Ministry of Environment, Science, Technology and Innovation (MESTI)

Town and Country Planning Department (TCPD)

THE STUDY
ON
THE COMPREHENSIVE URBAN
DEVELOPMENT PLAN
FOR

GREATER KUMASI

IN
THE REPUBLIC OF GHANA

FINAL REPORT
SUMMARY

September 2013

Japan International Cooperation Agency (JICA)

ORIENTAL CONSULTANTS CO., LTD.

CTI ENGINEERING INTERNATIONAL CO., LTD.

ALMEC CORPORATION

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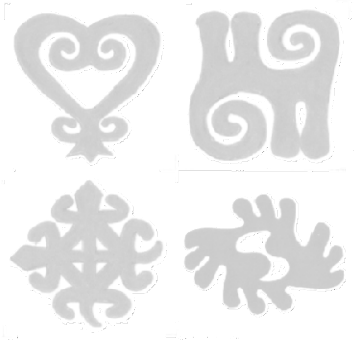

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Currency Exchange Rates

USD 1.00 = JPY 83.13
GHC 1.00 = JPY 43.86
USD 1.00 = GHC 0.53

Averages during the period between August 2012 and March 2013

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List of Abbreviations

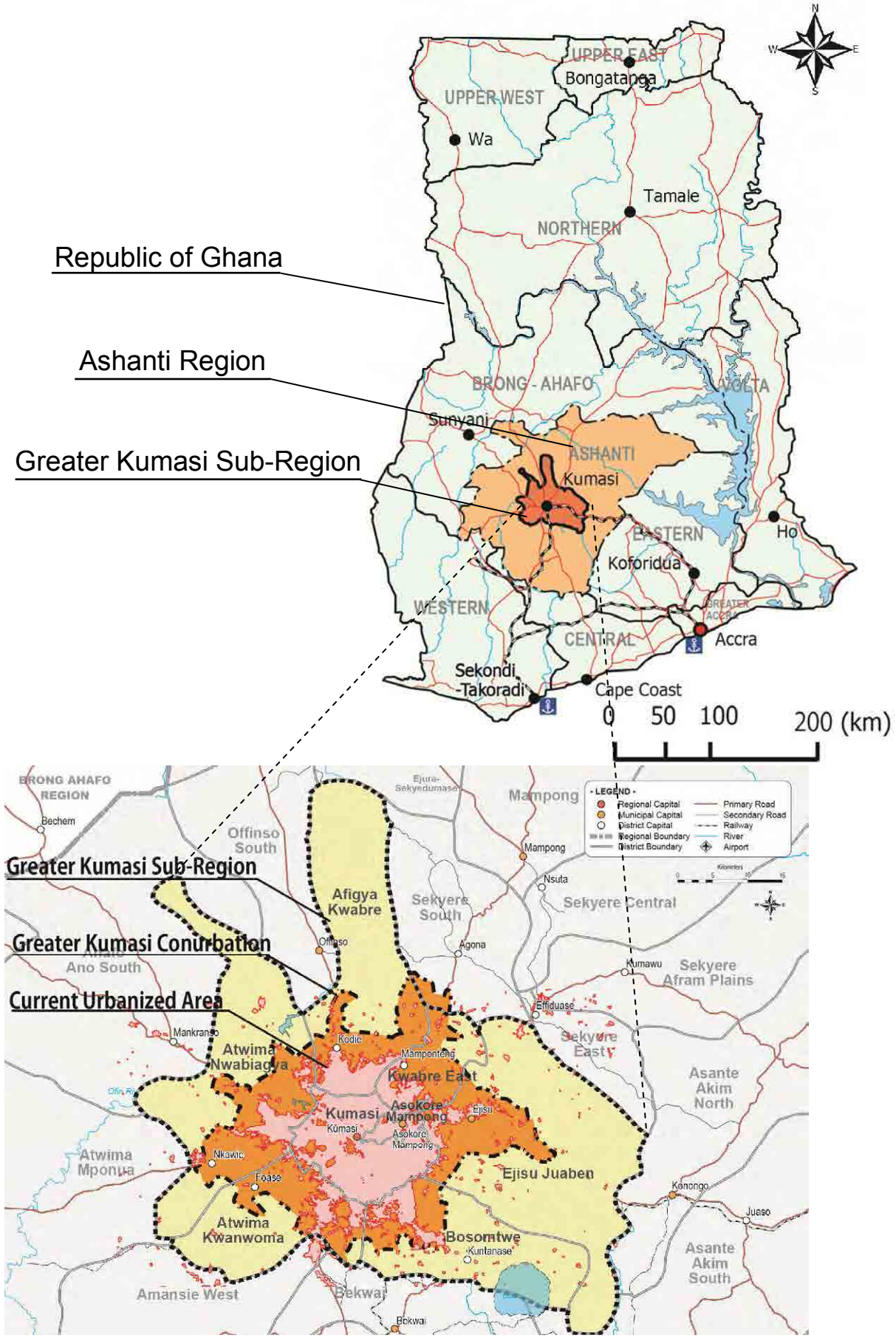
AFD	Agence Française de Développement French Agency for Development
AGI	Association of Ghana Industries
BOST	Bulk Oil Storage and Transportation
BPO	Business Processing Outsourcing
BRRI	Building and Road Research Institute
BRT	Bus Rapid Transit
BSP	Bulk Supply Point
CAP 84	Town and Country Planning Ordinance, 1945
CAPEX	Capital Expenditure
CBD	Central Business District
CHPS	Community-based Health Planning and Services
CSIR	Council for Scientific and Industrial Research
CWSA	Community Water and Sanitation Agency
DFR	Department of Feeder Roads
DMU	Drain Maintenance Unit
DPCU	District Planning Co-ordinating Unit
DUR	Department of Urban Roads
DVLA	Driver Vehicle License Authority
EAP	Economically Active Population
EC	Energy Commission
ECG	Electricity Company of Ghana
EHD	Environmental Health Department
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EPA	Environmental Protection Agency
EPO	Economic Planning Officer
FIRR	Financial Internal Rate of Return
FRHP	Focus Region Health Project
GCNet	Ghana Community Network Services Limited
GDP	Gross Domestic Product
GHA	Ghana Highway Authority
GHC	Ghana Cedi
GHS	Ghana Health Service
GIS	Geographical Information Systems
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit German International Cooperation

GNFS	Ghana National Fire Service
GoG	Government of Ghana
GPRTU	Ghana Private Road Transport Union
GRDP	Gross Regional Domestic Product
GRIDCo	Ghana Grid Company Limited
GSGDA	Ghana Shared Growth and Development Agenda
GSS	Ghana Statistical Service
GTZ	Deutsche Gesellschaft fur Technische Zusammenarbeit German Technical Cooperation Agency
GUMPP	Ghana Urban Management Pilot Project
GWCL	Ghana Water Company Limited
HOV	High Occupancy Vehicles
HSD	Hydrological Service Department
IBRD	International Bank for Reconstruction and Development
ICT	Information and Communication Technology
IEE	Initial Environmental Examination
IMF	International Monetary Fund
IPP	Independent Power Producers
IRI	International Roughness Index
ISPs	Informal Service Providers
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
KATH	Komfo Anokye Teaching Hospital
KBTH	Korle Bu Teaching Hospital
KCRP	Kumasi Composting & Recycling Plant
KMA	Kumasi Metropolitan Assembly
KMA-WMD	Kumasi Metropolitan Assembly Waste Management Department
KNUST	Kwame Nkrumah University of Science and Technology
KVIP	Kumasi Ventilated-Improvement Pit
LAP	Land Administration Project
LP	Local Plan
LUSPA	Land Use and Spatial Planning Authority (Proposed)
MCI	Millennium Cities Initiative
MDA	Ministry, Department and Agency
MDGs	Millennium Development Goals
MESTI	Ministry of Environment, Science, Technology & Innovation
MLGRD	Ministry of Local Government and Rural Development
MMDA	Metropolitan, Municipality, District Assembly
MMT	Metro Mass Transit

MoFEP	Ministry of Finance and Economic Planning
MOH	Ministry of Health
MOU	Memorandum of Understanding
MRF	Materials Recovery Facility
MSL	Mean Sea Level
MTDP	Medium Term Development Plan
MTHS	Medium Term Health Strategy
MTTU	Motor Transport Transit Unit
MVA	Mega Volt Ampere
MWRWH	Ministry of Water Resources, Works and Housing
NDPC	National Development Planning Commission
NGO	Non-Governmental Organization
NPV	Net Present Value
NRW	Non-Revenue Water
O&M	Operation and Maintenance
OASL	Office of the Administration of Stool Lands
OMC	Oil Marketing Companies
OPEX	Operating Expense
PAPs	Project Affected Persons
PCU	Passenger Car Unit
POW	Program of Work
PPMED	Policy, Planning, Monitoring and Evaluation Division
PSS	Primary Substation
PURC	Public Utility Regulator Company
RCC	Regional Co-ordinating Council
RED	Roads Economic Decision Model
ROW	Right of Way
RPCU	Regional Planning Co-ordinating Unit
S/W	Scope of Work
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SIP	Strategic Investment Programme
SP	Structure Plan
SRTM	Shuttle Radar Topography Mission
SSP	Strategic Sanitation Plan
SWM	Solid Waste Management
TCPD	Town and Country Planning Department
TDM	Transportation Demand Management

UESP	Urban Environmental Sanitation Programme
UGB	Urban Growth Boundary
UN	United Nations
UNDAF	United Nations Development Assistance Framework
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UPTUs	Urban Passenger Transport Units
VIP	Ventilated Improved Pit
VOC	Vehicle Operating Cost
VRA	Volta River Authority
WC	Water Closet
WD	Works Department
WEDC	Water, Engineering and Development Centre
WHO	World Health Organization
WPA	Wildlife Protected Area
WRC	Water Resources Commission
WRS	Water Resources Science
WTP	Water Treatment Plant

Study Area: Greater Kumasi Sub-Region



Photos of Greater Kumasi Sub-Region

Concentrated traffic around the central market in Kumasi: Kumasi City has been the centre of inter-regional and international logistics and trade

Kejetia Trotro Terminal in Kumasi City: Many routes of trotro (small bus) are available from this Terminal toward areas in Kumasi City and its surrounding areas.

Poorly developed road in a suburban area: In suburban areas of Greater Kumasi Sub-Region, rapid population increase has been taking place.

Deteriorated & unused railway line in Kumasi: Railway lines were constructed in the early 20th century connecting Kumasi with Accra, Tema and Takoradi.

Garbage illegally dumped in rivers and houses illegally constructed in their buffer zones along the rivers

Vehicle traffic on a national road (so-called Accra Road) entering into Kumasi City from the eastern side

The first stakeholder meeting for the spatial planning process for Greater Kumasi Sub-Region

The second stakeholder meeting for the spatial planning process for Greater Kumasi Sub-Region

Brief on the Study Project

Country: The Republic of Ghana

Study Project Name: Project on the Comprehensive Urban Development Plan for Greater Kumasi in the Republic of Ghana

Study Project Period: January 2012 to September 2013

Executive Agency: Ministry of Environment, Science, Technology and Innovation (MESTI)

Implementation Agency: Town and Country Planning Department (TCPD)

Study Area: The Study covers the Kumasi metropolitan area and its surrounding seven districts, namely Afigya-Kwabre District, Kwabre East District, Ejisu-Juaben Municipality, Asokore-Mampong Municipality, Bosomtwe District, Atwima-Kwanwoma District and Atwima-Nwabiagya District. Kumasi City and these adjoining districts are defined as the Greater Kumasi Sub-Region.

Objectives of the Project:

- To formulate a Sub-Regional Spatial Development Framework (SDF) for the Greater Kumasi Sub-Region.
- To formulate a Sub-Regional Structure Plan (SP) to guide the development and/or redevelopment of the urbanizing portion of the Greater Kumasi Sub-Region, which is defined as the Greater Kumasi Conurbation.
- To formulate an implementation plan for the Greater Kumasi Sub-Regional SDF and SP.
- To carry out relevant technology transfer to Ghanaian counterparts through the Study.

Scope of the Project:

The Scope of the Study Project includes the following items:

- Present situation analysis
- Formulation of a future vision for the Greater Kumasi Sub-Region
- Identification of overall development objectives
- Formulation of development strategies for the Greater Kumasi Sub-Region
- Formulation of the Spatial Development Framework (SDF) for the Greater Kumasi Sub-Region
- Formulation of the Structure Plan (SP) for the Greater Kumasi Conurbation
- Formulation of Sub-Regional Infrastructure Sector Plans and Programmes
- Implementation Plan of the SDF, SP and Sub-Regional Infrastructure Plans
- Capacity Development Programme for Spatial Development Planning and Implementation
- Strategic Environmental Assessment for the SDF, SP and Sub-Regional Infrastructure Plans

Executive Summary

Background

Kumasi is the capital city of Ashanti Region. Kumasi City (Kumasi metropolitan area, KMA) had a population of approximately two million in 2010. The Greater Kumasi Conurbation, which covers Kumasi City and its surrounding urbanizing portion of adjoining districts, had a population of 2.46 million in 2010. Kumasi is an important commercial centre for the regional economy. Kumasi also has the role of the transport and logistics centre for international distribution networks covering the surrounding landlocked countries, such as Burkina Faso, Mali and Niger.

In recent years, the urban environment has deteriorated due to lack of public services and extreme congestion in the city centre, as well as in suburban areas. These problems have arisen due to the rapid population increase in Kumasi City and urban sprawl in suburban areas beyond the border of Kumasi City.

In Ghana, the Town and Country Planning Department (TCPD) has worked on establishment of a new Land Use & Spatial Planning Law, under which spatial plans and socio-economic development plans are to be formulated in an integrated manner. Under the new spatial planning system, spatial plans (spatial development frameworks and structure plans) should be formulated at the national, regional, sub-regional and district levels so that planning and coordination between different levels and a holistic approach to urban development and environmental issues become possible.

Present Situation and Issues

Population Increase in Kumasi City and Urban Sprawl beyond the Border of Kumasi City: Unbalanced Provision of Basic Infrastructure and Weak Enforcement of Land Use Regulations

From 1984 until 2010, Kumasi City showed a very high population increase with an average annual rate of over 5.6%. The population of Kumasi City increased from 490,000 in 1984 to 1,170,000 in 2000 (increase of 680,000). From 2000 to 2010, Kumasi's population increased by a further 860,000 to reach 2 million.

Spatially urbanized areas have expanded beyond the boundary of Kumasi City into adjoining areas. The population of the Greater Kumasi Conurbation covering Kumasi City and surrounding urbanized areas was 2.46 million in 2010.

From 1984 to 2000, an extremely rapid increase in population took place in both Kumasi City (5.63% per annum) and its surrounding districts (4.24% per annum). On the other hand, from 2000 to 2010, while the rate of population increase continued to be very high within Kumasi City (as high as 5.69% per annum), that of the surrounding districts slowed down to an annual average rate of 2.16% per annum. As a result, a loose and low-density urban sprawl extends along a 30 km radius from the centre of Kumasi.

This excessive concentration and continued high increase in the rate of population in Kumasi City can be explained by both the underdeveloped basic infrastructure in suburban areas outside Kumasi City and the high concentration of urban functions and public

infrastructure/services in Kumasi City. Moreover, the existing system of layout plans and land use regulations has not been able to effectively control the urban sprawl.

Uncertain Ability of Economic Growth of Informal Sector

Kumasi appears to be economically prosperous supported by highly active commerce, logistics and car repair and other small manufacturing sectors, while it is the centre of regional government and finance in the Ashanti Region. However, the majority of these economic sectors are informal. They have relatively low productivity and weak potential for growth. Moreover, in the last ten years, the growth of the manufacturing sector in the Ashanti Region has been stagnant, while other regions, such as Brong Ahafo, Volta, Central and Eastern Regions, have largely increased their economically active population in the manufacturing sector.

Considering the rapidly increasing urban population and the necessity for receiving the continued influx of migrants from the northern areas, it is necessary for the Greater Kumasi Sub-Region to keep providing job opportunities for these people. For this purpose, it is essential for the Greater Kumasi Sub-Region to revitalize formal economic sectors including manufacturing and knowledge sectors and to create an effective link between informal and formal sectors.

Inefficient Utilization of Space: Underdeveloped Urban Function in City Centre and Suburban Areas

While the population increase continues in Kumasi City, many old compound houses remain in Kumasi's central areas, occupying prime lands in the city centre. These lands should be used to expand the Central Business District (CBD) and upgrade the urban function of Kumasi City Centre. These lands are also suitable for accommodating mid-rise housing. These are some examples of the inefficient utilization of urban space.

The transportation modes connecting Kumasi City Centre and suburban areas are only vehicles on roads and tro-tros (small-sized vans). There are no modern high-capacity public transportation modes to integrate the central area with suburban areas. Moreover, there are not enough modern commercial facilities in suburban areas. As a result, sparse residential development has taken place alongside the radial roads. This is another example of inefficient spatial utilization.

By 2033, a population of 5.5 million will reside and work in the Greater Kumasi Conurbation. In order to accommodate this large urban population, the provision of efficient transportation and functional urban centres is essential to induce and support residential areas and economic activities in suburban areas.

Underdevelopment of Economic Infrastructure and Underutilization of Human Resources to Support Economic Development

The revitalization of the economic sector including manufacturing requires infrastructure, such as roads, electricity and water. Therefore, at the first stage of revitalization of industries, it is useful for Greater Kumasi to take advantage of the unused lots available in the existing Kaase Industrial Area, which already has this infrastructure. At the second stage, it is necessary to make a solid effort to establish the Inland Container Depot (ICD) and

Technological Park (export processing zone) planned in Boankra, as soon as possible, to instigate private investment promotion.

For revitalization of the economic sector, it is essential to utilize available human resources, such as researchers and students of KNUST and other advanced research institutes. It is important to make an effective link between the economic sector and these universities and research institutes.

Heavy Traffic Congestion in Kumasi: Serious Weak Point for Transport and Logistics Centre

An important transport corridor connecting the southern area and northern area goes through Greater Kumasi. Since Kumasi is located in the central area of Ghana, it plays the role of transport and logistics centre not only for the Ashanti Region, but also as a gateway to the northern area of Ghana.

However, Kumasi City has suffered from traffic congestion in its central area, similar to cases in most large urban areas. Heavy traffic congestion has been observed on the Inner Ring Road, which was constructed as a bypass.

To sustain the roles as a gateway and transport/logistics corridor, it is necessary for the Greater Kumasi Sub-Region to construct another ring road (Outer Ring Road) to prevent trucks from travelling through the city centre. Furthermore, it is important to utilize the Outer Ring Road not only to strengthen the bypass transport function, but also to promote the development of urban centres and residential areas in suburban areas.

Comprehensive Urban Development Plan for Greater Kumasi

The Comprehensive Urban Development Plan for Greater Kumasi is composed of the following plans and programmes:

- Spatial Development Framework (SDF) for the Greater Kumasi Sub-Region
- Structure Plan (SP) for the Greater Kumasi Conurbation
- Infrastructure Sector Plans and Programmes
- Implementation Plan for the Greater Kumasi Sub-Regional SDF and Conurbation SP, as well as Sub-Regional Infrastructure Plans
- Capacity Development Programme for Spatial Development Planning and Implementation

The SDF for the Greater Kumasi Sub-Region is shown by diagrams to show the spatial structure of the sub-region, as well as by statements of development strategies. On the other hand, the SP for the Greater Kumasi Conurbation is shown by general land use plans to designate land uses to guide district-level SDFs and SPs, and by statements of actions to implement development strategies, including programmes and projects.

Vision

In the consultation with stakeholders, the following future vision for the Greater Kumasi Sub-Region has been identified.

“The Greater Kumasi Sub-Region will become a pioneer to transform the current economy to a vibrant, modernized and diversified economy including commerce, logistics, manufacturing and knowledge-based industries, by creating a liveable, sustainable and efficient urban space,

while maintaining the historical and cultural aspirations of the Ashanti Region."

Goals

Considering current issues and expected roles for the Greater Kumasi Sub-Region, the following goals are clarified to pursue the vision above:

- To revitalize economic sectors by promoting the development of formal economic sectors, as well as modernization of informal sectors.
- To efficiently and effectively utilize the space available within the Greater Kumasi Sub-Region both by developing suburban areas and by enhancing urban functions of the central area of Kumasi.
- To develop infrastructure and services to support and promote socio-economic development and spatial development.

Socio-Economic Framework

In 2010, the population of the Greater Kumasi Sub-Region was 2.46 million. In 2033, its population is expected to reach 5.5 million. On the other hand, the number of jobs in the Greater Kumasi Sub-Region was 1.14 million in 2010, and is expected to reach 2.74 million in 2033.

Spatial Development Framework (SDF) for the Greater Kumasi Sub-Region

Socio-Economic Development Policies for the Greater Kumasi Sub-Region

The overall strategies for medium and long-term socio-economic development are to focus on the following sectors:

- Investment in the manufacturing and knowledge sectors
- Modernization of small-scale commerce, logistics, car repairing services and small-scale machine manufacturing
- Creating an effective link between these sectors

Spatial Development Strategies for the Greater Kumasi Sub-Region

Considering the expansion of urbanization beyond the border of Kumasi City and the continuing rapid population increase in the Greater Kumasi Sub-Region, it is necessary to widely distribute urban functions outside Kumasi City within its adjoining urbanizing areas. At the same time, it is essential to enhance the advanced urban function of the central part of Kumasi City by expanding the CBD and improving infrastructure.

For this purpose, it was proposed to transform the existing mono-centric spatial structure centring on Kumasi City into a multi-nucleus spatial pattern with suburban centres. In actuality, in the stakeholder consultation, a multi-nucleus spatial pattern was preferred.

However, considering the practical difficulty to create such a decentralized spatial pattern, a combination of the spatial multi-nucleus structure and urban corridors are proposed as the spatial development strategies for the Greater Kumasi Sub-Region. In order to achieve this proposed spatial pattern, infrastructure development, BRT establishment and land use plans and regulations should be implemented in an effectively integrated manner.

Development Strategies for the Greater Kumasi Sub-Region

A diagram showing the future spatial structure was prepared for the Greater Kumasi Sub-Region considering the socio-economic development policies and spatial development strategies.

In order to transform the existing mono-centric spatial structure to a decentralized one, and to encourage revitalization of industries, it is necessary to promote the following development strategies for the Greater Kumasi Sub-Region:

1) To distribute industrial areas in suburban areas by developing industrial parks to accommodate formal economic sectors and provide employment opportunities in response to the future large population increase.
2) To distribute/decentralize commercial/business/service functions to suburban areas by developing urban centres in suburban areas to increase residential populations in suburban areas.
3) To restructure and expand the central area of Kumasi City to upgrade the urban functions of Kumasi City Centre.
4) To widen major radial roads not only to induce decentralization of urban functions to suburban areas from Kumasi City Centre, but also to achieve stronger integration between the central and suburban areas.
5) To establish Bus Rapid Transit (BRT) routes on major radial roads and to develop an Outer Ring Road to promote the development of residential areas and urban centres in suburban areas.(Although railway does not play an important role in urban public transportation by 2033 or so, the BRT dedicated lanes could be a good base for future development of rail-based public transportation in the very long term beyond 2033.)
6) To promote development of multi-storey housing in the central area of Kumasi City Centre by urban renewal measures for restructuring and enhancement of the urban functions of the Kumasi City Centre, and near urban centres in suburban areas to support the development of urban functions in suburban areas.
7) To designate and utilize urban growth boundaries and control the official approval of layout plans (or local plans) to guide suburban housing development towards desirable areas.
8) To designate and develop open spaces, river buffer zones and conservation areas to promote recreational activities and healthy lifestyles, as well as to improve the urban environment and amenities.
9) To implement other strategies for aspects of tourism, mining, health, education and rural development

Structure Plan for the Greater Kumasi Conurbation

General Land Use Plan for the Greater Kumasi Conurbation

Following the spatial structure and spatial development strategies proposed by the SDF for the Greater Kumasi Sub-Region, a general land use plan for the Greater Kumasi Conurbation

has been created. This general land use plan is important and useful to guide the formulation of not only district-level SDFs and SPs, but also sub-regional-level infrastructure sector plans.

The major characteristics of the general land use plan are as follows:

- Expanded CBD in Kumasi City Centre (within the Inner Ring Road)
- Sub-centres at major junctions along the Inner Ring Road
- Mixed development areas allowing multi-storey buildings to accommodate commercial/business and residential areas
- Higher-density residential areas (both low-rise and mid-rise housing) outside the Inner Ring Road and within the proposed Middle Ring Road
- Low-density residential areas outside the proposed Middle Ring Road
- Mixed development areas consisting of commercial/business and residential land uses) in suburban centres and district centres, allowing multi-storey buildings
- Industrial areas outside the proposed Outer Ring Road and along the major radial roads to accommodate formal industrial sectors
- Conservation areas covering immediate catchment areas of existing and proposed dams for conservation and future development of water resources

Urban Growth Management

An urban growth boundary is proposed for urban growth management in suburban areas. The proposed urban growth boundary extends up to 25 km from Kumasi City Centre along major radial roads, and is set partly along the proposed Outer Ring Road (at about a radius of 15~18 km from the city centre). Inside the urban growth boundary, urban development is promoted by providing basic infrastructure with priority. On the other hand, outside the urban growth boundary, layout plans (or local plans) for new area development (new subdivisions) should not be approved in principle.

Priority Programs and Projects

Priority Strategic Programmes for Urban and Industrial Development

To implement the socio-economic development policies and spatial development strategies, the following priority strategic programmes for promoting integrated urban and industrial development have been formulated:

- Programme for Investment Promotion for Greater Kumasi
- Programme for Revitalization of Kaase Industrial Area
- Programme for Development of Boankra Industrial-Logistics Centre
- Programme for Development of Kumasi-Ejisu Urban Corridor
- Programme for Redevelopment of Kumasi City Centre
- Programme for Development of New Towns
- Programme for Modernization of Informal Sectors

Programmes and Projects for Infrastructure Sectors

Sector plans and programmes for the following seven infrastructure/services sectors have been formulated for the Greater Kumasi Sub-Region:

- Transportation
- Water Resources
- Water Supply
- Liquid Waste Treatment
- Drainage
- Solid Waste Management
- Electricity Supply

Priority Projects for Infrastructure Development

The provision of infrastructure/services is essential for urban and economic development. The following infrastructure/services projects have been selected out of the formulated sector programmes:

- Outer Ring Road Project
- Middle Ring Road Project
- Project for Introduction of Type B Bus and Establishment of BRT System
- Feasibility Study on Water Resources Development for Greater Kumasi Sub-Region
- Project for Expansion of Water Supply Capacity of Barekese Water Treatment Plant
- Project for Effective Use of Existing Distribution Pipes Project
- Project for Development of Septage Treatment Ponds in Adjoining Districts/Municipalities within Greater Kumasi Sub-Region
- Expansion of Asafo Simplified Sewerage System for CBD Area
- Project for Solid Waste Management Improvement in MDAs Adjoining KMA within the Greater Kumasi Sub-Region
- Project for Replacement of Small-Sized Wires and Deteriorated Equipment, and Realignment of Distribution Lines

Implementation Plan

In Ghana, the capacity of the regional government for implementing development plans is limited due to a lack of adequate planning systems and development budget. To promote the implementation of the formulated spatial development plans for the Greater Kumasi Sub-Region, it is necessary to make the following special institutional arrangements.

- To establish a “regional platform” consisting of various actors under the Regional Planning and Coordinating Unit (RPCU) to promote the implementation of the Spatial Development Plan for Greater Kumasi.
- The National Development Planning Commission (NDPC) and the Town and Country Planning Department (TCPD), which will be restructured into a Land Use and Spatial Planning Authority (tentative name) after the Law of Land Use and Spatial Planning passes, should plan a key coordinating role at the national level.
- The national-level infrastructure agencies in charge of the proposed Outer Ring Road and water resources development should play a key role in utilizing and maintaining the Comprehensive Urban Development Plan for Greater Kumasi because these two projects are very important for the Greater Kumasi Sub-Region. The Department of Urban Roads is in charge of the Outer Ring Road and Ghana Water Company Limited (GWCM) is responsible for water resources development for the water supply.

Capacity Development Programme

A capacity development programme for those who are engaged in spatial development planning and implementation has been prepared. The major objective of the capacity development programme is to enable planning officers and others to utilize the Comprehensive Urban Development Plan (including SDF, SP and sub-regional infrastructure sector programmes) to make an effective and sustainable impact from the plan. The programme is composed of sub-programmes targeted at the following five major groups:

- Planning officer and others who work for national-level planning institutions
- Planning officers and others who work for regional-level physical (or spatial) planning institutions
- Planning officers and others who work for district-level physical (or spatial) planning institutions
- Citizens including traditional chiefs (who are traditional owners of lands)
- Teachers and researchers at universities and polytechnic institutes

Recommendation

Based on this JICA Study on the Comprehensive Urban Development Plan for Greater Kumasi, the following are recommended for implementation of the Plan:

- The Ashanti Region Regional Co-ordinating Council (RCC) should proceed with the process for official approval of the Master Plan as an official spatial plan document, together with other related agencies.
- After receiving official approval by the RCC of Ashanti Region, the Master Plan should be sent to the National Development Planning Commission (NDPC) so that necessary coordination can be done including incorporation of various important proposals of the Master Plan into the national-level mid-term development policy and mid-term sector development plans, as well as the district-level mid-term development plans.
- At the regional level, the RCC should establish a regional platform under the Regional Planning Coordinating Unit (RPCU) to promote implementation of the Master Plan and conduct the following activities:
    - Activities to appeal to national-level infrastructure sector agencies for implementation of priority projects
    - Activities for attracting private investment in accordance with the Master Plan
    - Formulation of district-level SDFs and SPs, and enforcement and implementation of land use regulations following the district-level SDFs and SPs

The major parts of the Master Plan for Greater Kumasi are the sub-regional level SDF and SP. The sub-regional level SDF is mentioned in the draft Law on Land Use and Spatial Planning. However, the role and contents of the sub-regional level SP have not been clarified in the draft Law. Under these circumstances, it is strongly recommended to clarify the official and legal position of the sub-regional SP so that the sub-regional SP could be used to guide the formation of district-level SDFs and SPs.

Conclusion

Conclusion

The Comprehensive Urban Development Plan for Greater Kumasi, formulated by the JICA Study Project, is composed of the following plans and programmes. This set of plans and programmes is called the Master Plan for Greater Kumasi or the Master Plan.

- Spatial Development Framework (SDF) for the Greater Kumasi Sub-Region
- Structure Plan (SP) for the Greater Kumasi Conurbation
- Infrastructure Sector Plans and Programmes
- Implementation Plan for the Greater Kumasi Sub-Regional SDF and Conurbation SP, as well as Sub-Regional Infrastructure Plans
- Capacity Development Programme for Spatial Development Planning and Implementation

The Master Plan has been completed through technical examination by the national-level TCPD and the Ashanti regional-level TCPD under the direction of the Regional Co-ordinating Council (RCC), the Ministry of Environment, Science, Technology & Innovation (MESTI), the Ministry of Local Government and Rural Development (MLGRD), and the National Development Planning Commission (NDPC). The study project has been monitored, guided and supported by organizing meetings of the technical and steering committees, whose members are representatives of national ministries, regional departments and local governments.

The study for formulating the Master Plan was initiated in January 2012 based on the agreement on the collective formulation of the Master Plan among Kumasi City and its adjoining six districts, namely Afigya-Kwabre District, Kwabre East District, Ejisu-Juaben Municipality, Bosomtwe District, Atwima-Kwanwoma District and Atwima-Nwabiagya District. Later, in early 2013, Asokore-Mampong Municipality was created out of the Kumasi Metropolitan area. Therefore, a total of seven MMDAs have been involved in the planning process and are covered by the Master Plan. These seven MMDAs compose the Greater Kumasi Sub-Region.

In the planning process for the Master Plan, six rounds of stakeholder consultative meetings (covering both regional and district levels) were conducted not only to collect various local information/knowledge and opinions, but also to present and discuss the concepts, proposals, spatial plans and projects being prepared in the course of formulating the Master Plan.

The Master Plan is comprehensive and integrated with respect to contents and characteristics. The items and sectors covered by the Master Plan are numerous and complicated. However, it is considered that the effective and timely implementation of the selected seven priority strategic programmes for urban and industrial development, as well as the ten priority infrastructure projects will initiate self-sustaining growth of the economic sectors and the transformation of the spatial structure of the Greater Kumasi Sub-Region in the medium and long terms.

Many of the proposed priority programmes and projects in the Master Plan are not new and have been discussed and planned for long time. The new aspect of the Master Plan is the emphasis on the linkage between revitalization of industries, transformation of the spatial structure and infrastructure development.

The social-economic and spatial development for the Greater Kumasi Sub-Region including the Greater Kumasi Conurbation is very important because of the large population and the potential for contribution to national economic development. It is worthwhile to mobilize public and private investment to revitalize the economic sector, develop infrastructure and transform the spatial structure. This revitalization will become possible through making a concerted effort towards spatial and socio-economic development in accordance with the Master Plan for Greater Kumasi.

PART I INTRODUCTION

Chapter 1 Introduction

1.1 Background

Kumasi is the capital city of Ashanti Region. Kumasi City (Kumasi Metropolitan Assembly, KMA) has a population of approximately 2.0 million. Kumasi has been a commercial centre of the regional economy. Kumasi also has been playing the role of the transport and logistics centre for international distribution networks covering the surrounding landlocked countries, such as Burkina Faso, Mali and Niger.

In recent years, the city environment has deteriorated resulting in extensive urban sprawl, lack of public services and extreme congestion in the city centre. These problems have arisen due to rapid population increase in Kumasi City and its suburban areas. As a result, the improvement of urban infrastructure, such as road networks, water supply and sewage systems and solid waste management, has become a pressing issue, which requires concerted actions of not only Kumasi but also its surrounding districts.

For sustainable development of a key centre of the economy, transport and logistics not only for Ashanti Region, but also for economic development of the nation, mid-term and long-term comprehensive and strategic development plans are required for Greater Kumasi Sub-Region. Furthermore, the formulation of land use plans and sector development plans in line with the sub-regional strategic plan are also necessary.

In Ghana, the Town and Country Planning Department (TCPD) has been working on establishment of a new Land Use & Planning Law, under which spatial plans and socio-economic development plans are to be formulated in an integrated manner. The new law and new spatial planning system is to replace the “Town & Country Planning Act”. Under the new spatial planning system, spatial plans (spatial development frameworks and structure plans) should be formulated at the national, regional, sub-regional and district levels.

Based on the background mentioned above, the Government of Ghana has submitted a request to Japan International Cooperation Agency (JICA) for provision of a technical assistance project for formulating a Comprehensive Urban Development Plan for Greater Kumasi, in accordance with the New Spatial Planning System, as well as TCPD’s capacity development concerning spatial planning.

1.2 Goals and Objective of the Project

The goals of the Project are as follows:

- The goal of the Project, which is to be attained during and after the Project, is to formulate a Comprehensive Urban Development Master Plan for Greater Kumasi.

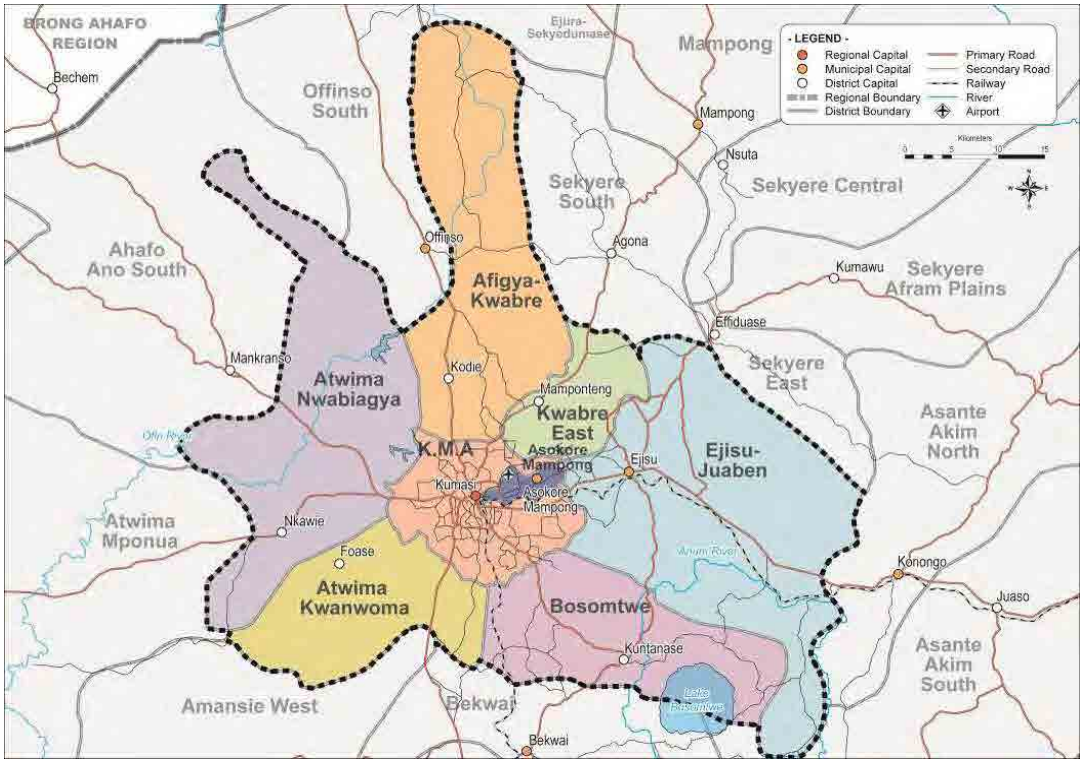
- The goal of the Project, which is to be attained by utilizing the proposed plan, is to contribute to the promotion of efficient and effective development of the Greater Kumasi Sub-Region.

By reviewing the discussions held with the Head Office of TCPD for determining the Scope of Work for this Study, the JICA Study Team defined the objectives of the Project as follows:

- To formulate a Sub-Regional Spatial Development Framework for the Greater Kumasi Sub-Region,
- To formulate a Sub-Regional Structure Plan to guide the development and/or redevelopment of the part of the Greater Kumasi Sub-Region[1], which is subject to urbanization from Kumasi City,
- To formulate implementation plan for the Sub-Regional Structure Plan, and
- To carry out relevant technology transfer to Ghanaian counterparts through the Study.

1.3 Study Area

The Study covers Kumasi Metropolitan Assembly and its surrounding 7 districts, namely Afigya-Kwabre District, Kwabre East District, Ejisu-Juaben Municipality, Asokore-Mampong Municipality, Bosomtwe District, Atwima-Kwanwoma District and Atwima-Nwabiagya District. These districts are defined as the Greater Kumasi Sub-Region. The total area is approximately 2,850 km^2.



Source: JICA Study Team

Figure 1.1 Study Area: Greater Kumasi Sub-Region

[1] According to the Technical Note signed between the TCPD and the JICA Study Team on August 16th, 2012, the planning area for the Structure Plan for KMA and its adjoining urbanizing areas within the Greater Kumasi Sub-Region is called "Greater Kumasi Conurbation."

1.4 Executive Agency and Implementing Agency

The Executive Agency for this Project is the Ministry of Environment, Science, Technology & Innovation (MESTI).

The Implementing Agency for this Project is the Town and Country Planning Department (TCPD) under the MESTI.

1.5 Phases of the Project and Reports

The planning process of this Project is composed of the following four phases:

- Phase 1: Analysis of Present Situation, Setting of Vision, Formulation of Basic Development Policies and Spatial Development Strategies,
- Phase 2: Formulation of a SDF for the Greater Kumasi Sub-Region, Formulation of a SP for the Greater Kumasi Sub-Region and Formulation of Infrastructure and Services Sector Plans for the Greater Kumasi Sub-Region,
- Phase 3: Formulation of a Comprehensive Urban Development Master Plan for the Greater Kumasi Sub-Region, including an Implementation Plan and a Capacity Development Programme, and
- Phase 4: Preparation of the Final Report.

1.6 Final Report

The Final Report is composed of the following documents and maps:

- Main Text Volume 1
- Main Text Volume 2
- Main Text Volume 3
- Summary Report
- GIS Atlas
- Supporting Document (only in the form of CD)
- 1:50,000 Topographic Maps and Present Land Use Maps
- 1:10,000 Topographic Maps and Present Land Use Maps

1.7 Organization of this Report (Summary Report)

This is the Summary Report, part of the Final Report mentioned above. This Summary Report is composed of the following nine parts:

- Part I: Introduction
- Part II: Present Situation of Ghana, Ashanti Region and Greater Kumasi Sub-Region
- Part III: Spatial Development Framework (SDF) for Ashanti Region
- Part IV: Spatial Development Framework (SDF) for Greater Kumasi Sub-Region
- Part V: Structure Plan (SP) for Greater Kumasi Conurbation
- Part VI: Infrastructure Sector Plans and Programmes for Greater Kumasi Sub-Region
- Part VII: Implementation Plan

- Part VIII: Capacity Development Programme for Spatial Development Planning and Implementation
- Part IX: SEA for SDF for Greater Kumasi Sub-Region and SP for Greater Kumasi Conurbation

Chapter 2 Planning Approach and New Spatial Planning System for Ghana

2.1 New Spatial Planning System for Ghana

2.1.1 National Development Planning System

The National Development Planning System of Ghana is based on a public administration that seeks to integrate the local government and central government at the regional and district levels. It seeks to decentralise but also to integrate the development planning process and its supporting budgetary system. It aims to provide adequate transfers of financial, human and other resources from central government to local authorities.

Four main laws provide the legal core of Ghana's planning system:

- The Civil Service Law, 1993 (sections 11 to 14);
- The Local Government Act, 1993 (Part II);
- The National Development Planning Commission Act, 1994; (sections 1, 2 and 9 to 15);
- The National Development Planning (Systems) Act, 1994

2.1.2 Current Spatial Planning System in Ghana

The requirement for Spatial Planning is provided for in the National Development Planning System and supported by the following legislation:

- The Local Government Act, 1993;
- The National Development Planning Commission Act, 1994;
- The National Development Planning (Systems) Act, 1994;
- The Town and Country Planning Ordinance, 1945 (CAP 84)

The National Development Planning System is an integrated planning approach involving the social, economic and spatial elements of the system. However the system of planning remains primarily based on the Town and Country Planning Ordinance of 1945 (CAP 84), which focuses on the preparation of 'Planning Schemes' or (which include detailed neighbourhood layouts, or 'Sector Plans').

2.1.3 New Spatial Planning System being Established

The New Spatial Planning System in Ghana was formulated within LUPMP (Land Use Planning and Management Project), which is a subcomponent of LAP (Land Administration Project). The content of New Spatial Planning System and the Draft Land Use and Spatial Planning Bill were prepared through this project. This Bill is currently waiting for approval at the parliament.

The proposed Spatial Planning System is a three-tier system, involving the preparation of Spatial Development Frameworks (SDFs), Structure Plans (SPs) and Local Plans (LPs).

The SDF provides a strategic vision (desired future) for the spatial development of the Nation,

a Sub-National entity, Region, Sub-Region or District. It is an indicative plan, showing expected development over a fifteen to twenty-year period. It will include the location of key components of a strategy which is aimed at achieving the desired development. It addresses the spatial development implications of settlement, housing, education, health care, economic development, employment, infrastructure services (waste, water, energy, etc.), tourism and leisure, transportation, communications, culture and the environment.

SP is a more detailed and accurate spatial plan which is used to guide the future development or redevelopment of all or part of a district, city or town for fifteen years. It defines all land uses, including residential, commercial, industrial and mixed use areas, major open space, agricultural areas and those requiring special treatment, such as areas of outstanding natural beauty, conservation areas and areas of historic or cultural importance, as well as areas for upgrading, regeneration and security. It also indicates the alignment and corridors of trunk and major transportation routes, trunk and major water, sewerage and power networks and other key features for managing the effects of development.

LP is an even more detailed plan in which individual plots can be identified. It proposes the disposition of land by function and purpose, or to be preserved in its present state, to meet the present and future identified community needs for ten or more years.

2.1.4 Sub-Regional Level Spatial Plans within the New Spatial Planning System

Not only in Kumasi, but also in Accra and Sekondi-Takoradi, the urban agglomerations are expanding beyond their cities' boundaries and occupying important parts of the regions. Administratively, those parts of the regions are called sub-regions, which are composed of several districts. In Ghana, those sub-regions have been very important places not only for urban development, but also places for national economic development. Therefore, major infrastructure for promoting economic development for these sub-regional urban agglomerations requires substantial allocation from central government's sector budgets, as well as donors' financial assistance.

Sub-Regional SDFs must be in compliance with the parameters established in the National Development Plan and its spatial realisation, the National SDF in the proposed Spatial Planning System. Sub-Regional SDFs, which are prepared by the Regional Spatial Planning Committee in coordination with District Physical Planning Departments and District EPOs, are approved by the RCC and affected Assemblies, and are duly signed by the Regional Minister.

Compared to these, Sub-Regional SPs are not definitively provided in the proposed Spatial Planning System, while SPs are supposed to be formulated for each district, part of a district or multiple districts.

The following roles are expected for Sub-Regional SDFs and SPs.

- Major urban functions are spatially arranged at the Sub-Regional level.
- Sub-Regional level infrastructures (relatively large-scale infrastructures) are planned.

- Important urban facilities at the Sub-Regional level are spatially arranged.
- Sub-Regional level land use plans are indicative to guide District level land use plans.

2.1.5 Proposed Official Position of Sub-Regional Level Structure Plans in relation with the New Spatial Planning System

Although Sub-Regional Spatial Development Frameworks (SDFs) are somehow situated within the New Spatial Planning System delineated by the Draft Law on Land Use and Spatial Planning, Sub-Regional Level Structure Plans (SPs) are not legally positioned in the prospective New Spatial Planning System.

In the New Spatial Planning System, Structure Plans (SPs) are prepared and approved only by district assemblies. District-Level Structure Plans have statutory documents and plan maps, with which development and building permits are issued in compliance. Under the current decentralization policy and the prospective Land Use and Spatial Planning Law, district assemblies have decentralized planning and law enforcement authorities.

While the importance of Sub-Regional Spatial Plans such as SDFs and SPs is clearly understood in the previous section, Such the meaning of formulating Sub-Regional SPs is not compatible with the district responsibility and power given by the decentralization policy and the decentralized planning system (both socio-economic and spatial), if district-level SDFs and SPs must comply the contents specified by Sub-Regional SPs.

If the function and authority of Sub-Regional SPs and District-Level SPs are rigorously considered and performed, these two-levels of SPs could have potential conflicts. In order to avoid such conflicts between the Sub-Regional SPs and District-Level SPs, it is necessary to prepare administrative or legal instruments. In this section, four alternatives are proposed and analysed in their utility.

1) Method 1: For the TCPD, to revised the draft law for Land Use and Spatial Planning before official approval

2) Method 2: For the TCPD, to prepare a separate law to oblige the government to formulate Sub-Regional SPs for large conurbations consisting of more than two districts, as a technical reference for the formulation of District-Level SDFs and SPs

3) Method 3: For the TCPD, to issue a Legal Instrument for the prospective Land Use and Spatial Planning Law, on Sub-Regional Structure Plans for large conurbations consisting of more than two districts

4) Method 4: For Ashanti RCC and concerned district assemblies, to officially approve the Sub-Regional SDF-SP for Greater Kumasi

2.2 Planning Approach

2.2.1 Formulation of a Sub-Regional Development Master Plan seeking Economic Development, Social Development and Environmental Conservation

A master plan for development of Greater Kumasi Sub-Region was formulated seeking the following three aspects:

- Economic Development,
- Social Development & Poverty Reduction, and
- Environmental Conservation & Disaster Management.

A "Comprehensive Urban Development Master Plan" is a spatial development plan combined with infrastructure and services development plans, with clear orientation to socio-economic development and paying attention to environmental conservation & disaster management. In this sense, the master plan would be a tool for making an effort at integrated development for Greater Kumasi Sub-Region covering these three aspects.

2.2.2 Formulation of Sub-Regional Spatial Development Framework (SDF) and Structure Plan (SP) within the New Spatial Planning System of Ghana

(1) Two Types of Spatial Plans

In accordance with the new spatial planning system prepared for Ghana, the following two spatial plans for Greater Kumasi Sub-Region were formulated.

- Spatial Development Framework (SDF) for Greater Kumasi Sub-Region
- Structure Plan (SP) for Greater Kumasi Conurbation

The SDF is the spatial strategy for achieving defined social, economic and environmental objectives and policies. The SDF is an indicative plan showing expected development in the next twenty years. The Structure Plan (SP) for Greater Kumasi Conurbation is a kind of land use plans which is combined with infrastructure sector plans.

(2) Planning Areas for SDF and Structure Plan

According to the Technical Note signed between TCPD and the JICA Study Team on August 16th, 2012, the planning areas for the Sub-Regional SDF and the Structure Plan at the Sub-Regional level have been determined as follows:

- The Sub-Regional SDF to be formulated in the Project shall cover the whole area of the Greater Kumasi Sub-Region.
- The Structure Plan at the Sub-Regional level to be formulated in the Project shall cover "the area to be contiguously urbanized by the target year" as stated in the M/M signed on 16th December 2010. This area shall be defined by the Sub-Regional SDF. This "area to be contiguously urbanized by the target year" is called the "Greater Kumasi Conurbation".

(3) Target Years for SDF and SP

In the same way, the target years for SDF and Structure Plan to be formulated in this Project have been extended as follows:

> "The target year for the SDF and Structure Plan to be formulated in this Project is 2025 (13 years from 2012) in the Minutes of Meeting signed on 16th December 2010. However, in accordance with the draft law for the New Spatial Planning System, the planning periods for the SDF and Structure Plan are 20 years and 15 years respectively. Therefore the target year for the SDF and Structure Plan in the Greater Kumasi Sub-Region should be 2033 (20 years from 2013) and 2028 (15years from 2013) respectively in this Project. In addition, the phases for spatial development planning are set for 1) 2013-2018, 2) 2018-2023, 3) 2023-2028, and 4) 2028-2033."

2.2.3 Planning Process based on Stakeholder Consultation

Stakeholder coordination and participation is required in the process of spatial development planning, involving a variety of stakeholders, consisting not only of government agencies but also of representatives of civil society and private sectors, including Community-Based Organizations and NGOs and business associations. Otherwise conflicts of different interest groups would emerge so that viability of formulated spatial development plans would become low.

Under the Draft Land Use and Spatial Planning Bill, all plans should be prepared with the participation of the general public and key stakeholders. This unquestionably indicates that the new spatial planning system of Ghana considers having adequate stakeholder consultation to be mandatory.

Series of official meetings for the Steering Committee and Technical Committee which could partly secure stakeholders' coordination were organized during the planning process.

It is also necessary for a variety of people who represent different sectors of people, as well as government agencies, to participate, express their views and contribute in the process of spatial planning by organizing more open stakeholder meetings. For this purpose, proceeding of five stakeholder meetings was planned in the course of the Planning Study.

For promoting stakeholder participation, the JICA Study Team supported the TCPD and Ashanti RCC to publicize the spatial planning activities for Greater Kumasi Sub-Region by relevant methods.

PART II PRESENT SITUATION OF GHANA, ASHANTI REGION AND GREATER KUMASI SUB-REGION

Chapter 3 Present Situation of Ghana, Ashanti Region and Greater Kumasi Sub-Region

3.1 Past Development Trend and Current Development Policies of Ghana

(1) Past Economic Development of Ghana

After the external debt crisis in the late 1990s, Ghanaian economy has recovered steadily. After 2005, Ghana's GDP grew at over 6 % due to the favourable prices of cacao and gold.

As a whole, the share of the service sector (including commercial activities) in GDP has been in an increasing trend, while that of agriculture (including forestry and fishing) in a decreasing trend. The share of the industrial sector (including mining, manufacturing, electricity & water, and construction) fluctuated in the past but it has been in a decreasing trend in recent years.

(2) Poor Performance of Manufacturing Sectors of Ghana

In general the manufacturing industries of Ghana have been weak. The recent rapid contraction in the manufacturing sectors was mainly due to the energy crisis Ghana suffered. Other factors for declining performance of the manufacturing sectors is attributed partly to the massive influx of cheap imported goods, unstable supply and low quality of raw materials and high costs of credit.

Table 3.1 GDP at 2006 Price by Economic Activity of Ghana

	2007		2008		2009		2010		2011 estimates	
	million GHC	%	million GHC	%	million GHC	%	million GHC	%	million GHC	%
Agriculture	5,322	28.6	5,716	28.1	6,129	28.5	6,453	27.8	6,507	24.7
Crops	3,743	20.1	4,064	20.0	4,479	20.8	4,703	20.3	4,878	18.5
o.w. Cocoa	493	2.6	509	2.5	535	2.5	677	2.9	771	2.9
Livestock	458	2.5	481	2.4	502	2.3	526	2.3	552	2.1
Forestry & logging	706	3.8	682	3.4	687	3.2	757	3.3	651	2.5
Fishing	416	2.2	488	2.4	460	2.1	467	2.0	427	1.6
Industry	3,930	21.1	4,522	22.2	4,725	22.0	5,053	21.8	7,132	27.1
Mining & quarring	532	2.9	544	2.7	581	2.7	690	3.0	2,116	8.0
o.w. Crude oil	0	0.0	0	0.0	0	0.0	65	0.3	1,372	5.2
Manufacturing	1,801	9.7	1,868	9.2	1,844	8.6	1,984	8.5	2,242	8.5
Electricity	118	0.6	141	0.7	152	0.7	170	0.7	169	0.6
Water & sewerage	227	1.2	229	1.1	246	1.1	259	1.1	267	1.0
Construction	1,252	6.7	1,739	8.5	1,902	8.8	1,949	8.4	2,339	8.9
Services	9,358	50.3	10,106	49.7	10,667	49.6	11,714	50.4	12,689	48.2
Trade, repair of vehicles, household goods	1,203	6.5	1,317	6.5	1,388	6.4	1,573	6.8	1,854	7.0
Hotels & restaurants	917	4.9	1,000	4.9	962	4.5	988	4.3	1,023	3.9
Transport & storage	2,573	13.8	2,672	13.1	2,790	13.0	3,014	13.0	3,114	11.8
Information & communication	503	2.7	601	3.0	624	2.9	777	3.3	909	3.5
Financial intermediation	560	3.0	620	3.0	678	3.2	791	3.4	799	3.0
Business, real estates & other services	944	5.1	943	4.6	945	4.4	1,076	4.6	1,227	4.7
Public administration & defence; social security	960	5.2	1,082	5.3	1,208	5.6	1,249	5.4	1,341	5.1
Education	720	3.9	814	4.0	915	4.3	963	4.1	1,000	3.8
Health & social work	259	1.4	271	1.3	312	1.4	347	1.5	364	1.4
Other community, social & personal services	720	3.9	786	3.9	845	3.9	936	4.0	1,057	4.0
GDP at basic prices	18,610	100.0	20,344	100.0	21,521	100.0	23,220	100.0	26,328	100.0
Net indirect taxes	1,303		1,248		934		1,032		1,414	
GDP in purchasers' value	19,913		21,592		22,454		24,252		27,742	

Source: Ghana Statistical Service, 2012

(3) Agricultural Sector of Ghana

Agriculture is an important economic sector for Ghana, contributing 28 percent of Ghana's GDP and employing 51 percent of the country's labour force including forestry in 2008. Since the late 1990s, the Ghanaian Government has taken a policy to diversify the agricultural sector to reduce dependency on the exports of traditional commodities such as cocoa and timber. Although the country is still heavily dependent on import for rice and wheat, the Government's efforts to increase cereal production and develop non-traditional exports have resulted in diversified cropping systems, leading to achievement of high growth rates in both food crops (cassava, yam, plantain, maize, and rice) and cash crops (cocoa beans, oranges, groundnuts, tomatoes, chillies and peppers, bananas and cashew nuts).

Agricultural production in Ghana is dominated by small-scale farming, with 90 percent of total cultivated land being held by landholders of less than two hectares. The country's fragmented production and processing systems are a major constraint to cash crops in achieving price competitiveness on international markets. The small-holding agricultural system in Ghana needs to overcome its disadvantages in technologies and economies of scale in order to compete with large-scale plantations in foreign countries.

Ghanaian cocoa has successfully developed and maintained an advantageous position on the international market due to its well-established cultivation and post-harvest technologies.

On the other hand, exporting product such as pineapple, cashew nut and orange are struggling with the great change in the export amount.

(4) Oil and Gas in Ghana

In Ghana, oil and gas was discovered recently. Now the reserves, supply and consumption of oil of Ghana rank 41st (not including US), 55th, and 93rd respectively in the world. The crude oil proved reserves jumped to 0.66 billion barrels in 2011 as they are being explored.

Taking advantage of the expected increase of revenues from oil and gas development, the government of Ghana is interested in embarking on downstream industries related to oil and gas, and utilizing revenues and increased borrowing capacity for investing in infrastructure development for supporting industrial development and modernizing agricultural sectors.

Table 3.2 Oil and Gas in Ghana

	2007	2008	2009	2010	2011	2011 Ranking
Crude Oil Proved Reserves (Billion Barrels)	0.02	0.02	0.02	0.02	0.66	41 not including US
Total Oil Supply (Thousand Barrels per Day)	7.69	7.69	7.69	8.88	74.27	55
Total Petroleum Consumption (Thousand Barrels per Day)	47.66	44.37	47.00	60.00	64.00	93
Proved Reserves of Natural Gas (Trillion Cubic Feet)	0.80	0.80	0.80	0.80	0.80	71 not including US
Dry Natural Gas Production (Billion Cubic Feet)	0.00	0.00	0.00	0.00	0.00	
Dry Natural Gas Consumption (Billion Cubic Feet)	0.00	0.00	0.00	0.00	4.24	

Source: U. S. Energy Information Administration (EIA) International Energy Statistics

(5) Long-Term National Vision 2020

In 1995, long-term national development policies for 2020 were presented in Ghana – Vision 2020 by NDPC (National Development Planning Commission). The long-term vision for Ghana is aimed to have GDP per capita of USD 3,000 and to become a middle-income

country by the year. 2020. In the production side, the share of industry in GDP was expected to increase from 16% to 37% with an average annual growth rate in output of over 12%.

(6) Ghana Shared Growth and Development Agenda (GSGDA): National Policy Framework

The latest policy paper formulated with accordance with Ghana – Vision 2020, Ghana Shared Growth and Development Agenda (GSGDA) (2010-2013) was presented by the President to the parliament in December 2010.

The paper presents a per capita GDP target of US$3,000. The paper also emphasizes that special efforts should be made to ensure a shift from the current economy dependent on the export of mineral resources and agricultural commodities to a more modernized, diversified and efficiency-based economy – industry-based economy.

(7) Spatial Development Policies of Ghana

For many years, Ghana has suffered geographical disparities of development between the northern part and the southern part of the country. However, no substantial geographically-oriented or spatially-oriented policies or programmes had been formulated or implemented.

In contrast to the past government the current government's national development policies and programmes are different in their focus on spatial orientation in development. In addition to the National Urban Policy (NUP) and Savannah Accelerated Development Programme, the following four area-based development initiatives/programmes, were announced.

- Western Corridor Development Initiative
- Eastern Corridor Development Initiative
- Capital City Development Initiative
- Forest Belt Development Initiative

Out of the four Development Initiatives, Western Corridor Development Initiative is in the spotlight with the oil and gas development. The projects are to be financed by the China Development Bank Corporation (CDB) in agreement with the Ghana government.

The NUP discusses about several issues in the urban area from various perspectives and outlines objection policies. It especially focuses on the growth management of cities such as Greater Accra Metropolitan Area and Greater Kumasi Sub-Region, and promotion of new growth points in the small-medium scale cities.

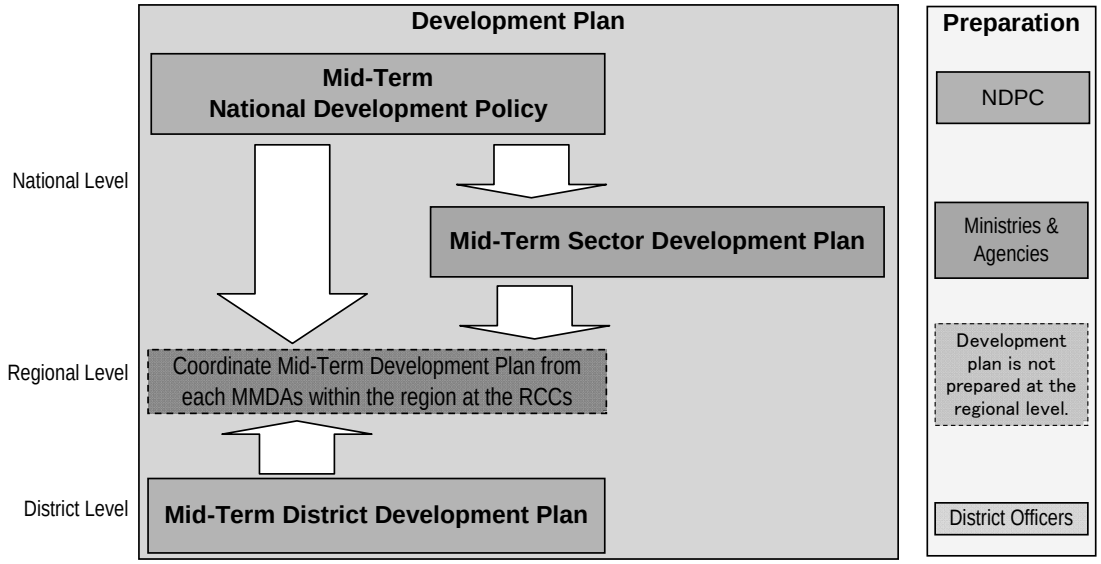
(8) Institutional Aspects of Development of Ghana

The administration system of government of Ghana consists of four level structures: national, regional, district and sub-district levels. Ministries at the national level undertake policy planning, monitoring and evaluation of policies and programmes. There are 10 regions in Ghana and each region has Regional Coordinating Councils (RCC). RCCs coordinate policy implementation among districts, but they do not implement any development projects.

At the district level, there are three types of districts according to population size: districts, municipalities and metropolises. Each of them has an assembly and they are preliminarily

responsible for policy implementation in Ghana. Minimum populations of districts, municipalities, and metropolises are 75,000, 95,000, and 250,000 respectively.

The national budget for the fiscal year 2012 marked a significant development in the introduction of the composite budget, for the purpose of strengthening of the fiscal decentralization process. The budgets of certain departments are being placed in the budgets of the district (composite budget) and accordingly the affiliation of officials in over 12 departments, including Town and Country Planning Department (TCPD) is being transferred to local governments.



Source: JICA Study Team

Figure 3.1 Hierarchy of Development Plan in Ghana

(9) Environmental Management Systems Related to Spatial Development Planning

The following are the environmental policies related to spatial development planning in Ghana.

- Based on the International Union of Conservation of Nature in Ghana, the classification of protected areas in Ghana contains Forest Reserve, Wildlife Reserve and Ramsar Site.
- The Planning Standards and Zoning Regulations which has been prepared under LUPMP determines the permitted and not permitted developments for public open space, conservation zone, protected coastal / water front zone. See Chapter 10 for detail.
- Under the leadership of EPA (Environmental Protection Agency) the government of Ghana started to pay serious attention to the institutionalisation and mainstreaming of sustainable development principles into the processes of public policy and development plan making, by demanding the mandatory use of Strategic Environmental Assessment (SEA). This is clearly stated in the Ghana Shared Growth and Development Agenda (GSGDA). See Chapter 26 for detail.

3.2 Present Characteristics of Ashanti Region

(1) Key Characteristics

Between 1975 and 2000, agricultural lands expanded largely in terms of land area. However, after 2000, it is said that many rural people left their agricultural lands and migrated to urban areas. The regional agricultural has been stagnant, many agricultural lands has been deteriorated, created a lot of out-migrants, in Ashanti Region's rural areas in general and especially in the north-eastern Savannah area of Ashanti Region.

In fact, between 2000 and 2010, the population increase rates decreased to less than 1 % per annum in rural areas of Ashanti Region (outside Greater Kumasi Sub-Region within Ashanti Region). This suggests that net outmigration from rural areas to urban areas largely took place in Ashanti Region.

Despite the huge number of outmigration from the rural areas the production of citrus and other fruits increased in response to expanding urban markets. Part of the produced citrus is processed into juice and exported. However the forest depletion due to farm land expansion could cause the decrease of volume of timber production. As a result, the production of timber processing industries in and around Kumasi City has been decreased and faced with a collapse of the timber processing industries.

In the rural areas of Ashanti Region, a substantial number of workers are also engaged in the industrial sector, including textiles, wood carving, black smith.

As a result, although Kumasi, the second largest city of Ghana is located in Ashanti Region, the ratio of economically active population (EAP) who are working in the formal private sector is limited compared with Greater Accra Region which has Greater Accra, the capital city of Ghana. The figures are rather similar with that of Ghana, which demonstrates that Ashanti Region is a region with a huge population working in the informal sector.

Table 3.3 Ratio of EAP by Employment Sector (15 years old and above)

Region	Public Sector	Private Sector (Formal)	Private Sector (Informal)	Others	Total
Ashanti	6.6%	7.1%	85.6%	0.7%	100.0%
Greater Accra	8.0%	17.4%	73.2%	1.4%	100.0%
Ghana	6.3%	7.0%	86.1%	0.7%	100.0%

Source: GSS, 2010 Population and Housing Census

In Ashanti Region, there are several urban centres, such as Obuasi, Konongo, and Offinso Municipalities, where public service facilities (health and education) are relatively well equipped. As a result, these urban centres could play important roles of regional centres serving to surrounding rural areas.

(2) SWOT Analysis for Ashanti Region

Major concerns and issues are analyzed by looking at strength (S) and weakness (W) of Ashanti Region from internal factors and at opportunities (O) and threats (T) from external factors (Method of SWOT analysis).

Internal Factors of Strength (S) are found in the following aspects:

- Ashanti Region's mainstay is agriculture based on its good soils and rainfall. Ashanti Region is also endowed with a good number of working populations in rural areas.
- Ashanti Region is centrally located in the territory of Ghana. It occupies an advantageous and central location for logistics bases serving not only inland regions of Ghana, but also inland neighbouring countries.
- There are many urban centres (metropolitan, municipality and district capitals, and small towns) in Ashanti Region. These centres are functional as distribution centres of agricultural products and chemical inputs, as well as providers of public services including health and education.
- Ashanti Region's capital, Kumasi is the central city of the region, with the second largest population of over 2 million in 2010. Kumasi and its surrounding districts form a sub-region, namely the Greater Kumasi Sub-Region. The rapidly urbanizing Greater Kumasi Sub-Region reached a population of 2.8 million in 2010. This is a huge accumulation of urban consumption capacity.
- Kumasi City and its surrounding suburban areas have certain manufacturing bases including timber processing and agro-processing, as well as auto-repairing services and semi-manufacturing. Such manufacturing tradition and human resources could be a potential base for further development.

Internal Factors of Weakness (W) are found in the following aspects:

- Trunk roads have been relatively well developed in Ashanti Region. However, the improvement of local roads and access roads to farm lands has been far behind the needs, in respect of supporting agricultural production and marketing.
- In part of Kumasi and its surrounding areas, electricity supply is not stable. In rural areas and some district capitals of Ashanti Region, the situation of electricity and telecommunication is not good.
- The majority of farmers are small farmers with 1.2 ha of land under cultivation. Mostly, they depend on rainfall for their agricultural production. They usually do not use chemical inputs. Even under strong government initiatives, it might be difficult to modernize existing small agriculture to be more productive.
- The arable land of Ashanti Region is only 60 %, and 80% of that is already cultivated. This suggests that most of the existing lands are utilized somehow for agriculture. Therefore, it might be difficult to attract foreign and domestic capital to modernization and scale-up agriculture. It is necessary to create and implement special measures for agricultural investors to allow easier access to large-scale lands.

External Factors: Opportunities (O) are found in the following aspects:

- The current Ghanaian government has adopted a set of development policies for economic transformation including industrial development in integration with agriculture and natural resources exploitation. Within Ashanti Region, it is possible to pursue both agricultural modernization and agro-based industrial development in a closely integrated manner.
- Currently, the Ghanaian government has promoted enhancement of capacity for cacao processing within the country. Ashanti Region is one of the leading cacao producing

regions. Moreover, Kumasi has a cacao processing capacity. It is highly possible for Ashanti Region and Kumasi City to promote both cacao production modernization and cacao processing in an integrated fashion.

- The possibility of utilizing government revenues from oil and gas production in the areas off-shore of the Western Region is becoming high, leading to higher possibility to re-invest those revenues in necessary infrastructures for supporting development in various regions. One of such regional development initiatives is the Forest Belt Development.

External Factors of Threat (T) are found in the following aspects:

- For many years under the past national policies, agricultural modernization had not been widely achieved. Although the current government has given a higher priority to agricultural modernization, it might be difficult to actually implement those measures and to realize the intended objectives.
- For many years under the past national policies, industrial development had not been widely promoted or achieved. Although the current government has given a higher priority to industrial development in integration with agricultural modernization, it might be difficult to realize the intended results.
- Based on the oil and gas exploitation and their down-stream industries, the Western Region might be able to develop its economic infrastructures and manufacturing bases, so as to further develop the Sekondi-Takoradi Sub-Region. This situation might exacerbate risks of Greater Kumasi's decline in economic power for attracting public and private investments compared to Sekondi-Takoradi.

Table 3.4 SWOT Cross Analysis for Ashanti Region

	Opportunity	**Threat**
	• A set of development policies for economic transformation including industrial development in integration with agriculture and natural resources exploitation has been adopted by the current Ghanaian government. • The possibility of utilizing government revenues from oil and gas production in the areas off-shore of the Western Region is becoming high, leading to higher possibility to re-invest those revenues in necessary infrastructures for supporting development in various regions.	• Agricultural modernization and industrial development had not been widely achieved under the past national policies. • Based on the oil and gas exploitation and their down-stream industries, Western Region might develop its economic infrastructures and manufacturing bases to develop Sekondi-Takoradi Sub-Region. This situation can exacerbate risks of Greater Kumasi's decline in economic power for attracting public and private investments.

Strength	• Ashanti Region has good soils and rainfall for agriculture and is also endowed with a good number of working populations in rural areas. • Location of Ashanti Region occupies an advantageous and central location for logistics bases serving not only inland regions of Ghana, but also inland neighbouring countries. • Many urban centres functional as distribution centres of agricultural products and chemical inputs, as well as providers of public services including health and education exists. • Greater Kumasi Sub-Region reached a population of 2.8 million in 2010 which is a huge accumulation of urban consumption capacity. • Kumasi City and its surrounding suburban areas have certain manufacturing bases including timber processing and agro-processing, as well as auto-repairing services and semi-manufacturing.	• By taking advantage of this strength and external threats, it is possible to promote modern agricultural development including that of cocoa production and integrated development of agriculture and industry (agro-processing).	• For utilizing this strength under the identified external threat, it is necessary to upgrade urban functions and to implement measures for attracting investments to agro-processing industry.
Weakness	• The improvement of local roads and access roads to farm lands has been far behind the needs, in respect of supporting agricultural production and marketing. • In part of Kumasi and its surrounding areas, electricity supply is not stable. In rural areas and some district capitals, the situation of electricity and telecommunication is not good. • The majority of farmers are small farmers with 1.2 ha of land under cultivation. Even under strong government initiatives, it might be difficult to modernize existing small agriculture to be more productive. • The arable land of Ashanti Region is only 60 %, and 80% of that is already cultivated. Therefore, it might be difficult to attract foreign and domestic capital to modernization and scale-up agriculture.	• For utilizing identified external opportunities and preparing against the identified weakness, it is necessary to develop infrastructures in rural areas, such as roads between urban centres and rural areas and electricity in district centres and rural areas. • It is necessary to implement special measures to ensure accessibility to agricultural lands by investors for attracting investments to commercial agriculture and for increasing production for agro-processing industry.	• For preparing against this weakness under the identified external threat, it is necessary to implement measures to develop small-scale agriculture to supply agricultural produce to outside Ashanti Region.

Source: JICA Study Team

3.3 Present Characteristics of Greater Kumasi Sub-Region

(1) Natural Environment of Greater Kumasi Sub-Region

Ashanti Region, in which Greater Kumasi Sub-Region is located, is endowed with fertile soils and annual rainfall of 1,600-1,700mm. There are two rainy seasons. One is the months of May-July and the other is those of September-November. These natural conditions are suitable for agriculture. On the other hand, Ashanti Region is rich in sands and rocks, which

can be used for construction material.

Greater Kumasi Sub-Region is located in upper stream of the basin of the Pra River. Moreover, the Offin River, Oda River and Anunu River run in the Greater Kumasi Sub-Region. Bosomtwe Lake, natural lake, is also located in Greater Kumasi Sub-Region.

The environment of Greater Kumasi Sub-Region has suffered from threats due to rapidly increased population and economic activities. Especially the concentrated car repairing workshops in Suame Magazine, spreading sand mining outside Kumasi City and illegal garbage dumping in rivers are increased threats to the environment in Greater Kumasi Sub-Region.

(2) Socio- Economy of Greater Kumasi Sub-Region

Major economic sectors of Kumasi City are service sectors including car repairing in Suame Magazine and commerce in the Central Market. On the other hand, in surrounding districts of Kumasi City, a shift has been taking place from the primary industry (mostly agriculture) to the tertiary industry (mostly commerce and services).

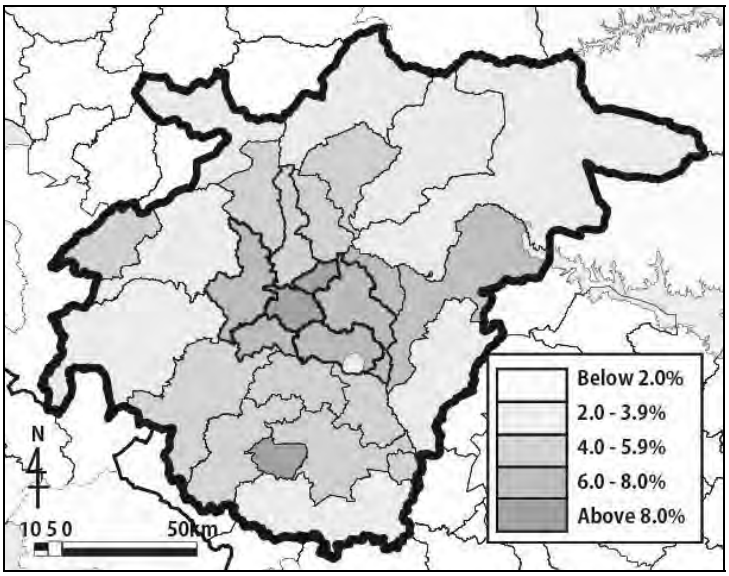
The unemployment rates of Kumasi City and Kwabre-East District are over 8%, which are higher than other districts of Ashanti Region. The percentages of EAP working in informal sectors in Greater Kumasi Sub-Region are relatively lower than those districts outside Greater Kumasi Sub-Region. On the other hand, the unemployment rates of Greater Kumasi Sub-Region are relatively higher than those districts outside Greater Kumasi Sub-Region.

Table 3.5 Percentage of Economic Active Population out of the Total Population

	Public Sector	Formal Private Sector	Informal Private Sector	Others	Total
KMA	8.9%	24.6%	63.3%	3.2%	100.0%
Urban Areas outside KMA within Greater Kumasi Sub-Region*	7.4%	17.2%	73.2%	2.2%	100.0%
Rural Areas outside KMA within Greater Kumasi Sub-Region*	4.0%	13.6%	80.8%	1.7%	100.0%
Total outside KMA within Greater Kumasi Sub-Region	4.8%	14.5%	78.9%	1.8%	100.0%
Greater Kumasi Sub-Region*	7.2%	20.5%	69.6%	2.6%	100.0%
Outside Greater Kumasi Sub-Region*	5.2%	11.7%	79.8%	3.4%	100.0%
Ashanti Region	6.3%	16.5%	74.2%	3.0%	100.0%

Source: 2000 Population and Housing Census

* Atwima District、Bosomtwe-Kwanwoma District、Ejisu-Juaben District、Kwabre District、Afigya-Sekyere District in accordance with the administrative units in 2000



Source: 2010 Population and Housing Census and Census Atlas

Figure 3.2 Unemployment Rates by District in Ashanti Region (over 15 years old)

(3) Existing Development Projects for Greater Kumasi Sub-Region

Existing Development Projects for the Transport Sector

A transport planning study for Greater Kumasi Sub-Region is being conducted by the assistance of the WB. The 2005 Urban Transport Planning and Management Study for Kumasi which was assisted by AFD was reviewed and the following was recommended:

- Construction/Widening of 19 roads
- Optimization of Signals of 5 Junctions
- Upgrading of Small Paratransit Vehicles into Large Bus Vehicles (Type B Transit Routes)
- Development of 5 BRT routes

The construction/widening of 19 roads include the construction of new Outer Ring Road by 2021. The development of five BRT routes are to be implemented in the following five roads: Mampong Road; Offinso Road; Sunyani Road; Bekwai Road; Accra Road.

Existing Development Projects for the Water Resources and Water Supply Sector

Ghana Water Limited Company (GWLC) is conducting the Kumasi Water Supply Project funded by the ORET Program (Development Relevant Export Transactions Program), which is a program of the Dutch Government to support Dutch Export. The project consists of the rehabilitation of the water treatment plant and technical assistant. Once the rehabilitation of the existing facilities is completed the capacity of the WTP will be 232,000 m^3/d, thus the total capacity of WTPs is now 123,500 m^3/d (110,000 m^3/d + 13,500 m^3/d). The technical assistance includes (i) network modeling and asset management, (ii) strategic master planning, (iii) reduction of unaccounted for water, and (iv) training. It is currently assumed that the percentage of Non Revenue Water (NRW) is to be approximately 40%, which is very high.

Existing Development Project for the Liquid Waste Sector

The Strategic Sanitation Plan for Kumasi (SSP-Kumasi, 1999) recommended that area of 300

– 600 person/ha should implement simplified sewerage system, area of 20 – 50 person/ha should have household latrines and in other areas household latrines or septic tanks.

According to the UNICEF / WHO Joint Monitoring Programme on sanitation, public shared toilets (and home toilet facilities shared by more than one household) are not considered as improved sanitation. This means increasing the number of public toilets does not contribute to the MDG7 Target[2]. However although MMDAs shall ensure the availability of facilities for the liquid waste, it seems that districts and municipality have been facing difficulty in the implementation process.

Existing Development Project for the Solid Waste Management Sector

The KMA-WMD has an engineered sanitary landfill facility at Oti commissioned in 2004 under the Urban Environment Sanitation Project financed by the WB. Oti Sanitary Landfill Site has future development plan under the Ghana Urban Management Pilot Project (GUMPP) financed by AFD. It is projected that the total capacity of Oti Sanitary Landfill Site will last until 2028 after all development is complete.

Existing Development Project for the Drainage Sector

As a part of the responsibility of KMA for planning and implementing drain maintenance, KMA is planning to establish a Drain Maintenance Unit (DMU) in its WMD.

Existing Development Project for the Electricity Supply Sector

Bui Dam is under construction to increase the installed generation capacity in Ghana by 22%. Once the project is complete in 2013, it is assumed that Ghana will contribute to alleviate power shortages common in the whole of Ghana.

Existing Development Project for Health Sector

Current health sector development projects are mostly formulated to achieve the Millennium Development Goals (MDGs).

Existing Development Project for Education Sector

The Basic Education Sector Improvement Program was designed to support the government's policy of "Free Compulsory Universal Basic Education" financed as a loan project by the WB. As for the secondary and tertiary education project has been formulated in response to the determination of the Government of Ghana to provide relevant education to all Ghanaians at all levels, thus facilitating poverty reduction and promoting socio-economic growth and national development.

(4) Key Characteristics

The key characteristics of Greater Kumasi Sub-Region are as follows:

- National Roads and Inter-Regional Roads are coming through Kumasi City (KMA), connecting Kumasi with major cities and regions in Ghana.

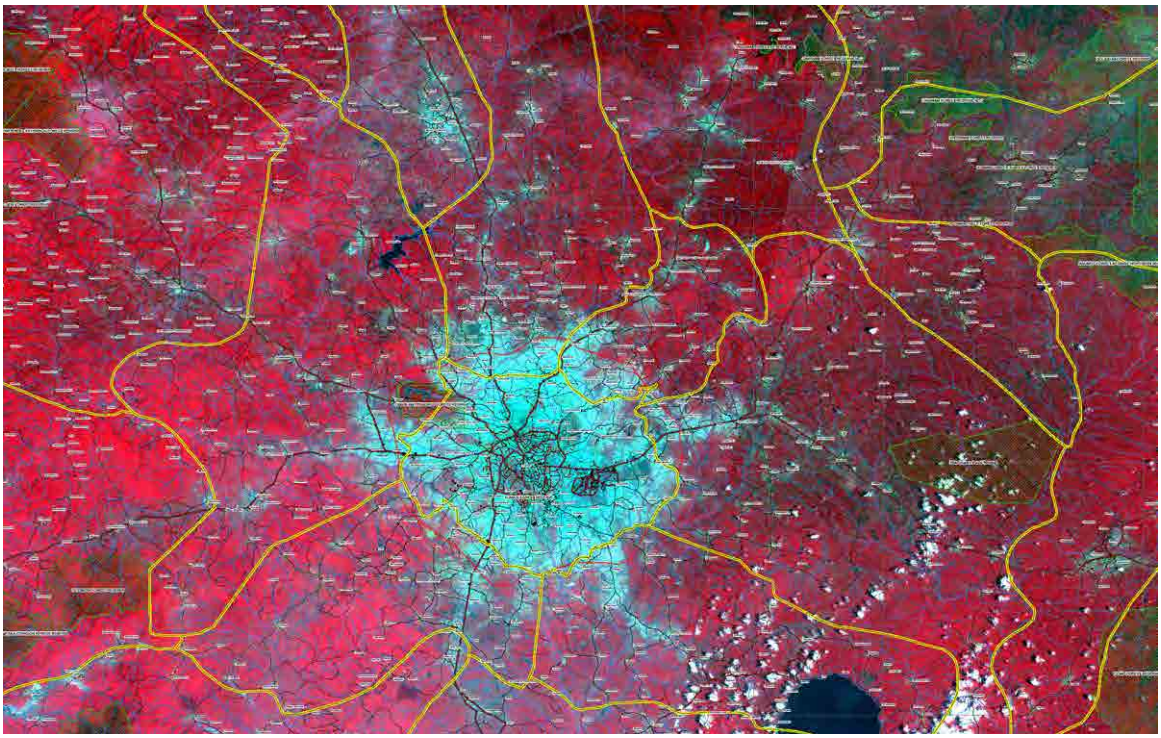
[2] The United Nations (UN) Millennium Development Goals (MDGs) launched in 2000, presents a minimum set of targets for achieving poverty reduction and sustainable development. The Government of Ghana is committed to the principles of the MDGs and with respect to MDG 7, which seeks to ensure environmental sustainability, will work towards improving access to safe water supply and sanitation to reduce the proportion of population without access to basic water supply and sanitation by 50% by 2015 and 75% by 2025.

- Because of the geographical central location, Kumasi City plays a significant role of the gateway between Northern Part and Southern Part in Ghana.
- Population and economic activities are concentrated in KMA. Over 50% of Ashanti Region's population is found in KMA.
- Poverty pockets or slum communities have been formed in KMA. In those areas, their population densities are very high.
- KMA showed very high population growth rates over 5.6% annum continuously from 1984 via 2000 and further to 2010.
- In adjoining districts to KMA, from 1984 to 2000, suburbanization took place widely, causing annual population increase as a rate of 4.1%. However, their speed of population increase dropped to 2.1% per annum between 2000-2010.

Table 3.6 Population of Greater Kumasi Sub-Region and Ashanti Region, 1984, 2000 and 2010

	Population			Annual Population Growth Rate (%)		Area (km^2)	Population Density (persons/km^2)		Population Increase (persons)		% of Population Increase of Ghana
	1984	2000	2010	1984-2000	2000-2010		2000	2010	1984-2000	2000-2010	2000-2010
KMA	487,504 *1	1,170,270 *3	2,035,064 *5	5.63%	5.69%	254	4,607	8,012	682,766	864,794	15.0%
Afigya-Kwabre	39,971 *2	89,358 *4	136,140 *5	5.16%	4.30%	517 *6	173	263	49,387	46,782	
Kwabre East	42,044 *2	101,100 *4	115,556 *5	5.64%	1.35%	135 *6	750	857	59,056	14,456	
Ejisu-Juaben	78,783 *1	124,176 *3	143,762 *5	2.88%	1.48%	723 *6	172	199	45,393	19,586	
Bosomtwe	41,283 *2	66,788 *4	93,910 *5	3.05%	3.47%	353 *6	189	266	25,505	27,122	
Atwima Kwanwoma	44,437 *2	79,240 *4	90,634 *5	3.68%	1.35%	291 *6	273	312	34,803	11,394	
Atwima-Nwabiagya	56,352 *2	127,809 *4	149,025 *5	5.25%	1.55%	597 *6	214	250	71,457	21,216	
Outside KMA	302,870	588,471	729,027	4.24%	2.16%	2,616	225	279	285,601	140,556	
Greater Kumasi Sub-Region	790,374	1,758,741	2,764,091	5.13%	4.62%	2,870	613	963	968,367	1,005,350	17.5%
Outside Greater Kumasi Sub-Region	1,299,726	1,854,209	2,016,289	2.25%	0.84%	21,519	86	94	554,483	162,080	
Ashanti Region	2,090,100 *1	3,612,950 *3	4,780,380 *5	3.48%	2.84%	24,389	148	196	1,522,850	1,167,430	20.3%
Ghana	12,296,081 *1	18,912,079 *3	24,658,823 *5	2.73%	2.69%	238,533	79	103	6,615,998	5,746,744	100.0%

Source: *1: 1984 Population and Housing Census
*2: Estimate based on 2010 District Boundaries and 1984 Community Populations
*3: 2000 Population and Housing Census
*4: Estimate based on 2010 District Boundaries and 2000 Community Populations
*5: 2010 Population and Housing Census
*6: Area measured using the District Boundary Maps by TCPD Regional Office



Source: JICA Study Team, based on ALOS AVNIR-2, JAXA 2008/2011

Figure 3.3 Urbanization of Greater Kumasi Sub-Region

Table 3.7 Urbanized Areas of Each MMDAs within Greater Kumasi Sub-Region

	Total Land Area (km^2)	Forest Reserve Area (km^2)	%	Urbanized Area (km^2)	%
Kumasi Metropolitan	234.15	5.28	2.3%	214.18	91.5%
Afigya Kwabre	517.28	22.97	4.4%	32.67	6.3%
Atwima Kwanwoma	290.72	0.00	0.0%	35.37	12.2%
Atwima Nwabiagya	596.98	8.44	1.4%	30.90	5.2%
Bosomtwe	352.58	0.00	0.0%	39.22	11.1%
Ejisu-Juaben	723.40	56.82	7.9%	25.57	3.5%
Kwabre East	134.82	0.00	0.0%	25.29	18.8%
Sub-Total of Outside KMA	2,615.78	88.23	3.4%	189.02	7.2%
Total Land Area	2,849.93	93.51	3.3%	403.20	14.1%

Source: JICA Study Team, based on the ALOS Satellite Imagery taken in 2008 and 2011

(5) SWOT Analysis for Greater Kumasi Sub-Region

The major concerns and issues are analyzed (SWOT analysis) by looking at the strengths (S) and weaknesses (W) of Greater Kumasi Sub-Region from internal factors and at opportunities (O) and threats (T) from external factors.

Internal Factors of Strength (S) are found in the following aspects:

- Kumasi City (KMA) and its surrounding districts have formed a large urban conurbation and a large agglomeration of urban economies. Their populations are massive, nearly 3 million, who are economically active workers and a huge number of urban consumers.
- KMA is endowed with rich resources of higher educational and research institutions, including KNUST and other national research institutes. These institutions have attracted

a large number of excellent young people to Kumasi, but they also produce a large number of excellent graduates for Kumasi and Ghana every year. There is high collaboration/linkage potential between higher education/research institutions and local industries.

- KMA and its surrounding districts have developed machine repairing services and manufacturing industries. One of the famous examples is car repairing services/manufacturing in Suame Magazine, which attracts customers widely, not only from Ashanti Region but also from the Northern Part of Ghana and further from neighbouring inland countries.
- KMA and its surrounding districts have developed a wide range of manufacturing industries (machinery, agro-processing, wood processing, beverage, etc.). Such manufacturing tradition and human resources could be a potential base for further development.
- KMA has developed an active commercial tradition. KMA has the Central Market, which attracts shoppers widely not only from Greater Kumasi but also from Ashanti Region and further northern parts of the country, even from neighbouring inland countries. Such tradition of commerce could be the foundation for further development by modernizing the commercial sector.
- Ashanti Region's mainstay is agriculture, based on relatively rich soils and rainfall favourable to agriculture, as well as a large population of farmers. Ashanti's agriculture could provide more raw material for agro-processing industries in the Greater Kumasi Sub-Region.
- Kumasi is geographically located almost at the centre of Ghana. Major transport routes go through Kumasi. Kumasi and Greater Kumasi could continue to be a logistics centre connecting to northern inland neighbouring countries and northern regions of Ghana.
- Ashanti Region's trunk roads (national and inter-regional roads) have been well developed and they are connected to Kumasi. The surrounding districts also could take advantage of those well developed trunk roads.

Internal Factors of Weakness (W) are found in the following aspects:

- Kumasi is located 300 km inland from the coastal area and major ports. In comparison with the coastal region and port cities, Kumasi's locational handicap is large when it comes to export and import of commodities/goods.
- Although car repairing sectors in Suame Magazine and commercial sectors in Central Market create a huge number of employment opportunities, those sectors are called informal sectors, which only produce a relatively small amount of added value per worker. Therefore, in the future it will be difficult for these informal economic sectors to support the increasing number of urban population and to sustain the growth of urban economies in Greater Kumasi Sub-Region.
- Current strong sectors, like Suame Magazine, Central Market and truck transport of Kumasi are causing serious urban problems in respect of traffic congestion and the urban environment. These sectors could increasingly cause malfunctions of transportation and inefficiency of socio-economic activities to Kumasi and Greater Kumasi Sub-Region.
- KNUST and other national research institutes have tried, but have not succeeded in producing entrepreneurs. They have not been so collaborative with local economic sectors

including local informal sectors. They have not contributed to economic development, industrial development or the regional economy.

- Not only in Greater Kumasi Sub-Region, but also in Ghana as a whole, foreign investments have not been actively made for developing the manufacturing sectors. There might be structural problems for this past situation.
- Because of the existing two dams and water reservoirs constructed for water supply in the colonial era, Kumasi has water supply not only to its citizens but also industries, such as beverage factories. However, the water quality of the two reservoirs is increasingly adversely affected by suburbanization. Moreover, the rapidly increasing populations require water resources development. However, such situation poses uncertainty of water availability for rapid and large urban growth of Greater Kumasi Sub-Region.
- Many people still depend on farming in the districts surrounding Greater Kumasi Sub-Region. However, rapid expansion of urban areas and increase of land prices cause difficulties in access to farm lands in surrounding districts.

External Factors of Opportunities (O) are found in the following aspects:

- Kumasi is expected to continue to be one of the important transport routes in Ghana in the national transport policies. Therefore, the national and inter-regional roads connecting with Kumasi will be well maintained or further upgraded in the future.
- Since the Greater Kumasi Sub-Region is the second largest urban area in Ghana in terms of population and its economic size, in terms of social development, as well as economic development, social infrastructures and economic infrastructures of the Greater Kumasi Sub-Region will be improved as needs arise.
- The current government's policies emphasize the importance of modernization of agriculture and integrated development of industry and agriculture, therefore within Ashanti Region, agricultural development and industrial development could be promoted in an integrated manner.
- The current government policies emphasize the increasing of cocoa processing within the country. Ashanti Region is the second largest cocoa producing region in Ghana. Moreover, Kumasi has factories for cocoa processing. While Ashanti Region promotes enhancement of productivity of cocoa farming, the Greater Kumasi Sub-Region could have the potential for developing more cocoa processing capacities.

External Factors of Threat (T) are found in the following aspects:

- Although the current government policies give high priority to industrial development in integration with agricultural modernization, it is uncertain how substantial the efforts that the government makes are and how effective they are.
- Since the government promotes the development of the Western Corridor and Eastern Corridor as road transport routes connecting ports with inland regions/inland countries, the relative importance of the Central Corridor through Kumasi might be reduced.

Table 3.8 SWOT Cross Analysis for Greater Kumasi Sub-Region

		Opportunity	Threat
		• The national and inter-regional roads connecting with Kumasi will be well maintained or further upgraded in the future as the need arise. • The current government's policies emphasize the importance of modernization of agriculture and integrated development of industry and agriculture. They also emphasize the increasing of cocoa processing within the country.	• It is uncertain how substantial and effective the efforts that the government makes for industrial development in integration with agricultural modernization will be. • The government is promoting the development of the Western and Eastern Corridor as road transport routes connecting ports with inland regions and countries.
Strength	• KMA and its surrounding districts have huge number of economically active workers and urban consumers. • KMA is endowed with rich resources of higher educational and research institutions, including KNUST and other national research institutes, producing a large number of excellent graduates every year. • KMA have developed machine repairing services and manufacturing industries such as Suame Magazine, attracting customers not only from whole of Ghana but also from neighbouring inland countries. • KMA and its surrounding districts have developed a wide range of manufacturing industries (machinery, agro-processing, wood processing, beverage, etc.). • KMA has Central Market attracting shoppers not only from whole of the country, but further from neighbouring inland countries. • Ashanti's agriculture could provide more raw material for agro-processing industries in the Greater Kumasi Sub-Region. • Kumasi is geographically located almost at the centre of Ghana. Major transport routes go through Kumasi.	• By taking advantage of this strength, it is possible to activate the manufacturing in the formal sector (including agro-processing) due to the geographical location of Kumasi.	• By utilizing this strength and for preparing against the identified external threats, it is necessary to modernize Suame Magazine and develop the expertise of Central Market. • It is necessary for higher educational institutions and manufacturing sector such as factories and Suame Magazine to co-develop.

Weakness	Kumasi's locational handicap is large for export and import of commodities/goods. • In the future it will be difficult for informal economic sectors to support the increasing number of urban population and to sustain the growth of urban economies in Greater Kumasi Sub-Region. • Current strong sectors, like Suame Magazine, Central Market and truck transport of Kumasi could increasingly cause malfunctions of transportation and inefficiency of socio-economic activities to Greater Kumasi Sub-Region. • KNUST and other national research institutes have not succeeded in producing entrepreneurs and have not contributed to economic development, industrial development or the regional economy. • Foreign investments have not been actively made for developing the manufacturing sectors. • The water quality of the two reservoirs is increasingly adversely affected by suburbanization. Moreover, the rapidly increasing populations require water resources development. However, such situation poses uncertainty of water availability for rapid and large urban growth of Greater Kumasi Sub-Region. • Many people still depend on farming in the rural area of Greater Kumasi Sub-Region. However, rapid expansion of urban areas and increase of land prices cause difficulties in access to farm lands in surrounding districts.	• For utilizing the external opportunities and preparing against the identified weakness, it is necessary to enforce measures for knowledge-based sector based on ICT by utilizing the graduates of higher educational institutions.	• For preparing against this weakness under the identified external threat, it is necessary to promote the development of small-scale agriculture in the rural area of Greater Kumasi Sub-Region since Greater Kumasi Conurbation will become a city with population of over 5 million which has a huge market.

Source: JICA Study Team

PART III SPATIAL DEVELOPMENT FRAMEWORK (SDF) FOR ASHANTI REGION

Chapter 4 Vision, Socio-Economic Development Policies, and Spatial Structure for Ashanti Region

4.1 Introduction

It is necessary to include social and economic factors in the formulation of a simplified version of the Spatial Development Framework (SDF) for the Ashanti Region, while the SDF looks at and provides guidance on the physical aspects of development and the environment.

In the chapters of Part III, spatial development and socio-economic development are discussed in an integrated manner in order to consider the future spatial structure of the Ashanti Region.

4.2 Visions and Socio-Economic Development Policies for Ashanti Region

In the current National Development Plans for socio-economic development, MTDPs have not been formulated at the regional level. There are no relevant socio-economic development plans for Ashanti Region to refer to. Therefore, it seems that no statements for future visions of Ashanti Region are available.

Under these circumstances, the following vision statement for Ashanti Region was proposed for stakeholder consultation and this proposed vision statement was generally accepted at the stakeholder consultative meeting.

> *"The Ashanti Region will maintain the historical and cultural aspirations of the region, and create a vibrant, modernized and diversified economy based on endowed natural resources and people, which will bring sufficient employment and social services to its people, while pioneering and contributing to propelling Ghana into middle-income status of the world."*

Options for socio-economic development polices for the Ashanti Region was proposed for the purpose of examining them in stakeholder consultative meetings. Potentials and options for economic development in the Ashanti Region are examined from two geographically different perspectives. One set of options is for the Greater Kumasi Sub-Region and the other set of options is for areas outside the Greater Kumasi Sub-Region. For the purpose of consideration and discussion, very different types of options are put forward. However, by considering each as alternatives, all eventualities can be considered for creation of plans.

The following three options for socio-economic development policies for the Greater Kumasi Sub-Region have been put forward:

- Greater Kumasi Option A: Focus on Commerce, Logistics and Car Repair Services/Manufacturing
- Greater Kumasi Option B: Focus on the Manufacturing Sector
- Greater Kumasi Option C: Focus on both Manufacturing and Knowledge-Based Sectors

The following three options for socio-economic development policies for areas outside the Greater Kumasi Sub-Region have been put forward:

- Outside Greater Kumasi Option 1: Modernization of Small-Scale Agriculture
- Outside Greater Kumasi Option 2: Promotion of Foreign and Domestic Direct Investment in the Agricultural Sector in Integration with the Agro-processing Industry
- Outside Greater Kumasi Option 3: Promotion of Development of the Mining Sector

In the stakeholder meetings to be held, a group discussion will be conducted to identify an appropriate combination of one option for the Greater Kumasi Sub-Region and another option for areas outside the Greater Kumasi Sub-Region.

4.3 Spatial Structure for Ashanti Region

Two sets of options for Socio-Economic Development Policies are proposed and discussed in the next chapter for the Ashanti Region. One set was for the Greater Kumasi Sub-Region and the other set was for the area inside the Ashanti Region but outside the Greater Kumasi Sub-Region. In this section, three different combinations of these two sets of socio-economic development policies are proposed and discussed for the purpose of considering different options for the spatial structure of Ashanti Region.

Although there are nine combinations of the two sets of options, the following three most likely combinations have been determined:

- Scenario 1: Combination of the following two options:
  - Greater Kumasi Option: Focus on Manufacturing Sector
  - Outside Greater Kumasi Option: Modernization of Small-Scale Agriculture
- Scenario 2: Combination of the following two options:
  - Greater Kumasi Option: Focus on Commerce, Logistics and Car Repair Services/Industry
  - Outside Greater Kumasi Option: Promotion of Foreign and Domestic Investments in Agriculture Sector in Integration with the Agro-processing Industry
- Scenario 3: Combination of the following two options:
  - Greater Kumasi Option: Focus on Both Manufacturing and Knowledge-Based Sectors
  - Outside Greater Kumasi Option: Promotion of Development of Mining Sector

Implications of the different combinations of socio-economic development policies have been studied to identify the needs for different characteristics of spatial structure for the Ashanti Region.

Based on this study, the following three options for the spatial structure for Ashanti Region have been identified:

(1) Option 1: Regional Spatial Structure for Scenario 1

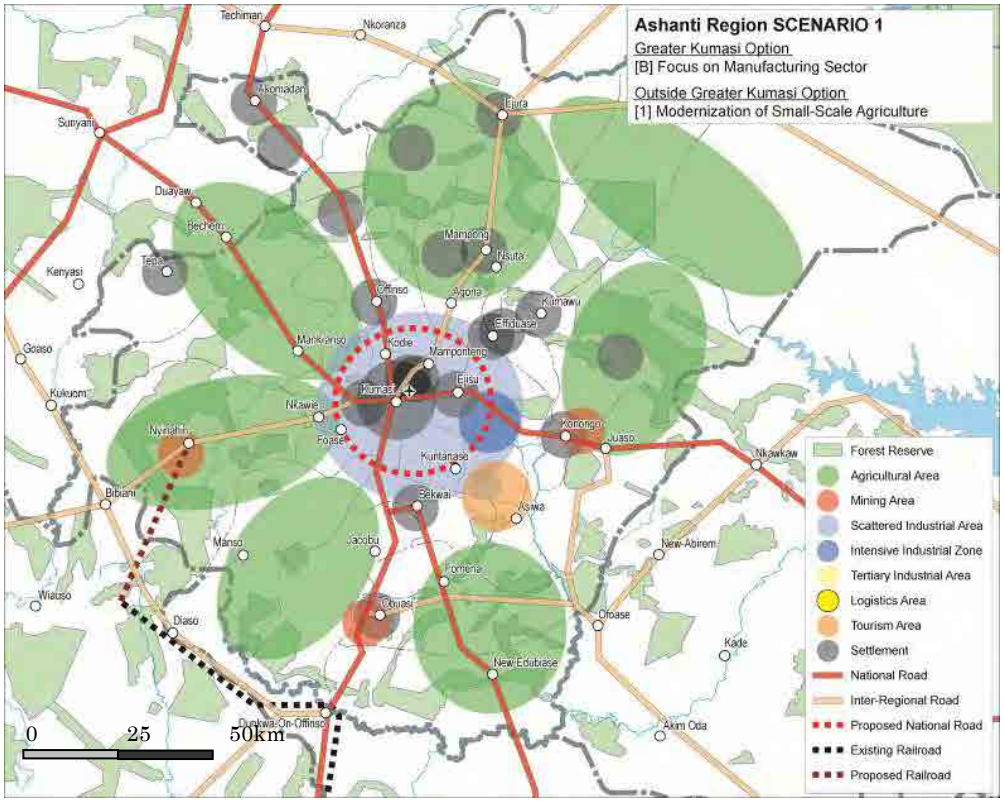
- Transport for the Greater Kumasi Sub-Region is based on roads in the long term (15–20 years), but not on railways.
- Road connection between agricultural areas and the Greater Kumasi Sub-Region is essential to support the integration between small-scale agricultural modernization and agro-processing in the Greater Kumasi Sub-Region.
- The construction of an Outer Ring Road is important for both enabling through traffic to bypass Kumasi and providing access to an ample number of land plots in order to attract manufacturing industries along the Outer Ring Road.
- Railway improvement is expected to transport bauxite from Awaso and Nyinahin.
- District capitals are important service centres for modernization of agriculture and rural life.

(2) Option 2: Regional Spatial Structure for Scenario 2

- Development of both railways and roads should be emphasized.
- A wide-width (over 6 lanes) and heavy-load road should be constructed for the Outer Ring Road in order to modernize and strengthen the logistics functions and logistics industries in the Greater Kumasi Sub-Region.
- The Western Railway Line and Eastern Railway Line should be connected by constructing a new section between Boankra and Bekwai to provide the Greater Kumasi Sub-Region with good access to both Tema Port and Takoradi Port.
- A new railway line should be constructed to extend the existing railway network to the northern part of the country.
- For integration of agriculture and agro-processing industries within agricultural areas, some district capital towns should be upgraded to become service centres for agriculture and bases for agro-processing industries.

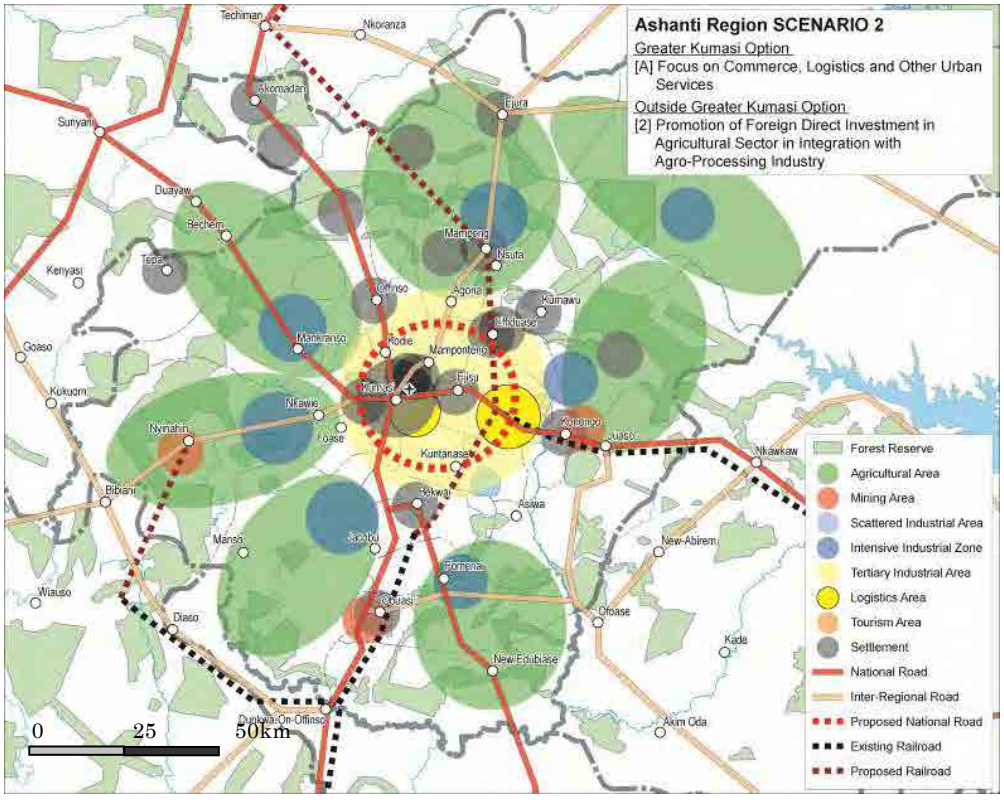
(3) Option 3: Regional Spatial Structure for Scenario 3

- A smaller Outer Ring Road than the one currently planned is needed to provide better mobility within the urban areas of the Greater Kumasi Sub-Region.
- This smaller Outer Ring Road would allow for the provision of land and good access for knowledge-based industries, which prefer to be closer to city centres and airports.
- Railway development should be upgraded for the mining sector (including the railway extension to Nynahin), but not for the Greater Kumasi Sub-Region in this option.



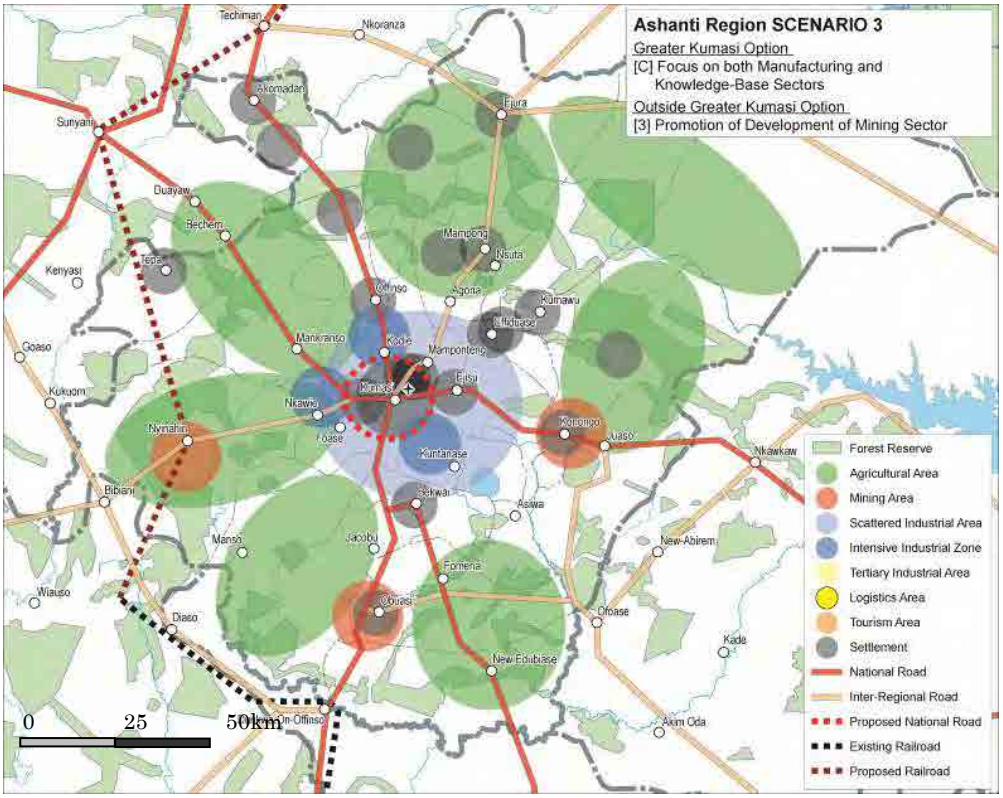
Source: JICA Study Team

Figure 4.1 Option 1: Regional Spatial Structure for Scenario 1



Source: JICA Study Team

Figure 4.2 Option 2: Regional Spatial Structure for Scenario 2



Source: JICA Study Team

Figure 4.3 Option 3: Regional Spatial Structure for Scenario 3

The socio-economic development scenario chosen by the stakeholders was Scenario 2, which is a combination of the following:

- Greater Kumasi Option: [A] Focus on Commerce, Logistics and Car Repair Services/Industry
- Outside Greater Kumasi Option: [2] Promotion of Foreign and Domestic Investments in Agriculture Sector in Integration with Agro-processing Industry

Considering both the preference of the stakeholders and the technical analysis by the Study, the following socio-economic scenarios are proposed:

- For the Greater Kumasi Sub-Region: in the short term, [A] Focus on Commerce is selected and in the medium and long terms, [C] Focus on Manufacturing and Knowledge Sectors.
- Outside the Greater Kumasi Sub-Region: both [2] Focus on Agricultural Investment and [3] Focus on Mining Sector.

By combining these policies, outside the Greater Kumasi Sub-Region, economic sector development can be promoted further to slow down migration to the Greater Kumasi Sub-Region. Moreover, inside the Greater Kumasi Sub-Region, the dependency on informal sectors can be gradually reduced.

This combined set of socio-economic policies would require a regional spatial structure, which combines the spatial options shown in Figure 4.2 and Figure 4.3. This regional spatial structure should have the following characteristics:

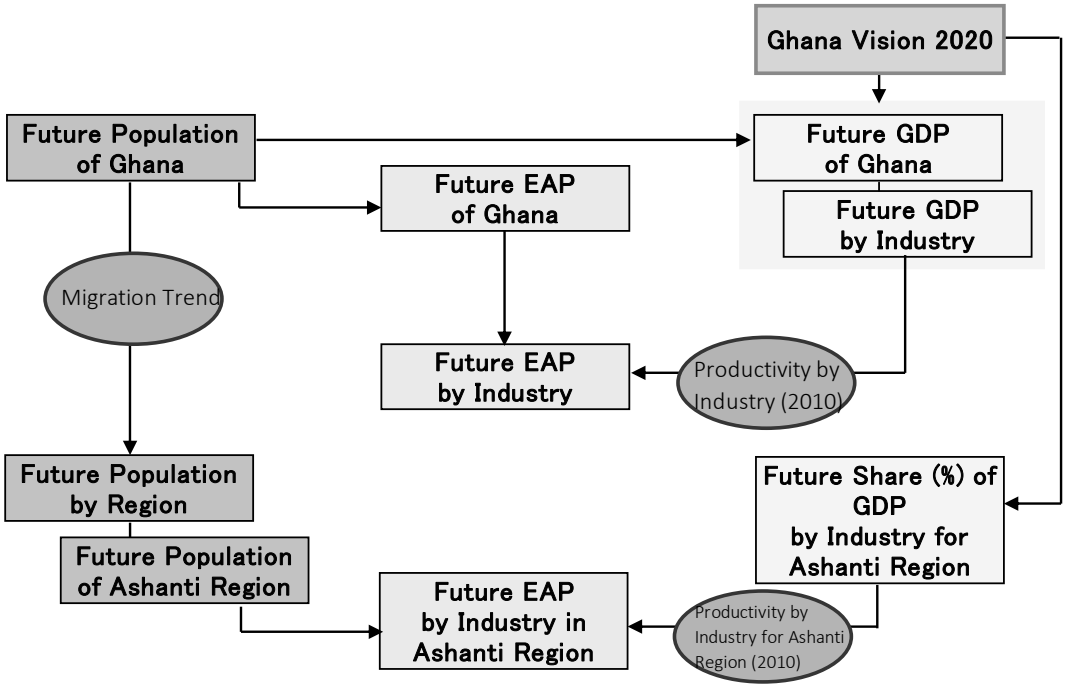
- Long-distance cargo railway transport is important. The Eastern Line should be extended from Ejisu or Boankra to the north. The connection of the Western Line with Kumasi's central area should be maintained. The branch line to Awaso should be extended to Nynahi from Awaso.
- The proposed Outer Ring Road should be constructed close to the central area of Kumasi in order to induce urban development.
- Urban centres for supporting both agricultural development and mining development are important, and roads to connect these urban centres to the Greater Kumasi Conurbation should be improved.

Chapter 5 Socio-Economic Frameworks for Ashanti Region

In this spatial development planning project, socio-economic frameworks consisting of population and economic active population (EAP) by industry are prepared for Ghana as a whole, Ashanti Region and Greater Kumasi Sub-Region. Furthermore, for the Greater Kumasi Sub-Region, sub-frameworks are prepared for KMA and Greater Kumasi Conurbation.

In Chapter 5, future populations and EAPs by industry of Ghana as a whole and Ashanti Region are predicted for the future socio-economic frameworks. In Chapter 7, based on the socio-economic framework for Ashanti Region, a socio-economic framework for the Greater Kumasi Sub-Region is formulated.

The flowchart of socio-economic framework for Ashanti Region is as below.



Source: JICA Study Team

Figure 5.1 Flowchart for Ashanti Region's Socio-Economic Framework

5.1 Population Framework for Ashanti Region

(1) Future Population of Ghana

The population of Ghana has been increasing at an extremely high rate in the past decades with 2.73% annual growth rate (1984-2000) and 2.69% annual growth rate (2000-2010).

The future population of Ghana has been predicted by United Nation (which predicted in 2010 that the annual population growth rate will drop to 1.81% by 2025-2030) and Ghana Statistical Service (which predicted in 2005 that the annual population growth rate will drop

to 1.9% by 2020-25). However these predictions do not reflect the most recent 2010 Population and Housing Census data.

Therefore the annual population growth rate of Ghana was set to continuously decrease towards the year 2033, due to the increased urban population ratio and women's social advancement. Considering both the still high population growth rates and these strong trends, the annual population growth rate is estimated to be approximately 2.1% for the period 2028-2033.

(2) Future Population of Ashanti Region

In the years by 2000, the regions with large cities and urban areas (Greater Accra, Ashanti and Western) tended to attract more social migration. However, in the years from 2000 to 2010, such phenomenon became less prominent. The population framework for Ashanti Region was set by assuming the continuation of this trend for certain years.

Table 5.1 Population Framework for Ghana and Ashanti Region to Year 2033

Region	1984*	2000*	2010*	2013	2018	2023	2028	2033
Ashanti	2,090,100	3,612,950	4,780,380	5,187,357	5,929,423	6,758,010	7,681,736	8,709,931
Growth Rate (Annual %)	-	3.5%	2.8%	2.8%	2.7%	2.7%	2.6%	2.5%
Total	12,296,081	18,912,079	24,658,823	26,655,204	30,171,371	33,902,644	37,817,508	41,876,311
Growth Rate (Annual %)	-	2.7%	2.7%	2.6%	2.5%	2.4%	2.2%	2.1%

Source: JICA Study Team
Note*: GSS, 1984, 2000 and 2010 Population and Housing Census

5.2 Economically Active Population in Ashanti Region

Due to the lack of regional government entities, official regional GDP cannot be obtained. Therefore the future economic active population (EAP) was estimated based on sectorial productivity and the past EAP.

The ratio of EAP is set to increase until the project target year 2033 in Ashanti Region due to the past trend where the working age of Ghana has increased from 49.5% in 1970 to 57.0% in 2010. Other factors considered are women's social advancement and the increase of EAP at the national level. In Ghana, more urbanized the region is, the higher EAP ratio is and since Ashanti Region has higher urban population ratio than the national average the EAP ratio is set with a higher ratio compared to the whole of Ghana.

Ghana has a national vision to become a middle-income county (GPD per capita US$3,000) by 2020 according to the national economic and social development policy (Ghana-Vision 2020) which was formulated in 1996, with the major shift in the sectoral composition of production with agriculture's share of GDP falling to below 20% and industry's share rising to 37% by 2020.

The socio-economic framework was set assuming that the strategies necessary for shifting the sectorial composition of production will be implemented in accordance with this development policy. Due to the discovery of oilfield along the coast of Western Region, a rapid economic growth is expected and Ghana is prospected to become a middle-income country (US$ 2,042

at 2010 record and US$ 2,2882 at 2017 based on IMF prediction). However the contribution of secondary industry to real GDP has been flat in the last decade reaching 27.7% in 2010. Even with the accelerated effort at industrialization, it is considered that it will not be easy to achieve the target of 37% share of the secondary industry in the GDP. Therefore, the target year for reaching 37% of GRDP is set to be delayed until 2025.

On the other hand, as for Ashanti Region, the target portion of the secondary industry in the GRDP is set to achieve 37% by 2020 for the following reasons:

- Ashanti Regional share of EAP in the secondary industry was 28.3% in 2010 and was slightly higher than the whole of Ghana.
- In Ashanti Region if the secondary industry should be one of the main players in Ghana, Ashanti Region itself should also achieve this target.

The estimation of industrial composition in Ashanti Region is therefore conducted based on the following assumptions.

- The contribution of the primary industry to real GDP will follow the past trend and continue to decrease with primary industry contribution below 20.0% by the year 2020.
- The contribution of the secondary industry will be over 37.0% in the year 2020.

Table 5.2 Estimated Future Composition by Industry in Ashanti Region

	2000	2010	2013	2018	2023	2028	2033
EAP	1,612,467	2,073,016	2,266,012	2,621,626	3,023,826	3,477,890	3,989,607
Primary Industry	770,246	631,302	631,268	610,619	593,998	581,034	546,620
(Composition of EAP)	(47.8%)	(30.5%)	(27.9%)	(23.3%)	(19.6%)	(16.7%)	(13.7%)
Secondary Industry	244,805	333,679	406,606	555,635	696,907	830,383	986,394
(Composition of EAP)	(15.2%)	(16.1%)	(17.9%)	(21.2%)	(23.0%)	(23.9%)	(24.7%)
Tertiary Industry	597,417	1,108,036	1,228,139	1,455,372	1,732,920	2,066,473	2,456,594
(Composition of EAP)	(37.0%)	(53.5%)	(54.2%)	(55.5%)	(57.3%)	(59.4%)	(61.6%)

Source: JICA Study Team based on data from Ghana Statistical Service

PART IV SPATIAL DEVELOPMENT FRAMEWORK (SDF) FOR GREATER KUMASI SUB-REGION

Chapter 6 Vision and Overall Objectives

6.1 Vision for Greater Kumasi Sub-Region

The following statement of future visions for Greater Kumasi Sub-Region was proposed, and it was agreed upon at stakeholder consultative meetings and the steering committee meetings in the planning process.

"The Greater Kumasi Sub-Region will become a pioneer to transform the current economy to a vibrant, modernized and diversified economy including commerce, logistics, manufacturing and knowledge-based industries, by creating a livable, sustainable and efficient urban space, while maintaining the historical and cultural aspirations of the Ashanti Region."

In addition to this vision statement, the following nickname for Greater Kumasi Sub-Regional SDF and SP was proposed, in order to give an immediate impression about the future of Greater Kumasi:

"Greater Kumasi Revitalization 2033: The Heart of the Nation"

This nickname of the plans, as well as the nickname for the Greater Kumasi Sub-Region, will be discussed in the course of the activities of the proposed Regional Platform.

6.2 Physical, Natural, Social and Economic Characteristics of Greater Kumasi Sub-Region

The Greater Kumasi Sub-Region has the following potential resources and features on which the Greater Kumasi Sub-Region could pursue the Vision for the future:

- Greater Kumasi Sub-Region has a long historical and cultural tradition, is the centre for the Ashanti Kingdom, and the site of the Manhyia Palace and administration.
- Greater Kumasi Sub-Region is a commercial and service centre for the agricultural region with good soils and climate.
- Greater Kumasi Sub-Region is the regional capital city in government administration.
- Greater Kumasi Sub-Region is the commercial centre for Ashanti Region and beyond.
- Greater Kumasi Sub-Region has an excellent academic centre.
- Greater Kumasi Sub-Region has clusters of manufacturing sectors in Kumasi and its surrounding areas.
- Greater Kumasi Sub-Region is strategically located in the centre of the country.
- Greater Kumasi Sub-Region is a hub of transportation between the southern and northern parts of Ghana, as well as toward neighbouring inland countries.
- The Greater Kumasi Sub-Region needs to maintain a large size of informal sectors while modernizing and transforming them, not only for providing employment opportunities for

migrants from other regions, but also for rapidly increasing populations within the sub-region.

6.3 Overall Objectives for Greater Kumasi Sub-Regional Development

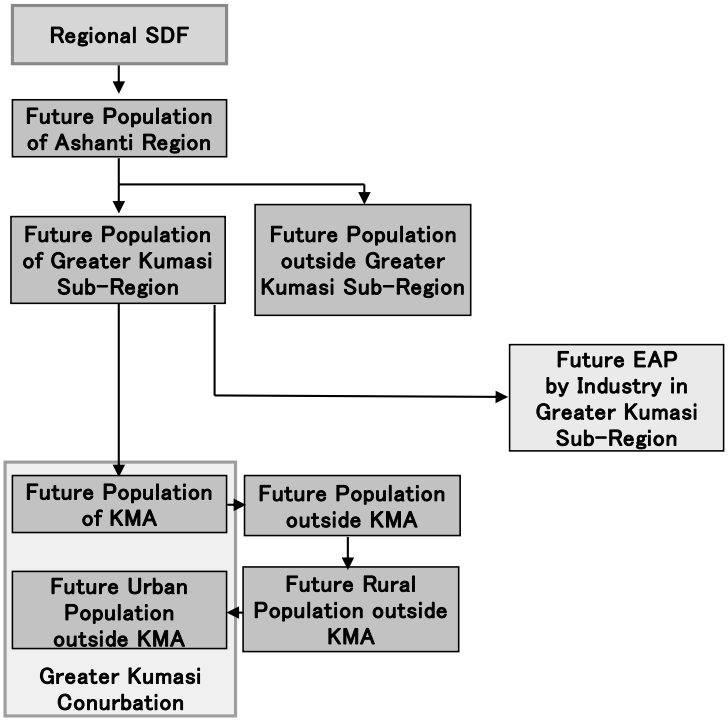
Considering the characteristics, roles and functions of Greater Kumasi Sub-Region, the following overall objectives for development are set:

- To substantially contribute to national economic development for making and sustaining Ghana a middle-income status.
- To promote industrial development, especially manufacturing sector, by attracting foreign/domestic investment and intelligent/skilled workers, and by integrating manufacturing sector with agricultural sector in Ashanti Region.
- To be upgraded to a city with regional headquarter functions (public and private), and also a city with providers of advanced business services, research and education services and top-referral hospitals.
- To be a centre of science and technology and its application to economic development
- To be primary commercial and industrial centre not only for Ashanti Region, but also for northern part of Ghana and inland neighbouring countries, by taking advantage of strategic location within Ghana and Western Africa
- To be a city with vibrant economy (both formal and informal) to keep generating employment opportunities not only for influx of migrants but also for sub-regional populations
- To provide major destinations for domestic tourists and visitors for recreation and leisure activities
- To maintain the feature of Garden City with productive and open greenery areas within the Sub-Region
- To seek balanced development for Greater Kumasi Sub-Region based on strong and shriving urban-rural linkage
- To keep providing incoming migrants with housing and employment opportunities
- To conserve nature areas and riverside areas and watershed area for existing and future dams not only for nature conservation but also water resources management
- To keep providing incoming migrants with housing and employment opportunities
- To conserve nature areas, riverside areas and river catchment areas not only for nature conservation but also water resources management

Chapter 7 Socio-Economic Framework for Greater Kumasi Sub-Region

In Chapter 5, the socio-economic frameworks consisting of population and economic active population (EAP) by industry are prepared for Ghana as a whole and Ashanti Region. By referring to these two frameworks, in Chapter 7, a socio-economic framework is prepared for Greater Kumasi Sub-Region and furthermore, a sub-framework for KMA and Greater Kumasi Conurbation is also prepared. The socio-economic frameworks are prepared for years 2018, 2023, 2028 and 2033.

The flowchart of socio-economic framework for Greater Kumasi Su-Region is as below.



Source: JICA Study Team

Figure 7.1 Flowchart for Greater Kumasi Sub-Region's Socio-Economic Framework

7.1 Population Framework for Greater Kumasi Sub-Region

The future population of Greater Kumasi Sub-Region was set focused on the areas outside Greater Kumasi Sub-Region within Ashanti Region. Due to the development of urban areas beside Kumasi in Ashanti Region such as Obuasi, Bekwai, Offinso, Konongo, Mampong, Effiduase etc. Greater Kumasi Sub-Region is set to moderately accommodate social migration.

Kumasi Metropolitan Assembly (KMA) is to ease its extreme congestion which occurred in the past decades due to the developments of suburban centres, district centres and new towns in the surrounding districts. The annual growth rate of surrounding districts is set to over take that of KMA in the first decade.

Table 7.1 Population Framework to Year 2033

	1984*	2000*	2010*	2013	2018	2023	2028	2033
KMA	-	1,170,270	2,035,064	2,361,000	2,883,805	3,369,716	3,816,007	4,226,860
(Annual Growth Rate)	-	-	(5.7%)	(5.1%)	(4.1%)	(3.2%)	(2.5%)	(2.1%)
Outside KMA	-	588,470	729,027	766,010	865,900	1,023,303	1,234,416	1,534,603
(Annual Growth Rate)	-	-	(2.2%)	(1.7%)	(2.5%)	(3.4%)	(3.8%)	(4.5%)
Greater Kumasi Sub-Region	-	1,758,740	2,764,091	3,127,010	3,749,705	4,393,019	5,050,422	5,761,463
(Annual Growth Rate)	-	-	(4.6%)	(4.2%)	(3.7%)	(3.2%)	(2.8%)	(2.7%)
Ashanti Region	2,090,100	3,612,950	4,780,380	5,187,357	5,929,423	6,758,010	7,681,736	8,709,931
(Annual Growth Rate)	-	(3.5%)	(2.8%)	(2.8%)	(2.7%)	(2.7%)	(2.6%)	(2.5%)

Source: JICA Study Team
Note*: GSS

7.2 Economically Active Population

In the socio-economic framework for Greater Kumasi Sub-Region, the economic active populations by the secondary industry (including manufacturing) and the tertiary industry (including ICT-BPO sectors) are set to occupy larger shares in response to the socio-economic development policies with larger oriented to both manufacturing and knowledge-base sectors.

The estimation of EAP for Greater Kumasi Sub-Region employs the assumption that the ratio of EAP to the total population will follow the trend of Greater Accra Region, which has a higher EAP ratio than the national average.

Table 7.2 Estimated Future Composition by Industry in Greater Kumasi Sub-Region

	2000	2010	2013	2018	2023	2028	2033
EAP	788,799	1,255,027	1,434,351	1,749,042	2,083,164	2,434,048	2,821,388
Primary Industry	180,166	157,107	160,322	156,846	152,836	148,479	137,988
(Composition by EAP)	22.8%	12.5%	11.2%	9.0%	7.3%	6.1%	4.9%
Secondary Industry	197,061	285,774	355,378	491,166	617,095	730,261	856,972
(Composition by EAP)	25.0%	22.8%	24.8%	28.1%	29.6%	30.0%	30.4%
Tertiary Industry	411,571	812,146	918,651	1,001,031	1,313,233	1,555,307	1,826,473
(Composition by EAP)	52.2%	64.7%	64.0%	63.0%	63.0%	63.9%	64.7%

Source: JICA Study Team based on the data from Ghana Statistical Service

7.3 Socio-Economic Sub-Framework for Greater Kumasi Sub-Region

The sub-framework for Greater Kumasi Sub-Region determines the population, EAP and the number of jobs by industry in Kumasi Metropolitan Assembly (KMA) and of those in Greater Kumasi Conurbation, and the population and total number of jobs in the each of six adjoining districts of Greater Kumasi Sub-Region.[3]

[3] The population of Asokore Mampong Municipality is included in the population of KMA.

(1) Population and Number of Jobs in Greater Kumasi Conurbation

The future population of Greater Kumasi Conurbation is estimated by estimating the rural and urban population outside Greater Kumasi Conurbation. The population of Greater Kumasi Conurbation was approximately 2.46 million in 2010 and is estimated to become approximately 4.75 million in 2028 and 5.47 million in 2033. The population in the six adjoining districts within the Conurbation was approximately 0.42 million in 2010 and is to become approximately 1.24 million in 2033.

The number of jobs in Greater Kumasi Conurbation is estimated considering that the increase in secondary industry outside KMA will be concentrated within the conurbation area. With the decrease of agricultural jobs in Greater Kumasi Sub-Region, the number of jobs will decrease outside Greater Kumasi Conurbation.

Table 7.3 Number of Jobs in Greater Kumasi Conurbation

	2010	2028	2033	Increase of Jobs 2010-28	Annual Growth Rate 2010-28	Increase No. 2010-33	Annual Growth Rate 2010-33
KMA	939,338	1,929,193	2,189,892	989,856	4.08%	1,250,554	3.75%
Outside KMA in Conurbation	200,287	404,996	554,185	204,709	3.99%	353,898	4.52%
Greater Kumasi Conurbation	1,139,624	2,334,189	2,744,076	1,194,565	4.06%	1,604,452	3.89%
Outside Greater Kumasi Conurbation	115,403	99,859	77,312	-15,544	-0.80%	-38,091	-1.73%
Greater Kumasi Sub-Region	1,255,027	2,434,048	2,821,388	1,179,021	3.75%	1,566,362	3.58%

Source: JICA Study Team

(2) Population and Number of Jobs by Districts in Greater Kumasi Sub-Region

The population and number of jobs by districts in the year 2033 is as shown in the table below.

Table 7.4 Population and Number of Job by District in Greater Kumasi Sub-Region

	2000	2010	2028	2033	Average Annual Increase Rate (% per annum)		No. of Jobs	Share of Jobs in Population (%)
					2000-2010	2010-2033	2033	2033
KMA	1,170,270	2,035,064	3,816,007	4,226,860	5.69%	3.23%	2,189,892	51.8%
Afigya-Kwabre	89,967	136,140	228,828	259,891	4.23%	2.85%	78,148	30.1%
Atwima Kwanmowa	73,014	90,634	154,039	198,629	2.19%	3.47%	46,829	23.6%
Atwima Nwabiagya	126,183	149,025	196,520	251,548	1.68%	2.30%	58,836	23.4%
Bosomtwe	62,450	93,910	147,711	165,273	4.16%	2.49%	39,552	23.9%
Ejisu-Juaben	124,176	143,762	323,297	438,940	1.48%	4.97%	181,009	41.2%
Kwabre East	102,310	115,556	180,871	220,322	1.22%	2.85%	86,054	39.1%
Greater Kumasi Sub-Region	1,748,370	2,764,091	5,047,272	5,761,463	4.69%	3.24%	2,680,319	46.5%

Source: JICA Study Team

(3) Number of Jobs by Industries in KMA

Number of jobs at workplace is based on the assumption that despite the development of service facilities and industrial areas in the districts adjoining KMA, people will continue to rely on KMA for secondary and tertiary industry workplaces, commuting to KMA in the next two decades.

Table 7.5 Number of Jobs by Industry in Greater Kumasi Sub-Region

Industry		2010	2028	2033	2010-2028		2010-2033	
					Increased Number	A.G.R.	Increased Number	A.G.R.
Primary	KMA	40,171	38,531	34,766	-1,640	-0.23%	-5,405	-0.63%
	Outside KMA	128,379	101,630	96,323	-26,749	-1.29%	-32,056	-1.24%
Secondary	KMA	220,065	570,740	650,228	350,675	5.44%	430,163	4.82%
	Outside KMA	43,504	118,610	163,852	75,106	5.73%	120,348	5.94%
Tertiary	KMA	679,102	1,319,921	1,504,897	640,820	3.76%	825,796	3.52%
	Outside KMA	69,941	148,255	230,252	78,314	4.26%	160,311	5.32%
Total	KMA	939,338	1,929,193	2,189,892	989,856	4.08%	1,250,554	3.75%
	Outside KMA	218,174	368,495	490,427	150,321	2.95%	272,254	3.58%

Source: JICA Study Team

Chapter 8 Sub-Regional Strategies for Socio-Economic and Spatial Development

8.1 Overall Spatial Development Strategies and Scenarios

(1) Overall Socio-Economic Development Strategies

Considering the economic characteristics of Greater Kumasi Sub-Region discussed in Chapter 6 and socio-economic framework discussed in Chapter 7, the overall strategies for socio-economic development for Greater Kumasi Sub-Region should be based on the following:

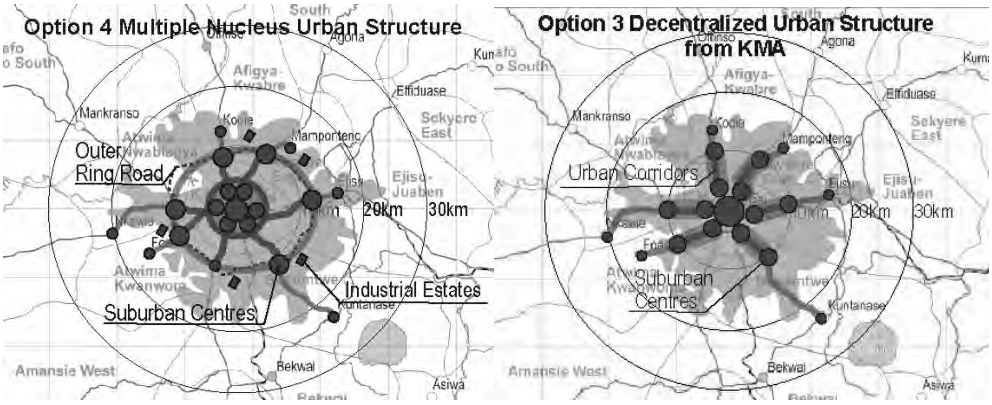
> "Focus on both manufacturing and knowledge-based sectors, while seeking modernization/upgrading of the current strong economic sectors (commerce, logistics and small-scale industries)"

(2) Overall Spatial Development Strategies

The changes of the population pattern in Greater Kumasi Sub-Region imply that Kumasi City has been expanding urbanized areas beyond its administrative boundaries, but at the same time, Kumasi continued to absorb an increasing amount of population within its city boundaries. This is partly because urban functions in the Greater Kumasi Sub-Region concentrate within Kumasi City. Kumasi City is rich, especially in private institutions of health and education. Moreover, Kumasi City's government functions are located in small central areas, causing heavy concentration of traffic.

The overall spatial development strategies should be in the following direction:

> "Transforming the current mono-centric spatial structure with too much functional concentration in Kumasi City to a Multi-Nucleus Urban Structure with suburban centres and suburban industrial functions"

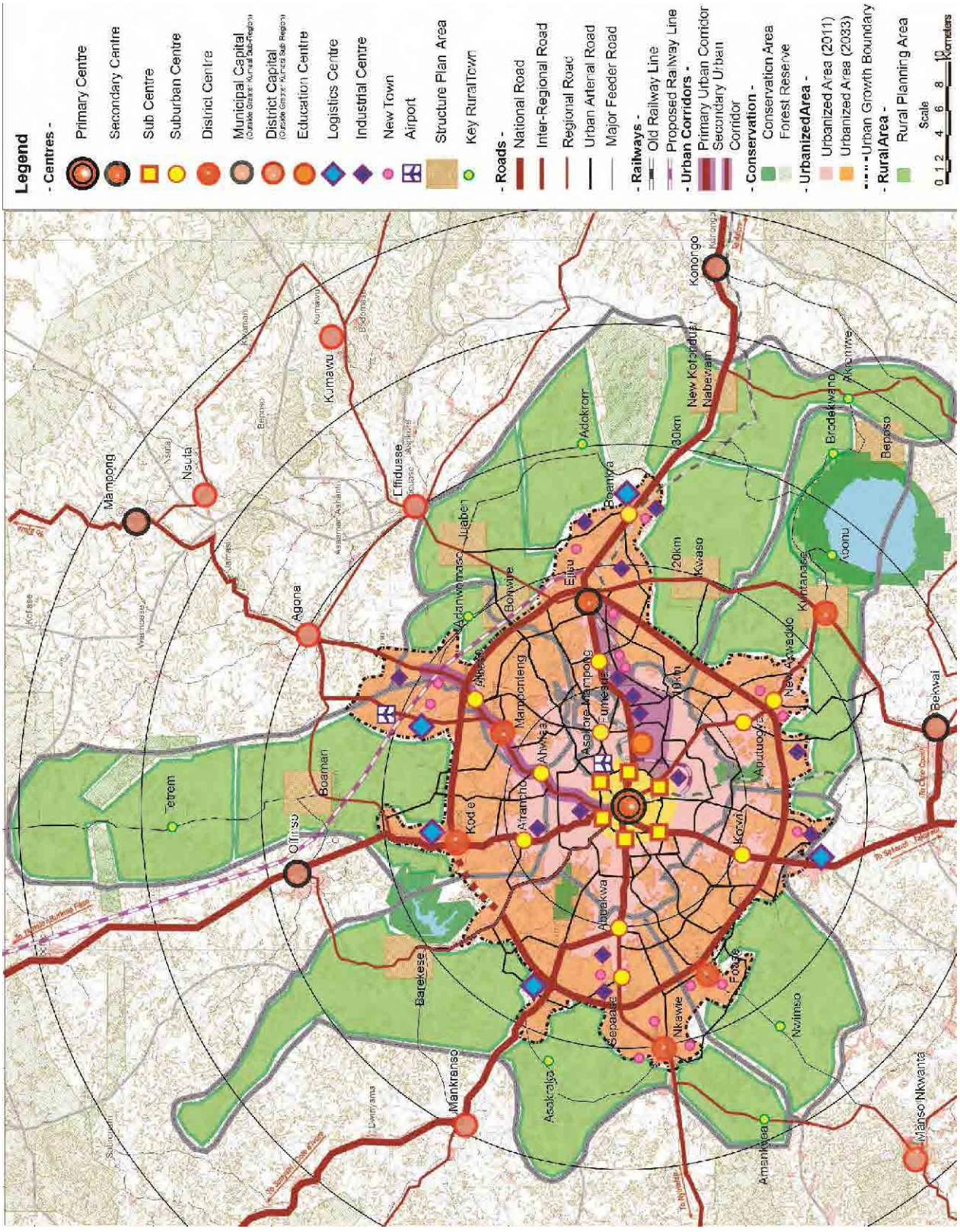


Source: JICA Study Team

Figure 8.1 Multiple Nucleus and Decentralized Urban Structure by Urban Corridors

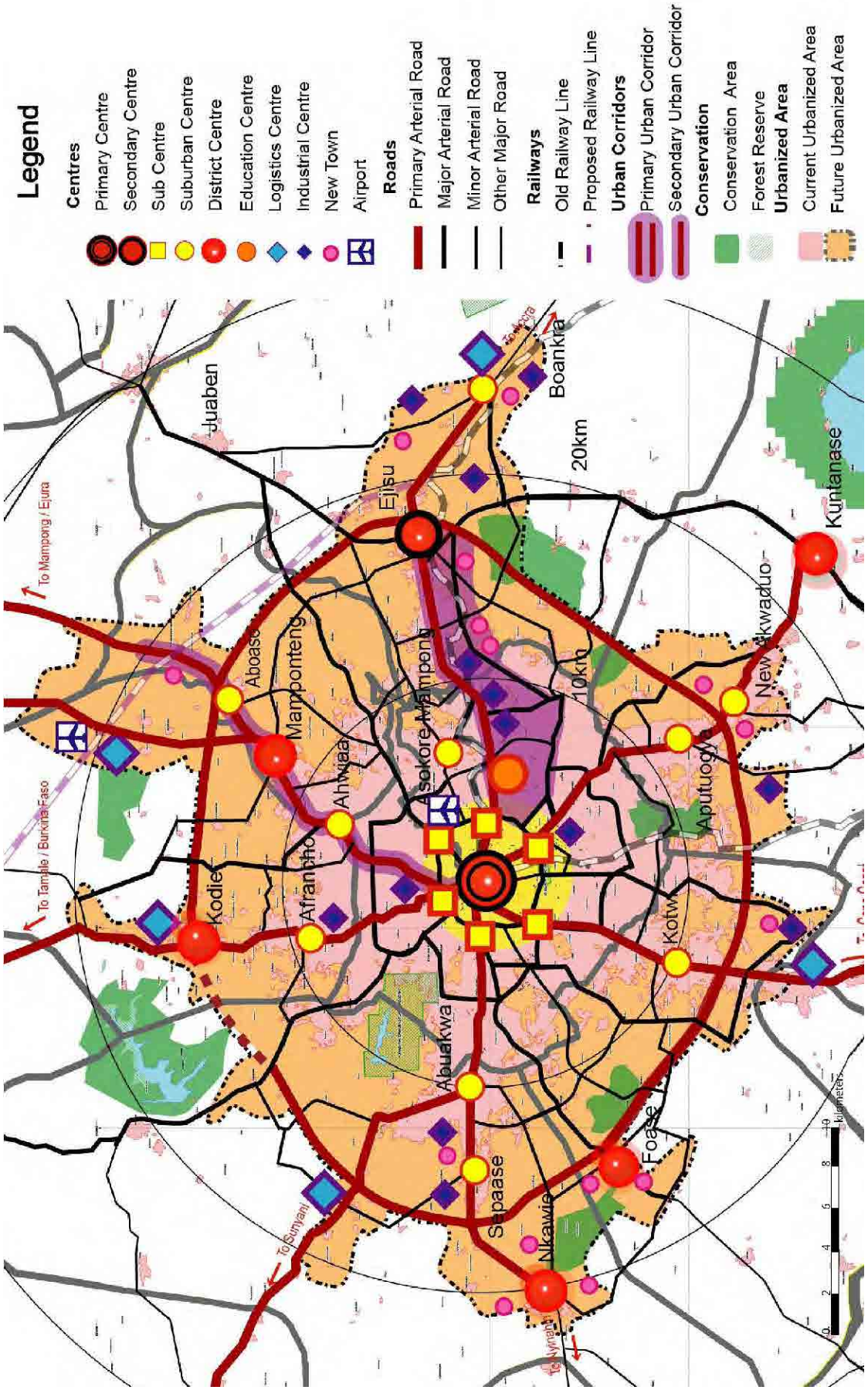
(3) Overall Spatial Structure for Greater Kumasi Sub-Region

The diagram of the overall spatial structure for Greater Kumasi Sub-Region is shown in Figure 8.2. The diagram of the overall spatial structure (the hybrid of Multiple Nucleus and Urban Corridors) for Greater Kumasi Conurbation is shown in Figure 8.3.



Source: JICA Study Team

Figure 8.2 Diagram of Spatial Development Framework for Greater Kumasi Sub-Region, 2033



Source: JICA Study Team

Figure 8.3 Diagram of Spatial Development Framework for Greater Kumasi Conurbation, 2033

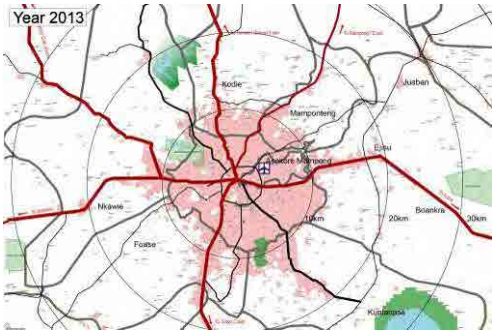
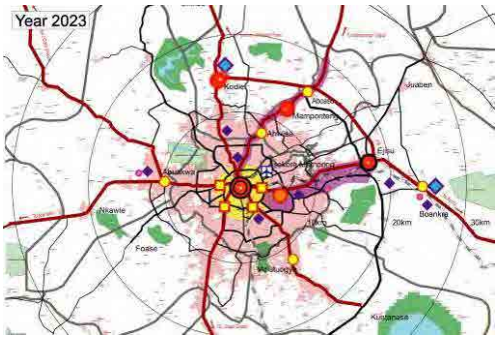
This spatial structure is also formed by implementing the following development and conservation strategies proposed in the subsequent sections of Chapter 8:

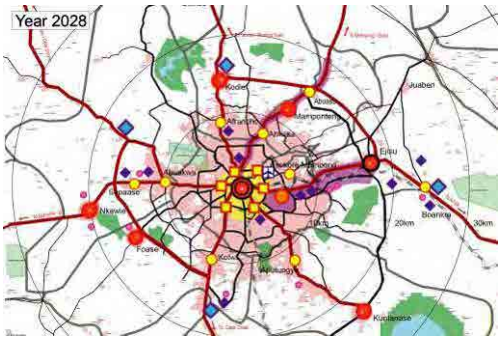
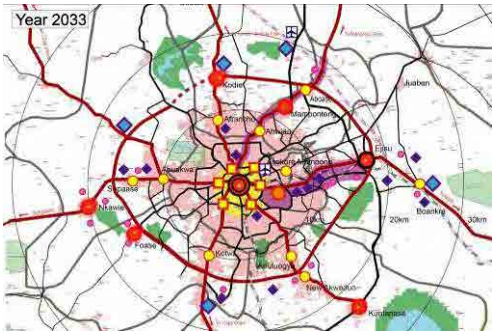
- Industrial Development Strategies
- Urban Centre Development Strategies
- Housing Development Strategies
- Strategies for Urban Growth Management in Suburban Areas
- Open Space and Recreation Strategies
- Conservation Area Strategies
- Tourism Development Strategies
- Mining Development Strategies
- Health Sector Strategies
- Education Sector Strategies
- Rural Development Strategies

(4) Phased Spatial Development Scenarios

The following phase development scenarios and recommended are considered from a very strategic point of view.

Table 8.1 Phased Spatial Development Scenarios for Greater Kumasi Sub-Region

Phase 1 2013-2023 Industrial development in Kumasi City and Boankra / Kumasi-Ejisu Urban Corridor development	• Upgrading of Ejisu-Kuntanase-Bekwai Rd (currently Regional Road) to Inter-Regional Road • Upgrading of Lake Rd, (currently Regional Road) to Inter-Regional Road • Development of Middle Ring Road Connection (currently under progress by Department of Urban Road) • Development of Second Middle Ring Road Connection • North-Eastern Section of the Outer Ring Road • The First Phase of Kumasi-Ejisu Urban Corridor • Boankra Export Processing Zone • Boankra Inland Port • The first phase of Kumasi-Mamponteng Urban Corridor by widening the Kumasi-Mampong Rd • Development of New Towns near Boankra, near Sepaase, near Nkawie and near Foase • Development of District Centres at Mamoponteng and Kodie • Development of Suburban Centres at Aboaso, Afratwo, Ahwiaa, Aputuogya, Abuakwa and Boankra • Redevelopment of Kaase Industrial Area • Development of Industrial Areas near Abuakwa, Afrantwo and to the South of Ejisu Town • Development of Logistics Centre at Boankra and Kodie	 

Phase 2 2023-2028 Acceleration of development for District Centres, New Towns and Industrial Areas in the suburban areas	• South-Western Section of the Outer Ring Road • Development of urban arterial roads • Second Phase of Kumasi-Ejisu Urban Corridor • Development of Industrial Areas south of Kotwi, near Sepaase and north of Boankra • Development of New Town near Nkawie, Foase and south of Kotwi and Aputuogya • Development of District Centres at Nkawie, Foase and Kuntanase • Development of Suburban Centres at Asokore Mampong, Kotwi, Sepaase and Afrancho • Development of Logistic Cetres along Bekwai Rd. and Sunyani Rd.	
Phase 3 2028-2033 Airport City Development	• South-Eastern Section of the Outer Ring Road • Part of North-Western Section of Outer Ring Road • First Phase of Airport City • Third Phase of Kumasi-Ejisu Urban Corridor Development • Development of New Town north of New Akwaduo, near Nkawie, Foase and Boankra • Development of Suburban Centre at New Akwaduo • Development of Industrial Area south of Aputuogya	

Source: JICA Study Team

8.2 Industrial Development

8.2.1 Objectives for Industrial Development

The objectives for industrial development are as follows:

- Revitalize industrial development in Greater Kumasi Sub-Region by attracting private investments
- Develop formal industrial sectors by promoting necessary infrastructure provision
- Modernization of informal sectors, such as car repairing services/manufacturing, by making linkage between formal sectors (including research institutes) and informal sectors

8.2.2 Strategies for Industrial Development

(1) Short-Term Strategies

The short-term strategies for industrial development are as follows:

- Start making an effort at revitalizing economic and industrial development using the following existing resources:
  - Unused lands and existing infrastructures available in the Kaase Industrial Area
  - Teachers, researchers and students (graduates) of KNUST and land available for development in KNUST Campus

- Develop an Export Processing Zone in Boankra for attracting private investment
- Improve Ejisu-Kuntanase Road (existing road) and designate industrial areas for promoting development of factories
- Major focus would be made on the agro-processing industry.
- Linkage between informal sectors and formal sectors (including research institutes) should be created for modernizing the informal sectors.

(2) Medium and Long-Term Strategies

The medium and long-term strategies for industry development are as follows:

- Promote industrial development in Kodie, New Bekwai Road and Nkawie by securing stable water supply
- Construct an Outer Ring Road and develop industrial estates along the Outer Ring Road, by providing stable electricity and water

8.3 Urban Centres and Urban Corridor

8.3.1 Objectives for Urban Centre Development

The objectives for urban centre development are as follows:

- Create a Kumasi City Centre with advanced high urban functions to support and sustain socio-economic development of Greater Kumasi Sub-Region and Ashanti Region as a whole.
- Maintain the Kumasi City Centre as the capital of Ashanti culture and people.
- Decentralize urban functions from Kumasi City toward suburban areas within Greater Kumasi Sub-Region in order to solve too much concentration of traffic in Kumasi City Centre.
- Develop District Capitals and Suburban Centres which could provide jobs and services for their surrounding suburban areas including rural areas.
- Integrate the Kumasi City Centre and urban functions in suburban areas strongly by efficient transportation and communication systems.

8.3.2 Strategies for Urban Centre Development

(1) Hierarchy of Urban Centres

In order to achieve a multi nucleus spatial structure also based on urban corridors, the following hierarchy of urban centres is recommended for the Greater Kumasi Sub-Region:

- Primary Centre (Kumasi City Centre): Central Core and Sub Centres along the Inner Ring Road
- Central Core: Areas within the Inner Ring Road
- Sub Centres: Centres near main roundabouts along the Inner Ring Roads
- Secondary Centre (Ejisu City Centre): Ejisu Municipality Capital Town
- Primary Urban Corridor (Kumasi-Ejisu Urban Corridor): Belt Area to be developed along Kumasi-Ejisu Road by building another road in parallel with Kumasi-Ejisu Road

- Secondary Urban Corridor (Kumasi-Mamponteng Urban Corridor): Corridor to be developed along Kumasi-Mampong Road
- Tertiary Centres (District Centres): District Capital Towns
  Mamponteng, Kodie, Nkawie, Foase and Kuntanase
- Suburban Centres: Within the Greater Kumasi Conurbation
  Ahiwa and Aboaso (Kwabre East), Afrancho (Afigya Kwabre), Abuakwa and Sepaase (Atwima Nwabiagya), Kotwi, (Atwima Kwanwoma), Aputuogya and New Akwaduo (Bosomtwe) and Boankra (Ejisu-Juaben) and Asokore Mampong (Asokore Mampong)

(2) Kumasi City Centre

The Kumasi City Centre should have the following urban functions:

- Central Business District (CBD) accommodating regional headquarters of public institutions and private corporations
- Modern shopping centres including high-end retail commerce of regional importance
- Cultural facilities
- Open spaces and sports facilities of regional importance
- Residence (low-rise and mid-rise)
- Neighbourhood retail commerce

(3) Ejisu City Centre

The following urban functions should be developed for Ejisu City Centre:

- Central Business District (CBD) accommodating sub-regional headquarters of public institutions and private corporations
- Modern Suburban Shopping Centres
- Wholesale commerce
- Suburban retail commerce
- Cultural facilities
- Health and education institutions of sub-regional importance
- Open spaces and sports facilities of sub-regional importance
- Low-rise and mid-rise residence
- Neighbourhood retail commerce

(4) Kumasi-Mamponteng Urban Corridor

The following urban functions should be developed for Kumasi-Mamponteng Urban Corridor:

- Modern shopping centres of sub-regional importance
- Business offices
- Suburban retail commerce
- Light industries
- Health and education institutions of sub-regional importance
- Low-rise and mid-rise residence

(5) District Centres

The following urban functions should be developed for District Centres:

- Government offices of district importance
- Suburban modern shopping centres of district importance
- Business offices
- Suburban retail commerce
- Health and education institutions of district importance
- Low-rise and mid-rise residence

(6) Suburban Centres

The following urban functions should be developed for Suburban Centres:

- Suburban modern shopping centres of district importance
- Business offices
- Suburban retail commerce
- Health and education institutions
- Low-rise and mid-rise residence

8.4 Transformation of Kumasi City Centre

8.4.1 Objectives for Transformation of Kumasi City Centre

The objectives for transformation of Kumasi City Centre are as follows:

- Upgrade the physical and functional capacity of the CBD of Kumasi City Centre (Kumasi's Central Area)
- Upgrade the physical and functional capacity of immediately surrounding areas of Kumasi's CBD
- Increase the residential capacity of Kumasi City Centre
- Enhance the traffic capacity of Kumasi's Central Area
- Strengthen integration between Kumasi City Centre and its surrounding areas by improving transportation
- Improve urban amenities for residents and visitors within Kumasi City Centre
- Improve the walking environment within Kumasi City Centre
- Improve the sense of the Ashanti cultural and social centre in Kumasi City Centre

8.4.2 Strategies for Transformation of Kumasi City Centre

(1) Strategies for the Central Core

The strategies for the central core of Kumasi City Centre are as follows:

- Establish a larger CBD area by developing a New CBD and by strongly integrating the new CBD and the existing CBD (Adum Area) in order to upgrade functions and physical space for Kumasi's CBD by the following measures:
  - Construct new roads and BRT routes for strongly integrating the New CBD, and the existing CBD

  - The New CBD is functionally complementary with the existing CBD (Adum Area)
- Redevelop army barracks, old housing areas and others, which have occupied good central locations for increasing:
  - Mid-rise housing buildings, as well as for introducing mixed development in the Central Core of Kumasi
  - Conserve historical areas with historical buildings in order to maintain the identity of the Ashanti by designating them as important
  - Modernize the Central Market and reduce the number of roadside hawkers
  - Maintain open space including parks and green areas in the Central Core
  - Establish pedestrian zones for enabling safe and comfortable walking and bicycling

(2) Strategies for Sub Centres

The strategies for Sub Centres which are at the intersections of Inner Ring Road and Primary Arterial Roads are as follows:

- Establish Sub Centres by the following measures:
  - Designate "Action Areas for Commercial and Business Uses" in the Structure Plan for Greater Kumasi Conurbation
  - Give incentives for Larger Volume of Development through Rezoning
  - Develop flyovers for grade separation of the junctions at the Inner Ring Road and major radial urban arterial roads (in the Sub Centres)
  - Establish BRT major stations, where people can change BRT routes and bus routes, near the junctions (in the Sub Centres)

(3) Strategies for Inner Ring Road Areas

The strategies for areas around Inner Ring Road are as follows:

- Designate Mixed Development Areas for accommodating commercial and business uses, as well as residential uses along the Inner Ring Road
- Designate mid-rise housing areas (for middle-income people) behind the Mixed Development Areas along the Inner Ring Road by rezoning in the Structure Plan for Greater Kumasi Conurbation
- Access to those mid-rise and high-rise housing areas should not be made directly from the Inner Ring Road. Access roads are required for locating mid-rise residential buildings.
- Relocate part of the existing Suame Magazine to other areas for reducing traffic congestion

(4) BRT Routes and BRT Key Stations within Kumasi City Centre

The strategies for BRT routes and BRT key stations with in Kumasi City Centre are as follows:

- BRT Routes are to be arranged for connecting District Centres / Suburban Centres with Kumasi City Centre.
- The BRT Routes coming from suburban areas have four key stations (major BRT transfer stations); Bantama, Zoological Garden (or Kejetia), Fanti New Town and Kumasi South (Dadiesoaba) within Kumasi City Centre.

- These four BRT key stations should be created by implementing urban redevelopment projects, which could provide business and commercial spaces.
- The four BRT key stations should also have car parking buildings so that car drivers could park their cars and transfer to BRTs.
- Within Kumasi City Centre, an inner route for BRT is to be operated connecting the four BRT key stations and surrounding the Central Core.
- Part of the BRT inner route would use the space of the former railway line.

(5) Pedestrian Zones in Kumasi Centre

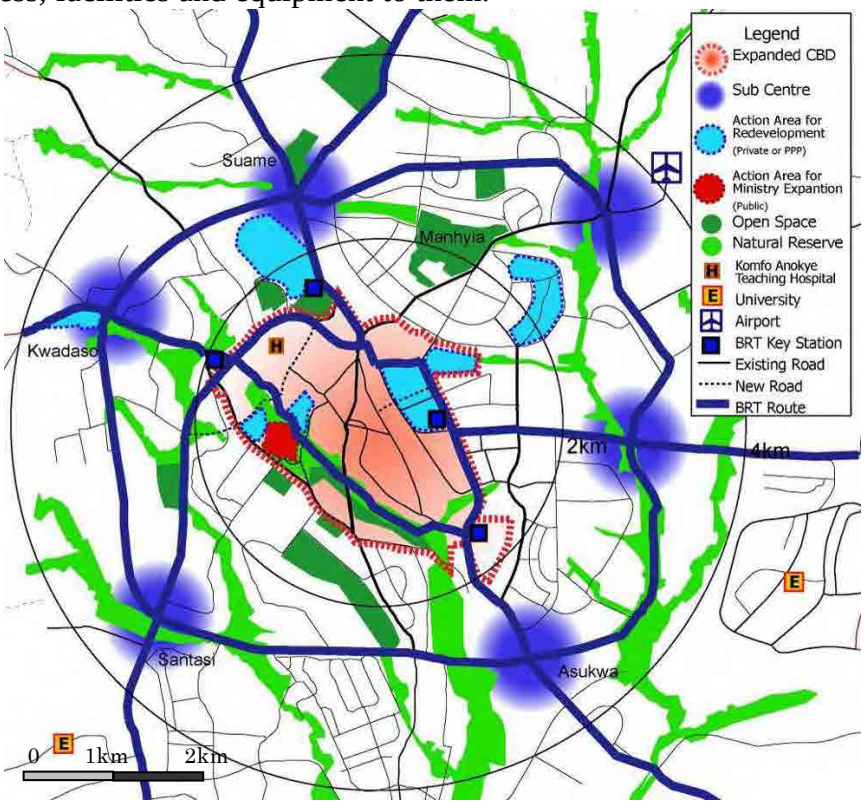
The strategy for pedestrian zones in Kumasi Centre is as follows:

- By operating BRT services on Kumasi City Centre-Suburban Routes and Inner Circle Routes for the Kumasi City Centre, car usage can be restricted to a certain extent and higher priority can be given to pedestrians in the future.

(6) Open Space Strategies in Kumasi City Centre

The strategy for open space in Kumasi City Centre is as follows:

- Open Spaces and parks were proposed by the Planning Scheme for Kumasi City prepared in 1963. These open spaces and parks have been mostly protected from other uses. However, the utilization of those spaces by people has been minimal. Therefore it is necessary to enable people to use and enjoy those open spaces and parks by providing proper access, facilities and equipment to them.



Source: JICA Study Team

Figure 8.4 Diagram for Proposed Spatial Structure for Kumasi City Centre with BRT Routes and BRT Key Stations, 2033

8.5 Housing Development

8.5.1 Objectives for Housing Development

The objectives for housing development are as follows:

- Provision of an Adequate Volume of Housing Units for the Rapidly Increasing Urban Populations
- Housing Development in response to Restructuring of the Urban Structure
- Improvement of Living Environments both in Central Areas and in Suburban Areas
- Creation of Sound Housing Markets

8.5.2 Strategies for Housing Development

The strategies for housing development are sort out into five categories as below.

(1) Redevelopment for Mid and High-Rise Housing Provision in Kumasi City Centre

- Zoning-based Urban Transformation: Promote land use intensification and densification of residential functions in low-density residential areas and alongside commercial roads. Construction of mid- and high-rise complex buildings, which allocate commercial functions on the lower floors and residential on higher floors, should be promoted by zoning incentives.
- Project-based Urban Transformation: Implement urban (re-)development projects by public entities, private developers, or public-private partnerships for housing provision.
- Implementation for Redevelopment for Middle and High-rise Residential Buildings: One type is rebuilding based on plot by plot. The other is redevelopment by consolidating plots.
- Strategic Land Acquisition for Urban Redevelopment in Kumasi City Centre: Unutilized lands in Kumasi City Centre should be, in a strategically planned manner, acquired by public entities in accordance with the Sub-Region Structure Plan. The acquired lands should be, in a timely and phased manner, developed for provision of residential functions in accordance with the Sub-Regional Structure Plan.

(2) Mid-Rise and High-Rise Residential Development in Suburban Areas

- Mid- and high-density residential functions should be allocated in the course of restructuring of the existing urban space including the following locations:
  - Alongside the primary/secondary urban corridors: Integrated with BRT bus stops
  - In the areas surrounding the Suburban Centres
  - In the areas surrounding interchanges of the Outer Ring Roads
- These developments will be mostly implemented by private developers or public-private partnerships with zoning incentives. In the areas with low development potential, complex development projects should be strategically implemented by public entities to encourage private development.

(3) New Town Development outside the Outer Ring Road

- In order to provide housing units in a large quantity with better environment, new town development should be promoted by Public-Private Partnership (PPP) initiatives.

- The new towns should be developed as new residential areas, consisting of single family houses and multi-family/multi-storey apartment buildings, together with new town centres for providing services and working places.

(4) Housing Market Development

- Increasing of the housing stock and provision of more housing choices are necessary for accelerating relocation of mid- and high-income people.
- Profitable mid and high-rise residential development should be promoted for mid and high-income people within Kumasi City Centre and alongside the primary/secondary urban corridors. Some development should be supported by subsidies from public funds.
- By encouraging the relocation of mid and high-income people to mid and high-rise housing buildings and suburban housing areas, old houses will provide opportunities for low-income people to rent them. These relocations will stabilize housing markets.
- Provision of public/social housing for low-income people should also be promoted to strengthen housing markets.

(5) Monitoring the Housing Situation

- The standards for residential units, including the number of persons occupying a residential unit were proposed by TCPD and are being adopted by the government.
- Public entities should establish and operate a monitoring system to achieve these standards.

8.6 Urban Growth Management for Suburban Areas

8.6.1 Objectives for Urban Growth Management for Suburban Areas

The objectives for urban growth management for suburban areas are as follows:

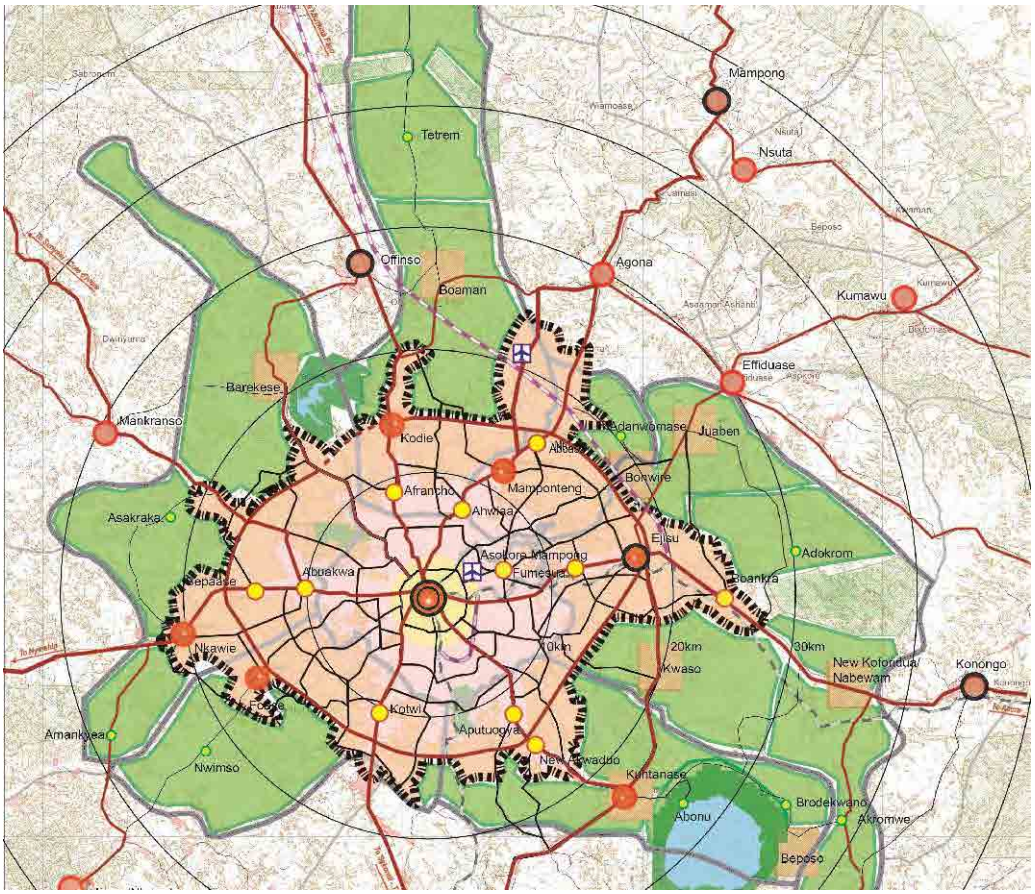
- Create better and attractive environments for residents and businesses in suburban areas of Greater Kumasi Conurbation by providing appropriate basic infrastructure and services
- Make a compact conurbation area of Kumasi within Greater Kumasi Sub-Region

8.6.2 Strategies for Urban Growth Management for Suburban Areas

The strategies for urban growth management for suburban areas are as follows:

- Control and guide urban sprawl of residential area development in fringe areas adjacent to Kumasi City by seeking the following directions:
  - Selectively providing basic infrastructure and services
  - Selectively controlling permits for land use and buildings
- In order to purse the above mentioned strategic direction, an Urban Growth Boundary (UGB) should be set for the objectives for urban growth management in suburban areas of Greater Kumasi Sub-Region.
- The UGB is the same as the boundary for the Structure Plan Area for Greater Kumasi Conurbation.
- The UGB should be used for controlling urban development as follows:
  - Outside the UGB, principally no urban developments should be allowed.

- Outside the UGB, preparation and approval of local plans (layout plans) should be strongly restricted.
- Outside the UGB, high priority should not been given to provision of urban infrastructures/services and restricted.
- Outside the UGB, special large-scale planned urban development projects could be approved for implementation if proper infrastructure and services are provided by the project.



Source: JICA Study Team

Figure 8.5 Urban Growth Boundary (UGB) for Greater Kumasi Sub-Region

8.6.3 Green Space outside Urban Growth Boundary

Outside the UGB, rural-agricultural-natural environments should be conserved for rural life including agricultural production and natural environments in suburban contexts in vicinity to Kumasi City.

By implementing the measures of using UGB, urbanization pressures outside the UGB will be reduced. As a result, it is expected more areas of agriculture and other green spaces will remain undeveloped or un-urbanized. More green space like agriculture land, wood land and water bodies will be conserved by implementing urban growth management using urban growth boundaries.

8.6.4 Structure Plan Areas to be Designated by the Sub-Regional SDF

The SDF for Greater Kumasi Sub-Region should designate structure plan areas. In addition to Greater Kumasi Conurbation, structure plans should be formulated for the following town areas:

- Kuntanase Town in Bosomtwe District
- Beposo Town in Bosomtwe District
- Boaman/Amoako/Chinikurom/Maase Towns in Afigya Kwabre District
- Juaben Town in Ejisu-Juaben Municipality
- Bonwire Town in Ejisu-Juaben Municipality
- Kwaso Town in Ejisu-Juaben Municipality
- Nobewam/New Korforidua Town in Ejisu-Juaben Municipality
- Barekese Town in Atwima Nwabiagya District

8.7 Open Space and Recreation

8.7.1 Objectives for Open Space and Recreation Facility Development

The objectives for open space and recreation facility development are as follows:

- Preserve existing open spaces as much as possible
- Improve existing open spaces for people's unitization physically and operationally
- Encourage people to participate in sports, recreational and leisure activities as healthy lifestyles
- Develop open spaces and recreational facilities in response to increasing urban populations
- Promote conservation of cultural heritage and nature in both urban and rural areas

8.7.2 Strategies for Open Space and Recreation Facility Development

The strategies for open space and recreation facility development are as follows:

- Secure existing parks and open spaces located in Kumasi City Centre and owned by the government, by cooperating with government organizations
- Secure, develop and utilize open spaces and vacant lands located in suburban areas, by applying PPP approach and combining with private development
- Designate green belts as public open spaces to preserve the natural environment by implementing measures for using Large Urban Growth Boundaries and Small Urban Growth Boundaries
- Describe proposals for the local field sport facilities and public open space to be accessible to the urban centres in the district level Structure Plans
- Promote utilization of the existing open space, maintaining and managing properly so that it may not be converted to other land use
- Establish a hierarchical system of parks and recreational facilities based on the present manual etc., and promote provision of the recreational facilities
- Establish the following parks following the hierarchical park system:
  - Two riverside regional parks within KMA

1) Riverside Park in North Patase
2) Riverside Park between Adum and Ridge

- Five regional parks or regional sports facilities in the following locations:
  1) Owabi Eco-Park: Regional Park with a Botanical Garden
  2) Barekese Eco-Park: Regional Park with Forest Trails and Cycling Routes
  3) Aiport Amusement Park: Regional Park with an Amusement Centre
  4) Bobiri Regional Park which has a large open space and recreational areas in the vicinity of Bobiri Wildlife Reserve
  5) Kuntanase National Football Stadium with Other Sports Facilities
- One district park for each submetro except Subin Submetro and Tafo Submetro within KMA
- One district park for each district outside KMA

- By implementing these developments, the total area for parks and sports facilities within Greater Kumasi Sub-Region will become 296 ha, which attains 0.51 m^2 per person of parks and sports facilities in 2033.

8.8 Conservation Areas

8.8.1 Objectives for Conservation of Natural Environment and Water Resources

The objectives for conservation of natural environment and water resources are as follows:

- Protect natural and built environments and scarce resources
- Increase/maintain storage capacity and improve water quality of existing dams
- Secure catchment areas for dam development
- Mitigate and reduce natural disasters and reduce risks and vulnerability
- Conserve areas of religious, cultural or archaeological importance
- Protect the inhabited environment from the bad effects of solid waste disposal sites
- Protect and conserve riverside areas (Buffer Zones) for managing rivers, nature conservation and recreational open spaces.

8.8.2 Strategies for Conservation of Natural Environment and Water Resources

The strategies for conservation of natural environment and water resources are as follows:

- Reinforce law enforcement and conservation activities for the following reserves:
  - Bobiri Wildlife Reserve
  - Forest Reserves (Bobiri, Gianima, Asufu Shelter Belt West, and Kumasi)
- Conserve the surrounding areas of Bosomtwe Lake by designating them as a conservation area where only limited development is permitted, for conserving precious nature, as well as for sustainable tourism development
- Restrict construction of structures in flood-prone areas by designating conservation areas over certain flood-prone areas and by enhancing law enforcement
- Strengthen law enforcement in Owabi Wildlife Reserve for protecting sources of water supply

- Conserve the surrounding areas of Barekese Dam by designating them as a conservation area where no new development is permitted
- Prevent waste water from flowing into the reservoirs of Owabi Dam and Barekese Dam
- Prevent dumping of solid waste into rivers, especially in the catchment areas of Owabi Dam and Barekese Dam
- Take effective, prompt and continuing measures to protect the catchment area of new surface water resources for water supply to Greater Kumasi Sub-Region, because the surface water resources endowed in Greater Kumasi Sub-Region are limited
- Conserve the natural environment in suburban areas, such as greenery open space, woodland and water bodies by implementing measures using Large Urban Growth Boundaries and Small Urban Growth Boundaries
- Designate, protect and conserve Buffer Zones along rivers for managing rivers, conserving the nature and creating recreational open spaces.

8.9 Tourism Development

8.9.1 Objectives for Tourism Development

The objectives for tourism development for Greater Kumasi Sub-Region are as follows:

- To attract more domestic and international tourists to existing tourist sites and facilities, and
- To provide better opportunities for cultural and recreational experiences for residents and visitors.

8.9.2 Strategies for Tourism Development

The strategies for tourism development are as follows:

- Conservation of Tourism Areas and Improvement of Access to Tourist Areas for Promoting Tourism: to identify potential tourism areas for conserving their resources and environment, as well as to secure proper access to them.
  - Cultural Tourism Area in Kumasi City Centre (Manhyia Palace, historical conservation area near Manhyia, Cultural Centre and Zoological Garden)
  - Ejisu-Kwabre Tourism Area (Traditional Shrines in the surrounding villages of Ejisu, handicraft and woodcarving in Ahwiaa, and Kente weaving, Adinkara symbol cloth printing in Adanwomase and Ntonso)
  - Asenemaso Shrine in Atwima Nwabiagya
  - Nature Reserve Areas (Bosomtwe Lake Tourism and Resort Area, Eco-tourism in Bobiri Wildlife Sanctuary and Eco-tourism in Owabi Wildlife Sanctuary)
- Development of Tourist Attraction in Agricultural Areas: potential agriculture or agro-industry related tourist attractions in Greater Kumasi Sub-Region include Agricultural Fair at Nkawie and Palm Oil Factory at Juaben.
- Development of International Standard Convention and Exhibition Centres in Kumasi-Ejisu Urban Corridor: high-standard exhibition and conference centres

8.10 Mining Sector

8.10.1 Objectives for Management of the Mining Sector

The objectives for management of the mining sector are as follows:

- Provide an adequate enabling environment for the mining sector, which is part of the important resources for economic development
- Mitigate negative impacts to agriculture, the natural environment and urban environment

8.10.2 Strategies for Management of the Mining Sector

(1) Gold Small-Scale Mining

Designation of small-scale mining activities and registration of small-scale miners with the Mineral Commission through District Assemblies should be implemented so that small-scale miners should follow certain conditions/regulations for governments to collect taxes from small-scale miners.

(2) Rock Quarry and Sand Winning

Looking at the future extent of urbanization in the surrounding districts of KMA, it is necessary to regulate rock quarrying and sand winning activities in a proper manner within urbanizing areas.

In order to avoid nuisance and negative impacts, it is necessary for district SPs to designate certain areas for prohibiting rock quarrying and sand winning, especially in urbanized areas, even though those areas have potential for quarrying and sand wining.

In order to prevent destruction of good agricultural land by mining activities, it is necessary for district SDFs to designate certain areas for prohibiting mining activities including rock quarrying and sand wining in rural areas.

8.11 Health Sector

8.11.1 Objectives for the Health Sector

The objective for the health sector is to provide people with the necessary access to health facilities in both KMA and adjoining districts, by increasing the number of health facilities in the adjoining district and to balance the spatial distribution of health facilities in the Greater Kumasi Sub-Region, as well as by improving the quality of health services to be provided.

8.11.2 Strategies for the Health Sector

In Ghana, the health centre functions as the primary health care facility, district hospital as the secondary health care facility and regional hospital as the tertiary health care facility. Therefore every region and every district should have at least one regional hospital and one district hospital respectively. However Ashanti Region does not have any regional hospital and Konfo Anokye Teaching Hospital has being playing the role of tertiary health care

facility. Additionally there are also some districts which do not have any district hospital in Greater Kumasi Sub-Region.

Considering the above, the strategies for the health sector of Greater Kumasi Sub-Region area as follows:

- To establish a regional hospital in Sawuah of Bosomtwe District
- To promote the establishment of another Regional Hospital[4] in the Kumasi-Ejisu Urban Corridor outside KMA within the Greater Kumasi Conurbation in response to its population increase
- To promote the establishment of district hospitals in the newly established districts such as:
  - Atwima Kwanwoma District, and
  - Asokore Mampong Municipality
- To promote the establishment of a second district hospital in the districts which do not have district hospitals in either the District Centre or Suburban Centre, which are:
  - Atwima Nwabiagya District (Abuakwa),
  - Afigya Kwabre District (Kodie), and
  - Kwabre East District (Mampongteng or Ahiwaa)
- To promote the establishment of urban health centres in suburban areas of Greater Kumasi Conurbation.
- To promote the establishment of health centres in the following Key Rural Towns:
  - Abonu (Bosomtwe)
  - Brodekwano (Bosomtwe)
  - Amankyea (Atwima Nwabiagya)
  - Asakraka (Atwima Nwabiagya)
  - Nyama Yaede (Ejisu-Juaben)

8.12 Education Sector

8.12.1 Objectives for the Education Sector

The objectives for the education sector in the Greater Kumasi Sub-Region are as follows:

- To provide people with the necessary access to senior high schools in both KMA and adjoining districts, especially by increasing the number of senior high schools in the adjoining district and to balance the spatial distribution of senior high schools in the Greater Kumasi Sub-Region, as well as by improving the quality of educational services at the senior high schools to be provided.
- To provide necessary senior high schools in rural areas within the Greater Kumasi Sub-Region.
- To attract or promote high educational institutions in Greater Kumasi Sub-Region for maintaining the status of national education centre in Ghana

[4] According to "Zoning Guideline and Planning Standards" published by TCPD (November 2011), one Regional Hospital is to serve up to 1,000,000 persons.

8.12.2 Strategies for the Education Sector

The strategies for the education sector in the Greater Kumasi Sub-Region are as follows:

- To promote the establishment of senior high schools in suburban areas of Greater Kumasi Conurbation for covering the future population growth, especially to attract private senior high schools for satisfying the needs for increasing suburban population
- To promote the establishment of senior high schools in identified Key Rural Towns, which do not have senior high schools yet
- To provide enable environment (for example, by providing lands and necessary access) to attract or promote development of high education institutions within the Greater Kumasi Sub-Region
- To strengthen the linkage between higher education institutes (KNUST etc.) and the industry by advancing the research work of the education institutes and putting effort into ICT industry

8.13 Rural Development

8.13.1 Objectives for Rural Development

The objectives for rural development are as follows:

- Enhance urban-rural linkage in the socio-economy of the Greater Kumasi Sub-Region
- Protect good agricultural land outside the Greater Kumasi Conurbation
- Identify and develop rural towns which could be rural service centres with strong integration with Greater Kumasi Conurbation Area
- Diversify economic sectors in rural areas by targeting the expanding urban and suburban markets of Greater Kumasi Conurbation
- Promote development of the formal industrial sector, especially in agro-processing industries together with promotion of private investment in agriculture for supply of raw material to agro-processing industries
- Promote recreational and leisure activities for domestic tourists and urban visitors for diversifying the economic sectors
- Promote development of mining activities as well as management of the environment in rural areas

8.13.2 Overall Strategies for Rural Development

The strategies for rural development are as follows:

- Promote suburban agriculture which is to produce fresh vegetable and fruits, targeting at selling to an increasing number of middle-income urban dwellers in Greater Kumasi Conurbation
- Identify and protect good agricultural lands from uncontrolled urban sprawl by preparing District SDFs
- Designate and develop key rural towns so that the key rural towns could play roles of not only as rural service centres but also as agricultural centres
- Designate and improve key feeder roads connecting key rural towns and District Centres /

Suburban Centres for stronger integration between rural areas and Greater Kumasi Conurbation

- Designate "Rural Planning Areas" for promoting integrated rural development with diversified economic sectors including agriculture, tourism (domestic tourism, recreation for urban dwellers), mining and agro-processing industries.
- Promote private investment in both agro-processing industries and agriculture in an integrated manner
- Development of destinations for recreational and leisure activities for domestic tourists and urban visitors
- Establish information centres at rural towns for domestic tourists and urban visitors
- Implement enforcement of laws and regulations both for promoting development of mining activities and management of the environment

8.13.3 Rural Town Development for Enhancing Urban-Rural Linkage

Within the Greater Kumasi Sub-Region, twelve Rural Planning Areas and Key Rural Towns are identified. See Figure 8.2.

- Each rural planning area has its own characteristics in agriculture, tourism and small industries.
- Key Rural Towns are not only service centres for rural people's lives in surrounding communities but also agricultural centres for providing chemical inputs, farming equipment and trading agricultural produce.
- Key Rural Towns are connected to district centres or regional roads through feeder roads.

(1) Agricultural Centres

Key Rural Towns are intermediate points linking farming areas and urban areas, distributing goods (fertilizers/pesticides, farming equipment, seedlings and others) to farmers and consumption products for farmers' families from urban areas to farming areas and collecting/processing and transporting agricultural produce from farming areas to urban areas.

Such Key Rural Towns will become more important not only for increasing productivity of agriculture sectors but also for supplying raw materials (agricultural produce) to agro-processing industries.

(2) Tourist and Recreational Centres

In the future, Key Rural Towns will become more important as tourist and recreational gateways to their rural planning areas because increasing urban populations need rural, open and recreational space in surrounding areas of congested urban areas.

Key Rural Towns should provide services (selling special products, art crafts, souvenirs and meals/resting, and others) for the tourists and visitors to recreation/sport areas.

8.13.4 Agricultural Development Strategies for Rural Areas within Greater Kumasi Sub-Region

Agricultural development is one of the important components for rural development strategies in rural areas outside the Greater Kumasi Conurbation. The following points are part of the agricultural development strategies:

- Promote private business development of suburban agriculture in response to massive urban population increase
- Promote linkage among suburban agricultural businesses, government and universities (Agricultural College, CSIR, KNUST)
- Develop agricultural market places in Suburban Centres and District Centres
- Attract agricultural investments through promoting establishment of industrial estates for agro-processing industries

Chapter 9 Sub-Regional Strategies for Infrastructure Sectors

9.1 Transportation

9.1.1 Background and Issues on Transportation

(1) Background and Issues on Public Transportation in Greater Kumasi Sub-Region

The public transportation services in Greater Kumasi Sub-Region are inefficient with road network dominated by a low capacity mode of transport at around 82% (cars, taxis and trotro). As a result traffic congestion results in long and uncertain lengths of travel time among commuters. Traffic congestion is particularly severe in the city centre as well as major junctions during peak hours. In addition, waiting passengers at the terminal are deprived of basic services due to lack of toilets, urinals, benches, sheds, among other things which could make their waiting comfortable.

(2) Background and Issues on Road Network Development in Greater Kumasi Sub-Region

The road development between Kumasi and surrounding districts is imbalanced. While road connections and road surfaces were observed to be good in Kumasi City, the road network of neighbouring districts is characterized by deteriorated road surfaces and missing links. Of the 1,753 km road network of Greater Kumasi Sub-Region, more than half (62%) are still unpaved.

(3) Background and Issues on Freight Transportation in Greater Kumasi Sub-Region

Concerning freight transportation, traffic congestion is one of the serious issues affecting the economic sectors. Poor supply of infrastructure that supports the freight industry is also notable and partly manifested by indiscriminate parking of trucks along the major roads of Kumasi and its adjoining districts. Overloaded trucks and a high number of pot holes and other types of damages on the road surface exist along the major freight corridors.

(4) Background and Issues on Pedestrian Walkways in Greater Kumasi Sub-Region

Pedestrian walkways are uninviting for various reasons such as existence of illegal structures, presence of vendors, and cars treating the space as car parking among others. These obstructions impede pedestrians' movements which often results in overflow of pedestrians onto the road. This reduces the capacity of the road and exposes pedestrians to danger.

9.1.2 Objectives for Transportation Development and Management

The objectives for transportation development and management are as follows:

- To provide high quality of transportation infrastructure to strengthen socio-economic linkage of Kumasi to surrounding districts and other regions.
- To establish efficient public transportation along the key corridors of Greater Kumasi Sub-Region to facilitate mass movement of people and goods efficiently.

- To support socio-economic development of Greater Kumasi Sub-Region and induce development along key corridors and surrounding districts.

9.1.3 Strategies of Transportation Development and Management

The strategies of transportation development and management are sort out into five categories as below.

(1) Strategies for Highway Network System

- Reorganize the hierarchy of roads within the Greater Kumasi Sub-Region / Greater Kumasi Conurbation:
  - By identifying "Urban Arterial Roads" composing major roads/streets.
  - By upgrading minor local roads to regional roads, which should serve as the connections between major radial roads within a 10km radius from the city centre
  - By identifying collectors/distributors among small roads
- Develop BRT's infrastructure covering the following corridors: Mampong Road, Offinso Road, Sunyani Road, Bekwai Road, Lake Road, Accra Road, Antoa Road, Abrepo Road, Old Bekwai Road and the Inner Ring Road. Widening of these corridors to at least two-lane per direction to accommodate a dedicated lane for BRT routes is desirable.
- Develop the Outer Ring Road to enhance the function of the road network and to eliminate transit traffic through urban areas of Kumasi and also to disperse incoming traffic to urban centres.
- Recognize the importance of constructing the first section of the Outer Ring Road between Ejisu and Kodie to accelerate new development in Mamponteng and Kodie.
- In addition to the Inner Ring Road and Outer Ring Road, promote the realization of a middle ring road for better traffic circulation by identifying existing roads that can be improved to form a Middle Ring Road.
- Develop a new arterial road from Ejisu to Kumasi that runs parallel to Accra Road to provide an alternative route and to further strengthen the connection between the two key towns.
- Recognize the necessity to increase the road capacity by widening critical roads for traffic such as the Western Bypass section, Southern Bypass section, Lake Road, Mampong Road, Harpor Road, New Bekwai Road, Antoa Road. Coupled with this effort, the construction of missing links like connecting Lake Road to Century Hall Road, and Old Bekwai Road to New Bekwai Road could provide more direct routes.
- Consider construction of grade separation at critical junctions like Suame, Abrepo, Sofoline, Anloga, and Bewai to reduce snarled traffic and improve traffic flow.

(2) Strategies for Public Transport System

- Promote a shift from low capacity (trotro) to high capacity public transport system (large bus) as a backbone of the transportation system. To ensure higher success of bus-oriented transportation, trotro routes should not compete with bus routes. Trotro can operate as feeders to buses or other roles that are complementary to bus service.
- Development of BRT and a bus network that covers the nine radial roads and Inner Ring Road.
- Development of "Urban Arterial Roads" to establish these public transport corridors,

where large buses are operated, and some of which are used for BRTs.

- Development of Transfer Points/Interchange Hubs in Tafo, Anloga, Kwadaso, Abinkyi, and Ejisu where long distance trips terminate. Trips to their final destinations will be facilitated by another transport mode.

As for the role of the railway, it is considered that by 2033, the railway plays a limited role only by rehabilitation of the existing railway lines (between Boankra/Ejisu and Kumasi and between Bekwai and Kumasi). For Greater Kumasi, heavy railway is considered too expensive to operate at least by 2033. However, the establishment of BRT routes on six major radial roads could prepare the foundation for railway's future development by utilizing the space (dedicated lanes) for BRT.

(3) Strategies for Traffic Control and Demand Management System

- Optimization of traffic light signals in Abrepo Junction, Kofron Junction, Zoo Junction, Aboabo Junction, Top High Junction, Anloga Junction and Amakom Junction to improve traffic flow.
- Apply vehicle access restrictions (e.g. one-way restriction) in areas with a high number of pedestrians like Adum and Central Market.
- In the future, consider implementing truck access restrictions (truck ban) on heavy trucks (e.g. 3.5 ton) from entering the Inner Ring road to contribute to decongestion.

1) **Strategies for Parking Management System**

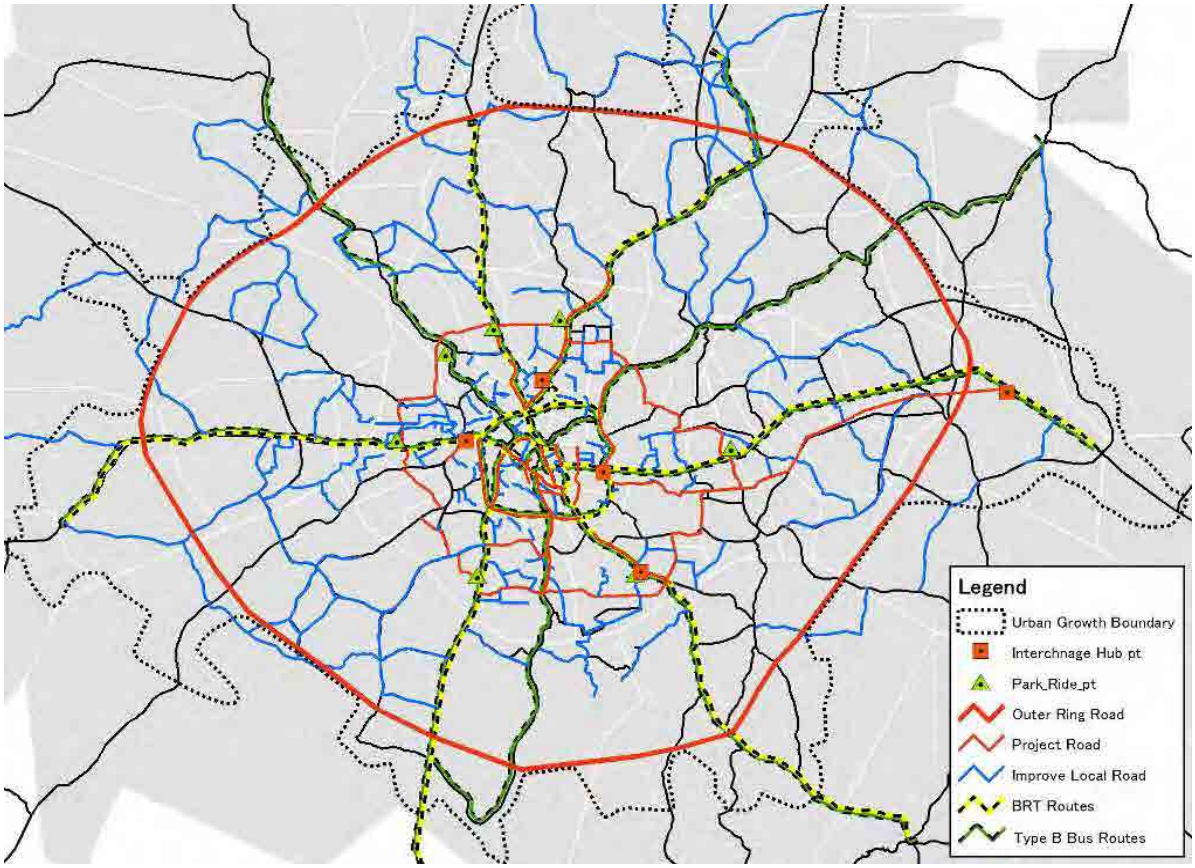
- Expansion of paid parking (both off-street and on-street) to other areas in the CBD
- In the view of the limited space, consider multi-storey car parking in the CBD
- Development of a framework for participation of the private sector in parking provision
- Integration of parking facilities in local plans

2) **Strategies for Walking and Cycling Systems**

- Encourage walking and cycling by improving walkways, street crossings, protection from fast vehicular traffic, and providing street amenities like trees, awnings, benches, etc.
- Prevent vendors, pavement dwellers, vehicle parking and other uses from blocking walkways.
- Establish walkway network in highly dense areas like Adum and Central Market
- Integration of walking and cycling lanes in local plans and new developments

(4) Strategies for Freight Transport System

- Strengthen the following logistics corridors by means of better road maintenance and road widening: Accra-Kumasi; Kumasi-Tamale-Burkina Faso; Takoradi –Tamale.
- Strengthen monitoring of overloaded trucks along the logistics corridors to protect road assets and to reduce accidents.
- Support full operation of the dry port in Boankra by early construction of a railway and consider expansion of functions to become a logistics centre.
- Promote rehabilitation of freight rail and push for connection via railway from Boankra dry port to Tema port and Takoradi port and eventually extend a new railway line to Burkina Faso.



Source: JICA Study Team

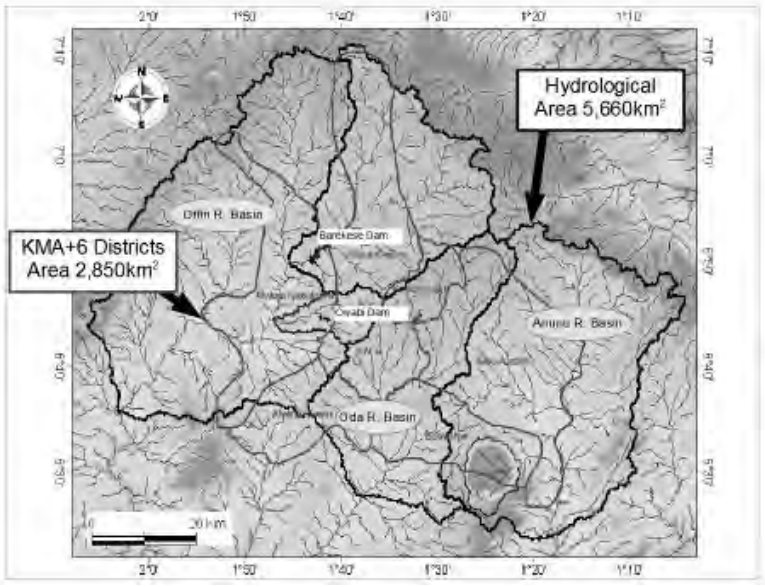
Figure 9.1 Transportation Sector Diagram

9.2 Water Resources

9.2.1 Background on Water Resources

The climate of Kumasi area is wet and semi equatorial with a mean annual rainfall of 1,402 mm (1961-1990). Rainfall is slightly bimodal with a short dry period in August. Nearly 90% of the rainfall is recorded in the seven months of the two wet seasons (from March to July and September to October).

Kumasi is located on the most upper part of the Pra River Basin and on a drainage divide of the Offin and the Oda Rivers. Greater Kumasi Sub-Region has only a very small river catchment in the upper area for surface water potential (amount). In terms of groundwater, KMA has a smaller size of recharge area because it is on a watershed divide.



Source: JICA Study Team

Figure 9.2 Designated Hydrological Area for Greater Kumasi Sub-Region

9.2.2 Issues on Water Resource Development

The issues on water resource development are as follows:

- Surface water (taken from Barekese Reservoir / Owabi Reservoir) and groundwater are used in Greater Kumasi Sub-Region. At present, quite a few people in the urban area rely on private groundwater usage because of insufficient pipe-borne water supply based on surface water.
- Storage capacity of Owabi Dam's reservoir has decreased because of sedimentation due to erosion caused by illegal logging and development in the catchment of the reservoir.
- Owabi's water quality is worsening due to (1) liquid/solid waste from illegal inhabitations in and around the area reserved for water catchment, and (2) liquid waste flowing from urbanized areas outside of the area reserved for catchment.
- Due to the population increase in the future, additional development of surface water resources will be necessary. However, additional surface water resources to be developed have not been decided yet. As a result, it is not possible to identify areas to be protected at this moment.
- Ground water has not been monitored; thus, it is difficult to exactly know the situation of the ground water.

9.2.3 Objectives for Water Resources Development

The objectives for water resource development are as follows:

- To increase/maintain storage capacity of the existing dams because, currently, the existing dams are underutilized due to sedimentation.
- To preserve new water sources for surface water for prospective dam development from hydrological designated areas in and around Greater Kumasi Sub-Region because it is anticipated that a substantial water shortage will take place due to the increase of water usage in the area.

- To clarify water budget among surface water and groundwater in hydrologically designated areas based on hydrological monitoring data because sustainable water resources management is necessary to make full use of the amount of naturally available water resources.
- To decide and implement the utilization of an appropriate amount of groundwater since the groundwater resources in Greater Kumasi Sub-Region are limited and fragile because of its location on the head waters of Oda River, Offin River and Anum River.

9.2.4 Strategies for Water Resources Development

The strategies for water resources development are as follows:

- To designate hydrological areas as water resources development planning units for spatial planning for the Greater Kumasi Sub-Region
- Protection/rehabilitation of existing dams which are Owabi Dam and Barekese Dam
- Development of new surface water resources
- Strengthening of hydrological monitoring in the designated hydrological areas
- Introduction of ground water monitoring system

9.3 Water Supply

9.3.1 Background on Water Supply

Barekese Water Treatment Plant (WTP) and Owabi WTP are the waterworks which produce piped water for the water supply areas of Ghana Water Company Limited (GWCL). The capacities of Barekese WTP and Owabi WTP are 110,000 m^3/day and 13,500m^3 respectively.

Treated water is pumped from Barekese and Owabi WTPs to Suame Water Tanks. In Suame, there are three underground tanks and one elevated tanks. The storage capacity of those tanks is 19,090 m^3.

The total length of GWCL's water distribution network is about 1,050 km, according to GWCL. Those pipelines' diameters range from 13 mm to 900 mm.

The coverage of water supply by GWCL is limited to urban areas mostly within KMA and small areas of adjoining districts. The population access to GWCL piped water supply is estimated to be 1.2 million, which is about 2.4 million of the urban population (in 2010) in the Greater Kumasi Conurbation Areas. The access rate of those who have access to piped water is just 50% in Greater Kumasi Conurbation Areas.

In suburban and rural areas, where piped water supply is not available, residents generally use groundwater from wells. The construction of the well for rural towns is conducted by a Committee of the Water and Sanitation Agency based on a request from district assemblies or KMA.

9.3.2 Issues on Water Supply

The issues on water supply sector are as follows:

- Shortage of capacity of water supply facility toward increasing water demand
- Limited capacity of water supply with pipelines
- The rate of Non Revenue Water (NRW) is high.
- The present water distribution system is relatively old. Therefore, rehabilitation or replacement of water pipelines is substantially necessary. It is especially necessary to replace those pipes made of asbestos cement in order to prevent pipes from bursting and leakage.
- There are a substantial number of costumers without water meters. The rate of working water meters was 53% of the total costumers in 2010.
- The number of boreholes for water supply to rural towns is currently insufficient in Greater Kumasi Sub-Region.

9.3.3 Objectives for Water Supply Development

The objectives for water supply development are as follows:

- Expanding to satisfy the increase in demand for water due to population growth and urbanization
- To provide stable water supply depending on the condition of each area
- To improve the management of the water supply business

9.3.4 Strategies for Water Supply Development

The strategies for water supply development are as follows:

- Upgrading of capacity of water treatment plants
- Rehabilitation of existing water distribution system
- Extension of water supply system to cover strategic urban centres and higher population areas
- Development of boreholes in periphery areas of Conurbation of lower population density for water supply (At the same time, it is necessary to monitor and evaluate the ground water level and water quality.)
- Increase of revenue for building foundation for sound management
- Enhancement of rural water supply system based on ground water
- Development of water supply facilities for meeting water demand in 2033

9.4 Liquid Waste Treatment

9.4.1 Background on Liquid Waste Treatment

The 2011 annual report prepared by the KMA-WMD states that of over 2 million population in KMA, 35% rely on public toilets, about 50% have access to household toilets (most rely on on-site holding facilities, such as septic tanks) and the remaining defecate indiscriminately.

In addition of all the communities in Kumasi, only three (Asafo, Ahinsan and Chirapatre) are equipped with sewerage treatment systems, in which black water from toilets are collected by pipes and carried to stabilization ponds. According to the 2010 Population and Housing Census, only 5% of households in KMA are connected to the sewerage system.

Septic tanks need facilities to treat and dispose of the septage. At present, in the Greater Kumasi Sub-Region, there is only one septage treatment and disposal facility, which is Oti Septage Treatment Pond.

It is also notable that there are some large factories for industries in KMA, and some of them have not installed waste treatment plants on the sites, in accordance with Environmental Health Officers.

9.4.2 Issues on Liquid Waste Treatment

The issues on liquid waste treatment area as follows:

- Low accessibility to hygienic toilets
- Although "Strategic Sanitation Plan for Kumasi (SSP-Kumasi)" had concluded that a simplified sewerage system is the most economic system for the liquid waste treatment, only 3 communities (approximately 10% of the households) in KMA are sewered.
- As stipulated in the Environmental Sanitation Policy, liquid industrial effluents must be pre-treated by industries to prescribed standards before discharging into the water bodies. However, an abattoir is not equipped with this waste treatment facility hence it has been discharging its untreated effluents into the water bodies.

9.4.3 Objectives for Liquid Waste Treatment

The objectives for liquid waste treatment sector are as follows:

- All residents should have access to hygienic toilets, if not private toilet at least to public toilets facilities.
- Appropriate treatment methods should be applied based on the type of wastewater, population density and etc.
- In the future all waste water, including grey water, should be treated, so the target for 2033 is preparation of conventional sewerage systems.

9.4.4 Strategies for Liquid Waste Treatment

The strategies for liquid waste treatment sector are as follows:

- Increase access to hygienic toilets by educating the people regarding the importance of hygienic toilets, constructing public toilet facilities, and providing financial support to residences for the construction of household toilets.
- Construct sewerage systems in highly populated areas
- Enforce laws to ensure industry, commercial and individuals comply with the environmental sanitation policy.
- Construct septage treatment pond in each district

9.5 Solid Waste Management

9.5.1 Background on Solid Waste Management

In 2004, the KMA succeeded in construction of the sanitary landfill with the land area of 40

ha in Oti within the KMA. In the KMA, the current waste collection rate is 87%. On the other hand, the open dumping method is still employed in the other major urban areas of the adjoining six Municipality and District Assemblies. The current solid waste collection rates in the adjoining six Municipality and District Assemblies are about 30~80 %. Although the waste collection, transportation and disposal practices in the adjoining six Municipality and District Assemblies have been conducted since 2006, the waste situation has become worse and it has become a pressing issue and requires concerted actions.

9.5.2 Issues on Solid Waste Management

As stated in “Primary Responsibility for Solid Waste Management rests with the Assembly” and “the Polluter-pays-principle” based on “the Environmental Sanitation Policy (Revised 2009), Ghana”, the Assembly should be responsible for wastes discharged in the Assembly area and treat them properly within the Assembly. On the other hand it is considered that recycling the organic waste into compost for agricultural use should be assisted by the private sector.

Intensive hygiene and sanitation education to the public are necessary for the proper SWM in the Greater Kumasi Sub-Region, and in order to improve the current SWM system, all the concerned MMDAs, related agencies, residents, NGOs, and private sector entities involved should all enhance their capabilities through the IEC (Information, Education and Communication) campaign. In addition, improvement and development of the hazardous waste management system in MMDAs in conformity with the related Government standards or regulations of MLGRD and EPA is necessary.

9.5.3 Objectives for Solid Waste Management

The objectives for solid waste management are as follows:

- The overall goal of the Environmental Sanitary Policy of Ghana is defined as "To develop a clear and nationally accepted vision of environmental sanitation as an essential social service and major determinant for improving health and quality of life in Ghana.”
- “To keep Kumasi clean and healthy through the provision and delivery of cost effective and environmentally acceptable waste management services in collaboration with all stakeholders to promote development and healthy living” from the mission statement.
- “To make Kumasi one of the top five cleanest cities in Africa by 2025” from the vision for KMA.

9.5.4 Strategies for Solid Waste Management

The strategies for solid waste management are organized as the table below.

Table 9.1 Action Programme for Solid Waste Disposal in Greater Kumasi Sub-Region

Stage	Strategies and Actions to be Taken
1st Stage	Enhancement of training through OJT of SWM unit- Environmental Health Department, MMDAs, especially in the adjoining six Municipality and District Assemblies is quite essential as follows: • Needs of 3Rs (reduce, reuse, recycling) & composting • Preparation of small-scale sanitary landfills • IEC campaign on SWM • Capacity development.
2nd Stage	It is a basic policy that wastes discharged in a district should be treated carefully within the local district where the wastes are originally produced. Suitable disposal sites should be selected carefully by all the concerned parties for not only the Peri-Urban Areas within the adjoining six Municipality and District Assemblies but also the rest of the District in Greater Kumasi Sub-Region. The target collection rate of 100% in year 2033 from the current rate of 87% is an ideal goal for all the residents of KMA, while 100% will be the target rate for the adjoining six Municipality and District Assemblies, except for self-disposal areas. It is necessary to conduct waste reduction and enhancement of 3Rs campaign.
3rd Stage	After the existing Oti Sanitary Landfill site is full, it may be found that the Kumasi composting & recycling plant area will be very essential for a promising landfill site for KMA. Because of its huge compound and looking to enhancement of 3R (reduce, reuse, recycling) & composting, for KMA and the adjoining six Municipality and District Assemblies it will be a promising composting and recycling plant for the Greater Kumasi Sub-Region. In implementation of construction of proposed small-scale sanitary landfills in the adjoining six Municipality and District Assemblies, the living environment aspect should be considered in layout planning. Need for implementation of waste reduction and enhancement of 3Rs campaign. There are 3 stages of the current and future conditions of the solid waste management for Greater Kumasi Sub-Region, in particular, aspects of final disposal sites, overlapping the target years of 2033 and 2028 for SDF and SP respectively. Monitoring of each staging about SDF and SP is required.

Source: JICA Study Team

9.6 Drainage

9.6.1 Background on Drainage

Within the 5 main drainage basins in Kumasi Metropolitan Area, namely Aboabo, Kwadaso, Nsuben, Sisai and Wiwi, which covers approximately 150km^2, the total drain length is about 141 km and 84% of the total length are in their natural unlined states. Lined sections can only be found along some sections in the Aboabo, Nsuben and Sisai drainages.

KMA is located in the most upper part of the Pra River basin on the catchment divide between the Offin and Oda Rivers. In this topographical sense, KMA is free from danger of prolonged flooding due to high water in the rivers. However KMA and its surrounding Districts and Municipality have few lined drains.

In Greater Kumasi Sub-Region, refuse in drains, resulting from dumping of refuse along

drain banks is common. Moreover, developers continue to encroach upon stream valleys and hamper drain maintenance.

9.6.2 Issues on Drainage

The issues on drainage in Greater Kumasi Sub-Region area as follows:

- The current condition of the unlined drainage courses creates sanitary nuisances, vector breeding, and the physical hazards of flooding.
- KMA has a serious potential that Offin and Oda Rivers could be troubled by flooding and erosion. The KMA area having densely developed drainage patterns is prone to erosion as well as flooding due to high intensity rainfall and soft surface soil condition.
- KMA is located on the catchment boundary thereby such rainwater drainage improvement would cause the increase of rainwater runoff to downstream. It is anticipated that flooding in downstream sections, especially in the Oda River, would be more serious.

9.6.3 Objectives for Drainage Improvement

The objectives for drainage improvement are as follows:

- To limit sanitary nuisances and vector breeding
- To prevent rainwater stagnation and erosion
- To prevent serious flooding in downstream river sections

9.6.4 Strategies for Drainage Improvement

The strategies for drainage improvement are as follows:

- In order to limit sanitary nuisances and vector breeding, drainage management should be integrated, and continuous improvement of the drainage system should be conducted, and a Drain Maintenance Unit (DMU) should be established.
- Lining already proposed by KMA for the remaining sections should be continuously conducted by KMA (DMU) to limit sanitary nuisances, vector breeding, and the physical hazards of flooding and to reduce the future maintenance cost.
- As the expansion of current urban areas progresses, comprehensive stormwater management planning should be conducted by KMA with coordination by the Water Resources Commission.

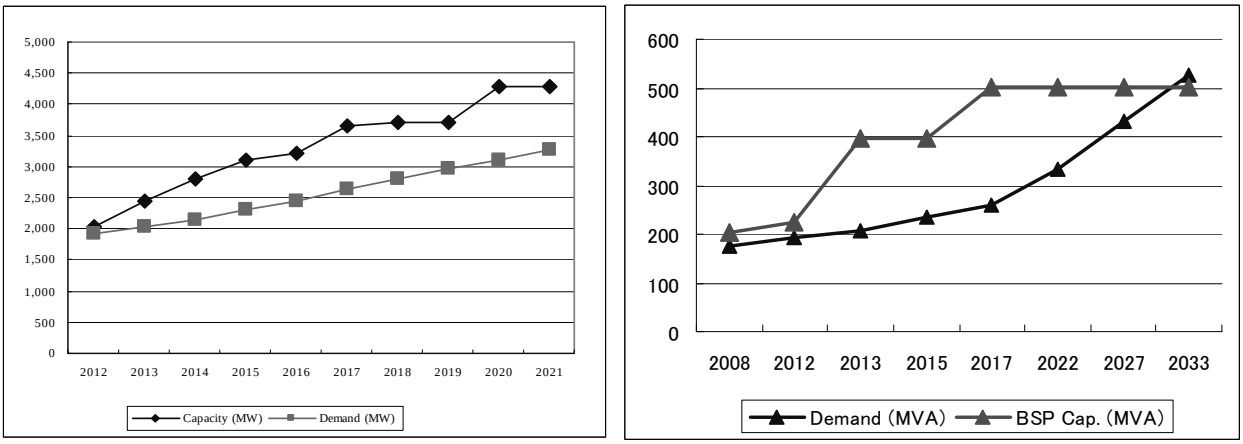
9.7 Electricity

9.7.1 Background on Electricity Sector

Total power generation capacity of Ghana is about 2,000MW as of year 2012. According to “The Energy Sector Strategy and Development Plan, 2010”, various power generation plants are planed to cover future growing electrical demand in Ghana. Once all planed projects are commissioned, the generation capacity will be increased to 4294MW by 2021.

On the other hand the total transformer capacity of the existing Bulk Supply Point (BSP) is 223MVA. The existing 25MVA line is currently being replaced by a new 66MVA line. To

cover the growing demand in Kumasi, a second BSP is now under construction and that will be commissioned by the end of 2012. The transformer capacity of the second BSP is 132MVA (66MVA-2 units). After commissioning, total capacity of BSPs will be 396MVA. In addition to the second BSP, GRIDco has a future plan to install a third BSP in Kumasi in 2014 and the transformer capacity will be the same as the second BSP.



Source (left): The Energy Sector Strategy and Development Plan, 2010
Source : GRIDco. and JICA Study Team

Figure 9.3 Power Generation Capacity & Maximum Demand in Ghana and BSP Capacity & Maximum Demand of Kumasi Sub-Region

Although the electricity generation capacity of Ghana and transformer capacity of Greater Kumasi Sub-Region has been increasing as the electricity demand rises, frequent power breakdown occurs in Greater Kumasi Sub-Region. Therefore major cause of frequent power breakdown is mainly due to power distribution.

9.7.2 Issues in the Electricity Sector

The following three issues in the electricity sector are found in the Greater Kumasi Sub-Region:

(1) Unstable Electrical Power Supply

In 2011, power breakdown caused by distribution line outage in the area covered by Electricity Company of Ghana (ECG) was recorded about 900 times, therefore the level of power supply reliability is not considered to be sufficient. The following case examples are considered as typical causes of the trouble:

- Clearance between street trees and 11kV sub-transmission line/LV distribution line
- Deteriorated distribution lines/equipment

(2) Power Loss

Power loss is one of the critical issues in Ghana. Improvement of power losses is also stated in the “Energy Sector Strategy and Development Plan” by the Ministry of Energy. According to the above Plan, the object is “Improve and modernize electricity distribution infrastructure to reduce system loss from 25% to 18% by 2015”.

(3) Budgetary Restrictions of ECG

ECG has a plan to replace deteriorated equipment as per the service life and maintenance programme. However, that replacement and maintenance could not be carried out timely due to budgetary restrictions.

9.7.3 Objectives for Electricity Sector Development

The objective of the electrical sector is "Stable and Reliable Power Supply" to the consumers. Especially industrial areas need "Stable and Reliable Power Supply" for their competitive operation.

9.7.4 Strategies for Electricity Sector Development

The strategies for electricity sector development are categorised into the following three categories:

(1) Enhancement and Improvement of Distribution System for Stable and Reliable Power Supply

- Small size overhead wires should be replaced by proper size wires for reducing technical loss of electricity.
- The clearance between overhead lines and obstacles such as trees should be monitored and if the clearance is less than ECG standard, measures such as tree trimming/replacing overhead poles should be taken to maintain necessary clearance.
- Deteriorated equipment such as insulators, overhead wires and cables should be replaced by new ones in order to reduce technical loss of electricity and to reduce the number of blackouts, as well as to assure a stable supply of electricity.
- Tighten enforcement toward un-paid consumers by providing pre-paid meters

(2) Expansion of Sub-Transmission and Distribution Lines

- Sub-transmission/distribution lines should be expanded for supplying stable and reliable power to the areas with high priority for infrastructure provision as shown in the proposed Diagram (Figure 8.2) for Greater Kumasi Sub-Region.

(3) Electrification in Rural Areas

- As per the "Energy Sector Strategy and Development Plan (by Ministry of Energy, 2010) and the National Energy Policy (by Ministry of Energy, 2010), the target percentage of access to electricity is set to increase to 80% by 2015 and to 100% by 2020.

PART V STRUCTURE PLAN (SP) FOR GREATER KUMASI CONURBATION

Chapter 10 Land Use Management System

10.1 Land Use Management Systems and Procedure

The Ghana land system features a dualism: combination of traditional and state land systems. Land rights and transactions (lease contract) cannot be registered in the state land system (office) for securing the land right without a chief's allocation note and Asantehene's endorsement on it. As land rights are registered through this procedure, most stool land which is not yet developed is not registered in the land office of the government.

Land use and building control in Ghana is enforced under a layout plan system based on which the development permit consisting of a planning permit and building permit is granted The plot owner to whom the lease right is transferred from the Chief makes an application for confirmation (planning permit) of his plot in the layout plan by TCPD. The application documents include a map indicating his plot and its block number in the copy of the layout plan which the Chief is due to provide. Accordingly, with the confirmation by TCDP, the plot owner submits site and building plans to the Planning Statutory committee for a building permit. The traditional land system takes time to provide necessary documents on land title, especially disputable land, so that it also delays the issuance of development permits by the local government.

10.2 Present Conditions of Land Use and Building Enforcement

It is reported that the majority of buildings in terms of number in Kumasi are without development or building permits. The factors which are attributed to the growth of unauthorized building have been generally claimed and reported as socio-economic, cultural, physical, political, historical and institutional.

District Governments identified the problems on development permits and management in their administrations as follows:

- Out dated base maps (Built up areas)
- Lack of base maps (New Areas)
- Inadequate logistics
- Delays and non-release of funds for plan preparation activities
- Haphazardous development due to the collusion of charlatans with landowners.
- Lack of a comprehensive study (Strategic plan)
- Litigation by landowners
- Physical development outpacing scheme/layout preparation

10.3 Emerging Land Use without Development Permits

The major symptoms caused by the no-permit development in the urban areas of Kumasi and the suburban areas in the surrounding districts are outlined as follows:

- Building expansion/annexation, addition of buildings on the same plot, subdivision and demolish/rebuilding for accommodating more people and families, which all need building permits, are carried out mostly without building permits, resulting in the expansion of high-density areas encroaching over the low-density areas.
- Proliferation of commercial uses
- Encroachment of buildings in water courses and vegetation areas that are meant to be conserved
- Disorderly development in suburban areas without layout plans

10.4 Government Measures to Improve Land Use Management

The Ghana Government has been taking measures to improve the situation of no-permit development and building among which major ones are listed below:

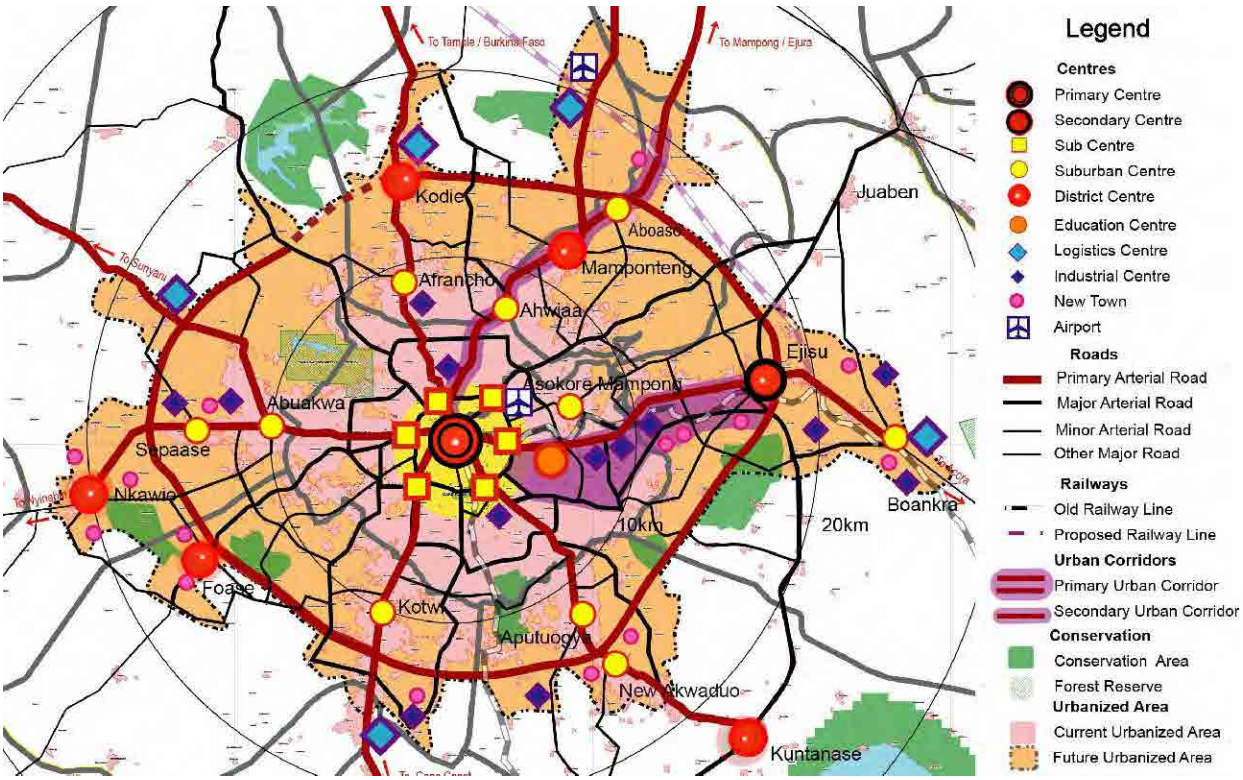
- Time-shortening of decision-making for development permits
- Strengthening enforcement of development permit regulation especially towards unauthorised buildings sited on watercourses
- Land Administration Project aimed to create an effective land use management system through establishing a spatial planning system coupled with an improved land market based on reformed land registration systems.
- Land Use and Planning Bill to establish a Spatial Planning System which sets forth spatial plans including a SDF and SP containing Land Use Plans. Land use management includes manifestation of prohibiting development without a permit, enforcement notice for immediate stop, notice to the owners who are or have been constructing a building, order to remove, compulsory execution, penal regulations

Chapter 11 Sub-Regional Land Use Plan for Structure Plan for Greater Kumasi Conurbation

11.1 Sub-Regional Level Land Use Plan

The Structure Plan (SP) is a spatial plan consisting of land use plans and the various kinds of infrastructure plans.

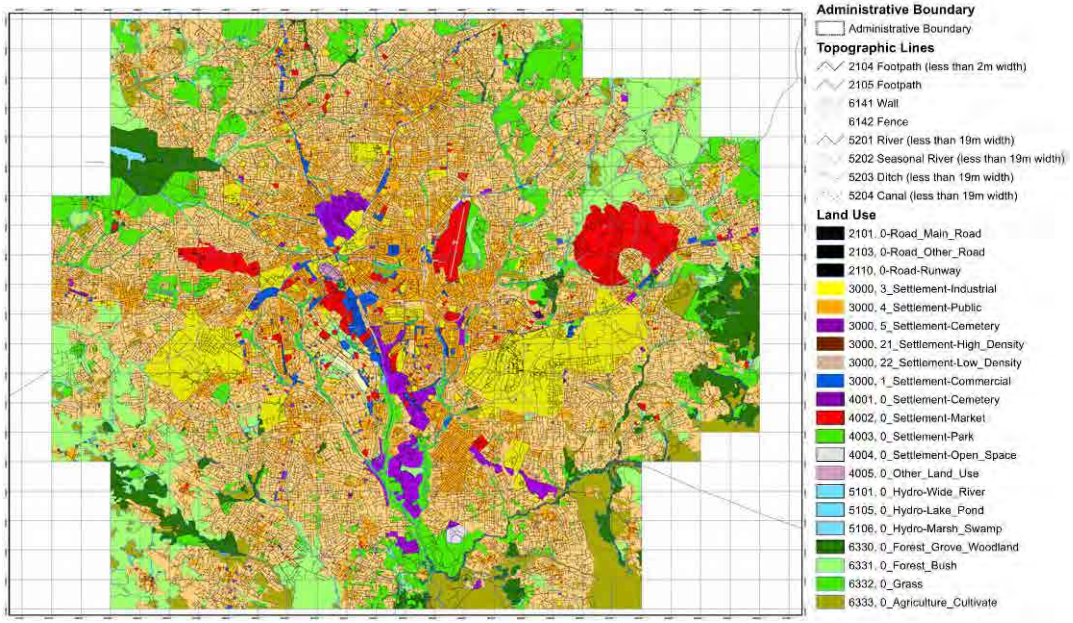
The Sub-Regional level Land Use Plan shows the desirable directions for future land uses, which are considered in terms of rational and/or effective use of land, which is a scarce resource. It is also a plan which shows how the precise disposition and scale of the elements encompassed by social, economic and environmental policies can be achieved most efficiently and effectively. It is based on the SDF which is diagrammatic in nature as illustrated in Figure 11.1.



Source: JICA Study Team

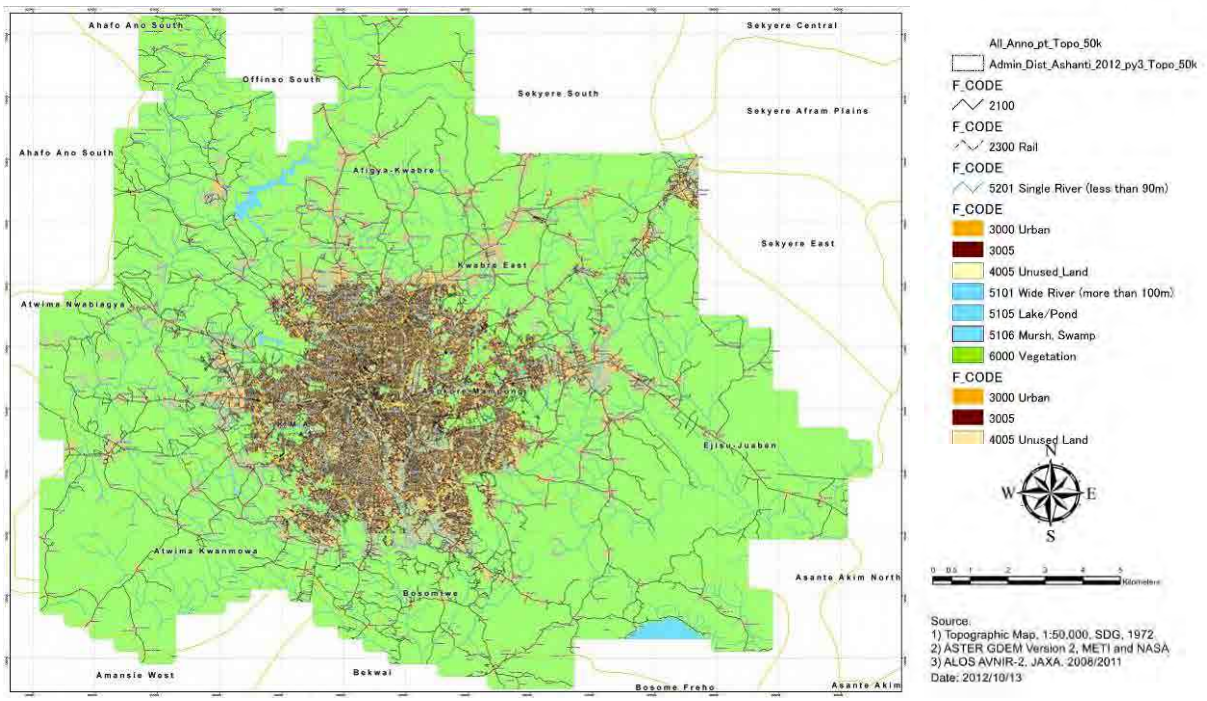
Figure 11.1 Diagrammatic Nature of the SDF, 2033

The existing land uses of KMA and Greater Kumasi Sub-Region are shown in Figure 11.2 and 11.3.



Source: JICA Study Team

Figure 11.2 Existing Land Use based on Orthophoto (2008)



Source: JICA Study Team

Figure 11.3 Existing Land Use based on ALOS Satellite Image 2008 & 2011

Based on the existing land use and the spatial analysis of Greater Kumasi Sub-Region, the land use plan formulated for Greater Kumasi Conurbation is as shown in Figure 11.4. The feature of each land use category and area are written in the following sections

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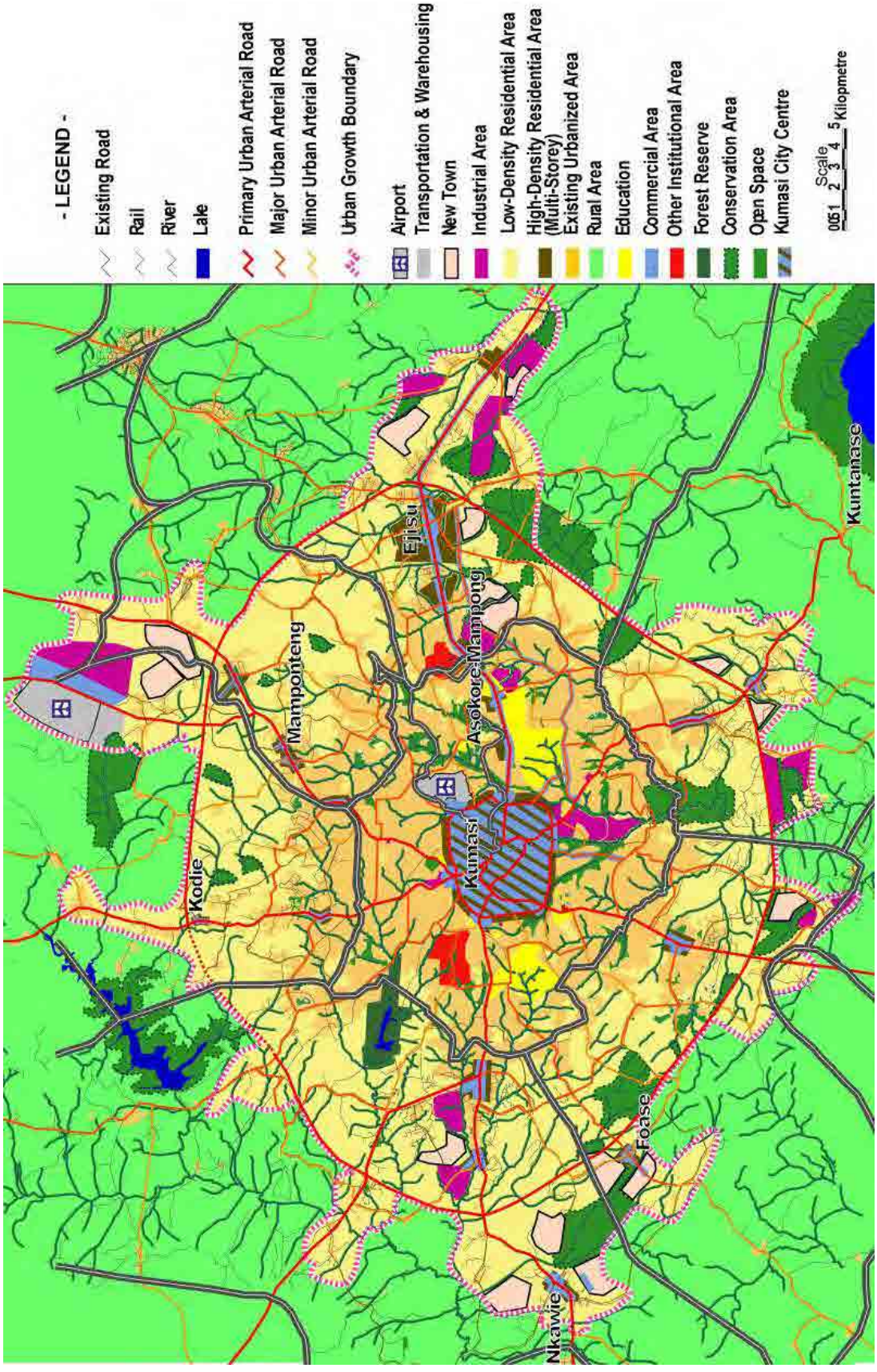


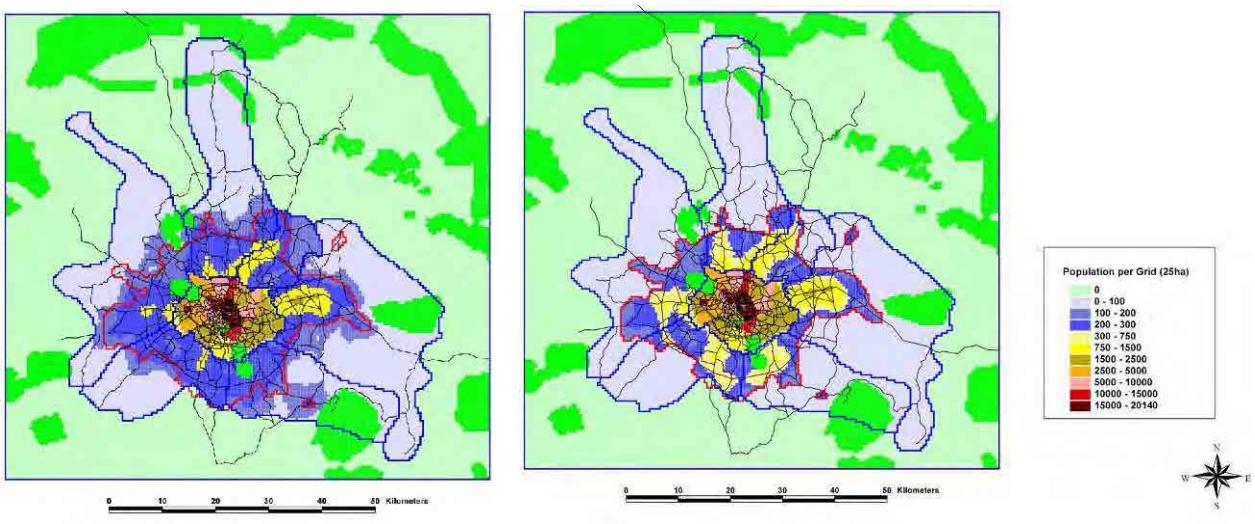
Figure 11.4 General Land Use Plan for Greater Kumasi Conurbation, 2028

Source: JICA Study Team

11.2 Future Land Use Policy by Land Use Category

(1) Residential Land Use

The strategy is to avoid the uncontrolled urban expansion of Greater Kumasi. The two urbanized patterns in year 2033 are shown in Figure 11.5. One is the urban pattern managed by designating an urban growth boundary (UGB). The other is the pattern without such an urban growth boundary (UBG).



(a) Without UGB **(b) With UBG**

Source: JICA Study Team

Figure 11.5 Population Distribution Simulation of Greater Kumasi Sub-Region in Year 2033

Due to the lack of available land within the KMA boundary there will be a very large increase in population density causing a large amount of higher density housing.

For the area outside KMA, but within the Urban Growth Boundary, the existing low population densities and the available undeveloped land means that a much lower increase in density and much greater increase in residential land use (in the order of 70%) will be needed.

Table 11.1 Population and Residential Area within Greater Kumasi Conurbation

	Population (persons)	Residential Areas (ha)	Gross Population Density of Residential Areas (persons/ha)	Populations (persons)	Residential Areas (ha)	Gross Population Density of Residential Areas (persons/ha)
	2010			2033		
K.M.A	2,035,064	12,761	159	4,226,860	15,163	279
Outside KMA within Conurbation	423,951	23,760	18	1,242,856	59,742	21
Greater Kumasi Conurbation	2,459,015	36,521	67	5,469,717	74,905	73

Source: JICA Study Team

As a result of the analysis of population growth, existing housing use and density, and the above predictions of the demands on land use up to 2033, the following residential land use policies are put forward for the areas within Greater Kumasi Conurbation:

- In suburban areas outside KMA, low density residential areas should generally promoted.
- However, near the District Centres and Suburban Centres, development of multi-storey residential buildings should be promoted. This would also apply to the Kumasi-Ejisu Urban Corridor.
- Within KMA, where densities will need to be greatly increased, in areas between the Middle Ring Road and Inner Ring Road, where lot sizes are relatively large, they have a piped water supply, and relatively dense road networks are available building more dwellings within the same lot, subdivision of the original lots should be formally allowed.
- Within KMA in order to cope with existing high density residential slum areas (compound areas) standards should be set for controlling overcrowding and decreasing the number of households within a dwelling unit and, monitoring and enforcement measures should be conducted.
- The development of high-density multi-storey residential buildings should also be promoted behind the commercial/business areas along the Inner Ring Road.
- In order to accelerate housing development and provide quality residential areas with basic infrastructures in suburban areas, new town developments should be promoted mainly outside the Outer Ring Road within the Conurbation Area.

(2) Commercial / Business Land Use

The following commercial / business land use policies are put forward for the areas within Greater Kumasi Conurbation:

- Within Kumasi City Centre, more commercial/business land uses should be allowed, by encouraging multi-storey buildings with first or second floor for commercial/business use and upper floors for residential use.
- Between the Inner Ring Road and Middle Ring Road, commercial/business land uses could be located along the major roads. That is, ribbon development of commercial/ business will be allowed to take place along the major roads in these areas.
- In the Kumasi-Ejisu Urban Corridor, the development of commercial/business multi-storey buildings should be promoted.
- At District Centres and Suburban Centres, area development of commercial/ business land uses including multi-storey buildings should be promoted by providing better local street networks within the centre areas.

(3) Industrial Land Use

The estimated capacity of sites shown in Table 11.2 is to create 30,000-50,000 jobs. These would be in the formal, secondary, manufacturing sector. The provision of adequately serviced and accessed sites attracts manufacturing. The main locations are at and around Boankra, the point of arrival from Accra and link to the centre via the Kumasi-Ejisu Urban Corridor; at the new airport; around the existing manufacturing area at Boadi and to the west of the city on the route to Bibiani and Cote d'Ivoire where sites have been identified for the extension or relocation of Suame Magazine.

Table 11.2 Necessary Area of Industrial Sites in 2033 Land Use Plan

	Name	Area (ha) High Case	Area (ha) Middle Case
Afigya Kwabre	Airport City	700	0
Atwima Nwabiagya	Sepaase North 1	80	80
	Sepaase North 2	100	100
	Abuakwa North	200	200
Atwima Kwanwoma	New Bekwai Road South 1	50	50
	New Bekwai Road South 2	110	110
	Nkwanta 1	120	120
	Nkwanta 2	250	0
Ejisu-Juaben	Fumesua	140	140
	Ejisu	400	400
	Bankra North	150	150
	Boankra	30	30
Outside KMA Sub-Total		2,330	1,380
KMA	Boadi 1	70	0
	Boadi 2	50	0
KMA Sub-Total		120	0
Greater Kumasi Sub-Region		2,450	1,380

Source: JICA Study Team

(4) Conservation Areas and City Parks Land Uses

For promoting nature conservation in Greater Kumasi Sub-Region, the following measures should be taken:

- Protection of existing water courses and enforcement of buffers in all areas
- Identify and designate conservation areas as show in the proposed Land Use Plan above
- Enforce protection of any remaining Forest Reserves
- Active landscaping and management of open spaces in partnership with private individuals and companies for leisure and urban agricultural uses.
- The following conservation areas are proposed in Greater Kumasi Conurbation:
  - Owabi Reserve to protect immediate catchment areas of Owabi Dam
  - Barekese Reserve to protect immediate catchment areas of Barekese Dam
  - Oti Reserve to secure buffer areas for keeping residential areas away from the Oti Landfill Site
  - Dedesua Reserve to protect the areas for a potential site and immediate catchment of a future dam in Dedesua area
  - Riverside buffers of water courses, in accordance to the national policy for protecting riversides from encroachment

(5) Health, Education, Security, Fire and Other Services' Land Uses

Although the bulk of public services including places of worship, cemeteries and education up to tertiary level and health up to District Hospital level, there are certain key uses which fall under the "civic and commercial" land use category, and for which land uses should be identified in the Sub-Regional Structure Plan which will require attention to land use and availability. These will include district hospitals, tertiary and higher level educational facilities, conference and leisure centres, the zoo, army and police barracks and others. The list is not exclusive.

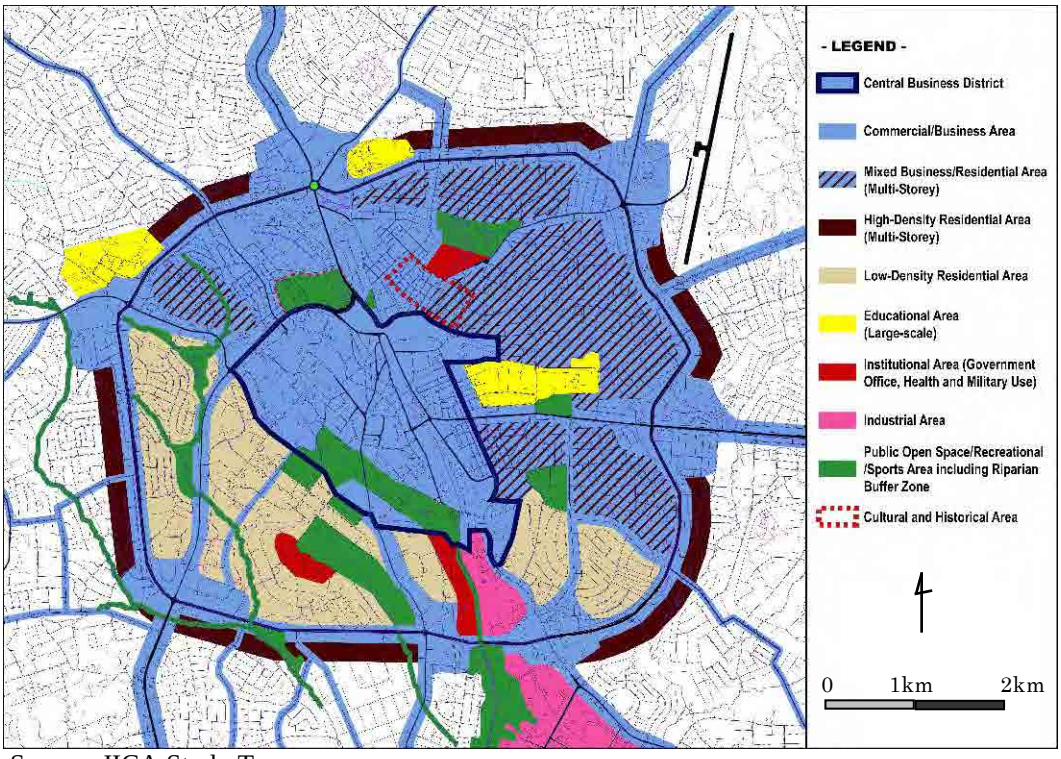
The private sector can be encouraged to play more important roles in health, education and other sub-regional facilities if certain areas are designated for these purposes.

11.3 Future Land Use Policies by Area

(1) Land Use Plan for Kumasi City Centre

In order to achieve the proposed strategies for transforming the Kumasi City Centre, the proposed Land Use Plan for the City Centre, has the following main characteristics:

- Allow and encourage the already dense areas to continue to change from residential areas to mixed business/residential areas, as hatched blue in Figure 11.6.
- Allow and encourage the development of multi-storey buildings for mixed business/residential areas.
- Allow changes of use to commercial use along the ring road and along all major roads.
- Encourage and permit Mid-rise Residential Areas behind the commercial uses on the outer edge of the inner ring road.
- Retain and safeguard the existing Low-Rise Residential Areas which have a good living environment (shown in yellow).
- Safeguard large-scale existing educational, industrial, public open space/leisure uses.
- Designate and apply appropriate policies to the Cultural and Historical areas as shown above: necessary to identify the important areas



Source: JICA Study Team

Figure 11.6 General Land Use Plan for Kumasi City Centre, 2028

(2) Land Use Policy for between the Inner Ring Road and Outer Ring Road

In the general land use plan for Greater Kumasi Conurbation, the expansion of suburban residential areas is allowed and encouraged by the following measures:

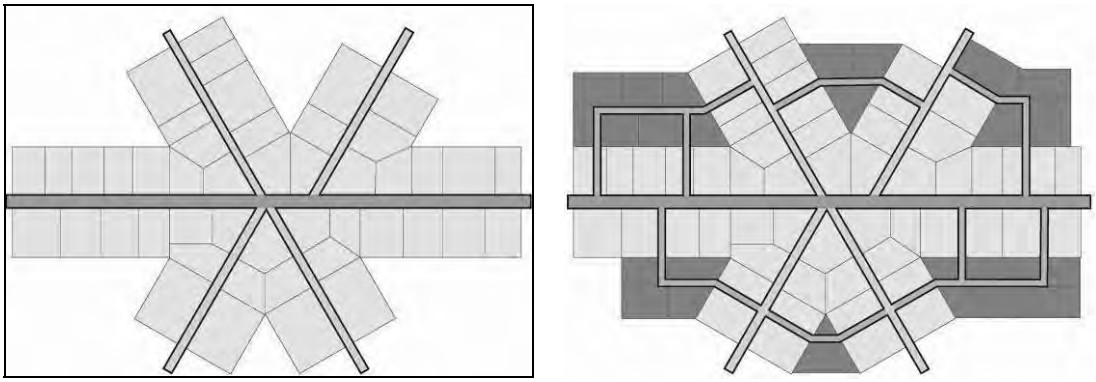
- Upgrading minor radial roads to major radial roads toward suburban areas
- Establishment and upgrading of a set of roads composing a Middle Ring Road connection
- Promoting the development of Suburban Centres for providing commercial and other services

In general, unnecessary urban functions in the central area should be relocated to these suburban areas, while high-degree urban functions should be more developed in the central area.

Suburban urban centres can provide perfectly adequate urban services which will prevent suburban residents from having to travel to the City Centre, if they are well planned and organised (for example smaller modern supermarkets, as well as modernized satellite markets). Such suburban centres should be planned not only for providing services to surrounding residents, but also as places for employment opportunities in suburban areas.

In the case between the Inner Ring Road and Middle Ring Road, commercial/ business uses should be allowed to develop along major roads since it is not so easy to develop necessary urban functions at Suburban Centres.

On the other hand, in the case between the Middle Ring Road and Outer Ring Road, commercial/business uses should be discouraged from developing along major roads in favour of development of the identified Suburban Centres. A model measure for upgrading and expanding suburban centres development is given in Figure 11.7. This figure shows the ways to add local streets for expanding commercial/business areas at Suburban Centres/ District Centres.



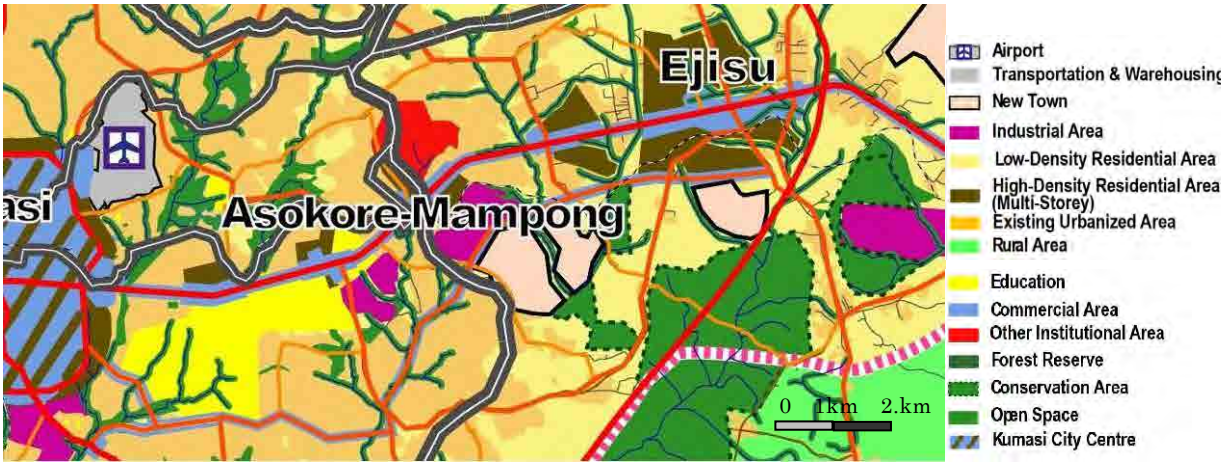
Source: JICA Study Team

Figure 11.7 Model Measures for Upgrading Suburban Centres and District Centres

(3) Land Use Plan for Kumasi-Ejisu Urban Corridor

The Kumasi-Ejisu Urban Corridor should be developed to accommodate business offices, shopping centres, government administrative offices and housing areas, but to have an overall theme of a “Knowledge Corridor” with facilities such as free wireless internet and meeting

points for higher education students and graduates with business funders. International exhibition and conference halls could be one of the urban functions which is part of the mix.



Source: JICA Study Team

Figure 11.8 Proposed General Land Use Plan for Kumasi-Ejisu Urban Corridor

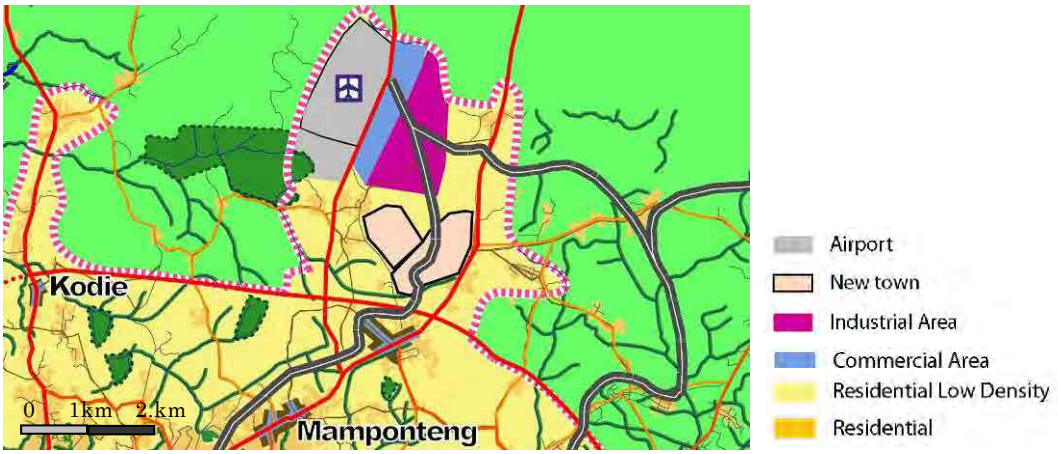
The development of the Kumasi-Ejisu Urban Corridor proposed in the SDF for Greater Kumasi Sub-Region should be encouraged by the following hardware and software measures:

- Road and BRT Development: a) Widening of Accra Road to accommodate dedicated BRT lanes (2 lanes), b) Construction of a new major road in parallel with Accra Road, and c) Establishment of BRT route and BRT stations on Accra Road
- Land Use Plan and Regulations: a) Set Commercial/Business Land Use Areas along Accra Road in the Land Use Plan, b) Set larger areas for Commercial/Business Land Use in surrounding areas of BRT Key Stations in the Land Use Plan, and c) Set Multi-Storey Residential Areas behind the Commercial/Business Areas along Accra Road
- New Area Development: a) Development of Industrial Areas for Knowledge-Based Sectors between Accra Road and the Parallel Road, and b) Development of New Towns in the south of the Parallel Road
- A key element of this urban corridor development is that the functions and amenities of Ejisu City Centre should be developed and strengthened as the Secondary Centre of Greater Kumasi Sub-Region. Ejisu City Centre should be developed to accommodate business offices and administrative services offices for serving the surrounding urban areas including industrial areas. Therefore this is designated as a high rise, high density area.

(4) Land Use Plan for Airport City

An airport city is proposed in conjunction with the proposed new international airport for Kumasi. The Airport City is composed of the following components:

- International Airport
- Commercial/Business Area
- Light Industrial Area including Logistics Centre
- New Town



Source: JICA Study Team

Figure 11.9 Proposed General Land Use Plan for Greater Kumasi Airport City

This Airport City is to have the following transport accesses:

- BRT route connecting Kumasi City Centre and a new airport terminal through Kumasi-Mamponteng Urban Corridor
- Expressway connecting between the Outer Ring Road and the new airport terminal
- Major roads connecting Mamponteng District Centre and Aboaso Suburban Centre with the new airport terminal

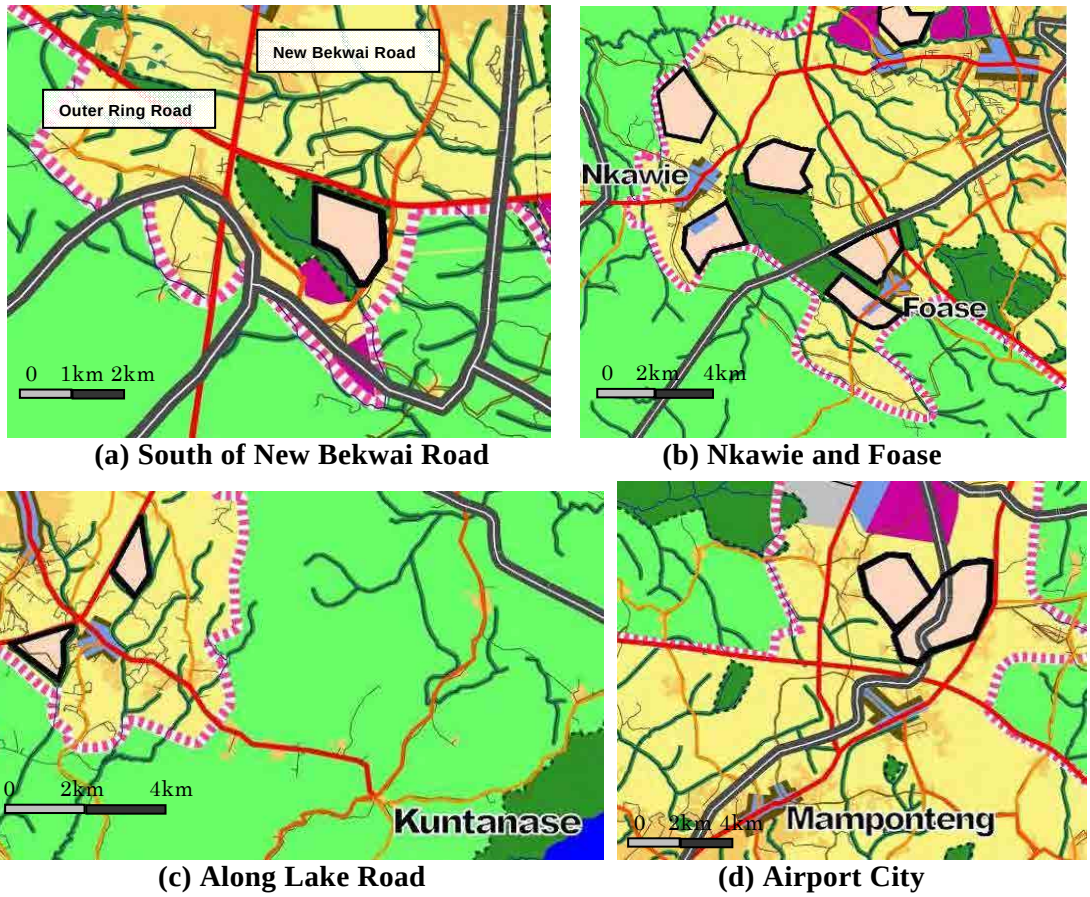
(5) New Town Development

Eleven new town sites are identified as shown in Table 11.3, Figure 11.8 (Kumasi-Ejisu Urban Corridor), Figure 11.9 (Airport City) and Figure 11.10. These new towns could provide residential capacity of about 300,000 populations. This accounts for over 30% of the future population increase outside KMA within the Greater Kumasi Conurbation.

Table 11.3 New Towns Proposed for Greater Kumasi Conurbation

	Name	Area (ha)
Afigya Kwabre	Airport City New Town 1	200
	Airport City New Town 2	200
Atwima Nwabiagya	Nkawie New Town 1	200
	Nkawie New Town 2	210
	Nkawie New Town 3	280
Atwima Kwanwoma	New Bekwai Road South New Town	130
	Foase New Town 1	130
	Foase New Town 2	230
Ejisu-Juaben	Ejisu New Town 1	190
	Ejisu New Town 2	120
	Ejisu New Town 3	110
Outside KMA Sub-Total		2,000
KMA Sub-Total		0
Greater Kumasi Sub-Region		2,000

Source: JICA Study Team



(a) South of New Bekwai Road **(b) Nkawie and Foase**

(c) Along Lake Road **(d) Airport City**

Source: JICA Study Team

Figure 11.10 Proposed New Towns in Greater Kumasi Conurbation

These new towns are mostly located outside the Outer Ring Road since the proposed new town development should be middle-sized area development requiring around 100 hectare.

These new towns are to be developed by private developers. Lands for such new town development should be arranged by traditional and government authorities. Such new towns should be developed and equipped with infrastructures in order to encourage people to start moving in immediately after the completion of construction of the new towns.

11.4 Relationship between Spatial Development and Infrastructure Development in Greater Kumasi Sub-Region

(1) Transportation Sector

The following actions should be taken by the transportation sector:

- A Middle Ring Road should be developed to induce residential development between major radial roads.
- Roads and BRTs are important infrastructure for guiding urbanization and changing the current mono-centric spatial structure into a multi-nucleus spatial pattern with suburban areas.
  - ➢ Construction of the first section of the Outer Ring Road

- Establishment of BRT routes on major radial roads (by widening major radial roads to six lanes)

It is also necessary to provide local roads within district centres and suburban centres through formulating layout plans (or local plans) to promote the development of these centres.

(2) Water Resources and Water Supply Sectors

At present, due to the constraints on available water resources, it is neither possible to increase the volume of water supply nor provide the population with a piped-water supply. Under such circumstances, it is necessary to efficiently utilize the existing water resources and water supply facilities as much as possible.

At the same time, in order to satisfy the needs of the rapidly increasing population, it is necessary to take action to prepare water resource development (construction of another dam for water supply). However, at least until around 2028, the new development in Ejisu and Boankra should rely on underground water rather than piped-water supply.

(3) Liquid Waste Treatment Sector

It is necessary to establish a modern sewerage system to cover Kumasi City Centre and its surrounding areas in the very long term (after 2033) to upgrade the urban function and accommodate the increased population density in Kumasi City Centre.

Although its service areas are very limited and the sewage treatment system is very basic, the existing sewerage system should be maintained and expanded so that a modern sewerage system could be established using the existing system as a base in the very long term (after 2033).

(4) Solid Waste Management Sector

Because of the strategies for suburbanization of adjoining districts and decentralization of urban functions, the demand for solid waste management will increase in the surrounding districts. Therefore, it is necessary that the surrounding districts develop the capacity to manage solid waste generated in the urbanized areas of their respective districts.

On the other hand, in order to prevent the excessive increase of demand for solid waste management of Kumasi City, it is necessary to decentralize the population and urban functions to suburban areas outside Kumasi City. The capacity of the existing final disposal site and the planned project for capacity expansion is sufficient to accommodate the future solid waste demand until around 2033. However, it is necessary for Kumasi City to rely on the final disposal sites in the adjoining districts in the very long term.

Considering this, Kumasi City and its adjoining districts would be required to establish an organization to collectively manage solid waste generated in the Greater Kumasi Sub-Region.

(5) Drainage Sector

Kumasi City and its adjoining urbanized areas occupy the upstream areas of the Pra River and Oda River. The future population increase and urban area expansion will cause an increase in river water in the downstream areas. Therefore, it is necessary to install a lining along the

rivers in the downstream areas.

(6) Electricity Sector

In order to upgrade the urban function including the function of the CBD of Kumasi City Centre, it is necessary to replace old overhead wires and obsolete transformers to reduce the frequency of blackouts.

Higher priority for electricity supply should also be assigned to expand the urban areas and suburban areas within the urban growth boundary. Strengthening the electricity supply to the Boankra area has already been planned.

Additionally the electricity supply to industrial areas planned outside the Outer Ring Road is proposed for implementation by establishing sub-transmission lines along the major radial roads. Furthermore, by installing sub-transmission lines along the Outer Ring Road, the stability and redundancy of the electricity supply system would be improved.

PART VI INFRASTRUCTURE SECTOR PLANS AND PROGRAMMES FOR GREATER KUMASI SUB-REGION

Chapter 12 Transportation Sector Plan and Programme

12.1 Objectives for Transportation Sector Development

(1) Policy on Transport Corridor Development (Infrastructure Development)

The policy will underscore the important role of public transport where the majority of commuters are relying on its services. Thus the objective for urban transport policy shall be:

- Develop a transport system that contributes to realization of the national transport vision of the country which is to make Ghana the hub for the West African Sub-Region
- Prioritize creation of mass transportation services along strategic corridors to improve mobility
- Integrate land use and transportation planning (e.g. by ensuring that high traffic attracting/generating developments are well located within the transportation system or by requiring traffic impact assessment to be carried out for large scale developments)
- Create a framework where participation of the private sector in transport infrastructure development is encouraged
- Strengthen the link between Kumasi and surrounding districts by expanding the network capacity

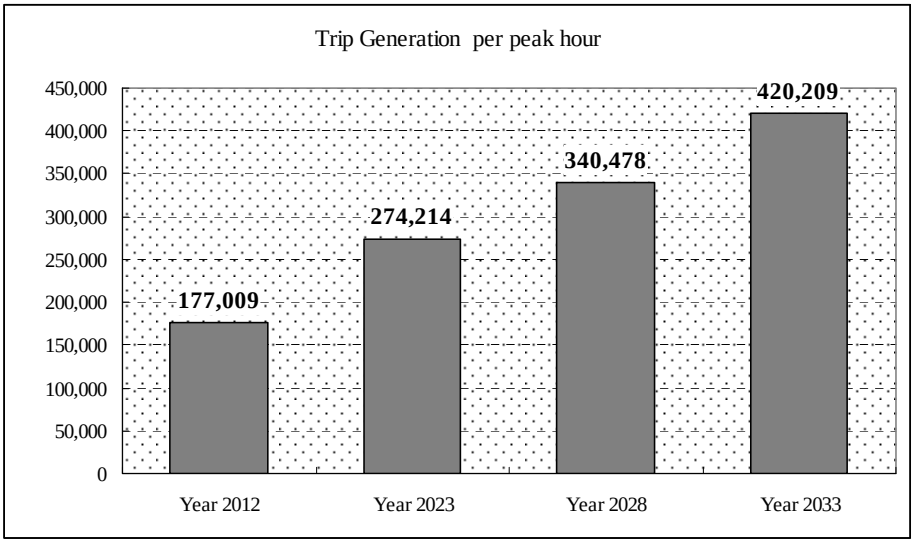
(2) Policy on Transportation Demand Management (TDM)

In view of the limited resources to fund infrastructure development, it is necessary to explore other measures which have potential to contribute in addressing the transportation problems of Greater Kumasi Sub-Region. Transportation Demand Management (TDM) is a general term for strategies that result in more efficient use of transportation resources, as opposed to increasing transportation system supply by expanding roads, parking facilities, airports and other motor vehicle facilities (Mobility Management, GTZ, 2003). TDM operates through legislative, traffic engineering, and operational measures to attain the goal of a better traffic environment. Unlike infrastructure-based (or hard measures), TDM does not require huge capital investment making it an attractive option to policy makers.

12.2 Future Transport Demand Analysis

By utilizing the transportation models developed in the past studies for Kumasi, especially the World Bank assisted Kumasi Transport Plan in 2011-2012, future transportation demands will be forecast using proposed socio-economic frameworks and new urban spatial structures.

The forecasting results are as shown in the figures and table below.



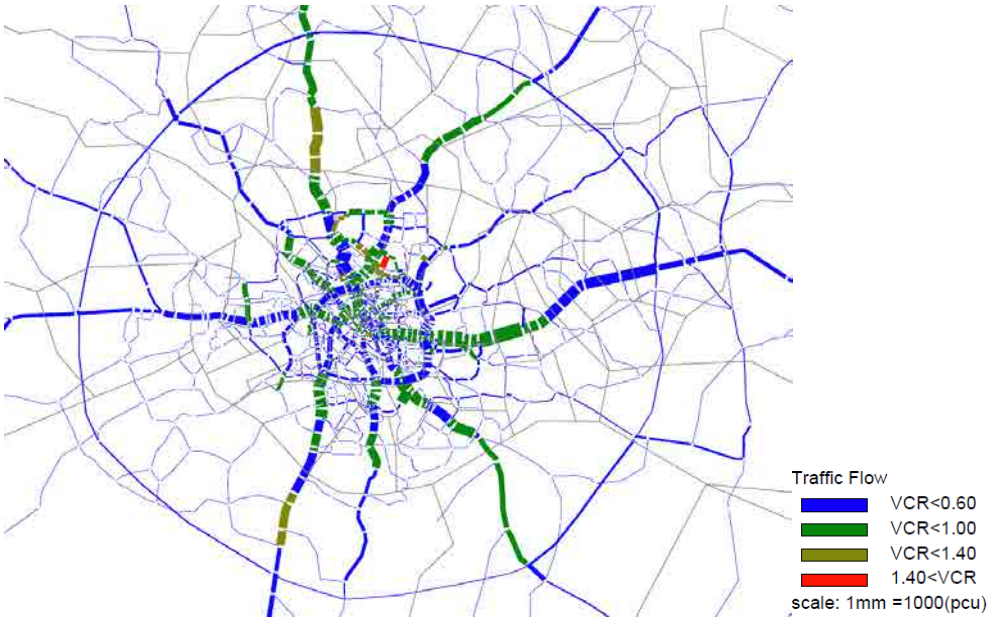
Source: JICA Study Team

Figure 12.1 Trip Generation in Year 2012, 2023, 2028 and 2033

Table 12.1 Existing and Future Trips by Modal Share

Person Trip in peak hour					
Year	Pax. Car	Taxi	Trotro/Bus Type B/BRT	Truck	Total
Year 2012	23,620	46,832	101,313	5,244	177,009
	13.3%	26.5%	57.2%	3.0%	100%
Year 2023	43,438	49,373	172,403	9,079	274,293
	15.8%	18.0%	62.9%	3.3%	100%
Year 2028	55,867	56,532	216,051	11,967	340,417
	16.4%	16.6%	63.5%	3.5%	100%
Year 2033	70217	65444	268713	15762	420,136
	16.7%	15.6%	64.0%	3.8%	100%
Vehicle Trip in peak hour					
Year	Pax. Car	Taxi	Trotro/Bus Type B/BRT	Truck	Total
Year 2012	9,448	11,708	5,629	1,748	28,533
	33.1%	41.0%	19.7%	6.1%	100%
Year 2023	17,375	12,343	4,310	3,026	37,055
	46.9%	33.3%	11.6%	8.2%	100%
Year 2028	22,347	14,133	4,910	3,989	45,379
	49.2%	31.1%	10.8%	8.8%	100%
Year 2033	28,087	16,361	5,598	5,254	55,300
	50.8%	29.6%	10.1%	9.5%	100%

Source: JICA Study Team



Source: JICA Study Team

Figure 12.2 Traffic Assignment Results on the M/P Road and Public Networks, 2033

12.3 Strategies for Transportation Sector Development

(1) Strategy for Road Network Development

The strategies for road network development are as follows:

- Reorganize the hierarchy of roads within the Greater Kumasi Sub-Region/Greater Kumasi Conurbation:
  - By identifying "Urban Arterial Roads" composing major roads/streets for Greater Kumasi Sub-Region/Greater Kumasi Conurbation.
  - By upgrading minor local roads to regional roads, which should serve as connections between major radial roads within 10 km radius from the city centre
  - By identifying collectors/distributors among small roads
- Develop the mass transportation network's infrastructure composed of the following corridors: Mampong Road, Offinso Road, Sunyani Road, Bekwai Road, Lake Road, Accra Road, Antoa Road, Abrepo Road, Old Bekwai and the Inner Ring Road. Widening of these corridors to at least two-lane per direction to accommodate dedicated lanes for a mass transportation system is desirable.
- First section of Outer Ring Road (ORR) to be constructed shall be between Ejisu and Kodie to accelerate new development in Mamponteng and Kodie and to provide diversion routes to truck traffic moving from Accra to Tamale.
- In addition to the Inner Ring Road (IRR) and ORR, promote the realization of a middle ring road for better traffic circulation by upgrading existing roads that can be improved to form a middle ring road.
- Develop a new arterial road from Ejisu to Kumasi that runs parallel to Accra Road to provide an alternative route and to further strengthen connection between the two key towns.

- Recognize the necessity to increase the road capacity by widening critical roads to traffic such as the Western Bypass section, Southern Bypass section, Lake Road, Mampong Road, Harpor Road, New Bekwai Road, Antoa Road etc. Couple this effort with construction of missing links like connecting Lake Road to Century Hall Road, Old Bekwai Road to New Bekwai Road etc. to provide more direct routes.

(2) Strategy for Intersection and Signalization Improvement

The strategies for intersection and signalization improvement are as follows:

- Coordinate traffic signals in the whole network to respond to actual conditions on the ground (from static to dynamic/intelligent traffic signals)
- Remove traffic bottlenecks by segregating traffic conflicts at major intersections like Suame, Abrepo, Sofoline, Anloga, Bewai etc.
- Improve traffic operation at other intersections by optimizing traffic light signals
- Assess other critical intersections and enforce necessary measures

(3) Strategy for Public Transport Development

The strategies for public transport development are as follows:

- Promotion of a shift from low capacity (trotro) to high capacity public transport system (bus) as the backbone of the transportation system.
- Development of a BRT and bus network that covers the nine radial roads and IRR.
- Development of "Urban Arterial Roads" to establish these public transport corridors, where large buses are operated, and some of which are used for BRTs.
- Development of Transfer Points/Interchange Hubs in Tafo, Anloga, Kwadaso, Abinkyi, and Ejisu where long distance trips terminate. Trips to their final destinations will be facilitated by other transport modes.

As for the role of the railway, it is considered that by 2033, the railway plays a limited role. For Greater Kumasi, heavy railway is considered too expensive to operate as urban public transportation at least by 2033. However, the establishment of BRT routes on six major radial roads could prepare the foundation for railway's future development by utilizing the space (dedicated lanes) for BRT.

(4) Strategy for Traffic Control in CBD

The strategies for traffic control in CBD are as follows:

- Provision of paid parking spaces particularly in high density areas like the CBD will reduce the problem of illegal parking on the road shoulder which affects traffic flow
- Recover and improve pedestrian space to contribute to people's mobility
- Provision of walkways and cycle lanes
- Expansion of paid parking (both off-street and on-street) in other areas in the CBD
- In view of the limited space, consider multi-storey car parking in the CBD
- Integration of parking facilities in local plans
- Development of a framework for participation of the private sector in parking provision
- Apply vehicle access restrictions (e.g. one-way restrictions) in areas with high density of pedestrians like Adum and central market.

(5) Strategy for Transportation Demand Management

The strategies for transportation demand management are as follows:

- Integrate public transport services – physical integration and operational integration (e.g. coordinated arrival schedule between BRT and feeder services for smooth mobility)
- Prioritize public transport over private by provision of priority lanes for buses particularly BRT
- Prioritize high occupancy vehicles (HOV) at intersections to improve service reliability
- Distribute traffic demand by exploring TDM measures such as flexible working hours
- Consider other measures which discourage use of private cars such as fuel tax increase and road pricing.
- Explore other measures which could make public transport more attractive such as financial incentives (e.g. monthly discount ticket) and education campaigns.
- In future, consider implementing truck access restrictions (truck ban) for heavy trucks (e.g. 3.5 ton) from entering the inner ring road to contribute to decongestion.

(6) Strategy for Freight Transport Management

The strategies for freight transport management are as follows:

- Reorganization of freight delivery particularly inside the city
- Strengthening of cooperation among the stakeholders of the freight industry.
- Reduce the number of trips of large trucks at the middle ring road by establishing Bulk Breaking Points
- In the long term, reduce the number of trips of large trucks in the outskirts of the city by building truck terminals that will also serve as bulk breaking points.

12.4 Projects for Transportation Sector Development

The table below shows the list of projects for transportation sector development in Greater Kumasi Sub-Region.

Table 12.2 List of Projects for Transportation Sector

Programme	No.	Projects	Length (km)	Cost ($ M)
Road Network Scheme	1	Widening of Western Bypass to 4 lanes in certain sections	3.60	5.59
	2	Widening of Southern Bypass to 4 lanes in certain sections	3.40	6.89
	3	Widening of Lake Rd to 4 lanes (Phase 2)	4.15	5.56
	4	Widening of Mampong Rd to 4 lanes in certain sections	5.50	9.03
	5	Widening of Harper Rd to 4 lanes from Ahodwo RB to Prempeh I Street	2.12	3.61
	6	Widening of New Bekwai Rd to 4 lanes from Santasi RB to Bekwai RB	2.53	4.61
	7	Widening of Old Bekwai Rd to 4 lanes from Ahodwo RB to Daban	3.48	5.43
	8	Widening of Antoa Rd to 4 lanes from Airport RB to Buokrom estate	2.64	8.21
	9	New link connection of Lake Rd and Century Hall Road, 4 lanes	1.20	0.82
	10	New link Old Bekwai Rd and New Bekwai Rd, 2 lanes	3.10	4.61
	11	New Outer Ring Road	91.49	190.60
	12	Yaa Asantewaa Rd widening to 4 lanes in certain sections	3.11	2.46
	13	Bantama Rd widening to 6 lanes in certain sections	0.63	0.66
	14	Eastern Bypass widening to 6 lanes in certain sections	2.60	3.29
	15	Offinso Rd widening to 6 lanes from Suame RB to New Magazine Rd	3.62	5.43
	16	Kwadaso Rd widening to 4 lanes from Sunyani Rd to Ohwimase Rd	1.12	2.14

Programme	No.	Projects	Length (km)	Cost ($ M)
	17	Maxwell Rd and Zongo Rd widening to 4 lanes	1.09	1.64
	18	Guggisberg Rd widening to 4 lanes	2.35	1.64
	19	Government Rd widening to 4 lanes	1.24	1.48
	20	New link connection between Ejisu and Kumasi (2 lane)	17.21	25.59
	21	New CBD road (2 lane)	3.01	4.48
	22	New Middle ring road by upgrading local roads (2 lane)	48.23	71.72
	23	Local road update in future urbanized area (2 lane)	468.89	159.42
Junction Improvement Scheme	1	Signal optimisation – Zoo junction		0.05
	2	Signal optimisation – Abrepo junction		0.05
	3	Signal optimisation – Kroform junction		0.05
	4	Signal optimisation – Top High junction		0.05
	5	Signal optimisation – Anloga junction		0.05
	6	Anloga Intersection Improvement by Conversion to Flyover		50.00
	7	Airport Roundabout Improvement by Conversion to Flyover		50.00
	8	Suami Roundabout Improvement by Conversion to Flyover		50.00
	9	Santase Roundabout Improvement by Conversion to Flyover		50.00
	10	Ahodwo Roundabout Improvement by Conversion to Flyover		50.00
	11	Osei Tutu II Blvd. at KNUST		0.05
	12	Harper Road / James E. Bandoh Drive		0.05
	13	Southern Bypass / Adiembra Road		0.05
	14	Western Pypass / Edwenase Road		0.05
	15	Atoa Road / Buokrom Estate Road		0.05
	16	Aboabo / St. Patrick Road		0.05
	17	Mampong Road / Cemetery Road		0.05
	18	Mampong Road / New Suame Road		0.05
	19	Mampong Road / Tafo Hospital Road		0.05
	20	Mampong Road / Pankrono Estate Road		0.05
	21	Obuasi Road / Odeneho Kwadaso		0.05
	22	Obuasi Road / Fankyenbra Road		0.05
	23	Obuasi Road / Adiembra Road		0.05
	24	Obuasi Road / Santasi New Site		0.05
Type B Transit Routes Scheme	1	Antoa Road Type B Routes	8.80	3.68
	2	Mampong Road Type B Routes	8.80	2.18
	3	Offinso Road B Routes	8.20	2.12
	4	Abrepo Road B Routes	7.40	2.04
	5	Sunyani Road B Routes	8.30	2.13
	6	Bekwai Road B Routes	8.40	3.64
	7	Old Bekwai B Routes	9.90	2.29
	8	Lake Road B Routes	10.40	2.34
	9	Accra Road B Routes	15.30	4.38
	10	Orbital Route Type B Route	18.30	7.53
BRT Routes Scheme	1	BRT Mampong Road	8.80	20.22
	2	BRT Offinso Road	8.20	19.08
	3	BRT Sunyani Road	8.30	19.27
	4	BRT Bekwai Road	8.40	19.46
	5	BRT Accra Road	15.30	34.57
	6	BRT Lake Road	10.40	23.26
Other Public Transport Scheme	1	Interchange Hubs**		NULL
	2	Sustainable Transit Corridor (using railway corridor)		1.60
	3	Park & Ride (7 sites)		4.90
Traffic Control in CBD Scheme	1	One-Way Traffic Operation		NULL
	2	Provision of Pay Parking		NULL
	3	Improvement of Pedestrian Walkways		NULL
	4	Provision of New Walkways		2.38

Programme	No.	Projects	Length (km)	Cost ($ M)
	5	Provision of Cycle Lanes		7.15
	6	Kumasi Centralized Traffic Signal Project		NULL
	7	Number plate restriction inbound CBD		NULL
TDM Scheme	1	Flexible Working Hours		NULL
	2	Rideshare programs		NULL
	3	Car sharing		NULL
	4	HOV Priority		NULL
	5	Road pricing		NULL
	6	Fuel tax increases		NULL
	7	Commuter financial incentives		NULL
	8	Education Campaign on Mobility Management		NULL
Freight Transport Scheme	1	Dry Port at Boankra		NULL
	2	Truck Terminal at Kodie		5.00
	3	Truck Terminal close to New International Airport		5.00
	4	Truck Terminal at Bekwai Road		5.00
	5	Bulk Breaking Point at Offinso Road		2.00
	6	Bulk Breaking Point at Accra Road		2.00
	7	Bulk Breaking Point at Lake Road		2.00
	8	Bulk Breaking Point at Bekwai Road		2.00
	9	Bulk Breaking Point at Sunyani Road		2.00
	10	Time Window for Truck Delivery within the inner ring road		NULL
	11	Truck Access Control (Total Truck Ban after completion of outer ring road)		NULL
	12	Establishment of Forum on Freight Transportation		NULL
	13	Railway Upgrade Tema – Kumasi	303.90	NULL
	14	Railway New Construction Kumasi – Paga	617.80	NULL
Airport	1	Kumasi International Airport		NULL

Source: JICA Study Team

Figure 12.3 Projects for Transportation Sector

Chapter 13 Water Resources Sector Plan and Programme

13.1 Objectives for Water Resources Development

The objectives for water resource development in Greater Kumasi Sub-Region are as follows:

- To make use of the existing reservoirs' capacity for water supply by rehabilitation of the dams.
- To materialize new water sources in and around Greater Kumasi Sub-Region
- To consolidate a hydrological monitoring system
- To enhance access to safe water supply in rural areas

13.2 Water Resources Potential

The minimum specific discharge for a catchment area of 1,000 km^2 is 0.003 $m^3/s/km^2$. If you consider the total area of the catchment in and around Greater Kumasi Sub-Region will be 5,660 km^2 and the annual runoff volume is calculated as follows:

$$0.003\ m^3/s/km^2 \times 5{,}660\ km^2 \times 86400\ s \times 365 = 5.3\times10^8\ m^3/year$$

(Equivalent = 1,400,000 m^3/day)

From the above, the water resources potential can be set at 1,400,000 m^3/day for 5,660 km^2 in dry year. It should be confirmed that the above water resources potential including surface water and groundwater is referential only, the total amount of runoff in a year. If huge dams are constructed in each main river in order to trap all the runoff that flows into the rivers, this volume could be used for water use. However this is impossible, so it is important to determine how much water out of that 1,400,000 m^3/day can be used practically.

The percentage of groundwater runoff out of the total runoff is 50% therefore the groundwater potential for 5,660 km^2 is 700,000 m^3/day. However, this amount must be considered as a theoretical maximum value because under natural conditions it becomes a part of total runoff (water resources potential) in a year.

Generally, groundwater exists locally, which means that the available amount in an area can be used in the same area. Therefore, assuming the future urban area in 2033 is 858 km^2, the groundwater potential in such urban area can be calculated as follows:

$$700{,}000\ m^3/day \times (858 / 5{,}660) = 106{,}000\ m^3/day$$

The water budget for the area 5,660 km^2 is shown in Figure 13.1. The naturally available water is 1,400,000 m^3. Among this, the existing dams are developing 230,000 m^3 and a certain amount of environmental flow is required. Also the rural water supply and the groundwater usage in the urban areas are developing to some extent. Therefore, it is assumed that approximately 900,000 m^3/day could be newly developed. However, attempts to develop this amount would encounter difficulty because of the topography, geology and social-environmental issues in and around Greater Kumasi Sub-Region.

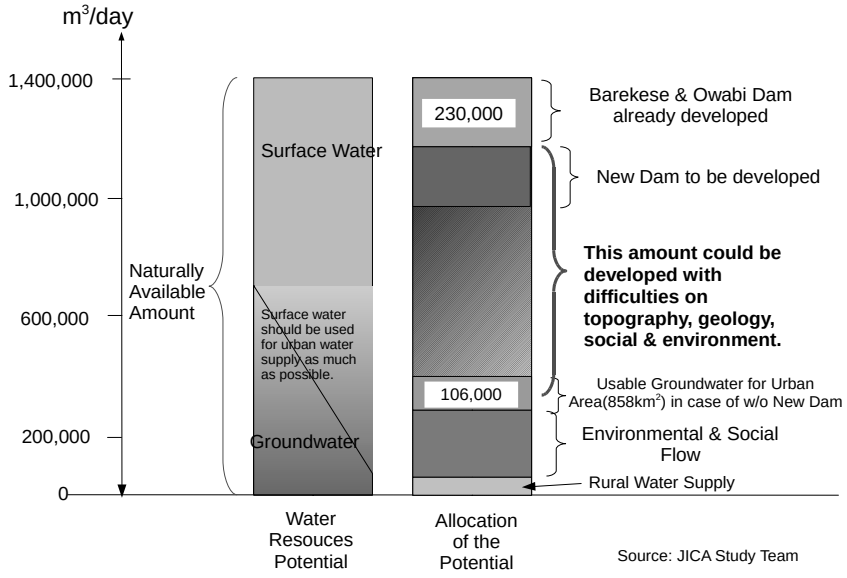


Figure 13.1 Allocation of Water Resources Potential for Dry Year (1,400,000m^3/day, Area=5,660km^2)

13.3 Strategies for Water Resources Development

The strategies for water resources development are as follows:

- Dredging of Barekese and Owabi Dam reservoirs
- Feasibility study on new water sources
- Consolidation of hydrological monitoring
- Enhancement of rural water supply
- Construction of dams

13.4 Water Resources Sector Plan and Programme

(1) Dredging of Barekese and Owabi Dam Reservoirs

Of the 2 dams, most of the yield is coming from Barekese Dam, so that the dredging for Barekese Dam should be prioritized.

The sedimentation volume in Barekese Reservoir is estimated at about 10,000,000 m^3 while the original water storage capacity was 33,750,000 m^3. The capital dredging of 10,000,000 m^3 would contribute to the increase of 20,000 m^3/day as the dam yield capacity.

The dredge site is the reservoir of Barekese Dam. The material to be dredged is basically fine sand and silt-clay which has been deposited on the bottom of the reservoir. The water depth of the reservoir is less than 15 m because the dam height is 15m.

There are two basic strategies for the disposal of dredged sediment: riverine disposal to the channel below the dam, or off-stream disposal into a diked upland containment area. In this case the off-stream disposal shall be recommended, which hydraulically dredged sediment is pumped into an upland diked containment area where the sediments are allowed to settle, and the supernatant water is discharged into the environment, often back into the reservoir being

dredged. The implementation period is set to be 6 years with 1 dredge.

(2) Feasibility Study on New Water Sources

A feasibility study on new water sources should be conducted in order to materialize new water sources in the future. The result of the study would contribute to the promotion of water supply planning.

The feasibility study should focus on the following items:

- Hydrological measurements (Surface water and groundwater)
- Clarification of water budget in and around Greater Kumasi Sub-Region
- Topographic and geological investigations for the candidate dam sites
- Basic design of dams and appurtenant works and water treatment plant (WTP)
- Social and environmental impact study
- Project justification considering the dam cost and WTP cost.

(3) Consolidation of Hydrological Monitoring

In any event, the dam yield potential should be evaluated based on more hydrological data such as inflow and outflow through intake and spillway. The consolidation of the hydrological monitoring network is required at present. In the short term, while the urban water supply is expanded for KMA, the hydrological monitoring system should be developed and the dam capacity is to be re-evaluated based on the actually measured data in order to decide the future action.

The following locations are to be prioritized for daily discharge measurement. They should be owned and operated by the Hydrological Service Department (HSD).

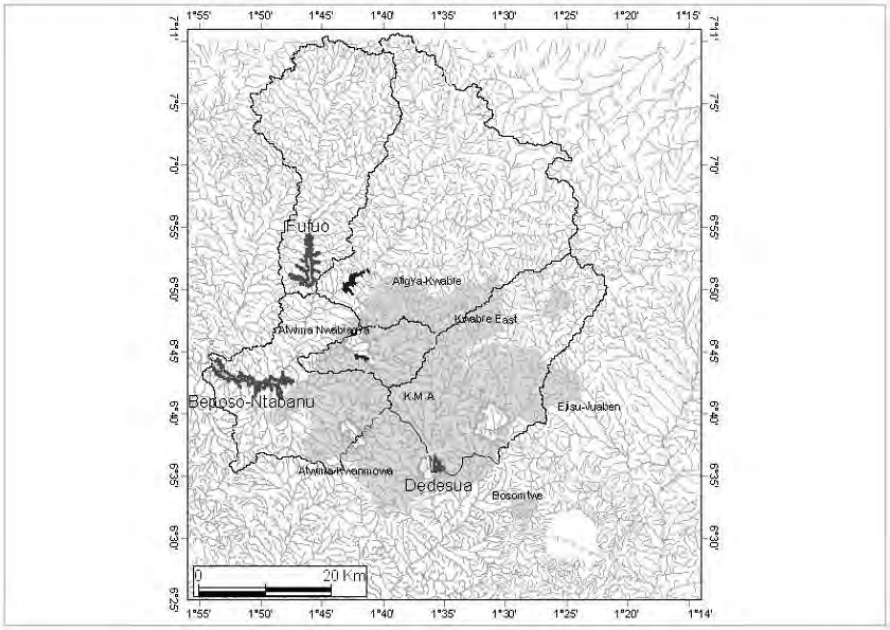
- Barekese Dam outflow
- Owabi Dam outflow
- Dedesua
- Beposo-Ntabanu
- Fufuo

(4) Enhancement of Rural Water Supply

Responding to the population increase in rural areas, Informal Service Providers (ISPs) are playing a very important role in water supply delivery in the communities. Their supply system such as Hand dug wells with hand pumps, mechanized hand dug wells, and mechanized boreholes should be implemented continuously in collaboration with Community Water and Sanitation Agency (CWSA).

(5) Construction of Dams

There are at least 3 feasible dam sites. Since Fufuo and Dedesua dam sites have smaller catchment areas than that of Barekese Dam, their necessary storage volumes have to be very large. Dedesua dam site seems to be unable to store the necessary storage volume. Beposo-Ntabanu site is better in terms of reservoir area size, while future urbanized areas are expected to occupy larger part of the catchment of Beposo-Ntabanu reservoir.



Source: JICA Study Team

Figure 13.2 Delineation of Basin Boundaries for Proposed Dam Locations

13.5 Costs of Water Resources Sector Programme

The preliminary cost estimation and implementation schedule for the Water Resources Sector are summarized in Table 13.1.

This cost does not include the disposal of dredged sediment. The construction cost of dam for water supply is to be used as reference since it shall be based on the Feasibility Study to be conducted.

Table 13.1 Cost and Implementation Schedule

Unit: million GHC

No.	Project/Programme		Short Term						Mid Term										Long Term					Total
			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
1)	Dredging of Barakese and Owabi Dam Reservoirs	CAPEX		6	6	6	6	6	6															36
		OPEX		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	60
2)	Feasibility Study on New Water Source	CAPEX		1.5	1.5																			3
		OPEX																						0
3)	Consolidation of Hydrological Monitoring	CAPEX	0.1					0.1					0.1					0.1					0.1	0.25
		OPEX																						0
4)	Enhancement of Rural Water Supply	CAPEX	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2		4
		OPEX																						0
5)	Constrcution of Dam for Water Supply	CAPEX													36	36	36							108
		OPEX																2.7	2.7	2.7	2.7	2.7	2.7	16.2
	Total		0	11	11	9	9	9	9	3	3	3	3	3	39	39	39	6	6	6	6	6	6	227

Source: JICA Study Team

Chapter 14 Water Supply Sector Plan and Programme

14.1 Forecast of Water Demand in Target Year 2033

At present, the Ghana Water Company Limited (GWCL) supply piped water in the part of the Greater Kumasi Sub-Region. For example, the water supply does not cover Ejisu-Juaben District and western part of the Sub-Region. The water supply of GWCL should cover the Greater Kumasi Conurbation, which will have population of 4.7 million by 2028 and 5.5 million by 2033.

The water demand by the population of the Greater Kumasi Conurbation will reach 440,000m^3/day in 2028 and 510,000m^3/day in 2033. .

14.2 Water Supply Sector Plan

(1) Effective Utilization of Existing Facilities

It is necessary to extend, upgrade and rehabilitate the existing facilities such as the water treatment plant and water pipes in order to respond to the rapidly increasing demand for piped water supply.

(2) Development of Boreholes in Lower Population Density Periphery Areas in the Conurbation

It is not possible to supply piped water to all residents inside the conurbation areas because of shortage of surface water resources, as well as shortage of GWCL's capacity to extend the piped water distribution system. Therefore, it is necessary to supply water from boreholes in the lower population density areas for community water supply systems.

(3) Increase of Revenue for Creating a Foundation for Sound Management

It is important to secure the basis for sound management of the water supply company (GWCL). For this purpose, it is essential to reduce the amount of Non-Revenue Water by installing water meters.

(4) Stable Supply of Clean Water for Greater Kumasi Sub-Region

In order to satisfy the rapidly increasing demand for piped water, it is necessary to develop new water sources. Then in response to the new water sources to be developed, it is necessary to develop water supply facilities.

14.3 Water Supply Sector Programme

There are 4 sub-programmes for the water supply sector for the Greater Kumasi Sub-Region. The detailed plans for each Programme are as follows:

(1) Sub-Programme 1: Effective Utilization of Existing Water Supply Facilities

- Extension of water treatment plant modules in Barekese

- Improvement in the operational management of the existing water treatment plant
- Installation of transport lines to Suame water tank from Barakese WTP
- Investigation of the necessity of new water tanks and the volume and locations with consideration of the distribution and construction of the new water tanks
- Investigation of the causes of NRW and replace pipelines based on the investigation results
- Replacement of aged pipes by large-diameter pipes for preventing water leakage

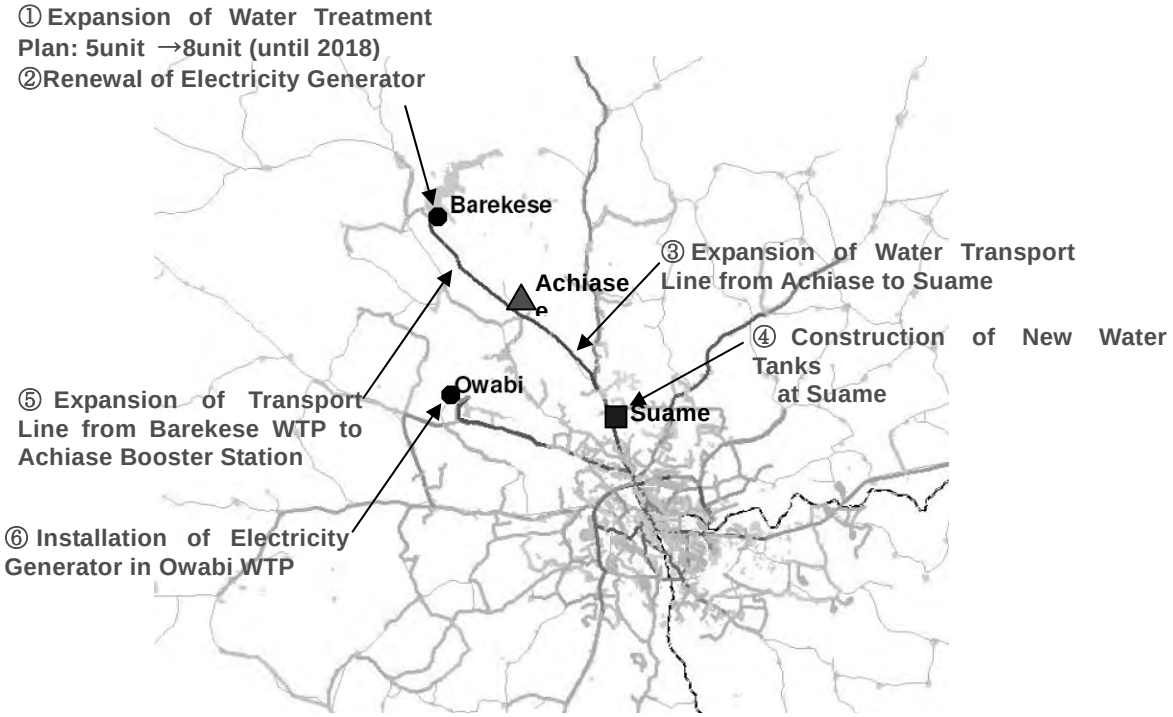


Figure 14.1 Projects for Sector Sub-Programme

(2) Sub-Programme 2: Development of Boreholes for Water Supply in Periphery Areas of Lower Population Density in Greater Kumasi Conurbation

- Construction of new boreholes with elevated tanks and pipe systems
- Groundwater data collection and monitoring

(3) Sub-Programme 3: Increase of Revenue for Creating a Foundation for Sound Management of Ghana Water Company Ltd.

- Installation of water meters for present customers that do not have working water meters
- Installation of water meters for new customers

(4) Sub-Programme 4: Stable Supply of Clean Water for Greater Kumasi Sub-Region

- To develop water treatment facilities in accordance with the development of new water sources
- Investigation of a more efficient distribution network and develop and upgrade the water distribution system

Table 14.1 Schedule for Water Supply Sector Programme

	Short-Term Plan						Mid-Term Plan										Long-Term Plan				
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Sub-Programme 1: Effective utilization of existing facilities																					
Extension of water treatment plant modules in Barekese	●	→	→	→	→	→															
Improvement in operational management of existing water treatment plant	●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
Installation of transport lines to Suame water tank from Barekese WTP	●	→																			
Investigation of necessity of new water tank and the volume and locations with consideration of distribution and construction of new water tank	●	→	→	→	→	→															
Investigation of causes of NRW and replace pipelines based on the investigation results	●	→	→	→	→	→															
Replace aged pipe with large-diameter pipes for preventing water leakage							●	→	→	→	→	→	→	→	→	→					
Sub-Programme 2: Development of boreholes in periphery areas in conurbation of lower population density area																					
Construction of new boreholes with elevated tank and pipe system	●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→					
Groundwater data collection and monitoring	●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→					
Sub-Programme 3: Increase of revenue for building foundation for sound management																					
Installation of water meters with present customers does not avail of working water meter	●	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→					
Installation of water meters with new customers												●	→	→	→	→	→	→	→	→	→
Sub-Programme 4: Stable supply of clean water for Greater Kumasi Sub-Region																					
Development of water treatment facilities in accordance with the development of new water resources												●	→	→	→	→	→	→	→	→	→
Investigation of more efficient distribution network and development and upgrade the water distribution system												●	→	→	→	→	→	→	→	→	→

Source: JICA Study Team

Table 14.2 Cost for Water Supply Sector Programme

		Cost ($x10^3$ GHC)	Remarks
Sub-Programme 1: Effective utilization of existing facilities			
	Extension of water treatment plant modules in Barekese	41,000	
	Improvement in operational management of existing water treatment plant	-----	
	Installation of transport lines to Suame water tank from Barekese WTP	12,000	
	Investigation of necessity of new water tank and the volume and locations with consideration of distribution and construction of new water tank	20,000	
	Investigation of causes of NRW and replace pipelines based on the investigation results	13,900	
	Replace aged pipe with large-diameter pipes for preventing water leakage	48,400	
Sub-Programme 2: Development of boreholes in periphery areas in conurbation of lower population density area			
	Construction of new boreholes with elevated tank and pipe system	147,000	
	Groundwater data collection and monitoring	-----	
Sub-Programme 3: Increase of revenue for building foundation for sound management			
	Installation of water meters with present customers does not avail of working water meter	14,000	
	Installation of water meters with new customers	22,000	
Sub-Programme 4: Stable supply of clean water for Greater Kumasi Sub-Region			
	Development of water treatment facilities in accordance with the development of new water resources	132,000	
	Investigation of more efficient distribution network and development and upgrade the water distribution system	523,000	

Source: JICA Study Team

Chapter 15 Liquid Waste Treatment Sector Plan and Programme

15.1 Objectives for Liquid Waste Treatment Sector Development

The objectives for liquid waste treatment sector development are as follows:

- Better access to hygienic toilets
- Adequate treatment of liquid waste
- Gradual improvement of the sanitation environment including treatment of grey water

15.2 Future Prospect for Liquid Waste Volume

Future projections for liquid waste volume are summarized in the tables below.

Table 15.1 Future Projections for Liquid Waste Volume

		Unit	2013	2018	2023	2028	2033
Population of Greater Kumasi Sub-Region		Nr.	3,127,010	3,749,705	4,393,019	5,050,422	5,761,463
Water Supply through Pipeline for Hose Connections							
	Population	Nr.	1,027,643	1,255,222	1,467,885	2,900,926	4,112,716
	Per Capita	Lcd	30	40	50	55	60
	Black Water Volume	m^3/day	12,330	20,080	29,360	63,820	98,710
	Gray Water Volume	m^3/day	18,500	30,130	44,040	95,730	148,060
	Total Volume	m^3/day	30,830	50,210	73,400	159,550	246,770
Water Supply from Standpipe or Borehole							
	Population	Nr.	2,099,367	2,494,482	2,925,134	2,149,496	1,648,747
	Per Capita	Lcd	20	30	30	30	30
	Black Water Volume	m^3/day	16,790	29,930	35,100	25,790	19,780
	Gray Water Volume	m^3/day	25,190	44,900	52,650	38,690	29,680
	Total Volume	m^3/day	41,980	74,830	87,750	64,480	49,460
Total Liquid Waste Volume							
	Black Water Volume	m^3/day	29,120	50,010	64,460	89,610	118,490
	Gray Water Volume	m^3/day	43,690	75,030	96,690	134,420	177,740
	Total Volume	m^3/day	72,810	125,040	161,150	224,030	296,230

Source: JICA Study Team
Note: The volume of Liquid Waste assumes domestic use only.

Table 15.2 Future Projections for Septage Amount

Unit: ton/day

	2013	2018	2023	2028	2033
KMA	349	415	482	523	577
Afigya-Kwabre	21	24	29	33	39
Kwabre East	18	21	24	26	33
Ejisu-Juaben	23	26	30	50	66
Bosomtwe	15	17	20	22	25
Atwima Kwanwoma	14	16	19	22	30
Atwima-Nwabiagya	23	27	31	32	38
Greater Kumasi Sub-Region	463	546	635	708	808

Source: JICA Study Team

15.3 Liquid Waste Treatment Sector Plan

(1) Increase of Access to Hygienic Toilets

In the future, the percentages of household with access with toilet should be improved by implementing strategies in order to achieve the objectives. Numerical targets for toilet facilities are set based on the following policies:

- Before 2023 (in ten years), all residents will be able to access hygienic toilets.
- Household toilets will be additionally constructed to the houses where toilets are not available .
- The 10% of households that relied on public toilets will have new household toilets constructed in conjunction with the move to the suburbs based on urban planning.

(2) Adequate Treatment of Liquid Waste

In the future, although the population and number of toilets will increase, maintenance of toilets in each household should be sufficient, and the septage also should be treated adequately.

(3) Improve Sanitation Environment Gradually

In the meantime, adequate treatment for liquid waste (black water only) such as septage treatment and the simplified sewer system is sufficient. But in the more distant future, it will be necessary to construct conventional sewer systems and treat all waste water including grey water because of the lack of capacity of septage treatment ponds and contamination of ground water and water bodies by grey water. Therefore, in the future after 2033, conventional sewer systems should be constructed in the conurbation area.

15.4 Liquid Waste Treatment Sector Programme

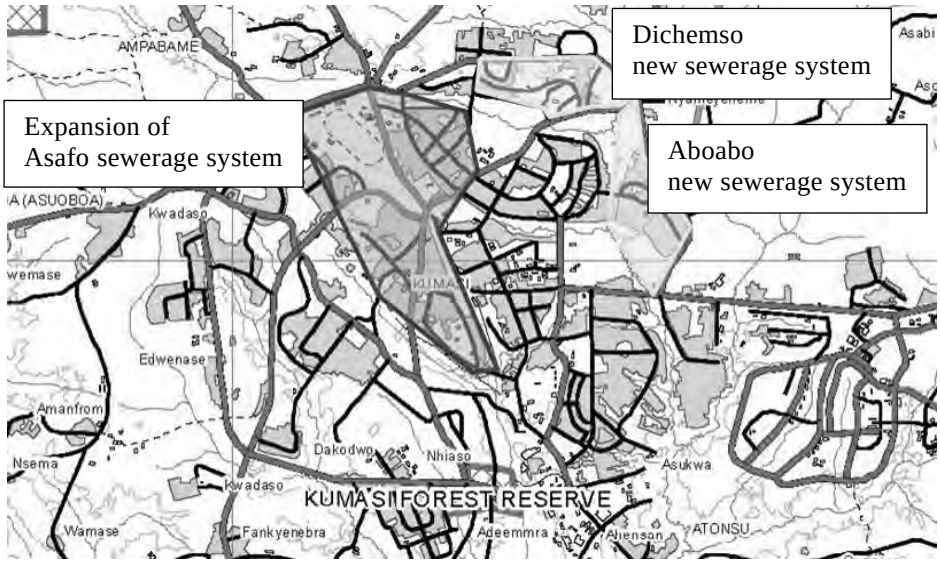
There are 5 sub-programmes for the liquid waste treatment sector for the Greater Kumasi Sub-Region.

(1) Project 1: Increase Access to Hygienic Toilets

- Hold meetings regarding the importance of hygienic toilets at each community and school
- Construct public toilets

(2) Project 2: Construction of Sewerage Systems

- Expand the existing Asafo sewerage system
- Construct new sewerage systems



Source : JICA Study Team

Figure 15.1 Projected Areas for Simplified Sewerage Systems

(3) Project 3: Enforcement of Environmental Policy and Regulations

- Enforce the Environmental Sanitation Policy, laws and regulations for existing industries which have no treatment facilities.
- Enforce the Environmental Sanitation Policy, laws and regulations for planned industries, prior to commencement of operation.

(4) Project 4: Construction of Septage Treatment Ponds

- Formulate septage treatment ponds and final landfill construction plans by each district and municipality, and identify suitable sites for constructing of septage treatment ponds in each district and municipality.
- Implement septage treatment pond and final landfill plans by each district and municipality

(5) Project 5: Construction of Conventional Sewerage Systems

- Formulate a comprehensive conventional sewerage plan
- Found a new organization for conventional sewerage systems beyond exiting local governments (MMDAs)

Table 15.3 Project Outline for Liquid Waste Treatment Sector Programme

	Short-term Plan						Mid-Term Plan										Long-Term Plan				
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Project 1: Increase access to hygienic toilets																					
a) Hold meetings at each community and school.	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	→
b) Construct public toilets	●	-	-	-	-	-	-	-	-	→											
Project 2: Construction of sewerage systems																					
a) Expand the existing Asafo sewerage system	●	-	-	-	-	-	-	-	-	→											
b) Construct new sewerage systems											●	-	-	-	→						
Project 3: Enforcement of environmental policy and regulations																					
a) To existing industries which have no treatment facilities.	●	-	-	-	→																
b) To planned industries, prior to commencement of operation.	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	→
Project 4: Construction of septage treatment ponds																					
a) Formulate construction plan	●	-	-	-	→																
b) Implement plans by each district and municipality							●	-	-	-	-	-	-	-	→						
Project 5: Construction of conventional sewerage systems.																					
a) Formulate a comprehensive conventional sewerage plan																	●	-	→		
b) Found a new organization																			●	-	→

Source: JICA Study Team

Table 15.4 Project Costs for Liquid Waste Treatment Sector Programmes

		Cost ($x10^3$ GHC)	Remarks
Project 1: Increase access to hygienic toilets			
	a) Hold meetings at each community and school.	---	
	b) Construct public toilets	3,510	
Project 2: Construction of sewerage systems			
	a) Expand the existing Asafo sewerage system	7,020	
	b) Construct new sewerage systems	1,800	
Project 3: Enforcement of environmental policy and regulations			
	a) To exiting industries which have no treatment facilities.	---	
	b) To planned industries, prior to commencement of operation.	---	
Project 4: Construction septage treatment ponds			
	a) Formulate construction plan	670	10% of Construct
	b) Implement plans by each district and municipality	6,730	
Project 5: Prepare construction of conventional sewerage systems.			
	a) Formulate a comprehensive conventional sewerage plan	---	
	b) Found a new organization	---	

Source: JICA Study Team

Chapter 16 Solid Waste Management Sector Plan and Programme

16.1 Objectives for Solid Waste Management of Greater Kumasi Sub-Region

The objectives for solid waste management sector are as follows:

- To provide the healthy public hygiene area, strengthening the solid waste management (collection, transportation, disposal) in the Greater Kumasi Sub-Region,
- To be responsible for (or to secure the ability to do) the solid waste management within not only the areas of the KMA, but also the entire area of Greater Kumasi Sub-Region.
- At the same time, to arrange the order of so as to carry out the solid waste management (SWM) by the cooperation among the KMA, the surrounding Municipal and District Assemblies in the Greater Kumasi Sub-Region.
- To consider effects carefully on the environment and deepen the understanding of residents regarding the importance of construction of a new final landfill.
- In the long-term future, to reduce the solid waste generation amount.

16.2 Solid Waste Management Sector Programme

There are four sub-programmes for the solid waste management sector for the Greater Kumasi Sub-Region.

(1) Sub-Programme 1: Expansion of Oti Sanitary Landfill Site

a) Implementation (Operation/ Maintenance) of Phase 2
b) Implementation (Preparation/ O-M) of Phase 3

(2) Sub-Programme 2: Continuation of Kumasi Composting and Recycling Plant (KCRP) Project at Adagya

a) Formulation of 3R (reduce, reuse, recycling) Implementation Plan
b) Construction of plant
c) Operation of plant
d) Implementation of Waste Reduction Plan
e) Preparation of new landfill site
f) Operation of new landfill site

(3) Sub-Programme 3: Enhancement of SWM Unit of EHD, MMDAs

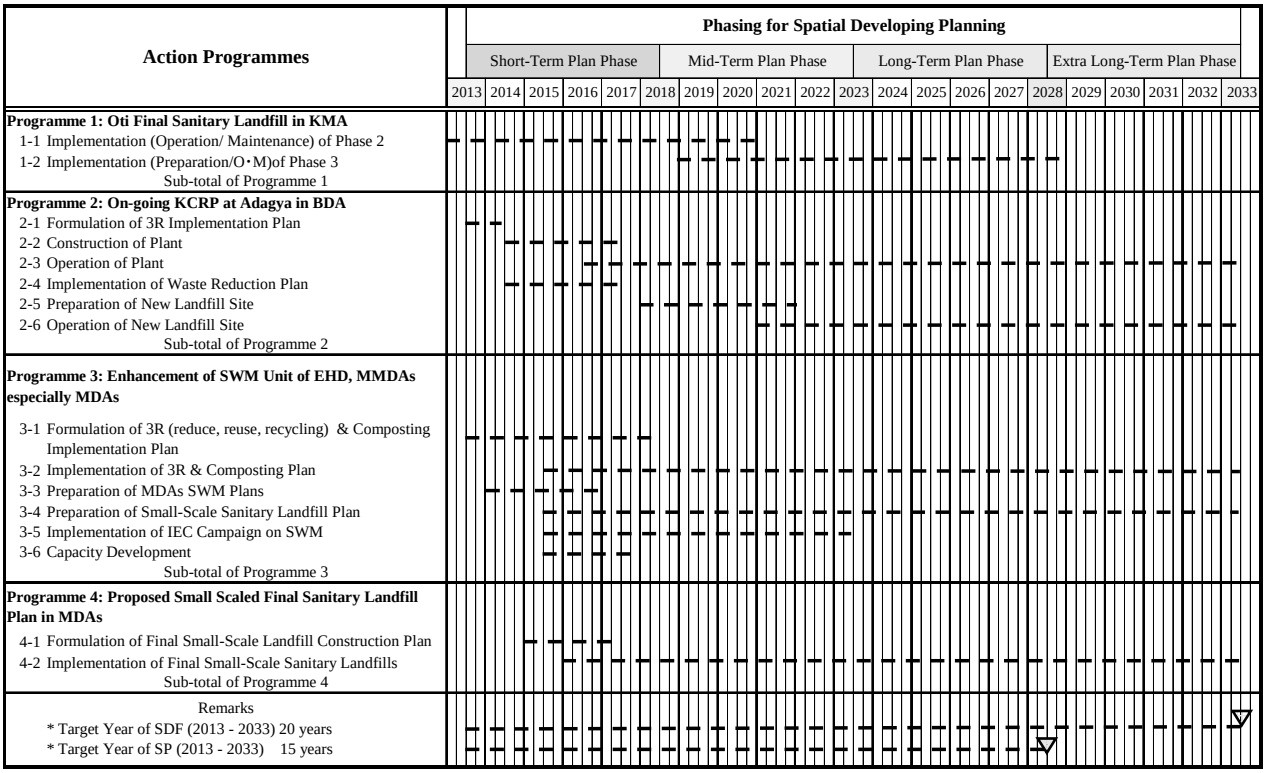
a) Formulation of 3R (reduce, reuse, recycling) & Composting Implementation Plan
b) Construction of 3R & Composting Plant
c) Preparation of the six adjoining Municipality and District Assemblies' SWM Plans
d) Preparation of small-scale sanitary landfill plan
e) Preparation of land acquisition process for landfills
f) Implementation of Information, Education and Communication Campaign on SWM
g) Capacity development

(4) Sub-Programme 4: Construction of Final Sanitary Landfill Sites in MDAs

a) Formulation of Final Small-Scale Landfill Construction Plans

b) Implementation of Final Small-Scale Sanitary Landfill

Table 16.1 Implementation Plan for SWM Sector Programme



Sources: KMA-WMD, Zoomlion Ghana Co. Ltd.
Notes: Kumasi Composting and Recycling Plant (KCRP), Bosomtwe District Assembly (BDA), Municipality and Districts Assemblies (6 MDAs)
Spatial Development Frameworks (SDF), Structure Plan (SP), Environmental Health Department (EHD), Information Education and Communication (IEC)

Table 16.2 Construction and Management Cost of Final Small-Scale Landfill in Surrounding Districts of KMA

MDAs	Construction cost			O/M cost (million GH₵/year)
	(million GH₵/ sanitary landfill/ district/ every 3-year)	Number of landfills for the period year 2013 to 2033	Sub-total (million GH₵) (2013-2033)	
Afigya Kwabre	0.8	7	5.6	0.064
Kwabre East	0.6	7	4.2	0.048
Ejisu-Juaben	0.8	7	5.6	0.064
Bosomtwe	0.5	7	3.5	0.04
Atwima Kwanwoma	0.5	7	3.5	0.04
Atwima Nwabiagya	0.8	7	5.6	0.064
Sub-total	4.0		28.0	

Source: JICA Study Team
Note: 2012 price level

Chapter 17 Drainage Sector Plan and Programme

17.1 Objectives for Drainage Sector Development

The objectives for drainage sector are as follows:

- To limit sanitary nuisances and vector breeding
- To prevent rainwater stagnation and erosion
- To prevent serious flooding in downstream river sections

17.2 The Future of the Drainage Sector

KMA is located in the upper most part of the Pra River basin on the catchment divide between the Offin and Oda Rivers. In this topographical sense, the KMA is free from danger of prolonged flooding due to high water in the rivers. The limits of the future urbanized area is to be 858 km^2. It is clear that the rainwater runoff will discharge into the KMA's surroundings due to its topography. Therefore, in terms of the drainage sector, Greater Kumasi Sub-Region, especially KMA, has to prepare 343 million GHC for the future drainage work.

Regarding the lining works, the extension of the lined section is necessary according to the future urbanization in Greater Kumasi Sub-Region. The preliminary cost estimation for future lining work is to be approximately 800 million GHC.

The actual implementation volume should be limited due to the extremely high cost. The preliminary cost for the drainage sector is estimated tentatively.

17.3 Strategies for Drainage Sector Programmes

The strategies for drainage sector programmes are as follows:

- Adequate drainage maintenance
- Continuous lining of drainage and erosion control
- Prevent flooding in downstream river sections

17.4 Outline of Projects for Drainage Sector Programmes

There are three sub-programmes for the drainage sector for the Greater Kumasi Sub-Region.

(1) Adequate Drainage Maintenance

Assemblies are making efforts to provide containers for solid waste in the communities so that people will not dump rubbish into the drains, and educate people for not littering.

The drainage maintenance includes the following:

- Dredging the main, the secondary and the tertiary drains (weed clearing, refuse removal, drain dredging and desilting)
- The dredged/desilted material should be carted away from the drain banks.

- Culvert outfalls should also be protected against scouring and erosion using rip-rap for example.

(2) Continuous Lining of Drainage and Erosion Control

The five main drainage in KMA, namely Aboabo, Kwadaso, Nsuben, Sisai and Wiwi drainage basins cover approximately 150km^2 and has the total length of 142km. However only 17% of the total length is lined and the rest of 83% (118km) is unlined which causes erosion.

In order to prevent erosion, the paving of residential roads and construction of roadside small drains are necessary. Therefore, the paving and construction of roadside drains should be conducted gradually, according to the development of the city.

(3) Prevention of Flooding in Downstream River Sections

In the future, surface penetration of rainwater will be reduced by urbanization. As a result, the amount of stormwater runoff will be increased which will increase the risk of flooding. It is also necessary to enter into discussions in terms of effective use of rainwater such as rainwater harvesting. Therefore it is necessary to formulate a plan for preventing flooding including effective use of the stored stormwater.

Assemblies are making efforts to enforce laws to ensure the buffer zone around the water bodies will be secured by taking measures to prevent housing from being built in the drains. The land to be secured from the water bodies shall include a buffer in accordance with relevant policies/laws such as the "Buffer Zone Policy for Managing River Basins in Ghana".

In order to implement the buffer zone policy it is necessary to formulate a plan to prevent flooding, including effective use of the stored stormwater, under the coordination of a regulatory body such as Water Resource Commission (WRC). In the course of discussion of the flood control plan, the future lining sections can be prioritized.

Table 17.1 Project Outline for Drainage Sector Programme

	Short-Term Plan						Mid-Term Plan									Long-Term Plan				
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Project 1: Adequate drainage maintenance																					
a) prevent solid waste from being dumped into the drainage	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	→
b) To integrate drainage Management	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	→
Project 2: Continuous lining of drainage and erosion control																					
a) acceleration of drainage lining work for primary drains	●	-	-	-	-	-	-	-	-	-	→										
b) Paving of streets in residential areas	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	→
Project 3: Prevent flooding in downstream river sections																					
a) Formulate plan for preventing flooding												●	-	-	-	→					
b) Enforce laws to ensure Buffer Zone	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	→

Source: JICA Study Team

Chapter 18 Electricity Sector Plan and Programme

18.1 Objective for Electricity Sector Development

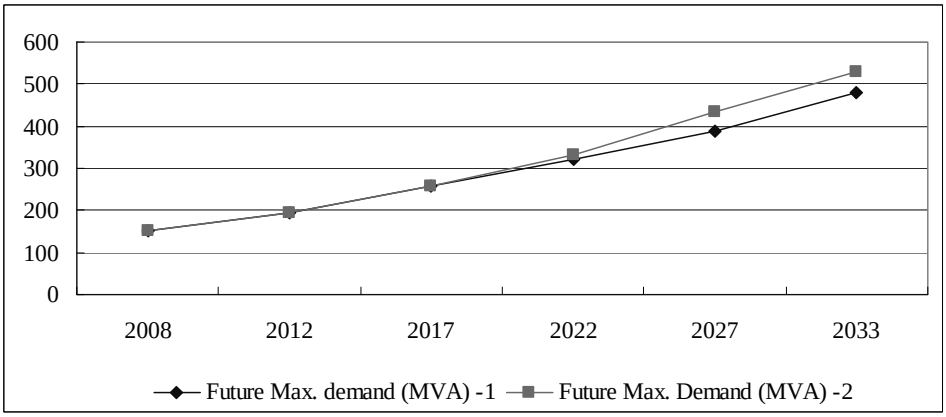
The objective of the Electrical sector is "Stable and Reliable Power Supply" to the consumers.

18.2 Future Demand Analysis

The maximum demand in the year 2011 was recorded as approximately 180MVA. The forecast of maximum demand is based on the record of the past 9 years maximum demand for electricity and the growth of population and GDP, and forecast growth of population and GDP. As a result annual growth rate is 4.6% and maximum demand for year 2033 is forecasted to be 500MVA (Future Max. Demand -1).

According to the Future Land Use Plan, many areas in Greater Kumasi Sub-Regions will be developed as industrial areas, urban and city centres, especially the industrial area is estimated to have a high demand, therefore spot demand (Future Max. Demand -2) will be considered in addition to the above forecast demand. The maximum spot demand for 2033 is forecasted to be 530MVA.

The following graph shows the relationship between future demand-1 and -2 of Greater Kumasi Sub-Region.



Source: JICA Study Team

Figure 18.1 Relationship between Future Maximum Demand-1 and -2

18.3 Strategies for Electricity Sector Development

The strategies for electricity sector development are as follows:

- Improve and modernize sub-transmission and LV distribution systems.
- Electrification in rural areas.
- Sub-transmission/distribution systems will be expanded for supplying stable and reliable power to the areas that are shown in the future Land Use Plan.
- Reduce the commercial losses by management of Electricity Company of Ghana (ECG).

18.4 Electricity Sector Plan

(1) Enhancement and Improvement of Sub-transmission and Distribution Systems

To achieve stable and reliable power supply, enhancement and improvement of Sub-transmission and Distribution Systems needs to be taken care of first. Therefore, the following sector plans are considered:

- Replacement of small size wires of sub-transmission and distribution systems
- Replacement of deteriorated equipment

(2) Electrification in Rural Areas

Increase access rating to electricity for communities with more than 500 population to 80% by 2015 and to 100% by 2020.

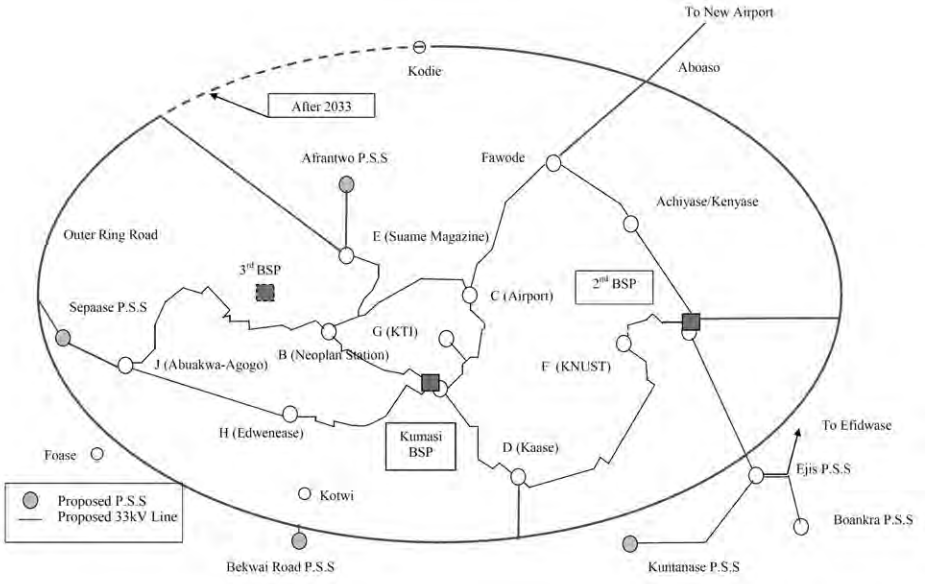
(3) Expansion of 33kV Sub-transmission and Distribution Systems

Sub-transmission and distribution lines are to be expanded based on the electrical demand shown in the future Land Use Plan.

(4) Future Sub-transmission System

Expanding the 33kV Sub-transmission system based on the demand in the future Land Use Plan is deemed to create a more reliable system compared to the current 33kV Sub-transmission system.

Since the 33kV sub-transmission system is a key system of electrical power supply, a 33kV ring main system will be planed. The main ring system will result in increased distribution capacity and supply reliability to the consumers. Future sub-transmission systems including the ring main system are shown in Figure 18.2.



Source : JICA Study Team

Figure 18.2 Future 33kV Sub-Transmission and Main Ring Systems

18.5 Electricity Sector Programme

The electricity sector programmes are as in the table below.

Table 18.1 Electricity Sector Programme by Phases

Phase	Sector Programme
2013 – 2018	• Deteriorated equipment such as overhead wires, insulators and cables should be replaced with new ones. • Installation of new sub-transmission lines and 11kV underground distribution system based on the future Land Use Plan • Installation of distribution lines and transformers for non electrified communities in rural areas (Target:80% electrification of communities with more than 500 population)
2018 – 2023	• Installation of 33/11kV substation and 11kV/433V transformers (500kVA- 2) based on the future Land Use Plan • Installation of distribution lines and transformers for non electrified communities in rural areas (Target:100% electrification of communities with more than 500 population)
2023 – 2028	• Installation of P.S.S., 33kV Sub-transmission line and 11kV/433V transformers (500kVA-1) based on the future Land Use Plan
2028 – 2033	• Installation of 33kV sub-transmission line based on the future Land Use Plan • Installation of 33kV Sub-transmission line for redundancy between 33kV Sub-transmission line along the outer ring road

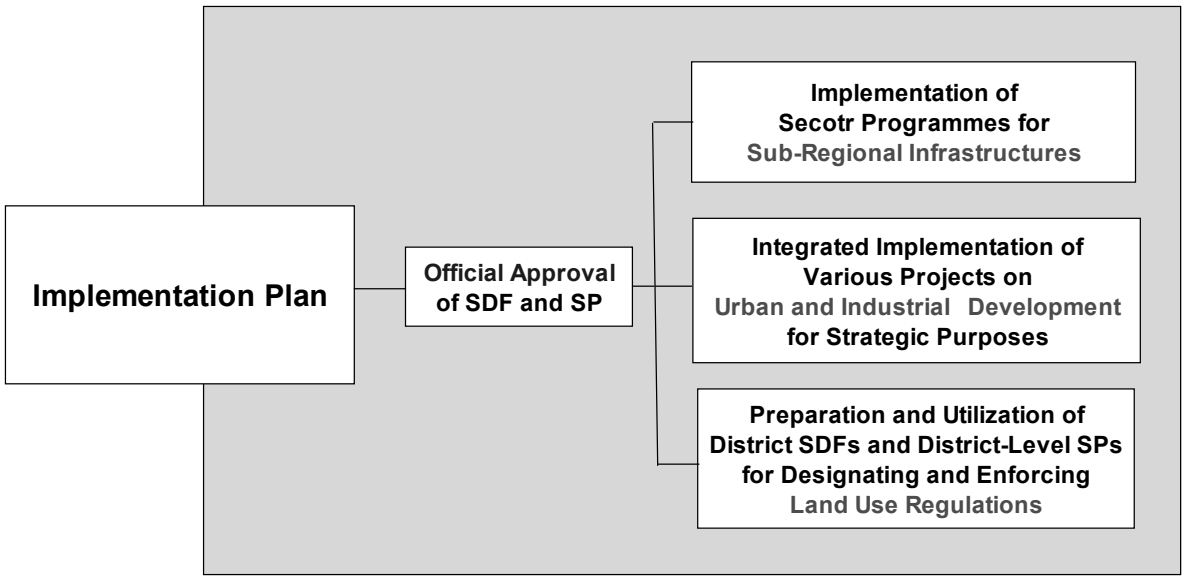
Source: JICA Study Team

PART VII IMPLEMENTATION PLAN

Chapter 19 Introduction

For implementing the Greater Kumasi Sub-Regional SDF and Greater Kumasi Conurbation SP, the following four key types of actions are required:

- Official approval of the SDF for Greater Kumasi Sub-Region and the SP for Greater Kumasi Conurbation (In fact, based on this recommendation, the master plan for Greater Kumasi Sub-Region was approved by the Regional Co-ordinating Council (RCC) of Ashanti Region.)
- Implementation of sector programmes for sub-regional infrastructures
- Integrated implementation of various projects for strategic purposes
- Preparation and utilization of district-level SDFs and SPs for designating and enforcing land use regulations.



Source: JICA Study Team

Figure 19.1 Framework of Implementation Plan

In addition to these four aspects, financial arrangements for implementing programmes and projects are also very important. Different financial arrangements are proposed for different economic sectors and infrastructures/services.

Chapter 20 Institutional Framework for Implementation of Greater Kumasi Sub-Regional SDF and Greater Kumasi Conurbation SP

20.1 Present Institutional Issues on Implementing Greater Kumasi Sub-Regional SDF and Greater Kumasi SP

The current Ghana's development planning system does not demand the regional level to prepare its own development plans (socio-economic plans). The current Ghanaian budgetary system does not provide the regional level, any development budget to be spent for its own regional initiatives.

However it is essential to make concerned efforts at the regional level in collaboration with districts for achieving efficient, effective and sustainable development. It is especially important for the purpose of mobilizing national resources for regions or sub-regions.

20.2 Institutional Framework Necessary for Implementing Greater Kumasi SDF and Greater Kumasi SP

(1) Regional Platform

It is necessary to organize a regional platform for carrying out collective efforts at the regional level. Such a regional platform should be established at a government unit under the Regional Co-ordinating Council (RCC) of Ashanti Region. The existing Regional Planning Coordinating Unit (RPCU) could perform the function of the regional platform for the Greater Kumasi Sub-Regional SDF and Conurbation SP. Otherwise the Regional Spatial Planning Committee, to be established under the RPCU in accordance with the new Land Use Law, could perform the function of the regional platform.

Regularly every two months or so, official meetings of the Regional Platform should be held for monitoring and evaluating the activities and results of implementation promotion by the members of the Regional Platform.

For active promotion for implementation of the following selected strategic purposes, flexible, action-oriented Working Groups should be formed and their activities should be managed. Private groups should be included as formal members of the Working Groups. Even the appointment of private sector persons as leaders for the Working Groups should be encouraged.

(2) National-Level Coordination Functions for Implementation of Greater Kumasi Sub-Regional SDF and Greater Kumasi Conurbation SP

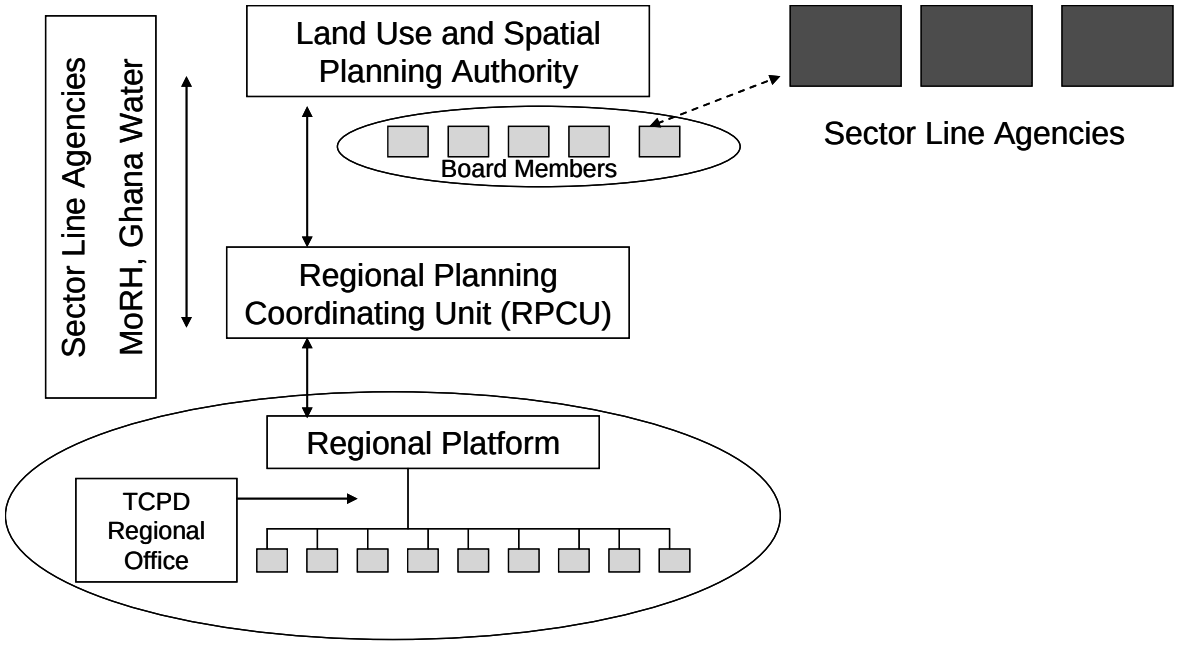
At the national level, some national-level organizations should play coordinating roles for promoting the implementation that the Greater Kumasi SDF and SP require.

One of the candidate organizations is the National Development Planning Commission (NDPC), by which a national infrastructure master plan has being formulated in consultation with infrastructure sector agencies.

Another candidate organization is the prospective "Land Use and Spatial Planning Authority" to be established under the new law on Land Use and Spatial Planning.

(3) Key National Infrastructure Agencies for Greater Kumasi Sub-Region

In addition to the regional platform and national-level coordination function, the vertical relation of certain infrastructure sector agencies should be utilized for promoting the implementation of important infrastructures. This is because certain infrastructures such as the Outer Ring Road, water resources development and water supply, are very critical in the future development of Greater Kumasi's urban and industrial development.



Source: JICA Study Team

Figure 20.1 Institutional Framework for Implementation of Greater Kumasi Sub-Regional SDF and Conurbation SP

Chapter 21 Priority Strategic Programmes for Urban and Industrial Development

The urban and industrial development efforts needed for Greater Kumasi Sub-Region are multi-sector and private-public collaboration efforts. The following programmes are priority strategic efforts to be made for promoting urban and industrial development for Greater Kumasi Sub-Region:

- Programme for Investment Promotion for Greater Kumasi;
- Programme for Revitalization of Kaase Industrial Area;
- Programme for Development of Boankra Industrial-Logistics Centre;
- Programme for Redevelopment of Kumasi City Centre; and
- Programme for Development of New Towns.

As recommended in Chapter 20 on the institutional framework, the establishment and operation of Working Group by the Spatial Planning Subcommittee of the RPCU of the RCC is important for mobilizing multi-sector efforts and private sector contributions. Profiles of these programmes are provided in this chapter.

(1) Programme for Investment Promotion for Greater Kumasi

Objectives	To promote private investment in strategic areas within Greater Kumasi Sub-Region for revitalizing the economy of Greater Kumasi
Main Executive Agencies	Ghana Investment Promotion Centre
Sub Executive Agencies	RCC of Ashanti Region, MMDAs of Greater Kumasi Sub-Region, Ghana Free Zones Board, Regional Department, Ministry of Trade and Industry, Ashanti Branch of Ghana Association of Industries, Ghana Real Estate Developers Association, Possible investors such as SSNIT and Ghanaian banks
Steps of Actions	· Establishment of Working Group for investment promotion for Greater Kumasi · Discussion on investment promotion strategies for Greater Kumasi · Preparation of pamphlets for investment promotion for Greater Kumasi · Holding of investment seminars for Greater Kumasi in Accra and Overseas

(2) Programme for Revitalization of Kaase Industrial Area

Objectives	· To reactivate industrial sectors in KMA · To promote private investments in industrial sectors in Kaase Industrial Area · To promote industrial sector production in Kaase Industrial Area
Main Executive Agencies	KMA

Sub Executive Agencies	Regional Department of Ministry of Trade and Industry, RCC of Ashanti Region, Ghana Investment Promotion Centre, Ghana Association of Industries
Steps of Actions	· Establishment of Working Group for Redevelopment of Kaase Industrial Area · Discussion on redevelopment strategies of Kaase Industrial Area by involving land owners and stakeholders · Identification of possible sites and changing land use regulations for attracting industries within Kaase Industrial Area · Preparation of pamphlets for attracting investments in Kaase Industrial Area · Participation in investment seminars to be organized for Greater Kumasi in Accra and Overseas · Identification of necessary rehabilitation of infrastructures for Kaase Industrial Area · Promotion of mobilizing funds for infrastructure rehabilitation for Kaase Industrial Area

(3) Programme for Development of Boankra Industrial-Logistics Centre

Objectives	· To promote the development of Boankra Industrial-Logistics Centre (not only the Dry Port and Export Processing Zone, but also surrounding areas) · To promote the development of Ashanti Technology Centre (Export Processing Zone) · To promote the development of Boankra Dry Port · To promote infrastructure provision (including roads, electricity and water supply) for the Boankra Industrial-Logistics Centre
Main Executive Agencies	Ghana Free Zones Board
Sub Executive Agencies	Ejisu-Juaben Municipality, Ghana Shippers' Authority, Regional Department of Ministry of Trade and Industry, Ghana Investment Promotion Centre, RCC of Ashanti Region, Ghana Real Estate Developers Association, Ghana Association of Industries
Steps of Actions	· Establishment of Working Group for Boankra Industrial-Logistics Centre · Sharing with participants of the Working Group of information on the current situation for Boankra area development · Preparation of layout plans/local plans for Boankra area including suburban centres and feeder roads · Monitoring of electricity supply to Boankra area · Speed up of electricity supply projects to Boankra area including Boankra Industrial-Logistics Centre · Preparation of pamphlets to promote private investments in Boankra Industrial-Logistic Centre · Participation in investment seminars to be organized for Greater Kumasi Sub-Region

(4) Programme for Development of Kumasi-Ejisu Urban Corridor

Objectives	· To create a Knowledge-Based Urban Corridor between Kumasi and Ejisu and further to Boankra · To provide advanced infrastructures for supporting the development of knowledge industries · To promote private investment in knowledge industrial development in the urban corridor · To promote urban mixed development of residential, business-commercial and industrial sectors
Main Executive Agencies	KMA, Ejisu-Juaben Municipality, KNUST, CSIR, Kumasi Polytechnic
Sub Executive Agencies	RCC of Ashanti Region, Ghana Investment Promotion Centre, Department of Urban Roads of Ministry of Roads and Highway, Department of Urban Roads of KMA, Urban Transportation Project of KMA, Urban Transportation Project, of Ejisu-Juaben Municipality, Regional Department of Ministry of Trade and Industry , Ghana Real Estate Developers Association, Ghana Association of Industries
Steps of Actions	· Establishment of Working Group for Development of Kumasi-Ejisu Urban Corridor · Discussion on strategies for Kumasi-Ejisu Urban Corridor · Securing Space for Widening of Accra Road to accommodate BRT route · Determination of upgrading of parallel road along Accra Road within the urban corridor · Preparation of layout plans/local plans including land use plans for economic development · Encouragement of KNUST to prepare a business plan for developing Knowledge City within the urban corridor · Preparation of pamphlets for promoting private investment in Kumasi-Ejisu Urban Corridor · Participation in investment seminars for Greater Kumasi · Private investment promotion for knowledge industries and hotel-conference facilities within the urban corridor

(5) Programme for Redevelopment of Kumasi City Centre

Objectives	· To promote the development of advanced urban functions within Kumasi City Centre for widely serving Greater Kumasi Sub-Region, as well as Ashanti Region and northern areas · To attract private investment in real estate development within Kumasi City Centre
Main Executive Agencies	KMA, Asokore Mampong Municipality
Sub Executive Agencies	Asantehene, Kumasi Traditional Council, Office of the Administrator of Stool Lands (OASL), Land Commission, RCC of Ashanti Region, Ghana Investment Promotion Centre, Ghana Real Estate Developers Association, major corporate entities either present or planning to locate in Kumasi City Centre

Steps of Actions	· Establishment of Working Group for Redevelopment of Kumasi City Centre · Discussion on redevelopment strategies of Kumasi City Centre · Designing of pilot projects for redeveloping within Kumasi City Centre · Encouragement of involvement of Asantehene for land arrangement for redevelopment projects · Encouragement of involvement of Kumasi Traditional Council · Encouragement of involvement of private real estate developers · Discussion on financial strategies by involving banks and private real estate developers

(6) Programme for Development of New Towns

Objectives	· To promote the speedy development of well-ordered suburban residential areas · To promote the development of infrastructures for suburban residential areas
Main Executive Agencies	Ghana Real Estate Developers Association
Sub Executive Agencies	Private real estate developers, Banks and finance companies (e.g. Ghana Home Loans, HFC) providing housing loans, Asantehene, Traditional Council, State Housing Corporation, Lands Commission, Department of Urban Roads, Department of Feeder Roads, District Assemblies where New Towns are located
Steps of Actions	· Establishment of Working Group for new town development in suburban areas of Greater Kumasi Conurbation · Designing of models for new towns in suburban areas of Greater Kumasi Conurbation · Discussion of financial arrangements for private real estate developers for new town development · Establishment of financial schemes for new town development

(7) Programme for Modernization of Informal Sectors

Objectives	· To promote the modernization of informal sectors, such as car and machine repairing industries · To promote the modernization of logistics sectors, such as trucking and warehouse sectors · To promote the modernization of commercial sectors > By making linkage between universities/polytechnic and informal sectors > By making linkage between formal sectors and informal sectors
Main Executive Agencies	· Regional Office for Ministry of Trade and Industry · KMA

Sub Executive Agencies	· Suame Association · Trucking Association · Association for Small Scale Industries · KNUST · Kumasi Polytechnic · Association of Ghana Industries · Banks and finance companies
Steps of Actions	· Establishment of Working Group for informal sector modernization · Investigation on potential technologies to be utlilized for informal sectors · Designing of models for linkages between formal sectors and informal sectors · Discussion of financial arrangements for informal sectors · Implementation of pilot projects

Chapter 22 Priority Projects and Actions for Infrastructure Sectors

22.1 Introduction: Priority Projects and Actions for Infrastructure Sectors

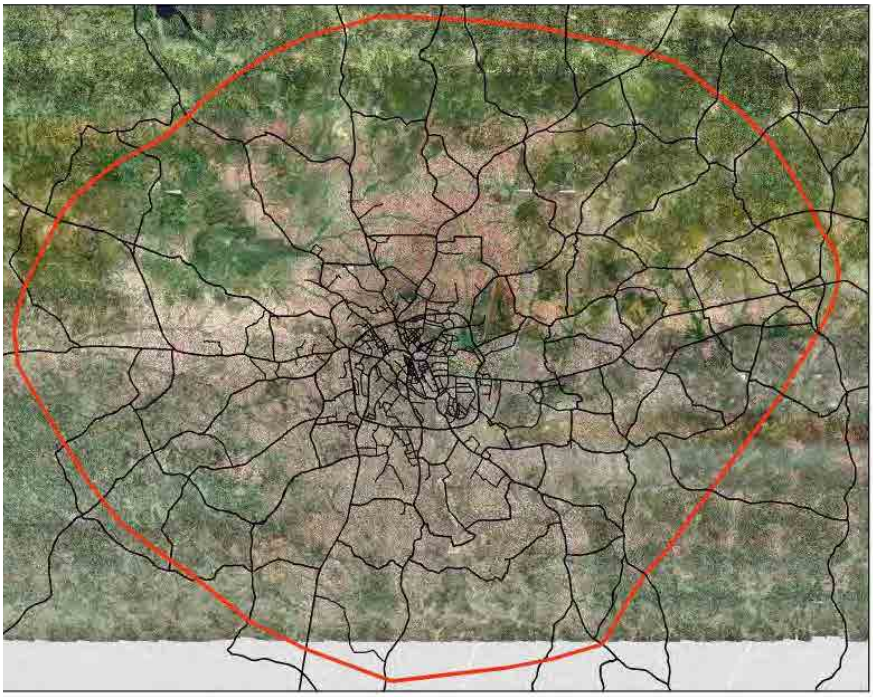
In addition to the SDF and SP, sector programmes for infrastructure sectors are formulated for the seven infrastructure sectors as written in Chapter 12-18. Under each sector programme, sub-programmes are prepared. Each sub-programme is composed of several projects and actions. The following 10 priority projects are identified within the projects composing the infrastructure sector programmes.

- Outer Ring Road Project
- Middle Ring Road Project
- Project for Introduction of Type B Bus and and Establishiment of BRT System
- Feasibility Study on Water Resources Development for Greater Kumasi Sub-Region
- Project for Expansion of Water Supply Capacity of Barekese Water Treatment Plant
- Project for Effective Use of Existing Distribution Pipes Project
- Project for Development of Septage Treatment Ponds in Adjoining Districts/ Municipalities within Greater Kumasi Sub-Region
- Expansion of Asafo Simplified Sewerage System for CBD Area
- Project for Solid Waste Management Improvement in MDAs Adjoining KMA within Greater Kumasi Sub-Region
- Project for Replacement of Small-Sized Wires and Deteriorated Equipment, and Realignment of Distribution Lines

22.2 Priority Projects and Actions for Transportation Sector

(1) Outer Ring Road Project

Background	The Department of Urban Roads (DUR) proposed the construction of a 70 kilometre long Outer Ring Road based on the Kumasi Transport Study 2005 to re-direct traffic away from the city centre as well as improving access to the planned dry inland port at Boankra. The Outer Ring Road was expected to enhance the function of the road network to eliminate vehicle flow though urban areas of Kumasi and also to disperse traffic coming into the urban centre. A project for a feasibility study and preliminary design for the Outer Ring Road was commenced in 2008, but it was stopped because urbanization pressure along the original proposed alignment of the Outer Ring Road made land acquisition and property compensation very difficult. Considering this situation, the DUR have requested TCPD to revise and select an appropriate corridor for the Outer Ring Road from the viewpoint of future spatial development of the Greater Kumasi Sub-Region.
Objectives	· To improve traffic circulation by expanding the capacity of the road network and by removing bottleneck sections of the road network

<table>
<tr><td></td><td>· To support socioeconomic development of Kumasi and surrounding districts by improving movement of people and goods
· To strengthen socioeconomic integration between Kumasi and surrounding districts and among the districts themselves</td></tr>
<tr><td>Location of Project</td><td>
<table>
<tr><td>Length</td><td>98.9 km</td></tr>
<tr><td>Design speed</td><td>100 km/h</td></tr>
<tr><td>No. of driving lanes</td><td>4 (based on this study’s demand forecast)</td></tr>
<tr><td>No. of ramps</td><td>11 locations with arterial roads</td></tr>
<tr><td>Intersection type</td><td>roundabout (up to 2033), grade separation (after 2033 depending on future traffic demand)</td></tr>
<tr><td>Future demand</td><td>8,200 PCU per day in 2033</td></tr>
</table>

</td></tr>
<tr><td>Scope of Project</td><td>· Land acquisition and property resettlement, detailed design and construction</td></tr>
<tr><td>Responsible Agencies</td><td>· Land Acquisition and Property Resettlement DUR
· Project Implementation DUR
· Maintenance DUR</td></tr>
<tr><td>Estimated Cost</td><td>· Approximately US$190.6 million (based on DUR unit cost)</td></tr>
<tr><td>Financial Sources Expected</td><td>· Land Acquisition and Property Resettlement DUR
· Project Implementation DUR, donor agencies
· Maintenance DUR</td></tr>
</table>

Implementation Schedule

	Year				
	2014-2018	2019-2023	2024-2028	2029-2033	2034-2038
North-East Arc		■			
North-West Arc					■
South-West Arc			■		
South-East Arc				■	

Legend: ■ Implementation

Effects and Evaluation

Positive Effects

Direct Effects:
- -Improvement of travel speed
- -Reduction of transport cost
- -Reduction of traffic accident
- -Improvement of traveller's amenity and increase of travel's comfort

Indirect Effects:
- -Transport cost reduction (commodity prices)
- -Mitigation of load to environment (traffic pollution)
- -Facilitating regional development
- -Settlement of people and increase in population
- -Expansion of community activities
- -Improve access to public facilities
- -Strengthening of exchange and cooperation among districts and city
- -Growth of production and income
- -Increase in employment by the growth of production
- -Increase in revenue by the growth of production

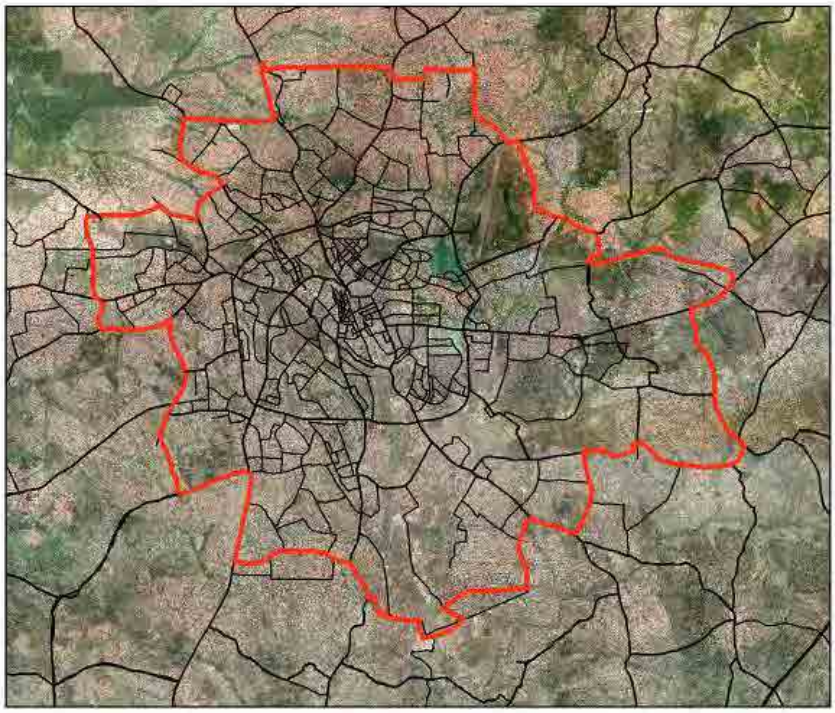
Negative Impacts:
- -ROW acquisition
- -Involuntary resettlement
- -Increase in noise level during construction
- -Slope modification
- -Disruption of service utilities and infrastructures in some cases
- -Demolition of structures
- -Construction wastes
- -Noise due to pile driving
- -Dust caused by construction work
- -Increased housing requirement for transient workers, and project management staff
- -Increased hazards due to construction activities
- -Cutting trees

(2) Middle Ring Road Project

<table>
<tr><td>Background</td><td>The imbalance of road development between Kumasi and surrounding districts was noted. Although road connections and road surface are good in Kumasi City Centre (within the Inner Ring Road) and its surrounding areas within KMA, road conditions are bad in the surrounding districts. The road network of neighbouring districts is characterized by deteriorated road surfaces and missing links. Most areas rely on radial arterial roads, since there are no connecting roads between radial roads. Due to the missing links, some areas lacked good access and vehicles are forced to take long routes. Traffic congestion is also prevalent due to convergence of vehicles into limited road network and limited capacity.

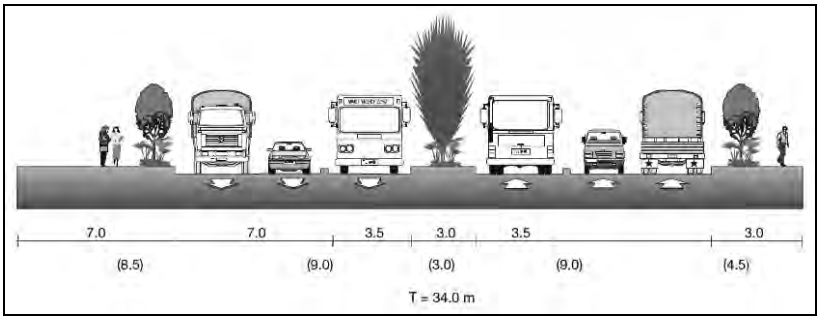
To solve this status, the ORR project had been proposed in various transportation studies, located 10 km from Kumasi CBD, then a revised route and design criteria were studied. Since the previous route ran over the developed and urbanized area and would have had difficulty with land acquisition, the outer ring road project did not progress.

Considering this situation the ORR is newly proposed 20 km from Kumasi CBD. In addition to the inner ring road and the newly proposed ORR, a new circular road should be promoted for a middle ring road (MRR) for better traffic circulation by upgrading existing roads that can be improved to form a MRR.</td></tr>
<tr><td>Objectives</td><td>· To improve traffic circulation by expanding the capacity of the road network and by removing bottleneck sections of the road network
· To support socioeconomic development of Kumasi and surrounding districts by improving movement of people and goods
· To strengthen socioeconomic integration between Kumasi and surrounding districts and among the districts themselves</td></tr>
<tr><td>Location of Project</td><td><table>
<tr><td>Length</td><td>48km</td></tr>
<tr><td>Design Speed</td><td>60km/h</td></tr>
<tr><td>Driving Lanes</td><td>2 lanes</td></tr>
<tr><td>Intersection Type</td><td>Roundabout or signalized with arterial road</td></tr>
<tr><td>Future Demand</td><td>5,600 PCU per day in 2033</td></tr>
</table></td></tr>
</table>

	
Scope of Project	Construction
Responsible Agencies	· Land Acquisition and Property Resettlement DUR · Project Implementation DUR · Maintenance DUR
Estimated Cost	· Construction Cost: 72 million US$ (Based on DUR unit cost)
Financial Sources Expected	· Land Acquisition and Property Resettlement DUR · Project Implementation DUR · Maintenance DUR
Implementation Schedule	The high-priority section of North-East Arc should be constructed by 2016, the other sections should be constructed by 2023.
Effects and Evaluation	It is expected that travel speed in Kumasi will improve which would be translated into economic gains after the execution of the projects. As a result, it will reduce vehicle-km and vehicle operating cost. Less vehicle km means less source of pollution thus less greenhouse gas emissions. Likewise passengers' hour spent on board the vehicle will also decreases thus they can use the time to more productive activities.

(3) Project for Introducing Type B Bus and BRT System

Background	In Greater Kumasi Conurbation, the public transport services are provided predominantly by the private sector, which operates a mix of buses, Trotro and taxis. Trotro is defined as an efficient and inexpensive, minibus used for short distance travel. The services being provided are usually unscheduled and often, on demand-responsive routes, filling gaps in informal transit provision, resulting in overcrowding, undependable, and insufficient services. Furthermore the vehicles used for service are old and poorly maintained buses and minibuses. The unreliable nature of public transport services has resulted in the gradual increase in cars, which further congest the roads in the CBD and the major radial roads and worsen air pollution, noise, and safety problems. Urban Passenger Transport Units (UPTUs) in DUR have been set up in both Accra and Kumasi to plan, register, license, monitor and enforce urban public transport operations. An early role has been to collect information on existing routes operated in each city, with the progression to route licensing to move to a planned and regulated public transport network. Type A permits will be given to the operators on existing routes who fulfil the minimum requirements for operations (vehicle roadworthiness, correct driving license etc.). These licenses will be of one year duration. In addition, an enhanced type of license will be piloted on selected routes exhibiting the appropriate attributes. The Type B license will permit operators using large buses to operate on these high demand corridors, offering higher quality and more efficient public transport on these routes. The BRT is a bus-based mass transit system that delivers fast, comfortable, and cost -effective urban mobility. Through the provision of exclusive ROW lanes and excellence in customer service, the BRT essentially emulates the performance and amenity characteristics of a modern rail-based transit system but at a fraction of the cost. While the BRT utilises rubber -tyre vehicles, it has little else in common with conventional urban bus systems.
Location of Project	The proposed Type B and BRT network consists of a combination of radial and circumferential routes that together will form a network of routes that cover most major development areas. Due to the capital costs involved in providing the Type B and BRT running-ways and transit terminal /stops, the proposed Type B and BRT network is restricted to major corridors of demand.

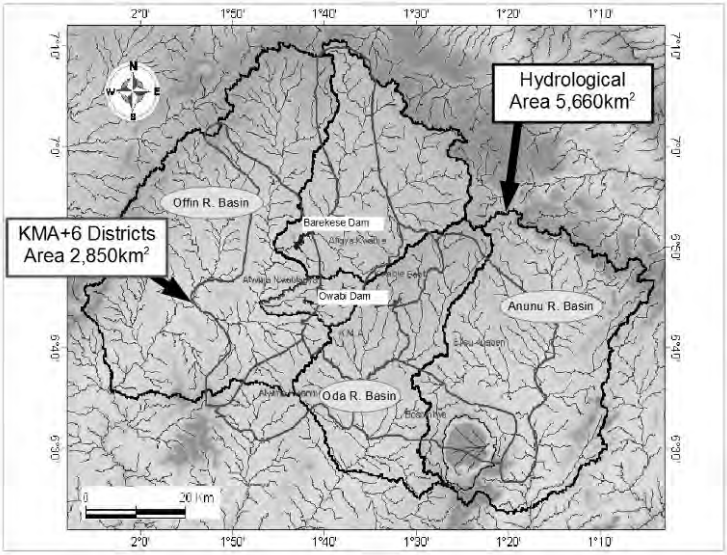
	
Scope of Project	Cross Section of BRT Routes 
Responsible Agencies	· Land Acquisition and Property Resettlement DUR · Project Implementation (Infrastructure) DUR · Operation (Bus and BRT) Private Bus Operators · Maintenance (Infrastructure) DUR · Maintenance (Bus and BRT) Private Bus Operators
Estimated Cost	· Type B Bus: 32 million US$ · BRT Bus: 157 million US$ · This does not cover the road widening for Type B bus and BRT routes, and the cost for bus and BRT vehicles for operation.
Financial Sources Expected	· Land Acquisition and Property Resettlement: DUR and Local Governments along the Routes · Project Implementation (Infrastructure): DUR and Local Governments with International Organization Aids · Operation (Bus and BRT): Private Bus Operators · Maintenance (Infrastructure): DUR and Local Governments · Maintenance (Bus and BRT): Private Bus Operators
Implementation Schedule	Type B Bus System should be installing by 2023, and then the BRT routes should be implemented by 2033.

<table>
<tr><td>Effects and Evaluation</td><td>An effective public transit system can underpin a city's progress towards social equality, economic prosperity, and environmental sustainability. By leap-fogging past a car-dependent development path, cities can avoid the many negative costs associated with uncontrolled growth that ultimately disrupts urban coherence and a sense of community.
<table>
<tr><th>Category</th><th>Description of BRT Benefits</th></tr>
<tr><td>Economic</td><td>・ Reduced travel times
・ More reliable product deliveries
・ Increased economic productivity
・ Increased employment
・ Improved work conditions</td></tr>
<tr><td>Social</td><td>・ More equitable access throughout the city
・ Reduced accidents and illness
・ Increased civic pride and sense of community</td></tr>
<tr><td>Environmental
Urban form</td><td>・ Reduced emissions of pollutants that impact on human health (CO, SOx, NOx, particulates, CO_2)
・ Reduced noise levels
・ More sustainable urban form, including densification of major corridors
・ Reduced cost of delivering services such as electricity, sanitation, and water</td></tr>
<tr><td>Political</td><td>・ Delivery of mass transit system within one political term
・ Delivery of high-quality resource that will produce positive results for virtually all voting groups</td></tr>
</table></td></tr>
</table>

22.3 Priority Projects and Actions for Water Resources Sector

(1) Feasibility Study on Water Resources Development for Greater Kumasi Sub-Region

Background	Greater Kumasi Sub-Region is located on the most upper part of the watershed of Pra River. Consequently the available water resources of both surface water and groundwater are quite limited in Greater Kumasi in terms of the possible volume of water utilization. The Greater Kumasi Sub-Region depends on 2 dams (Owabi and Barekese) and a number of existing shallow wells and deep boreholes for supplying urban water and rural water. However, water supply is insufficient in terms of volume and quality at present. Considering the expected rapid increase in population and increasing water demand per capita, the water supply capacity will be in shortage and unstable to satisfy the increase in water demand. The present heavy and increasing utilization of groundwater without proper monitoring would create a risky and unstable situation of groundwater utilization in the future, considering topographical positions that Greater Kumasi Sub-Region occupies the upper streams of rivers and the capacity of groundwater resources is limited. Moreover, the data on river water discharge is sparse in that the period of data collection is not long enough and the locations of stations for river water discharge too few to scientifically prepare water resources development plans. It is clear that water resources should be developed somehow by finding

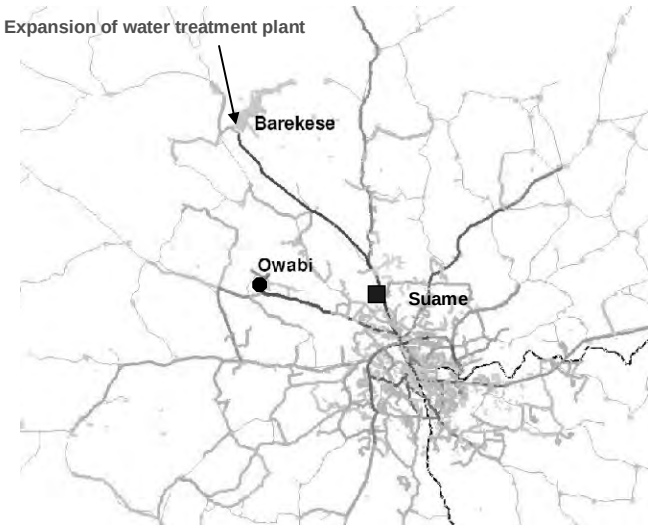
	new water sources for Greater Kumasi Sub-Region in the future. Therefore, it is necessary to conduct a full-scale feasibility study on water resources development for Greater Kumasi Sub-Region, based on field data collection on surface water and groundwater.
Objectives	· To obtain more hydrological data for planning of water resources development during the study project · To examine the water balance between water demand and water supply considering both surface water and groundwater resources · To identify additional surface water sources to be developed, such as those by constructing new dams · To prepare a basic design for surface water sources development · To prepare necessary actions to mitigate impacts of water resources development on the natural and social environments
Location of Project	The study should not only cover the administrative areas of MMDAs of the Greater Kumasi Sub-Region, but also the hydrological areas in relation to the Greater Kumasi Sub-Region. 
Scope of Project	· Hydrological measurement of surface water and groundwater · Clarification of water budget in and around the Greater Kumasi Sub-Region · Topographic and geological investigation for candidate dam sites · Basic design of Dams and appurtenant works · Consideration of social and environmental impacts and preparation of mitigation measures for social and environmental impacts · Economic and financial analyses for examining economic and financial feasibility · The necessary surveys are the topographical & geological surveys around the candidate dam sites and reservoir sites
Responsible Agencies	Ghana Water Company Limited under the Ministry of Water Resources, Works and Housing
Estimated Cost	US$ 3 million

Financial Sources Expected	GOG should prepare the financial source.
Implementation Schedule	Prior to the conducting of the main items of this feasibility study, the hydrological monitoring should be started first and continued for at least for 5 years (for example, 2014-2018) in order to accumulate the basic hydrological data. That is, other study items in the feasibility study should be conducted after the hydrological data has been accumulated.

22.4 Priority Projects and Actions for Water Supply Sector

(1) Project for Effective Use of Barekese Water Treatment Plant

Background	The water treatment capacity of the existing facilities is not able to provide sufficient water supply. Moreover, it will not be able to supply water for the rapidly growing populations. On the other hand, the Barekese dam reservoir has had its original water storage capacity greatly reduced due to sedimentation. The Barekese Water Treatment Plant currently only has the capacity to treat about 60% of the volume of water that could be provided by the Barekese dam reservoir. Therefore, immediate action is necessary for urgent increase in the water supply. The present capacities of Barekese dam reservoir and Water Treatment Plant are about 180,000m^3/day and 136,500m^3/day respectively. The average per capita water consumption for domestic household use is estimated to be just 20 litres per day. If Barekese dam and Water Treatment Plant are not improved and expanded in the future, the average water consumption must decrease due to the increase in population growth. If this project is implemented the capacity of Barekese WTP will be increased to about 218,400m^3/day. The average per capita water consumption for domestic household use is predicted to rise to 40-50 litres per day. The current piped water supply area covers the CBD and high density population areas. These areas will continue to develop as residential areas and as a main commercial area. Therefore, stable water supply to these areas is essential for the development of Greater Kumasi Sub-Region.
Objectives	· To upgrade the water supply capacity in response to an increasing water demand. · To supply water in response to increasing water demand

<table>
<tr><td>Location of Project</td><td> 
</td></tr>
<tr><td>Scope of Project</td><td>· Feasibility study, basic design services
· Detailed design, tendering and contracting services
· Dredging of the reservoir for Barekese Dam
· Construction of water treatment modules at Barekese Water Treatment Plant</td></tr>
<tr><td>Responsible Agencies</td><td>· Project Implementation: Ghana Water Company Lt. (GWCL)
· Operation: Ghana Water Company Lt. (GWCL)
· Maintenance: Ghana Water Company Lt. (GWCL)</td></tr>
<tr><td>Estimated Cost</td><td>· Dredging: GHC 36.0 million
· Construction:
Water treatment modules: GHC 41.0 million
· Total Cost: GHC 77.0 million</td></tr>
<tr><td>Financial Sources Expected</td><td>Basically, it should be carried out by funding of GWCL. However, the construction of the fifth module used funding from the Netherlands. Considering this situation it is considered that funding from donor agencies is necessary.</td></tr>
<tr><td>Implementation Schedule</td><td>
<table>
<tr><td></td><td>2013</td><td>2014</td><td>2015</td><td>2016</td><td>2017</td><td>2018</td></tr>
<tr><td>Dredging</td><td colspan="6"></td></tr>
<tr><td>Water Treatment Module</td><td colspan="6"></td></tr>
<tr><td></td><td colspan="6">Lead time (feasibility study, basic design, financial arrangement, detailed design, tendering and contracting)
Construction / Implementation</td></tr>
</table>
</td></tr>
</table>

Effects of the Project	Target Beneficiaries · The 1.9million residents that live in existing piped water supply area in year 2013. · The 2.7million residents that will live in the existing piped water supply area in year 2023. Effects · Increase in the number of residents who are able to obtain clean water from a water supply pipeline. · Increase in water consumption volume per capita
Evaluation of the Project	Economic Viability · EIRR: 15.20% · Great amount of benefits that are expected through the increase in the water volume available for non-domestic as well as domestic use. Financial Soundness · FIRR: 13.77% · It is desirable to carry out the other projects such as rehabilitation and replacement of aged pipes and installation of water meters. Positive Environmental Impacts · Improvement of the sanitary living environment · Decrease in waterborne infections Negative Environmental Impact · Deterioration of water quality of water bodies due to increase of non-treated grey water

(2) Effective Usage of Existing Distribution Pipes Projects

Background	The water supply capacity of existing facilities is insufficient due to population growth and changes in demand. In the future, it will not be able to respond further. On the other hand, Non-revenue water is currently in the magnitude of 35%. One of the causes of NRW is pipe breaks. This means that 35% of the clean water produced has been wasted. Therefore, it is necessary to take immediate action for reduction of NRW by replacing the existing distribution pipes. In Kumasi it is observed that there are bursts in which pipe breaks of diameters greater than 7.6cm occur every two and one half days and leaks in which pipe breaks of diameters less than 7.6cm occur every other day. In the future, the frequency of pipe breaks will increase due to the increase in the proportion of aged pipes. The target of ratio of NRW is 10% by replacing aged pipes. The current piped water supply area covers the CBD and high density population areas. These areas will continue to develop as residential areas and as a main commercial area. Therefore, stable water supply to these areas is essential for the development of Greater Kumasi Sub-Region.
Objectives	· To correspond to the increase in water demand. · To provide water supply

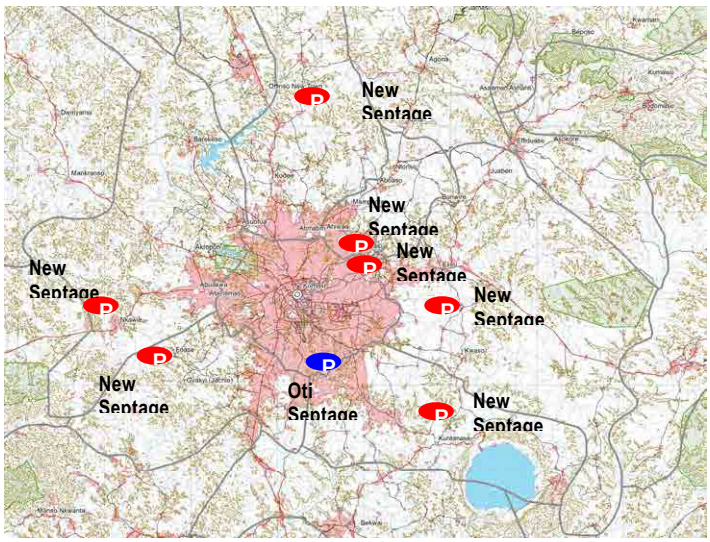
<table>
<tr><td>Location of Project</td><td>· Existing piped water supply area</td></tr>
<tr><td>Scope of Project</td><td>· Investigation of causes of NRW
· Replace pipelines based on the investigation results
· Replace aged pipelines</td></tr>
<tr><td>Responsible Agencies</td><td>· Project Implementation: GWCL
· Operation: GWCL
· Maintenance: GWCL</td></tr>
<tr><td>Estimated Cost</td><td>· Construction:
Replacement of small-diameter pipes: GHC 13.9mil.
Replacement of large-diameter pipes: GHC 48.4 mil.
· Total Cost: GHC 62.3 mil.
Note: Replacement volume is estimated in this study. So as a result of further investigation, the amount of pipes to be replaced is likely to increase or decrease significantly.</td></tr>
<tr><td>Financial Sources Expected</td><td>Basically, it should be carried out through the funding of GWCL. On the other hand, some support for Ghana water supply system from China and US is planned for replacement and renewal of the distribution systems. Therefore, the appropriate use of these funding sources is preferred.</td></tr>
<tr><td>Implementation Schedule</td><td>
<table>
<tr><td></td><td>2013-15</td><td>2016-18</td><td>2019-23</td><td>2024-28</td></tr>
<tr><td>Investigation</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Replacement of Small-Diameter Pipes</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Replacement of Large-Diameter Pipes</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td colspan="4">Lead time (financial arrangement, feasibility study, basic design, detailed design, tendering contracting)
Construction / Implementation</td></tr>
</table>
</td></tr>
<tr><td>Effects of the Project</td><td><u>Target Beneficiaries</u>
· The 1.9million residents that live in existing piped water supply area in year 2013.
· The 2.7million residents that will live in the existing piped water supply area in year 2023.
<u>Effects</u>
· Increase in the number of residents who are able to obtain clean piped water.
· Increase in the water consumption volume per capita
· Increase in revenue by reduction of NRW</td></tr>
<tr><td>Evaluation of the Project</td><td><u>Economic Viability</u>
· Although no economic analysis has been done, it is expected that the Project is economically viable because a great benefit is expected whereby the volume of non-domestic water use is increased as well as the domestic use
<u>Financial Soundness</u>
· No financial problem is anticipated.
· Reduction of NRW will increase the revenue, so the financial situation of GWCL would be improved.</td></tr>
</table>

	· In order to improve the financial soundness, it is desirable to carry out the other projects such as the expansion of the water treatment plant modules in Barekese and installation of transport lines to the Suame water tank from Barekese WTP. Positive Environmental Impacts · Improvement of the sanitary living environment · Decrease in waterborne infections Negative Environmental Impact · Deterioration of water quality of water bodies due to increase of non-treated grey water · Traffic restrictions and congestion will be expected in the construction period for the replacement of distribution pipelines.

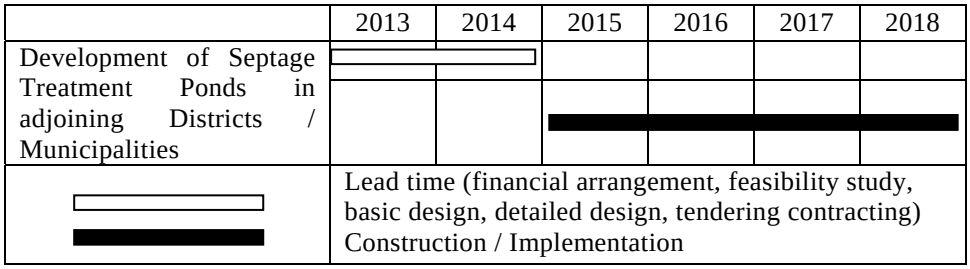
22.5 Priority Projects and Actions for Liquid Waste Treatment Sector

(1) Projects for Development of Septage Treatment Ponds in adjoining Districts / Municipalities within Greater Kumasi Sub-Region

Background	Oti septage treatment pond is the only facility to treat septage in Greater Kumasi Sub-Region. The septage treatment pond was constructed under the Urban Environmental Sanitation Project in 2004. The capacity of Oti septage treatment plant is 600m^3/day Due to the rapid population growth in the future, the amount of septage generated is expected to increase rapidly in Greater Kumasi Conurbation. Then the amount of septage generated will exceed the capacity of Oti septage treatment pond. At present, septage generated from adjoining districts and municipalities are transported to Oti septage treatment pond through KMA. Vacuum trucks passing through Kumasi City cause problems such as odour. Therefore, construction of septage treatment ponds in the districts and municipalities is also useful for the improvement of the urban environment. Considering the above conditions, it is recommended to construct new septage treatment ponds in each district/municipality. It is also recommended that the septage treatment pond should treat leachate generated from solid waste final disposal sites, like Oti septage treatment pond.
Objectives	· To create a clean living environment in Greater Kumasi Conurbation · To provide a hygienic environment in Greater Kumasi Conurbation · To reduce the occurrence of infectious diseases caused by uncontrolled liquid waste

Location of Project	
Scope of Project	· Feasibility study including site selection of septage treatment ponds and basic design[5] · Land acquisition · Detailed design, tendering and contracting · Construction of new septage treatment ponds and small-scale final land fill sites
Responsible Agencies	· Project Implementation: Works Department (WD) of District/ Municipality · Operation: Works Department (WD) of District/Municipality · Maintenance: Works Department (WD) of District/Municipality
Estimated Cost	· Planning and Design: GHC 0.65 million · Construction: · Afigya-Kawbre : GHC 1.04 million · Kwabre East: GHC 0.89 million · Ejisu-Juaben: GHC 1.76 million · Bosomtwe: GHC 0.67 million · Atwima Kwanwoma: GHC 0.80 million · Atwima-Nwabiagya: GHC 1.01 million · Subtotal Cost of Construction: GHC 6.17 million · Total Cost: GHC 6.82 million
Financial Sources Expected	The land acquisition and construction of septage treatment ponds should be financed by each District Assembly. However, the capacity development for planning and management of the liquid waste treatment should be assisted by national-level government agencies and/or development partners.

[5] Sites proposed for new septage ponds are still tentative. The site selection should be done considering the SDF for reater Kumasi Sub-Region and SP for Greater Kumasi Conurbation.

Implementation Schedule	
Effects of the Project	Target Beneficiaries · Residents living in Greater Kumasi Conurbation Effects · Improvement of sanitary living environment · Creation of clean areas in suburban portions of adjoining districts and municipalities

(2) Expansion of Asafo Simplified Sewerage System for CBD Area

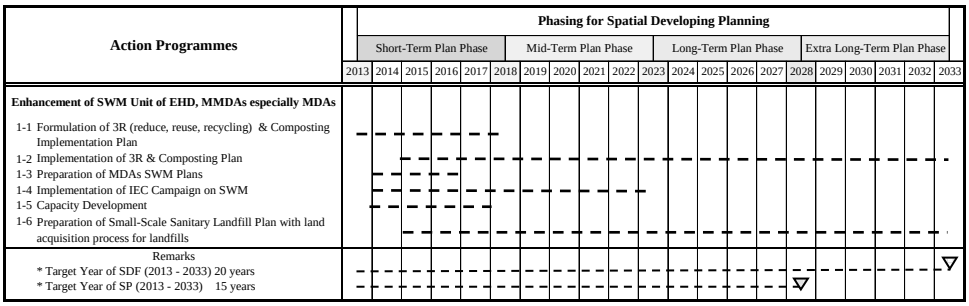
Background	The Asafo simplified sewerage system which collects wastewater (black water) from the Asafo community including some hotels and educational institutions was constructed in 1994. The collected wastewater is treated by stabilization ponds in Asafo. At present, the Asafo simplified sewerage system covers part of the city centre area (the CBD area) including 300 households, 6 hostels, 5 transport associations, 6 public toilets, 4 educational institutions and 6 hotels. In accordance with the Greater Kumasi Sub-Regional SDF and Conurbation SP, the CBD will be expanded to enhance the urban functions in terms of quality and quantity. The new expanded CBD will have more space and accumulation of advanced urban functions. In response to this CBD expansion and upgrading, it is necessary to expand the capacity of the existing Asafo Simplified Sewerage System to provide sewerage services to the proposed new expanded CBD area of Kumasi City Centre.
Objectives	· To create a clean city centre · To provide a hygienic environment · To reduce the occurrence of infectious diseases caused by uncontrolled liquid waste

<table>
<tr><td>Location of Project</td><td>  </td></tr>
<tr><td>Scope of Project</td><td>· Capacity Development for Planning and Management of Liquid Waste Treatment
· Feasibility study and basic design
· Detailed design
· Construction of new sewerage pipes and expansion of Asafo stabilization ponds</td></tr>
<tr><td>Responsible Agencies</td><td>· Project Implementation: Waste Management Department of KMA
· Operation: Waste Management Department of KMA
· Maintenance: Waste Management Department of KMA</td></tr>
<tr><td>Estimated Cost</td><td>· Construction: GHC 22 mil.</td></tr>
<tr><td>Financial Sources Expected</td><td>Basically, the capital investment for the project should be carried out by KMA. On the other hand, the maintenance of the sewerage system should be done by using fees collected for the sewerage services.</td></tr>
<tr><td>Implementation Schedule</td><td>
<table>
<tr><td></td><td>2013</td><td>2014</td><td>2015</td><td>2016</td><td>2017</td><td>2018</td></tr>
<tr><td>Expansion of Asafo simplified sewerage system</td><td colspan="2"></td><td colspan="4"></td></tr>
<tr><td></td><td colspan="6">Lead time (financial arrangement, feasibility study, basic design, detailed design, tendering contracting)
Construction / Implementation</td></tr>
</table>
</td></tr>
<tr><td>Effects of the Project</td><td><u>Target Beneficiaries</u>
· The residents and visitors in the CBD
<u>Effects</u>
· Improvement of the sanitary environment
· Creation of a clean city</td></tr>
</table>

22.6 Priority Projects and Actions for Solid Waste Management Sector

(1) Project for Solid Waste Management Improvement in MDAs adjoining KMA within Greater Kumasi Sub-Region

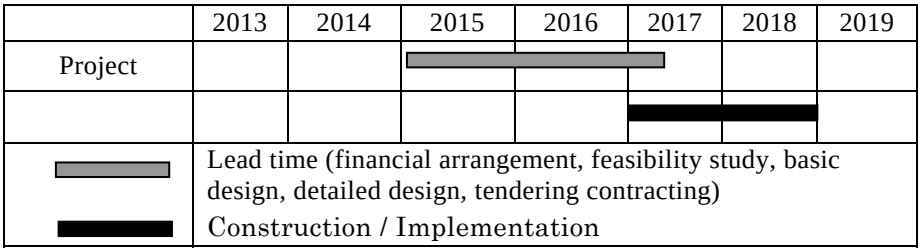
Background	A contiguously urbanizing area centring on Kumasi (Greater Kumasi Conurbation) is expanding beyond the boundary of KMA. The present waste treatment system mostly depending on private service providers should be improved systematically. In particular, MDAs adjoining KMA will need to play more important roles in solid waste management in the Greater Kumasi Sub-Region. The current collection rates of solid waste in the MDAs are estimated to be more than 26% and the amounts of waste disposed vary from 20 to 40 t/day among the MDAs. Open dump sites are presently the major method at the community level. However, disposed wastes are not properly controlled or managed at the open dump sites. The future collection rates and waste amounts during the periods between 2013 and 2033 are projected as shown in Table 22.6.2. The amount of waste generation is projected to increase from 429 t/day in 2013 to 2,049 t/day in 2033. In the 6 MDAs adjoining KMA within Greater Kumasi Sub-Region, solid waste has not been properly treated, resulting in a poor hygienic environment. In order to improve the existing hygienic environment in the MDAs, it is necessary to upgrade the capacity of the Environmental Health Department of the MDAs, especially for the purpose of strengthening of 3R, composting by preparation of SWM plans, and small-scale sanitary landfill plans including the land acquisition process for the landfills.
Objectives	To improve the environmental sanitation condition in MDAs Adjoining KMA by providing proper solid waste management
Location of Project	6 MDAs: Afigya Kwabre District, Kwabre East District, Ejisu-Juaben Municipality, Bosomtwe District, Atwima Kwanwoma District and Atwima-Nwabiagya District in Grater Kumasi Sub-Region
Scope of Project	To conduct capacity development on solid waste management for Environmental Health Departments of MDAs Adjoining KMA through conducting the following tasks on solid waste management: · To formulate a 3R (reduce, reuse, recycle) and composting plan for pilot areas in MDAs Adjoining KMA · To prepare a Solid Waste Management (SWM) plan for Adjoining MDAs · To implement IEC campaign on SWM in MDAs, and · To prepare development plans for small-scale sanitary landfill sites including a land acquisition process for the landfill sites
Responsible Agencies	· Project Implementation: 6 MDAs of Greater Kumasi Conurbation and Ministry of Local Government and Rural Development (MLGRD)

	· Operation: MDAs-EHD · Maintenance: MDAs-EHD
Estimated Cost	· Personnel Cost: US$ 1.5 million · Direct Expenses: US$ 1.7 million · Total Cost: US$ 3.2 million
Financial Sources Expected	International or foreign agencies are expected to assist in the funding.
Implementation Schedule	 Sources: JICA Study Team, 2012 Notes: Kumasi Composting and Recycling Plant (KCRP), Bosomtwe District Assembly (BDA), Municipality and Districts Assemblies (6 MDAs) Spatial Development Frameworks (SDF), Structure Plan (SP), Environmental Health Department (EHD), Information Education and Communication (IEC)
Effects of the Project	<u>Target Beneficiaries</u> · The whole population of 1,917,000 in the 6 MDAs in year 2033 <u>Effects</u> · Formation/induction of the planned solid waste management framework for the MDAs · Formation of a 3R & compost plan for pilot areas · Implementation of the formulated 3R & composting plan for pilot areas · Implementation of IEC campaign on SWM and capacity development of MDA-EHD · Preparation of small-scale sanitary landfill plans and a land acquisition process for the landfills

22.7 Priority Projects and Actions for Electricity Supply Sector

(1) Project for Replacement of Small-Sized Wires and Deteriorated Equipment, and Realignment of Distribution Line

Background	The total power generation capacity of Ghana is about 2,000MW as of year 2012 and generation capacity will be increased to 4294 MW by 2021. This generation capacity will exceed the forecast electricity demand of 2021. And the capacity of 116kV transmission lines and bulk supply points (BSP) will be able to cover the increased demand. However, at present in Kumasi and its adjoining suburban areas, the reliability of power supply is low, and technical power loss is high due to deteriorated distribution lines/equipment and employing smaller-sized distribution wires than required. In 2011, approximately 900 power outages caused by distribution line

	breakdowns were recorded and the power loss of ECG/NED in 2008 was about 25%. The power loss is one of the critical issues in Ghana. Reliable/stable power supply is one of the essential infrastructures to achieve sustainable socio-economic development of Greater Kumasi Sub-Region. This reliable and stable power supply should be achieved at first in the already urbanized areas in order to satisfy basic human needs for urban people. The improved situation of electricity supply by this project could also attract private investments to the economic sectors of Greater Kumasi.
Objectives	· To reduce the number of power outages in KMA and its adjoining suburban areas · To reduce power loss in KMA and its adjoining suburban areas
Location of Project	KMA and its adjoining suburban areas of the Greater Kumasi Sub-Region
Scope of Project	· Feasibility study and basic design · Detailed design, tendering and contracting · Replacement of small-sized overhead wires with proper-sized wires · Realignment of distribution lines to meet the ECG standard. · Replacement of deteriorated equipment
Responsible Agencies	· Project Implementation: ECG · Operation: ECG · Maintenance: ECG
Estimated Cost	· Detailed Design & Supervision Cost: USD 0.96 million · Construction: · Replacement of small size overhead wires: USD 1.57 million · Realignment of distribution lines: USD 0.39 million · Replacement of deteriorated equipment: USD 1.17 million · Total Cost: USD 4.09 million
Financial Sources Expected	Basically, this project should be funded by ECG. However, since the current electricity prices are set at a relatively low level by the government, the financial situation of ECG is not good. Therefore, in order to improve the situation of basic needs, it is urgently necessary to rehabilitate the existing deteriorated electricity supply infrastructures by utilizing financial (including grant aid) and technical assistances from development partners.
Implementation Schedule	

Effects of the Project	<u>Target Beneficiaries</u> · The whole population in Greater Kumasi of 3.5 million in year 2018 <u>Effects</u> · The number of power outages is reduced leading to productivity improvement. · Operation time of private emergency generators is reduced leading to oil saving. · By reducing power loss, the following effects are expected: - Reduction of energy loss - Lower operation cost and increased revenue

Chapter 23 High Priority Projects for Infrastructure Sector

23.1 Selection of High Priority Projects

Out of the projects composing the 6 infrastructure sector programmes, 10 priority projects are identified as shown in Chapter 22. Out of the 10 priority projects, 3 projects are selected as high priority projects, so that economic and financial evaluation is conducted. This selection of high priority projects is done using the following criteria:

- The cost for implementing the project is relatively greater than other projects.
- There have been no committed funds available for implementing the project.
- The project is neither for planning studies nor for capacity development.
- The executive agency for the project has adequate implementation capacity.
- The project is mature and ready for implementation.

The following 3 projects that satisfy these conditions are selected for economic and financial evaluation:

- Outer Ring Road Project
- Middle Ring Road Project
- Project for the Expansion of the Water Supply Capacity of Barekese Water Treatment Plant

23.2 Economic and Financial Analysis for High Priority Projects

(1) Outer Ring Road Project

The costs and benefits are calculated as the differences between “with” and “without” the Project. The “with” case denotes the situation of a new ring road being constructed as given in the sub-programmes, estimating the benefits of saving in vehicle operation costs (VOC) and travel time costs (TTC). While, the “without” case means that there is no change in the current situation.

The evaluation period is assumed to be 30 years from 2019 to 2049

The economic analysis of the implementation of the Outer Ring Road is made based on the benefits and costs estimation.

The rate of through traffic from outside will be three times that of the existing volume in the period from year 2012 to year 2033. Thus, the improvement to the road may cause existing traffic to divert to another route, this ring road. The benefits arising from such diversion must be included in the benefit calculation and this would indicate that the economic figure is very high in this project.

Table 23.1 Result of Economic Analysis for Outer Ring Road

	Result
EIRR (%)	32.3
B / C	6.0
NPV (GHC 1,000)	237,256

Source: JICA Study Team

(2) Middle Ring Road Improvement Project

The costs and benefits are calculated as the differences between "with" and "without" the Project. The "with" case denotes a situation of how the road conditions could be improved as given in the revised Master Plan Network or Projects and the benefits estimated are saving in VOC and TTC. While in the "without" case there is no change in the current situation.

Evaluation period is assumed to be 30 years from 2019 to 2049

The economic analysis of the improvement of the Middle Ring Road is made based on the benefits and costs estimation.

The benefits from this project are great and cost can be reduced by upgrading the existing unpaved roads that are in poor condition. Moreover, generated traffic will arise from the saturated condition of the radial roads because this road improvement makes a journey more attractive as a result of travel cost and time reduction.

Table 23.2 Result of Economic Analysis for Middle Ring Road

	Result
EIRR (%)	45.1
B / C	17.3
NPV (GHC 1,000)	276,288

Source: JICA Study Team

(3) Project for Expansion of Barekese Water Treatment Plant

Economic Evaluation

The costs and benefits are calculated as the differences between "with" and "without" the Project. The "with" case denotes a situation of how to correspond to an increase in water demand and to provide the water supply to the residents. While, in the "without" case nothing is done and the current situation continues into the future. The share of piped water and other sources is unchanged.

The evaluation Period is assumed to be 30 years from 2014 to 2044.

Benefit estimation is to be derived from Affordability to Pay or Willingness to Pay in this study. Industrial or commercial businesses (non-domestic water) also consume a huge amount of water. The calculation shall be done the same as in the Master Plan in Chapter 14.5. In order to obtain a reliable supply of water, the companies and factories would consider to pay 1.75 times the current water bill.

Table 23.3 Result of Economic Analysis for Project for Expansion of Barekese Water Treatment Plant

	Result
EIRR (%)	15.2
B / C	1.2
NPV (GHC 1,000)	36,007

Source: JICA Study Team

Financial Analysis

Financial costs of the project are summarized in Table 23.2.5. Operational cost and maintenance cost were also estimated based on the calculation of economic cost in the above section.

Table 23.4 Financial Costs for Project for Expansion of Barekese Water Treatment Plant (GH¢ Thousand)

Description	Cost
Capital Investment Cost	77,000
Operation and Maintenance cost	93,000

Source: JICA Study Team

Revenue from households is assumed in accordance with total water demand for the piped water system. The computed Financial Internal Rate of Return (FIRR) for the project is 13.77%. The value of project is financially feasible in current projections. However, the assumptions of revenue and expenses for O & M contain a great deal of uncertain data so that the study team indicated the figure is only preliminary. Thus, a feasibility study will be required.

Chapter 24 Monitoring and Evaluation Plan

24.1 Objectives of Monitoring and Evaluation

Monitoring and evaluation during implementation of the formulated SDF and SP are essential parts of the implementation plan and activities for promoting execution of the formulated SDF and SP.

The objectives of the monitoring and evaluation plan for implementation of SDF and SP are also two-fold, including objectives for both monitoring and evaluation.

The objectives of monitoring of the plan are as follows:

- To encourage key stakeholders to continue conducting activities for implementation of the SDF and SP, as well as infrastructure programmes.
- To collect and share information on actualization and difficulties of implementation of the plan.
- To make minor modifications to efforts made for implementing the SDF and SP using the collected information.

The objectives of evaluation of the plan are as follows:

- To analyze collected information on actualization and difficulties of implementation of the plan.
- To measure impacts or outputs from the implementation of the plan.
- To make recommendations for changing methods of implementation of the SDF and SP
- To make recommendations for revising proposed strategies in the SDF and SP, as well as the infrastructure plans themselves.

24.2 Five Components of Monitoring and Evaluation of Implementation Activities

To implement the Greater Kumasi Sub-Regional SDF and Greater Kumasi Conurbation SP, the following five key types of activities are required:

(A) Official approval of the SDF for Greater Kumasi Sub-Region and the SP for Greater Kumasi Conurbation
(B) Institutional preparation for activities for implementation of the SDF and SP
(C) Implementation of sector programmes for sub-regional infrastructures
(D) Integrated implementation of various priority strategic projects for urban and industrial development
(E) Preparation and utilization of district-level SDFs and SPs for designating and enforcing land use regulations.

Therefore, monitoring and evaluation also should cover these five types of actions. For each of these five major activities, the information to be collected and indicators to be measured, as well as times to be conducted, are proposed.

PART VIII CAPACITY DEVELOPMENT PROGRAMME FOR SPATIAL DEVELOPMENT PLANNING AND IMPLEMENTATION

Chapter 25 Capacity Development Programme for Spatial Planning and Implementation

25.1 Introduction

In the beginning of this chapter, an institutional analysis for spatial planning and implementation is presented as a basic understanding for preparing a capacity development programme for spatial planning and implementation in relation to the Greater Kumasi Sub-Regional SDF and Conurbation SP. In the next section, based on the institutional understanding, a framework for a capacity development programme is presented. Consequently, a capacity development programme targeting 5 groups and consisting of 12 sub-programmes is presented with a description of the scopes of the sub-programmes.

25.2 Institutional Analysis for Spatial Planning and Implementation

25.2.1 Town and Country Planning Department (becoming the Land Use and Spatial Planning Authority (LUSPA))

The objective of the Department is to formulate effective policies and strategies for the socio-economic and physical development to ensure the proper use of land and the exploitation of natural resources for the benefit of the people.

Under the forthcoming Land Use and Spatial Planning Bill it will be transformed into the Land Use and Spatial Planning Authority (LUSPA, still tentative name). Under the new Bill, TCPD's regional office is to be transferred to the RCC. Moreover, under the decentralization policy, TCPD's district offices have been transferred to district assemblies.

The Authority's major objectives as stipulated in the draft Bill are summarized as follows:

- Perform spatial land use and human settlement planning functions of the national development system;
- Provide directions and guidelines for the spatial and human settlement planning;
- Enhance the capacities of the District Assemblies and other institutions for effective performance of their spatial planning and human settlement management functions;
- Ensure efficiency in the development control function at national, regional and district levels through the decentralized governance structures;
- Oversee the implementation of approved policies regarding spatial planning and physical development.

25.2.2 Regional Office of TCPD (becoming the Physical Planning Department of the RCC)

The Regional Office of the TCPD is responsible for preparing a Regional Spatial Development Framework which harmonize the Plans of Districts. At present, even under the decentralized situation of district-level TCPD offices, the TCPD Regional Office also plays a coordinating role by assisting and facilitating the smooth operation of the District Offices within the Region, particularly those with fewer personnel.

The Land Use and Spatial Planning Bill stipulates that the Regional Coordinating Council (RCC) of each region shall establish a "Regional Spatial Planning Committee" as a technical committee of the Regional Planning Coordinating Unit (RPCU). The current TCPD Regional Office will be a member of the Regional Spatial Planning Committee.

25.2.3 Physical Planning Departments at MMDA Level

The Metropolitan Office of the TCPD has been already transferred to KMA in the context of the decentralization policy. The Town Planning Metropolitan Office of KMA currently has one director, two town planning officers, nine technical officers, two accountants and other staffs.

The Land Use and Spatial Planning Bill stipulates that a District Spatial Planning Committee and its Technical Sub-Committee should be established in every District. Current TCPD District Office will be the secretary for the District Spatial Planning Committee.

Each Physical Planning/Town Planning District Office is to have at least one town planning officer. However, out of 30 MMDAs, only 13 MMDAs have town planning officers. The other 17 districts do not have any town planning officers.

25.3 Basic Framework for Capacity Development Programme for Spatial Planning and Implementation

25.3.1 Primary Objective

The primary objective for implementing the capacity development programme is to develop the capacity of those who are engaged in spatial planning and implementation at the national, regional and district levels so that they can utilize the Greater Kumasi Sub-Regional SDF and Conurbation SP and guide effective, efficient and sustainable spatial development in the Greater Kumasi Sub-Region.

25.4 Needs and Objectives and Requirements for Capacity Development Programme for Implementation of Greater Kumasi Sub-Regional SDF and Conurbation SP

Table 25.1 Needs and Objectives of Capacity Development Programme by Administrative Level

Administrative Level	Needs and Objectives of the Capacity Development Programme
District Level: Physical Planning Officers, Development Planning Officers, and Works Engineers, Information Services Officers of District Assemblies	<**Preparation of District SDFs, District-Level SPs and Local Plans**> To be able to prepare District-Level SDF, SPs and local plans in conformity with the Greater Kumasi SDF and SP; <**Enforcement of District SDFs, District-Level SPs and Local Plans**> To enforce land use regulations in conformity with District SDFs, SPs and Local Plans; <**Implementation of Civic Education**> To educate and involve the stakeholders in implementing the Greater Kumasi SDF and SP, including understanding their roles and responsibilities at the local level.
Regional Level: Physical Planning Officers, Planning Officers, Engineers, Information Services Officers of RCC and Regional Departments	<**Harmonization of District-Level SDFs and SPs with Greater Kumasi SDF and SP**> To be able to harmonise district-level plans with the Greater Kumasi SDF and SP; <**Review and Renewal of Greater Kumasi SDF and SP**> To be able to prepare and revise/renew the Greater Kumasi SDF and SP through implementation, monitoring and evaluating the Greater Kumasi SDF and SP; <**Promotion of Public Investment in Sub-Regional Infrastructures and Services**> To be able to organize and run thematic implementation working groups to appeal to the needs for public investment in sub-regional infrastructures and services toward the national-level agencies; <**Promotion of Private Investment**> To be able to organize and run thematic implementation working groups to attract private investment in the economic sectors; <**Implementation of Civic Education**> To educate and involve the population including Traditional Chiefs in the Greater Kumasi SDF and SP for implementation including understanding their roles and responsibilities.
National Level: Officers of NDPC, LUSPA and GIPC	<**Incorporation of Sub-Regional SDF and SP into National SDF, National MTDP and Sector MTDPs**> To be able to understand and incorporate the Greater Kumasi SDF and SP into the National SDF and Sector Medium Term Development Plans, to ensure their conformity with the National Medium Term Development Plan; <**Promotion of Public Investment in Sub-Regional Infrastructures and Services**> To be able to promote public investment in sub-regional infrastructures and services proposed by the Greater Kumasi SDF and SP at the national and international levels; <**Promotion of Private Investment**> To identify and attract private investment in achieving the Greater Kumasi SDF and SP.

Source: JICA Study Team

25.5 Composition and Scopes of Capacity Development Programme

Table 25.2 Composition of Capacity Development Programme

Target Groups	Sub-Programme
National Level Planning Institutions	(1) Sub-Programme for Capacity Development for Harmonising Sub-Regional SDFs and SPs with the National SDF and National Medium Term Development Plan
Regional-Level Physical Planning Institutions	(2) Sub-Programme for Planning Capacity to Formulate and Revise/Renew the Greater Kumasi Sub-Regional SDF and Conurbation SPs for Physical Planning Officers at RCC (3) Sub-Programme for Coordination Capacity for Implementation of the Greater Kumasi SDF and Conurbation SP
District-Level Physical Planning Institutions	(4) Sub-Programme for Capacity Development for Formulating District SDFs and District SPs outside Greater Kumasi Sub-Region (5) Sub-Programme on Capacity Development for Formulating District SDFs and District SPs inside Greater Kumasi Sub-Region including KMA (6) Sub-Programme of Capacity Development for Monitoring and Enforcing the District SDFs and District SPs (7) Sub Programme for Training Members of District, Municipal and Metropolitan Assemblies Spatial Planning Committees
Citizens including Traditional Chiefs	(8) Sub-Programme for Citizens' Education on Spatial Plans (9) Sub-Programme for Chiefs' Education on Spatial Plans
Universities and Polytechnics	(10) Sub-Programme for Designing Courses for PC Skills Training for Spatial Planning Practice (11) Sub-Programme for Designing Courses for GIS Skills Training for Spatial Planners (12) Sub-Programme for Designing Courses for Development Planners on Spatial Planning

Table 25.3 Scope of Capacity Development Programme

Sub-Programme	Scope
(1) Sub-Programme for Capacity Development for Harmonising Sub-Regional SDFs and SPs with the National SDF and National MTDP	Increased Capacity at LUSPA Head Office and at NDPC At LUSPA (currently TCPD Head Office as above) the current complement of staff is well below the number which is needed. Hence, the placement of a staff member to oversee TCPD's involvement in implementation of the Greater Kumasi Plan is proposed. This person may also work closely with the NDPC, where the staff compliment is currently at 16, compared with the required number of 52. Finally, they may also be responsible for organizing national level workshops as per the next item. Capacity Development for other Stakeholders at National Level

	Although the above structures are to some extent routine, it will be necessary to achieve the desired focus for Greater Kumasi by continuing a process which has been set in motion during the preparation of the Plan, of convening a joint meeting of the agencies at national level to comment on and later monitor the implementation, including the effective cross-sector working by agencies at national level. At the beginning, a 2-day residential workshop and one day follow-up year one, batch 1; year two, two one-day follow ups <u>Capacity Development for the Investment and PR forum for Greater Kumasi at the National level</u> The scale of the necessary levels of investment that will be needed to implement the Greater Kumasi Plan is such that it will need to be well organized at the national and international level. It will be important for the linkages and synergy between investments in different sectors, building on each other, to be realized in order for funding to be committed in a timely manner. Therefore, it is proposed that a National level investment, PR and communications workshop be held.
(2) Sub-Programme for Planning Capacity to Formulate and Revise/Renew the Greater Kumasi Sub-Regional SDF and Conurbation SPs for Physical Planning Officers at RCC	The training will regularly monitor the process of implementation, renew/review of the Greater Kumasi SDF and SP. It will discuss how to handle issues which have arisen. This will be delivered through conducting monthly workshops for Physical and Development Planners and Officers of other agencies in the RPCU as appropriate for the first six months, quarterly for the rest of the first eighteen months and bi-annually thereafter (total 12 workshops). The workshops will review progress and discuss how to deal with challenges to the plan and methods of adjustment and review.
(3) Sub-Programme for Coordination Capacity for Implementation of the Greater Kumasi SDF and Conurbation SP	The Regional Platform, which will monitor and promote the implementation of the Greater Kumasi SDF and Conurbation SP, will be organized by the Physical Planning Department of the RCC. The director, town planning officers and technical officers of the Physical Planning Department of the RCC need actual opportunities to promote implementation and to have on-the-job training, as well as logistics support in order to become able to conduct this task for implementation. In the process of the implementation promotion, the Regional Platform will organize and operate working groups of key themes identified in the Implementation Plan for Greater Kumasi Sub-Regional SDF and Conurbation SP.
(4) Sub-Programme for Capacity Development for Formulating District SDFs and District SPs outside Greater Kumasi Sub-Region	· Two – year on-the-job training programme with 16 training workshops, · Physical Planning Officers of all the districts outside Greater Kumasi Sub-Region in the Ashanti Region will take part in the programme, · Drafts of the District SDFs and Structure Plans will be developed through the programme, · Participants will be divided into two groups and the training workshop of the first group starts first. When preparation of the SDFs by the first group is completed, the training workshop of the second group will start, · In the training workshops for the first group, the counterpart staffs

	concerned with this project will become trainers and training of trainers will be carried out at the same time. In the training workshops for the second group, the staffs of the first group will be trainers.
(5) Sub-Programme on Capacity Development for Formulating District SDFs and District SPs inside Greater Kumasi Sub-Region including KMA	· One – year on-the-job training programme with 16 training workshops, · Sub-Regional SDF and SP formulated in this project and relevant data can be utilized, · Physical Planning Officers of all the districts inside Greater Kumasi Sub-Region in the Ashanti Region will take part in the programme, · Draft of the District SDFs and Structure Plans will be developed through the programme, · In the training workshops, the counterpart staffs concerned with this project will become trainers and training of trainers will be carried out at the same time.
(6) Sub-Programme of Capacity Development for Monitoring and Enforcing the District SDFs and District SPs	The training will encompass Development Control systems and measures, current practice, laws, roles and responsibilities and new practices and laws under the forthcoming Land use and Spatial Planning Bill. The training will also cover how to examine Local Plans to make sure that the planned development and land use conforms to the District Structure Plan and serves the public interest The training will also encompass the necessary methods of monitoring and evaluation, which should align with those laid down by the NDPC in its Guidelines for regional Monitoring and Evaluation and for district level Monitoring and Evaluation of MTDPs. This will be delivered through conducting monthly workshops for Physical and Development Planners and Officers of other agencies in the RPCU as appropriate for the first six months, quarterly for the rest of the first eighteen months and bi-annually thereafter (total 12 workshops). The workshops will review progress and discuss how to deal with challenges to the plan and methods of adjustment and review.
(7) Sub Programme for Training Members of District, Municipal and Metropolitan Assemblies Spatial Planning Committees	· Roles and responsibilities of the Committees and members · Practical (on the job) issues in the implementation of the Greater Kumasi SDF and SP · Management of Plan Preparation arising from the Greater Kumasi SDF and SP. This will be delivered through conducting monthly workshops for key members of Planning Committees bi-monthly in synch with the Planning committee meetings, as appropriate for the first six months, quarterly for the rest of the first eighteen months and bi-annually thereafter (total 12 workshops). The workshops will review progress and discuss how to deal with the challenges of implementing the Greater Kumasi SDF and SP.
(8) Sub-Programme for Citizens' Education on Spatial Plans	The exhibitions will be at the Regional Policy Fair and travel to all eight MMDAs with a month in each District Assembly Office. Before, during and after the exhibition in each place there will be a series of six programmes that will be presented on local radio stations, including phone-in from each locality, and dissemination by the District Information Officers using speaker vans and local fora. Prior to and

	after each District exhibition, a workshop will be held to prepare and debrief, assess impact and learn how to sustain the education through understanding cost and benefits and how to include these in the department budget (Total eighteen workshops).
(9) Sub-Programme for Chiefs' Education on Spatial Plans	The scope of this input will include: · Public interests and spatial plans (sub-regional and district) · Obligation of chiefs as land owners · Purposes of preparing layout plans (local plans) This will be delivered through conducting monthly workshops for Chiefs as appropriate for the first six months, quarterly for the rest of the first eighteen months and bi-annually thereafter (total 12 workshops). The workshops will review progress and discuss how to deal with challenges for Traditional Authorities in implementing the Plan.
(10) Sub-Programme for Designing Courses for PC Skills Training for Spatial Planning Practice	University teachers (planning teachers and IT teachers) will conduct two or three pilot studies to formulate district-level SDFs and SPs in actual districts together with actual town planning officers and technical officers for the purpose of experiencing and understanding the actual needs for spatial planning and PC skills. University teachers (planning teachers and IT teachers) will design the following courses: · Course for basic PC skills for spatial planning for university students of physical/spatial planning and socio-economic development planning · Course for basic PC skills for spatial planning for polytechnic students of physical/spatial planning and socio-economic development planning · Course for basic PC skills for current town planning officers · Course for basic PC skills for current technical officers After finishing these course designs, the university teachers (planning teachers and IT teachers) will provide the courses experimentally for university students, polytechnic students, current town planning officers and current technical officers to get feedback regarding the course designs.
(11) Sub-Programme for Designing Courses for GIS Skills Training for Spatial Planners	The Assessments and course design, including setting up of short courses for Physical Planning staff should entail a two months assignment. This will be followed by regular quarterly visits to course sessions and teachers and students to monitor progress over one year.
(12) Sub-Programme for Designing Courses for Development Planners on Spatial Planning	The Assessments and course design, including setting up of short courses for Development Planning staff should entail a two months assignment. This will be followed by regular quarterly visits to course sessions and teachers and students to monitor progress over one year.

PART IX SEA ON SDF FOR GREATER KUMASI SUB-REGION AND SP FOR GREATER KUMASI CONURBATION

Chapter 26 Strategic Environmental Assessment on Development Framework (SDF) for Greater Kumasi Sub-Region and Structure Plan (SP) for Greater Kumasi Conurbation

26.1 Legal Basis and Objectives of Strategic Environmental Assessment Study

In Ghana, it is considered by the NDPC and EPA that the mandatory implementation of Strategic Environmental Assessment for public policies and development plans is stipulated by interpreting the following law, policy documents and guidelines in combination:

- The National Development Planning Commission Act (1994), which gives the NDPC the authority to determine what kinds of policies and plans should be prepared for managing and developing the country
- The Ghana Shared Growth and Development Agenda (GSGDA), which recommends that the environment should be mainstreamed in development policies and plans, and that SEA should be conducted.
- The "Guidelines for the Preparation of District Medium-Term Development Plan" for 2010–2013, which instructs district assemblies on the necessity of conducting SEAs for district medium-term development plans

In addition, the "Manual for the Preparation of a Spatial Development Framework" (TCPD, MEST, 2010) and the "Manual for the Preparation of a Structure Plan" (TCPD, MEST, 2010) stipulate the necessity of conducting SEA studies for SDFs and SPs. Based on this understanding and prevalent practice of SEA in Ghana, an SEA Study was conducted for the Greater Kumasi Sub-Regional SDF and Conurbation SP.

26.2 Target, Contents and Process of Strategic Environmental Assessment Study

Based on the previous section, the Study on the Comprehensive Urban Development Plan for Greater Kumasi will include the undertaking of an SEA Study, which targets two of the significant outputs of the Plans as follows:

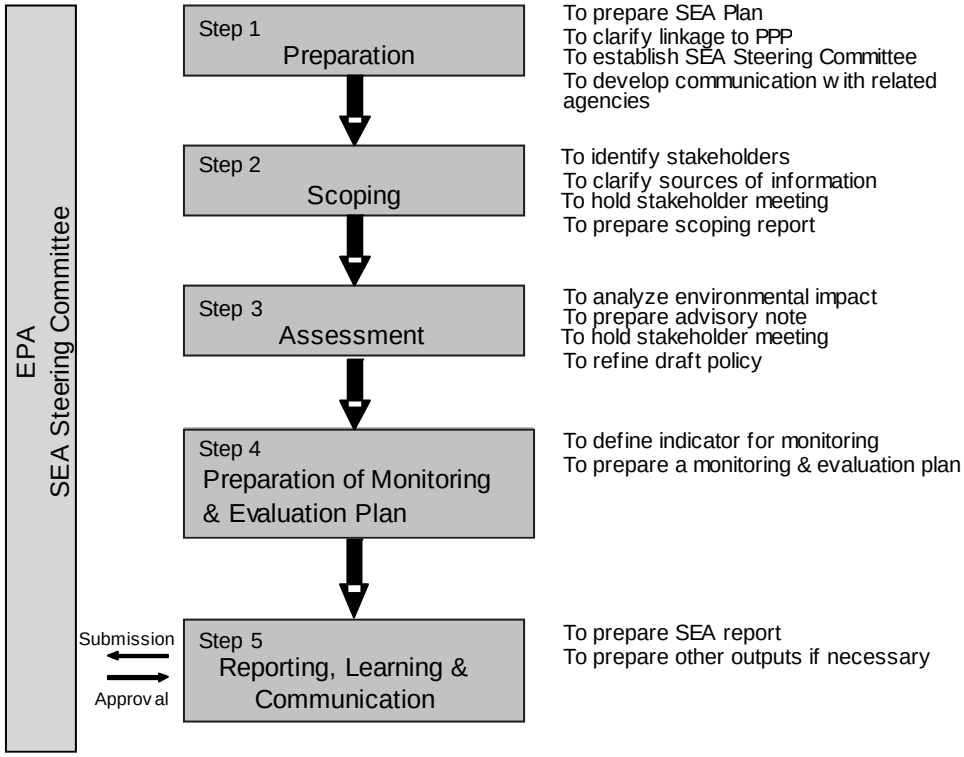
- Spatial Development Framework (SDF) for the Greater Kumasi Sub-Region
- Structure Plan (SP) for the Greater Kumasi Conurbation

The above outputs from the JICA Study will be evaluated based on the identified environmental and sustainability issues. The results of the SEA Study should be incorporated into the SDF and SP. The prediction and evaluation of environmental impacts caused by the

adoption of SDF and SP will be the main focus of the SEA Study. Furthermore, environmental mitigation measures should be recommended in order to minimize the impacts.

The process of the SEA Study for SDF and SP consists of five steps based on the "Review of Strategic Environmental Assessment in Ghana" (Environmental Protection Agency) including Preparation, Scoping, Assessment, Monitoring and Evaluation, and Reporting, Learning and Communication as shown in Figure 26.1.

Throughout the SEA Study process, various stakeholders will be involved, in order to understand and determine their interests and incorporate their needs and opinions into the whole process. Activities and interactions through meetings, workshops and group discussions will be facilitated and organized. The implementation of stakeholder meetings is considered to collect ideas and opinions on significant occasions, such as scoping and assessment.



Source: JICA Study Team based on the Review of Strategic Environmental Assessment in Ghana (Environmental Protection Agency)

Figure 26.1 Process of the SEA Study

26.3 Stakeholder Analysis

A stakeholder analysis is used in order to map out and identify the interests and needs of various stakeholders. The level of interest and influence of stakeholders will depend on a range of issues, such as the nature of the policy, the timing and extent of their involvement, and their potential ability to have an impact on the effectiveness of the outcomes. It is important to keep in mind that the interest or influence of a stakeholder may change as the SDF and SP progress. Therefore, continuous reassessment and identification of new stakeholders and the level of stakeholder engagement at different stages are necessary.

For this purpose, a scoping workshop was held by inviting 85 persons from national agencies, RCC and regional departments of Ashanti Region, various officers of KAM and district assemblies, universities and NGOs. At the scoping workshop, a discussion session on identifying stakeholders for this SEA Study was organized and as a result, considering the scope identified in the scoping workshop, 58 stakeholders were identified to be invited to the assessment workshop.

26.4 Validation of Baseline Condition

The main purpose of validation of the baseline condition is to identify the environmental baseline (current environmental aspects) to clarify environmental impacts that could be caused by the implementation of the SDF and SP. The following major issues were highlighted in the discussion on the validation of the baseline condition:

- Loss of forest resources
- Impact of urbanization on watersheds of rivers
- Scattering and odour of solid waste
- Traffic congestion and noise

26.5 Scoping

The scoping workshop included the scoping of stakeholder identification and environmental issues. The output of the environmental issues identified and proposed to be addressed is shown below. The identified issues and their characteristics could suggest the scope of baseline validation and assessment of the impact of the formulated plans.

Table 26.1 Environmental Issues Proposed at Scoping Workshop

Sector	Proposed Issues
Land Use Sector	· Harmonization and coordination among all stakeholders by designing with minimizing conflict of interest among the stakeholders and coordination including public announcement · Law enforcement to prohibit illegal structures and occupations, as well as environmental pollution · Education and enlightenment of public to control illegal structures and environmental pollution
Transportation Sector	· Implementation of Bus Rapid Transit System · Increased number of toll collection points · Construction and rehabilitation of arterial roads · Penalty for undisciplined road users
Water and Waste Sector	· Education and public enlightenment · Prosecution and enforcement of existing laws · Reforestation · Penalty for undisciplined road users · Introducing the Polluter Pays Principle · Funding for sanitation projects by the central government and traditional authorities · Release of land for sanitation projects · Employing more trained sanitation officers
Energy Sector	· Encourage IPPs to increase energy generation · Installation of prepaid meters to eliminate the human factor · Education and sensitization of the general public on the dangers of illegal connections

Source: JICA Study Team

26.6 Assessment

The SEA Assessment Workshop was undertaken through active involvement in group discussions. The Ghana SEA system has some assessment tools (compound matrix, compatibility matrix, sustainability test, and environmental risks and opportunity matrix), which are useful for the participants who have little knowledge about SEA assessment.

According to the presentations and discussion among the participants, the following are highlighted:

- The importance of an Integrated Water Resources Management (IWRM) Study of the Greater Kumasi Sub-Region was stressed to consider not only the necessity for developing new water sources, but also the appropriate size of the future population of the Greater Kumasi Sub-Region.
- Emphasis was also put on the necessity of a proper resettlement programme for Project Affected Persons (PAPs) since the number of PAPs is expected to increase due to the large volume of infrastructure development, especially road widening. The resettlement programme should indicate not only monetary compensation, but also social support (e.g., job opportunities and income recovery).
- The financial sources, "how various programmes proposed in the SDF and SP are to be implemented," and "how implementation of the plan intervention related to environmental monitoring and evaluation is to be secured" were indicated as some of the important concerns.

Regarding the assessment tools, the compatibility matrix revealed that there were no inconsistencies between the various objectives while the compound matrix and the opportunities/risk matrix provided various issues to assist in the development of recommendations and guidelines for implementation of the plan interventions.

26.7 Recommendation by SEA Study

The SEA Study provides a variety of recommendations covering a wide range of issues. Most of those recommendations have been considered and incorporated into the SDF/SP, as well as the infrastructure plans.

However, due to the severe financial constraints, it is not easy to implement all the proposals made by the SDF, SF and infrastructure plans. Therefore, it is necessary to make a concerted effort to conduct monitoring and evaluation of the implementation of the SDF, SP and infrastructure plans to bring attention to any impact resulting from partially implemented programmes and projects.

26.8 Monitoring and Evaluation Plan

In this section, indicators are proposed from the perspective of SEA. This section deals with the following aspects in relation to the Monitoring and Evaluation Plan:

- List of indicators to monitor the impacts of the proposed SDF and SP (see Table 26.2)

- Methodology of measurements of indicators used

A Monitoring and Evaluation Plan for Implementing the Greater Kumasi SDF and SP is presented in Chapter 24. The Monitoring and Evaluation Plan incorporates the indicators proposed and methodology for measurements of indicators as proposed in this section.

Table 26.2 Proposed Indicators

Sector	Proposed Indicators
Land Use Changes	(1) Percentage of land preserved as open space for recreation purposes (2) Percentage of agricultural areas that have changed to built-up areas (3) Number of established industrial areas on designated road corridors and in designated towns (4) Percentage of biodiversity/habitat loss (5) Level of soil erosion and fertility (6) Percentage of land used for other infrastructure e.g., roads, landfills, and utilities
Water Resources	(1) Water resources utilization by dams and reservoirs (2) Pollution indicators of water bodies, coliforms, trace metals, nitrates, pesticides, and salinization (3) Water pollution in terms of nutrient build-up and organic loading (4) Surface and groundwater levels, flows and quality (5) Water consumption and costs
Drainage	(1) Extent of control of flooding in low lying areas (2) Extent of control of erosion in roadways
Transport	(1) Level of atmospheric pollution due to quality of emissions to air (air and noise) (2) Number of improved road networks by category (3) Number of BRT terminals and extent of use (4) Number of signals installed and functioning (5) Level of use of improved public transport system
Solid Waste	(1) Number of sanitary landfills established and functioning (2) Level of high calibre staff employed into solid waste management (SWM) units at the MMDAs
Liquid Waste	(1) Coverage of hygienic toilets and level of access to their use (2) Number of households with toilet facilities (3) Coverage of sewerage systems and functional status (4) Number of functional sewage treatment facilities
Electricity Supply	(1) Number of good quality transformers installed and functioning (2) Number of transmission and sub transmission systems installed and functioning (3) Number of communities served with electricity that hitherto had not been the case (4) Level of commercial losses as against the established minimum acceptable level

Source: JICA Study Team