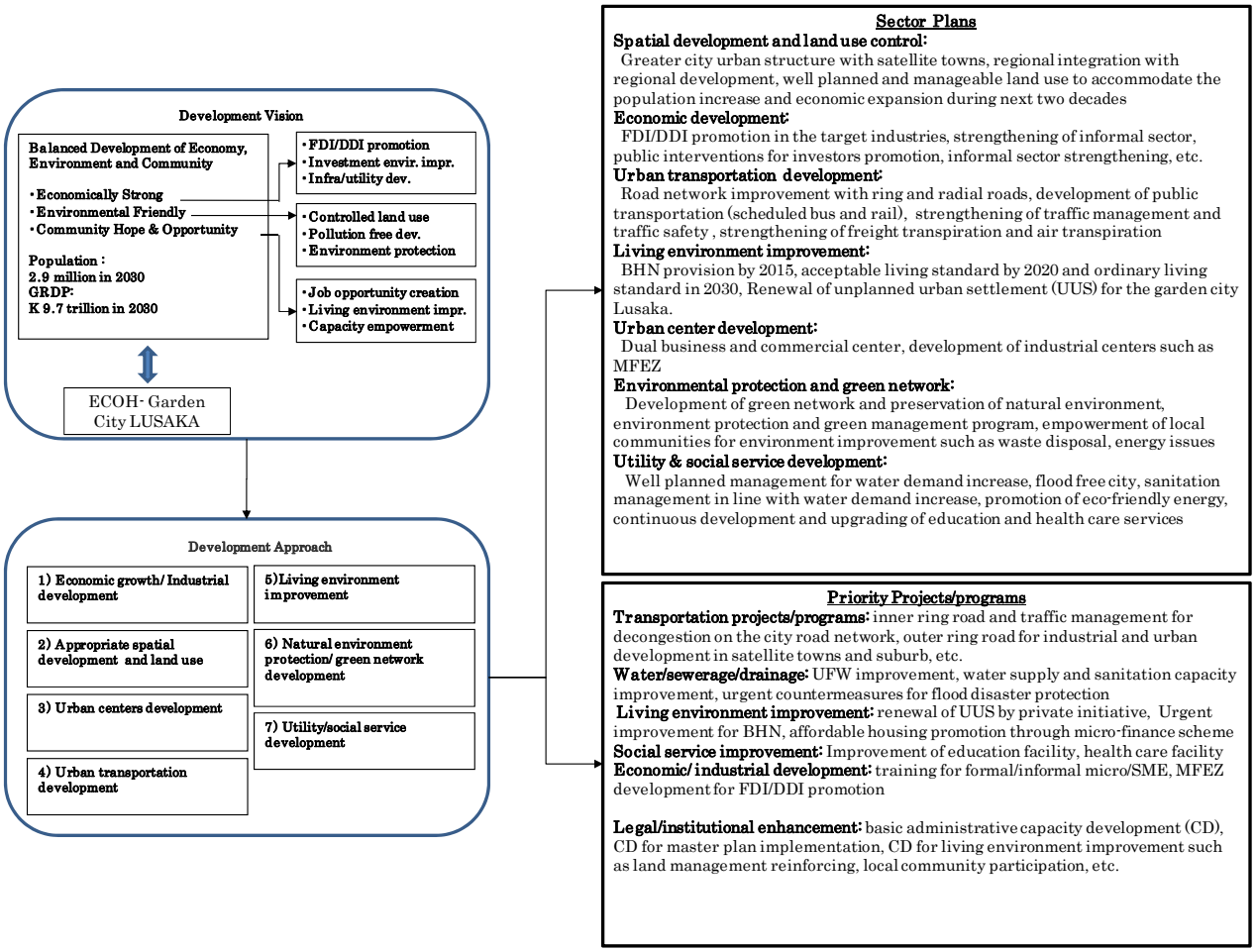
# 4. Development Plan of Lusaka

## 4.1 Plan Framework

Integrated development of Greater Lusaka as shown in Figure 16, should be realized for the realization of vision proposed by composing the sector plans and priority projects/programs proposal encompassing economic/industrial promotion, spatial development and land use control, urban transportation improvement, sustainable environment preservation, improvement of living environment, and upgrading of infrastructure and social services.




Source: JICA Study Team

**Figure 16 Frameworks for Comprehensive Urban Development of Greater Lusaka**

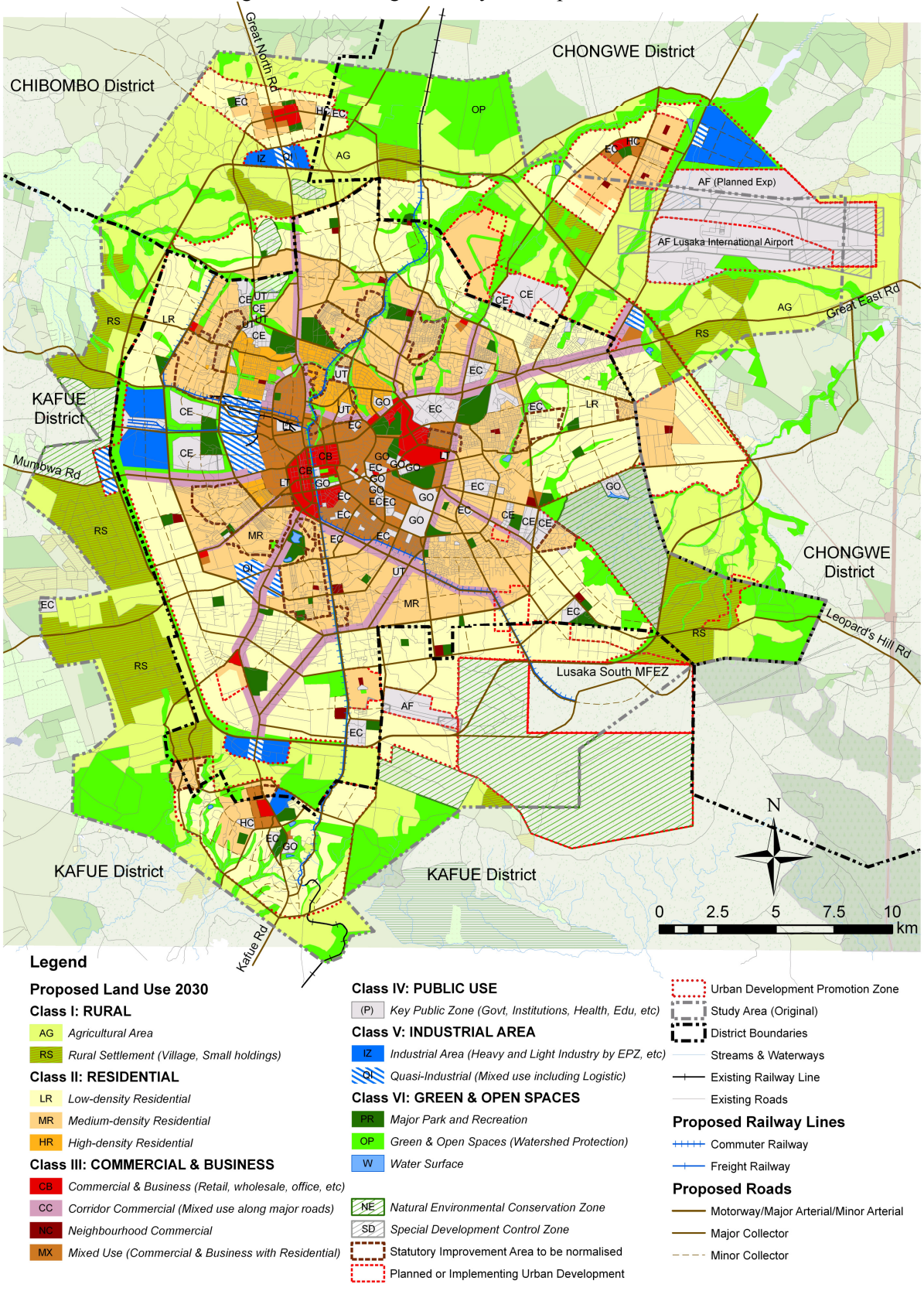
## 4.2 Spatial Development Plan

Proposed Land Use Plan 2030 for Greater Lusaka

The land use plan for Greater Lusaka is formulated as shown in Figure 17, according to target population and employment towards 2030. It is anticipated that gradual dense residential development and effective foundation for economic development, led by industrial zones and competitive urban center development, are fundamental elements for the land use plan, while vulnerable water system with greenery network will be protected and formulated.

Satellite cities will be established in medium- and long -terms in adjacent areas covered by Chibombo, Chongwe and Kafue Districts, in conjunction with industrial zones'

development within the sphere of the proposed Outer Ring roads. Peri-urban agricultural land will be retained and improved for both food production and environmental buffer green of ECHO garden city development.




Source: JICA Study Team

**Figure 17 Proposed Land Use Plan 2030**

Land use distribution for Greater Lusaka is set to accommodate target population and employment. Residential area will increase largely to about 15,600 ha (dominated by the medium density development), utilizing mainly vacant and grass & bush land and low intense agricultural land. Industrial land will be also developed in suburban areas, while park and recreation areas and open spaces will be secured with the conversion of natural green areas including agricultural land for ECHO garden city development.

**Table 3 Future Land Use Plan for Greater Lusaka**

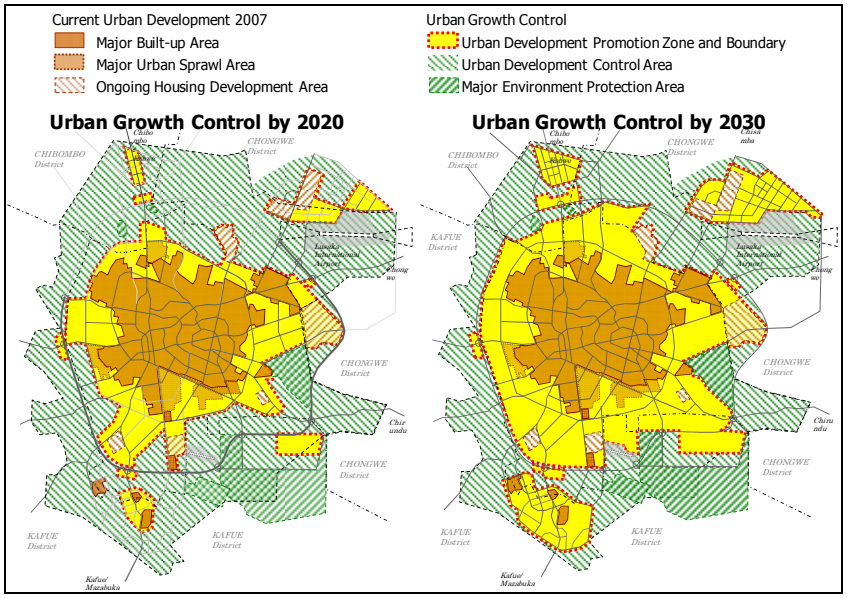
Unit: hectare

| Category | 2007 | | | 2030 | | | 2007-2030 Change | | |
|---|---|---|---|---|---|---|---|---|---|
| | Lusaka | Adjacent Area* | total | Lusaka | Adjacent Area | Total | Lusaka | Adjacent Area | Total |
| Agri (high-intense) | 2,857 | 6,268 | 9,125 | 1,077 | 6,260 | 7,337 | -1,780 | -8 | -1,788 |
| Agri (low-intense) | 2,375 | 10,187 | 12,562 | 0 | 10,000 | 10,000 | -2,375 | -187 | -2,562 |
| Rural settlement | 11,809 | 9,851 | 21,660 | 4,360 | 7,570 | 11,930 | -7,449 | -2,281 | -9,730 |
| Residential | 12,321 | 357 | 12,678 | 24,040 | 4,270 | 28,310 | 11,719 | 3,913 | 15,632 |
| High-dense | 1,841 | 0 | 1,841 | 3,080 | 0 | 3,080 | 1,239 | 0 | 1,239 |
| Medium | 4,350 | 0 | 4,350 | 12,430 | 3,840 | 16,270 | 8,080 | 3,840 | 11,920 |
| Low | 6,130 | 357 | 6,487 | 8,530 | 430 | 8,960 | 2,400 | 73 | 2,473 |
| Commercial & Business | 447 | 26 | 473 | 1,130 | 200 | 1,330 | 683 | 174 | 857 |
| Industry | 1,350 | 36 | 1,387 | 1,850 | 1,680 | 3,530 | 500 | 1,644 | 2,143 |
| Public Use | 2,642 | 1,878 | 4,520 | 3,700 | 2,210 | 5,910 | 1,058 | 332 | 1,390 |
| Park & Recreation | 735 | 67 | 802 | 4,080 | 700 | 4,780 | 3,345 | 633 | 3,978 |
| Green & Open Space | 2,256 | 1,235 | 3,491 | 2,100 | 6,028 | 8,128 | -156 | 4,794 | 4,638 |
| Vacant/ grass & bush | 5,545 | 13,774 | 19,318 | 0 | 4,760 | 4,760 | -5,545 | -9,014 | -14,558 |
| Total | 42,337 | 43,678 | 86,015 | 42,337 | 43,678 | 86,015 | | | |

Note: * Adjacent area covers some portion of three adjacent Districts of Kafue, Chongwe in Lusaka Province and Chibombo District in Central Province, of which the area also covers the study area as Greater Lusaka.
Source: JICA Study Team.

## Urban Growth Management

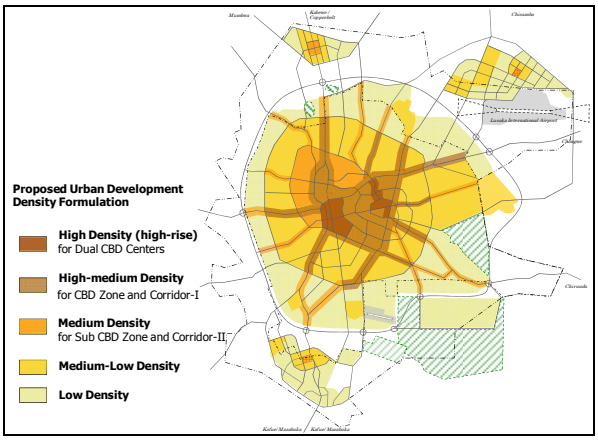
Urban growth management will be achieved through effective urban growth control and intensive infrastructure provision in the guided Urban Development Promotion Area by appropriate administration against inadequate urban sprawl, while other area will be strictly controlled.




Source: JICA Study Team.

**Figure 18 Urban Growth Management by Phase**

Density formulation of Greater Lusaka development for the future will be a fundamental tool in maximizing efficient land utilization in urban areas guiding the private sector development, given by economic development incentives. Gradual densification will be set from the center to outer area of Greater Lusaka area by land use control measure in combination of floor area ratio (FAR) and building coverage ratio (BCR).




Source: JICA Study Team.

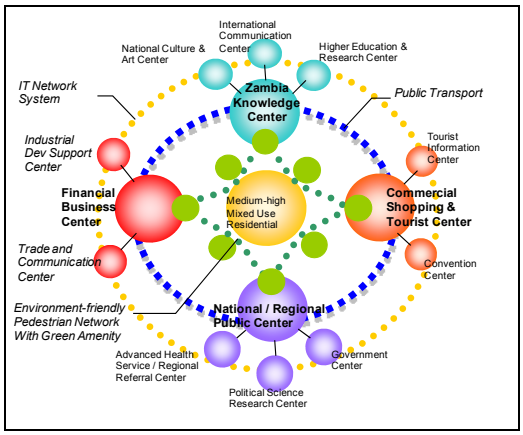
**Figure 19 Development Density Formulation 2030**

## 4.3 Urban Center Plan

The urban center of the Capital of Zambia will play essential role in Zambia growth center development and serving commercial and inter-regional and international business activities in competitive manner.

Lusaka CBD will be formulated by dual core development connected by public transportation system and pedestrian network where a financial business center will be strengthen as in the existing business and commercial center while another new urban center will be established in Lusaka City Airport area for commercial-shopping tourist center development.

Government center will be also enhanced in association with knowledge center development with advanced technology and IT infrastructure provision utilizing higher education resources and facilities. Livable living places in CBD area will be also re-organized by densification of residential area as mixed use development including urban renewal.

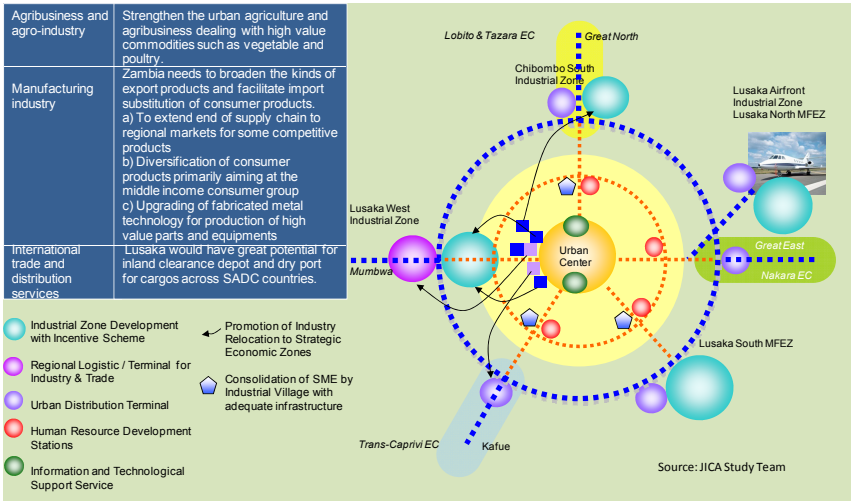




Source: JICA Study Team

**Figure 20 Plan of Lusaka Central Business District (Dual Core LCBDs)**

Industrial development serving as the lead role in economic development in Greater Lusaka will achieve the development vision through the effective and efficient provision of infrastructure. Urban centers will support urban services including human resource development and information technology, together with SME enhancement, through adequate infrastructure provision and skill development and training, which are important aspects of FDI industrial development.




Source: JICA Study Team

**Figure 21 Spatial Formation of Industry Development**

## 4.4 Urban Transportation Development Plan

Strategy for Urban Transportation Development

Urban transportation development master plan applies the structure consisting of challenges, objectives, and programs and projects, shown in Figure 22. The challenge is a simple statement that interprets the future situation as a clear target, while the objective is one of the means and target in meeting the challenge. Programs and projects are concrete actions to be implemented.

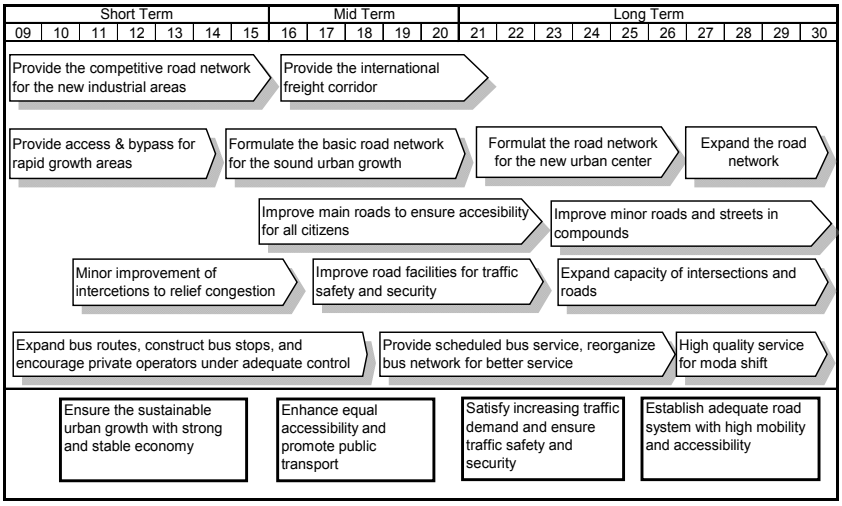
| Challenges | | Objectives | Program Group |
|---|---|---|---|
| Equal accessibility for all citizens | 11 | Cover the entire city with passenger transort services | Arterial & collector road development |
| | 12 | Improve bus services | |
| | 13 | Provide access road for vehicles in all communities | Community road development |
| | 14 | Develop road network for quick access within the city | |
| Safe and pleasant transport system | 21 | Reduce traffic accidents | Public transport development |
| | 22 | Improve the security on roads and streets | |
| | 23 | Manage and control traffic flow under good condition | Traffic management |
| | 24 | Provide safe and comfortable pedestrain routes | |
| Sustainable Economic Development | 31 | Provide access to new industrial zones | |
| | 32 | Provide the north-south corridor for inter-city transport | |
| | 33 | Provide the competitive freight transport system | |
| | 34 | Provide the competitive air tranpsort services | |
| Sound and managed urban growth | 41 | Connect the new urban area with good transport system | Pedestrian and non-motorized transport |
| | 42 | Provide sufficient transport system to meet the demand | |
| | 43 | Formulate good urban structure by hierarchic road network | Freight transport |
| | 44 | Provide transport terminal for smooth transfer | |
| Enriched qality of life | 51 | Improve deteriorated roads and streets | |
| | 52 | Relief traffic congestion | |
| | 53 | Promote non-motorized transport | Airport development |
| | 54 | Reduce vehicle emission | |

Source: JICA Study Team

**Figure 22 Program Groups and Corresponding Objectives**

A number of projects will be necessary to meet the challenges and objectives. However, the backlog of transport sector in Lusaka is already huge. Considering the limited budget, the most important issue is to ensure the sustainable economic growth that is currently supported by the copper industry, so that the city will be able to secure budget for the transportation sector. From this point of view, high priority should be given to road development as essential infrastructure to attract economic/industrial investments. In addition, Lusaka needs to prepare urban expansion and prevent urban sprawl. Therefore, new road network should be conceived by paying due attention to the future urban structure.

The next step in meeting the challenges of the transportation sector is to promote equal job opportunities and other urban activities especially for low-income communities, by improving the main roads and public transport system, which will contribute to income generation. Subsequently, it is necessary to provide sufficient road network for the increasing demand. Figure 23 illustrates the development strategy mentioned above and necessary challenges in the urban transportation development.




Source: JICA Study Team

**Figure 23 Approach of Urban Transportation Master Plan**

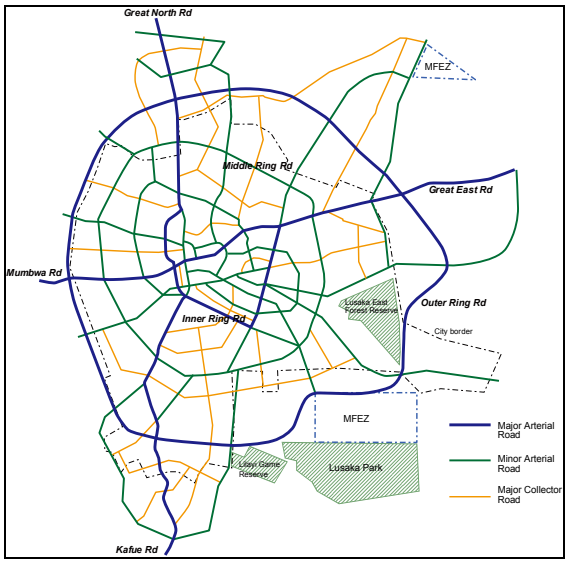
Future Transportation System of Lusaka

Future transportation plan of Lusaka is summarized in the following table.

**Table 4 Strategy for Urban Transportation Facility Development**

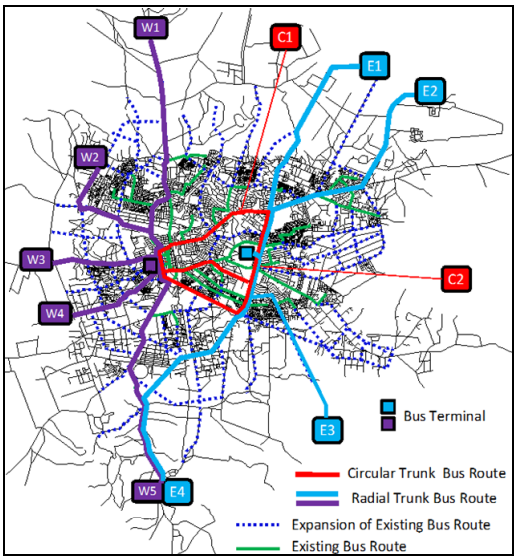
| Transport System Facility | Strategy for Development |
|---|---|
| Road network | Figure 24 illustrates the proposed road network in 2030. The road network consists of three ring roads, 12 radial roads, and seven other major roads. Traffic service level on roads will remarkably improve if the proposed JST urban transport development plan is implemented. |
| Public Transport   | The modal shift from car to public transport will be necessary in 2030. **Bus transit**: In the short-term, the present bus system will continue since public transport has to rely on private sector under the national policy of liberalization and weak financing situation of Lusaka City. Bus network will be expanded through the improvement of the roads, construction of bus stops, and designation of new bus routes. Scheduled bus services on fixed route system will be introduced in the mid-term. Priority or exclusive lane system for scheduled buses as shown in photo will be introduced in 2030. **Rail transit**: Considering investment cost, rail transit should be introduced only when it is economically feasible in terms of energy consumption and the reduction of traffic congestion on roads. Further study will be needed to determine whether the railway should be included in the master plan or not. At present, rail transit is proposed as the project beyond 2030, when Zambia becomes a middle income country. |
| Freight traffic | Outer Ring Road will serve as the freight corridor connecting the future industrial zones such as MFEZs and logistics centers. |
| Air transport | Lusaka International Airport will deal with air cargo and both international and domestic passengers. The new passenger terminal for international flight and the new building for cargo flight will provide high quality services. |

Source: JICA Study Team




Source: JICA Study Team

**Figure 24 Road Network Plan in 2030**




Source: JICA Study Team

**Figure 25 Route Plan of Bus Service in 2030**

## 4.5 Living Environment Improvement Plan

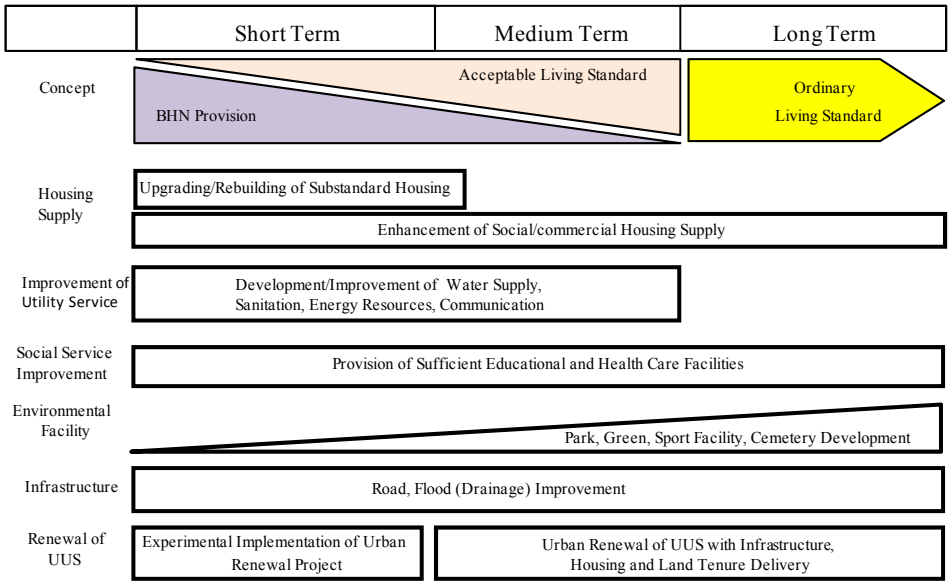
Strategy for Living Environment Improvement

Considering fundamental issues of UUS where majority of living areas lack infrastructure and urban services for securing Basic Human Needs (BHN), the goal for its improvement is set below.

- Fulfillment of the BHN such as water supply, which is undeveloped in several UUSs, should be urgently implemented as top priority.
- Comprehensive improvement and upgrading of living environment by implementing house renovations, road upgrading, drainage facility development, etc. will be realized by means of urban renewal measures with community participation. First attempt shall be done in the short-term while upgrading of all UUS is planned before 2030 by considering lessons learned from the first project.
- Legal rights for securing households in terms of property ownership are important for the success of the renewal of UUS. Therefore, the intervention of legal procedure arrangement by LCC and concerned ministries should be tackled.
- Livelihood encouragement is also inevitable for the success of community participation in UUS renewal. Preservation and encouragement plan of livelihood measures for community should be fully considered.

BHN and acceptable living environment will be provided in UUS in the short- and medium-terms, while the ordinary living standard is planned to be realized in the long-term as shown in Figure 26. House building/facility renovations and provisions for the public and private sectors for the improvement of social and utility services, environmental facility and infrastructure should be initiated for such purpose.

Integrated improvement of living environment will be experimentally implemented in several UUS scattered in the central area of Lusaka within the short- and medium-terms. Further, improvement of remaining UUSs in the suburbs will follow with the replication of the renewal method learned.

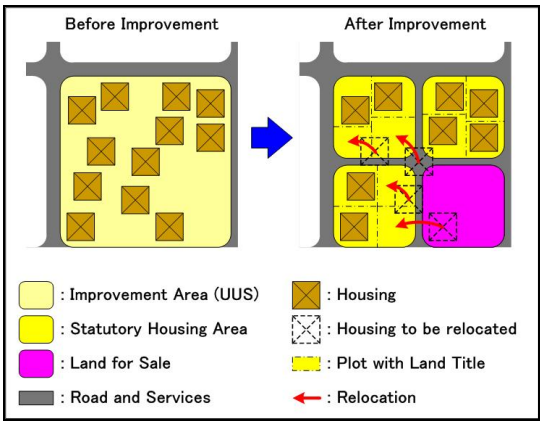



Source: JICA Study Team

**Figure 26 Phasing Program of Living Environment of UUS**

Renewal of UUS

Urban renewal, urban development mechanism suitable for densely populated area, is proposed to be introduced to deal with complex and challenging issues of UUS. The mechanism includes community consensus building, securing/arrangement of property rights, land tenure delivery, fund arrangement, housing construction, provision of infrastructure and public services, and other related administrative services. Figure 27 shows the project method for the renewal scheme.



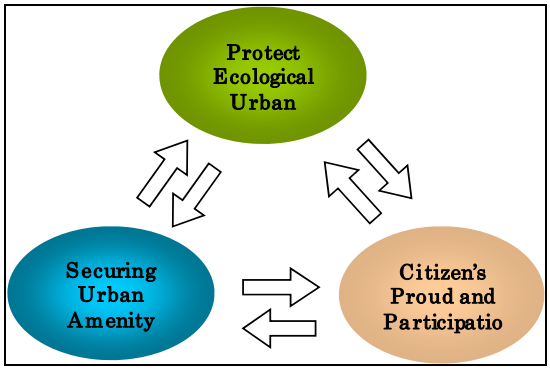

Source: JICA Study Team

**Figure 27 Method of Urban Renewal**

## 4.6 Environment Protection and Green Network Development Plan

The goals for urban environment protection is set as described below. These take into account the roles and functions of the natural environment, in order to achieve a livable and attractive urban setting in Lusaka in a sustainable manner.

- To achieve sustainable urban development taking account of ecological urban environment formulation and nature area protection
- To secure and encourage quality of life of citizen with attractive amenity such as rich green and attractive water front and recreation place




Source: JICA Study Team

**Figure 28 Three Pillars for Urban Environment Protection and Green Network Development**

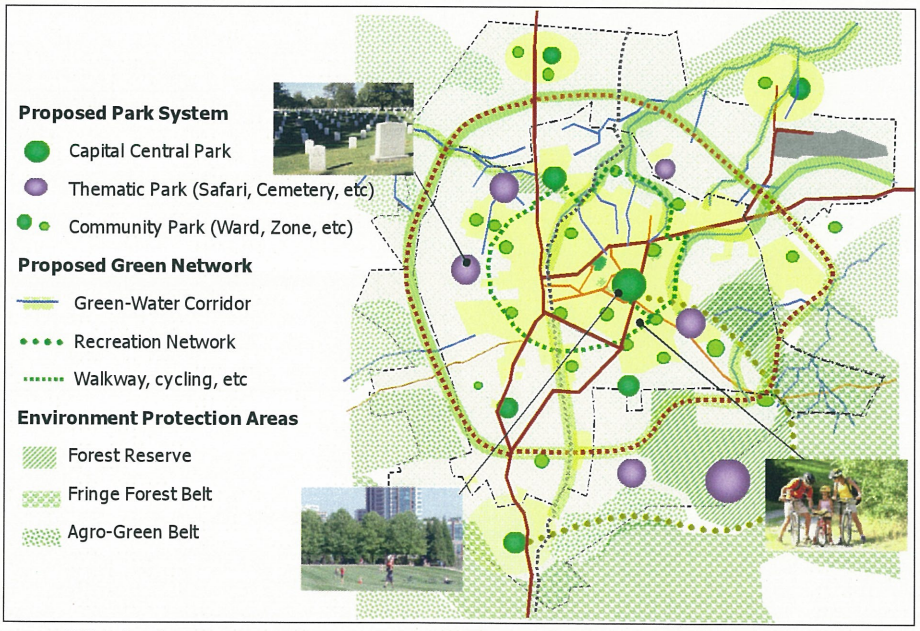
- To foster citizen's proud and participation for urban environmental protection

As Lusaka still has potential natural resources, strategic approach is required to achieve effective urban environment protection, as it is also known as the "garden city Lusaka". In this context, strategies for urban environment protection and green network development need to be taken as follows:

- To provide urban environment protection and green management program in order to formulate strategic interventions for environmental protection
- To establish sustainable urban design in order to protect the destruction of natural reserve forest and damage of natural habitats and biodiversity
- To formulate a "green belt zone" maintaining mainly agriculture land and other natural green spaces, functioning as buffer for urban sprawl and environmental and recreational network
- To formulate spatial network for urban green environment (river green, street green, open space, and suburban agriculture belt), and recreational activities (parks and walkways or cycling lanes)
- To empower local communities' activities in a participatory manner for the environment improvement, especially for waste management and energy (charcoal) issues

Plan of ECHO Garden City and Green Environment Protection

The ECHO garden city will be achieved as a long-term goal through overall environmental creation and protection programs with the involvement of all stakeholders, i.e., the citizens and civic leaders. The water system in the City of Lusaka and its surroundings is environmentally vulnerable. Hence, it requires careful planning and management to accomplish environmental protection and development in a sustainable manner. Citizen's participation will be essential for achieving the goal of the ECHO garden city. They will act as important partners in providing public services for the park's development and environmental protection program through continuous efforts. The plan of green city development and environment protection is illustrated in Figure 29.




Source: JICA Study Team

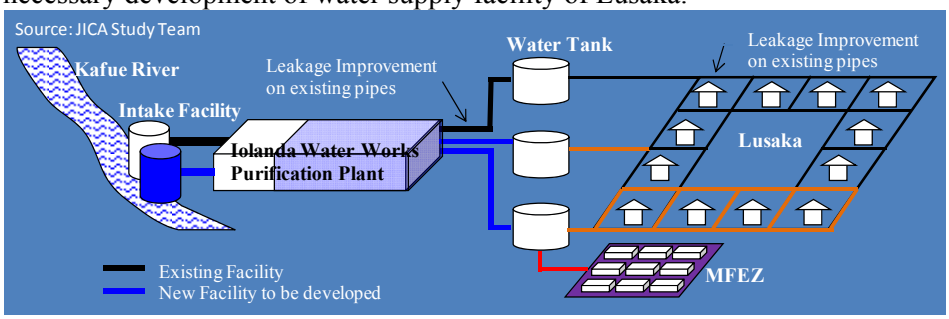
**Figure 29 Plans of Greener City and Environment Protection**

## 4.7 Social Service and Utility Service Development Plan

Water Supply

Water resource development should be tactically carried out to cope with the increasing water demand of Lusaka. Present water demand of approximately 218,000 $m^3$ per day will increase to 290,000 $m^3$, 380,000 $m^3$ and 615,000 $m^3$ per day in 2015, 2020 and 2030, respectively, due to population increase and economic growth. Current water supply capacity of LWSC of 221,000 $m^3$ per day should be strategically developed to support the urban development of Lusaka.

Kafue river water with sufficient flow capacity can be utilized as the main water resources to correspond to the Lusaka City water demands of 2030, while the groundwater resources should be conservatively utilized as supplemental resources especially for community water works. The following schematic diagram shows necessary development of water supply facility of Lusaka.




Source: JICA Study Team

**Figure 30 Necessary Development of Water Supply Facility for Lusaka**

Drainage

Flood problem seriously affecting the living environment in UUS should be urgently dealt with. Both urgent dewatering project such as mobile pumping stations, and the formulation of integrated master plan for flood control in Lusaka are necessary.

Sanitation

Rehabilitation of existing sewerage treatment system and expansion of service area, as well as empowerment of management capacity of LWSC, are proposed. A new pilot plant is proposed in consideration of the economic and technical constraints in Lusaka.

Energy

Charcoal most commonly used for cooking and heating of household rooms should be substituted gradually with other alternatives such as hydro-generated electricity, sugar cane and/or Jatropha basis bio fuel energy, in consideration of the deforestation problem and global warming issues.

Education

Shortage of basic schools and high schools should be resolved to offer proper education to the next generation. Upgrading of the vocational training for both the informal and formal sectors is also necessary. Groups of vulnerable SMEs or individuals in the formal and informal sectors shall be trained and educated to enhance their management and technical capacity and advance their fundamental skills for industrial production works.

Health

Lusaka City has only one general hospital (UTH) as of 2008. Therefore, upgrading of the four health centers (Matero, Chelstone, Kanyama, and Chilenje) to first-level referral hospitals is necessary. Concurrently, there are needs to develop neighboring clinics such as health posts and health center in some wards, considering that the health development criteria of "one ward shall have at least one health center" is unachieved. Capacity enhancement of the present clinics is also necessary.

# 5. Capacity Development Plan

## 5.1 Capacity Development Issues and Goals

The capacity development issues in terms of city planning administration are: i) strengthening development control, ii) improving land management mechanism for better living environment, iii) infrastructure project implementation, and iv) improving public administration.

Strengthening Development Control

The corresponding concerns on strengthening development control are:

- Regional Coordination and Planning to Deal with Uncontrolled Urban Sprawl
- Strengthening Administrative Functions for implementing the Master Plan
- Implementation

Improving Land Development Mechanism for Better Living Environment

The concerns on improving land development and living conditions are:

- Regional Cooperation for Efficient Public Service Delivery
- Accelerating Land Registration (Improvement Areas)
- Financing Public Services
- Efficient Land Use

Infrastructure Project Implementation

The issue on infrastructure deficiency is serious. While the role of the districts is vital in initiating infrastructure development projects, their financial capacity for implementation is insufficient.

Improving Public Administration

In order to facilitate all the issues discussed, administrative capacity of the Departments of City Planning, Engineering Services and Housing and Social Service (HSS) needs to be initiated. Utilizing appropriate information technology would be essential to the organizational capacity development. As new plans will be put into place both at the national and local levels, coordination system becomes essential. The issue on systemic improvement in an organization would be improved with the introduction of technological instruments, while coordination needs to be conducted to achieve the same levels of understanding for each issue to be resolved.

According to the capacity development issues, future desirable states for administrative capacity as development goals are formulated. These goals become benchmarks to assess the current administrative capacity by identifying gaps between current capacity and future goal.

Capacity Development Goal

- To achieve effective and efficient urban growth management through establishing the statutory plan of the Master Plan and strengthening development control
- To achieve living environment improvement through establishing effective land management system, adequate development standard and promoting community's partnership for social services

- To establish effective implementation mechanism for infrastructure development and urban renewal
- To achieve effective and sufficient public administration services through strengthening professional development, information management and related institutional arrangement

## 5.2 Gap Assessment

Institutional Gap Assessment

The institutional gaps are assessed considering implementation environment and system completion. Implementation environment includes funds as well as political, cultural, organizational and human resources. The system completions meanwhile are assessed based on conducted interviews and discussions.

Although the Urban and Regional Planning Bill (new TCPA) is still under discussion, current urban management capacity including development control, land management, implementation capability and basic administrative capacity is still necessary to be strengthened inevitably by necessary institutional arrangements and to meet the new TCPA as the result of assessment shown in Table 5.

**Table 5 Institutional Gap Assessment**

| Development Goal | Criteria | Assessment | Note |
|---|---|---|---|
| Achieve effective and efficient urban growth management | Planning /Coordination | Incomplete/ Inadequate | Multi-provincial cooperation is not available in the new TCPA. |
| | Planning Permission | Inefficient | A zoning regulation is old and vaguely defined. |
| | Enforcement /Inspection | Inadequate | Building standard is obsolete while administration capacity is below the current requirements. |
| Achieve desirable management for living environment improvement | Land Registration | Incomplete/ Inadequate | Low administration capacity; illegal rental units in Improvement Areas.. |
| | Urban Renewal Management | Insufficient | Unplanned Urban Settlement facing very poor living conditions for decades needs effective renewal measures |
| | Efficient public service | Insufficient | Social enterprises (e.g. CBE) are necessary to be strengthen by establishment of partnership for social services in communities |
| Establish effective implementation mechanism | Coordination | Incomplete | Roles of road administration are not clearly defined in the Public Road Act. |
| | Funds | Incomplete | Funding mechanism for district councils is not established. |
| | Monitoring | Inefficient | The rules of project monitoring have not been established due to vaguely defined roles of government organizations. |
| Achieve effective and sufficient public administration | Professional Skill | Insufficient | No institutional mechanism for providing licensed professional for urban management planners |
| | Administrative Role sharing | Inefficient | Very limited role sharing against public service demand in Ward level (permission, others) |
| | New administration | Not established | No establishment of Satellite Cities' management administration |

Source: JICA Study Team

Organizational Gap Assessment

Almost all the functions of the departments of LCC are observed by insufficient capacity for urban management to cope with current urban issues. As the key organizations' gap assessment indicating the summary results in the following table, City Planning Department as a one of the key organizations for urban management is

facing especially considerable lack of professionals and staffs to address current urban management issues.

**Table 6 Organizational Gap Assessment**

| Development Goal | Assessment Criteria | Gap Assessment | | | | | |
|---|---|---|---|---|---|---|---|
| | | City Planning | | Engineering Services | | HSS | |
| | | Role | Gap | Role | Gap | Role | Gap |
| Achieve effective and efficient urban growth management | Planning/Coordination | ● | ● | ○ | ○ | ○ | ○ |
| | Planning Permission* | ● | ● | - | - | - | - |
| | Enforcement/Inspection | ● | ● | - | - | - | - |
| Achieve desirable management for living environment improvement | Land Registration | ○ | ○ | - | - | ● | ● |
| | Urban Renewal Management | ● | ● | ○ | ○ | ● | ● |
| | Efficient public service | ○ | ○ | ○ | ○ | ● | ● |
| Establish effective implementation mechanism | Coordination | ○ | ● | ● | ● | ○ | ○ |
| | Implementation | ○ | ● | ● | ● | ○ | ● |
| | Monitoring | ● | ● | ● | ● | ○ | ○ |
| Achieve effective and sufficient public administration | Communication/Coordination | ● | ● | ○ | ○ | ○ | ○ |
| | Staff allocation | ● | ● | ● | ● | ○ | ○ |

● Major role / Large gap; ○ Minor role / Medium gap; - Small role / Small gap, * = Department of Public Health has a partial responsibility for allocation documents appraisal

Source: JICA Study Team

Individual (Professional) Gap Assessment

As the results of the individual gap assessment, insufficient professionals for urban management make an essential gap to address large demand and requirement of urban activities. And also individual capabilities of planning skill and implementation management have considerable gaps for appropriate plan implementation.

**Table 7 Individual Gap Assessment**

| Development Goal | Assessment Criteria | Gap Assessment for Skill | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Planner | | Architect | | Engineer | | Surveyor | |
| | | Role | Gap | Role | Gap | Role | Gap | Role | Gap |
| Achieve effective and efficient urban growth management | Planning/Coordination | ● | ● | ○ | ○ | ○ | ○ | - | - |
| | Planning Permission | ● | ● | ● | ○ | ● | ● | - | - |
| | Enforcement/Inspection | ● | ● | ● | ● | ● | ● | ● | ● |
| Achieve desirable management for living environment improvement | Land Registration | ○ | ○ | - | - | ○ | ○ | ● | ● |
| | Urban Renewal Management | ● | ● | ○ | ○ | ○ | ○ | ● | ● |
| | Efficient public service | ○ | ○ | - | - | ○ | ○ | ● | ● |
| Establish effective implementation mechanism | Coordination | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
| | Implementation | - | - | ● | ● | ● | ● | ○ | ○ |
| | Monitoring | ● | ● | ● | ● | ○ | ● | - | - |
| Achieve effective and sufficient public administration | Planning/analysis skill | ● | ● | ● | ○ | ● | ○ | ○ | ○ |
| | Professional/functional skill | ● | ● | ● | ○ | ● | ○ | ● | ● |
| | Coordination skill | ● | ● | ● | ○ | ● | ○ | ● | ● |

● Major role / Large gap; ○ Minor role / Medium gap; - Small role / Small gap

Source: JICA Study Team

## 5.3 Capacity Development Plan and Projects & Programs

Considering the capacity development issues and gap assessment results aforementioned, programs and projects are programmed by four pillars namely, i) least cost programs for basic and thematic programs, ii) basic capacity development, iii) capacity formulation for Master Plan implementation, iv) capacity building for urban and living environment improvement.

**Table 8 Capacity Development Pillars and Key Projects & Programs**

| Development Pillars | | Key Projects and Program for Capacity Development | | | CAPDEV Focused Area | | | Target |
|---|---|---|---|---|---|---|---|---|
| | | | | | Individual | Org | Institution | |
| Least Cost Capa-city Deve-lop-ment | Basic CD (LB Group) | 1) | Installation of Operational Improvement Mechanism | | ○ | ● | -- | S |
| | | 2) | Basic Information Management | | ● | ● | -- | S |
| | Thematic CD (LT Group) | 3) | Knowledge Sharing | | ● | ○ | -- | S |
| | | 4) | Use of the Internet | | ● | ○ | -- | S |
| | | 5) | Accelerating the Basic IT skills by using free software | | ○ | ● | -- | S |
| Basic Administrative Capacity Development (BC group) | | 6) | Data management, communication, basic skill, no. of staff | | ● | ● | -- | S |
| | | 7) | Empowerment of Ward role and function in urban management | | ● | ● | ○ | S/M |
| | | 8) | Establishment of urban management administration for Satellite Cities | | ● | ● | -- | M |
| | | 9) | Accreditation of qualified Planner by organization | | ● | -- | ● | S |
| Formulation of Capacity for Master Plan Implementation (MC group) | | 10) | Establishment of statutory zoning and development control by guideline | | ● | ● | ○ | S |
| | | 11) | Empowerment of building permission, inspection, penalty enforcement | | ○ | ● | ○ | S/M |
| | | 12) | Reinforcement of infrastructure project implementation | | ● | ● | -- | S |
| | | 13) | Formulation of urban transportation planning section in CPD | | ● | ● | -- | S |
| | | 14) | Planning coordination organization (authority, committee) for G-Lusaka | | ○ | ● | ○ | S |
| | | 15) | Skill development for review, update and revision of the plan | | ● | ● | -- | S |
| Capacity for Urban & Living Environment Improvement (IC group) | | 16) | Land management enhancement | a) land registration promotion | ○ | ● | ○ | S/M |
| | | | | b) promotion of public asset management | ○ | ● | ○ | S/M |
| | | | | c) Chibolya pilot project implementation | ○ | ● | ○ | S |
| | | 17) | Formulation of regional public service (water, waste, ambulance, etc) | | ○ | ● | -- | S/M |
| | | 18) | Establishment of Condominium Law for dense development | | ○ | ○ | ● | M/L |
| | | 19) | Reinforcement of planning standards and building codes | | ● | ○ | ● | S/M |
| | | 20) | Empowerment of local communities (CBO/CBE) for public services | | ○ | ● | ○ | S |

Legend : ●= priority, ○=partial, -- = not applicable S = short-term, M = medium-term, L = long-term

Source: JICA Study Team

## 5.4 Action Plan for Capacity Development

The action plan for capacity development is prepared by selecting short term target projects and programs from Table 8. The costs include sum of the staff costs, domestic consulting costs and international consulting costs. The total cost of the priority projects and programs for capacity development is about USD3.3 million (equivalent to ZMK11.8 billion) as shown in Table 9.

## Table 9 Priority Projects and Programs of Capacity Development Action Plan for Urban Management

| Development Pillars | Action Plan for Capacity Development | | | Expected Organization | Contents of Activities | Cost (us$ million) | equivalent to K billion |
|---|---|---|---|---|---|---|---|
| Least Cost Capa-city Deve-lop-ment | LB01 | A feedback process installation by department for administration improvement | | LCC/ 3Districts | Organizational analysis | 0 | |
| | LB02 | Basic filing and data input and management | | LCC/ 3Districts | Filing and data input | 0 | |
| | LT01 | Teaching each other and sharing technologies and skills learned in seminar and training | | LCC/ 3Districts | OJT | 0 | |
| | LT02 | Getting information, learning and using the Internet | | LCC/ 3Districts | On-line training | 0 | |
| | LT03 | Accelerating the basic IT skills by using free software | | LCC/ 3Districts | Basic IT training | 0 | |
| Basic Administrative Capacity Development | BC01 | Strengthening data management, communication skill and mechanism, basic skill of technical work | | LCC/ 3Districts | Manual provision, training, discussions | 0.25 | |
| | BC04 | Promoting accreditation and increment of Qualified Planner by authorized organization | | Zambia Institute of Planners | Teachers training teaching material | 0.25 | |
| | | | | | Sub-total | **0.5** | 1.8 |
| Formulation of Capacity for Master Plan Implementation | MC01 | Reinforcing development control through statutory zoning establishment and its guideline provision | | LCC/ 3Districts | OJT, provision of guideline of operation | 0.15 | |
| | MC02 | Empowerment of building permission, inspection, penalty enforcement | | LCC/ 3Districts | OJT, increment of staff, | 0.4 | |
| | MC03 | Strengthening implementation capacity of infrastructure project (technology, finance, manage) | | LWSC/Road Admin (ESD) | Guidance provision, training, OJT | 0.15 | |
| | MC04 | Formulation of urban transportation planning section (traffic management, public T) in CPD | | LCC (CPD) | Training, recruiting staff, setting Section | 0.25 | |
| | MC05 | Formulating planning coordination organization (authority, committee) among 4 Districts | | LCC/ 3Districts | Task force setting, discussions, organizing | 0.1 | |
| | MC06 | Skill development for review, update and revision of the plan | | LCC mainly | OJT for data management, planning | 0.15 | |
| | | | | | Sub-total | **1.2** | 4.3 |
| Capacity for Urban & Living Environment Improvement | IC00 | Reinforcing Land Management | IC01 Promotion of land registration | LCC/ 3 Districts | Data management, training, recruiting staff | 0.2 | |
| | | | IC03 Promotion of Chibolya urban renewal pilot project | LCC/MLGH/ MoFNP/MoL | Implementation body, financing, investors | 0.8 | |
| | IC07 | Empowerment of local communities (CBO/CBE) for public services participation | | LCC/WDC/CB O/CBE | Task force setting, pilot study, model project | 0.4 | |
| | | | | | Sub-total | **1.4** | 5.0 |
| | | | | | Total | **3.1** | 11.1 |

Legend：LCC = Lusaka City Council, CPD = City Planning Dept, HSSD = Housing Social Service Dept, ESD = Engineering Service Dept. WDC=Ward Development Committee, LWSC = Lusaka Water and Sewerage Company, MoFNP= Ministry of Finance and National Planning, MoL = Ministry of Land, CBO = Community Based Organization, CBE = Community Based Enterprise

# 6. Plan of Project/Program and Implementing Management

Projects and Programs

Necessary projects and programs for the comprehensive urban development of Lusaka are provisionally proposed and summarized in Table 10 according to development schedule and respective implementing organization. Only the public projects/programs are included in assessing the impact on the public expenditure while the private initiative projects such as commercial housing development, business/commercial complex, etc. are excluded.

**Table 10 Necessary Projects/Programs for Comprehensive Urban Development of Lusaka**

| Item | Imp. Schedule | | | Implementing Organization | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Short | Mid | Long | CG | LCC | SA | SC | LWSC | P | NGO | Com |
| Transportation Network | | | | | | | | | | | |
| Roads (new construction & upgrade) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| Public transport development | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | | |
| Traffic management | ■ | ■ | ■ | | ■ | ■ | | | | | |
| Traffic safety and vulnerable road uses | ■ | ■ | ■ | | ■ | ■ | | | | | |
| Freight transport related development | | ■ | ■ | ■ | | ■ | | | | | |
| Airport renovation | | ■ | ■ | ■ | | | ■ | | | | |
| Utility | | | | | | | | | | | |
| Water supply system & water resources expansion | ■ | ■ | ■ | ■ | | | | ■ | | | |
| Sewerage development | ■ | ■ | ■ | ■ | | | | ■ | | | |
| Drainage development | ■ | ■ | ■ | ■ | ■ | | | | | | |
| Electric facility | ■ | ■ | ■ | ■ | | | ■ | | | | |
| Solid waste management | ■ | ■ | ■ | ■ | ■ | | | | ■ | | ■ |
| Living Environment Improvement of UUS | | | | | | | | | | | |
| Renewal of UUS | ■ | ■ | ■ | | ■ | ■ | | | ■ | | ■ |
| Urgent upgrading of utility service | ■ | ■ | | | ■ | | | ■ | | ■ | ■ |
| CBE-led living environment improvement | ■ | ■ | ■ | | ■ | | | | | ■ | ■ |
| Housing supply | | | | | | | | | | | |
| Micro-finance for housing development | ■ | ■ | | ■ | ■ | | | | | ■ | ■ |
| Social housing development | ■ | ■ | ■ | ■ | ■ | | | | | | |
| Commercial housing development | ■ | ■ | ■ | ■ | | ■ | | | ■ | | |
| Social Service | | | | | | | | | | | |
| Construction of schools | ■ | ■ | ■ | ■ | ■ | | | | | ■ | ■ |
| Construction of health posts, health centers | ■ | ■ | ■ | ■ | ■ | | | | | | |
| Park, Green Development(inclusive of cemetery) | ■ | ■ | ■ | ■ | ■ | | | | ■ | | |
| Capacity Development of Urban Management | ■ | ■ | | ■ | ■ | | | | | | |
| Empowerment of Formal/informal SME | ■ | | | ■ | | ■ | | | | ■ | ■ |
| LS-MFEZ | ■ | | | ■ | | ■ | ■ | | ■ | | |

Note: CG: Central Gov., SA: State Agency, SC: State Company, P: Private, Com: Community
Major public initiatives only
Source: JICA Study Team

Development cost of the necessary projects and programs are estimated at USD 3,136 million (equivalent to ZMK 11,230 billion) to be earmarked for the public development expenditure during the next 20 years until the year 2030 as shown in Table 11.

Development cost by implementing organization is summarized in Table 12. LCC and LWSC will bear about USD 1,600 million and USD 1,000 million, respectively, until 2030.

**Table 11 Development Cost by Sector for Lusaka Urban Development (Public Investment)**

(unit: US$ million)

| | | -2015 | 2016-2020 | 2021-2030 | Total (million $) | equiv: (K' billion) | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | Urban transportation development | 188 | 364 | 540 | 1,092 | 3,910 | Road, public transport, traffic management, etc. |
| 2 | Utility development | 199 | 337 | 540 | 1,076 | 3,850 | Water supply, sewerage, drainage, etc. |
| 3 | Living environment improvement /note | 78 | 114 | 181 | 373 | 1,330 | Urgent improvement, housing supply, etc. |
| 4 | Social service improvement | 47 | 94 | 231 | 372 | 1,330 | School and health care facility |
| 5 | Park, green, sports facility development | 24 | 31 | 78 | 132 | 470 | |
| 6 | Legal/Institutional reforms | 5 | 2 | 0 | 7 | 20 | Land tenure system, property tax management, etc. |
| 7 | Empowerment of formal/informal SME | 10 | 0 | 0 | 10 | 40 | Training for management and technology skill |
| 8 | LS -MFEZ | 75 | n.a. | n.a. | 75 | 270 | |
| Total | | 625 | 942 | 1,569 | 3,136 | 11,230 | 1$=3,582K |

Note: US$ 2,000 million cost by private initiative scheme is additionally necessary for UUS renewal.
US$1.00＝ZMK3,582

Source: JICA Study Team

**Table 12 Development Cost by Organization for Lusaka Urban Development (Public Investment)**

(unit: US$ million)

| | | -2015 | 2016-2020 | 2021-2030 | Total | equiv: (K' billion) | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | LCC (Inclusive of RDA) | 308 | 435 | 889 | 1,632 | 5,840 | Road, drainage, social housing, school, medical facility, park/green, etc. |
| 2 | LWSC | 187 | 327 | 530 | 1,044 | 3,730 | Water supply, sewerage |
| 3 | NHA | 40 | 60 | 100 | 200 | 720 | Commercial housing construction |
| 4 | TEVETA | 10 | 0 | 0 | 10 | 40 | Training for management and technology skill |
| 5 | ZDA | 75 | n.a. | n.a. | 75 | 270 | LS-South MFEZ |
| 6 | National Airport Co. Ltd. | 5 | 120 | 50 | 175 | 630 | Renovation of LS Int. airport |
| Total | | 625 | 942 | 1,569 | 3,136 | 11,230 | |

Note: US$ 2,000 million cost by private initiative scheme is additionally necessary for UUS renewal.

Source: JICA Study Team

Priority Project

Priority projects and programs are selected from among the short term projects/programs in consideration of i) urgency, ii) effectiveness, iii) viability, iv) environmental soundness. Investment cost magnitude is also examined to determine the financial arrangement difficulty. Table 13 shows the priority project list with cost summary. Approximately USD 421 million (ZMK 1,510 billion) is estimated for the priority projects.

**Table 13 Priority Project/Programs for Short Term Period Implementation**

(USD million)

| Project Program Title | Cost |
|---|---|
| **Urban Transportation** | **108.6** |
| 1) Inner Ring Road (Mumbwa-Kafue-Kasama, 12.9km) | 29.4 |
| 2) Outer Ring Road (9.4km)+Lilay Road (7.6km) | 31.8 |
| 3) LS-MFEZ Access (10.4km) | 21.7 |
| 4) Airport Road Extension (LN-MFEZ, 6.4km) | 4.9 |
| 5) Mumbwa road/Los Angeles Road (4.0km) | 12.8 |
| 6) Kalambo Road/Benbella Road (1.6km) | 0.7 |
| 7) Bus Institutional Reform | 1.0 |
| 8) Traffic Management in Town | 2.5 |
| 9) Intersection Improvement (10 intersections) | 3.8 |
| **Water/Sewerage/Drainage** | **167.0** |
| 1) Water Resources Management Program (Acquisition of Kafue River Water Right, Study on Comprehensive Groundwater, Ordinance on Registration of Industrial/Commercial Wells) | 3.0 |
| 2) Water Supply Sector | 128.0 |
| a Improvement of UFW (Leakage) | 3.0 |
| b Water Supply and Sanitation Improvement Project (Kafue Water) | 85.0 |
| c Improvement and Expansion of Distribution System | 40.0 |
| 3) Sewerage Sector | 24.0 |
| a Remaining Rehabilitation of Existing Facilities | 24.0 |
| 4) Drainage Sector | 12.0 |
| a Provision of Mobile Pumping Station as urgent measure | 4.0 |
| b Urgent Rehabilitation of Existing Facilities | 4.0 |
| c Comprehensive Drainage Master Plan Study | 4.0 |
| 5) Solid Waste Management | |

| Project Program Title | Cost |
|---|---|
| **Living Environment Improvement** | **15.5** |
| 1) Urgent Improvement of Living Environment (renovation of communal tap, drainage, sanitation, etc.) | 3.0 |
| 2) CBE-led Living Environment Improvement/Public Service Operation | 2.0 |
| 3) Enhancement of Micro-finance for Housing Development, Upgrading of Substandard Housing in UUS | 10.5 |
| **Social Service Improvement** | **47.2** |
| 1) Improvement of Education Service | 32.2 |
| 2) Improvement of Medical Care Service | 15.0 |
| **Legal/Institutional Enhancement** | **3.1** |
| 1) Least Cost Capacity Development (A feedback process installation, basic filing and data input and management, etc.) | **0.0** |
| 2) Basic Administrative Capacity Development (Strengthening data management, communication skill, etc., Promoting accreditation and increment of Qualified Planner by authorized organization) | 0.5 |
| 3) Formulation of Capacity for Master Plan Implementation (Development control, building permission, inspection, penalty enforcement, implementation capacity of infrastructure project, new urban transportation planning section, planning coordination organization) | 1.2 |
| 4) Capacity for Urban & Living Environment Improvement (Reinforcing Land Management, Empowerment of local communities for public services participation) | 1.4 |
| **Industrial Development/Job Opportunity Expansion** | **80.0** |
| 1) Formal/Informal Micro, SME training | 5.0 |
| 2) LS-MFEZ Development (Phase1) | 75.0 |
| **Total** | **421.4** |
| (ZMK billion) | **1,510** |

US$1.00＝ZMK3,582

Note: UUS renewal projects by private initiative will be necessary in addition to above.

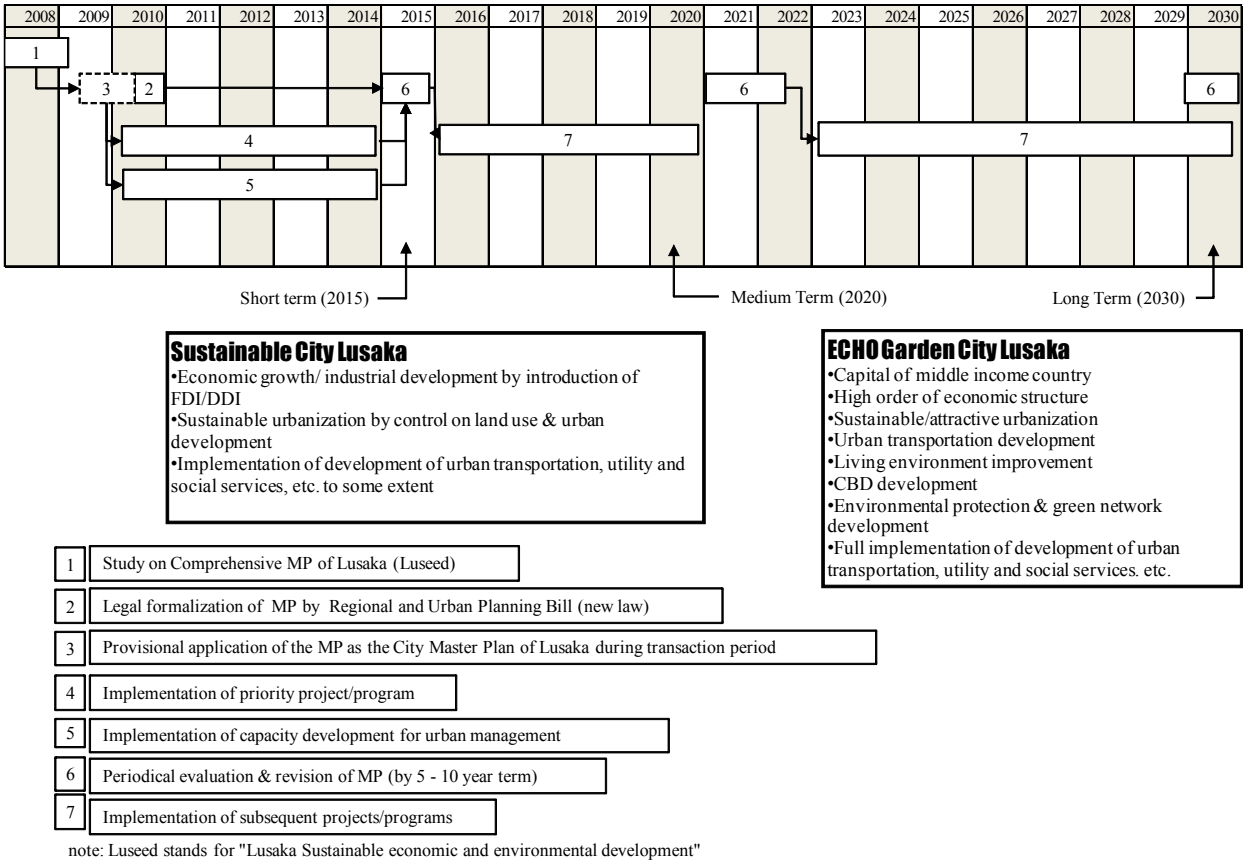
Source: JICA Study Team

Implementation Management

For the implementation of the comprehensive master plan proposed in the Study, management of the following is necessary.

(a) Legal formalization as the master plan of greater Lusaka
(b) Provisional implementation of the master plan during negotiation period
(c) Periodic evaluation and revision of the master plan

Schedule and work flow of the implementing management is schematically presented in Figure 31.




Source: JICA Study Team

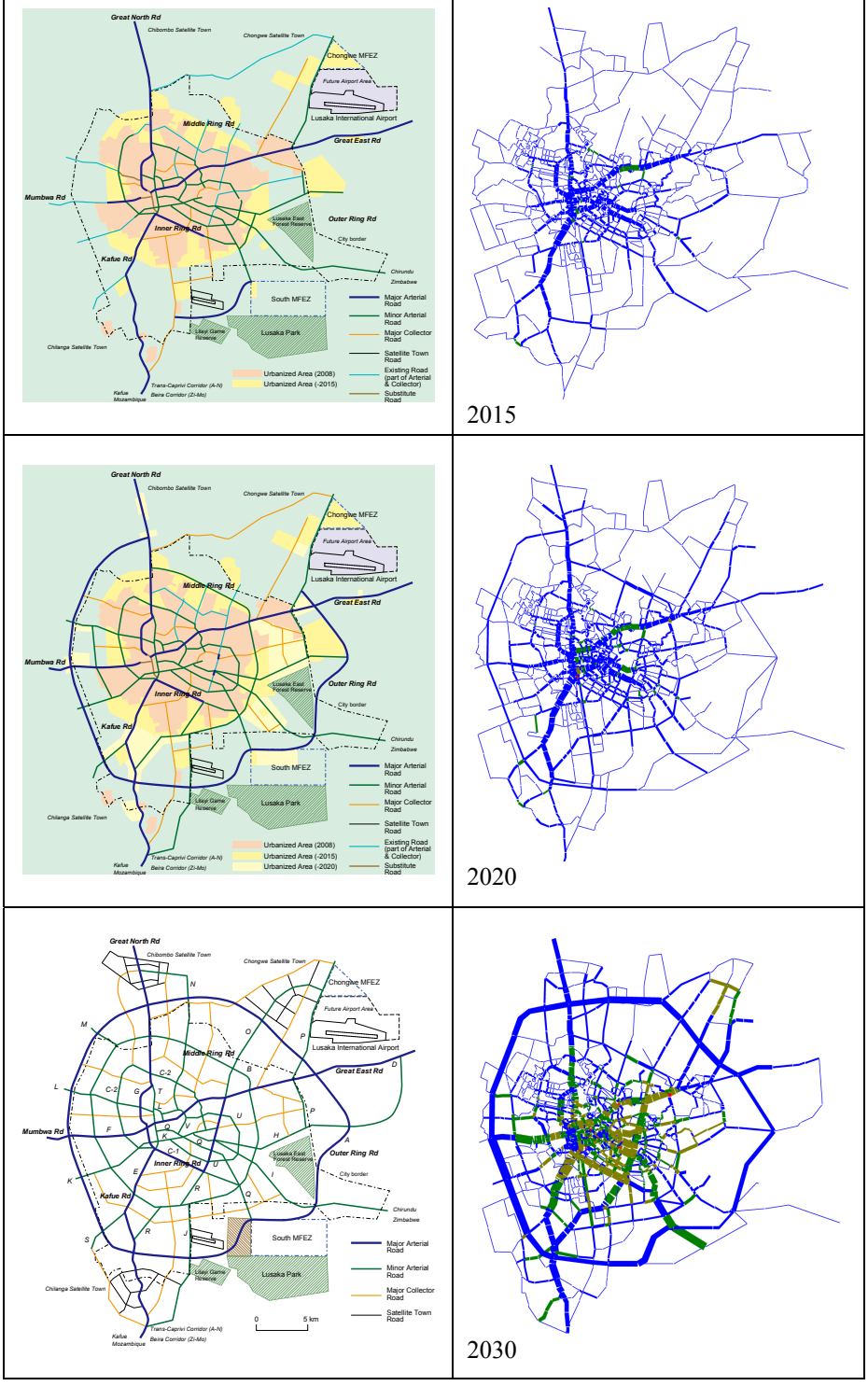
**Figure 31 Implementation Management of the Master Plan**

# 7. Plan of Three Sub-Programs

## 7.1 Plan of Urban Transportation Development

Road Network Plan

Road network plan and traffic projection results in 2015, 2020 and 2030 are illustrated in Figure 32. To cope with the traffic congestion anticipated in 2030, mass transit development will be necessary.

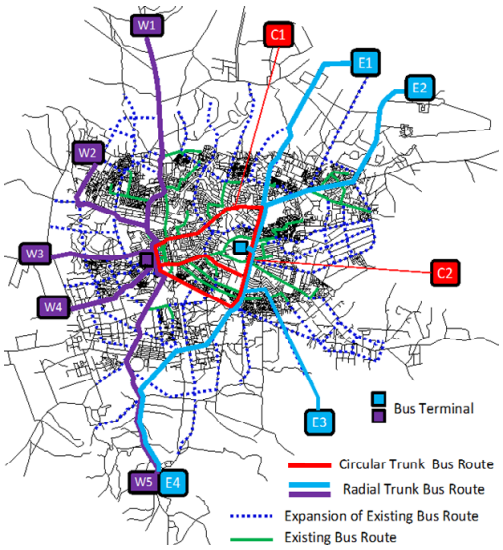



Source: JICA Study Team

**Figure 32 Road Network Plan and Traffic Projection Results**

Introduction of Mass-Transit

Figure 33 shows the trunk bus network and urban railway route proposed for the long-term. The future bus network will have two terminal points within the town and the new city center. Priority or exclusive use of one lane for scheduled trips will be introduced as trunk for faster movement of the buses.




Proposed Trunk and Feeder Bus Route

Proposed Urban Rail Route (50 km) beyond 2030

Source: JICA Study Team

**Figure 33 Mass Transit Systems in Long Term**

Trunk bus network system is proposed to be introduced by phase as shown below.

**Table 14 Phase Development of Bus Transit System**

| Stage | Bus Transit System | Characteristics | Target |
|---|---|---|---|
| 1st | Free operation on designated routes under quality licensing | Private bus companies compete in providing bus services on designated routes under quality licensing. Existing bus routes will be reorganized. | - 2015 |
| 2nd | Combination of scheduled bus on fixed routes and free operation under license on other routes | Scheduled bus services will be provided along the major routes by concession, which gives the operator exclusive rights for the service. Present buses will be operated along other routes under the licensing scheme. | 2016 - 2020 |
| 3rd | Trunk and feeder system | Priority or exclusive use of a lane for scheduled trips will be introduced as the trunk route for faster movement of buses. | 2020 - 2030 |

Source: Proposal by the JICA Study Team.

Projects and Programs

Projects and programs for the urban transportation sub-programs are proposed with preliminary cost estimates summarized in Table 15.

Priority projects and programs for the urban transportation sub-programs to be implemented in the short term are proposed below through the priority evaluation.1

- Outer Ring Road (9.4 km) and Lilay Road (7.6 km) for LS – MFEZ Access

[1] Priority projects are selected from the short-term projects (-2015) based on evaluation of the criteria such as 1) contribution to short-term policy, 2) scale of benefit, 3) economic viability (B/C), 4) negative impact 5) project maturity, and 6) urgency.

- Inner Ring Road – Kafue – Kasama (9.1 km) and Mumbwa – Kafue (3.6 km)
- MFEZ Access (10.4 km)
- Airport Road (6.4 km, Chongwe MFEZ Access)
- Mumbwa Road and Los Angeles Road (4.0 km)
- Institutional Reform for Bus Operations
- Comprehensive Traffic Management Program
- Improvement of Intersections
- Kalambo Road/ Bebblela Road (1.6 km)

**Table 15 Necessary Project/Programs of Urban Transportation Sub-program for Short Term**

| Group | Code | Project/Program name | Length km | US$ million | (equivalent to K billion) |
|---|---|---|---|---|---|
| Road | RD01 | Construction of Outer Ring Road (MFEZ Access) | 9.4 | 16.4 | |
| | RD04 | Construction of Middle Ring Road (Twin Palm – Musi Oa Tuya) | 5.1 | 4.2 | |
| | RD07 | Construction of Inner Ring Road City Bypass (Kafue – Kasama) | 9.3 | 10.3 | |
| | RD10 | Construction of Inner Ring Western Bypass (Mumbwa – Kafue) | 3.6 | 3.0 | |
| | RD10 | Construction of Inner Ring Western Bypass (Industrial Road) | 3.3 | 2.6 | |
| | RD10 | Construction of Inner Ring Western Bypass (Matero Road) | 6.0 | 4.6 | |
| | RD12 | Widening of Great North Road (Lumumba Road-Ngwere Road) | 6.3 | 11.5 | |
| | RD13 | Widening of Kafue Road (Chifundo Road–South Gate Park Road) | 3.9 | 9.6 | |
| | RD14 | Widening of Mumbwa Road | 2.4 | 10.8 | |
| | RD15 | Improvement of Leopard Hill Road | 9.3 | 8.1 | |
| | RD16 | Improvement of Twin Palm Road | 6.3 | 11.6 | |
| | RD17 | Improvement of Los Angeles Road | 1.6 | 2.0 | |
| | RD19 | Construction of Chongwe MFEZ Access Road | 6.4 | 4.9 | |
| | RD25 | Construction of MFEZ Access | 15.4 | 12.2 | |
| | RD27 | Improvement of District Road | 11.1 | 8.8 | |
| | | Improvement of Lilay Road | 14.6 | 6.7 | |
| | | Improvement of Chifundo Road | 2.4 | 1.1 | |
| | RD29 | Construction of Missing Links | 7.0 | 5.2 | |
| | RD36 | Road Maintenance & Rehabilitation | - | 10.1 | |
| | RD37 | Development of Road Database | - | 0.6 | |
| Public Transport | PT01 | Improvement of Existing Bus Terminals | - | 1.8 | |
| | PT02 | Construction and Improvement of Bus Stops | - | 1.2 | |
| | PT03 | Reorganization of Bus Route | - | 2.8 | |
| | PT06 | Institutional Reform for Bus Operation | - | 0.8 | |
| | PT07 | Revitalization of Commuter Rail | - | 5.0 | |
| Traffic Management | TM01 | Comprehensive Congestion Relief Program | - | 2.5 | |
| | TM03 | Improvement of Car Parking System | - | 2.0 | |
| | TM04 | Improvement of Intersection | - | 3.8 | |
| Traffic Safety | NM01 | Development of Safe Traffic Environment | - | 10.7 | |
| | NM02 | Improvement of Safe Pedestrian Network | - | 5.6 | |
| | NM03 | Development of Bicycle Network | - | 1.8 | |
| Freight | FT1 | Reform of Railway Operation | - | 1.0 | |
| Airport | AT01 | Improvement of Airport Facilities | - | 5.0 | |
| | | | Total | 188.3 | 674.6 |

Note: RD10 includes 0.3m portion of RD08
Source: JICA Study Team.

## 7.2 Water Supply and Sanitation Plan

Expansion of Water Supply System

To cope with the water demand increase in the future, the LWSC will undertake enhancement of supply capacity through expansion of the production capacity and improvement of Unaccounted for Water (UFW) in three stages until 2030. The water demand projection result and stage-wise capacity development plan are summarized in Table15 and Figure 34.

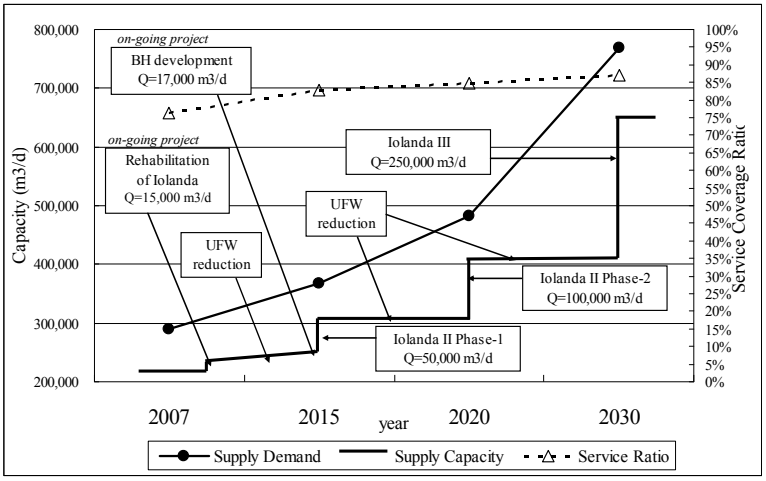
**Table 16 Water Demand Projection**

($m^3$/day)

| | 2007 | | 2015 | | 2020 | | 2030 | |
|---|---|---|---|---|---|---|---|---|
| Domestic | 85,100 | 39% | 125,600 | 43% | 173,700 | 46% | 367,000 | 60% |
| Public | 20,300 | 9% | 24,700 | 9% | 28,400 | 7% | 40,400 | 7% |
| Commercial | 4,700 | 2% | 5,600 | 2% | 7,000 | 2% | 13,200 | 2% |
| Industrial | 108,000 | 50% | 135,100 | 46% | 169,800 | 45% | 194,400 | 32% |
| Total | 218,100 | 100% | 291,000 | 100% | 378,900 | 100% | 615,000 | 100% |

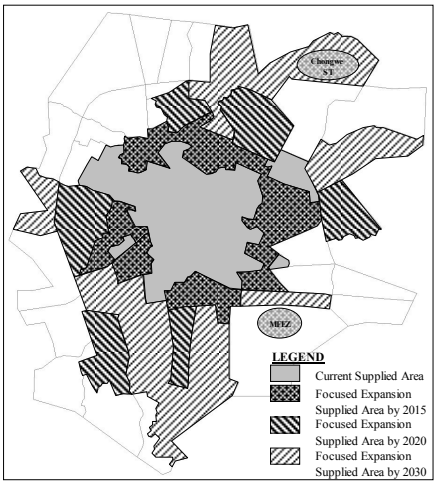
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Cap. Shortage | 3,600 | | -69,300 | | -157,200 | | -393,300 | |
| Current Capacity | 221,700 | | | | | | | |

Source: JICA Study Team




Source: JICA Study Team

**Figure 34 Development Plan of Water Production Capacity**




Source: JICA Study Team

**Figure 35 Distribution System Development Scenario**

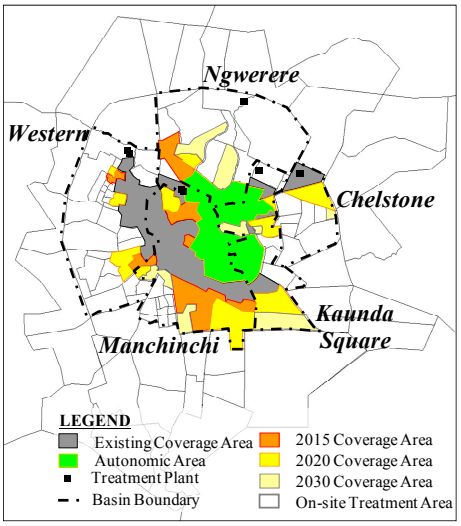
Adjoining areas of the current service area will be predominantly targeted to be served to efficiently utilize the present pipeline network. However, industrial development in Kafue district and the northern part of the airport will be prioritized to support the economic development of Lusaka City. The development scenario for the water distribution system is shown in Figure 35.

Development of Sewerage System

Stage-wise expansion of the sewerage system is planned as summarized in Figure 36.

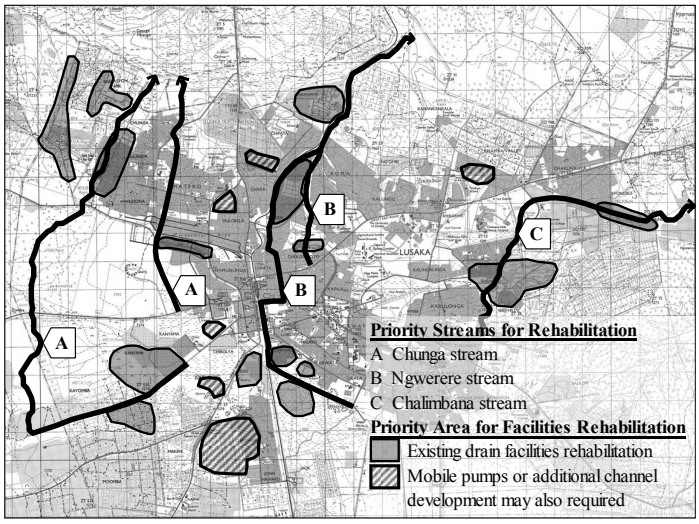
Development Plan of Drainage Sector

Drainage system improvement will be done primarily in areas which are currently inundated through rehabilitation of the existing facilities and dredging of the streams. Mobile pumping stations or a new diversion channel may be necessary in some areas. A drainage master plan study is necessary to plan the integrated city drainage system prior to the commencement of the projects proposed, as shown in Figure 37.




Source: JICA Study Team

**Figure 36 Sewerage Service Development Scenario**




Source: JICA Study Team

**Figure 37 Plan of Urgent Drainage Improvement**

Projects and Programs

Projects and programs for the water supply and sanitation sub-program in the short-term period (2015) are summarized below, with their priority evaluation and preliminary cost estimation. Urgent and high priority projects and programs in the following table have been selected to be implemented preferentially.

**Table 17 Necessary Project/Programs of Water and Sanitation Sub-program for Short Term**

| No | Project Title | Project Outline | Estimated Cost (US$ million) | (equivalent to K billion) | Priority |
|---|---|---|---|---|---|
| **Water Resources Sector** | | | | | |
| WR-1 | Acquisition of Kafue River Water Right | Acquire additional water right (min. 430,000m3) to meets 2030 demand. | administration fee | | urgent |
| WR-3 | Study on Comprehensive Groundwater Management Program | Investigate and analyze groundwater aquifers for sustainable development. | 3.0 | | high |
| WR-4 | Establishment of Groundwater Level Observation Network | Installation of monitoring wells. | 1.0 | | middle |
| WR-5 | Development of New Sufficient Groundwater | Construct sufficient boreholes for water supply and urban agriculture. | 31.0 | | middle |
| WR-6 | Ordinance on Registration of Industrial/Commercial Wells | Prepare by-law to register large capacity wells for groundwater management. | none | none | urgent |
| **Water Supply Sector** | | | | | |
| WS-1 | Improvement of UFW | Establish DMA, fixing physical losses, prepare sufficient billing system. | 3.0 | | urgent |
| WS-2 | Development of Iolanda-II Phase-1 Water Works | Newly construction of intake, treatment plant and transmission pipeline. | 85.0 | | urgent |
| WS-3 | Improvement and Expansion of Distribution System | Installation of new pipes and replacement of old pipes. | 40.0 | | high |
| **Sewerage Sector** | | | | | |
| SW-1 | Remaining Rehabilitation of Existing Facilities | Rehabilitation of existing facilities and expansion of the sewer line. | 24.0 | | high |
| **Drainage Sector** | | | | | |
| DR-1 | Provision of Mobile Pumping Station | Purchase mobile pumping stations. | 4.0 | | urgent |
| DR-2 | Urgent Rehabilitation of Existing Facilities | Rehabilitation of drains, culverts, pipes and excavation of the streams. | 4.0 | | urgent |
| DR-3 | Comprehensive Drainage Master Plan Study | Surveys and study for drainage improvement of overall Lusaka City. | 4.0 | | high |
| | | Total | 199.0 | 712.8 | |

Source: JICA Study Team

## 7.3 Living Environment Improvement Plan

Housing Development

Housing demand is huge due to the increasing number of families. Yearly, about 17,000 housing units were estimated to be necessary in order to meet the demand.

It is assumed that the majority of houses are developed by the private sector. However, government-related housing supply is likewise targeted as follows.

- Supply of 200 housing units by NHA annually
- Supply of 250 social housing units by LCC annually
- Promotion of self-help housing development through enhancement of micro-finance schemes by infusion of government funds

Upgrading of Infrastructure/Social Services in UUS

The following is a summary of the infrastructure and social services in UUS proposed to be upgraded.

**Table 18 Summary of Infrastructure and Social Service Development in UUS**

| Item | Development Plan Proposal |
|---|---|
| Roads and Drainage | Roads and drainage are developed through implementation of renewal of UUS.<br>Collector roads in UUS, which are presently unpaved, will be paved, with drainage ditch facilities. |
| Water Supply | In the short/medium term, communal taps are provided for unserved area, which is estimated at 14% of total area of UUS. During the medium/long term, individual tap service is provided through implementation of renewal of UUS. |
| Public Services (educational facilities and health care) | Additional educational and health care facilities are necessary as described in Section 4.6. Schools will be developed by the community, with private and public sector cooperation. |
| Household Appliances | For the sanitation of UUS, pit latrines will be replaced with septic tanks. Certain areas of UUS will be connected to the urban sewer system. Regarding household energy, a shift from charcoal to environment-friendly energy is necessary. |
| Others | Green zones and sports amenities will be developed in the urban renewal project. |

Source: JICA Study Team

The short-, medium-, and long-term targets for living standards in UUS are proposed as shown in Table 19. Minimum standards, including the provision of BHN, are targeted until the medium-term period, while common living standards will be reached in the long-term period by 2030.

**Table 19 Living Standard Proposal for UUS**

| | Short Term (2015) | Medium-Term (2020) | Long Term (2030) |
|---|---|---|---|
| Housing | Promotion of self-help housing construction/renovation by micro-finance scheme, Provision of Collective Social Housing by Public Sector | | |
| Water Supply | Improvement of Communal Tap Service | Communal Tap Service to Entire UUS | Individual Tap Service to Entire UUS |
| Road | Tarred Major Local Roads | | All Tarred Local Roads |
| Drainage | Emergent Pump Dewatering System | | Fully Equipped Drainage System |
| Park/ Sport | One Sport Park in One Ward, Neighboring Park | | One Sport Park in One Ward, Neighboring Park |
| Security | Adequate Distribution of Police Post | | Adequate Distribution of Street Lights |
| High School | Provision of Sufficient Classroom | | One High School in One Ward |
| Medical Care | Improvement of Existing Clinics | | One Clinic in One Ward |
| Market | Convenient Market with Good Accessibility | | Clean Neighboring Market |
| Toilet | VIP Toilet, Septic Tank | | Septic Tank/Water Flush Toilet |

Source: JST proposal made based on the questionnaire results in Living Environment Group of 1st Workshop

Urban Renewal Scheme

An urban renewal method, which is a packaged development mechanism suitable for densely populated areas, should be introduced in order to deal with complex and challenging issues of the UUS. The mechanism should include total management of project, planning, fund arrangement, consensus-building, securing/arrangement of property rights, land tenure delivery, housing development, provision of infrastructure and public services, and other related administrative services.

**Table 20 Type of UUS**

| Name of UUS | Location | | | Condition of Road Network | | | Type of UUS |
|---|---|---|---|---|---|---|---|
| | Near to CBD | Far from CBD but Next to Major Trunk Road | Far from CBD & Major Trunk Road | Grid Pattern | Poor but Partial Grid | Poor | |
| Kuku/Misisi/Frank | X | | | | | X | A |
| Chawama | | | X | | X | | B, C |
| John Howard | | | X | | X | | B, C |
| Jack | | | X | | X | | B, C |
| Freedom | | X | | | | X | C |
| Kanyama | | | X | | X | | B, C |
| Chbolya | X | | | | X | | A |
| John Laing | X | | | | X | | A |
| Linda | | | X | | | X | C |
| Bauleni | | | X | | | X | C |
| Kalikiliki | | | X | | | X | C |
| Mazyopa | | | X | | | X | C |
| N'gombe | | | X | | X | | B, C |
| Garden | X | | | | X | | A |
| Chaisa | X | | | | | X | A |
| Chipata | | | X | | X | | B, C |
| Chazanga | | X | | | | X | C |
| Kabanana | | | X | X | | | B |
| George | | | X | | | X | B, C |
| Chunga | | | X | X | | | B |
| Chainda | | | X | | | X | C |
| Mtendere Exp. | | | X | X | | | B |
| Kalingalinga | | | X | | X | | B, C |
| Kamanga | | | X | | X | | B, C |

Source: JICA Study Team

UUS can be roughly classified into three types, from viewpoints of development measures. "Type A" UUS located next to the CBD can source funds from investors as well as subdivision of plots, because of high land prices due to its proximity to the urban center. "Type B" UUS located in remote areas from the CBD, with ordered grid pattern, can be improved with less difficulty because of the existing grid pattern. "Type C" UUS located in the remote areas and disorderly developed without grid pattern will be costly due to rearrangement of plots for the development of roads. Urban renewal plans are proposed by categorized UUS type as shown below.


Source: JICA Study Team

**Figure 38 Urban Renewal Options for UUS**

In the case of the "Type A" UUS, financial land for sale is allocated to procure fund of project. As Chibolya is Type A, the first urban renewal project in Chibolya settlement will be implemented if "Chibolya Urban Renewal Pilot Study" by JST is successful and concluded project as feasible. Through this experimental implementation, the appropriate and applicable urban renewal mechanism can be established and replicated to the other UUS. Based on similarity of location as Chibolya, the potential UUS will be Kuku/Misisi/Frank, Garden, Johnlaing and Chaisa, which can be renewed within the short-term period.

Project/Program

The projects/programs for living environment improvement are proposed in Table 20, with corresponding priority evaluation and preliminary cost estimation. High priority projects and programs in the table are selected to be implemented immediately.

**Table 21 Necessary Project/Programs of Living Environment Improvement Sub-program for Short Term**

| Classification | Code | Project and Program | Project Outline | Cost (USD million) | Priority |
|---|---|---|---|---|---|
| Renewal of UUS | UU01 | Experimental Implementation of Chibolya Urban Renewal Project | F/S, DD and construction of infrastructure and land readjustment with land title registration including all necessary process of renewal project involving community | 47.0 | High |
| | UU02 | Renewal of UUS with Infrastructure, Housing and Land Tenure Delivery | F/S, DD and construction of infrastructure and land readjustment with land title registration including all necessary process of renewal project involving community | 23.0 | High |
| | UU03 | CBE-led Living Environment Improvement | Cooperative living environment improvement scheme for UUS in order to grade up sanitary, room standard, etc. | 1.0 | High |
| | UU04 | CBE-led Public Service Operation (drainage and solid waste management) | Cooperative public service scheme for UUS for drainage and waste management system improvement | 1.0 | High |
| Promotion of Affordable Housing | AH01 | Enhancement of Micro-finance for Housing Development | Government/financial agencies funding and support to NGOs' micro-financing activities for expansion of affordable housing development | 8.0 | High |
| | AH02 | Upgrading of substandard housing in UUS | Financial support to NGOs' micro-financing activities for upgrading of substandard housing in UUS | 2.5 | High |
| | AH03 | Development of Social Housing by LCC | Housing development for low-income group | 22.0 | Medium |
| | AH04 | Development of Commercial Housing by NHA | Affordable commercial housing development (rent-housing, multi-story housing) | 40.0 | Medium |
| Improvement of Housing Facilities | BI01 | Urgent Communal Tap Installation | Provision of communal tap service for uncovered areas of water supply (14% of UUS area) | 1.0 | High |
| | BI02 | Improvement of Sanitation from Pit Latrine to Septic Tank | Publicity campaign for promotion of septic tank installation | 1.0 | High |
| | BI03 | Environmental Betterment by Conversion of Household Energy Source | Publicity campaign for promotion of environment-friendly energy source | 1.0 | High |
| Social Service Improvement | SS01 | Provision of Sufficient Educational Facilities | Provision of basic schools, high schools | 32.2 | High |
| | SS02 | Improvement of Medical Care | Provision of health posts, health centers | 15.0 | High |
| Development of Park & Green | PG01 | Development of Park, Green, Sport Facilities, Cemetery | Development of Park, Green, Sport Facilities, Cemetery | 23.5 | Medium |
| | | | Total | 218.2 | 781.6 |

(equiv.. to ZMK billion)

Source: JICA Study Team

# 8. Environmental and Social Considerations

In this study, the Initial Environmental Examinations (IEE) level study for the master plan as well as the three sub-program master plans and the Pre-Environmental Impact Assessment (Pre-EIA) level studies for three priority projects are both conducted. Additionally, some elements of the Strategic Environmental Assessment (SEA) are also undertaken.

Adoption of Elements of Strategic Environmental Assessment (SEA)

In the JICA Guidelines for Environmental and Social Consideration of 2004, SEA is defined as "an assessment being implemented at the policy, planning and program level rather than a project-level EIA."

In this study, four components are adopted as shown below. Initial SEA of alternative considerations for the spatial development concept was conducted as described in Section 4.2 of the Main Report-Volume I.

(a) Impact assessment at the early decision-making stage (e.g. planning stage);
(b) Alternatives were considered for spatial development concepts for the Master Plan;
(c) Stakeholder meetings: Seminars/workshops have been organized for the Master Plan formulation. Public consultation meetings are planned to be organized for selected priority projects; and
(d) Accumulated impacts of three sub-program master plan were assessed.

Stakeholder Participation and Information Disclosure

As activities of stakeholder participation, working groups and stakeholder meetings have been organized throughout the Study as shown in Table 22 and 23.

**Table 22 Past Working Group Meetings**

| No. | Working Group |
|---|---|
| 1 | Urban Planning & Living Environment Working Group |
| 2 | Urban Transport Working Group |
| 3 | Water Supply Working Group |

Source: JICA Study Team

**Table 23 Results of Stakeholder Meetings**

| No. | Study Phase | Main Subjects | Date |
|---|---|---|---|
| 1 | Formulation of the Vision and Strategy | - Introduction of study outputs<br>- Discussion on alternatives<br>- Discussion on issues of sub-program | Feb. 2008 |
| 2 | Formulation of the Comprehensive Urban Development M/P & M/Ps of 3 sub-program | - Information dissemination of the draft M/Ps to representatives of communities<br>- Collection of feedbacks from stakeholders including residents | July 2008 |
| 3 | Stakeholder meeting on Inner-Ring Road Project | - Sharing of understanding with the stakeholders (ward representatives) on the proposed Inner-Ring Road Project, its expected environmental/social impacts, and the social/environmental consideration study for the Project<br>- Obtaining comments/suggestions from stakeholders | Nov. 2008 |
| 4 | Presentation on the Comprehensive Master Plan for the City of Lusaka (draft) | - Invite general public and the media to discuss the draft master plan and obtain their opinions. | Nov. 2008 |
| 5 | Pre-F/S of Priority Projects | - Introduction of study outputs<br>- Discussion on priority projects | Nov. 2008 |
| 6 | Finalization of the Study & Preparation of the Draft Final Report | - Information dissemination of the draft M/P & F/S to representatives of communities<br>- Collection of feedbacks from residents | Feb. 2009 |

Source: JICA Study Team.

The newsletter of the Study was regularly issued to inform the stakeholders on the study progress. The hard copy of the newsletter is distributed to stakeholders at individual meetings, working group meetings, and stakeholder meetings. The soft copy of the newsletter is also made available through the websites of MLGH and LCC.

To disseminate the master plan and obtain feedbacks from the public, exhibitions were continuously organized at three different locations, the Lusaka City Council, Arcades Shopping Mall and the Lusaka City Market, from the 17th to 28th of November 2008. A questionnaire survey was conducted to receive written comments from participants, which will be analyzed and considered when finalizing the Comprehensive Master Plan.

IEE for the Master Plans and Three Sub-programs

The IEE has been carried out as part of the master plan study. The objectives of the IEE are i) to evaluate potential impacts of the master plan to the natural and social environments and ii) to propose potential mitigation measures. Since in this study, the IEE considers overall impacts of the master plan consisting of several program lists, the environmental management plan and environmental monitoring plan will be prepared at the latter stage when a program/project has already been implemented.

The IEE was conducted referring to the relevant laws, regulations and standards applicable in Zambia, and the JICA Guidelines for Environmental and Social Considerations. For the IEE, 30 environmental impact items were ranked from A to D (both positive/negative) depending on their environmental and social significance, in accordance with the rating criteria listed below.

*Rating Criteria*

| | |
|---|---|
| *A:* | *Significant impact (+/-) is expected.* |
| *B:* | *Some impact (+/-) is expected.* |
| *C:* | *Extent of impact is unknown (+/-). (Examination is needed, and impact could be clarified as the study progresses)* |
| *Blank:* | *No impact is expected.* |

If significant and some negative impacts are anticipated, potential mitigation measures are proposed to cope with the impacts. The mitigation measures are expected be conducted properly at the implementing stage of the urban development plans and the three- sub-programs proposed in the Study.

Results of the IEE with corresponding impact examination and proposed mitigation measures are described in Chapter 7 of the Main Report-Volume I.

# 9. Detailed Study on Priority Projects

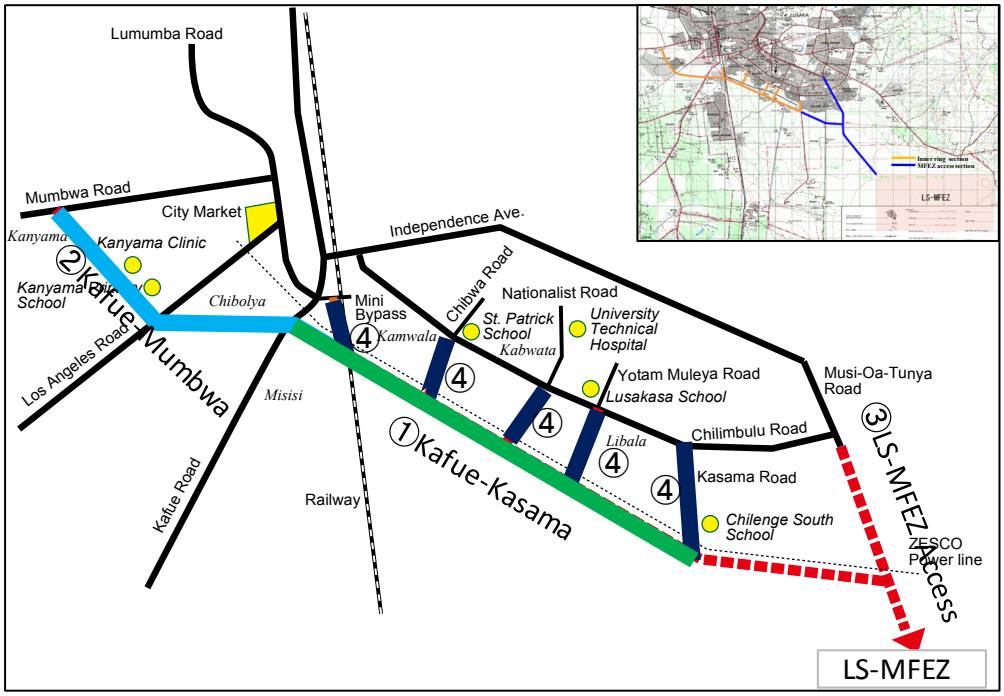
In- depth studies on the road network development and expansion of the water supply system were undertaken.

## 9.1 Inner Ring Road

Project Viability

For the purpose of decongesting the inner city roads and the development of alternative access to LS-MFEZ, a 23-km length road is proposed as the urgent road project, as shown in Figure 39. Traffic volume for inner ring road is forecasted as shown in Table 23.

Heavy traffic volume with approximately 14,000 PCU and 53,000 PCU per day in 2015 and 2030, respectively, is forecasted on the Kafue road to Kasama road. Since the present traffic on Kafue road near the Kafue roundabout is 29,000 PCU per day in 2008, it was estimated that half of the volume of Kafue road traffic will be observed in the inner ring road in 2015.




Source: JICA Study Team

**Figure 39 Location of Inner Ring Road**

**Table 24 Forecast of Traffic Volume on Inner Ring Road (PCU/day)**

| | Distance (km) | Traffic Volume (PCU/day) | | |
|---|---|---|---|---|
| | | 2015 | 2020 | 2030 |
| ①Kafue～Kasama | 5.94 | 8,400 - 14,400 | 11,000 - 18,000 | 47,000 – 53,000 |
| ②Kafue～Mumbwa | 3.57 | 4,800 - 11,400 | 7,000 - 12,000 | 9,000 - 17,000 |
| ③LS-MFEZ Access | 10.46 | 7,500 - 10,800 | 9,000 – 14,000 | 40,000 -60,000 |
| ④Other Collectors | 3.13 | 4,600 – 14,500 | 8,100 – 17,500 | 16,200 – 22,100 |
| Total | 23.10 | - | | |

Source: JICA Study Team

Project Feasibility

Cost: Total cost of inner ring road is estimated at USD 51.0 million (equivalent to

ZMK182.7 billion), of which the MFEZ access road section costs USD 21.7 million (ZMK 77.7 billion) as shown in Table 245.

Economic Internal Rate of Return (EIRR) and Net Present Value (NPV): Based on the assumption that travel time and vehicle operating time (VOT) savings were the economic benefits of the Inner Ring Road, the EIRR and NPV were calculated respectively at 23% and USD73 million, assuming a 10% discount rate.

**Table 25 Development Cost for Inner Ring Road (Preliminary) (Unit: USD million)**

| | Project Cost/1 | Land Acquisition | Compensation (USD million) | Total (USD million) | Equivalent to (ZMK billion) |
|---|---|---|---|---|---|
| 1. Railway – Kasama Road | 10.7 | 0.1 | - | 10.8 | 38.7 |
| 2. Collector Road (5 roads) | 7.2 | 0.7 | - | 7.9 | 28.3 |
| 3. Mumgwa Road – Kafue Road – Railway | 9.3 | - | 1.3 | 10.6 | 38.0 |
| 4. MFEZ Access Road | 20.3 | 1.3 | 0 | 21.7 | 77.7 |
| Total | 47.5 | 2.1 | 1.3 | 51.0 | 182.7 |

Note: /1 Construction Cost, engineering cost, administration cost, and contingency (10%) is inclusive in project cost.
Source: JICA Study Team

Environmental Consideration:

Alternative plans of two different alignments in the southern routes and the zero option case were analyzed concerning the inner ring road.

On the results of alternative analysis that the original route is advantageous in terms of cost efficiency and savings in travel time cost, which represents the impact of congestion relief, while the southern route has slightly advantages in $CO_2$ reduction and VOC (vehicle operating cost). The JST recommends that the original route be adopted due to its effectiveness in the decongestion of the city road network.

Environmental and social impacts by the inner ring road project were assessed through the Pre-EIA. Involuntary resettlement, community split by construction of heavy traffic road, air pollution, noise and vibration level worsening due to traffic increase are projected and environmental management and monitoring plans were proposed. The Resettlement Action Plan (RAP) framework was also prepared for the involuntary resettlement households.

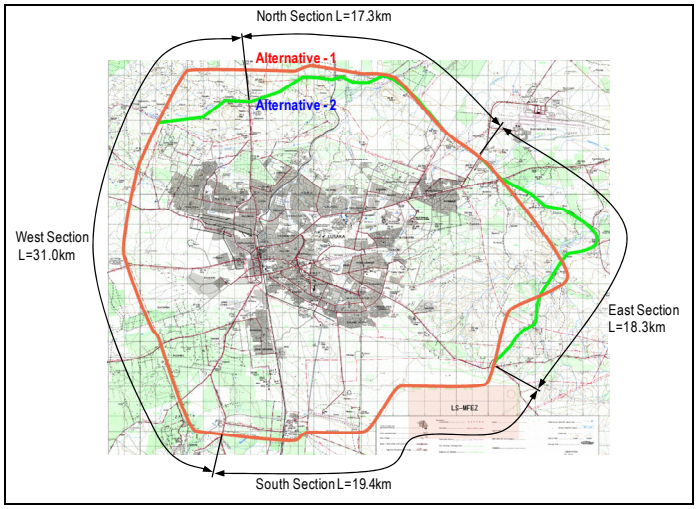
Recommendation for Implementation

- The EIRR of 23% and NPV of USD 73 million can justify the implementation of the inner ring road project.
- From the engineering viewpoint, there is no significant difficulty in this project other than land acquisition and resettlement.
- In case that the inner ring road project faces delay due to difficulty of resettlement, the first phase of the project can still be designated for the Kafue Road – Mini Bypass – Railway crossing – Kasama Road section, with five collector roads.
- A four-lane road is proposed for the Kafue Road and Kasama Road sections for long-term period. Since the four-lane road needs a 35 m width instead of the 16 m for a two-lane road, and housing development is active around, it is recommended that necessary right-of-way land be reserved for the first phase development.

## 9.2 Outer Ring Road

Project Viability

The outer ring road is proposed not only for the purpose of bypassing the international and intra-regional through-traffic but also to support the satellite town's development. Eighty-six km length outer ring road is planned to circle Greater Lusaka as shown in Figure 40.




Source: JICA Study Team

**Figure 40 Alignment Plan of Outer Ring Road**

As Table 25 shows, 20,000 to 54,000 PCU per day is projected on the outer ring road in 2030 and it can be said that the road should be four-lane for all sections. However, full opening of the outer ring road in the early stages is not feasible and a two-lane road can be workable until the medium term period, as shown in Table 27.

**Table 26 Forecast of Traffic Volume on Outer Ring Road (PCU/day)**

| | 2015 | 2020 | 2030 |
|---|---|---|---|
| Outer Ring Road | 6,900 | 3,400 - 13,000 | 20,000 - 54,000 |

Source: JICA Study Team

**Table 27 Stage-wise Construction of Outer Ring Road**

| | Short Term -2015 | Mid Term -2020 | Long Term -2030 |
|---|---|---|---|
| South Section | 2-lane * | | 4-lane |
| West Section | | 2-lane | 4-lane |
| East Section | | 2-lane | 4-lane |
| North Section | | | 4-lane |

Source: JICA Study Team

*: If the access road from Kafue road to LS-MFEZ is urgently necessary, the southern part of the outer ring road will be suitable to be developed.

Project Feasibility

Cost: Development cost of the outer ring road is estimated at USD 500 million (equivalent to ZMK1,800 billion) as shown in Table 28.

EIRR: EIRR is calculated at 11.2%, in case of stage-wise construction as shown in Table 26, under the assumption that travel time and vehicle operating time (VOT) savings are considered as economic benefits.

**Table 28 Development Cost of Outer Ring Road (Preliminary)**

(Unit: USD million)

| Section | Length | Project Cost | Land Acquisition | Compensation | Total (USD million) | Equivalent to (ZMK billion) |
|---|---|---|---|---|---|---|
| South (Kafue –Leopard Hill) | 19.3 km | 84.5 | 12.2 | 0 | 96.7 | 346.4 |
| East (Leopard Hill – Great East Road) | 18.3 km | 126.2 | 11.5 | 0.1 | 137.8 | 493.6 |
| North (Great East Road - Great North Road) | 17.3 km | 70.6 | 10.9 | 0.1 | 81.6 | 292.3 |
| West (Great North Road – Kafue Road) | 31.0 km | 164.3 | 19.5 | 0.2 | 184.0 | 659.1 |
| Total | 86.0 km | 445.6 | 54 | 0.4 | 500.0 | 1,791.0 |
| (Ref) LS-MFEZ Access from Kafue Road (2-lane) | 9.3 km | 26.7 | 1.6 | - | 28.3 | 101.4 |

Note: /1 Construction Cost, engineering cost, administration cost, and contingency (10%) is inclusive in project cost.
Source: JICA Study Team

Environmental Considerations:

Several alignment alternatives, including a zero option scenario, were discussed for the outer ring road design and as a result, the four-lane road development is recommended in 2030, in consideration of the most efficient vehicle-km, $CO_2$ emission reduction, vehicle-hour savings, and vehicle operation cost savings.

The alignment of the outer ring road is designed to avoid involuntary resettlement to the maximum extent. Therefore, significant negative impact is only anticipated for the noise and vibration increase due to the increase in traffic along the ring road. The environmental management and monitoring plans were proposed to counter the significant negative impacts.

Recommendation for Implementation

- The outer ring road is expected to play a significant role for the satellite city and industrial area development, including manufacturing and logistics industry. In addition, the road will be important to bypass intra-regional through-traffic along the economic corridor in the southern Africa.
- The outer ring road should be a long-term project. Its full opening as a four-lane road should be in long term future and the road should be constructed as a two-lane road in 2015, if the access road to LS-MFEZ from Kafue road is urgently necessary, the southern part of the outer ring road will be suitable to be developed.
- Lusaka City will not be able to implement the project alone because the outer ring road passes through three adjacent districts – Chongwe, Kafue, Chibombo. Coordination among these districts is therefore necessary.

## 9.3 Water Supply and Sanitation Improvement

Project Viability

To deal with the water demand increase caused by the population increase and economic growth in Lusaka, water supply capacity should be augmented. Due to limited groundwater resources under the Lusaka terrain, the present Kafue water works have the Kafue River water as sole source for the expansion of supply capacity. Used water (sewer) treatment will be concurrently necessary to prevent water pollution by increasing water usage.[2]

The Water Supply and Sanitation Improvement Project consists of 2 components as presented below.

(a) Expansion of the Iolanda Water Works (Phase-1)
- Intake facility on Kafue River: 150,000 $m^3$/day (pump facilities is 50,000

[2] UFW (unaccounted-for water) should be reduced prior to the project development.

$m^3$/day)
- Raw water main pipeline: 2 km
- Water treatment plant: 50,000 $m^3$/day
- Booster pumping station: 50,000 $m^3$/day
- Transmission main pipeline: 66 km

(b) Wastewater Treatment (Sanitation) Project
- Sanitation pilot plant

Project Feasibility

Cost: Project cost of the Water Supply and Sanitation Improvement Project (Phase-1) is estimated at approximately USD 92 million (equivalent to ZMK 330 billion) as shown in Table 29.

**Table 29 Project Cost of Water Supply and Sanitation Improvement Project (Phase-1)**

| Project Component | Cost (USD million) | Equivalnt (ZMK million) |
|---|---|---|
| 1. Intake structure for 150,000m3/d pump for 50,000m3/d | 3.19 | 11,400 |
| 2. Raw Water Main (steel dn800 2,000m x1line) | 1.40 | 5,000 |
| 3. Water Treatment Plant for 50,000m3/d | 29.02 | 103,900 |
| 4. Transmission Main-1 (WTP - Booster Pump Station) | 21.00 | 75,200 |
| 5. Booster Pump Station | 6.10 | 21,900 |
| 6. Transmission Main-2 (Booster Pump Station - Reservoir | 22.40 | 80,200 |
| 7. Sanitation Pilot Plant (2 units) | 1.85 | 6,600 |
| Sub-Total (Project Direct Cost) | 84.96 | 304,200 |
| 8. Engineering Services (8%) | 7.39 | 26,500 |
| TOTAL | 92.35 | 330,700 |

Source: JICA Study Team

FIRR/EIRR: Financial Internal Rate of Return (FIRR) of the project is estimated as 3.33%. In case that soft loan mobilization is possible (i.e. 1.92% average cost of capital), the project will be feasible. Further, the EIRR is estimated as 15.35% which is above the hurdle rate of 10.0% generally accepted for similar types of water supply projects. Therefore, both FIRR and EIRR confirm the feasibility of the project.

Sensitivity analysis on the FIRR was conducted under a different UFW rate. Under the delay of UFW improvement, the FIRR will be lower than 1.92% and the project will not be feasible, therefore, UFW reduction is crucial to ensure the project's viability.

Environmental Consideration:

Alternative route analysis on the transmission main pipeline, major project components and possible environmental impact factors, was undertaken and discussed, including the zero option. As shown in the result summary below, Alternative B, which involves installing the pipeline alongside the Kafue Road is recommended, although the length of the pipeline is longer than Alternative A.

**Table 30 Comparison of the Alternatives**

| Impact | Alternative-A | Alternative-B | Zero Option |
|---|---|---|---|
| Component | 30.0km pipeline along existing pipeline | 36.5km pipeline along Kafue road | None |
| Cost | Slightly High | Ordinary | None |
| Technical Difficulties | Difficult | Ordinary | None |
| Environmental Impact | Bad | Almost None | Very Bad |
| Social and Economic Impacts | Good | Good | Very Bad |
| Evaluation | Not recommended | **Recommended** | Not recommended |

Source: JICA Study Team

Environmental and social impacts from the Water Supply and Sanitation Improvement Project were assessed through conduct of an IEE. The results show that significant negative impacts are not anticipated in the implementation of the project.

Recommendation for Implementation

- Since the Water Supply and Sanitation Improvement Project is financially and economically feasible, the project should be started targeting its implementation in 2015, when 70,000 $m^3$ increment of the daily water demand is projected.
- Considering the high project cost and the gradual increase of the water demand, stage-wise development is recommended. Phase-1 development, including expansion of the intake facility, treatment plant, and transmission pipeline with the capacity of 50,000 $m^3$/day, and construction of sanitary pilot plants, which amounts approximately USD 92 million, is the target project to be implemented by 2015.
- Reduction of UFW (unaccounted-for water), since more than 50% is presently inevitable prior to the project implementation. A study on UFW reduction has now been conducted, taking the LWSC as a model case. Results of the study will be presented in the Final Report.
- For the project implementation, the following tasks are required to be done:
  - Confirmation and approval of related government authorities for the construction measures such as works in Kafue River, road/railway crossing permission, etc.
  - EIA and approval from ECZ
  - Feasibility study (1year period will be necessary from the study commencement)

## 9.4 Environmental Study on Three Priority Projects

Inner Ring Road Project

Preliminary environmental impact assessment on the inner ring road project is being carried out through a sub-contract. The RAP framework for involuntary resettlement, natural environment assessment including noise, and air pollution, and social impacts such as community split, traffic safety, etc. will be examined and edited as a draft EIA report and will be included in Final Report of the Study.

Outer Ring Road Project

The environmental and social considerations study for the outer ring road was conducted. The summary of environmental and social impacts of the outer ring road project is shown in Table 31. The significant negative impacts will be involuntary resettlement, and increase in noise and vibration to be caused by the project.

**Table 31 Summary of Environmental and Social Impacts of the Outer Ring Road Project**

| Env. Impacts / Impact Phase | Social Environment | | | | | | | | | | | | | | Natural Environment | | | | | | | | | Pollution | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1.Involuntary Resettlement** | 2.Local Economy such as Employment & Livelihood, etc. | 3.Land Use & Utilization of Local Resources | 4. Social Institutions such as Split of Communities | 5.Existing Social Infrastructures & Services | 6.The poor, indigenous & ethnic people | 7.Misdistribution of Benefit & Damage | 8.Cultural Heritage | 9.Local Conflict of Interest | 10.Water Usage or Water Rights & Rights of Common | 11.Sanitation | 12.Hazards (Risk), Infectious Diseases such as HIV/AIDS | 13.Accidents | 14.Traffic Jam & Congestion | 15.Topography & Geographical Features | 16.Soil Erosion | 17.Groundwater | 18.Hydrological Situation & Rainwater | 19.Coastal Zone | 20.Fauna, Flora & Biodiversity | 21.Meteorology | 22.Landscape | 23.Global Warming | 24.Air Pollution | 25.Water Pollution | 26.Soil Contamination | 27.Waste | **28.Noise & Vibration** | 29.Ground Subsidence | 30.Offensive Odor | 31.Bottom Sediment |
| Design Phase | A- | | | | | B- | | | | | | | | | | | | | | | | | | | | | | | | |
| Construction Phase | | B+ | B+ | B- | B- | | | | | | | | | B- | | | | | | C- | | | | B- | | | B- | B- | | B- | |
| Operation Phase | | A+ | B+ | B- | | | B- | | B- | | | | B+/- | A+ | | | | B+/- | | C- | | B- | B+ | B- | | | A- | | B- | |

Rating Criteria

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

Blank: No impact is expected.

Source: JICA Study Team

The outline description of the environmental and social impacts and the Environmental Management Plan (EMP) for the Outer Ring Road Project is proposed as described in Table 32.

**Table 32 Outline of the EMP for the Outer Ring Road Project**

| Significant negative impacts | Description of environmental and social impacts | Proposed EMP |
|---|---|---|
| Involuntary Resettlement | Forty-nine affected households are identified from the satellite images, although it has been minimized as much as possible by considering alternative routes. However, the affected households are relatively scattered along the alignment, with 21 affected households identified in the West Section. | Public Consultation with the Project-Affected Persons (PAPs) and adequate Resettlement Action Plan shall be prepared in accordance with international standards such as the World Bank's Operational Policy 4.12.<br>The RAP shall include consideration of appropriate relocation site(s), information disclosure, and discussions with resettlers, appropriate infrastructure in a new relocation site(s), and compensations and livelihood assistance.<br>Special attention shall be made to vulnerable sectors, such as the lower-income residents, illegal occupants without the Occupancy Licenses, the elderly, the disabled, women and children. |
| Noise & Vibration | Noise (B- in construction; A- in operation): Noise levels would be temporarily higher due to construction machinery during construction. Moreover, noise levels would worsen due to the increased number of vehicle traffic during operation. The noise impact is especially, considered significant in the quiet rural communities without the existing road.<br>Vibration (B- in construction; no impact in operation): At present, perception of vibration as a pollution problem in Zambia is very low. Additionally, vibration impact is often localized and less direct compared to the noise impact. Therefore, impact on the vibration level from the project is minor and negligible. | Provide road side planting to mitigate noise.<br>Adopt low noise and vibration emitting equipment, vehicles and methodology for construction, if available.<br>Avoid nighttime construction activities near communities.<br>Provide temporary barriers or screens during construction, if necessary.<br>Noise and vibration standards of industrial enterprises shall be enforced to protect construction workers. If there will be strong noise, earplugs shall be worn, and working time shall be limited.<br>Equipment and vehicles shall be well-maintained to keep their noise/vibration at a minimum. |

Source: JICA Study Team

The outline of the Environmental Monitoring Plan (EMoP) for the Outer Ring Road Project is proposed as described in Table 33.

**Table 33 Outline of the EMoP for the Outer Ring Road Project**

| Significant Negative Impacts | Proposed EMoP | |
|---|---|---|
| | Internal Monitoring | Auditing (External Monitoring) |
| Involuntary Resettlement | The internal and external Monitoring Plan for resettlement and compensation shall be formulated separately in the RAP, in accordance with international standards such as the World Bank. | • Environmental Auditing is required by the EPPC (EIA) Regulations, 1997 for the developer to conduct a post-assessment environmental audit within 12-16 months after the completion of the project or the commencement of the project, whichever is earlier.<br>• Monitoring shall be conducted by at least 2 persons of the EIA Team or any qualified persons appointed by the developer and approved by the ECZ.<br>• The monitoring report shall be prepared by the developer and submitted to the ECZ. |
| Air Pollution | **During Construction:**<br>Monitor dust on regular basis at least once every month by a site visit of the person in charge of the LCC.<br>Monitor air quality (e.g. $SO_2$, $PM_{10}$, NOx, CO, Pb & dust) in consultation with ECZ, if necessary and/or when any complaints are received from local residents.<br>**During Operation:**<br>Monitor air quality (e.g. $SO_2$, $PM_{10}$, NOx, CO, Pb & dust) in consultation with ECZ. Monitoring at least twice a year (dry season & rainy season) is suggested. | |
| Noise | **During Construction:**<br>Monitor roadside noise level (LAeq) in consultation with ECZ, if necessary, and/or when any complaints are received from local residents.<br>**During Operation:**<br>Monitor roadside noise level (LAeq) in consultation with ECZ, if necessary, and/or when any complaints are received from local residents. Monitoring at least once a year is suggested. | |

Source: JICA Study Team

Water Supply and Sanitation Improvement Project

The significant negative impacts will not expected from the water and sanitation improvement project as summarized in Table 34.

**Table 34 Summary of Environmental and Social Impacts of the Water Supply and Sanitation Improvement Project**

| Env. Impacts / Impact Phase | Social Environment | | | | | | | | | | | | Natural Environment | | | | | | | | | Pollution | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1.Involuntary Resettlement | 2.Local Economy such as Employment & Livelihood, etc. | 3.Land Use & Utilization of Local Resources | 4. Social Institutions such as Split of Communities | 5.Existing Social Infrastructures & Services | 6.The poor, indigenous & ethnic people | 7.Misdistribution of Benefit & Damage | 8.Cultural Heritage | 9.Local Conflict of Interest | 10.Water Usage or Water Rights & Rights of Common | 11.Sanitation | 12.Hazards (Risk), Infectious Diseases such as HIV/AIDS | 13.Topography & Geographical Features | 14.Soil Erosion | 15.Groundwater | 16.Hydrological Situation | 17.Coastal Zone | 18.Fauna, Flora & Biodiversity | 19.Meteorology | 20.Landscape | 21.Global Warming | 22.Air Pollution | 23.Water Pollution | 24.Soil Contamination | 25.Waste | 26.Noise & Vibration | 27.Ground Subsidence | 28.Offensive Odor | 29.Bottom Sediment | 30.Accidents |
| Planning Phase | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Construction Phase | | B+/B- | | | B- | | | | | | | | | | | | | B- | | | | B- | B- | | | B- | | | | |
| Operation Phase | | A+ | | | | A+ | | | | | A+ | B+ | | | B+ | | | | | | | | | | | | | | | |

Rating Criteria

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

Blank: No impact is expected.

Source: JICA Study Team