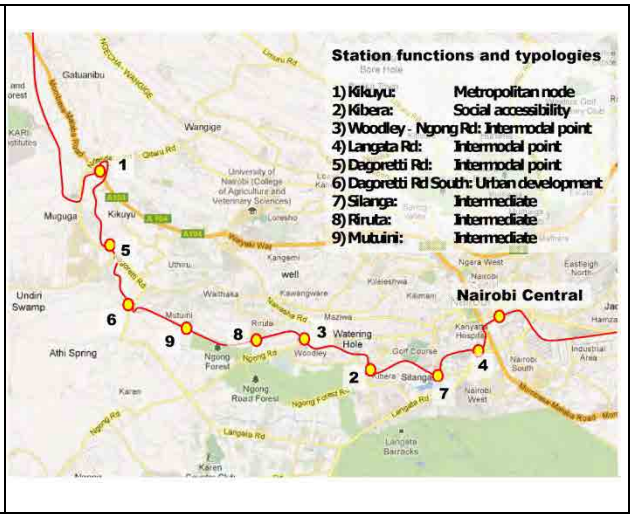


Figure 4.1.6 Proposed Stations in NRS-Kikuyu Section

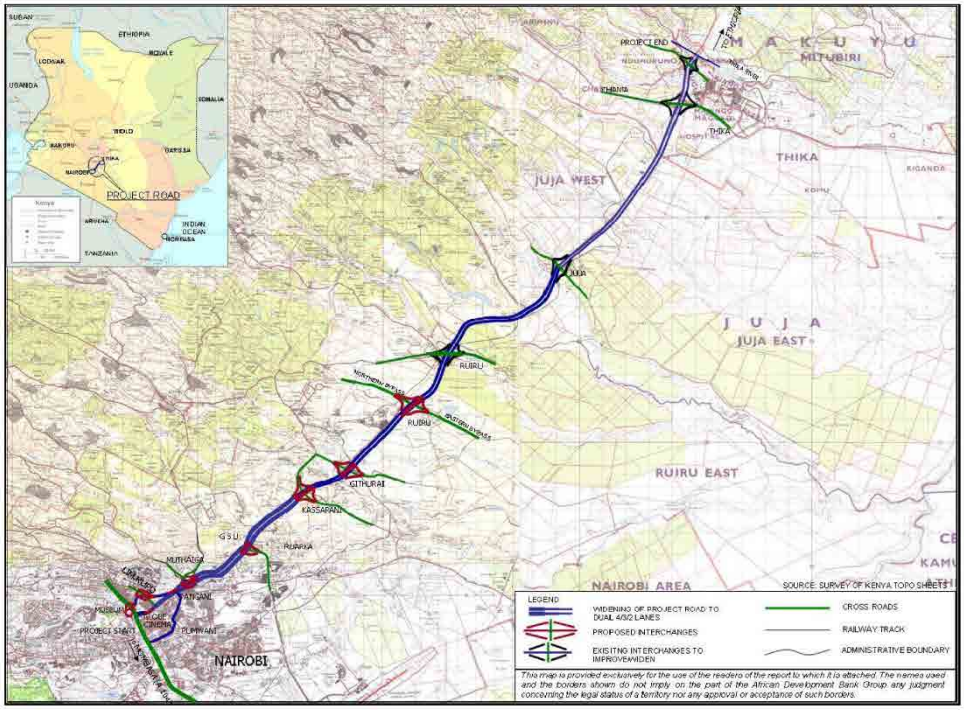
Source: NaMSIP, Nairobi Metropolitan Leadership (Presentation document for 2 July 2013 meeting)

(2) African Development Bank (AfDB)

1) Nairobi - Thika Highway Improvement Project

The Nairobi-Thika highway is a dual-carriageway road of about 45 km. The road is part of the international trunk road classified as A2 which originates in downtown Nairobi City and extends to Moyale at the Ethiopian border. To accommodate the existing and future traffic, the highway needs substantial improvements to increase its capacity which would entail the construction of additional lanes and the removal of at-grade intersections at several locations to be replaced by interchanges.

The project was implemented by the Roads Department of the Ministry of Roads and Public Works (MORPW) (currently under MOTI). The project started in January 2008, and opened in November 2012.



Source: Appraisal Report, Nairobi-Thika Highway Improvement Project, September 2007, ADF

Figure 4.1.7 Nairobi-Thika Highway Improvement Project Location Map

The construction between downtown Nairobi City and Kenyatta University was financed by AfDB and the Kenyan government for the amount of US$260 million. AfDB financed the project with a package of US$180 million through its concessional window, the African Development Fund, including a loan of US$175 million (civil works and related consultancy services), and a grant worth US$5 million (feasibility study and detailed design of a mass rapid transit system for the Nairobi Metropolitan Area). The Kenyan government contributed US$80 million towards the road project. The project still has one major drawback in that, the connectors to the Nairobi City centre and Uhuru Highway (A104) are still congested during the peak hours.

The section from Kenyatta University to Thika Road, which is part of the Nairobi-Thika Highway Improvement Project, is being implemented at a cost of KSh10.6 billion. It involves the construction of extra lanes from Kenyatta University to Thika Town with an intention to improve the traffic flow along the route. The Exim Bank of China financed US$100 million for the upgrading between Kenyatta University and Thika.

2) Mass Rapid Transit System (MRTS) for the Nairobi Metropolitan Region, June 2011 (Consultancy Services for Feasibility Study and Technical Assistance for the Mass Transit System of the Nairobi Metropolitan Region)

i) Study Area and Study Components

The study area of MRTS corresponds to the area of Nairobi Metro 2030, and the target year is also 2030. The major study components are described as follows:

(i) Preparation of an integrated multi-modal transport plan for NMR that complements the Nairobi urban transport master plan proposals covering a period of 20 years (2010-2030)

(ii) Formulation of a comprehensive public transport policy for Nairobi Metropolitan Region (NMR)

(iii) Recommendation of an appropriate legal, institutional, and regulatory framework for facilitating the implementation of the MRTS in NMR

(iv) National Road Transport and Safety Authority which has been established to deal with road transport issues and concerns

(v) Nairobi Metropolitan Transport Authority (to be established) which will be responsible for licensing, regulating public transport, and traffic management in NMR.

ii) MRTS Corridors

Evaluating existing corridors in Nairobi City, the study considers appropriate mass rapid transport system along the nine corridors leading to the central business district (CBD) of Nairobi City. These corridors are as follows:

(i) Nairobi Rail Station (NRS)- Ruiru - Thika

(ii) NRS - Juja Road – Kangundo

(iii) NRS – Jogoo Road – Komorock

(iv) NRS - JKIA - Athi River

(v) NRS - Langata Road -Karen

(vi) NRS – Upperhill – Ngong

(vii) NRS – Kabete – Kikuyu

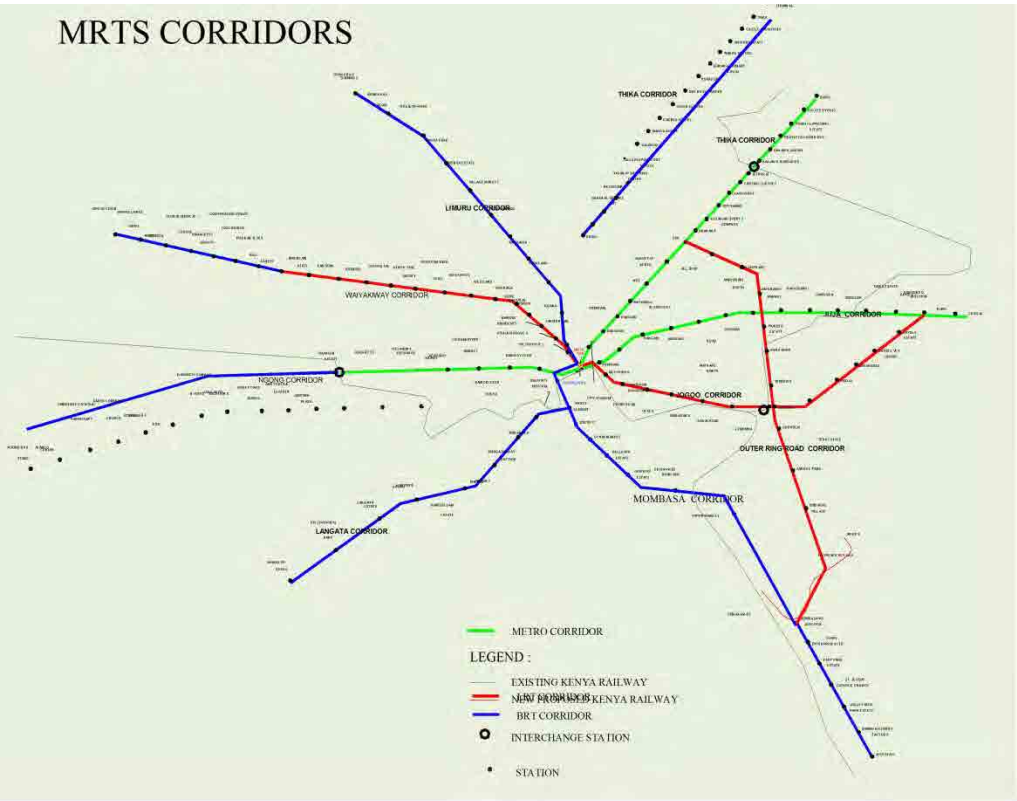
(viii) NRS – Gigiri – Limuru

(ix) Outer Ring Road

iii) Selection of Modes

The selection of modes amongst metro, BRT system, light rail transit (LRT) system or monorail depends mainly on the forecasted passenger demand presented in peak hour peak direction traffic (PHPDT). The BRT or monorail have been considered where the PHPDT is in excess of 5,000 passengers. The LRT has been considered where the PHPDT is in excess of 12,000 passengers; and metro rail in corridors where PHPDT is in excess of 30,000 passengers.

The proposed network on nine corridors in Nairobi City is shown in Figure 4.1.8.



Source: Mass Rapid Transit System for the Nairobi Metropolitan Region (MRTS), June 2011, Chapter 8.

Figure 4.1.8 MRTS Corridors

iv) Economic Viability

The annual cost and benefit streams for each MRTS corridor were analysed to derive the net cash flow. The EIRR and NPV at the 12% discount rate were determined using the discounted cash flow technique. The results of the economic evaluation are summarised in Table 4.1.2.

Table 4.1.2 Results of Economic Evaluation

Corridor	EIRR (%)	NPV@12% (million KSh)
MRTS 1: Waiyaki Way	11.09%	(-)2,255
MRTS 2: Thika Road	25.52%	97,057
MRTS 3: Juja Road	16.53%	17,598
MRTS 4: Jogoo Road	19.80%	18.654
MRTS 5: Outer Ring Road	20.81%	22.198
MRTS 6: Ngong Road	18.99%	18,431
MRTS 7: Limuru Road	22.31%	8,537
MRTS 8: Langata Road	28.98%	6,775
MRTS 9: Mombasa Road/Athi River	14.23%	2,598
All Corridors Together	19.88%	189,592

Source: Mass Rapid Transit System for the Nairobi Metropolitan Region (MRTS), June 2011, Chapter 10

The results indicate that all the corridors, except Waiyaki Way, are economically viable, as the EIRRs are greater than 12%. BRT corridors have higher EIRRs because of their relatively lower costs compared with LRT costs.

(3) Government of Japan/JICA

The Study on Master Plan for Urban Transport in the Metropolitan Area in the Republic of Kenya, 2006, JICA

The Study commenced in July 2004 and was completed in January 2006. The objectives of the Study were: 1) to formulate a master plan for urban transport in the Nairobi Metropolitan Area for the target year 2025; 2) to conduct a pre-feasibility study on the priority projects under the master plan; and 3) to carry out relevant and appropriate technology transfer to Kenyan counterpart personnel in the course of the study.

Components of the recommended master plan are as follows:

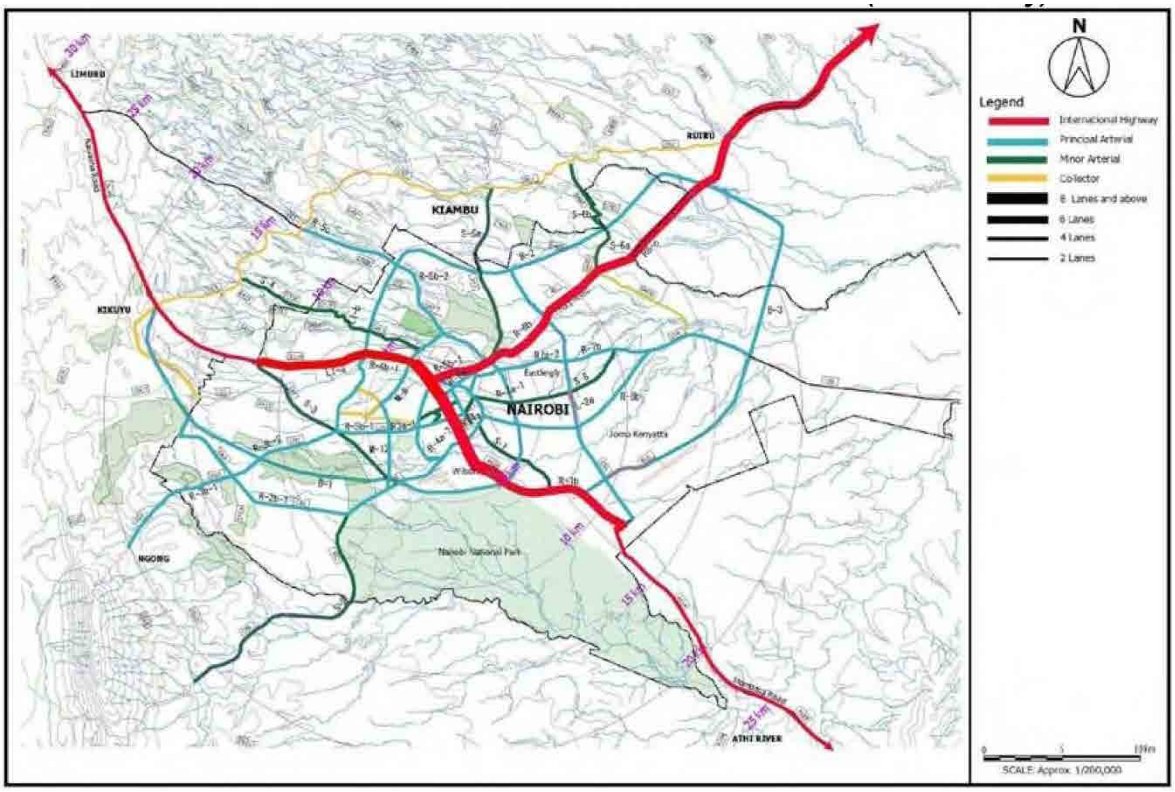
(i) Radial and circumferential (R/C) road network (2) including planned projects

(ii) Bus incentive and priority measures

(iii) Upgrading of the existing rail to a commuter rail

(iv) Improvement of Uhuru Highway, stage I as expressway

The road network of the master plan in 2025 is shown in Figure 4.1.9.



Source: The Study on Master Plan for Urban Transport in the Metropolitan Area in the Republic of Kenya, Final Report Executive Summary, March 2006

Figure 4.1.9 Road Network in the Urban Area (Nairobi City) in 2005

Table 4.1.3 Staging Plan Proposed in the Master Plan and its Current Progress

	Short-term (2006-2010)	Medium-term (2011-2015)	Long-term (2016-2025)	Progress
1. Bypass and Link Roads			• Bypass roads • Link roads • Link roads extension	• Eastern bypass completed • Northern bypass completed • Western bypass under construction • Western link road under construction
2. Missing Link	• Missing links (arterial)	• Missing links (collector) • Missing links (local)		• Missing link 6, 7 under construction • Refer to (4) EU assistance
3. Radial Roads	• Radial roads within C-3	• Radial roads outside C-3 (north and east)	• Radial roads outside C-3 (south and west) • New radial roads	• Ngong Road under design • Langata Road under construction
4. Circumferential Arterial Roads		• Circumferential arterial roads C-3	• Circumferential roads C-1 and C-2	
5. Secondary Arterial Roads			• Secondary arterial roads (south-west) • Secondary arterial roads (north-east)	
6. Intersection Improvement	• Intersection improvement (stage 1)	• Intersection improvement (stage 2)	• Intersection improvement (stage 3)	
7. Non-motorised Transport (NMT)	• NMT (north and west)	• NMT (south and part of west)	• NMT (south and part of west)	
8. Uhuru Highway	-	-	-	
9. Traffic Circulation	Traffic circulation (stage 1)	Traffic circulation (stage 2)		

Source: The Study on Master Plan for Urban Transport in the Metropolitan Area in the Republic of Kenya, Final Report, and JICA Study Team

Nairobi Western Roads

Nairobi western roads are referred to as the missing link which connects Kileleshwa Police Station to the Westlands Roundabout, Ole Dume Road, and James Gichuru Road to Ngong Road. The construction of roads was derived from the master plan as the priority roads by the grant aid project from the Government of Japan. Connecting the three missing link roads will create a network in the area, which is currently separated by rivers, and alleviate the congestion as well as contribute to the smooth and safe transport of people and goods between the Westlands and Kilimani areas. The total road length is 8.36 km, and the grant amount is ¥2.54 billion. The construction commenced in June 2011 and was completed in June 2013.

Nairobi Dagoreti Corner Road C60/C61

The Preparatory Survey on the Project for Dualling of Nairobi-Dagoretti Corner Road C60/C61 in the Republic of Kenya was conducted from June 2010 to March 2011. The proposed road improvement section was from Adams Arcade intersection to Ngong Road/Kenyatta Avenue intersection. The improvement measure is to widen the current two lanes into four. The total length is 4.7 km. After the completion of the preparatory survey, the MRTS project by MOT selected Ngong Road as one of the nine corridors for MRTS. The investigation of the cross section for the proposed road was carried out to make space for MRTS. In conclusion, the mode of the MRTS was decided as LRT, and the detailed design will be conducted under this precondition.

(4) European Union (EU)

EU assists in the road development in Nairobi City through a project named "KENYA/ACP/Regional Economic Integration by means of Transport Infrastructure - Urban Roads". The project, which is under KURA, comprises technical assistance for MOTI, relevant road authorities, and MOT, and construction of Nairobi City's missing link roads and non-motorised transport facilities. The construction project consists of 10.5 km of new road links, pedestrian footpaths, and cycle tracks in the Westlands/Parklands area as well as in the industrial area. Design for the Missing Link No. 6 is ready. Tendering for construction of the roads is ongoing. The roads are:

(i) Accra Road to Ngara Road: 0.7 km (Missing Link No. 1)

(ii) (Muratina St) General Warungi St to Juja Road: 3.0 km (Missing Link No. 5)

(iii) (Likoni Road Extension): Enterprise Road to Mombasa: 1.8 km (Missing Link No. 10)

(iv) Ring Road Parkland (Westlands Roundabout-Limuru Road): 4.0 km (Missing Link No. 15a)

(v) Ring Road Parkland Extension (Limuru Road to Thika Road): 1.6 km (Missing Link No. 15b)

(vi) Quarry Road Extension (Ladhies Road to Quarry Road): 2.5 km (Missing Link No. 16)

Source: Showcasing the status of roads in Nairobi City, August, 2012, MOR (Ministry of Roads)

(5) China

China assisted GOK through four large road projects, three of which were completed. The extent of assistance is shown in Table 4.1.4.

Table 4.1.4 Chinese Assistance on Road Development in Nairobi City

	Length	Cost	Financer	Progress
Thika Road (Kenyatta University-Thika)		KSh10.6 billion	Exim Bank of China	Completed in November 2012
Northern Bypass	31 km	KSh8.5 billion	Kenya Gov't 15% China Gov't 85%	Completed
Eastern Bypass	39 km	KSh4.2 billion	Kenya Gov't 15% China Gov't 85%	Completed
Southern Bypass	28.8 km	KSh16.9 billion	Kenya Gov't 15% Exim Bank of China 85%	Construction period: three years from March 2012

Source: Megaprojects Kenya Website

4.1.3 Railway

(1) The Nairobi Commuter Railway Project

Kenya Railways Corporation (KRC) has a national railway network, including a network within and around Nairobi City, which is capable of providing reliable commuter services affordably. In order to utilise the existing railway infrastructure, the Government of Kenya authorised KRC to enter into a joint development agreement (JDA) with InfraCo Limited (INFRACO) to develop the new commuter rail system jointly on the basis of a public-private partnership. Kenya Railways Corporation and INFRACO signed the JDA on 15 April 2009.

INFRACO is a company owned by the Private Infrastructure Development Group Trust (PIDG), which is supported by several development partners including the following:

(i) Swedish International Development Cooperation Agency (SIDA);

(ii) UK Department of International Development (DfID);

(iii) Swiss State Secretariat for Foreign Affairs (SECE);

(iv) Netherlands Ministry of Foreign Affairs (DGIS);

(v) Austrian Development Corporation (ADC); and

(vi) World Bank

The project development is to be undertaken in two phases as stipulated in the JDA. The purpose of phase 1 is to create the project development plan (PDP), which includes proposed funding and commercial structure, as follows:

(i) Detailed market forecast;

(ii) Engineering designs;

(iii) Development of bankable project documents;

(iv) Competitive procurement of contractors, suppliers, and operator(s); and

(v) Identification and procurement of debt and equity financing through to financial close and start of constructions.

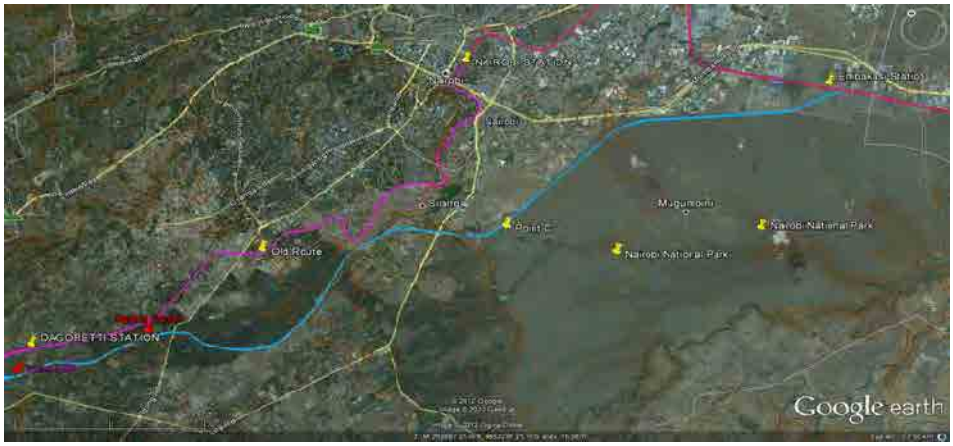
The system has been designed with a capacity to move 43 million passengers per year, which means 172,000 passengers per day compared with the current capacity of 25,000 passengers per day.

KRC is continuing the station improvement project between Syokimau and Nairobi stations, including providing automated ticket gates and high platforms for commuter train operations. The following Figure 4.1.10 shows the Makadara Station improvements.

Figure 4.1.10 Automated Ticket Gate (left) High Platform Construction (right)

INFRACO is now planning to provide a Diesel Multiple Unit (DMU) train set, consisting of five cars, for commuter train operations on this line. An automated fare collection system will be provided at Nairobi, Syokimau, and Makadara stations.

The Kenyan government has agreed with the Chinese government for the finance and construction of a standard gauge track between Mombasa and Nairobi stations. When the standard gauge track is constructed, all the freight trains will be shifted to the new track, and the existing meter gauge track will be dedicated for passenger services. The following Figure 4.1.11 indicates the planned alignment of the standard gauge track from Nairobi to Dagoretti.



Source: Kenya Railways Corporation (KRC)

Figure 4.1.11 Proposed Standard Gauge Railway Corridor from Nairobi to Dagoretti (Blue Line)

4.1.4 Airport

Kenya Airports Authority (KAA) conducted several airport development projects. Some of the projects were implemented through foreign assistance. The recent projects of JKIA and Wilson Airport are shown below.

(1) Jomo Kenyatta International Airport (JKIA)

KAA announced the expansion plan for the terminal area (Terminal 4) including the aircraft apron in October 2005. The expansion project aimed at the improvement of JKIA aviation services such as terminal area and related apron and taxiways. The passenger capacity increased from 25,000 m^2 to 55,000 m^2 and the apron space expanded from 200,000 m^2 to 300,000 m^2. The project cost was approximately US$204 million, which is funded by WB and the national budget. The first phase of the project was completed in mid-2008, which consisted of civil works of the terminal building including the aircraft apron, taxiway, and fuel hydrant system. The second phase was the construction of the Terminal 4 building with car parks.

On the other hand, KAA conducted the national airports system plan (NASP) in 2010. This plan consisted of ten airport master plans for JKIA, Wilson, Mombasa International, Eldoret International, Kisumu, Ukunda, Malindi, Lamu, Lokichogio, and Wajir airports.

A huge fire damaged the main airport building of JKIA on 7 August 2013. Investigations have concluded that it was due to an electrical fault that started from the power distribution box where some wires in the box overheated and sparked. This resulted in complete destruction of the terminal building and especially the entire arrivals section of the main airport building, forcing the shutdown of the runway and cancellation of flights. Within days, a huge tent was put up to act as a makeshift terminal which was later replaced (September 2013) by a temporary terminal in what used to be the main parking garage.

KAA is in the process of bringing down the damaged international arrival terminal to pave the way for its reconstruction, alongside the redesign for terminals 1, 2, and 3. Plans are also underway to complete the new terminal 4 to house international arrivals and departures until JKIA expansion plans are fully implemented. The construction of the greenfield terminal, with a handling capacity of 20 million passengers per year has also kicked off.

1) JKIA Expansion Plan

As part of Vision 2030's flagship project, KAA intends to enhance its passenger handling capacity and improve on the efficiency of hub operations at JKIA through construction of a

new passenger terminal complex. The floor area is around 178,000 m^2 on four levels. The associated facilities of the passenger terminal building are as follows:

(i) 50 international check in positions

(ii) 32 contact and eight remote gates

(iii) Associated apron with 45 aircraft stands and liking taxiways

2) National Airports System Plan (NASP)

In the last ten years, both passenger and goods traffic through Kenya's main airport has increased substantially. In order to handle the growth in its international and domestic air traffic and maintain its status as an important hub in the region, Kenya faces several challenges.

The airport development plans of NASP consist of airside facilities, landside facilities, and public utilities. The facilities development has three phases, namely: phase I for target year 2015, phase II for target year 2020, and phase III for target year 2030. The detailed facilities requirements are shown below.

i) Phase I Development

Airside facilities

- The taxiway is extended to the end of the runway
- Displacement of 572 m of the threshold of Runway 24
- Three new runway exits
- A holding bay near the end of Runway 06
- Isolated parking stand
- Remote parking positions

Landside facilities

- A cell phone parking lot
- A new lane arrival curb

Public utilities

- New electrical equipment to supply the new domestic passenger terminal area
- Expansion of the telephone system
- Complementary equipment in the existing substations

ii) Phase II Development

Airside facilities

- A parallel runway and a full length taxiway
- Taxiway connectors to the new runway system
- Two holding bays
- New airport rescue firefighting (ARFF) facilities
- Integrated landing systems and navigation aids for the new runway

Landside facilities

- New arrival and departure building
- BHS system
- New cargo terminal building

iii) Phase III Development

Airside facilities
- Expansion of the general aviation apron
- Expansion of cargo apron
- Two rapid exit taxiways to the new runway
- Parallel taxiway to Taxiway G

Landside facilities
- Expansion of the primary access roads
- Additional lanes in the arrival curb

Public utilities
- New electrical equipment to supply the new domestic passenger terminal area
- Expansion of the telephone system
- Complementary equipment in the existing substations

(2) Wilson Airport

Wilson Airport is the busiest airport in Kenya and the third busiest in Africa. The daily aircraft frequency recorded is 160 flights in 2012. KAA is currently undertaking airport development based on the NASP of 2010. The development phases are scheduled in the short, medium and long terms by target years 2015, 2020, and 2030, respectively. The airport development plans are shown below.

1) Phase I Development (2015)

Airside facilities

- Full parallel taxiway to Runway 07-25 and a partial 275 m long taxiway to Runway 14
- Additional aircraft position of Aprons 1, 2 and 3
- New engine run-up apron
- A new control tower and ARFF facility

Terminal
- Temporary terminal building

Landside facilities
- Parking lot expansion, 165 spaces

Utilities
- Upgrading the existing generator including mechanical equipment, electrical equipment, and cable network
- IP Telephony

2) Phase II Development (2020)

Airside facilities

- New apron for the new terminal building
- Parallel taxiways for both runways
- New calibration taxiway and pad

Terminal
- New terminal building

Landside facilities
- New access road

Utilities
- New standby generator including mechanical equipment, electrical equipment, and cable network

3) Phase III Development (2030)

Phase III development is considered for the passenger terminal building, if the forecasts are exceeded.

With regard to the relocation of Wilson Airport, each organisation has a different view. NASP includes the Wilson Airport development plan and spatial planning concept for the Nairobi Metropolitan Region proposed redevelopment of the Wilson Airport area to a government office complex. The position of Wilson Airport will be further discussed and confirmed with stakeholders through a working group discussion.

(3) Airport Development in Nairobi City

Both JKIA and Wilson Airport are operated and managed by KAA who are also in the process of implementing the airport's future development plan. The future plan of JKIA was announced by Vision 2030 as an airport city; Wilson Airport has already undergone improvement works under NASP. This could illustrate KAA's reluctance to approve the relocation of both airports at the moment.

However, airports sometimes may have negative impacts when social and environmental factors are considered. Recently, it seems that there is no airport operation-related complaint or impact such as aircraft noise and pollution, even though a number of housing developments are being implemented around the airports .Wilson Airport is particularly affected in this regard.

JKIA will not be able to relocate from its present location where it has been incorporated in the Nairobi development plan. On the other hand, the Wilson Airport area is the most strategic in Nairobi City. Therefore, it must be required to relocate to another area from the standpoint of city planning and the citizens. However, airports in many cities in the world are located in the city centre for general aviation for business executives. Some airport relocation plans have been postponed in other countries. Therefore, it is not easy to promote the relocation of Wilson Airport.

4.1.5 Water Supply

(1) World Bank

The Water and Sanitation Services Improvement Project is ongoing for supporting the Athi Water Service Board (AWSB), Coast Water Service Board (CWSB), Lake Victoria North Water Service Board (LVNWSB), and their water service providers (WSPs) for the improvement of water supply and sanitation systems. The area covered by AWSB and its WSP includes Nairobi City.

Under the project, the Feasibility Study and Master Plan for Developing New Water Sources for Nairobi and Satellite Towns (FSMPNWS) was carried out and co-financed by AFD. Its contents were the projection of population and water demand until 2035, preparation of six scenarios of water resource development, and the preliminary design of water resource development and water supply system.

(2) Agence Francaise Developpement (AFD)

In addition to FSMPNWS, AFD financed two projects for the rehabilitation of water supply facilities including a barrage for Nairobi City and development of the water supply system in informal settlements of Nairobi City. The projects financed by AFD are as follows:

(i) Nairobi Water and Sewerage Emergency Physical Investment Project, and

(ii) Complementary Support to the Nairobi and Kisumu Water and Sanitation Project

(3) Japan International Cooperation Agency (JICA)

The development of the National Water Master Plan 2030 in Republic of Kenya (NWMP) was completed. In the project, a comprehensive plan for water resources is discussed for water supply, sanitation, irrigation, hydropower generation, food and drought management, and environmental management. The project carried out the projection of population and water demand, proposal of water allocation plan, development plan of water resources and strategy of water supply system for the Athi Catchment Area including Nairobi City.

(4) African Development Bank (AfDB)

To support the institutional activity of AWSB and the development activity in Kibera, Nairobi City, AfDB financed the Water Service Boards Support Project. The project is ongoing as of April 2013.

(5) European Commission (EC)

EC supported water supply projects for anti-poverty programme. Ongoing projects financed by EC are as follows:

(i) Nairobi Informal Settlement Water and Sanitation Improvement Programme; and

(ii) Micro Financing for Community Managed Water Projects.

(6) Other Partners

A few bilateral development partners are active in Nairobi City for the development of the water supply system in informal settlements and reform of the water sector. The following projects are financed by bilateral partners:

(i) Water Sector Reform Program financed by German Technical Cooperation;

(ii) Water Supply and Sanitation for the Urban Poor financed by German Technical Cooperation;

(iii) Water Supply and Sanitation for the Urban Poor Phase II financed by German Technical Cooperation;

(iv) Support to Water Service Trust Fund financed by Finland; and

(v) Kenya Water and Sanitation Program financed by SICA.

Besides the above, there are two projects financed by UN-HABITAT, as follows:

(vi) Kibera Water and Sanitation Project financed by UN- HABITAT; and

(vii) Kibera Support Programme financed by UN-HABITAT.

4.1.6 Stormwater Drainage and Sewerage

The major ongoing projects relevant to the infrastructure development of the stormwater drainage and sewerage in Nairobi City are listed in Table 4.1.5. Each project covers a wide scale in terms of the objectives and target areas. Brief descriptions of each project and ongoing activities relevant to the infrastructure development of stormwater drainage and sewerage in Nairobi City are identified from the published documents and summarised hereunder in this subsection.

Table 4.1.5 Ongoing Projects Relevant to Infrastructure Development for Stormwater Drainage and Sewerage in Nairobi City

Project	Implementing Agency	Donor
Water and Sanitation Service Improvement Project (WaSSIP)	AWSB, CWSB, LVNWSB	World Bank
Kenya Municipal Program (KMP)	MOLG	World Bank
Kenya Informal Settlement Improvement Project (KISIP)	MOH	World Bank
Nairobi Metropolitan Services Improvement Project (NaMSIP)	MONMD	World Bank
Nairobi Rivers Basin Rehabilitation and Restoration Program: Sewerage Improvement Project (NaRSIP)	AWSB	AfDB

Source: Project Appraisal Documents

(1) Water and Sanitation Service Improvement Project (WaSSIP)

The WaSSIP is financed by the WB and aims at increasing access to reliable, affordable, and sustainable water supply and sanitation services; and improving the water and wastewater services in the areas served by AWSB, CWSB, and LVNWSB. The period of the project implementation was scheduled originally for 2008-2012 and is further extended with additional financing by the WB.

The project comprises the following three components:

(i) Component 1: Support to the Athi Water Services Board

(ii) Component 2: Support to the Coast Water Services Board

(iii) Component 3: Support to the Lake Victoria North Water Services Board

Of the three components, Component 1 comprises the following subcomponents:

(i) Rehabilitation and Extension of Water Supply Facilities;

(ii) Rehabilitation and Extension of Wastewater and Sanitation Facilities; and

(iii) Institutional Strengthening Program.

Of the infrastructure developments for wastewater and sanitation facilities under subcomponent (ii) above, the major works implemented in Nairobi City are listed as shown in Table 4.1.6 below.

Table 4.1.6 Major Infrastructure Developments for Wastewater and Sanitation Facilities in Nairobi City under the WaSSIP

Works	Procurement Information	Description
Construction of Gatharaini Trunk Sewers including Rui-Rwaka, Gatharaini North and Gatharaini South	Contract No. AWSB/WaSSIP/Comp.1/W-6/2009 Contract Signed on 24 March 2010 Construction Period: 24 months	● Construction of approximately 49 km of pre-cast concrete sewers of various sizes ranging from 300 to 1200 mm diameter ● Construction of box culvert (1400 x 1400), manholes, and other auxiliary works ● Construction period: 24 months
Construction of Lavington - Riruta Trunk Sewers Extensions	Contract No. AWSB/WaSSIP/Comp.1/W-7/2009 Contract Signed on 9 June 2009 Construction Period: 12 months	● Extension of approximately 8 km trunk sewers of various sizes ranging from 750 mm diameter nominal (DN) to 225 mm DN spigot and socket concrete pipes covering Lavington, Riruta North, and Riruta South areas, in Nairobi City
Rehabilitation of Dandora Sewerage Treatment Works and Reconstruction of the Ngong River Trunk Sewers	Contract No. AWSB/WaSSIP/Comp.1/W-9/2009 Contract Signed on 20 May 2009 Construction Period: 20 months	● Desludging of existing facultative and maturation pond series 7 and 8 including removal of approximately 550,000 m^3 of sludge (at Dandora STP) ● Construction of six anaerobic ponds prior to series 1 and 2 and series 7 and 8, each dimension is 120 m by 90 m by 4.5 m deep including earthworks of approximately 200,000 m^3 (at Dandora STP) ● Construction of associated reinforced concrete works of approximately 3,000 m^3 and ancillary 3No penstocks 1400 mm by 100 mm and 1 No. 1000 mm by 1000 mm (at Dandora STP) ● Rehabilitation and reconstruction of 24,000 m of Ngong trunk sewers including cleaning, unblocking, repairing and replacement of short sections and manhole covers, and associated works.

Source: Procurement Plan for the WaSSIP (World Bank, January 2010) and the updates shown in the website of the World Bank as of April 2013

In addition, the procurement plan for the WaSSIP from July 2012 to December 2013 indicates the recruitment of consultants to carry out the consulting services for updating the Nairobi City sewerage master plan and preparation of the master plan for selected satellite towns. Based on the procurement plan, the submission and opening of proposals had been planned on 30 October 2012.

(2) Kenya Municipal Program (KMP)

MOLG is implementing phase 1 of KMP with financial assistance from the WB. The development objective of phase 1 is to strengthen local governance and improve service delivery in 15 selected municipalities through a combination of institutional reforms, capacity building, and investment in infrastructure. The phase 1 of the KMP is scheduled to be implemented from 2010 to 2015.

The selected municipalities (major cities and towns) are (1) Nairobi City, (2) Mombasa, (3) Kisumu, (4) Nakuru, (5) Eldoret, (6) Malindi, (7) Naivasha, (8) Kitui, (9) Machakos, (10) Thika, (11) Nyeri, (12) Garissa, (13) Kericho, (14) Kakamega, and (15) Embu.

The project comprises the following fourcomponents:

(i) Component 1: Institutional Strengthening

(ii) Component 2: Participatory Strategic Urban Development Planning

(iii) Component 3: Investment in Infrastructure and Service Delivery

(iv) Component 4: Project Management, Monitoring, and Evaluation

Of the above, Component 3 consists of the infrastructure developments considered as eligible for financing under the KMP; motorised and non-motorised transport facilities (including bus parks, access roads, sidewalks, and paved paths), street lighting, markets, solid waste management,

stormwater drainage, disaster management and prevention facilities and equipment, public parks, and green spaces.

The investments for Component 3 are phased into two: (a) investments for implementing the infrastructure developments during 2010-2013 and (b) investments for implementing the infrastructure developments during 2013-2015. The selection of infrastructure developments is based on either (a) year 3–5 investments, or (b) the criteria established in the process of the project design of the KMP as described in the project appraisal report (World Bank, April 2010).

The investments for Component 3 cover the infrastructure developments for stormwater drainage in the municipalities (major towns and cities) concerned. The procurement plan for phase 1 of the KMP (World Bank, July 2012) shows the scheduled procurements relating to the infrastructure developments for stormwater drainage in Mombasa, Malindi, Nyeri, Naibasha, and Kitui.

Besides, the updated list of the procurement notices (World Bank website, as of April 2013) shows the request for expression of interest (EOI) for the Preparation of a Master Plan, Detailed Designs, Tender Documents and Operations and Maintenance Manuals for Stormwater Drainage Works in the City of Nairobi (Contract No. MOLG/KMP/COMP3/SWD-02C), which was announced by the MOLG on 11 March 2013. The period of the assignment for the consultancy service is expected to be nine months. The request for EOI was closed on 26 March 2013.

(3) Kenya Informal Settlement Improvement Project (KISIP)

The MOH (currently under MOLHUD) is implementing the KISIP with the financial assistance by the WB. The project development objective is to improve living conditions of informal settlements in 15 selected municipalities in Kenya as shown below. The KISIP is scheduled to be implemented from 2011 to 2016.

The selected municipalities (major towns and cities) are (1) Nairobi City, (2) Mombasa, (3) Kisumu, (4) Nakuru, (5) Eldoret, (6) Malindi, (7) Naivasha, (8) Kitui, (9) Machakos, (10) Thika, (11) Nyeri, (12) Garissa, (13) Kericho, (14) Kakamega, and (15) Embu.

The KISIP comprises the following four components:

(i) Component 1: Strengthening Institutions and Programme Management

(ii) Component 2: Enhancing Tenure Security

(iii) Component 3: Investing in Infrastructure and Service Delivery

(iv) Component 4: Planning for Urban Growth

Of the above, Component 3 supports investments in settlement infrastructure, and when necessary, extension of trunk infrastructure to settlements. The infrastructure developments considered as eligible for financing under the KISIP are roads, bicycle paths, pedestrian walkways, street and security lighting, vending platforms, solid waste management, stormwater drainage, water and sanitation systems, electrification, public parks, and green spaces. The selection of infrastructure developments is performed based on the criteria established in the process of project design of the KISIP as described in the project appraisal report (World Bank, February 2011).

From the procurement plan of the KISIP from December 2012 to December 2013 and the updated list of the procurement notices (World Bank website, as of April 2013), the following procurements relating to the infrastructure developments for stormwater drainage and sewerage in Nairobi City are identified:

1) Extension of Services to Informal Settlements in Nairobi City, Lot 4: Kayole Soweto Sewerage

Contract No. AWSB/KISIP/W-1/2013
Bid Submission and Opening (NCB): 14 May 2013
Construction Period: 16 months
Major Components:

(i) Excavation, laying, jointing, and backfilling of trenches for 4 km of precast concrete sewer pipes of diameter 300 mm to 375 mm;

(ii) Excavation laying, jointing, and back filing of trenches for 26 km of PVC Class 41 sewer pipes of diameter 160 mm to 225 mm; and

(iii) Construction of 164 manholes and 3,760 inspection chambers.

2) Socio-economic surveys, settlement upgrading plans, and bidding documents for infrastructure improvement of informal settlements in Nairobi, Naivasha, and Machakos

Contract No. MH/KISIP/CS/004/2011-2012
Signing Date: 22 August 2012
Period of Consulting Service: August 2012 - October 2013
Key objective: to prepare settlement upgrading plans for selected informal settlements
Major tasks:

(i) Carrying out a socio-economic survey;

(ii) Preparing a preliminary settlement upgrading plan, including preliminary designs and feasibility studies for the proposed infrastructure investments; and

(iii) Preparing a final upgrading plan as well as detailed engineering designs and bid documents for the agreed infrastructure investments.

(4) Nairobi Metropolitan Services Improvement Project (NaMSIP)

The MONMD is the agency responsible for implementing the NaMSIP with financial assistance from the WB. The project development objective is to strengthen urban services and infrastructure in the Nairobi Metropolitan Region.

The project comprises the following four components:

(i) Component 1: Institutional reform and planning

(ii) Component 2: Local government infrastructure and services

(iii) Component 3: Metropolitan infrastructure and services

(iv) Component 4: Project management, and monitoring and evaluation.

Under Component 3, the project will invest in the development of local infrastructure (roads, markets, street lighting, bicycle and pedestrian pathways, drainage, etc.) as well as solid waste management and sewerage collection/disposal.

The procurement plan of NaMSIP from December 2012 to December 2013 (World Bank, December 2012) describes a series of procurements for the implementation of the NaMSIP. Of these, the following procurements are found to be directly relevant to the infrastructure development for stormwater drainage and sewerage in and around Nairobi City.

1) Construction of Nairobi stormwater drainage works

Procurement Method: International Competitive Bidding (ICB)

Bid Submission and Opening: 1 August 2013 (Planned)

2) Preparation of feasibility studies, final designs and bidding documents for stormwater drainage in Nairobi City (Dagoretti, Langata, CBD, and Embakasi), Thika (CBD and west of CBD), Mavoko and Ongata Rongai townships

Contract No.

Procurement Method: Quality- and Cost-Based Selection (QCBS)

RFP Submission and Opening: 23 November 2012 (Actual)

(5) Nairobi Rivers Basin Rehabilitation and Restoration Program: Sewerage Improvement Project (NaRSIP)

The Nairobi Rivers Basin Rehabilitation and Restoration Program provides the comprehensive framework for the water environment management in Nairobi City. The comprehensive framework was elaborated by the former Nairobi River Basin Program (NRBP, 1999-2008).

The Sewerage Improvement Project is part of the Nairobi Rivers Basin Rehabilitation and Restoration Program. The project has been elaborated in the Nairobi Sewerage Master Plan study (1998), and further detailed in the feasibility study completed in June 2010. The AWSB is the agency responsible for implementing the project with financial assistance by the AfDB.

The project has three main components, as follows:

(i) Wastewater Infrastructure

(ii) Sanitation, Hygiene, and Social-environmental Support

(iii) Institutional Development Support

Of the above, (i) Wastewater Infrastructure consists of the following works as described in the project appraisal report (AfDB, July 2010):

(i) Rehabilitation of the Kariobangi conventional sewerage treatment plant currently operating at about 30% of its design capacity to the full capacity of 32,000 m^3/day;

(ii) Construction of two additional series of waste stabilisation ponds at Dandora to increase the capacity by 40,000 m^3/day from 120,000 to 160,000 m^3/day;

(iii) Rehabilitation and laying of new trunk lines at an overall length of 54 km in addition to 40 km of reticulation lines;

(iv) Duplication of inlet works at Dandora for the increased wastewater flow; and

(v) Construction of 100 ablution blocks in various informal settlements where the trunk sewer lines are proposed to go through.

The procurement notices issued by AWSB in relation to the above are listed in the website of the AfDB as shown in Table 4.1.7 below.

Table 4.1.7 Major Ongoing Infrastructure Developments in Nairobi City under the Sewerage Improvement Project

Contract	Description	Procurement Information
Works	Lot 1: Construction of the Kiu River and Dandora Estate Trunk Sewers and Expansion of Dandora Waste Water Treatment Plant.	Contract No. AWSB/NaRSIP/W/01/2012 Bid Submission and Opening 24 May 2012
Works	Lot 2: Construction of Mathare, Nairobi, Ngong Rivers Trunk Sewers and Reticulation Network	Contract No. AWSB/NaRSIP/W/01/2012 Bid Submission and Opening 11 June 2012
Works	Construction of Dandora, Kangundo Road, Kibera, Upper Hill and, Kirichwa Dogo Trunk Sewers	Contract No. AWSB/NaRSIP/W03/2013 Bid Submission and Opening 2 August 2013
Consultancy Services	Design and supervision of works.	Expressions of Interest (EOI) Submission: 3 January 2011
Consultancy Services	Community mobilisation and sensitisation, design and supervision and works coordination for implementation of the ablution blocks	Expressions of Interest (EOI) Submission: 25 May 2012

Source: Relevant documents listed in the website of the AfDB as of September 2013

4.1.7 Power Supply

The power sector in Kenya has many kinds of projects such as distribution, transmission and generation projects, and rural electrification projects. Amongst the projects, the section reviews projects with a focus on Nairobi City. Table 4.1.8 shows the ongoing projects related to the project.

Table 4.1.8 Power Sector Projects

No.	Project	Loan Amount (million)	Status	Implementing Agency	Donor
1	Electricity Expansion Project	US$330.00	Ongoing (2010-2015)	MOE, Kenya Power, REA KenGen,	WB, IDA
2	Energy Sector Recovery Project Additional Financing	US$80.00	Ongoing (2009-2013)	MOE, Kenya Power, REA KenGen,	WB, IDA
3	Nairobi Ring	€78.50	Ongoing (2012-)	MOE, KETRACO, Kenya Power	AFD
4	Ethiopia-Kenya Electricity Highway Project	UA760.00	Ongoing (2012-2017)	EEPCO, KETRACO	WB, AfDB, AFD

MOE : Ministry of Energy
KPLC : Kenya Power and Lighting Company Limited,
WB : World Bank
REA : Rural Electrification Authority
KenGen : Kenya Electricity Generating Company Limited
AFD : French Development Agency
AfDB : African Development Fund
IDA : International Development Association
EEPCO : Ethiopia Electric Power Corporation

Source: JICA Study Team

(1) Electricity Expansion Project

The objectives of the WB-assisted Electricity Expansion Project are to increase electricity access in urban, peri-urban, and rural areas as well as to improve the efficiency, reliability, and quality of services to consumers. The project has five components, of which the components of distribution upgrading and infilling project are related to this survey. This component includes upgrading of distribution substations as well as reinforcement and extension of networks in an area including the Nairobi region.

(2) Energy Sector Recovery Project Additional Financing

The World Bank-assisted Energy Sector Recovery Project additional financing enables the original project to meet unanticipated cost overruns and financial shortfalls. The original project had four components, namely: (i) institutional and capacity building component, (ii) studies and engineering

services component, (iii) generation component, and (iv) distribution component. The additional financing project is for (iii) and (iv). The original distribution component (iv) was to provide the upgrading of existing substations, constructing new substations, reinforcing and extending the distribution system, supplying energy meters and upgrading SADA/EMS systems. The additional financing for the distribution component includes expanding the distribution network to un-electrified areas in Nairobi City, Western, Central, and Coast provinces. This activity will cater to 40,000 applicants for connection.

(3) Nairobi Ring Project

The objective of AFD-assisted Nairobi Ring Project is to support the country's economic growth by providing reliable, economical, and low-carbon energy. The objective is divided into the following three sub-objectives:

(i) Improve the security of supply of Nairobi City as well as encourage social and economic development of the city and of the country.

(ii) Allow the transmission of energy generated by Olkaria geothermal plants, wind power plant of Lake Turkana, and thermal power plant near Mombasa to Nairobi City.

(iii) Allow interconnection with Ethiopia and Tanzania under the East African Power Pool.

In order to realise the objective, the project sets the following components:

(i) Construction of 400 kV transmission lines, approximately 100 km, from Suswa to Isinya;

(ii) Construction of 220 kV substations in Suswa, Isinya, Thika Road, Koma Rock, the Athi River, and Ngong, as well as switching and monitoring devices at the existing substation and Dandora;

(iii) A spur line to Ngong Substation and an underground cable between Dandora and Komarock Substation.

(4) Ethiopia-Kenya Electricity Highway Project

The project co-financed by the WB, AfDB, and AFD involves the construction of an electricity highway between Ethiopia and Kenya consisting of about 1,068 km of 500 kV transmission lines and associated substations. The demand for electricity in the East African region has steadily increased. The region has a great variety of natural resources, in particular hydropower, mainly concentrated in Ethiopia. The project seeks to position Ethiopia as the main powerhouse and Kenya as the main hub for power trade in the East African Region. The power sector in Kenya has a plan to import electricity from Ethiopia to Nairobi Region, so the project is important for Nairobi City to avoid electricity shortage.

4.1.8 Solid Waste Management (SWM)

There are some development partners implementing studies, programmes, and projects. The main development partners are UNEP, UN-HABITAT, and WB.

(1) UNEP

UNEP has supported small-scale and medium-sized projects related to solid waste management. These projects are related to waste, sanitation, and poverty reduction sectors. One of the main projects is "Integrated Solid Waste Management Plan for Nairobi City". The project commenced in March 2009. A national task team was formed and local university teams took hundreds of samples of wastes in 2009 to determine the origins and compositions as well as to estimate the amounts. In the plan, some action plans were proposed.

Several training sessions were run. Stakeholders were consulted on matters of concern in early December 2009, and a strategic approach to the integrated waste management plan was presented by the national task team. In the plan, some action plans such as 1) strategic alignment, 2) recognition of partners, 3) continuous monitoring and research of waste character, quantities, and related solid waste information to aid in future planning, 4) end-of-life levies on problematic wastes, 5) source separation of recyclable and pure organic wastes with incentives, 6) streamlined (weight-based) collection fees, 7) awareness campaigns and education, 8) zoning of waste collection, 9) formalised waste collection contracts, 10) development of material recovery and transfer facilities, 11) derivation of value from the organic waste fraction, 12) strengthening of specific recycling strategies, 13) development of a new engineered landfill site, and 14) rehabilitation of Dandora landfill site.

(2) UN-HABITAT

The Kibera Integrated Water, Sanitation and Waste Management Project (WATSAN) assists in low-cost community-based demonstrations in the Soweto Village of Kibera slums. The project aims at contributing towards improving the livelihoods of the urban poor in Soweto East, by supporting small-scale community-based initiatives in water, sanitation, and waste management. The activities related to solid waste is to implement small-scale door-to-door waste collection and recycling demonstrations. The Kenya Slum Upgrading Program (KENSUP) is also related to solid waste management and the main objective is to improve the livelihood of people living and working in slums and informal settlements in Kenya's urban areas. The programme started with selected slums within the statutory, regulatory, and legal boundaries of the County Council of Nairobi (CCN), the Kisumu Municipal Council, and the Mavoko Municipal Council.

(3) World Bank

The WB implements the KMP from 2010 to 2015, which includes solid waste management (SWM) through the cooperation of the Ministry of Metro Development. However, the area of the SWM sector of this programme is outside of Nairobi City. The WB currently considers the possibility of assistance for SWM in Nairobi Metropolitan Area.

4.1.9 Telecommunications

The telecommunications projects are as listed below. Projects for the overhaul of the telecommunications infrastructure of Kenya were sponsored by the WB and were implemented in 1979, 1982, and 1985, consecutively.

(1) World Bank Project in 1979

The project in 1979 overhauled the telecommunications services by expanding local services and by providing high quality long-distance circuits, as well as basic telecommunications facilities to rural areas which were poorly served at the time. Major components included the installation of (a) a total of 46,200 additional lines of local automatic exchange equipment with associated cables and subscribers' plant, and a total of 46,000 additional connections; (b) long distance public call centres to

provide services in 200 urban, rural, and market areas without telephone services; (c) eight microwave radio systems, each with a capacity of 960 channels, three UHF radio systems with a total of 540 channels, 190 UHF/VHF channels and multiplex equipment to provide 3,100 additional channels; (d) long distance automatic exchanges with a total of 3,600 terminations and extensions to existing exchanges by 1,800 terminations; and (e) buildings to house equipment.

(2) World Bank Project in 1982

The second WB telecommunications project in 1982 comprised the installation of (a) a total of 80,900 additional lines of local automatic exchange equipment with associated cables and a subscribers' plant to connect 75,000 additional main lines; (b) a total of 7,100 terminations in long distance exchanges; (c) three microwave and radio systems and 1,270 additional channels; (d) rural carrier systems to provide 200 additional channels; (e) two telex systems with a total of 3,000 additional lines and connection of 500 additional subscribers; and (f) buildings to house the equipment. The project also included consulting services and training in association with the above installations.

(3) World Bank Project in 1985

The third telecommunications project in 1985 comprised of (a) expansion of telephone and telex switching facilities, associated cable networks and subscriber plants, and expansion of international and long distance facilities; (b) overhaul of workshops and repair facilities and provision of spare parts; (c) support for the Kenya Post and Telecommunication Company’s (KPTC) training programmes and procurement of laboratory equipment; and (d) overhaul of KPTC's management system and consulting services for studies, including a review of the telecommunications tariff structure.

(4) USAID Project in 2011

In 2012, the United States Agency for International Development (USAID) provided technical assistance that covered the development of a national broadband strategy to underpin the deployment of modern broadband infrastructure to meet the needs of businesses, the government, and the entire economy.

4.2 Review of Current Infrastructure Conditions

4.2.1 Urban Transport

(1) Road Network

1) Road Classification and Jurisdiction

Roads in Kenya are classified under the Kenya Road Classification Manual (July 2009, Ministry of Roads). The manual classifies rural roads into eight categories (S-G) and urban roads into seven categories (H-P). The summary of categories is shown in Table 4.2.1.

Table 4.2.1 Summary of Road Classification in Kenya Road Classification Manual

Category	Functional Class	Road Class	Functional Class	Alternative Descriptive Term	Description	Indicative Design Standards	
						Carriageway Width in Meters	Design Speed (kph)
Rural Road	Arterial or Trunk	S	Super Highway	Auto route, Motorway, Expressway	Highways connecting two or more cities and designed to carry safely large volumes of motor vehicle traffic at high speeds	Dual carriageway of min 2 lanes	90-120
		A	Major Arterial	Trunk Road	Roads forming strategic routes and corridors, connecting international boundaries, and international terminals	7-14	70-110
		B	Minor Arterial	Trunk Road	Roads forming important national routes, linking province headquarters or other important centres to the capital, to each other or to class A roads	7 (-14)	70-110
	Collector	C	Major Collector	District	Roads linking district headquarters and other major designated towns to the higher level network or to each other	6.5	60-110
Urban Road	Arterial	H	Major Arterial	Highway	Major arterials provide for through traffic and for relatively long distance movements between widely separated parts of the town or city	3.5 m per lane, 4-6 lanes	70-90
		J	Minor Arterial	Principal Arterial	Minor arterials provide the main means of moving between different zones of the urban area	3.5 m per lane, 2-4 lanes	50-60
	Collector	K	Major Collector	Primary Distributor	Major collectors provide the link between arterials and local roads, distributing traffic to residential and other defined zones	7	30-50
		L	Minor Collector	District Distributor	These perform a similar function to major collectors, but generally serve a smaller area, with lower traffic levels	7	30-50
	Local	M	Major Local	Shopping / Local Street	These roads include the main shopping and business streets in the urban CBD or suburbs of larger towns and cities	5-7	30-50
		N	Minor Local	Non-residential Access	Roads providing direct access to individual or groups of properties, other than residential areas	5	30-50
		P	Local Access	Residential Access	Roads providing direct access to groups of residential properties	3-5	30-50

Source: "Kenya Road Classification Manual" July 2009, Ministry of Roads

Amongst the classified rural roads, class S, A, B, and C are national roads under the jurisdiction of KeNHA. Other rural roads are mainly under the jurisdiction of Kenya Rural Roads Authority (KeRRA). Urban roads are under jurisdiction of KURA and are currently in the process of devolution to the municipality.

Nairobi is the capital city of Kenya and the economic, social, and cultural centre of Kenya. There are two international roads (class A) forming the major arterial road in Nairobi City. One is the Northern Corridor (A109/104) that includes Mombasa Road, Uhuru Highway, Chiromo Road, Waiyaki Way, and Naivasha Road as the trunk road. A104 then extends from Nairobi City centre to the south through Kajiado and Namanga towards the Tanzanian border. Further, A109 extends to the east and connects to Mombasa, the second largest city in Kenya, and to the west border of Uganda, and forms the logistic axis for the inland countries.

The second international trunk road is Thika Road (A2) that was constructed and improved currently with the assistance of AfDB and China. The road connects in the northeast direction from Nairobi City centre to Thika and to A2, which connects further to Ethiopia.

Figure 4.2.1 shows the road network and road classification in Nairobi City. The functions of major roads of class B, C, and H are described in Table 4.2.2. Recently constructed bypasses such as H6 and H7 are also included in the table.

Table 4.2.2 Classified Roads in Nairobi City and Their Functions

Road Number	Name	Function	Coverage Area
B10	Airport North Road	Principal Arterial	Airport North
C58	Magadi Road	Minor Arterial	Langata, Kajiado
C59	Outer Ring Road	Principal Arterial	Embakasi, Makadara, Kamukunji, and Kasarani
C60	Ngong Road	Principal Arterial	Dagoretti, Langata to Kajiado
C61	Naivasha Road	Minor Arterial	Dagoretti to Langata (partly missing)
C62	Limuru Road	Principal Arter1al	Westlands
C63	Langata Road, Dagoretti Road, Kiambu Road and Ruiru Road	Principal Arterial	Langata, Kajiado, Kiambu
C64	Kiambu Road	Minor Arterial	Kasarani, Westlands
C98	Komarock Road	Principal Arterial	Embakasi, Kjiru, Kathiani
H6	Eastern Bypass	Principal Arterial	Embakasi, Njiru
H7	Northern Bypass	Principal Arterial	KIambu, Kasarani, Westlands

Source: JICA Study Team, Road functions are based on The Study on Master Plan for Urban Transport in the Nairobi Metropolitan Area, JICA 2006

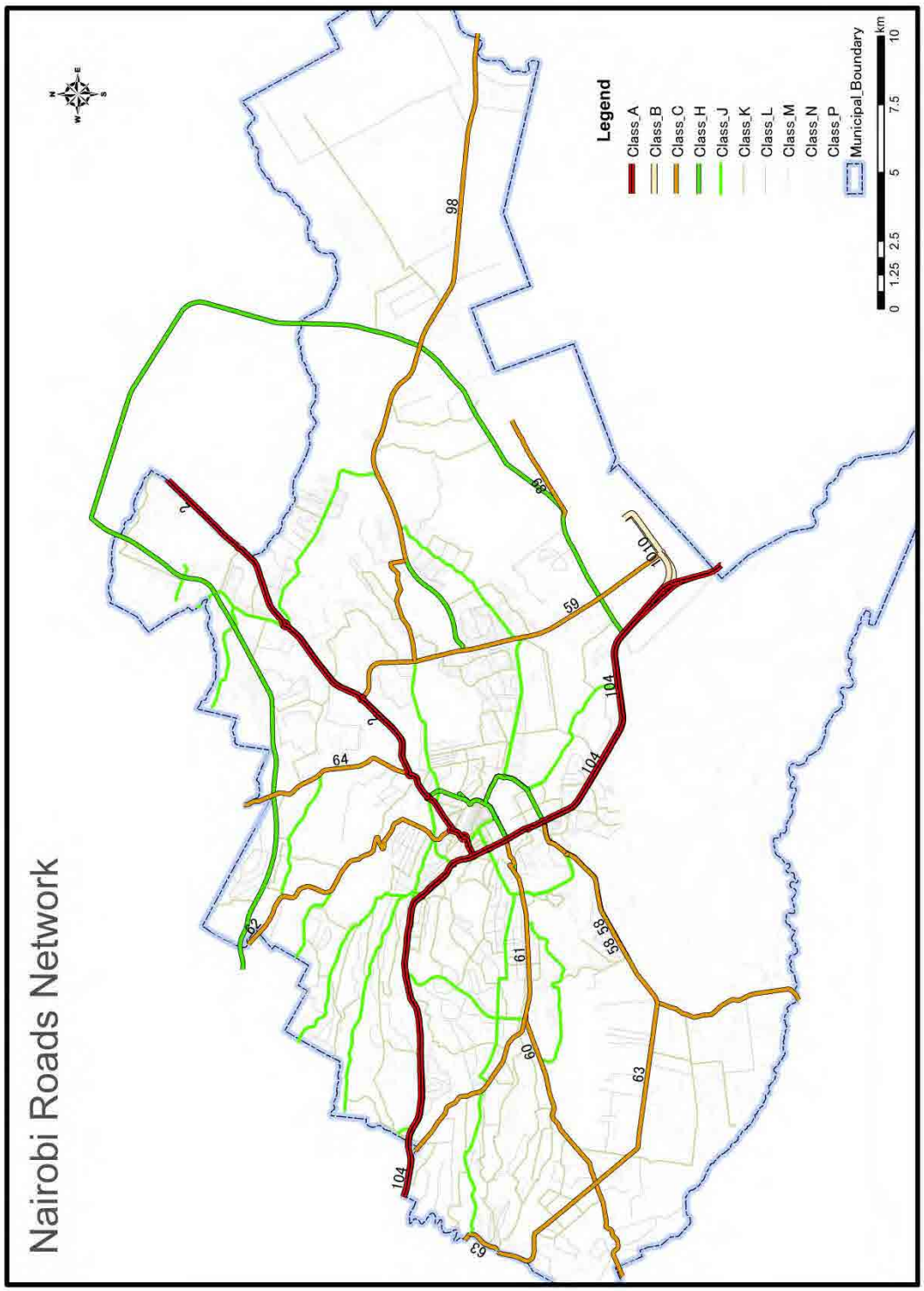


Figure 4.2.1 Road Network in Nairobi City

Source: JICA Study Team

The structure of the road network in Nairobi City is described as follows:

(i) The international roads go through Nairobi City and function as the most crucial radial road in the study area.

(ii) The importance of the Northern Corridor as the city's trunk road as well as an international trunk road is emphasised, and traffic flow of the Northern Corridor is apparently given more priority than other crossing roads. Therefore, the Northern Corridor becomes a kind of barrier for the local traffic flow in the west-east direction.

(iii) As the densely populated area of Nairobi City mainly stretches to the west and east, the traffic demand of west-east is larger than north-south. Therefore, roads in the west-east direction across the Northern Corridor are always congested.

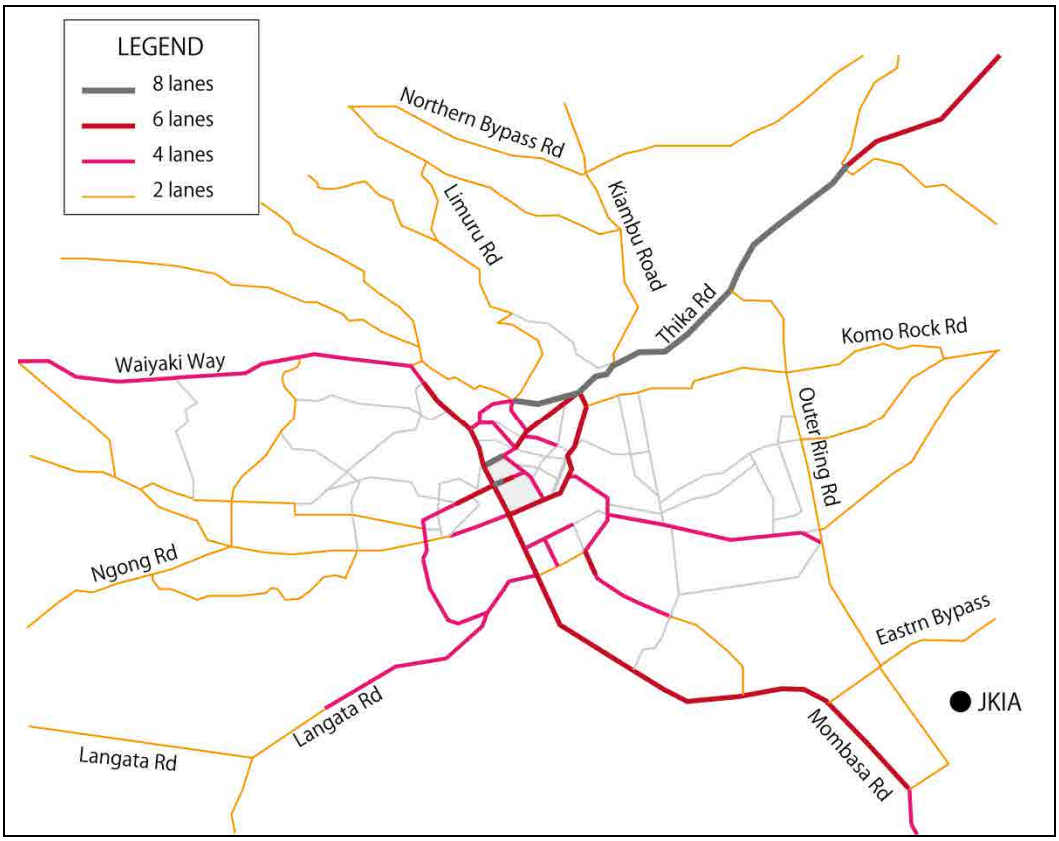
(iv) The present land use structure of Nairobi City is centralised around the CBD. Hence, radial roads are predominant in the network system. This network system attracts most of the traffic into the city centre including vehicles that do not have intention of going to the city centre.

(v) In the suburban area, where housing developments are in progress, not only the access roads and collector roads, but also arterial roads that collect the generating traffic are insufficient.

(vi) The urban transport master plan by JICA emphasised the forming of radial and circumferential road system, and a staging plan is proposed based on this policy. Although, currently, this road development has not been implemented based on the proposed staging plan.

2) Number of Lanes

The number of lanes of the existing road class A to J and those that have more than four lanes are shown in Figure 4.2.2. The roads with more than four lanes are major trunk roads in the city centre area. Most of the roads in the south-north direction have two lanes. Consequently, traffic demand is concentrated to A104. According to the traffic analysis, traffic in the east-west direction will increase in the future. Roads in the east-west direction also require to be strengthened.



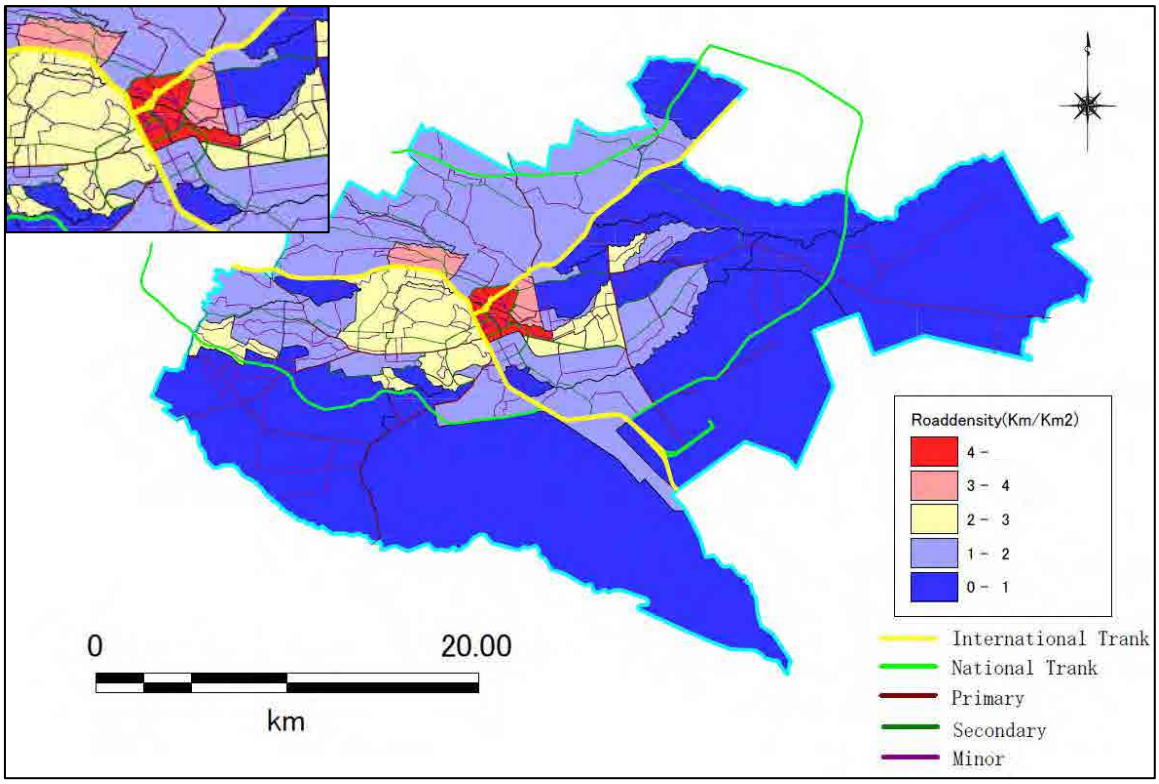
Source: JICA Study Team (JST)

Figure 4.2.2 Number of Lanes of Existing Roads

3) Road Density

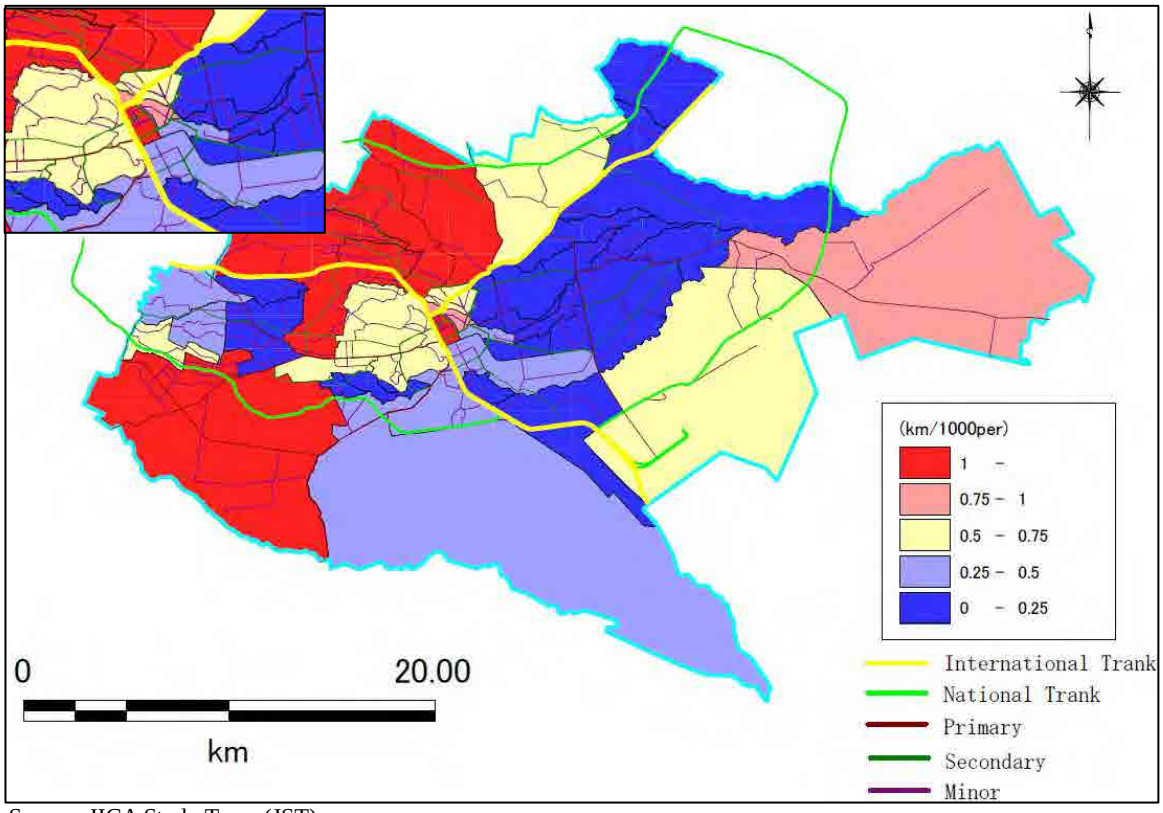
The road length density of the road network is shown in Figure 4.2.3. The road length density is 0.98 km/km^2 in entire Nairobi City, which includes some low population density areas. The Japanese standard density of the trunk road in the urban area is 4.0 km/km^2, and only the centre of Nairobi City is in this range. Next, the road length density by population is shown in Figure 4.2.4. The road length density by population of entire Nairobi City is 0.22 km/1000 people. The western part of Nairobi City has a high road length density by population. However, the east side of Thika Road has low road length density; it indicates that there are not enough roads where rapid increase in population is taking place. (Refer to Figure 2.1.3, Average Annual Population Growth Rate of Nairobi City and its Environs)

In general, the development/improvement of roads in Nairobi City is concentrated in the trunk roads, and the development/improvement of small roads in residential areas is left behind.



Source: JICA Study Team (JST)

Figure 4.2.3 Road Length Density by Area of the Target Road Network



Source: JICA Study Team (JST)

Figure 4.2.4 Road Length Density by Population of the Target Road Network

(2) Non-Motorised Transport

Since Kenyan people walk a lot along the arterial roads and in the urban streets, walking occupies a large proportion of the travel modes. Therefore, NMT facilities for safe, comfortable, and easy movement are necessary especially in traffic congested areas. In this viewpoint, the following are pointed out:

(i) Sideways are narrow.

(ii) Markings for pedestrian crossings are not sufficient.

(iii) Pedestrian crossing signals are insufficient, sometimes not working, and are neglected by drivers and passengers.

(iv) Along some roads, sideways are provided, but there is still no formulated pedestrian network.

(v) No dedicated lane for bicycles is available in the urban area.

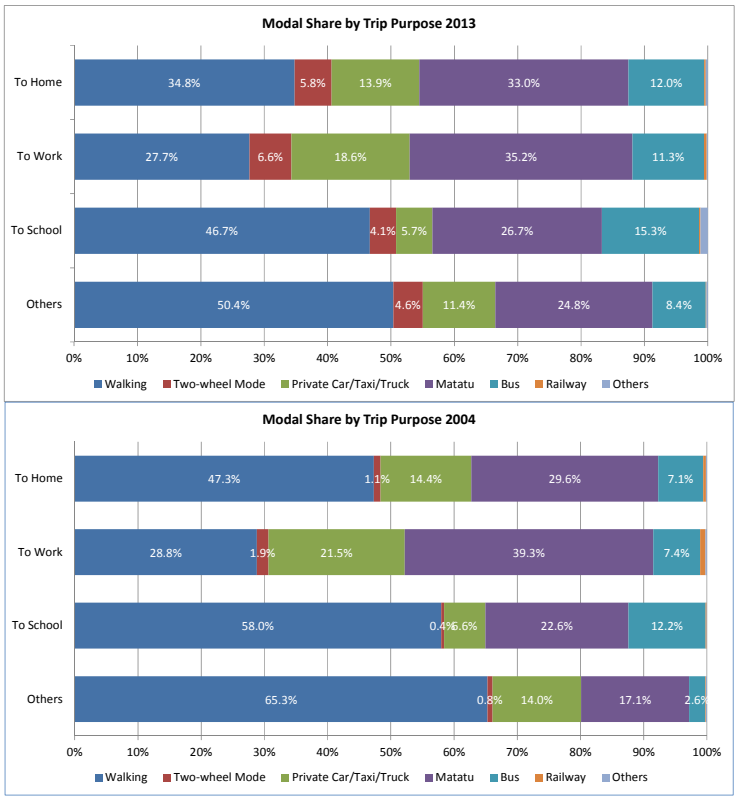
(3) Public Transport

Most bus and *matatu* terminals are located around the Nairobi Railway Station, but are not systematically located according to direction or destination. Outside the city centre, lay-bys for bus stops are prepared on the trunk roads, but along minor roads, *matatus* and buses often stop at roadsides or intersections for picking up passengers, which cause obstacles in the traffic flow of the roads.

According to interviews with public transport passengers, three major requirements of bus/*matatu* passengers were: 1) improvement of bus stop facility/information, 2) improvement of accessibility, and 3) improvement of regularity/punctuality.

As a result of the screen line survey, there were a total of 72,000 *matatus* and 23,000 large buses. Applying the average number of passengers, which is ten per *matatu* and 27 per large bus, the total passengers crossing the screen line are 720,000 by *matatu* and 620,000 by bus.

Figure 4.2.5 also shows that modal shift to public transport was not progressing much. Considering the traffic condition in Nairobi City, the use of public transport should be encouraged more. To this end, conditions and quality of public transport operations shall be improved for higher operation speed, punctuality, better accessibility to terminals, and convenience for passengers.



Source: JICA Study Team (JST)

Figure 4.2.5 Comparison of Travel Mode by Trip Purpose between 2004 Survey and 2013 Survey

4.2.2 Railway

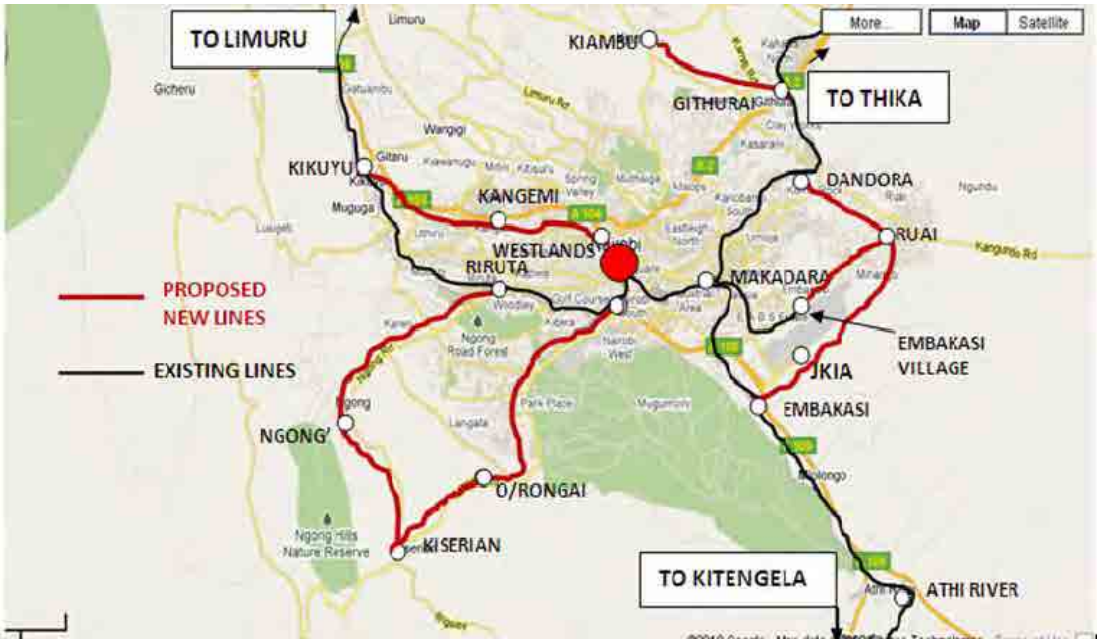
The main line of the KRC is the line from Mombasa to Uganda through Nairobi City. Many railway commuters are using this line from the Athi River (south-east direction) to Nairobi City, and from Kikuyu, (north-west direction) to Nairobi City. Many passengers are also commuting from Ruiru, (north-east direction) to Nairobi City, on a branch line towards Thika Town. A short branch line towards Embakasi Village is also used for commuting purposes.

The existing meter gauge track is composed of 85/90 lb/yard rail with steel sleepers. Rails are welded at some sections; however, mainly fishplate joints are used. The ballast is heavily contaminated with soil. Turnouts are operated manually without any type of signal equipment. Train operation is controlled by telephone between stations. Instead of a tablet, paper sheets are used to confirm the track occupancy.

Except for a few stations, the existing station buildings are small and not well maintained. In general, the access roads to the stations are in poor condition as shown in the photos below.

Figure 4.2.6 Existing Track Condition (left), Existing Ruiru Station (right)

KRC is now planning to strengthen commuter train services by providing new lines as indicated in red on the following Figure 4.2.7. The planned new line from Nairobi to Kikuyu shown on the map is overlapping with the planned LRT line, proposed in the MRTS report in 2011.



Kenya Railways Corporation (KRC)

Figure 4.2.7 KRC Existing and Planned Lines

Due to the increasing severe traffic congestion in the city, the need for mass transit system is widely recognised. There are two approaches for the development of rail-based mass transit system in Nairobi City; namely, 1) the utilisation of the existing KRC facilities, and 2) the construction of new LRT/mass rapid transit (MRT) lines.

(1) Utilisation of Kenya Railways Corporation Facilities

Although the Nairobi Commuter Railway Project, as described in Clause 5.3.2, is ongoing, there is no other specific operation that has been achieved other than the Nairobi-Syokimau commuter service.

The existing commuter train services on the following lines are operated by Rift Valley Railways (RVR), the concessionaire of train operations since 2006.

RVR is now operating commuter train services on the following sections:

(i) Nairobi Railway Station (NRS) – Ruiru Section (32 km)

Operating 22 coach trains, 2 trains/day, total of 6,900 passengers/day in 2010, 7,450 passengers/day in 2011, and 5,350 passengers/day in 2012.

(ii) NRS – Kahawa Section

Operating 16 coach trains, 2 trains/day, total of 6,900 passengers/day in 2010. From 2011, 8 trains/day, 7,500 passengers/day in 2011, and 3,950 passengers/day in 2012.

(iii) NRS – Embakasi Section

Operating 10 coach trains, 2 trains/day, total of 2,300 passengers/day in 2010. From 2011, 8 trains/day, 4,960 passengers/day in 2011, and 3,030 passengers/day in 2012.

(iv) Nairobi - Kikuyu Section

Operating 10 coach trains, 2 trains per day, total of 4,200 passengers/day in 2010, 1,100 passengers/day in 2011, and 1,910 passengers/day in 2012.

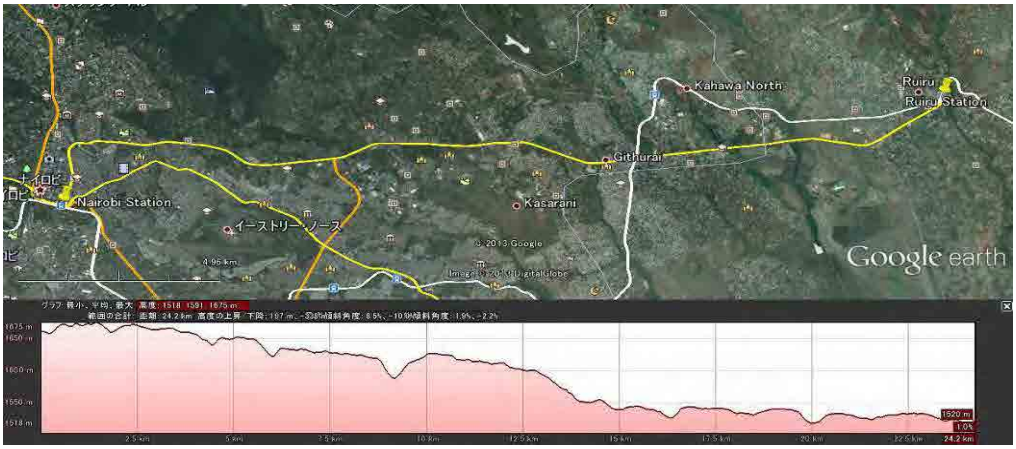
Operating 7 coach trains, 5 R.T. per day, total of 2,500 passengers.

(2) Planned Alignments of MRT/LRT

The Feasibility Study and Technical Assistance for Mass Rapid Transit System for the Nairobi Metropolitan Region has been prepared by Indian and Kenyan consultants in 2011. The MRT and LRT lines are planned on the following six major roads:

1) Thika Road (Elevated (EL): NRS – Githurai): 15.04 km

Thika Road has enough overall width for the construction of elevated structures for an MRT line. However, if the MRT structure is constructed at the centre of the road, the width of the existing median strip (central reservation) is not enough for the construction of viaduct piers because at least 2.5 m width is required for the construction of piers and its protective structure for collision of vehicles.



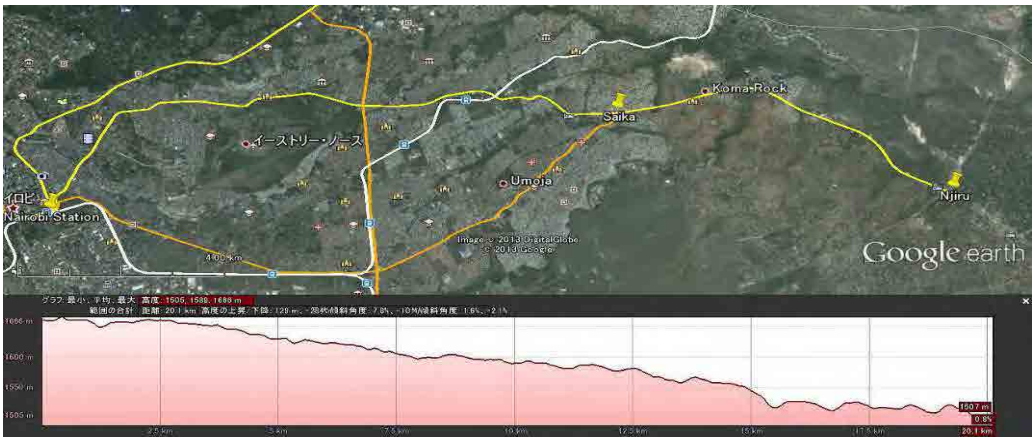
Source: JICA Study Team (JST)

Figure 4.2.8 Horizontal and Vertical Alignment of MRT on Thika Road

Although the first priority of MRT construction is given to this alignment, the construction schedule shall be planned carefully considering the capacity of the existing Thika Road and future demand forecast.

2) Juja Road (Underground (UG): NRS – Pangani + EL: Pangani – Njiru): 4.37 km + 9.45 km = 13.82 km

There seems to be no difficulty in the construction. The location of the transition section from the underground structure to the elevated structure shall be carefully selected in order not to block the vehicles on the surface road. Prior to the construction of the MRT, the road shall be widened with a wide median strip for the piers construction.



Source: JICA Study Team (JST)

Figure 4.2.9 Horizontal and Vertical Alignments of MRT on Juja Road

3) Jogoo Road (EL: NRS – Kayole Crossing): 12.79 km

Jogoo Road has a wide median strip enough for the construction of LRT piers up to the crossing with the Outer Ring Road. Enough space for the right of way (ROW) of the proposed LRT construction has also been reserved .

However, from the Outer Ring Road crossing up to Kayole Crossing, there is no median strip at all. Reservation of ROW is not enough at some locations.

Source: JICA Study Team (JST)

Figure 4.2.10 Horizontal and Vertical Alignments of LRT on Jogoo Road

4) Ngong Road (UG: NRS – Hilton Hotel + El: Hilton Hotel – Dagoretti/Thompson Estate): 0.66 km + 7.87 km = 8.53 km

The description of Hilton Hotel seems wrong. The alignment will go through the Railway Club which is located at the west side of NRS. As shown in Figure 4.2.11, there is a steep slope between the Railway Golf Course and the Upper Hill area. The slope of the existing ground is 5.5% approximately. Since the maximum applicable gradient of the MRT system using steel wheel on steel rail is 3.5%, it is impossible to climb this steep slope via the planned alignment.

Except for the section between NRS and Upper Hill, there is a wide median strip where the piers of the viaduct structure can be constructed. The condition of the existing road is very good.

Source: JICA Study Team (JST)

Figure 4.2.11 Horizontal and Vertical Alignments of MRT on Ngong Road

5) Outer Ring Road (EL: Thika Road Crossing – Airport Road): 12.93 km

As shown in Figure 4.2.12 below, there are three river crossings along this alignment. In order to avoid flooding during the rainy season, the rail level shall be set higher than the highest level of the record flood.

The condition of the existing road is generally fair except in some locations where the pavement is severely damaged. ROW for future widening seems to be reserved already, however, the existing pavement width is very narrow. Therefore, prior to the construction of the LRT, the road shall be widened with a median strip for future pier construction.

Source: JICA Study Team (JST)

Figure 4.2.12 Horizontal and Vertical Alignments of LRT on the Outer Ring Road

6) Thika Road-2 (EL: Githurai – Ruiru): 9.71 km

The condition of this section is similar to that of the section between NRS–Githurai. However, widening of the median strip may not be required because of the wider existing median compared with the NRS – Guthurai Section (refer to the Figure 4.2.8.).

7) Waiyaki Way (EL: NRS – Kabete): 12.4 km

Waiyaki Way consists of a four-lane road with a wide median strip. The condition of the pavement is very good. Therefore, there will be no difficulty in the construction of LRT along this road, except for the section between NRS – Waiyaki Way.

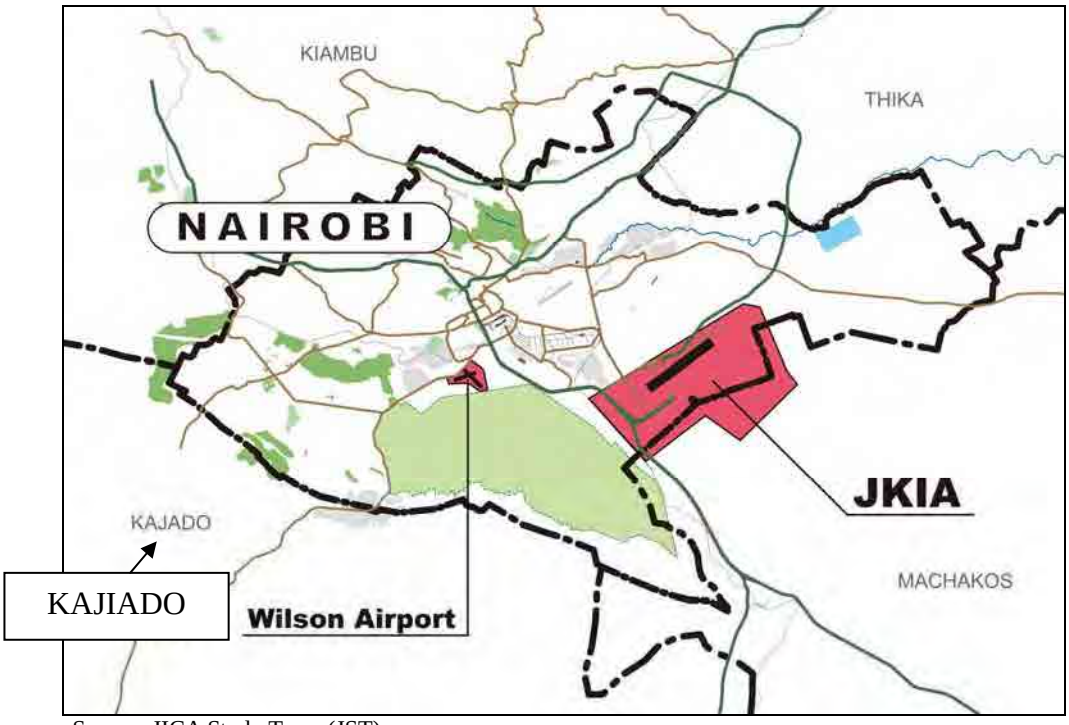
Source: JICA Study Team (JST)

Figure 4.2.13 Horizontal and Vertical Alignments of LRT on the Waiyaki Way

4.2.3 Airport

The airport sector has the shared responsibility of air transport mode. Air transport plays a significant role in the economic growth of developing country. In Kenya, it is the main transport mode for tourism, high value exports and imports, and perishable goods. Also, Kenya occupies a strategic position as an aviation centre in the Eastern and Central Africa regions. In the last ten years, air traffic through Kenya's airports has increased substantially from 4,748,000 to 8,584,000 annual passengers.

Nairobi City has two civil airports which are JKIA and Wilson Airport. JKIA is conveniently located 18 km from the city centre to serve as a domestic hub and international gateway in Kenya. JKIA is the 7th busiest airport in Africa and a major hub in East and Central Africa for tourist and cargo movement. Wilson Airport is located 5 km south of the city and neighbours Nairobi National Park. Wilson Airport is used mostly for both domestic and international general aviation traffic. This airport lies approximately 18 km west of JKIA. The location of the two airports is shown in Figure 4.2.14 below.



Source: JICA Study Team (JST)

Figure 4.2.14 Locations of JKIA and Wilson Airport

(1) Jomo Kenyatta International Airport (JKIA)

JKIA serves as the gateway for international air traffic and a hub for domestic airports in Nairobi City in Kenya. JKIA is situated at an altitude of 1,624.5 m MSL with one runway, two passenger terminal buildings, which are separated for departure and arrival, cargo terminal, and related airport facilities. Table 4.2.3 describes the major facilities at the airport; whereas Figure 4.2.15 shows the image of JKIA passenger terminal area.

Table 4.2.3 Major Facilities of JKIA

Item	Name	Description			
Principal Feature	Name	Jomo Kenyatta International Airport (JKIA)			
	Operation	International and domestic			
	Code	ICAO: HKJK IATA: NBO			
	Location	Latitude: 01º19'09.267"S			
		Longitude: 036º55'39.992"E			
	Access to airport	18 km from Nairobi City centre, approx. 30 min. by vehicle			
	Reference ground elevation	1,624.5 m +MSL			
	Temperature	Average 21ºC			
	Operation	24 hours (Air Traffic Services: ATS)			
	Operator	Airport facility: KAA, Navigation system: KCAA			
Runway	No.	Dimension	PCN	Slope/max	Strip Dimension
	06/24	4,117 m × 45 m	65/F/A/W/T	0.5365%	4,361 m × 300 m
Taxiway	Width		PCN	surface	
	23 m		65/F/A/W/T	Concrete, Asphalt	
Aircraft Parking Apron	PCN			surface	
	65/F/A/W/T			Concrete	
Approach and Runway Lighting	RWY06: PALS, LIL/ PAPI Left side of RWY				
	RWY24: SALS, LIL/ PAPI Left side of RWY				

Source: AIP

Source: JICA Study Team (JST)

Figure 4.2.15 View of JKIA Terminal Area from Control Tower

JKIA is projected to grow with the growth of Kenya's economy, as well as increase in foreign currency income. In 2011, JKIA had more than 80% of its total passenger traffic from international flights and around 40% from domestic flights. Moreover, JKIA had 65% of the total flights in Kenya in 2011.

(2) Wilson Airport

Wilson Airport is used mostly by both domestic and international general aviation traffic. The domestic flight is extensively used for tourism, health care, and agriculture. Safari is the most popular tourism attraction in Kenya, i.e., Maasai Mara, Mombasa, Kilimanjaro, Amboseli, Eldoret, and Lamu, which are all just a short flight away by Air Kenya, Aero Kenya, and Safarilink. Other flight operations are for humanitarian agencies such as Africa Medical and Research Foundation (AMREF), Mission Aviation Fellowship (MAF) as well as flight training. Wilson Airport also has major international flights, which are commonly used by business executives.

Table 4.2.4 Major Facilities of Wilson Airport

Item	Name	Description			
Principal Feature	Name	Nairobi/ Wilson			
	Operation	International and domestic			
	Code	ICAO: HKNW IATA: WIL			
	Location	Latitude: 01º19'16.578"S			
		Longitude: 036º48'53.881"E			
	Access to airport	5 km from Nairobi City centre, approx. 10 min. by vehicle			
	Reference ground elevation	1,687 m +MSL			
	Temperature	Average 23ºC			
	Operation	0330 – 1730/ 14 hours (Air Traffic Services: ATS)			
	Operator	Airport facility: KAA, Navigation system: KCAA			
Runway	No.	Dimension	PCN	Slope/max	Strip Dimension
	07/25	1,463 m x 24 m	18/F/B/X/U	1.42%	
	14/32	1,560 m × 23 m	13/F/A/W/T	1.0%	
Taxiway	Width		PCN	surface	
	23 m		15/F/B/X/U	Bitumen	
Aircraft Parking Apron	PCN			surface	
	15/F/B/X/U			Bitumen	
Approach and Runway Lighting	RWY07: SALS/ PAPI Left side, RWY25: NIL				
	RWY14: PAPI Both side, RWY 32: NIL				

Source: AIP

Source: JICA Study Team (JST)

Figure 4.2.16 View of Wilson Airport Airlines Hangar and Taxiway from Control Tower

Wilson Airport had mainly domestic flight operations and around 13% of its total passenger traffic are from domestic flights. However, Wilson Airport has historically the highest aircraft movement in Kenya. In 2011, the number of aircraft movement was 76,388 times.

4.2.4 Water Supply

(1) Water Resources

The existing water resources for the water supply system of Nairobi City were from Sasumua Dam, Thika Dam, Ruiru Dam, and Mwagu Intake on the Chania River, Kikuyu Springs, and boreholes for groundwater. The capacity for the water supply is summarised in Table 4.2.5. The outline map for the water supply of Nairobi City is presented in Figure 4.2.17.

Table 4.2.5 Existing Water Resources of Water Supply for Nairobi City

Name	Water Supply Capacity (m^3/day)		Remark
Sasumua Dam	63,000	549,500	Chania River
Thika Dam -Mwagu Intake	460,000		Thika River
Ruiru Dam	21,700		Ruiru River
Kikuyu Springs	4,800		Two springs mainly supply raw water to Nairobi City.
Groundwater		45,000	Due to the shortage of water, private boreholes were developed in Nairobi City. Nairobi City Water Supply and Sewerage Company (NCWSC) owns 30 boreholes and 13 of those are in operation. Figure 4.2.17 shows total as expected by NCWSC in 2010.

Source: JICA Study Team (JST)

(2) Existing Water Supply Facilities

There are four water supply systems in Nairobi City based on its water resource, namely the Sasumua system, Ruiru system, Mwagu system, and Kikuyu system. Some of the facilities of the systems, such as raw/treated water transmission pipelines of Sasumua Water Treatment Plant (WTP) and Ngethu WTP exist outside of Nairobi City as presented in Table 4.2.5. Thus, countermeasure for complaints from the users in the area needs to be considered in the rehabilitation/expansion of facilities, some of

which may be located outside of Nairobi City. In fact, Nairobi City Water Supply and Sewerage Company (NCWSC) supplies bulk water from the systems to the WSP of the area.

The existing facilities of the Sasumua system, Ruiru system, Mwagu system, and Kikuyu system are presented in Tables 4.2.6, 4.2.7, 4.2.8, and 4.2.9, respectively. The outline of the connection between the facilities is presented in Figure 4.2.17.

Table 4.2.6 Existing Facilities of Sasumua System

Name	Capacity or Size
Raw Water Transmission	Total length from the dam to WTP is 686 m. D800 pipeline started from the dam was diverted to two pipelines of D600 and D450. Before inlet of WTP, hydropower generators were installed.
Sasumua WTP	63,000 m^3/day
Treated Water Transmission	Form Sasumua Dam to Ruiru Chamber. Two parallel pipelines of D462.5 and 318.75 were installed. From Ruiru Chamber to Kabete and Kyuna reservoirs, pipeline of D600 was installed.

Source: JICA Study Team (JST)

Table 4.2.7 Existing Facilities of Ruiru System

Name	Capacity or Size
Raw Water Transmission	Three pipelines of D225, D300 and D400 were installed
Kabete WTP	21,700 m^3/day, treated water is transmitted to Kabete Reservoir

Source: JICA Study Team (JST)

Table 4.2.8 Existing Facilities of Mwagu System

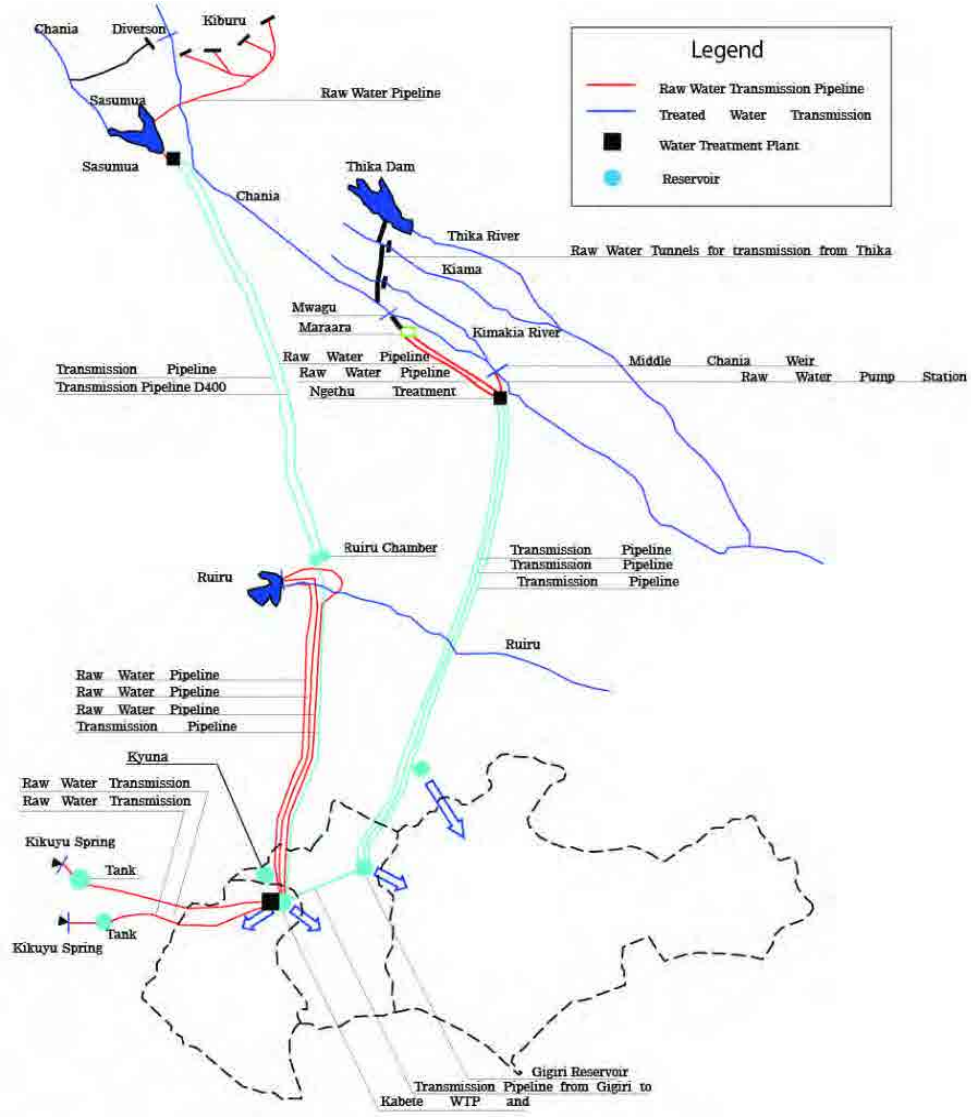
Name	Capacity or Size
Raw Water Transmission	Tunnel with diameter of three meters connected from Mwagu Intake to Mataara Chamber. From the chamber to Ngethu WTP, two parallel pipelines of D1,400 and D1,200 were installed.
Ngethu WTP	460,000 m^3/day
Treated Water Transmission	Three parallel pipelines of D700, D1,000, and D1,000 - D1,400 connected from Ngethu WTP to the Gigiri and Kabete reservoirs. The pipelines were interconnected for bulk water supply to Ruiru, Gatundu, and Kiambu, which are environs of Nairobi City.

Source: JICA Study Team (JST)

Table 4.2.9 Existing Facilities of Kikuyu System

Name	Capacity or Size
Raw Water Transmission	Pipeline of D300 connected Kikuyu Spring no.1 to Kabete WTP via tank no.1 with volume of 150 m^3. Pipeline of D200 connected Kikuyu Spring no.2 to Kabete WTP via tank no.2 with volume of 150 m^3. The capacity is 4,800 (m^3/day) in total.

Source: JICA Study Team (JST)



Source: JICA Study Team (JST)

Figure 4.2.17 Outline of Map of Water Supply to Nairobi City

The distribution network of Nairobi City receives treated water from four reservoirs, namely: Kabete, Kyuna, Kiambu, and Gigiri reservoirs and the distribution area is segmented into 13 zones based on the reservoir supplying the water to the zone. The distribution network is installed with high density in the western area of Nairobi City and low in the eastern area.

The zones of the distribution systems in Nairobi City are summarised in Table 4.2.10 and the general layout of the zones is presented in Figure 4.2.18.

Table 4.2.10 Zones of the Distribution System in Nairobi City

Zone Number	Reservoir Supplying Water	Capacity of Reservoir (m^3)
1	Kikuyu Tank no.1	250
	Kikuyu Tank no.2	250
2N	Kabete	42,000
2S	Kabete PS- Dagoretti	11,000
3N	Kabete PS- Uthiru	11,000
3S	Kabete PS- Dagoretti	11,000
4	Kyuna PS - Loresho Tower	450
5	Kyuna	9,000
6	Kiambu	59,000

Zone Number	Reservoir Supplying Water	Capacity of Reservoir (m^3)
7	Kabete PS - Hill Tank	18,000
8	Gigiri	61,000
9	Gigiri - Karura	9,000
10	Gigiri - Ring Road Tower	450
11	Kiambu – Kasarani	11,000

Source: JICA Study Team (JST)

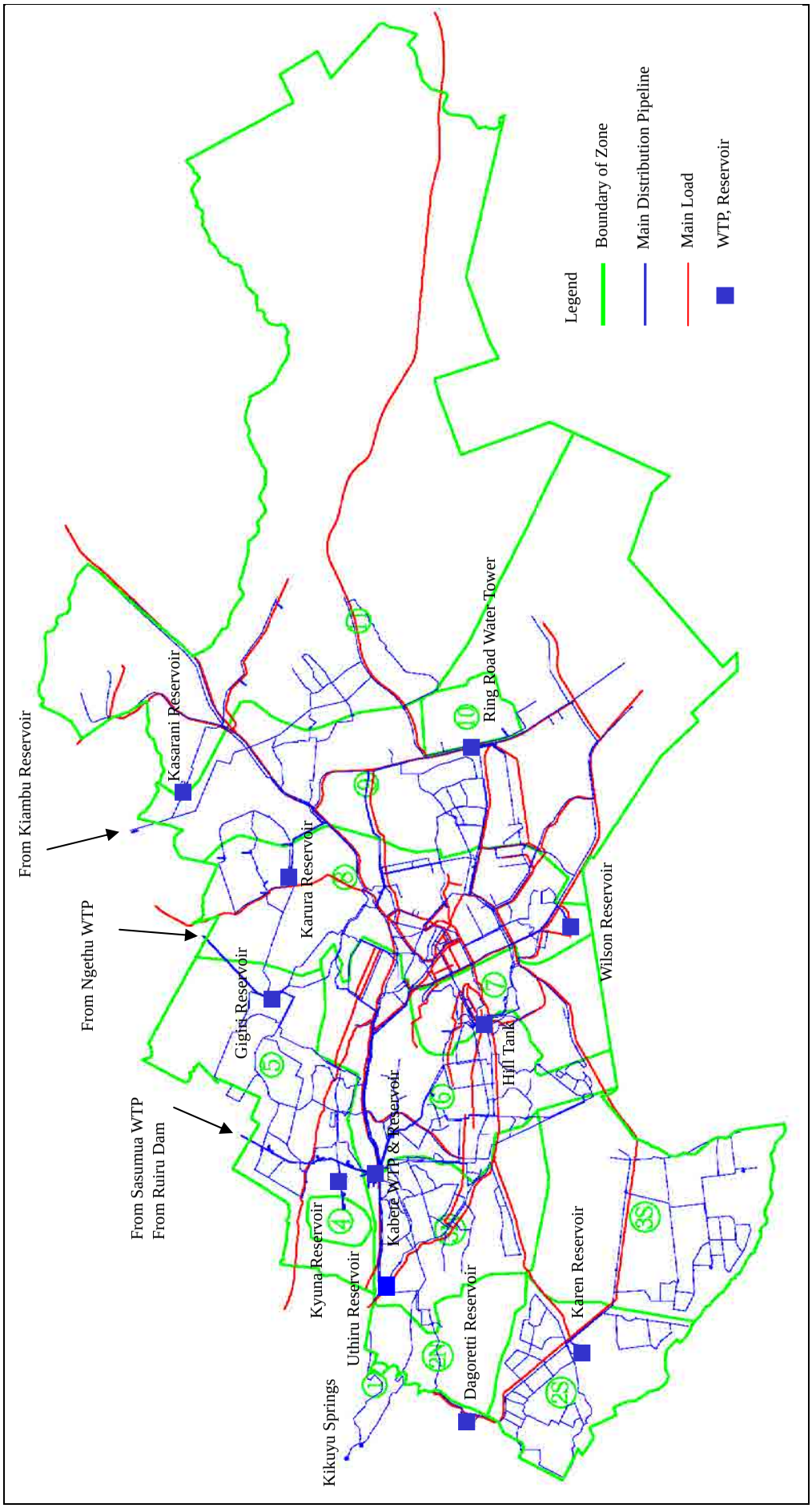
(3) Water Supply Services in Nairobi City

1) Produced/Served Water and Unaccounted for Water (UfW)

According to the performance report of Kenya's water services subsector, the produced water in 2008 was estimated at 423,000 m^3/day and the served amount of water was estimated at 255,000 m^3/day. The UfW in Nairobi City was approximately 40%.

In reference to FSMPNWS, the water demand in 2010, considering the 40% of UfW, was 578,643 m^3/day. This estimate was in accordance with the practical manual of water supply issued by the Ministry of Water and Irrigation (MWI). As presented in Table 4.2.5, the total capacity of the water supply facilities of Nairobi City is 549,500 m^3/day. Thus, the capacity of the facilities is a little short of the requirement of MWI.

On the other hand, the difference between the produced water and the total capacity is 126,500 m^3/day. The main reason was that the inlet flow rate of Ngethu WTP was 360,000 m^3/day as referred by FSMPNWS, while its capacity is 460,000 m^3/day. On this issue, discussion is necessary regarding the further allocation of water resources and the rehabilitation of the facilities to fill the gap.



Source: JICA Study Team (JST)

Figure 4.2.18 General Layout of the Zones

2) Coverage Ratio

The served population of Nairobi City in 2008 was 2,157,826 as mentioned in the performance report. The total population of Nairobi City in 2008 was 3,138,369. The ratio of the served population is approximately 67% .

On the other hand, the actual figure is expected to be higher than the reported. Water supply projects for informal settlements were implemented as mentioned in Subsection 2.6.5. Few of the beneficiaries of these projects were reflected in the figure described above, because water kiosks and yard taps were provided by the projects and their customers were not fixed due to the style of the facilities.

3) Water Tariff

Water tariff in Nairobi City is issued by AWSB with the approval of the Water Service Regulatory Board pursuant to Water Act 2002 and is conducted by NCWSC.

The water tariff consists of water fees, rental fees of water meters, refundable deposits, connection fees, and fine penalties of illegal connections. NCWSC has managed the O&M works of the water supply system with the revenues from the water tariff.

(4) Rehabilitation of Facilities

On the rehabilitation of facilities for raw water transmission, water treatment plants, and transmission mains, projects financed by AFD are ongoing as of April 2013. The projects cover Sasumua system and Mwagu system.

For the distribution network, as UfW is targeted to decrease from 40% to 20% in the practical manual of water supply issued by MWI, the plan and schedule of rehabilitation/improvement of the distribution network need to be established.

(5) Existing Development Plan

In FSMPSNWS, the development plan of water resources was proposed as per the projection of population and water demand in Nairobi City based on the practical manual of water supply in force in Kenya.

In this study, the urban development plan of Nairobi City including the projection of the population and study of land use is carried out. Based on the projection, review of the plan will be carried out.

4.2.5 Stormwater Drainage and Sewerage

(1) Stormwater Drainage

1) Drainage System

Nairobi City is located in the uppermost part of the Athi Catchment area. The Nairobi River belongs to the Athi River system and its catchment area includes majority of the land area of the city. The northern and central areas of the city are drained by the tributaries of the Athi River, namely: Gitathuru, Rui Ruaka, Nairobi, and Ngong rivers. The south of the city, mostly occupied by the Nairobi National Park, belongs to another catchment that is drained by the Mbagathi River and associated streams.

In Nairobi City, the existing stormwater drainage system is developed mainly in the CBD and part of neighbouring areas, and is composed of roadside drains associated with the existing urban roads, storm sewers, and canalised trunk drains to collect stormwater from the catchment areas and discharge it to the tributaries mentioned above. Because the topography is generally sloping from west to east, the stormwater is drained by gravity. In the suburbs of Nairobi City, it is observed that stormwater is collected and discharged through roadside drains and small streams, which are not well developed as a whole.

2) Drainage Development Works

The regional office of the Water Resources Management Authority (WRMA) is in charge of the management of water resources in the Nairobi River basin. The tasks of the regional office include the river training works and canal works for the development of the stormwater drainage system.

The KURA is responsible for the development of urban roads including roadside drains, which comprise majority of the stormwater drainage facilities in Nairobi City.

The City Engineering Department of NCC is in charge of checking the design of stormwater drainages during the appraisal of road construction works and their maintenance. The main task of the department is to clean the roadside drains and canalised open channels. It was reported that the department carried out the cleaning of roadside drains along 700 km of existing roads out of the total of 2,400 km in 2010 but any identification and repair of deteriorated locations were not undertaken[1]. At present, the department has prepared a map of the existing stormwater drainage system in Nairobi City and is making efforts to identify problematic locations that need to be improved.

The department is faced with the difficulty of managing the stormwater drainage system because previous maps and records for the stormwater drainage system were destroyed by a fire that engulfed the city hall in 2004. Most of the data was in hard copy with no back up of soft copies available elsewhere. At present, the department through the consultancies under the KMP and NaMSIP is initiating the preparation of a map of the existing major stormwater drainage systems in Nairobi City besides the existing roadside drains and making efforts to identify problematic locations that need to be improved.

3) Primary Observations

In April 2013, the JICA Study Team has initiated the infrastructure development planning for stormwater drainage in Nairobi City and made primary observations of its situation during the rainy season. The main points of the observations are described below.

Problems:

(i) It is suggested that Nairobi City was suffering repeatedly from the localised inundation at many locations during the rainy season.

(ii) During a rainstorm, the inundation on the main roads causes heavy traffic jam in the city centre.

(iii) A number of roads were washed and pitted with puddles even the day after the rainstorm.

(iv) Stormwater stagnation is attributed to the degradation of the living environment in housing areas, e.g., informal settlements formed in the lowlands.

[1] Preparatory Survey on Nairobi Urban Development Programme, JICA, October 2011

Suggested Causes:

(i) Roadside drains are not functioning effectively due to improper design and/or construction, structural deterioration, and lack of removal of sediments and garbage.

(ii) Stormwater drainage network is not functioning effectively. Many drainage sections and/or outfalls remain blocked/clogged, due mainly to the difficulty in identifying such locations in densely built-up areas (e.g., informal settlements).

(iii) In general, there is no systematic identification of problems on the stormwater drainage system, and localised works on ad-hoc basis are done only to create another problem elsewhere.

(iv) Urbanisation in higher areas increases bare/concreted ground surfaces with less infiltration capacity and results in the rapid concentration of stormwater to the downstream areas.

(v) Developed areas where land topography forms a centralised low point (basin-like) with zero natural drainage for any generated stormwater without introduction of a significant stormwater drain to carry the water out of the low point (e.g., in Runda Estate).

4) Status of Planning

Meanwhile, any usable planning document for stormwater drainage in Nairobi City is unknown. It was reported that a stormwater drainage plan for Nairobi City had been prepared in 1980s with support from the WB and GTZ; however, such document was neither available nor used in the City Engineering Department of NCC[2].

Under the KMP, it is expected that the MOLG will initiate the preparation of a master plan, detailed designs, tender documents, and operations and maintenance manuals for storm water drainage works in Nairobi City within 2013. The MOLG issued a procurement notice on 11 March 2013 regarding the request for EOI by 26 March 2013. It is presumed that the MOLG would proceed with the process of selecting consultants by April 2013.

As suggested in the published information by the WB regarding the NaMSIP, the Ministry of Nairobi Metropolitan Development (MONMD) would be carrying out the preparation of the feasibility studies, final designs, and bidding documents for stormwater drainage in Nairobi City (Dagoretti, Langata, CBD and Embakasi), Thika (CBD and west of CBD), Mavoko and Ongata Rongai townships in 2013. Afterward, the bid submission and opening of the construction of Nairobi City storm water drainage works is scheduled in August 2013.

(2) Sewerage System

1) Sewerage Treatment Plants

There are 24 existing sewerage treatment plants (STPs) in Nairobi City, but most of them are localised STPs with a small capacity of less than 2,000 m^3/day. The major STPs are Dandora STP (120,000 m^3/day) and Kariobangi STP (32,000 m^3/day). A report by the NCWSC indicates that these STPs are not well functioning in terms of actual sewerage treatment volume and water quality of treated outflow as shown in Table 4.2.11 below. In particular, the

[2] Preparatory Survey on Nairobi Urban Development Programme, JICA, October 2011

Kariobangi STP suffers from deterioration and mechanical troubles; hence, it is not operational substantially[3].

Table 4.2.11 Operating Conditions of Existing Major STPs in Nairobi City

Type, Capacity, Inflow and Outflow

STP	Type	Capacity (m^3/day)	Sewerage Inflow (m^3/day)	Treated Outflow (m^3/day)
Dandora	Lagoon	120,000	90,870	69,941
Kariobangi	Conventional biological aerated filter	32,000	11,933	(N/A)

Treatment

STP	Item	Water Quality (mg/L)		
		Sewerage Inflow	Treated Outflow	Effluent Standard
Dandora	BOD	375	66	30
	COD	924	245	50
	TSS	500	113	30
Kariobangi	BOD	340	194.8	30
	COD	774.7	373.1	50
	TSS	306.5	77.3	30

Source: NCWSC Quarterly Report, July-September 2011

2) Sewers

The majority of existing sewers are combined sewers, collecting both stormwater and wastewater, and are developed in the CBD and in other recent development areas. The total length of the existing trunk sewers is about 162 km that collect wastewaters from the sewerage service areas totaling about 208 km^2, which accounts for approximately 40% of the total area covered by the water supply service. But some of the sewerage service areas still need some reticulation lines (secondary sewers) locally and an actual percentage of service coverage is not clear yet accordingly[4].

Wastewater collected from the sewerage service areas are conveyed to STPs located in the east of Nairobi City through the trunk sewers constructed along the rivers running west to east.

3) Sanitation

"Nairobi Sanitation Status" on the website of IWA Water Wiki[5] summarises the existing situation of sanitation in Nairobi City as described below.

(i) About 10% of the population is served by sewers while 20% has septic tanks and the remainder uses latrine, although these appear to be very crude data (UN-HABITAT, 2003).

(ii) Business/institutional centre and wealthy/middle-income residential districts mostly are served by sewerage system or septic tanks.

(iii) About 60% of the population live in informal settlements. Of this population, 24% is estimated to have a latrine (improved or unimproved) or a flush toilet, while 68% use public toilets (mostly overcrowded, low-quality latrines), and 6% resort to open defecation or in plastic bags that they call "flying toilets" (NCWSC/AWSB 2009).

[3] Preparatory Survey on Nairobi Urban Development Programme, JICA, October 2011

[4] - ditto -

[5] http://www.iwawaterwiki.org/xwiki/bin/view/Articles/34)+NAIROBI+(Kenya)+3 (as of April 2013)

4) Sewerage Development Works

i) Athi Water Services Board (AWSB)

The AWSB is the agency responsible for planning, design, and implementation of projects for sewerage development works in the Athi Catchment area where Nairobi City is located. In Nairobi City, the AWSB has been implementing the following sewerage development works recently under the WaSSIP:

(i) Construction of Gatharaini Trunk Sewers including Rui-Rwaka, Gatharaini North and Gatharaini South (Contract No. AWSB/WaSSIP/Comp.1/W-6/2009)

(ii) Construction of Lavington-Riruta Trunk Sewers Extensions (Contract No. AWSB/WaSSIP/Comp.1/W-7/2009)

(iii) Rehabilitation of Dandora Sewerage Treatment Works and Reconstruction of the Ngong River Trunk Sewers (Contract No. AWSB/WaSSIP/Comp.1/W-9/2009)

Besides, the AWSB has initiated the following sewerage development works under the Nairobi Rivers Rehabilitation and Restoration Program: Sewerage Improvement Project.

(iv) Lot 1: Construction of the Kiu River and Dandora Estate Trunk Sewers, and Expansion of Dandora Waste Water Treatment Plant (Contract No. AWSB/NaRSIP/W/01/2012)

(v) Lot 2: Construction of Mathare, Nairobi, Ngong Rivers Trunk Sewers, and Reticulation Network (Contract No. AWSB/NaRSIP/W/01/2012)

In addition to the above, the rehabilitation of the Kariobangi STP is also scheduled within the Sewerage Improvement Project.

ii) Nairobi City Water and Sewerage Company (NCWSC)

The NCWSC is a service provider appointed by the AWSB. The NCWSC takes charge of the provision of the water and sewerage services including the operation, maintenance, and management of the sewerage system consisting of the sewers and STPs.

5) Status of Planning

The current sewerage development works are implemented on the basis of the Nairobi Sewerage Master Plan Study (1998) and Nairobi Sewerage Master Plan Validation Report (2009).

The AWSB plans to carry out the updating of the Nairobi City Sewerage Master Plan as listed in the procurement plan of the WaSSIP from July 2012 to December 2013.

The AWSB and NCWSC, with the support of the Water and Sanitation Program, prepared jointly the Strategic Guidelines for Improving Water and Sanitation Services in Nairobi City's Informal Settlements (2009). The guidelines articulate the priorities and overarching principles adopted by AWSB and NCWSC to improve the water and sanitation services delivery in Nairobi City's informal settlements. These principles have been used to develop a framework that provides NCWSC with the practical tools to apply on a settlement-by-settlement basis.

The guidelines consist of six main parts, as follows:

(i) context, relevance, and objectives;

(ii) socio-economic, institutional, and legal issues;

(iii) general technical guidelines;

(iv) finance and ownership issues;

(v) overarching principles for service provision in informal settlements; and

(vi) action model guiding NCWSC's work in informal settlements.

4.2.6 Power Supply

(1) Power Companies in Kenya

The electric power sector of Kenya is under the jurisdiction of the Ministry of Energy (MOE). The sector comprises Kenya Power Generating Company (KenGen), Kenya Power, independent power producers (IPPs), Kenya Electricity Transmission Company (KETRACO), Geothermal Development Company (GDC), and Rural Electricity Authority (REA). As an independent regulatory body, the Energy Regulation Commission (ERC) is supervising the sector.

1) MOE

MOE is responsible for establishing the national energy policy and rural electrification plan, setting the direction for the growth of the electrical power sector, and making a long-term vision for the sector.

2) KenGen

KenGen, as well as other IPPs, generate electricity and sell it to Kenya Power. While KenGen is a state corporation, IPPs are basically private sector investments. IPPs currently provide about 20% of the whole demand and are expected to continue to play a significant role in power generation. KenGen will remain as a dominant power generation player in the long term. KenGen is listed at the Nairobi Stock Exchange, with 70% shares held by GOK and 30% by private shareholders.

3) Kenya Power

Kenya Power was renamed from the Kenya Power and Lighting Company (KPLC) in 2011. It is responsible for electricity transmission and all distribution systems in Kenya. The transmission system is composed of 220 kV, 132 kV, and 66 kV transmission lines. The National Social Security Fund (NSSF) and GOK own 50.1% of the stocks, whereas private shareholders own 49.9%.

4) IPPs

IPPs are essentially private investors in the power generation sector. Amongst the active IPPs, there are IberAfrica, Tsavo, Or-power, Rabai, Imenti, and Mumias. They account for about 28% of the country's installed capacity.

5) KETRACO

KETRACO was founded in 2008 with a full capital investment by GOK. KETRACO is responsible to plan, design, construct, own, operate, and maintain new 132 kV and above voltage electricity transmission infrastructure.

6) GDC

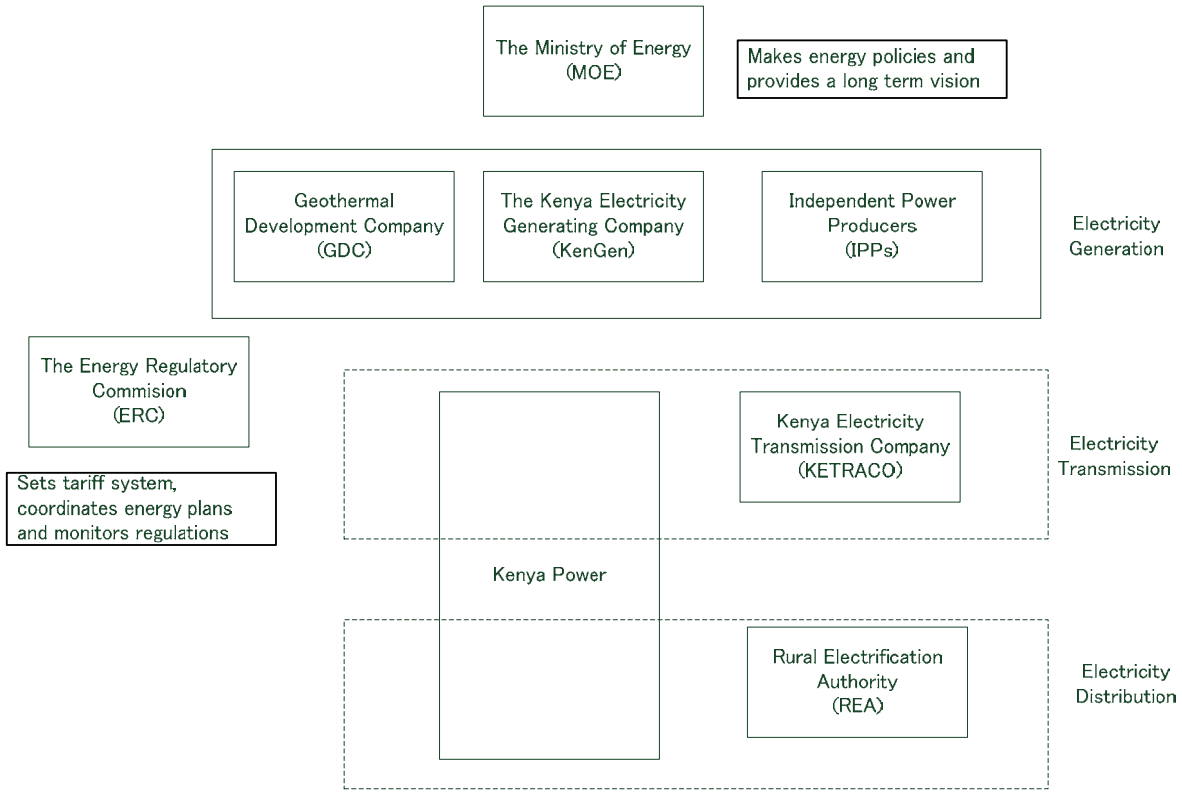
GDC is a state corporation owned 100% by GOK. GDC is tasked with developing steam fields to reduce upstream power development risks so as to promote rapid development of geothermal electric power. GDC will underwrite any dry wells sunk by private developers selected through a competitive bidding processes.

7) REA

REA was established in 2007 to accelerate the implementation pace of the Rural Electrification Programme, which is one of the most important challenges of the government. The rural customers have increased from 133,047 in 2007 to 251,056 in 2010.

8) ERC

ERC is responsible for establishing both technical and economical regulations of the energy sector. ERC settles disputes between stakeholders, sets the tariff system of Kenya Power, coordinates the energy plan, and monitors the sector regulations.



Source: JICA Study Team (JST)

Figure 4.2.19 Power Sector in Kenya

(2) Power Demand and Supply

1) Power Demand and Supply in Kenya

During the 2011/12 financial year, the number of customers for Kenya Power has exceeded 2,000,000. This was achieved due to an increase of customers in 2011/12 of about 285,000, or 16% from the previous year. Kenya Power aims at connecting new 300,000 customers every year, so the record was close to the target.

Total electricity sales as well as the number of customers increase every year. This is because of the increased in number of customers and electricity consumption despite the increased system losses. Especially, system losses during the 2011/12 financial year rose by 1.1% from the previous year. The causes of the rise are the large area expansion of the electricity distribution networks and increased transmission of electricity from the newly constructed Kipevu III generation plant in the coast area.

System peak demand increased to 1,236 MW in 2011/12 financial year. According to an official of Kenya Power, the system peak demand exceeded 1,350 MW in March 2013.

Table 4.2.12 Power Demand and Supply in Kenya

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
Number of Customers	**924,329**	**1,060,383**	**1,267,198**	**1,463,639**	**1,753,348**	**2,038,625**
Percent Increase in Number of Customers	15.2%	14.7%	19.5%	15.5%	19.8%	16.3%
SALES						
- Kenya Power System (GWh)	4,771	5,036	5,155	5,318	5,785	5,991
- Rural Electrification Programme (REP) System (GWh)	221	240	250	279	307	308
- Export to Uganda (GWh)	73	46	27	26	30	41
- Export to Tanesco (GWh)	0	0	0	1	1	1
TOTAL SALES (GWh)	**5,065**	**5,322**	**5,432**	**5,624**	**6,123**	**6,341**
System Losses (GWh)	1,104	1,062	1,057	1,068	1,180	1,329
Sales Percentage of Energy Purchased	82.1%	83.4%	83.7%	84.0%	83.8%	82.7%
Losses as Percentage of Energy Purchased	17.9%	16.6%	16.3%	16.0%	16.2%	17.3%
System Peak Demand (MW)	**987**	**1,044**	**1,072**	**1,107**	**1,194**	**1,236**

Source: Kenya Power Annual Report and Financial Statements 2012

2) Power Demand and Supply in Nairobi Region

Table 4.2.13 shows the number of customers, total sales, and maximum demand in Nairobi City. The number of customers in Nairobi City has increased by more than 100,000 annually from 2009/10 financial year. Moreover, according to the New Connections Report 2012 to 2013 of Kenya Power, the number of customers in Nairobi was recorded at 1,062,329 in April 2013.

On the other hand, the latest data on total sales in Nairobi region experienced a slight decrease from the previous year. This is probably because poor rainfall resulted in the reduction of hydropower generation in the first half of 2011/12 financial year, and thus suppressed the sales. Table 4.2.14 shows the sales by tariff type. From the table, the sales for domestic in 2011/12 financial year decreased from the previous year. Also, the sales for small and large commercial and industrial loads (11 kV) decreased.

Table 4.2.13 Power Demand and Supply in Nairobi Region

Nairobi Region	**2006/07**	**2007/08**	**2008/09**	**2009/10**	**2010/11**	**2011/12**
Number of Customers	445,595	505,414	595,010	669,128	814,251	921,548
Total Sales (GWh)	2,595	2,782	2,950	3,071	3,332	3,290
Maximum Demand (MW)	522	548	568	588	623	662

Source: Kenya Power Annual Report and Financial Statements 2012

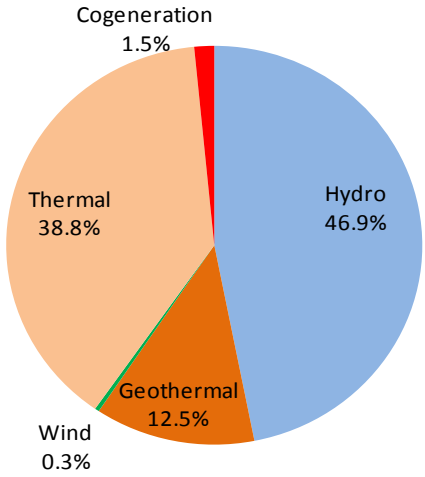
Table 4.2.14 Sales for Type of Customers Covered by Tariff

Tariff	Type of Customers Covered by Tariff (GWh)	2008/09	2009/10	2010/11	2011/12
DC	Domestic	800	804	888	841
SC	Small Commercial	400	402	435	426
CI1	Large Commercial and Industrial Load (415 V)	757	752	760	760
CI2	Large Commercial and Industrial Load (11 kV)	598	652	736	727
CI3	Large Commercial and Industrial Load (33 kV)	0	3	4	3
CI4	Large Commercial and Industrial Load (66 kV)	272	326	368	384
CI5	Large Commercial and Industrial Load (132 kV)	20	31	30	34
IT	Off-peak	40	34	36	41
SL	Street Lighting	11	11	12	11
	R.E.P. Schemes	52	55	63	63
	TOTAL	2,950	3,071	3,332	3,290

Source: Kenya Power Annual Report and Financial Statements 2012

(3) Power-generating Facilities

Figure 4.2.20 shows the composition of power-generating facilities in Kenya. The ratio is for the installed capacity of the facilities and is composed of only the total interconnected systems. As shown in the figure, hydropower occupies 46.9% of the total generated capacity for the main network system. Because of the large portion of hydropower, seasonal variations in power generation occurs due to the amount of rainfall.



Source: Kenya Power Annual Report and Financial Statements 2012

Figure 4.2.20 Classification of Power Plants by Installed Capacity

Table 4.2.15 shows a breakdown of the power-generating facilities. As shown in the table, the total generated capacity of the main network system is 1,680.4 MW as installed capacity and 1,253 MW as the actual output capacity. Besides the interconnected system, there are isolated systems mainly in the northern part of Kenya. The off-grid installed capacity is 10.1 MW in total.

Table 4.2.15 Power-generating Facilities

Type		Name	Installed Capacity (MW)	Effective Capacity (MW)
Hydro	KenGen	Tana	20.0	20.0
		Kamburu	94.2	90.0
		Gitaru	225.0	216.0
		Kindaruma	44.0	44.0
		Masinga	40.0	40.0
		Kiambere	164.0	164.0
		Turkwel	106.0	105.0
		Sondu Miriu	60.0	60.0
		Sangoro	21.2	20.0
		Small Hydros	13.7	10.9
	Total Hydro		788.1 (46.9%)	769.9 (48.0%)
Geothermal	KenGen	Olkaria I (KenGen)	45.0	44.0
		Olkaria II (KenGen)	105.0	101.0
		Eburru Hill	2.5	2.2
		Olkaria Wellhead OW37	5.0	4.4
	IPP	OrPower 4 Geothermal	52	48
	Total Geothermal		209.5 (12.5%)	199.6 (12.5%)
Wind	KenGen	Ngong	5.3	5.1
	IPP	Imenti Tea Factory	0.3	0.3
	Total Wind		5.6 (0.3%)	5.4 (0.3%)
Thermal	KenGen	Kipevu I Diesel	75.0	60.0
		Kipevu III Diesel	115.0	115.0
		Embakasi Gas Turbines	60.0	27.0
		Garissa and Lamu	8.7	7.3
	IPP	Iberafrica	108.5	108.5
		Tsavo	74.0	74.0
		Rabai Power	90.0	90.0
	Emergency	Aggreko energy to Kenyan Market	120	120
	Total Thermal		651.2 (38.8%)	601.8 (37.5%)
Cogeneration	IPP	Mumias Cogeneration	26 (1.5%)	26 (1.6%)
Total Interconnected System			1,680.4 (100%)	1,602.7 (100%)
Off-grid Stations	KenGen	Thermal	9.4	8.5
		Solar	0.6	0
		Wind	0.1	0
	Total Off-grid Capacity		10.1	8.5
Gross Capacity			1690.5	1,611.2

Source: Kenya Power Annual Report and Financial Statements 2012

(4) Power Transmission and Distribution Networks

1) Reliability of Power in Nairobi City

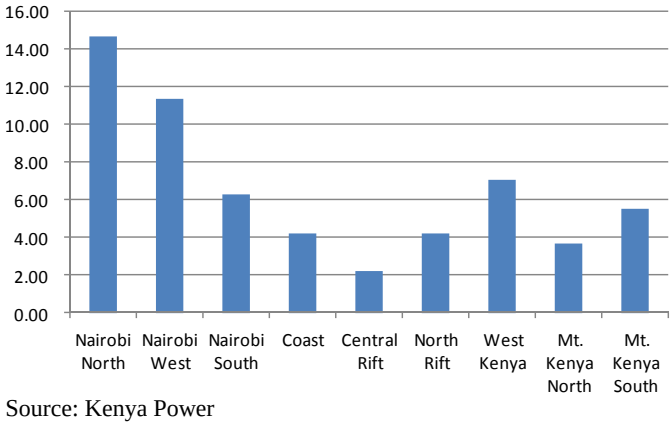
The Nairobi region is one of the areas with unreliable electricity. Table 4.2.16 shows the blackout incidence frequency according to sub region. The column under Target as of 29 April 2013 in the table shows the objective number of incidences from 1 to 29 April 2013. The incidences per 1000 customers as of 29 April 2013 show the following: Nairobi North and Nairobi West are particularly higher than other regions, Nairobi South is high as well. According to the table, the current condition of power quality in Nairobi is the worst amongst the regions. In many cases, blackouts occurred when a tree touches a distribution line or an uprooted tree causes a disconnection.

Based on this, Kenya Power has been putting in effort to deliver adequate and reliable power to Nairobi and other regions. During 2011/12 financial year, under the Energy Sector Recovery Project, Kenya Power installed modern equipment. Moreover, Kenya Power has struggled to implement the underground cable project as shown in Table.4.2.16.

Table 4.2.16 Daily Monitoring of Blackout Incidence

Sub Region	Target	Actual (All Incidences)	Incidences per 1000 Customers	% Variance
Nairobi North	1,236	6,256	14.68	-406.1%
Nairobi West	773	3,025	11.35	-291.3%
Nairobi South	1,072	2,323	6.29	-116.8%
Coast	700	1,023	4.24	-46.1%
Central Rift	536	409	2.21	23.7%
North Rift	369	541	4.25	-46.4%
West Kenya	729	1,774	7.06	-143.4%
Mt. Kenya North	610	764	3.63	-25.3%
Mt. Kenya South	444	844	5.51	-90.0%
TOTAL	6,469	16,959	7.60	-162.1%

Source: Kenya Power (As of 29 April 2013)



Source: Kenya Power

Figure 4.2.21 Incidences per 1,000 Customers as of 29 April 2013

Table 4.2.17 Underground Cable Projects

Description	Cost (Million US$)
Nairobi CBD overhead lines	7.99
Nairobi Upper Hill and Westlands	15.98
Kileleshwa and Kilimani areas	26.63
Nairobi Industrial and Lavington areas	53.27
Nairobi Eastlands	66.58
Mombasa Island – Convert all overhead lines and secondary transformers	18.64
Kisumu City Centre	13.32
Thika town	21.31
Nakura City Centre	10.65
Nyeri City Centre	10.65
TOTAL	255.68

Source: Project Proposal for Possible Funding by Financing Institutions (KPLC)

2) Securing Distribution Networks

In Nairobi City, vandalism to the electricity system such as stealing electricity, stealing oil or copper from transformers, and eventually stealing transformers themselves sometimes happen. As countermeasures for vandalism, Kenya Power has been executing some preventive measures such as police patrols, spot-welding, reinforcement and relocation of transformers to safe areas, and installation of electronic burglar alarms. Figure 4.2.22 is a picture of a countermeasure against vandalism for a transformer. A ring-shaped 11 kV naked

Source: JICA Study Team

Figure 4.2.22 Countermeasure for Vandalism

electric wire is installed above the transformer. Moreover during 2011/12 financial year, penalty for vandalism became strict i.e., a jail term of 10 years, and/or a fine of KSh5 million. At present, underground cable projects for distribution lines have been proceeding, therefore these projects contribute to restraining vandalism.

(5) Tariff System

Table 4.2.18 shows the tariff system of Kenya Power, which was revised in June 2008 and has been applied to date. Besides the tariff system, customers need to pay for a new connection. For example, low voltage connection for customers within 600 m of the transformer costs KSh35,000 for single phase and KSh45,000 for three phases. In order to connect customers more easily, Kenya Power sets the loan funding option called "stima loan". In addition, the Equity Bank operates loans for electricity connection.

Table 4.2.18 Retail Electricity Tariff Structure

Tariff	Type of Customer	Supply Voltage (V)	Consumption (kWh/month)	Fixed Charge (KSh/month)	Energy Charge (KSh/kWh)	Demand Charge (KSh/kVA/month)
DC	Domestic Consumers	240 or 415	0 - 50	120.00	2.00	-
			51 - 1,500		8.10	
			Over 1,500		18.57	
SC	Small Commercial	240 or 415	Up to 15,000	120.00	8.96	-
CI1	Commercial/ Industrial	415 - 3 phase	Over 15,000 No limit	800.00	5.75	600.00
CI2		11,000		2,500.00	4.73	400.00
CI3		33,000 / 40,000		2,900.00	4.49	200.00
CI4		66,000		4,200.00	4.25	170.00
CI5		132,000		11,000.00	4.10	170.00
IT	Interruptible Off-Peak Supplies	240 or 415	Up to 15,000	120.00	4.85	-
				240.00 – when used with DC or SC		
SL	Street Lighting	240	-	120.00	7.50	-

Source: Updated Retail tariffs Application to Energy Regulatory Commission Updated Version Dated 7 Feb 2013 (ERC)

(6) Relationship between Kenya Power and Nairobi City

In the power sector, Kenya Power has the closest relationship to Nairobi City. From an interview with an official of Kenya Power, the following arrangements are said to be in existence as some examples between Kenya Power and Nairobi City:

(i) Kenya Power can cut a branch of tree if the branch is within 3 m from a distribution line. However, it has to pay KSh1,000 to Nairobi City.

(ii) When the distribution network connects to customers, Kenya Power has to pay KSh1,000 to Nairobi City.

(iii) If distribution facilities need to be removed for road maintenance and improvement, Nairobi City has to pay for the removal cost to Kenya Power. On the other hand, if Kenya Power installs them in Nairobi City, Kenya Power needs to pay Nairobi City.

Besides this arrangement, if Nairobi City has a plan of constructing a new road, it needs to inform Kenya Power of the plan.

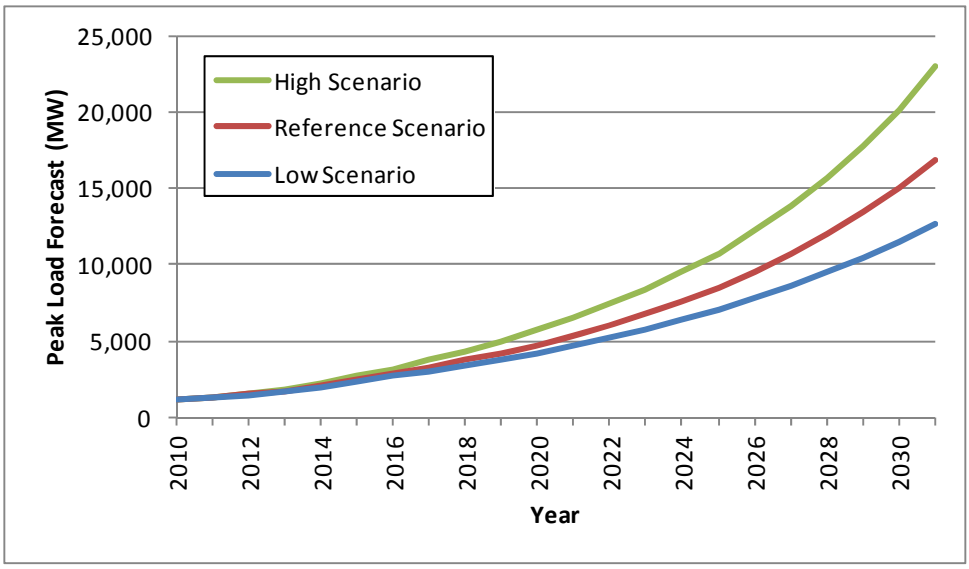
(7) Existing Demand Forecast and Existing Future Plan

The Kenyan power sector has been preparing the Least Cost Power Development Plan (LCPDP) as the power sector plan for 20 years. Kenya's power generation and transmission system plan is undertaken on the basis of LCPDP which is in consideration of Kenya Vision 2030.

1) Existing Demand Forecast

LCPDP describes the demand forecast from 2010 to 2031, as shown in Figure 4.2.23. The three scenarios depend on some factors. These are calculated by using the Model for Analysis of Energy Demand (MAED). Kenya Vision 2030 assumes some projects as vision 2030 flagship projects such as special economic zones, light rail for Nairobi City and suburbs, as well as resort cities. Besides the calculation of MAED, the demand forecasts are added to the demand of vision 2030 flagship projects.

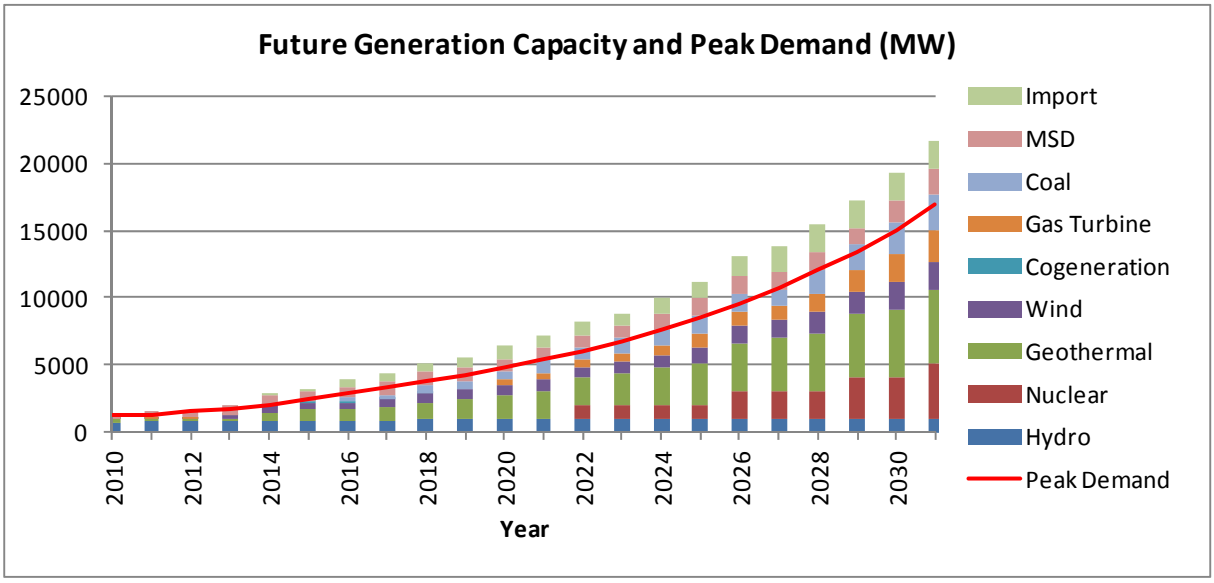
Amongst the three scenarios, most of the assumptions adopted for the reference case and the reference scenario demand were used for analysis of the future plan in LCPDP. In the case of the reference scenario, the peak demand of 2030 is about 12 times that of 2011/12 financial year.



Source: Updated Least Cost Power Development Plan Study Period: 2010 - 2031

Figure 4.2.23 Demand Forecast from 2010 to 2031

2) Existing Demand Forecast



Source: Updated Least Cost Power Development Plan Study Period: 2010 - 2031

Figure 4.2.24 Least Cost Expansion Plan and Peak Demand

LCPDP has the generation plan until 2031 as the least cost expansion plan. This planning is simulated by using Wien Automatic Simulation Package (WASP) and presumes the demand of the reference scenario. Figure 4.2.24 shows the future generation capacity as the least cost expansion plan in the country. In the figure, the reference scenario demand is also shown. The plan in 2031 indicates 5% from hydro plants, 19% from nuclear plants, 26% from geothermal plants, 11% from gas turbines, 12% from coal plants, 9% from medium speed diesel (MSD), and 9% from imports.

(8) Future Issues

The technical working group held a meeting concerning the power sector on 6 May 2013 in order to:

(i) Discuss what information is shared, who shares the information, and how to share the information. This is because the power sector is closely related to other sectors such as road, railway, airport, water supply, wastewater, and telecommunication. Therefore NCC hopes that the information on the power sector shall be shared amongst the concerned sectors.

(ii) Get the GIS data of the distribution facilities for grasping the situation and for future land use plans. NCC is notable to overview the current condition of distribution facilities in Nairobi City.

(iii) Study how to save electricity cost. NCC is not satisfied with the relatively high electricity cost for street lighting, because the lighting is not for commercial activities but for the safety of the citizens.

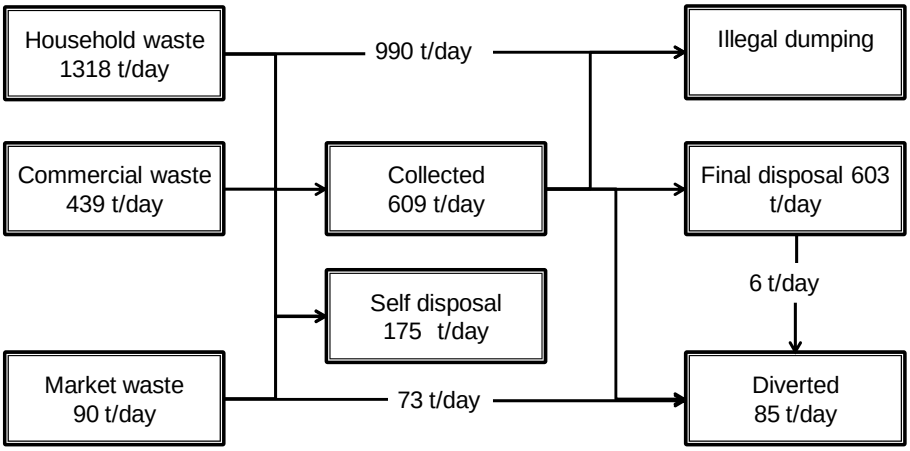
(iv) Discuss the possibility that NCC owns its own facilities in order to generate and sell electric power with the cooperation of IPPs and Kenya Power or other power sector companies.

(v) Identify the gap between the existing demand forecast and proposed demand forecast based on the master plan of this project.

4.2.7 Solid Waste Management (SWM)

(1) Overall Waste Management in Nairobi City County

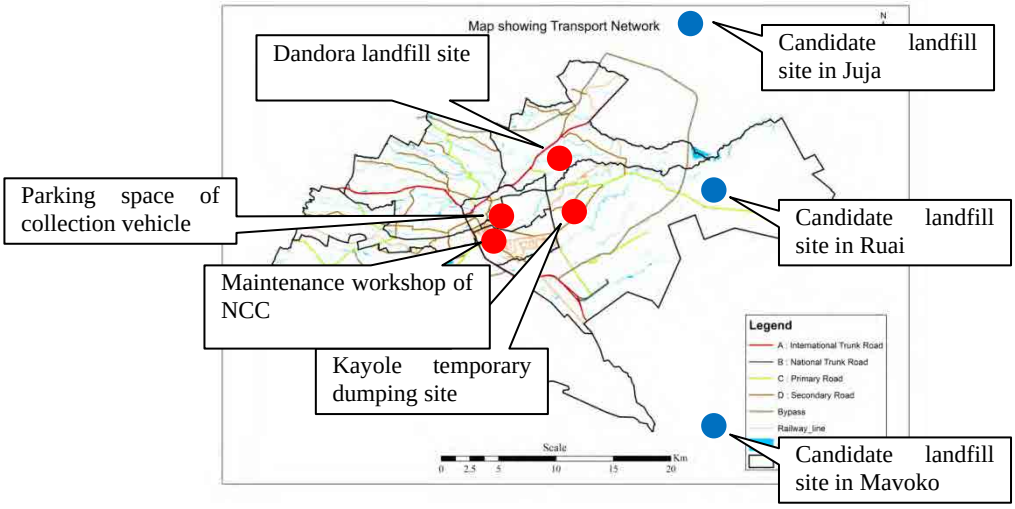
The Nairobi City County (NCC) has the responsibility of SWM in Nairobi City. The Department of Environment (DOE) in NCC collects the solid waste by themselves or subcontract it to private companies. On the other hand, private companies collect the solid waste through the contract with households, public, or private enterprises. The collected waste is transported into the Dandora landfill site or other dumping sites. Some of the collected waste is illegally dumped. There are some areas that cannot be collected by NCC or private companies due to the lack of access roads. In this area, CBO collects the waste. The waste flow from the generation source to the final disposal site is shown in Figure 4.2.25.



Source: JICA Survey Team (JST) prepared based on the data of JICA Preparatory Survey for Integrated Solid Waste Management (2010)

Figure 4.2.25 Solid Waste Flow in Nairobi City (2009)

The facilities related to SWM and management situation are shown in Figure 4.2.26.



Source: JICA Survey Team (JST)

Figure 4.2.26 Facilities Related to Solid Waste Management

(2) Legal Framework

1) Policy

Kenya Vision 2030 provides the development direction toward 2030 including the necessity of sustainable growth in Kenya. In the vision, the Solid Waste Management System Initiative as the flagship project is raised and relocation to Dandora dump site and the development of SWM systems in five leading municipalities have been proposed.

2) Law and Regulation

Environmental Management Coordination Act (EMCA, 2006) is an Act of parliament to provide for the establishment of an appropriate legal and institutional framework for the management of the environment including SWM. The Local Government Act (Cap 265 of Laws of Kenya) is one of the Acts in Kenya that establishes and governs local authorities. The Act spells out responsibility, jurisdiction, powers, and functions of the local authorities. Most functions related to SWM are undertaken by local authorities such as collection, transportation, and disposal of solid waste. According to this Act, decision making powers rest on council members as policy makers. The basic by-law of SWM in CCN is City Council of Nairobi (Solid Waste Management) By-law of 2007. The by-law describes the role and responsibility of CCN for SWM.

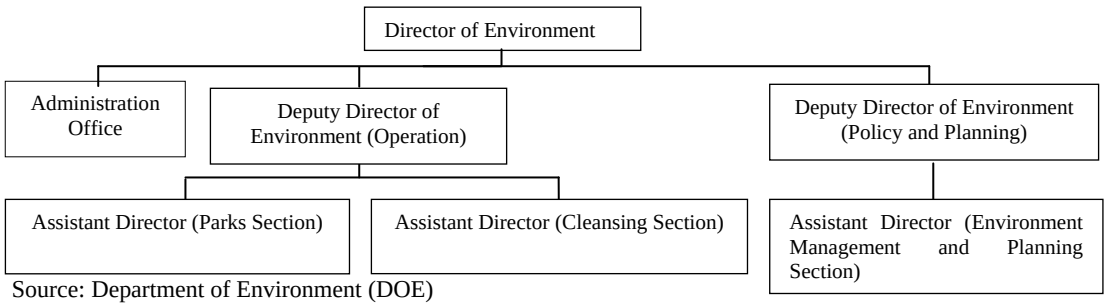
3) Guidelines

There are guidelines for private sector participation and license application of companies related to SWM including transportation, incinerator, landfill, recycling, transfer station, etc. However, there is no technical guideline for SWM or facility operation.

(3) Organisation Structure

The National Environmental Management Authority is the regulatory body of SWM at the national level. DOE in CCN is in charge of the implementation of SWM in Nairobi City. The cleansing section in DOE has the responsibility of SWM. In addition, the DOE also has the responsibility of EIA auditing and environmental conservation in CCN. The park section has the responsibility of conservation of green area and maintenance of park recreation as well as nurseries. The section of environmental management and planning has the responsibility for public awareness and environmental management and monitoring.

The organisation structure of DOE is shown in Figure 4.2.27 and Table 4.2.19.



Source: Department of Environment (DOE)

Figure 4.2.27 Organisation Structure of Department of Environment

Table 4.2.19 Number of Staff in Each Section

Administration Office	Environment Management and Planning	Cleansing	Park	Total
25	39	465	117	648

Source: Department of Environment (DOE)

(4) Waste Generation

JICA Preparatory Survey for Integrated Solid Waste Management in Nairobi City (2010) (hereafter JICA SWM Survey in 2010) implemented the solid waste amount and characterisation survey in the area of CCN.

1) Amount of Waste Generation

The latest data related to the amount of waste generation is the survey data in 2009 as shown in Table 4.2.20. According to the data, the total amount of solid waste is estimated to be 1,848 t/day and more than 60% of the total waste is generated from residential sources.

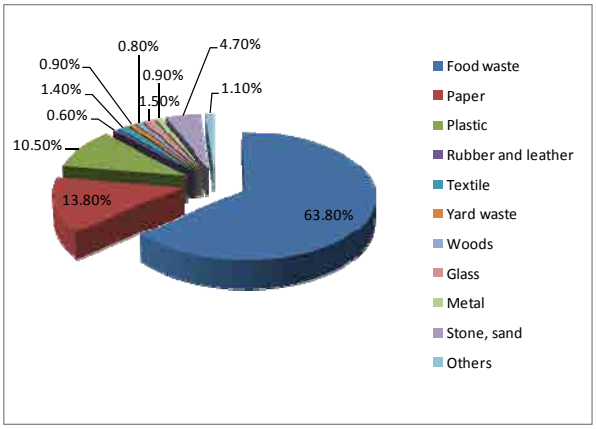
Table 4.2.20 Amount of Waste Generation

Generation source		Number [person or establishment]	Unit Generation Rate [kg/day/number]	Total [kg/day]
Residential	High income	397.362	0.621	246,635
	Middle income	1,066,393	0.474	505,076
	Low income	1,576,245	0.360	566,670
Commercial	Shop	47,941	0.5	23,970.5
	Restaurant	1,582	38	60,116
	Standard hotels	140	350	49,000
	Lodging house	586	100	58,600
	Public facilities	500	137	68,500
	School	2,847	32	91,104
	Industrial plant	501	150	75,150
	Other establishment	27,077	0.5	13,538
Market		44	2045	90,000
Street		563.3	106	(60,000)
Total				1,848 t/day

Source: JICA Preparatory Survey for Integrated Solid Waste Management in Nairobi City (2010)

2) Characterisation of Waste

For waste characterisation in Nairobi City, the survey data in 2009 is the latest one. The most recent data of physical composition in Nairobi City is the one shown in Figure 4.2.28. According to the figure, more than 60% of the total waste comes from food which occupies the larger portion of the pie graph of solid waste. As for the three contents including moisture contents, ash, combustible, high value of moisture content was confirmed to be from 65% to 80% for residential, restaurant, hotel, or market except generation sources such as shop or public facilities.



Source: JICA SWM Survey (2010)

Figure 4.2.28 Physical Composition of Waste in Nairobi City

(5) Collection and Transportation

The collection and transportation of solid waste are implemented by DOE, private companies contracted by DOE, private service providers (PSPs), and community based organisations (CBOs).

Waste picking activity during unloading of waste from collection vehicle

As for the collection service provided by CCN, the operation method is basically a station type collection. The operation team composed of one supervisor, three collectors and one driver collect the waste. The maintenance activity to repair the collection vehicle is carried out in the CCN transport depot. Regarding the service provided by the private companies contracted by CCN, most of the companies have three to five collection vehicles and half of the vehicles have a tipping function and they collect the waste from the station including the collection points transported by CBO, which collects by hand cart as its primary collection. Regarding the service provided by PSPs, the operation scale is different with each PSP. Some PSPs are only small companies that have only one collection vehicle but other PSPs are large companies which have more than 20 collection vehicles. Some of the collection vehicles of PSPs do not have a tipping function, and this causes inefficient unloading activity.

The collection time is 24 hours for CCN, and from 6 a.m. to 6 p.m. for private contractors of CCN and PSPs to prevent their illegal dumping activities. Therefore, they have to transport solid waste during daytime when the roads are congested.

The overall collection system in Nairobi City for each organisation is envisaged in Table 4.2.21.

Table 4.2.21 Collection System in Nairobi City

Organisation	Service Area	Collection Method	Equipment
CCN	CBD; Districts	Station type: common Door to door: very rare	Trucks with tipping function
Private company contracted with CCN	Districts	Station type	Trucks with/without tipping function
Private service provider	Middle and high income residential area	Door to door	Trucks without tipping function
CBOs and local youth group	Slum and low income areas	Door to door	Handcart

Source: JICA Survey Team (JST) based on the field survey and hearing from DOE

The total amount of collected waste is shown in Table 4.2.22.

Table 4.2.22 Collected Waste in Nairobi City

Year	CCN	Contractor	PSP	Total
2008	9.4 t/day	398.0 t/day	121.9 t/day	529.3 t/day
2009	29.6 t/day	446.5 t/day	132.2 t/day	608.4 t/day

Source: Department of Environment (DOE)

The collection rate of solid waste is approximately 33% in 2009 according to DOE and the remaining waste is presumed to be illegally dumped or self-disposed at the generation source. There are many illegal dumping sites in Nairobi City. In the area where waste is not collected such as low income area or in access road areas, illegal dumping occurs. As another case, even though CBO collects the waste

in collection points where CCN or the private company contracted by CBO will collect, the situation is sometimes similar to illegal dumping due to the improper discharging manner, low frequency collection, or absence of containers in collection points. There is another case that private companies such as the company contracted by CCN or PSP is illegally dumping. To prevent such illegal dumping, it is necessary to enforce the institutional system, to implement inspection and monitoring, to prepare suitable collection points and systems, and to implement environmental education for the staff related to SWM as well as for waste dischargers such as residents and business establishments.

Illegal dumping site in low income area and waste pickers who collect recyclables

(6) Reduce, Reuse, and Recycle (3R)

As for the reduction of waste, the campaign for environmental education for waste reduction is rare. Waste reduction is naturally carried out through daily life in low income areas. However, it is necessary to set up the campaign for environmental education for waste reduction activities by CCN to promote waste reduction. As for the reuse of waste, there are some second hand shops which handle second hand clothes, shoes, or electronics. Some people use the second hand shops. In addition, the low income people carry out reuse as a normal daily activity. As for recycling of waste, the collection of recyclable waste in Nairobi City mainly has three major flows. First, the discharged waste is collected by waste pickers in town and sold to junk buyers. Second, waste collection workers collect recyclable material in the waste collection vehicles. Third, recyclable waste is collected by waste pickers in dump sites including Dandora landfill site. There are no separate collection systems or sorting facilities in Nairobi City. The 3R activities are operated unofficially but so many waste pickers are engaged in waste picking activities. In addition, there are many CBOs which implement the collection of recyclables during the waste collection activities with some environmental education related to the separation of recyclables.

In the JICA SWM Survey (2010), they tried to identify the flow of recyclable waste and compostable waste. The amount of recyclables estimated in the study is shown in Table 4.2.23.

Table 4.2.23 Amount of Recyclables

Recyclable Material	Recyclable Material Handled by Junk Buyer/Brokers [t/day]	Recyclable Material Handled by Recyclers/Factory [t/day]
Recyclable	6.07	23
Plastics	4.99	8
Glass	2.27	50
Scrap metal	6.45	67
Others	0.41	-
Total	20.19	148

Source: JICA SWM Survey (2010)

However, as shown in the table above, the amount of recyclables handled by junk buyers is less than the amount of recyclables handled in factories, which indicates that it is so difficult to identify the recycling flow in Nairobi City, especially the condition of the recyclables handled by junk buyers. There is no monitoring system for this activity.

(7) Final Disposal

The main treatment and disposal method in Nairobi City is final disposal. There is an official landfill site in Dandora currently. However, there are many illegal dumping sites where the private contractors contracted by CCN and PSPs sometimes dispose their collected waste.

The information on the current official landfill site and temporary dump sites are shown in Table 4.2.24.

Table 4.2.24 Dumping Sites in Nairobi City

Name	Zone	Area [ha]	Planned Service Period	Present Condition
Dandora landfill site	Embakasi	46	1981-	Open dumping and no supervision of waste pickers, bad access and inland roads
Kayole temporary dumpsite	Embakasi	4	2009-	Area is historically a quarry area. Currently, there is open dumping and there are some waste pickers.

Source: JICA Survey Team (JST) based on information from DOE

The Dandora dumping site is currently the only official landfill site in Nairobi City. However, the operation of disposal in Dandora dumping site is open dumping, which means that there is no soil covering. This is located 7.5 km away from the northeast side of the city centre. The operation of the landfill site began in 1981 and the total area is approximately 46 ha. The total amount of disposed waste is estimated to be 3,550,000 t/day, according to DOE. There are many waste pickers who carry out waste picking activities during unloading operations of the collection vehicles and spreading activities by the landfill equipment as shown in the pictures below.. The access road is muddy and in bad condition, especially during the rainy season. Therefore, the unloading area is different based on the climate condition, and collection vehicles are pulled by bulldozers when they get stuck in the muddy areas of the access road during the rainy season.

Waste picking activity during unloading of waste from collection vehicle

Waste picking activity during spreading of waste by excavator

The management of the Dandora dumping site is carried out by the cleansing section of DOE. The landfill operation is carried out by two bulldozers and one excavator through a contract with a private company. Due to the unsanitary operation conditions of Dandora dumping site, CCN considers the development of a new landfill site in or near Nairobi City. The JICA Preparatory Study for Nairobi Solid Waste Management Project (2012) has been conducted for the Ruai candidate landfill site. However, due to the issue of bird strikes to airplanes, the location of a new landfill site in Ruai has been opposed by the Civil Aviation Authority (CAA). Currently, DOE also considers other options such as another location for the landfill site or other technical options.

(8) Financial Aspect

1) Financial Condition

Currently, the revenue and expenditure of DOE were based on the general budget system of CCN. Based on the JICA SWM Survey (2010), the special budget for SWM as well as the establishment of Solid Waste Public Corporation (SWPC) were proposed.

According to DOE, the budget for SWM is 10% to 50%, which is fluctuating based on the situation of the county budget. Generally, the budget for SWM is not prioritised in comparison with other sectors. This results in no payment for the private contractors for collection and transportation as well as landfill operations. The latest data on the financial condition provided by DOE is shown in Table 4.2.25.

Table 4.2.25 Financial Condition of CCN and DOE

Year	Revenue (CCN) [KSh]	Expenditure (CCN) [KSh]	Expenditure (DOE) [KSh]	Expenditure (Solid Waste Management) [KSh]
2009/2010	8,612,928,000	9,951,002,000	544,217,000	356,091,000

Source: Department of Environment (DOE)

2) Waste Collection Service Charge

i) CNC

Business establishments are categorised into around 80 groups and the charge rates per ton are classified into five classes, namely; KSh100, 200, 320, 420, and 500. In addition, the following per ton rates are set: KSh1000 for supermarkets; KSh1500 for post offices, banks, and courts; KSh3000 for other institutions; and KSh5000 for hotels. In fact, the collection rate is less than 35%. The collection and transportation service will be suspended in case there is no payment from these establishments, which might result in illegal dumping. For households, waste collection service charge of KSh10 had been previously collected with the water supply service. After the the privatisation of the water supply service to the NCWSC in 2003, the collection was suspended. At this moment, DOE provides the service to households through the revenue from the general budget.

ii) Private Service Provider (PSP)

The licensed PSPs collect the waste collection service charge directly from waste generators such as households or business establishments. They mainly collect solid waste in high income and middle income areas where it is efficient to obtain the profit. The rates are not fixed in Nairobi City and depend on the business strategy of PSPs. Then, the waste generators in low and middle income areas cannot receive the collection services from PSPs.

3) Supervision of PSPs and CBOs

The DOE has responsibilities of supervision of PSPs and CBOs. There are lists of supervision of PSPs and CBOs related to SWM registered by the National Environment Management Authority (NEMA). However, there is no comprehensive information on the contract condition regarding waste discharging of PSPs and CBOs as well as their financial conditions. Then, it is difficult to supervise the activities of PSPs and CBOs. This might result in the illegal activities of PSPs.

4.2.8 Telecommunications

(1) Regulatory Bodies and Their Roles

The telecommunications policy in Kenya is formulated by the Ministry of Information, Communication and Technology (MOICT), with the Communications Commission of Kenya (CCK) acting as its overseeing body (established in 1998, following the Kenya Information Communications Act). Also, Kenya Vision 2030 stipulates the strategic guidelines for the ICT sector, with a target to raise Kenya's GDP to the world average.

CCK's scope of authority is as follows: i) granting operating licenses; ii) controlling service changes; iii) assignment of frequencies and telephone numbers; iv) managing the universal service fund; v) protection of end users; and vi) issuing technical standards and equipment type approvals.

The Kenya Information Communications Act (1998) regulates the establishment of CCK and sets the regulatory framework for the telecommunications sector and the license application procedures. In 2008, following global trends, CCK made a decision to issue telecommunications licenses under three categories, namely: i) telecommunications infrastructure; ii) application services; and iii) contents services. As of 2012, there were 29 licensed operators for infrastructure, 92 for application, and 140 for contents.

The Kenyan government's telecommunications policy features privatisation, interoperable connections (interconnection), and mobile number portability. In 2007, Telkom Kenya, a state owned operator, was privatised by the consortium of France Telecom and Alcazar Capital Limited's acquiring 51% of its stock shares. The above policy is one of the measures to create a competitive environment in the telecommunications sector.

Since 2009, fixed and mobile operators have been required to provide interoperable domestic connections. In 2011, Telkom Kenya and Safaricom were designated by CCK as major operators. In 2010, CCK carried out a 50% reduction in interoperable connection charges and a further cut of 40% is scheduled by 2014.

In 2011, the Kenya Network Information Center (KENIC), controlled by Porting Access Kenya, started its mobile number portability service. The number of service users stood at 36,224 in the first quarter of 2012.

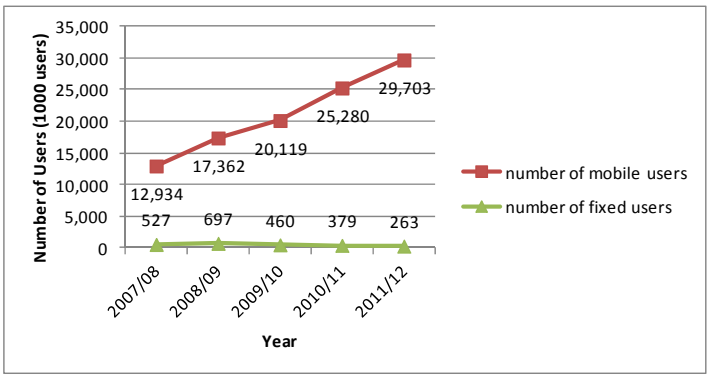
Another notable feature of the telecommunications policy targets information and communication technology (ICT). In line with the Kenya Vision 2030's objective to raise GDP to the international average by 2030, MOICT announced its ICT Policy Guideline in 2011, with the aim of providing a broadband connection to last one mile users and ICT services at schools and public institutions nationwide by 2015.

(2) Current Condition of Telecommunications

This section describes the current conditions of fixed/mobile telecommunication, broadcast and postal/ courier services.

1) Fixed/Mobile Telecommunications/Internet

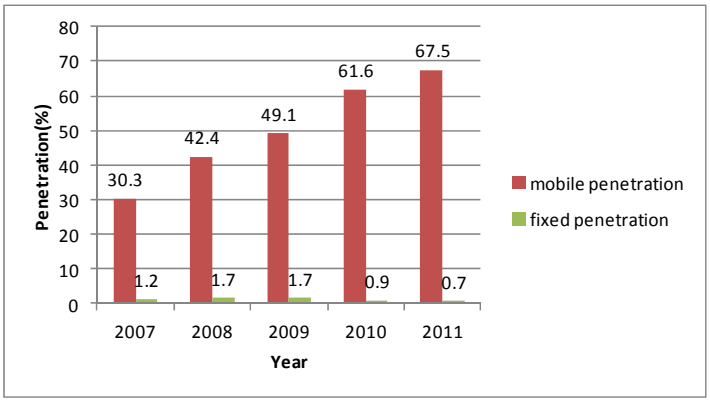
Figure 4.2.29 shows the number of fixed and mobile users. In 2011/12, there was a rapid growth of mobile users against a decline of 30% in the number of fixed subscribers from the previous fiscal year.



Source: JICA Study Team (JST) based on CCK Annual Report 2011/12

Figure 4.2.29 Number of Fixed and Mobile Users in Kenya

A clear contrast is observed in Figure 4.2.30 indicating the fixed telephone and mobile penetration ratio per 100 inhabitants. Between 2007 and 2011, the fixed telephone penetration ratio was close to 1% and had a year on year decreasing tendency. On the other hand, mobile penetration increased from 30% to 65% in the same period, which leads to the conclusion that most telephone users in Kenya are mobile users.



Source: JICA Study Team (JST) based on ITU (International Telecommunication Union) statistics

Figure 4.2.30 Proportion of Fixed and Mobile Telephones in Kenya

Over 98% of the internet subscribers have been mobile users since 2009/10 and over 50% of the internet users accessed the internet through their mobile handsets in 2011/12 as shown in Table 4.2.26. On the other hand, fixed line internet users make up less than 1% of the internet subscribers even though the number of fiber optic users is increasing rapidly.

Table 4.2.26 Subscriptions of Internet Users

Fiscal Year	2008/09	2009/10	2010/11	2011/12	May 2013
Terrestrial Mobile Data/Internet Subscription	1,562,065	3,059,906	4,189,720	7,655,576	9,589,851
Terrestrial Wireless Data/Internet Subscription	8,602	22,134	29,979	21,709	24,011
Satellite Data/Internet Subscription	26	953	960	519	727
Fixed Digital Subscriber Line(DSL) Data/Internet Subscription	7,822	9,631	15,168	11,682	10.390
Fixed Fiber Optic Data/Internet Subscription	851	4,303	22,460	49,371	55,007
Fixed Cable Modem (Dial Up) Data/Internet Subscription	21	25	-	25	25
Total Internet Subscription	1,824,203	3,096,952	4,258,287	7,738,882	9,680,011
Estimated Internet Users*	3,648,406	7,832,352	12,538,030	14,032,366	16,444,861

Note:* The number of internet users is estimated by multiplying the number of mobile data/internet subscriptions by one, the terrestrial wireless subscriptions by ten, and the fixed DSL, fiber optic and satellite subscriptions by 100. There is no scientific method of estimating internet users; for the purpose of this report, the methodology adopted is borrowed from the ITU recommendations and those of the Internet Market Study 2006 carried out by the Commission.

Source: CCK Annual Report 2011/12, CCK Sector Statistics Report (3rd quarter 2012/13)

Broadband subscriptions, with a bandwidth of over 256 kbps, are expanding dramatically as shown in Table 4.2.27, although the broadband subscriptions for 2012 represented only about 1.8% of the population of Kenya.

Table 4.2.27 Subscriptions of Broadband Services

Fiscal Year	2010/11	2011/12	May 2013
Fixed Broadband (DSL, Satellite, and Fiber)	6,552	35,265	N/A
Wireless (Wimax)	5,646	17,282	N/A
Mobile	108,928	674,255	N/A
Total	121,126	726,802	1,178,077

Source: CCK Annual Report 2011/12, CCK Sector Statistics Report (3rd quarter 2012/13)

The penetration ratio of telecommunications per province is presented in the National ICT Survey Report by the Kenya National Bureaus of Statistics and CCK (see Table 4.2.28). Fixed telephone and internet users are concentrated in Nairobi City. The regional gap in the penetration ratio between Nairobi City and the provinces is well recognised.

Table 4.2.28 Penetration Ratio of Telecommunications in Nairobi City and the Provinces

Province	Fixed Telephone (%)	Mobile Phone (%)	Internet (%)
Nairobi	11.9	76.2	28.3
Central	1.4	74.0	7.1
Coast	6.3	50.7	8.4
Eastern	2.0	64.2	4.9
North Eastern	1.2	41.1	3.6
Nyanza	1.8	57.3	5.8
Rift Valley	2.3	58.0	4.7
Western	1.2	49.5	1.5

Source: National ICT Survey Report 2011 June by Kenya National Bureaus of Statistics and CCK

Like almost all developing countries in the field of telecommunications, the rapid growth of mobile users is in stark contrast to the number of fixed line users. Safaricom, Airtel, Telkom Kenya (a.k.a. Orange), and Essar Telecom are major mobile operators in Kenya, covering all 90% of the population in 2011. In March 2013, the number of mobile users reached 29.8 million nationwide, with a penetration ratio of 69%. More than 99% of mobile users utilised prepaid services.

Mobile money services called M-Pesa were provided first by Safaricom in 2008 to transfer small amounts of money via mobile phones. The same service is now provided by Orange and Airtel as well. As of March 2013, 23.2 million users which account for 78% of total mobile subscribers used this service. The transaction amount between April and June 2012 reached KSh192.7 billion (US$2.3 billion).

Regarding internet services, fixed connections are provided by Wananchi Telecom, Kenya Data Network (KDN), Access Kenya, and Telkom Kenya. Meanwhile, the mobile connection is provided by Safaricom. The above carriers provide ADSL, FTTx, and WiMAX for local access connections. In May 2013, the number of internet users reached 16 million, and 99% of them are accessing mobile internet services through the 3G network. In reality, however, 3G services do not seem to meet specified speed requirements, with less than 10% of mobile internet users being able to access with the maximum speed of 256 kbps.

Table 4.2.29 Major Operators

Category	Operator	Market Share as of March 2013
Fixed phone subscription	Telkom Kenya (Orange)	N/A
Mobile phone subscription M-Pesa	Safaricom Airtel Network Kenya Essar Telecom Kenya Telkom Kenya (Orange)	65.1% 16.9% 10.9% 7.1%
Internet subscription (Mobile Data/Internet)	Safaricom Airtel Network Kenya Telkom Kenya (Orange) Essar Telecom Kenya	74.4% 11.2% 8.0% 6.4%
Internet subscription (Other Fixed / Wireless Internet)	Wananchi Telecom Kenya Data Network (KDN) Access Kenya Telkom Kenya Safaricom	35.4% 23.7% 12.9% 11.5% 7.2%

Source: JICA Study Team based on CCK Sector Statistics Report (3rd Quarter 2012/13)

2) Broadcast

i) Radio

Kenya Broadcasting Corporation (KBC), the government-managed broadcaster, operates FM radio broadcast and middle-wave radio broadcast throughout the nation in English and Kiswahili for 24 hours. Over 100 FM broadcasters including local broadcasters are also licensed to broadcast.

ii) Television

KBC broadcasts a nationwide TV programme at Channel 1 in English and Kiswahili for an average of 19 hours a day. For commercial broadcasting, 17 broadcasters are licensed.

Digital terrestrial broadcast commenced in five cities including Nairobi City in January 2010. The analogue terrestrial broadcast was supposed to be shut down all over the country by 2012. However, the government made a decision to delay the shutdown until 2015 since digital terrestrial broadcasting could cover up to 80% of the population as of the end of 2012. For Nairobi City area, it was announced to be shut down in December 2013. The operators of digital terrestrial broadcasting are Mutlichoice and KBC. Multchoice provides over 50 programmes on its fee-TV service named "GOTv".

iii) Satellite Broadcast

Multichoice Kenya, a joint venture established by KBC and Multichoice, delivers 13 packages of TV programmes through Ku band on Eutelsat W4 which is operated by the European Telecommunications Satellite Organization. It reached 120,000 subscribers by the end of 2011.

iv) Cable Television

In October 2010, Wananchi Group launched ten packages of TV programmes and reached 50,000 subscribers as of May 2011.

3) Postal and Courier Services

As of 2012, CCK licenses 190 postal/courier operators, an increase of 14 new postal/courier operators compared with the previous year. This was due to a successful public awareness campaign on the postal and courier services regulatory requirements.

The postal/courier operators are categorised into seven types as shown in Table 4.2.30

Table 4.2.30 Number of Licensed Postal and Courier Operators

Category of Operators	2007 /08	2008/ 09	2009 /10	2010 /11	2011 /12	Remarks
Public Postal Licensee	1	1	1	1	1	Charged with the responsibility of ensuring provision of universal postal services as an obligation (USO) and has the widest international and domestic coverage.
International Operators	14	15	12	14	14	Operate internationally with both worldwide and domestic networks.
International In-bound Operators	11	11	9	11	13	One-way operators; receiving items from overseas for local delivery.
Regional Operators	10	11	12	13	13	Major operators within Kenya and within the East African network
Intra-country Operators	75	87	91	99	109	Operators within Kenya
Intra-city Operators	36	38	33	37	39	Operate within a city/town boundary
Document Exchange Operators	1	1	1	1	1	Operate a document mail exchange point for a particular clientele
Total	148	164	159	176	190	

Source: CCK Annual Report 2011/12, CCK website

As shown above, intra-country postal/courier operators remain the largest category of operators, accounting for 57.3% of the total number of licensed operators. This is followed by the intra-city operators that account for 20.5%. Furthermore, the postal and courier market segment continues to register positive growth with respect to network development, and this brings the operators into further competition.

(3) Spread of ICT Equipment in Government Offices

1) Nairobi City County (NCC)

According to a computer inventory list in 2011 prepared by the ICT department of NairobiCity County, the total number of computers is 668. Amongst these, desktop computers account for 627 and laptop computers for 41. The numbers of printers and copiers are 387 and 32, respectively. The number of officers who are recognised to use a computer based on personnel inventory in the human resources department is 4,010, which is more than the number of

computers. Thus, it is obvious that there is a lack of computers in the city county. The computers are for standalone use, with no intranet or data server. This makes enhancing information sharing amongst the offices difficult.

Table 4.2.31 Number of ICT Equipment and Computer Users

Equipment	Number of Sets	Officers	Number of Persons
Desktop computer	627	Total number of officers (approximately)	11,000
Laptop computer	41	Clerical officers	1,115
Printer	387	Technical officers	309
Copier	32	Officers recognised to use a computer	4,010

Source: Computer Inventory List (ICT Dept. of NCC), Hearing Survey (Human Resource Dept. of NCC)

Communication amongst officers is primarily conducted through the officers' private mobiles. The NCC headquarters' internal line system has not worked for internal communications for about five years. Most officers started to get their mobile sets at that time for internal use. The only fixed telephones to be found in the offices are broken. Significant business communications are made through letters and some officers use e-mail.

Each department has site offices for administrative management purposes. Correspondence between the NCC headquarters and the site offices by letters is prevalent. There are especially few officers using a computer in the site offices.

2) National Government Network

The Government Common Core Network (GCCN), the national governmental network, is operated and maintained by Telkom Kenya. The GCCN connects 32 buildings and is shared by national government offices, which is set to be linked with counties through the National Optic Fiber Backbone Infrastructure (NOFBI).

The NOFBI is a countrywide fiber optic network implemented by the government and operated and maintained by Telkom Kenya. It connects 29 county headquarters, including Nairobi City County, under phase I of the project. The government has also formulated an expansion plan for NOFBI under phase II to cover the remaining 18 counties.

Source: National Broadband Strategy 2013

Figure 4.2.31 NOFBI Coverage

(4) Strategy

1) Kenya Vision 2030

Kenya Vision 2030, launched in 2008, presents a roadmap for Kenya's transformation into a newly industrializing middle-income country. The vision is built upon a tripod of economic, social, and political pillars. As the ICT regulator for the country, CCK lays out the economic framework through the projects highlighted below.

i) Migration from analogue to digital broadcasting

The government initiative to migrate from analogue to digital broadcasting is a result of the Regional Radio Conference decision (2006, Geneva, Switzerland <RRC-06>) requiring all countries to migrate to the digital platform by 2015. CCK is on the Digital Television Committee that brings together various government bodies for implementation.

ii) Information security

Cyber security is a key factor in the growth of the ICT sector. CCK established the Kenya Incident Response Team Coordination Centre that serves as the national coordination and collaboration centre for cyber security management.

iii) Facilitate universal access to ICT services

CCK is responsible for ensuring that everyone in Kenya has access to affordable communications services. To address the gaps in ICT access across the country, CCK has undertaken pilot projects in certain parts of the country. The projects include the establishment of 16 school-based ICT centres, four tele-centres, and eight centres for persons with disabilities.

iv) Fibre Optic Cables

CCK has provided licenses for landing four undersea cables into the country. The cables have had a positive impact on internet access speed in the country. CCK, in collaboration with the Kenya ICT Board, developed an informative documentary for public information.

2) National Broadband Strategy for Kenya

MOICT, in collaboration with CCK, advocated the development of the National Broadband Strategy (NBS) with technical assistance from USAID's Global Broadband Initiative Program. The vision of this broadband strategy is to transform Kenya into a knowledge-based society, driven by a high capacity nationwide broadband network. NBS cites the following five issues as key to national broadband development:

(i) Infrastructure, Connectivity, and Devices

(ii) Content, Application, and Innovation

(iii) Capacity Building and Awareness

(iv) Policy, Legal, and Regulatory Environment

(v) Financing and Investment

NBS's strategy and its implementation plan for five years from 2013 through 2017 are based on the above fundamentals.

As for connectivity, the NBS's minimum broadband speed forecast targets to meet Kenya Vision 2030 are indicated in Tables 4.2.32 and 4.2.33.

Table 4.2.32 Minimum Broadband Speed

	2013-2017	2018-2022	2023-2027	2028-2030
Urban	40 Mbps	300 Mbps	1024 Mbps	2048 Mbps
Rural	5 Mbps	50 Mbps	100 Mbps	500 Mbps

Source: National Broadband Strategy (NBS)

Table 4.2.33 Broadband Penetration Targets

	Baseline	Target by 2017
% of penetration by households	6.3%	35%
% of penetration by schools	43.4%	100%
% of penetration by health facilities	n/a	100%

Source: National Broadband Strategy (NBS)

3) Strategic Plan for 2008-2013

CCK implemented its first three-year (2005-08) strategic plan in line with the 9th National Development Plan (2002-08) and the Economic Recovery Strategy for Wealth and Employment Creation 2003-07 (ERS/ERSWEC). The first strategic plan ended on 30 June 2008 and the commission has developed its successor - a comprehensive five-year strategic plan that draws from the experience of the first strategic plan and takes into account rapid global developments in the sector. The preparation of the 2008-2013 strategic plan was carried out in a participatory manner that brought together all departments and units.

The previous vision of CCK was to "enable access to reliable communications services by all Kenyans". This was redefined in order to align it with the mission statement and the core function of CCK of facilitating access to communications services. The redefined vision is timebound in line with the country's vision to be a middle income state by 2030. The communications sector is expected to play a key role in the realisation of Kenya Vision 2030. Key outputs and outcomes are shown in Table 4.2.34.

Table 4.2.34 Key Outputs and Outcomes

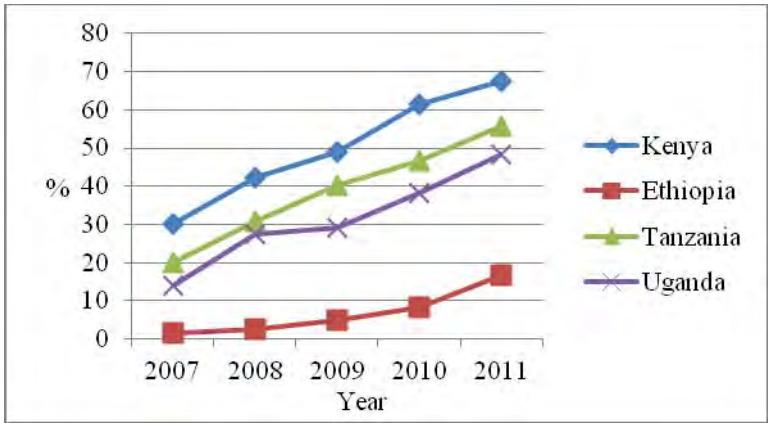
Outputs	Performance Indicators	Outcomes
• Mobile operators licensed • Broadcasting networks licensed • Number of equipment type approved • Numbers assigned • Frequencies assigned • Postal/courier operators licensed	• Number of licenses issued • Timely standard and type approval • Number of type approval cases handled • Ranges of numbers and access codes assigned	• Increased access to all varieties of communications services • Equipment compatibility and seamless services • "Better consumer experience" • Increased investment opportunities
• Policies, laws, and regulations enforced • Tariffs regulated • Guidelines issued	• Timely enforcement of license conditions and regulation of tariffs	• Fair play • License compliance • Clear rules • Governance improved • Reliability • "Better consumer experience"
• Improved access and connectivity • Universal access promoted	• Levels of penetration	• New services to the community which result in creation of job opportunities • "Better consumer experience"
• Interconnection agreements approved • Consumer education programmes implemented	• Internal efficiency and effectiveness	• Quality service • Improved and competitive business environment • Informed customers • Improved image

Source: Communications Commission of Kenya (CCK)

(5) Comparative Position of Kenya

1) Fixed/Mobile Telecommunication

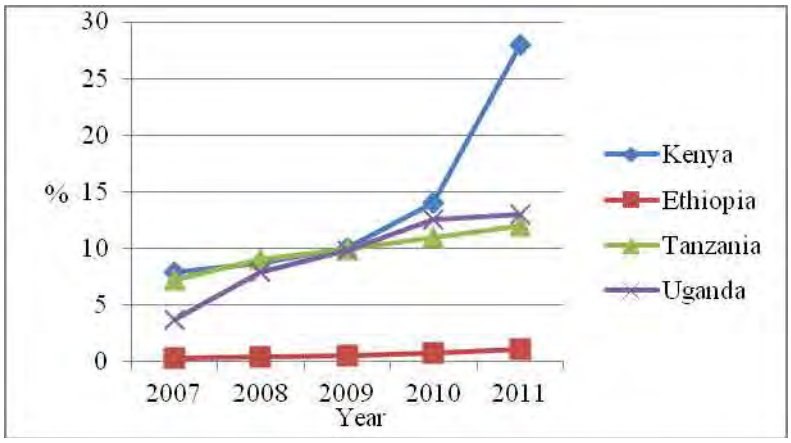
Figure 4.2.32 to Figure 4.2.34 show the percentage of mobile subscriptions, individual internet use, and fixed telephone subscriptions in Kenya and its neighbouring countries. The percentage of mobile subscriptions in Kenya is the highest amongst the countries (see Figure 4.2.32) while fixed subscriptions show a decreasing trend (see Figure 4.2.34).



Source: JICA Study Team (JST) based on ITU statistics

Figure 4.2.32 Percentage of Mobile Subscriptions Among Four Countries

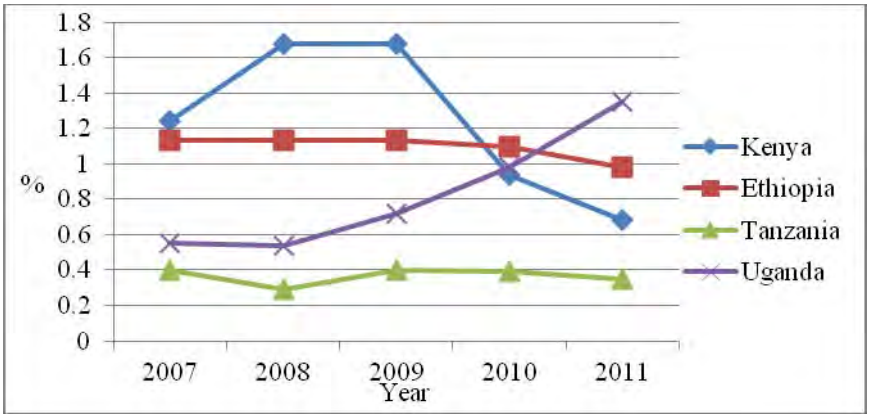
The increase in internet users in Kenya is particularly notable. With the number of fixed (wired) internet subscribers at 13,959 (ca. 0.04%), and internet use at 14% in 2010, most internet users are therefore mobile users. As for the number of broadband subscriptions, although fixed broadband subscriptions in Kenya jumped from 6,552 in 2011 to 35,265 in 2012, their share per 100 inhabitants is no more than 0.01% in 2010 and 0.10% in 2011. Most internet users, therefore, have little choice but to use narrow band internet.



Source: JICA Study Team (JST) based on ITU statistics

Figure 4.2.33 Percentage of Individual Internet Use Among Four Countries

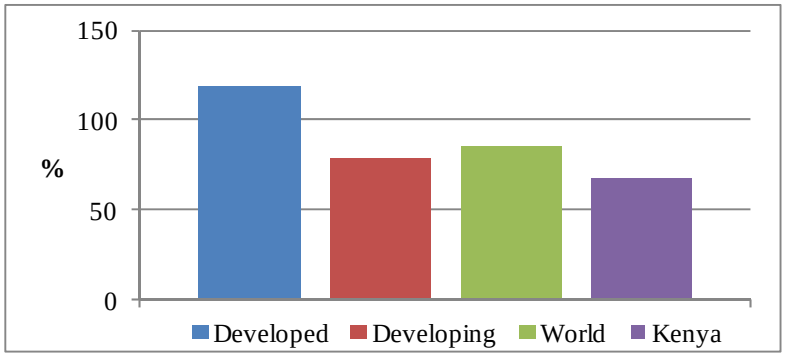
Fixed telephone subscription is evidently becoming marginal for communications in Kenya. There will be demand for fixed telephones in private offices, public institutions - schools, hospitals, police stations, public government, etc. However, local access by FTTx optic fibre cable should be developed within the frame of the current plan in order to maintain a certain level of system reliability.



Source: JICA Study Team (JST) based on ITU statistics

Figure 4.2.34 Percentage of Fixed Telephone Subscriptions Among Four Countries

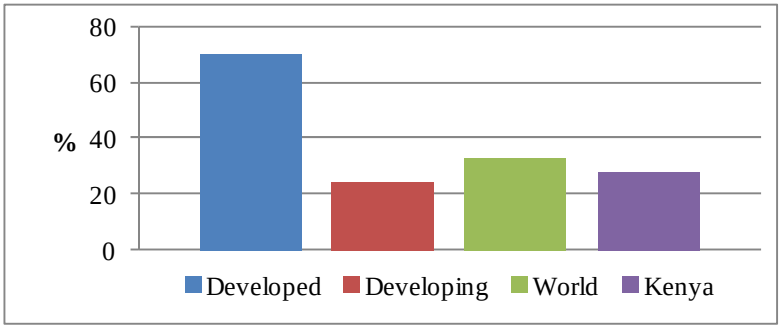
Figure 4.2.35 to Figure 4.2.37 compare Kenya globally, as well as with other developed and developing countries[6] in terms of mobile subscriptions, individual internet use, and fixed telephone subscriptions in 2011. Mobile phone ownership and internet access in Kenya closely line up with the global average and those of the developing countries.



Source: JICA Study Team (JST) based on ITU statistics

Figure 4.2.35 Penetration Ratio of Mobile Subscriptions in Kenya Compared Globally

The penetration ratio for individual internet use in Kenya is close to the global ratio and that of the developing countries. A favorable network environment available to users will therefore bring a sharp rise in subscribers.

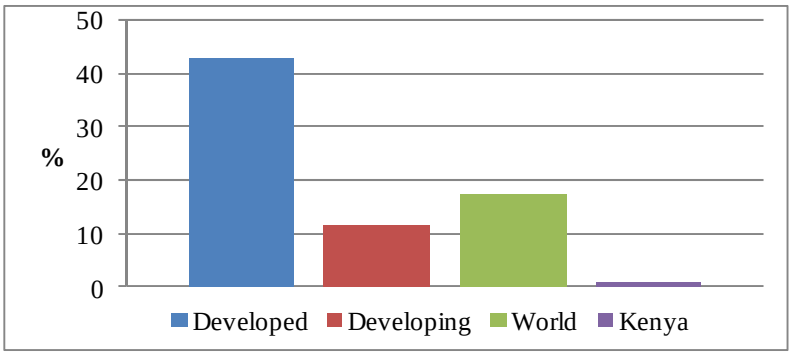


Source: JICA Study Team (JST) based on ITU statistics

Figure 4.2.36 Penetration Ratio of Individual Internet Use in Kenya Compared Globally

[6] The developed/developing country classifications are based on the UN M49, referable URL: http://www.itu.int/ITU-D/ict/definitions/regions/index.html.

The low penetration ratio of fixed telephone subscriptions in Kenya stands out compared with the rest of the world. Since this is, however, a result of national policy by Kenya which emphasises mobile rather than fixed telephones, the low figure does not directly mean vulnerability in the telecommunications infrastructure classified as local access network in outside plants.

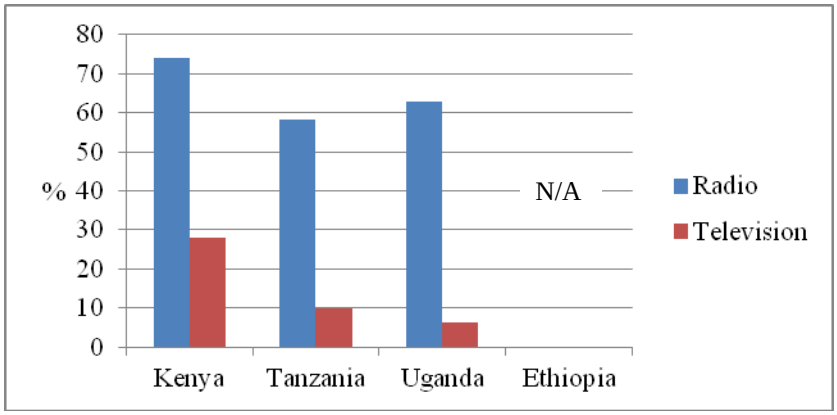


Source: JICA Study Team (JST) based on ITU statistics

Figure 4.2.37 Penetration Ratio of Fixed Telephone Subscriptions in Kenya Compared Globally

2) Broadcast

Figure 4.2.38 shows the percentage of households with radio and television in 2009 in Kenya and its neighbouring countries. The percentage of households with radio and television in Kenya is the highest amongst the countries. However, two thirds of all households in Kenya do not own a television.



Source: JICA Study Team (JST) based on ITU statistics

Figure 4.2.38 Percentage of Household with Radio and Television Among Four Countries

3) Postal and Courier Services

Although the number of licensed postal/courier operators in Kenya is approximately 200 as previously described, those in Tanzania and Uganda account for less than one third of the number of operators in Kenya as shown in Table 4.2.35. Compared with the difference in population amongst these countries, there is a great difference in the number of licensed postal/courier operators amongst neighboring countries. This means that the Kenyan postal/courier services market is more competitive than that of neighboring countries.

Table 4.2.35 Number of Licensed Postal and Courier Operators Among Four Countries

Category of Operators	Kenya	Tanzania	Uganda	Ethiopia
Public Postal Licensee	1	1	1	1
International Operators	14	5	8	N/A
International In-bound Operators	13	-	-	N/A
Regional Operators	13	3	7	N/A
Intra-country Operators	109	7	13	N/A
Intra-city Operators	39	31	-	N/A
Document Exchange Operators	1	-	-	N/A
Total	190	47	29	N/A

Source: JICA Study Team (JST) based on CCK Annual Report 2011/12, Uganda Communications Committee Website, Tanzania Communications regulatory Authority Website and Ethiopian Postal Service Enterprise Website

(6) Global Trend of Telecommunications

The International Telecommunication Union (ITU) published ICT Facts and Figures which shows continued and almost universal growth in ICT uptake in 2013. Some remarkable topics in this publication are shown below for comparison with the directions of Kenya Vision 2030.

1) In total, 6.8 billion mobile cellular subscriptions in 2013

The world population in 2013 will be 7.1 billion and the number of mobile subscriptions will be 6.8 billion. The mobile penetration ratios stand at 96% globally, 128% in developed countries, and 89% in developing countries. In 2013, the mobile penetration ratio in Kenya is estimated at about 80%, which exceeds the total African penetration ratio of 63.5%.

2) In total, 2.7 billion people, almost 40% of the world's population, are online in 2013

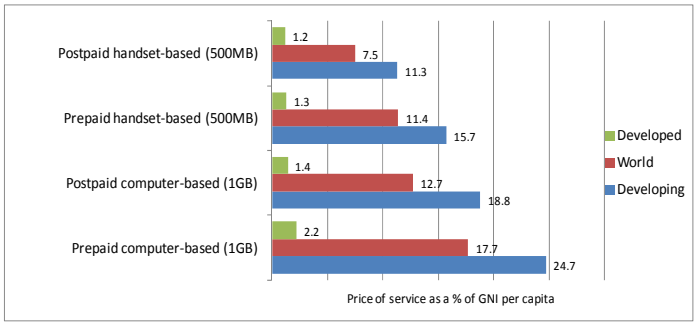
In 2013, over 2.7 billion people are using the internet, which corresponds to 39% of the world's population. In the developing world, 31% of the population is online, compared with 77% in the developed world. In Africa, 16% of the population uses the internet, which is only half the penetration ratio of Asia and the Pacific. In 2013, internet penetration in Kenya will reach 70%, far over the African figure and almost at the level of the developed world.

3) Continuous growth of mobile broadband is expected

Mobile broadband subscriptions have climbed from 268 million in 2007 to 2.1 billion in 2013. This reflects an average annual growth rate of 40%, making mobile broadband the most dynamic ICT market. In developing countries, the number of mobile broadband subscriptions more than doubled from 2011 to 2013 (from 472 million to 1.16 billion) and surpassed those in developed countries in 2013. Africa is the region with the highest growth rates over the past three years and mobile broadband penetration has increased from 2% in 2010 to 11% in 2013. This trend is followed by Kenya as well.

4) Mobile broadband is much more expensive in developing countries

By early 2013, the price of an entry-level mobile broadband plan represents between 1.2-2.2% of monthly GNI per capita in developed countries and between 11.3-24.7% in developing countries, depending on the type of service. However, in developing countries, mobile broadband services cost considerably less than fixed broadband services, i.e., 18.8% of monthly GNI per capita for a 1 GB postpaid computer-based mobile broadband plan compared to 30.1% of monthly GNI per capita for a postpaid fixed broadband plan with 1 GB of data volume. Amongst the four typical mobile broadband plans offered in the market, postpaid handset-based services are the cheapest and prepaid computer-based services are the most expensive, across all regions. A regional comparison highlights, that mobile broadband services remain largely unaffordable in Africa, where the price of a computer-based plan with 1GB of data volume represents, on average, more than 50% of GNI per capita. This situation can be applied to Kenya as well.



Source: International Telecommunication Union (ITU)

Figure 4.2.39 Price of Mobile Broadband Services, Early 2013

CHAPTER5 CONSTRAINTS AND PLANNING ISSUES

5.1 Overview of Constraints and Planning Issues

The overall constraints and issues are identified through thematic working groups as well as stakeholder and public meetings, which are compiled based on the points of view of urban planning, urban transport, and socioeconomic factors. Some of these are caused by outdated urban development management mechanisms, including the lack of a master plan, development implementation scheme, land use control, and institutions. The sectoral constraints and their resolutions are shown in Section 5.3.

(1) Urban Planning

1) Lack of Sufficient Urban Infrastructure (water supply, sewage, waste disposal, power supply, telecommunications, etc.)

A number of infrastructure plans have already been prepared but many are not implemented. In some cases, the lack of coordination between Nairobi City and the national governments hinders the process. Since population projection that can be shared by stakeholders has not been available and the land use plan that justifies the infrastructure has been weak, the feasibility and efficiency of the infrastructure plans were not secured.

2) Sprawl and Expansion of Uncontrolled Urban Development

The sprawl and expansion of uncontrolled urban development occurs for several reasons, and the main reasons are that the master plan is outdated, and the development permit and land use plan are not linked. In order to stop urban sprawl, the master plan has to be updated to match the development trend and implementation mechanism of the master plan. In addition, the development permit system has to be strengthened.

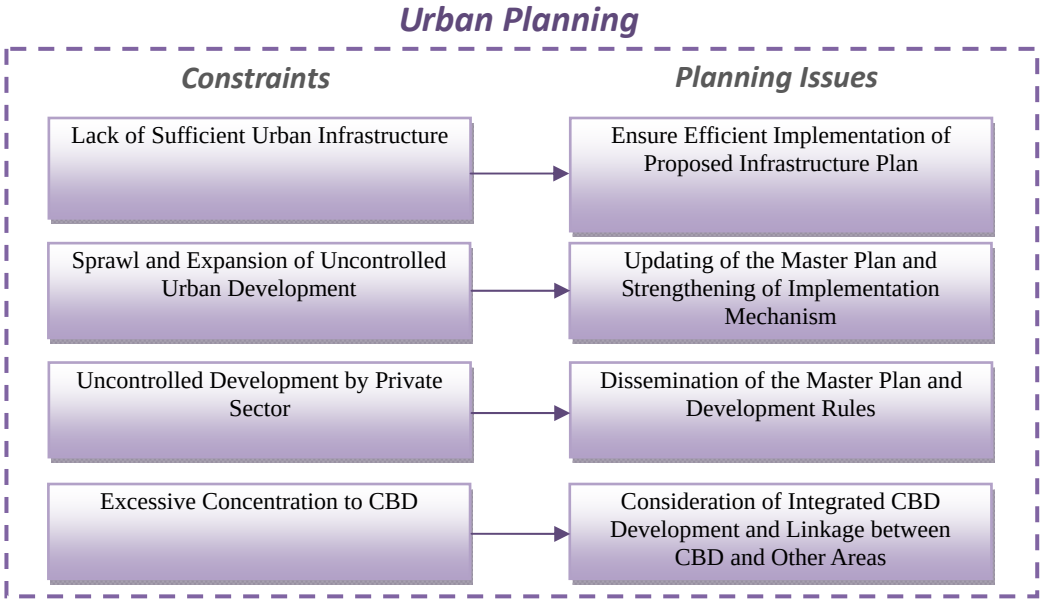
3) Uncontrolled Development by the Private Sector (insufficient affordable housing and unplanned development)

In addition to the issues mentioned in (2), the lack of proper public awareness on development control is another cause of uncontrolled development. Some people are unaware that development and building permits are required for development. Disseminating the master plan and rules of development is necessary to reduce uncontrolled development.

4) Excessive Concentration in the Central Business District (CBD)

One of the major issues in Nairobi City is heavy congestion in the urban centre, particularly in and around CBD, where existing radial roads bring all the traffic to CBD. An integrated development plan has not been prepared for CBD, railway yard, the upper hill, the Nairobi river front, and Moi Avenue, which have all been planned separately. Integrated CBD development and linkage between CBD and other areas have to be considered together.

Urban planning issues are summarised in Figure 5.1.1 below.



Source: JICA Study Team (JST)

Figure 5.1.1 Urban Planning Issues in Nairobi City

(2) Urban Transport

1) Passage of International Transportation Route Through the Urban Centre

Uhuru Highway, which passes through the centre of Nairobi City, is a part of the main road connecting Mombasa to Kisumu and further constitutes the Northern Economic Corridor. Thus, a number of heavy trucks and trailers pass through Nairobi City. The road network within and around Nairobi City has to be improved to divert the through traffic to bypass routes, and reduce congestion in Nairobi City.

2) Rapid Increase of Private Vehicles

There has been a rapid increase in passenger cars in the past several years and road development cannot catch up with the number of vehicles. The road development mechanism, including planning, finance, rules for development, and coordination amongst stakeholders, has to be strengthened.

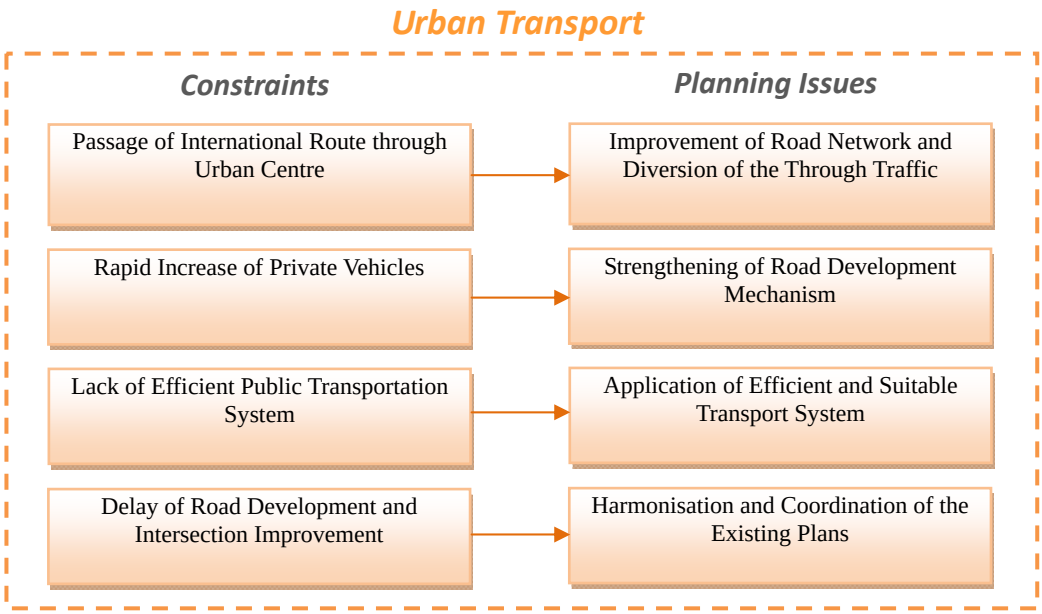
3) Lack of Efficient Public Transportation System (Mass Rapid Transit (MRT) and Bus Rapid Transit (BRT))

For a city with a population of more than three million, mass public transport mode is usually available, but Nairobi City does not have such transport mode yet. The improvement of roads is not sufficient to solve the traffic congestion once and for all, because the number of cars will increase. A public transportation system has to be considered together with the road improvement.

4) Delay of Road Development and Intersection Improvement (includes suburban areas)

There have been many transportation improvement plans but only a few plans have been implemented. In order for these plans to be efficiently implemented up to the year 2030, the land use plan and transport plan have to be synchronised and coordinated.

Urban transport issues are summarised in Figure 5.1.2 below.



Source: JICA Study Team (JST)

Figure 5.1.2 Urban Transport Issues in Nairobi City

(3) Socio-economy

1) Safety and Security in Districts

Safety and security is identified as a priority social concern. Poor planning, design, and management of the area are some of the numerous factors that give rise to crime and violence in the city. The existing governance, legal, and institutional frameworks have also failed in providing the much desired safe and secure city. The lack of safety and increasing insecurity in Nairobi City have contributed largely to the loss of property and even sometimes the loss of possible investment opportunities. Consequently, the county is losing in its economic development agenda both in terms of losses in human and financial resources. Proper urban development with a strong institution can mitigate the safety and security issues.

2) Inadequacy of Proper Housing for a Variety of Income Groups

Providing housing for all income levels of people is one of the challenging issues. The issues of housing can be characterised as high rent, poor housing conditions, congested residential areas, and not enough housing for low income people, which are believed to be one of the causes of urban sprawl. The government should control housing to provide proper housing through sub-centre development and institutional strengthening. Housing should also be provided through public and private collaboration.

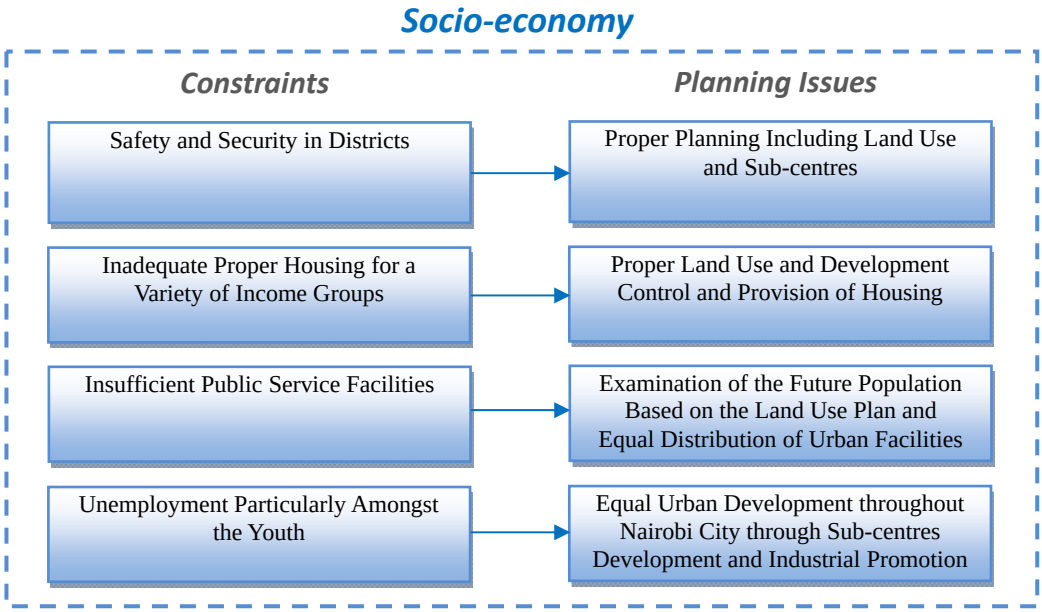
3) Insufficient Public Service Facilities (educational and health facilities, regional facilities, and open spaces)

Because the population projection and allocation of the population in Nairobi City are not clear, it is difficult to prepare plans for social facility development. A number of public facilities that need to be developed have to be examined based on the future population and its allocation based on the land use plan.

4) Unemployment Particularly Among the Youth

Unemployment, particularly amongst the youth, was identified as one of the social issues for most of the districts in Nairobi City, which is caused mainly by the lack of skills and poor access to the job market. Equal distribution of social facility development for capacity development and sub-centre development in order to improve access to employment opportunities are also expected to contribute to improving employment conditions. In addition, industrial development has to be promoted.

Socioeconomic issues are summarised in Figure 5.1.3 below.



Source: JICA Study Team (JST)

Figure 5.1.3 Socioeconomic Issues in Nairobi City

5.2 Issues of the 1973 Nairobi Strategic Plan

Section 2.4.2 (4) of the Nairobi Metropolitan Growth Strategy 1973 describes the outline of the plan. One of the issues that Nairobi City County faces is that the strategy has not been realised and this master plan should propose measures to secure implementation that were not covered in the strategy. Issues for the implementation of the strategy are compiled based on some reports and technical working group discussions.

(1) Recommendation has not been realised.

Since the plan covers the development direction, the detailed plans/programmes based on the strategy have to be prepared. The action area proposal including detailed land use, road and utility planning areas for development, housing policy, programme, and implementation were amongst the recommendations in the strategy. Also, the short-term plan or priority has not been identified. The lack of a detailed plan and prioritisation have resulted in development without the guidance of a detailed localised zoning system and development without regard to the limitations of the existing infrastructure, transport, and utility facilities to support increased development in the planned area.

(2) Measures for private fund promotion are not clear.

Urban development requires public and private sector involvement. The private sector plays an important role in urban development, but the mechanism of private sector development was not developed which resulted in the lack of funding from the private sector. The mechanism of private investment promotion is necessary to be developed.

(3) Capacity of City Council of Nairobi (then) was not fully utilised in terms of number and skills.

Nairobi City County is now responsible for following up the action recommended in the strategy. Due to the lack of capacity of then City Council of Nairobi, in terms of number of staff and skills, follow up action was not taken. Such skills cover planning, control, and implementation management.

(4) Legal framework was not developed.

The legal framework for implementation of the strategy had not been developed for a long time. Even though some regulatory frameworks have been developed, such as the Physical Planning Act and Urban Areas and Cities Act, after the preparation of the strategy, the legal justification of implementation was not fully prepared, which resulted in uncontrolled land use management and infrastructure development.

(5) There is lack of commitment and political will.

Public awareness on urban development was weak both from the public side and political side. Resources (financial and human resources) have not been fully allocated for implementation. Urban development was not considered a priority.

5.3 Sector Constraints and Planning Issues

5.3.1 Constraints and Planning Issues for Land Use and Settlements

Constraints and planning issues for land use and settlements are cross-cutting and comprehensive. As discussed with the counterpart, the following constraints and planning issues are identified.

(1) Quarrying/Mining

1) Constraints

- Location and compatibility with other land uses, ways of extractions, pollution, and disasters

2) Planning Issues

- Develop a mining and reclamation policy

(2) Industry

1) Constraints

- Diminishing industrial sector with only 3% of the entire city workforce

2) Planning Issues

- Create new industrial areas close to high density districts

(3) Commercial

1) Constraints

- Primacy of the core CBD that contributes to traffic congestion
- Proliferation of small-scale informal trading
- Flight of major commercial functions from the CBD

2) Planning Issues

- Development of multi-storey CBD in formal trading centres close to high density estates
- Creating mixed land use districts
- Selling of development rights for developing beyond the permissible plot ratios - revenue streams to the county

(4) Residential

1) Constraints

- Densification in existing residential areas
- Strain on existing infrastructural services
- Loss of neighbourhood architectural character
- Loss of privacy
- Lack of proper rationalisation criteria for plot ratios within neighbourhood
- Loss of building lines and open spaces
- Creation of parking on road reserves and loss of greens and pedestrian paths

2) Planning Issues

- Planning and design study towards sustainable local area redevelopment plan
- Constant monitoring and review of redevelopment criteria
- Neighbourhood commercial centres with core centre of higher plot ratios

(5) Informal Residential

1) Constraints

- Lack of accessibility and connectivity to services

2) Planning Issues

- Planning for areas, servicing, site and service, and creation of employment centres

5.3.2 Constraints and Planning Issues for Urban Transport

(1) Urban Transport

1) Radial Network System

i) Constraints

Presently, the network system in Nairobi City is mainly composed of a radial pattern focusing on the CBD as its centre. Moreover, most essential radial roads also function as the international transport axes. In this way, traffic flow on the international roads affect the movement of local traffic in the entire Nairobi City.

ii) Planning Issues

To this day, development of circumferential roads to divert traffic away from the city centre is necessary.

2) Increase of Incoming Vehicles to Nairobi City

i) Constraints

As the urban activities in Nairobi City become more active, traffic flow into the Nairobi City area will also grow rapidly. Most of the incoming traffic seem to have a destination in the city centre area.

ii) Planning Issues

Dispersion of functions in the city centre, especially those that are not necessarily located in the city centre, is urgently required for relocation to a suburban location.

3) Chronic State of Traffic Congestion

Compared with the traffic condition in 2004, traffic congestion has worsened over time in terms of extent and area. Since the growth in population as well as the sharp increase in car ownership are inevitable in the future, quick fix-type measures will not solve the problem fundamentally.

4) Measures Necessary to Enhance Modal Shift to Public Transport

i) Constraints

A large number of passengers waiting for a bus or *matatu* are observed during peak hours. Moreover, facilities such as bus stops are inadequate and the timetable is seldom prepared. In some areas, the quality of public transport services is insufficient, which causes an extensive use of private vehicles.

ii) Planning Issues

The timetable of *matatu* or stable transportation system is essential for passengers who intend to transfer to other public transport modes. Measures for the convenience of public transport

passengers should be introduced before the development of an advanced mass transit system is started.

5) Strengthening of Traffic Management

i) Constraints

Traffic counting at major intersections was conducted in this survey, and is being analysed. Evidently, manual traffic control by a police officer is not efficient to achieve the maximum capacity of intersections. Immediate introduction of signal control system is necessary. In the near future, the number of motorcycles is presumed to increase rapidly.

ii) Planning Issues

In the circumstance that there would be a rapid increase of motorcycles, better regulation and improved driving manners shall be launched to create harmony with other vehicle operations.

6) Systematic Development of Road Network

i) Constraints

According to the staging plan in The Study on Master Plan for Urban Transport in the Nairobi Metropolitan Area, the short-term (2006-2010) measures include missing links (arterials) and radial roads within C-3. In the medium term (2011-2015), development of missing links (collector and local), radial roads outside C-3 (north and west), and circumferential road C-3 was scheduled. The bypass roads, link roads, link road extensions, radial roads outside C-3 (south and east), and circumferential roads C1 and C2 were expected in the long term. While many of the proposed measures have not been followed, routes not included in the proposal such as the eastern bypass and northern bypass were constructed, while the southern bypass is under construction.

ii) Planning Issues

Construction of roads in the city centre is not progressing much except for some missing links. Systematic road development should be examined again.

7) Requirement of Non-motorised Transport Protection

i) Constraints

While pedestrian crossings and pedestrian signals are not sufficiently installed in Nairobi City, non-motorised transport (NMT), especially pedestrians, are exposed to danger as the traffic volume increases. In the current condition, women, children, and persons with disability will have difficulty of travel not only in the city centre but also in suburban areas.

ii) Planning Issues

Road markings for pedestrian crossings and pedestrian signals are urgently required to be improved. Education on road safety for pedestrians should be conducted.

(2) Railway

1) Constraints

Based on the existing concession agreement between Kenya Railways Corporation (KRC) and Rift Valley Railways (RVR), RVR is responsible for the passenger train operation,

maintenance, and rehabilitation of the rolling stock owned by KRC. Although the government would provide US$1 million annually, in the maximum case, RVR shall pay US$5 million to KRC annually as the concession fee for the passenger train operation.

Considering the existing condition of the rolling stock and track structure, it is hard to gain such an amount from the passenger train operation. Although the main body of the RVR has been changed from Sheltam (South Africa) to Citadel (Egypt) in 2010, there is no clear sign of improvement in the passenger train operation, as typically seen in the available number of diesel locomotives which has not increased.

Source: KRC Annual Report

Source: JICA Study Team (JST)

Figure 5.3.1 Existing Passenger Train Operation by RVR (left), Sample Photo of DMU (right)

There is a high number of commuters with limited services to cater to the high demand; for instance, there are only one or two trains operating in the morning and evening hours. The trains have limited coaches that cannot serve the increasing demand. There has been no significant investment in commuter railway transport in Nairobi City over the years; increasing the number of trips per day on each corridor is essential and expansion of the tracks should be prioritised.

In order to improve the situation of the passenger train operation, the following ideas can be considered as short-term projects:

- Introduction of Diesel Multiple-Units (DMUs)

DMUs are passenger car units equipped with diesel engines below the floor of each car. DMU can be operated at non–electrified section without heavy investment.

DMU can be operated at higher speeds than passenger trains pulled by a diesel locomotive.

- Rehabilitation of track structure

Prior to the start of passenger train operation by the concessionaire, it was reported that 61 derailments occurred in a month due to the poor condition of the existing track structure. Therefore, the maximum speed is limited to a very low speed. If the track structure is rehabilitated to allow higher speed train operation, the traffic volume of each line can be increased accordingly.

2) Planning Issues (Future MRT/ Light Rail Transit (LRT) Projects)

Although the detailed design for the first MRT line along Thika Road was planned to commence in 2011 after the completion of the feasibility study, there has been no action taken so far. Because of the completed construction of the modern and wide highway on Thika Road, the requirement of MRT along the road does not seem to be very critical.

On the other hand, severe traffic congestions are observed along Ngong Road, Waiyaki Way, and Juja Road.

Therefore, review of the feasibility study report is urgently required in order to revise the priority of MRT/LRT projects.

(3) Airport

Air passengers and cargo volume are growing, so both transport and logistics in and around airport facilities are congested. The restriction of building height and land use for aircraft takeoff and landing is a constraint for solving urban issues. Especially, possible bird strikes above the planned landfill at Ruai is a controversial issue.

1) Constraints

- Inadequate existing cargo facilities
- Limited internal and external accessibility
- Inadequate sectoral plans
- Lack of integration between the airport and other modes
- Encroachment and incompatible land uses
- Accessibility challenges especially of Wilson Airport from Langata Road

2) Planning Issues

- Airports provide opportunities for medical evacuation and other rescue missions
- Provide opportunity for multimodal integration
- Availability of land for expansion
- Opportunity for business travel/tourism and national economy
- Opportunity for development of helipads

5.3.3 Constraints and Planning Issues for Infrastructure

(1) Water Supply

As described in this subsection, the water demand of Nairobi City is over the supplied amount at present. Furthermore, as the population of Nairobi City is projected to increase rapidly, the shortage of water is a critical issue. To resolve the issue, the following subjects need to be considered:

1) Development of Water Resource and Facilities for Water Supply

i) Constraints

To meet the increase of population in the future, the development of the water supply system including water resources is indispensable. The master plan of the development is studied under the Ministry of Water and Irrigation (MWI) and Athi Water Services Board (AWSB) with financing from the World Bank (WB) and Agence Francaise Developpement (AFD).

ii) Planning Issues

In this study, the population of Nairobi City is projected for the urban development plan of the city. The water demand will be estimated based on the population. Comparing the water demands estimated in this study and the master plan, the annually stepped development plan will be reviewed for adjustment of the development plans between water resources and water

supply facilities by MWI and AWSB as well as the urban development plan by the Nairobi City County (NCC).

2) Improvement of Unaccounted for Water (UfW)

i) Constraints

The improvement of UfW is targeted at 20% in the practical manual issued by MWI. To meet the target, periodical surveys of leakage in the distribution network need to be conducted. While the Nairobi City Water and Sewerage Company (NCWSC) is in charge of maintenance of the network, only repair after leakage breakout is conducted.

ii) Planning Issues

Technical support in order to establish the survey team in NCWSC and a study of the tariff to cover the budget of the team are necessary.

3) Schedule of Replacement of Water Supply Facilities

i) Constraints

As almost all water supply facilities were constructed from 1950 to 1980, the necessity of replacing the water supply facilities to recover the capacity of water supply has arisen in these years.

ii) Planning Issues

Comprehensive schedule based on the evaluation of the water supply facilities is necessary for maintaining the designed capacity of the facilities and discussing the financial plan for the replacement project.

4) Role of NCC in Water Supply

i) Constraints

The structure of organisations for water supply services has been already established under the Water Act 2002. While the main roles of planning, implementing, and operating the water supply projects were appointed to the Water Services Regulatory Board (WSRB), World Scout Bureau (WSB), and Water and Sanitation Program (WSP), NCC does not have a role directly concerning water supply under the structure.

ii) Planning Issues

The development of the water supply system is one portion of urban development. For its implementation, harmonisation amongst the sectors of transportation, sewerage and drainage, electricity, telecommunications, and water supply is indispensable.

From the situation described above, establishing a committee is necessary for NCC in order to collect/update information about water supply projects from the related organisations and to hold a meeting amongst the sectors for discussing how to reflect the information to the urban development plan. In this study, collecting plans and reviewing them based on the study results such as the projection of population and land use will be carried out to support the action.

(2) Stormwater Drainage and Sewerage

1) Stormwater Drainage

i) Constraints

There is no usable technical data (master plan, project documents, as-built drawings, etc.) available with the City Engineering Department of NCC for carrying out planning, design, construction, and maintenance of the stormwater drainage system in Nairobi City at present. The absence of such technical data makes it hard to properly manage the development and maintenance of the stormwater drainage system and results in problematic situations that remain unimproved as described before in subsection 4.1.6.

ii) Planning Issues

The Ministry of Local Government (MOLG) has a plan to carry out the preparation of a master plan for stormwater drainage in Nairobi City under the Kenya Municipal Program (KMP). The Nairobi Integrated Urban Development Master Plan (NIUPLAN) proposes a concept for infrastructure development including the stormwater drainage system in line with the formulation of an urban development master plan for Nairobi City. For coordinating urban development with the stormwater drainage development in the future, a concept for infrastructure development to be proposed by the NIUPLAN will need to be incorporated into the preparation of the master plan for stormwater drainage in Nairobi City by the MOLG.

From the issues identified in the process of the NIUPLAN, such a master plan for the stormwater drainage in Nairobi City needs to include the following principal requirements:

(i) Systematic identification of stormwater drainage network

Extensive baseline surveys should be carried out to identify the existing stormwater drainage network systematically from upstream to downstream; comprising the drainage segments such as roadside drains, secondary drains, trunk drains, and river channels in each of the catchment areas drained respectively by the tributaries of the Nairobi River (e.g., the Gitathuru, Rui Ruaka, Nairobi and Ngong rivers).

The results of the baseline surveys should be complied into a database (e.g., GIS) for the identification of the type, location, and dimensions for each drainage segment as well as the problematic locations in each catchment area.

(ii) Hydraulic assessment

In each catchment area, hydraulic assessment for the stormwater drainage network should be performed systematically from upstream to downstream. As a result of the hydraulic assessment through the application of design rainfall intensity-duration-frequency (IDF), the required hydraulic capacity should be identified to design each drainage segment. For the purpose of the future plan, the hydraulic assessment should be performed on the basis of future land use conditions in each catchment area.

(iii) Overall development plan

Based on the baseline surveys and hydraulic assessment, an overall development plan of the stormwater drainage system should be prepared for each catchment area. The stormwater drainage system should be planned systematically from upstream to downstream for draining storm water eventually to the downstream end of the catchment area through a series of designed drainage segments. Stormwater retention facilities should be included in the plan as required for alleviating rapid concentration of stormwater drained from urbanised higher areas within the catchment area.

(iv) Implementation Plan

A series of stormwater drainage works under the overall development plan should be subject to evaluation from technical, economical, financial, social, and environmental viewpoints. The priority development works should be initiated in accordance with the implementation plan prepared with due consideration of the evaluation results.

From the technical viewpoint, the stormwater drainage works within the catchment area should be developed first from the downstream segments (e.g., river channel, trunk drains) and then extended over the upstream segments (e.g., secondary drains, roadside drains).

(v) Review of design standards and specifications

Design standards and specifications should be reviewed for improving the functional problems on existing stormwater drainage works. Reviewed design standards and specifications should be applied in the succeeding feasibility study, final design, construction works, and operation and maintenance (O&M) plan for upgrading the stormwater drainage works.

2) Sewerage

i) Constraints

The capacity of the existing sewerage system in Nairobi City is insufficient to cope with the sewerage generated at present in terms of sewerage collection and treatment. The available data suggest that the sewage generated would be less treated or untreated as a whole and then discharged eventually to the tributaries of the Nairobi River.

The total sewerage inflow received by the existing sewerage treatment works (STWs) is estimated in the order of 100,000 m^3/day. Although, the water quality of treated outflow discharged from the STWs does not meet the effluent standards[1].

The total water distributed is estimated at around 400,000 m^3/day[2] and the total billed water consumption is recorded at around 300,000 m^3/day[3]. Assuming that the sewerage generation would be almost equivalent to the actual water consumption, the total amount of sewerage generated from the water supply service areas by NCWSC is estimated in the range of 300,000 to 400,000 m^3/day. It is therefore presumed that more than 200,000 m^3/day would not be conveyed to the existing STWs but discharged eventually to the rivers through existing sewers or other drains.

According to the NCWSC, buildings and households served by the existing sewerage system discharge their wastewater directly to the combined sewers. Other than the areas covered by the existing sewerage system, the majority of households have septic tanks or latrines. Septic tanks and latrines are emptied by registered private firms. Removed sludge is transferred by tankers and then disposed at the Dandora Estate STW. The number of registered private firms is 36. It is suggested that the removed sludge would be sometimes dumped illegally as the operations of these private firms are not monitored[4].

In informal settlements, removal of sludge from latrines is handled by small-scale operators working under unsanitary conditions. Removed sludge is disposed into sewer inlets, rivers, and drainage ditches[5].

1 NCWSC Quarterly Report, July-September 2011
2 Feasibility Study and Master Plan for Developing New Water Sources for Nairobi and Satellite Towns, MWI/AWSB, February 2011
3 Water Consumption by Consumer Category 2010/2011, NCWSC
4 Preparatory Survey on Nairobi Urban Development Programme, JICA, October 2011
5 Strategic Guidelines for Improving Water and Sanitation Services in Nairobi's Informal Settlements (NCWSC/AWSB, 2009)

ii) Planning Issues

The AWSB has been implementing a series of sewerage development works including the rehabilitation and expansion of the existing STWs as well as construction of trunk sewers and reticulation networks under the Water and Sanitation Service Improvement Project (WaSSIP) (2007-2015) and Sewerage Improvement Project (2011-2016).

According to the project appraisal report of the Sewerage Improvement Project (AfDB, July 2010), the following achievements are expected upon completion of the project:

(i) Total capacity of existing STPs: 192,000 m^3/day (= Dandora 160,000 + Kariobangi 32,000) to meet the effluent standards (BOD_5 < 30 mg/L)

(ii) Percentage of population with sewerage access: increasing up to 59% (from 40% in 2009)

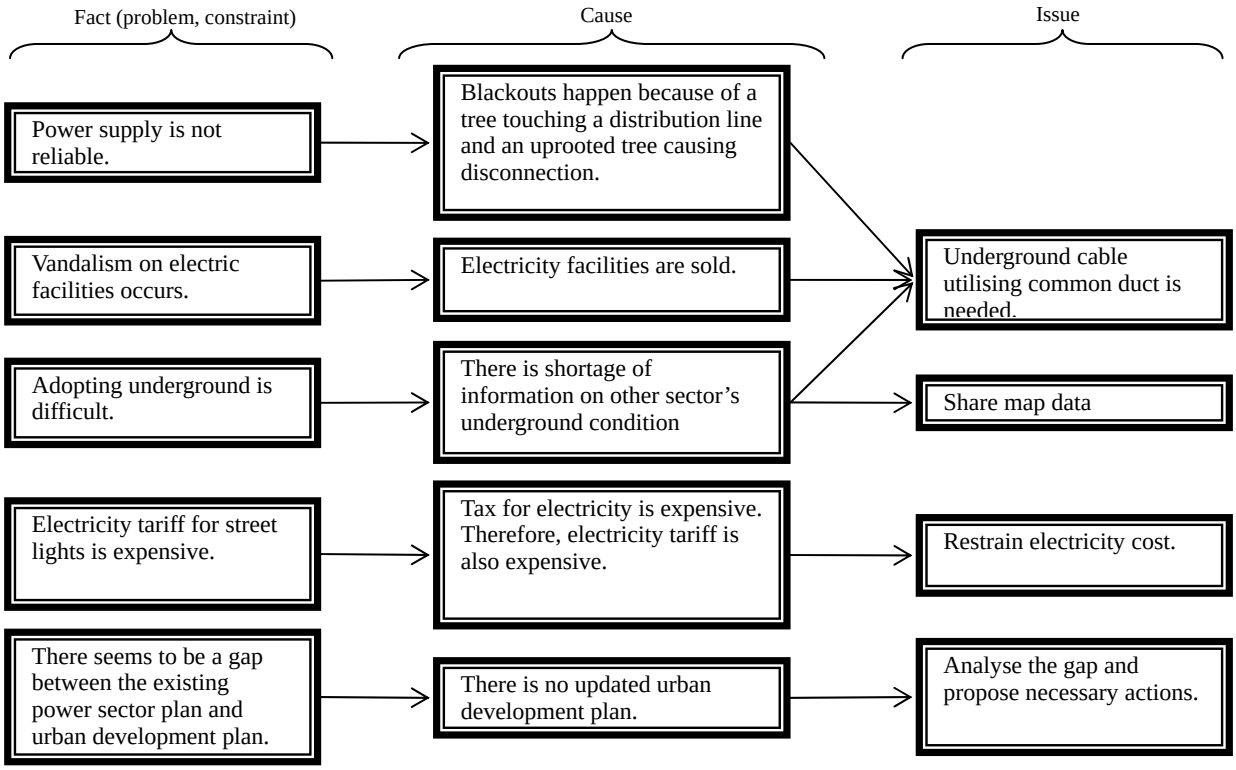
To ensure the achievements above, it is essential to carry out the activities to support the performance of the augmented sewerage system before commencement of its operation. The O&M for the STWs should be well organised to attain and keep the treated water quality satisfying the effluent standards. Household connections with existing and expanded reticulation network should also be accelerated for increasing the actual volume of sewerage collection and treatment.

Disposal of sludge removed from septic tanks and latrines should be managed properly through strengthening of the administrative system relevant to sanitation as well as augmentation of disposal site (e.g., Dandora Estate STW and/or possible alternatives). The improvement of unsanitary disposal of latrine sludge in informal settlements is being discussed and handled as a part of the water and sanitation improvements supported by different projects (e.g., Water and Sanitation Service Improvement Project (WaSSIP), Kenya Informal Settlements Improvement Project (KISIP)).

For further development of the sewerage system in Nairobi City, the AWSB plans to update the Nairobi City Sewerage Master Plan under the WaSSIP. Besides, the NIUPLAN proposes a concept for infrastructure development including the sewerage system in line with the formulation of an urban development master plan for Nairobi City. For coordinating urban development with the sewerage development in the future, it is expected that a concept for infrastructure development to be proposed by the NIUPLAN will need to be incorporated into the update of the sewerage master plan by the AWSB.

(3) Power Supply

As the population and economy grow in Nairobi City, power demand also grows. According to the field survey as well as discussion in the working group, the following issues (from fact finding to qualitative analysis) are preliminarily identified:

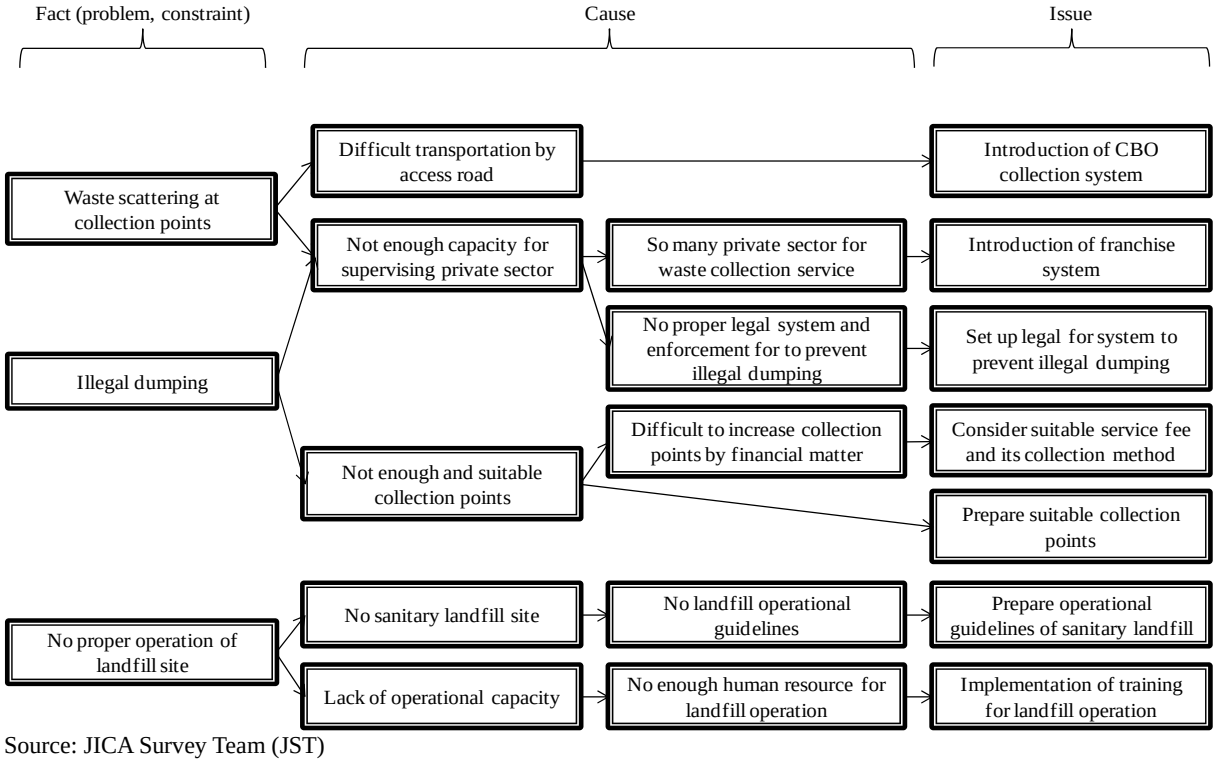


Source: JICA Study Team (JST)

Figure 5.3.2 Preliminary Identified Issues through the First Survey (Power Supply)

(4) Solid Waste Management

According to the field survey and hearing with Department of Environment (DOE) as well as discussions in the working group, the following issues are preliminarily identified (from fact finding to qualitative analysis). The identified issues will be reflected in the next stage planning.



Source: JICA Survey Team (JST)

Figure 5.3.3 Preliminary Identified Issues (Solid Waste Management)

(5) Telecommunications

1) Constraints

The current condition of telecommunications in Kenya is summarised below.

(i) Mobile penetration in Kenya reached more than half the population. At the same time, fixed telephones, internet, and postal services are not widespread.

Table 5.3.1 Major Telecommunications Indicators

Indicators	Penetration Ratio	
Fixed Telephone Penetration Ratio	0.7%	(as of 2011)
Mobile Telephone Penetration Ratio	64.8%	(as of 2011)
Internet Use Penetration Ratio	28%	(as of 2011)
Broadband Users	1.8%	(as of 2012)
Postal Service Use	12%	(as of 2011)

Source: ITU, National ICT Survey Report 2011 (CCK), Annual Report 2011/12 (CCK)

(ii) Indicators for Nairobi City are higher than the national figures. There is a difference in the distribution of the Information Communication Technology (ICT) equipment between urban and rural areas.

(iii) Unintegrated telecommunications infrastructures of various service providers in Nairobi City has adverse effects on urban landscape preservation.

(iv) Uneven quality of construction and installation works

(v) Insufficiency in information sharing and inefficiencies in governmental administrative services

(vi) Insufficiency in information dissemination to citizens

The above constraints are attributed to the following causes:

(i) Local access network from the local exchange and base transceiver station is not expanded to all end users.

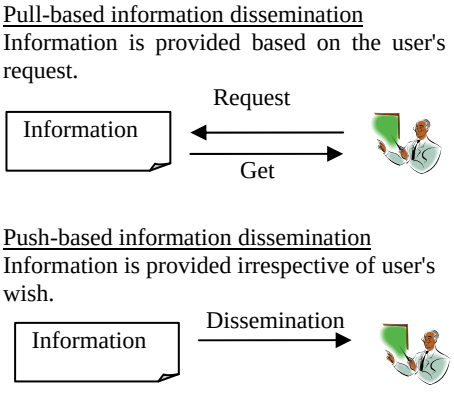
(ii) Capacity of the metro trunk communication network is insufficient.

(iii) Low reliability and insufficiency of postal services in contrast to availability and reliability of SMS, e-mail, and courier services

(iv) Telecommunications operators deploy their infrastructure such as fibre optic cables and antenna towers individually in accordance with their own marketing strategy.

(v) Not all telecommunications contractors comply with the government agencies' codes and regulations for installation and maintenance of communications infrastructure.

(vi) Government officers have insufficient awareness of ICT and information sharing. There is a lack of ICT equipment and infrastructure including intranet and



Source: JICA Study Team (JST)

Figure 5.3.4 Pull-based and Push-based Information Dissemination

database servers for information sharing.

(vii) NCC has a pull-based information dissemination tool including a webpage on the internet but has no push-based information dissemination tool. The pull-based information dissemination requires citizens' action such as accessing the internet and checking the website to get the information. Thus, not all the citizens can get the information at the same time. Emergency information to protect life and property shall be equally provided to all citizens.

2) Planning Issues

The following telecommunications infrastructures and policies are key to implementing the integrated urban development plan for Nairobi City:

(i) Metro trunk communication network based on optic fibre cable

(ii) Local access network provided through fibre optic cable and wireless access typified by Long Term Evolution (LTE)

(iii) Common infrastructure including underground ducts and towers to be shared amongst the telecommunication operators for infrastructure aggregation

(iv) Improve coordination amongst public agencies (NCC, CCK, and road operators)

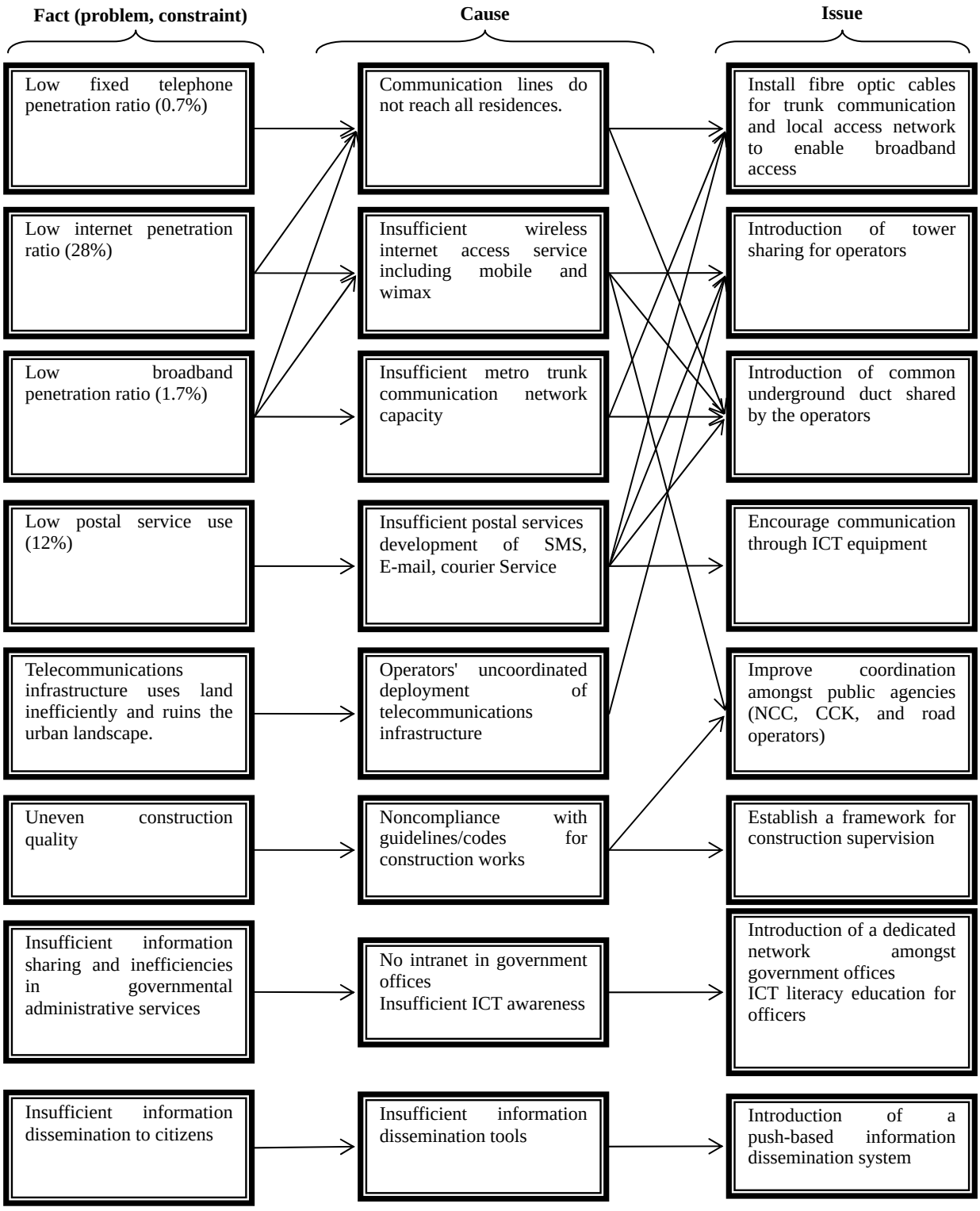
(v) Establish a framework for the construction and installation works' supervision

(vi) Introduce dedicated networking amongst government offices

(vii) Raise ICT awareness

(viii) ICT literacy education to utilise ICT equipment

(ix) Introduce a push-based information dissemination system



Source: JICA Study Team (JST)

Figure 5.3.5 Constraints and Planning Issues for Telecommunications

5.3.4 Constraints and Planning Issues for Governance and Institution

After the new constitution was in effect in 2010, new laws have been prepared and executed. The County Government Act (2012) and Urban Areas and Cities Act (2011) are amongst the newly developed acts. In addition, the Physical Planning Act, which is a base for physical development, will be replaced by the Spatial Planning Act. These acts show general instruction on urban development but the details on execution are not mentioned. Moreover, one of the issues of 1973 Nairobi Strategic Plan was the weak implementing organisation.

Institutional issues can be classified into: (i) development control, (ii) development management, (iii) private sector promotion, (iv) public participation, and (v) master plan implementation organisations.

(1) Development control: Linkage (coordination) between building control and development control is not clear for development control.

NCC is responsible both for building control and land development control. Building control is managed by the Development Control Section and development control is managed by the Programme Implementation Section (PIS). The Development Control Section and PIS coordinate for building and land development, but the standard for urban development is not clearly stated. The building code, which is a base for building control, does not mention the so-called “performance-oriented bulk control system”, which consists of building restrictions in line with urban development such as setbacks, width of the road in front of the building, and building use.

In addition, detailed guidance on land use control is not available. The technical standard or planning handbook, which is used for evaluating the land development permit, was prepared more than ten years ago. The new building code is under preparation.

For proper land development control, the building code, land development permission, and technical standards have to developed. Moreover, the relationships amongst the three documents have to be clearly defined.

(2) Urban development management: Spatial development and infrastructure development are weak.

One of the criticisms of the master plan is that there are many master plans but none are implemented as planned. In the case of Nairobi City, there are many sector plans and urban development plans such as the “Railway City development” and “Upper Hill development”, but the implementation mechanism is weak. Urban development requires coordination amongst sectors, clear roles and responsibilities, and strong legal justification.

Infrastructure management is also facing difficulties. Due to the lack of coordination, lack of clear policy in infrastructure management, and the lack of a common database on infrastructure, infrastructure is developed separately by the concerned agencies with little coordination, which resulted in inefficient infrastructure development management including wayleaves management.

In order to secure proper urban development and infrastructure development, a new urban development scheme with a strong legal background has to be developed. Such laws shall include “land re-development project” and “land re-adjustment project”.

(3) Private sector promotion: Private sector investment scheme and incentive are weak.

For successful urban development, the private sector has to be involved actively. The Nairobi Metro Strategy 1973 also addresses the importance of private sector involvement in urban development, but private sector has not been fully utilised up until now. There should be a mechanism for promotion of private sector involvement to guide urban development based on the master plan; otherwise, the private sector will maximise their interest, which may contradict the development direction of the

master plan.

The private sector promotion scheme should include incentives for the private sector in order to follow the master plan, including financial and other incentives such as easing the development conditions including building use, height, and other conditions.

(4) Public participation: Public awareness/understanding of urban development is weak.

In addition to private sector involvement, public or community involvement is necessary for efficient execution of the master plan. Even if the regulatory framework, such as the building code and land development permit mechanism, is established, execution will be difficult without public awareness and understanding.

For building construction, the permit from NCC is required, but almost half of the buildings are constructed without a permit because public awareness on building construction permits is low. In order for the master plan as well as the development and control rules for urban development to be executed effectively, the public awareness programme has to be strengthened.

In addition, any rules related to urban development have to be open to public to enhance public awareness and to be fair on development permits.

(5) Master plan implementation organisations is weak.

In order to secure development control, infrastructure development, and public participation, which are considered important components of master plan implementation, competent organisations have to be developed. Although NCC plays an important role in implementing the master plan and in coordinating with concerned agencies, it has not implemented the master plan since its establishment in 2013 due to its weak implementation capacity.

In addition, the coordination mechanism is weak. Coordination can be categorised as coordination within NCC, coordination between NCC and national government, and coordination amongst county governments.

Also, through public meetings, community participation was identified as one of the important issues for master plan implementation, but the community participation mechanism has not been established. Strengthening of organisations both for the government and for community participation is essential for implementation of the master plan.

5.3.5 Constraints and Planning Issues for Socio-economy

The rapid population increase, primarily due to a large number of in-migration and the disproportionate development of employment opportunities and urban services, has created a large gap between the demand and supply of urban functions.

Therefore, deceleration of the population growth, acceleration of employment generation, and urban service development are required, although the volume of in-migration depends not only on internal conditions of Nairobi City but also on various conditions at the national level.

Although Nairobi City is positioned higher than the national average in most socioeconomic indicators, the city faces serious socioeconomic issues that need to be addressed.

- The unemployment, underemployment, and working poor are serious issues for the city. The unemployment rate of 14.7% in the 2009 census might be an understatement. In addition, there are a number of informal settlement areas in the city, the total population of which may be around 1,300,000, but it is yet to be verified. Thus, there are large socioeconomic gaps between different groups and between different zones within Nairobi City.

- Safety and security is considered as one of the priority urban issues to be solved. The lack of proper planning and poor urban management play some role in safety and security issues.

Inclusive urban development is therefore required in socioeconomic and geographic terms. For example, the gap between relatively rich areas and relatively poor areas should be reduced.

Industrial development is the central area of the socioeconomy. For further industrial development, the following major issues need to be addressed:

- Poor nationwide infrastructure especially the lack of reliability and the high cost of power supply (this is interpreted as an investment opportunity).
- Delays in tax refund and customs clearance processes (the doing business rank in 2013 is 121 out of 185 economies).
- Competition with imported commodities, in particular those from China, affects local manufacturing.
- High reliance of GDP and export on agriculture.

5.3.6 Constraints and Planning Issues for Environment

Constraints and planning issues for environment are summarised below.

(1) Protected Ecosystem/or Green Spaces

1) Constraints

(i) There are several important green spaces which provide residents with shady recreational areas and a visitor's glimpse of Kenya's wildlife and vegetation while helping to maintain the local biodiversity, filter air pollutants, and act as minor water catchments within and on the outskirts of Nairobi City. Although these green spaces have been legally protected, much of the natural vegetation surrounding Nairobi City disappeared as city's boundaries were extended numerous times to accommodate the growing population.

(ii) As the city expanded after its founding, most of the newly developed settlements were unplanned and had encroached some of the protected areas. These areas do not have proper infrastructure services and tend to cause secondary negative impacts on surrounding green spaces (e.g., discharge of untreated wastewater, illegal dumping of waste, illegal logging, and others).

2) Planning Issues

(i) Need to establish organised citywide land use plan and sub-centres that would control the city expansion so as not to conflict with already existing protected areas such as forest reserves, national parks and surrounding water resource recharge areas while strengthening legal enforcement regarding the conservation of protected ecosystem/or green spaces.

(2) Air Pollution

1) Constraints

(i) The main sources of atmospheric pollution are vehicles, industries, emissions from the use of charcoal and firewood, and other municipal sources such as open burning of waste. In particular, the rapid growing number of vehicles without proper inspection

and maintenance considerably worsens urban air pollution problems as well as urban transport conditions.

(ii) Vehicles emit significant levels of air pollutants, including greenhouse gases and precursors of smog. Although relevant environmental standards and regulation already exist in Kenya, actual enforcement is weak.

(iii) Several air quality surveys were conducted around the CBD of Nairobi City in the past, and it was found that there is a strong correlation between the recent urban air quality degradation and the vehicular emission therein. Also, recent citywide health statistics report a rapid increase of acute and chronic respiratory diseases such as asthma.

(iv) No long-term, continuous, citywide air quality monitoring has been implemented such that reliable quantitative evaluation of urban air quality, which would be one of the important sources of baseline information for the development of effective environmental mitigation and management programme as well as effective on-the-job training (OJT)-based capacity building approaches for the environmental administrative staff, is not established yet.

2) Planning Issues

(i) Need to establish a citywide air quality monitoring system that would provide important baseline information for the development of effective environmental mitigation and management programme.

(ii) Need to strengthen the legal enforcement of vehicle inspection and the maintenance system while implementing capacity development of relevant administration agencies.

(iii) Need to establish a comprehensive urban transport system that would restrict the circulation of ill-conditioned vehicles around CBD while alleviating the traffic congestion, which is one of the serious factors that accelerate roadside air quality degradation.