CHAPTER 5 DEVELOPMENT CONCEPTS FOR THE LS-MFEZ

5.1 REVIEW OF THE URBAN DEVELOPMENT PLAN BY LUSEED

JICA's Comprehensive Urban Development Master Plan Study started last August 2007, and project outline announced by the JICA Study Team (Luseed). According to the LS-MFEZ development, the LS-MFEZ maintains the same concept with the urban development master plan as that of the new satellite town.

5.1.1 NEW SATELLITE TOWN DEVELOPMENT

Outline of the new satellite town development is described here in after:

(1) Population

1) Urban population of Greater Lusaka in 2030 is projected to be 2.6 to 3.2 million; the median expectation is 2.9 million.

2) Urban infrastructure is planned on the basis of the population growth rate of 3.05 % between 2007 and 2030.

3) Industries that are capable of drawing a growing population are considered.

4) Three phases are planned for the Greater Lusaka Urban Development: Phase-1 (2015), phase-2 (2020) and phase-3 (2030).

(2) Industrial Zone

1) The demand of an industrial zone was estimated at 1,350 ha in 2007 and 3,530 ha in 2030; an increase of 2,180 ha or 4.27 % annual growth.

2) Each size of the five industrial zones has an average of 436 ha (= 2,180 ha/5).

3) The LS-MFEZ is designed to be a Government-supported economic zone.

4) Accordingly, the size of the industrial zone in the LS-MFEZ is planned at 366 ha at 2030 by the JST that is an 85 % of 436 ha.

(3) Road

1) Land use and road network development are planned for the new satellite town developments based on the existing urban situation.

2) Five satellite towns are considered for Greater Lusaka City intersection of radial roads and ring roads.

(4) Urban Infrastructure

1) Urban infrastructure is inadequate to attain the rapid growth of population and industrial activities.

2) Water resources are developed by each new satellite town, due to the lack of potable water in Lusaka City.

3) Each new satellite town is required to develop potable water for the initial stage, however the second stage shall be equipped with a pipeline for a new water intake facility at the Kafue River which is planned by year 2015.

4) Wastewater is not discharged to the Lusaka City area, but treated within the each satellite new town area, because the wastewater treatment facility in Lusaka City is not available to treat all wastewater generated by the five satellite towns in the early stages.

5) Discharge of rainwater is a crucial issue for Lusaka City and its centre where the inundation/flood scenes have been seen frequently. The rainwater is also prohibited to discharge within the new satellite town areas or to the outside.

5.1.2 ROAD NETWORK OF GREATER LUSAKA CITY

Outline of the road network related with the LS-MFEZ are described as follows:

(1) Radial Roads

1) Great East Road (east)
2) Great North Road (north)
3) Kafue Road (south)
4) Mwembeshi Road (west)
5) Leopard Hill Road (southeast)

(2) Ring Roads

1) Inner Ring Road is 5 km from the city centre
2) Outer Ring Road is 15 km from the city centre
3) Mediator ring roads between inner and outer ring roads
4) Crucial and urgent issues for the development of Inner Ring Roads and Mediator Ring Roads
5) Outer Ring Road for strict control of urban fringe sprawl

5.1.3 NEW SATELLITE TOWN IN THE SOUTHEAST AREA

The LS-MFEZ is the part of the new satellite town in the southeast area, total concept of new southeast satellite town is described here in bellow:

1) A new satellite town shall be planned around the intersection of Leopard Hill Road and Outer Ring Road.
2) Leopard Hill Road shall be expanded into 4 lanes.
3) Residential areas shall also be considered in the LS-MFEZ as a part of a new satellite town as well as industrial zones.
4) Population of the southeast satellite town is projected at 50,000.
5) Lusaka citizens shall live in the centre of the new satellite town; or on the other hand, in the LS-MFEZ, where the high class working staff will live.
6) 10,000 people are planned to reside in the LS-MFEZ, taking urban infrastructure, land use and size of residence areas into consideration.

5.2 THE LS-MFEZ PLAN BY REFLECTING ON THE LUSEED PLAN

(1) Geographical characteristics of the five industrial zones are taken into account for industrial features respectively.
- West site: daily-commodity manufacturing industry,
- Airport site: light, thin and small size products manufacturing industry for utilizing air cargo,
- North site: export-oriented industry to northern countries,
- South site: export-oriented industry to southern countries,
- The LS-MFEZ: industry introducing urban type of industry such as office equipments.

(2) The location of the LS-MFEZ is at a dead end of the southeastern part of Greater Lusaka City

(3) Water resources are being developed carefully, because the LS-MFEZ is located at an elevated area among Greater Lusaka City and groundwater resources are recharging from the LS-MFEZ site for Greater Lusaka City.

(4) The groundwater resources are expected to be from the southern groundwater divide of watershed so as to prevent the groundwater level for Lusaka shallow well groundwater.

(5) The water resources are limited. In Phase-2, the LS-MFEZ is expected to be connected to the water pipeline of a new intake facility at the Kafue River that is being planned by Greater Lusaka City.

(6) First, wastewater treatment is required for each tenant or investor. Secondly, treated water shall be pumped and scattered within Miombo reforestation sites. Finally treated water then penetrates the site in the underground.

(7) The reforestation and existing forest preservation are the gift of greenery for Lusaka Citizens under the eco-friendly concept.

(8) Industrial supporting system is the key factor for the LS-MFEZ by government-led development projects.

(9) The LS-MFEZ introduces small and medium industries that require a lot of support by the government.

(10) Taking into consideration the roles of the Government are securing and promoting incubating businesses, upgrading small and medium industries and existing industries, and maintaining established and leading industries for the LS-MFEZ.

(11) Envisage introducing industries that consume less-water, saving water for process plants and environmental friendly industries into the LS-MFEZ.

(12) The southern area of the LS-MFEZ site shall preserve grass fields and Miombo forests because Zambia Wildlife Authority is constructing a Lusaka Park which has many functions such as wildlife sanctuary, wildlife orphanage and recreational park (Lusaka Park General Management Plan, ZAWA 2004). Environmental consideration must be keep for preparation of the land use plan of the LS-MFEZ.

5.3 CONCEPT RELATED WITH TOH

In the Common Service Facility Zone (CSFZ), it is expecting to locate government-supported facilities. In this area, most ToH projects could be introduced in the LS-MFEZ.

ToH Projects are described below:

(1) Air cargo hub, inland ports

Although the Lusaka East MFEZ (LE-MFEZ) is aiming for establishing an air cargo-handling hub, the LS-MFEZ could provide inland ports and air cargo hubs, too.

(2) Agriculture

Agriculture itself is not fit for the LS-MFEZ, however research and development works for agriculture are available and incubators for the agro-industry could be introduced to the LS-MFEZ.

(3) Banking and finance

Banking and financial businesses are available in the central business district (CBD) of the LS-MFEZ.

(4) Cotton

Cotton related businesses for research and development (R&D) and incubators also are available in the LS-MFEZ.

(5) Education

Educational facilities are most welcome in the CSFZ such as;

- Schools and Universities
- Polytechnic and Vocational Training Centres
- Public Libraries
- R&D Institutes and Incubators under Ministries
- Science Parks, etc.

(6) Government Streamlining

If the governmental-run organizations are located on the site, synergy and accumulation effects will be generated and industries that wish to collaborate with governmental organizations may have the chance to do so.

(7) Health

Hospitals and clinics are required to be very close to the industries for health and security for staffs and workers.

- Hospitals and Clinics
- Periodical health checks
- Disease R&D Institutes

(8) Information Communication Technology

- ICT R&D Institutes
- Call Centres
- Information Centres
- Net cafés

(9) Multi-Facility Economic Zone

- Vehicles of the diversify of industries
- MFEZ linkage centre

(10) Mining

- Mineral Museum
- Mining Cultural Museum
- Mineral R&D Institute

(11) Small and Medium Enterprises

- Institute of S&M Scale of Industry
- Production Technology Centres
- Entrepreneurship Centres

(12) Tourism

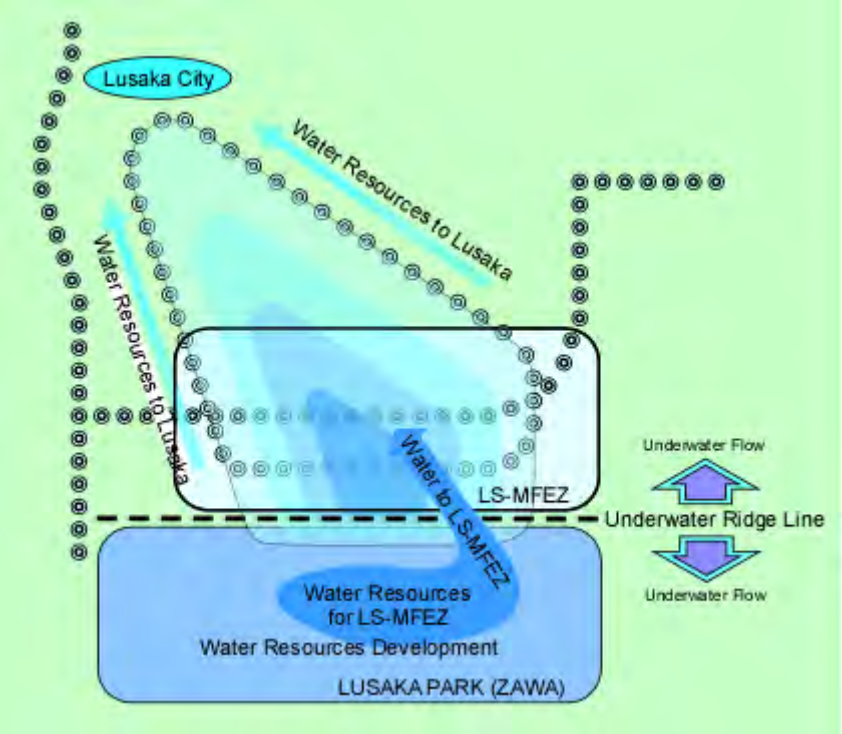
- Recreational Park
- Town hotels
- Tourism and Hotel Schools
- Nature Museums
- Driving School

5.4 THE LS-MFEZ DEVELOPMENT CONCEPT

5.4.1 WATER MANAGEMENT CONCEPT

JICA Luseed Team is planning and developing Greater Lusaka City (GLC) as an Eco City concept. The LS-MFEZ is one of the 5 planned satellite towns in GLC. The LS-MFEZ is located at the highest place of geographical conditions and the groundwater and surface water flow from the LS-MFEZ area through Lusaka Centre to other satellite towns. Therefore the LS-MFEZ area is prohibited from using groundwater because of its effects on Lusaka's shallow well groundwater resources and is also prohibited from discharging any wastewater and drain water because of lack of treatment facilities, flooding and safety reasons (see Figure 5.4.1).

During the groundwater resources investigation, a groundwater ridge-line was found on the southern part of the LS-MFEZ in Lusaka Park. If the LS-MFEZ project could cooperate with Lusaka Park under the Zambia Wildlife Authority (ZAWA) of Ministry Tourism, Environment and Natural Resources (MTENR), the LS-MFEZ could use groundwater by end of first phase development in 2015. After 2015, the government could possibly equip city water from the Kafue Water Pipeline.



Source: JICA Study Team

Figure 5.4.1 Water Management Concept

5.4.2 GREENERY MANAGEMENT CONCEPT

According to the groundwater flow from the LS-MFEZ to Lusaka City, the LS-MFEZ access roads from the northwest and northeast ends to Lusaka City could provide colonnades of green belts as a

gift of greenery to Lusaka City (see Figure 5.4.2). For this purpose, the LS-MFEZ access roads shall design green belts and water supply pipelines along the streets lined. Since the LS-MFEZ is the vehicle for inviting state of the art development for a newly industrialized economy, the LS-MFEZ should be developed with a natural environmental friendly economic zone and symbiosis of Lusaka citizens. Zambia's natural beauty must revive Miombo Forests, together with the greenery management concept.

Source: JICA Study Team

Figure 5.4.2 Greenery Management Development

5.4.3 TWIN GROWTH POLES CONCEPT

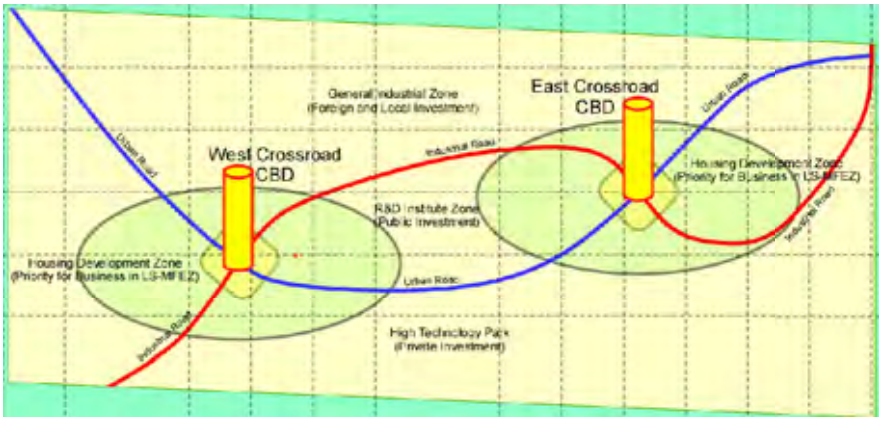
The LS-MFEZ is the vehicle for economical development for Greater Lusaka City that will;

(1) Introduce a diversity of industry bases,

(2) Reduce poverty by creating new jobs, and

(3) Build up the economical centre of southern Africa.

The configuration of the LS-MFEZ is a parallelogram that lies along the west to the east, while Lusaka City is expanding from the west to the east. The northwest side is close to Lusaka centre, about 7 km and about 13 km northeast of Lusaka Centre. Generally speaking, normal workers usually commute there on foot. Considering the size of the LS-MFEZ (7 km x 3 km), two growth poles are planned at the west and east sides of the LS-MFEZ, within walking distance from the outside (see Figure 5.4.3). So, potentially the LS-MFEZ could use all of the land as an economic zone for Lusaka Citizens.

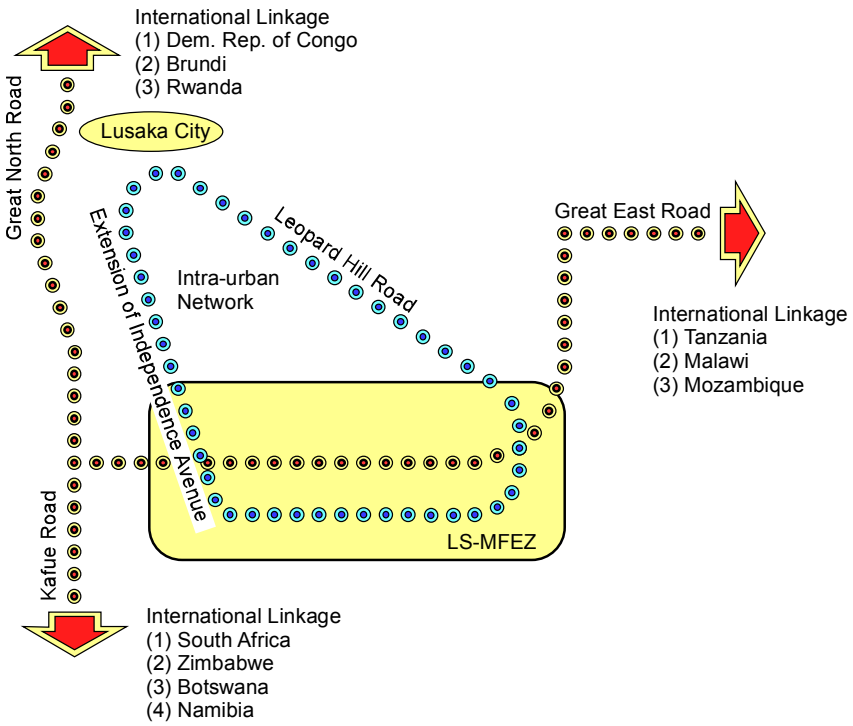


Source: JICA Study Team

Figure 5.4.3 Twin Growth Pole Concept

5.4.4 ROAD NETWORK CONCEPT FOR ESTABLISHMENT OF THE LS-MFEZ

The LS-MFEZ is for the base of industrial activities, including any kind of business and manufacturing base. It is a very huge development, however only one existing road, Leopard Hill Road/Chifwema Road connects to the LS-MFEZ. Considering that, at least 2 urban roads and 2 industrial roads shall be connected to the LS-MFEZ for supporting industrial activities in the LS-MFEZ. To make it easier for commuters to arrive at and leave the LS-MFEZ, urban roads shall be connected to the centre of Lusaka City. Also, industrial roads shall act as domestic and international truck transportation routes among the vicinity of regions and countries (see Figure 5.4.4).



Source: JICA Study Team

Figure 5.4.4 Road Network for the LS-MFEZ

Road Network around the LS-MFEZ shall be coordinated with Greater Lusaka City Urban Development (see Figure 5.4.5). Access roads for the LS-MFEZ have been considered as follows;

(1) Urban Road

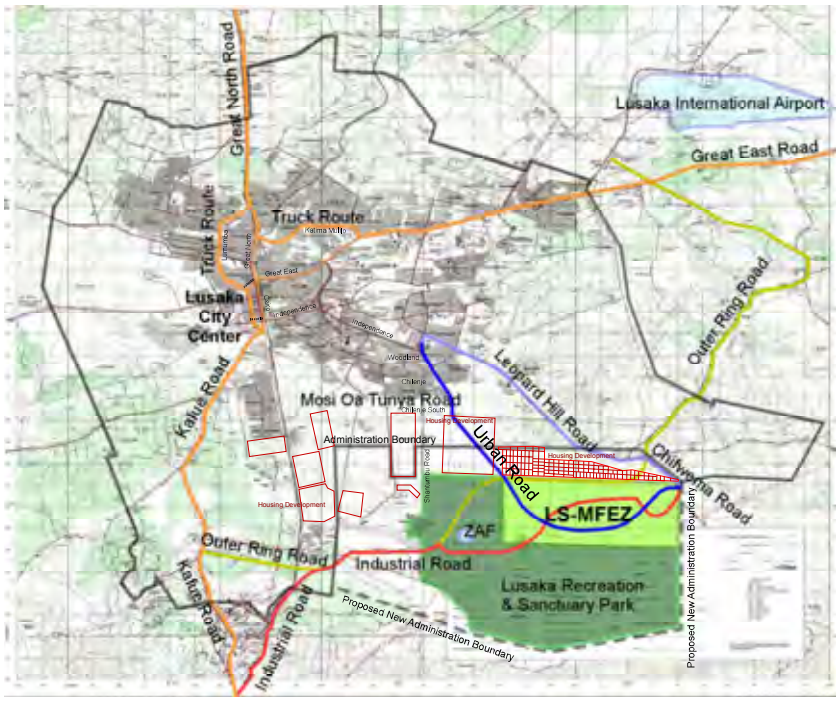
1) Leopard Hill Road and Chifwema Road (necessity for widening Chifwema Road)

2) Independence Avenue / Moshi-O-Tunya Road and Moshi-O-Tunya Road Extension (necessity for widening Moshi-O-Tunya Road, and land acquisition and new road construction of Moshi-O-Tunya Road Extension)

(2) Industrial Road

1) West Industrial Road (land acquisition for the road alignment and connecting with Outer Ring Road; industrial road alignment along the railway is an alternative industrial road.)

2) North Industrial Road (Land acquisition for access road to Outer Ring Road from northeast LS-MFEZ and using Outer Ring Road as an industrial road to connect Great East Road.)



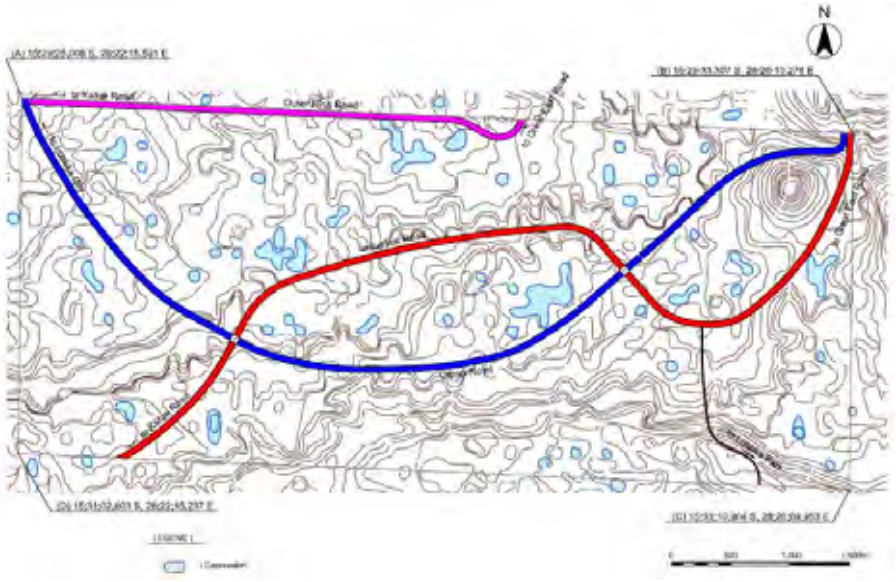
Source: JICA Study Team

Figure 5.4.5 Tentative Road Network for the LS-MFEZ

5.4.5 Main Road Concept in the LS-MFEZ

Lusaka City is located on dolomite ground and the LS-MFEZ is located on dolomite terraces. Depressions and/or sinkholes have been observed in this area (see Figure 5.4.6). In Lusaka City, there are many cases of road accidents caused holes and imparity sinkages of houses. A geographical survey was requested, but unfortunately we could not receive the data. The most important thing that must be considered regarding the choice of the LS-MFEZ design is that depressions and sinkholes must be avoided for main road construction works. Main roads will be used for bus mass transit and heavy-duty trucks.

On the other hand, hilly areas should be avoided for main roads construction. The slope design must be less than 1% for the heavy-duty trucks.



Source: JICA Study Team

Figure 5.4.6 Main Road Network in the LS-MFEZ

5.4.6 THE BUS MASS TRANSPORTATION SYSTEM

Since minibus fares are high in Lusaka City, the bus mass transit system will be introducing new alternatives for cost saving and avoiding traffic congestions in the LS-MFEZ. Since the LS-MFEZ area is quite large (about 7 km x 3 km), people will need mass transit services within the site. The bus mass transit system shall be introduced making it easy access to any point within the LS-MFEZ (see Figure 5.4.7).

(1) Although the JST will introduce the micro-bus system at the beginning of the First Phase, transportation fares will be quite expensive at about 3,500 ZMK (nearly USD 1.00) for 15 km, which most people cannot see as a feasible nor economical transportation alternative. Therefore a twin bus-transportation system shall be introduced in the second phase development from 2016.

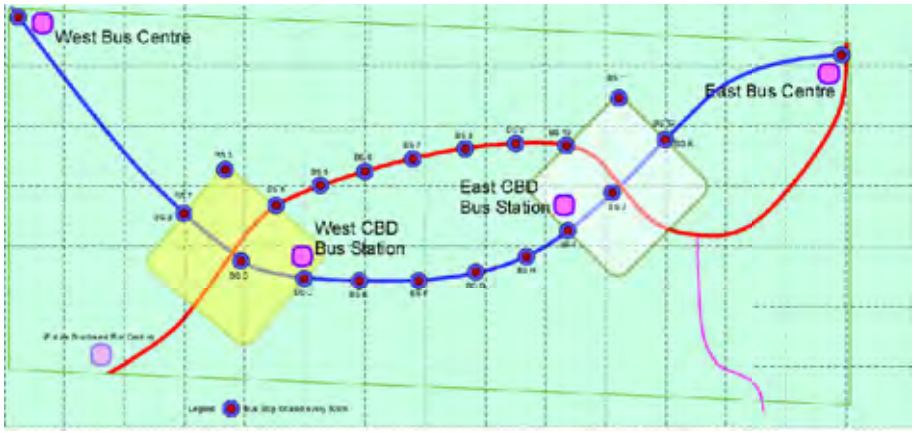
(2) Bus stops shall be located every 500 m along main roads and people will be able to reach anywhere in the site within 750 m, a 10 minute walk.

(3) The exclusive bus lanes shall be arranged at the center of the road and bus stops shall be located every 500 m with a cross-over pedestrian bridge.

(4) The LS-MFEZ project expects to create 40,000 jobs by year 2030.

(5) At that moment, 20,000 people are expected to commute by their own passenger vehicles, 10,000 people by walk or by bicycles and 10,000 people by the bus mass transportation system.

(6) Since 10,000 people are expected to come and back by twin buses within one hour for commuting rush hour, 1.3 twin-buses must run every minute (10,000 people / 130 person/bus / 60 minutes = 1.3 bus/minute).



Source: JICA Study Team

Figure 5.4.7 Bus Mass Transit System in the LS-MFEZ

5.4.7 LAND USE PLAN CONCEPT

Since the LS-MFEZ will introduce several functional zones such as the General Industrial Zone (GIZ), the High-Tech Park Zone (HTPZ), the Common Service Facility Zone (CSFZ), the Central Business District (CBD) and Housing Zone (HZ), two growth poles shall be developed with five functions each.

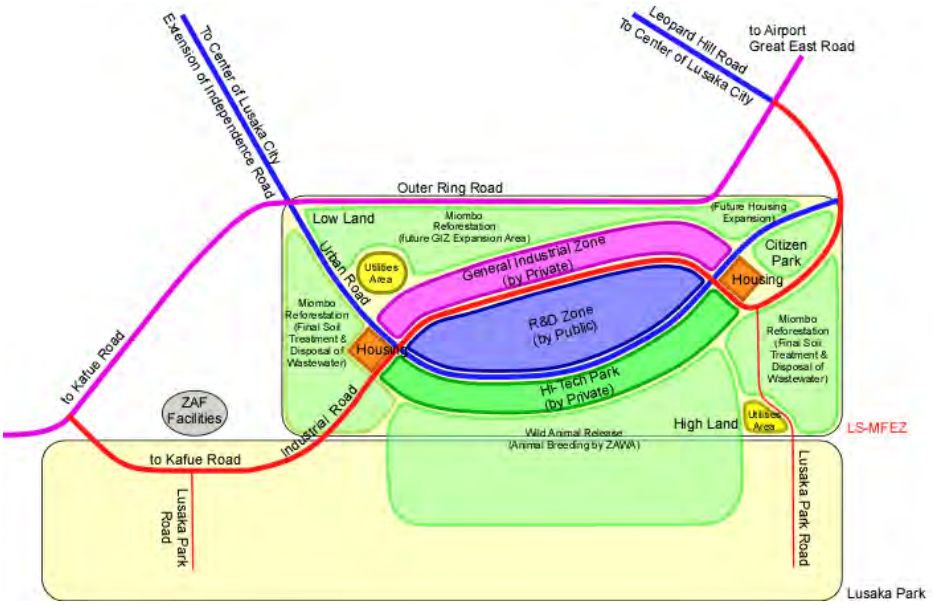
These five functions must be located within the first development phases, this is because a lot of potential tenants are initially invited and the management body must investigate what kind of industrial businesses should be invited to the LS-MFEZ. For this purpose, the CBD must be located at the cross intersection of the twin growth poles and the remaining 4 functions must be allocated in the 4 corners at the cross intersection.

Since the general industries, high-tech industries and common services are the major industrial activities, three functions must be located in the centre of the LS-MFEZ area. And Housing Zones must be reached directly outside the LS-MFEZ area for reaching Lusaka City centre. The CSFZ must introduce the supporting system for industrial activities that are located between the GIZ and HTPZ.

In the southern LS-MFEZ area is Lusaka Park and it is an ideal place for setting up a wildlife amusement park. The main functional areas and activities of the park are a safari park, auction for wild animals, zoo, water amusement park, hotel & lodge and restaurants. The wild animals will be release to the whole area and the LS-MFEZ is located along the animal release near Miombo forests and grasslands. Since wild animals become nervous with noise, vibrations and pollution, environmental friendly industries shall be located next to Lusaka Park.

The HTPZ shall invite environmental friendly industries especially that industries have research and development department, designing department and/or high-tech functional high value added industries. The HTPZ must be located next to Lusaka Park, however green grass buffers are required between the HTPZ and Lusaka Park.

The concept land use plan is shown in Figure 5.4.8:



Source: JICA Study Team

Figure 5.4.8 The Land Use Plan

5.4.8 ONE MINISTRY ONE INSTITUTE CONCEPT

Since the LS-MFEZ is the vehicle of a new tool for the industrialization of Zambia, supporting systems for the industries must be introduced in the common service facility zone (CSFZ). If there are many industrial-related institutes located in CSFZ, then manufacturing industries will be used as supporting tools for their business activities. Especially, as small and medium scale industries are weak and lack supporting functions, they will use theses institutes for their management.

Under the "one institute one ministry" concept, LS-MFE wishes to have a lot of tenants and investors in CSFZ. If ministries already established are related to the research institute, the LS-MFEZ will expect to receive relocation demands from each ministry. Tentative ideas for the establishment of institute are tabulated in Table 5.4.1.

Table 5.4.1 List of Proposed Institutes under the One Ministry One Institute Concept

No.	Ministry or Agency		Related Agencies
1	MAC	Ministry of Agriculture and Co-operatives	(Agroindustry Technology Institute)
2	MCTI	Ministry of Commerce, Trade and Industry	Zambia Development Agency
			Chamber of Commerce and Industry
			(Economic Research Institute)
			(Institute of Small and Medium Scale Industry)
3	MCTI	Ministry of Communications and Transport	Communication Authority of Zambia
			Road Transport and Safety Agency
			Road Development Authority
			National Airports
			Zamtel
			Zambia Railways
			Tazara
			Zampost
			(Institute of Telecommunications)
			(Institute of Transport Policy)
4	MCDSS	Ministry of Community Development and Social Services	(Institute of Regional Economic Development)
5	MOD	Ministry of Defense	(Institute of Defense Technology)
6	MOE	Ministry of Education	University of Zambia
			Copperbelt University
			Mulungushi University (Kabwe)
			(Institute of Industrial Management Technology)
7	MEWD	Ministry of Energy and Water Development	(Institute of Energy Economics)
8	MFNP	Ministry of Finance and National Planning	Bank of Zambia
			Zambia Revenue Authority
			Central Statistics Office
			(Institute of Economy)
9	MFA	Ministry of Foreign Affairs	(Institute of Foreign Relationship)
10	MGWD	Ministry of Gender and Women in Development	(Institute of Women Affaires)
11	MOH	Ministry of Health	(Institute of Tropical Disease)
12	MHA	Ministry of Home Affairs	(Institute of Regional Security)
13	MIBS	Ministry of Information and Broadcasting Services	(Institute Broadcasting)
14	MOJ	Ministry of Justice	(Institute of Intellectual Property)
15	MLSS	Ministry of Labor and Social Security	(Institute of Labor)
16	MOL	Ministry of Lands	(Institute of Landuse)
17	MLGH	Ministry of Local Government and Housing	(Institute of Housing Development)
18	MMMD	Ministry of Mines and Mineral Development	(Institute of Mining)
19	MSTVT	Ministry of Science, Technology and Vocational Training	National Science and Technology Council
			Technical Education Vocational and Entrepreneurship Training Authority
			National Institute for Scientific and Industrial Research
			National Technology Business Center
			(Institute of Science Technology)
			(Institute of Production Technology)
20	MYSCD	Ministry of Youth, Sport and Child Development	(Institute of Junior Chamber)
21	MTENR	Ministry of Tourism, Environment and Natural Resources	Zambia Wildlife Authority
			Environmental Council of Zambia
			(Institute of Tourism)
22	MWS	Ministry of Works and Supply	(Institute of Human Resources Development)

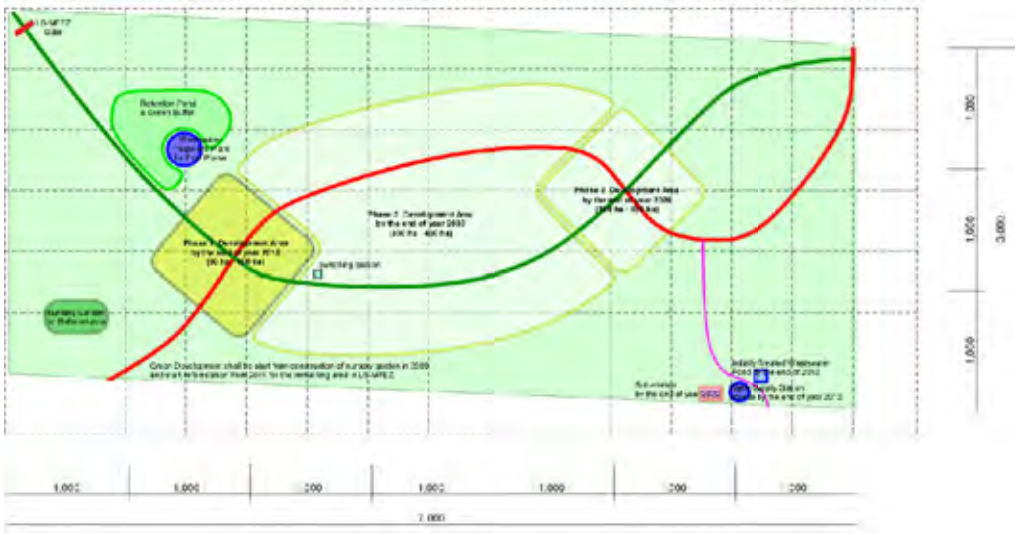
Note: (palentus) means proposed research institute.

Source: JICA Study Team

5.5 FIRST PHASE DEVELOPMENT CONCEPT

Since Leopard Hill Road exists, in the northeast corner of the LS-MFEZ, it is far from the city centre and a huge city graveyard is situated along Leopard Hill Road, so access is not attractive for the tenant investors. The first phase must be made attractive for the tenant investors for their business interests. So time saved, short distance and attractive access roads must be considered for the tenant investors. As a result, a new Moshi-O-Tunya Extension Road must be developed for the first stage of the LS-MFEZ development (see Figure 5.5.1).

On the other hand, skilled and unskilled labours and office workers do not use city mini bus transportation frequently. The bus fare is 3,500 ZMK per 15 kilometers, nearly equal one US Dollar. So the nearest area from west of the LS-MFEZ should be given first priority for development.



Source: JICA Study Team

Figure 5.5.1 Phasing Development

5.6 LAND PLANNING BY MODULE

According to the consideration of introducing five functions, the five functions should be introduced in first phase all at the same time. For this occasion, basic modules are being built up for easy consideration of the arrangement of the five functions, functional blocks and individual lots.

5.6.1 GENERAL INDUSTRIAL ZONE MODULE

The blocks for manufacturing industries in the LS-MFEZ are split into two categories, namely small and medium-scale industry (SMI) and medium and large-scale industry (MLI) (see Figure 5.6.1). The lot size for the sub-division modules for SMI is 100 m x 100 m, about 1 hectare (ha), and 10 modules or 10 ha are available in each block. The lot size of modules for MLI is 100 m x 150 m, about 1.5 ha, and 10 modules or 15 ha are available in each block.

The key consideration for facilitating the sales of lot sub-divisions is to provide tenants with flexibility; for example, in the case of SMI, tenants can rent a lot with an area in multiples of 0.5 hectares (e.g. 0.5, 1.0, 1,5 ha). The end location of MLI shall be sold as a whole of 1.5 hectares.

This concept of the GIZ shall be established based on the following findings:

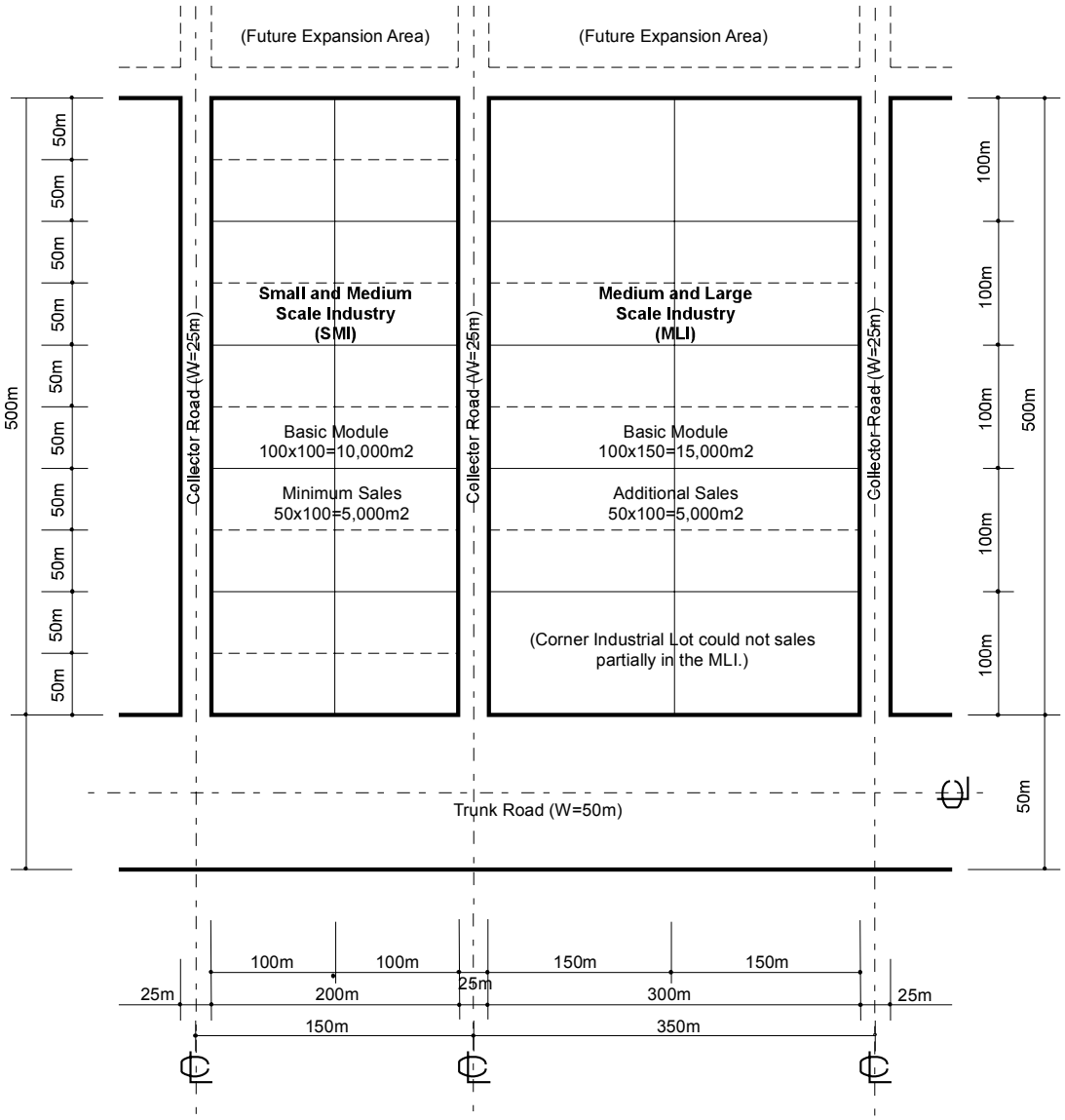
(1) South Africa is the leader of the industrial growth pole in southern Africa and enjoys a lot of foreign direct investments (FDI). Most of the FDI are applied to medium to large scale manufacturing industries (ex. 1 ha to 6 ha) that have been invited into the industrial zones.

(2) Tanzania is a newly industrialized country that embraces industries on a wide range of scales, including small, medium and large (ex. 0.5 ha to 4 ha).

(3) The rights of ways of roads in front of industrial estates are 30 m to 50 m in South Africa and Tanzania.

(4) In the case of Mozambique, scales of manufacturing industries are small to medium (ex. 0.5 ha to 2 ha). However, the national leading product is the aluminum industry which is quite huge with 6 ha of its lot.

(5) In the case of existing industries in Lusaka City, small to medium scale industries are prevalent (0.5 ha to 2 ha).



Source: JICA Study Team

Figure 5.6.1 General Industrial Zone Module

5.6.2 HIGH-TECH PARK ZONE MODULE

The High-Tech Park Zone (HTPZ) is planned with a special road arrangement for environmental control, in order to avoid general traffic entering the zone. A lot of Tenants' properties are facing Lusaka Park in which the LS-MFEZ allows the release of wild animals in the nearby of grass fields, enabling them to watch wild animals from their working space. These special locations are a characteristic of this HTPZ and it should be a first African High-Tech Park in the LS-MFEZ. Tenants should be carefully selected for maintaining a good environment in this HTPZ and Lusaka Park.

Before the sale of lots, a concrete fence, as a blind spot, should be installed for keeping the wild animals safe. And after renting the lots, tenants will be allowed to remove the concrete fence to enjoy watching the wild animals. Rules for environmental considerations shall be set up.

The west and east side, along with Lusaka Park should include a 500 m Miombo forest of green buffer from the wildlife released area. The environmental friendly industries shall be preferentially selected for the HTPZ and tenants must follow the relevant regulations on wildlife preservation (see Figure 5.6.2).

(1) A high-tech industry is defined as manufacturing industries that have design departments, research and development (R&D) departments and / or high value added products, and are in relatively environmentally friendly industries, especially without any noise, vibration and air pollution generation.

(2) HTPZ is located next to Lusaka Park which is operated by the Zambia Wildlife Authority (ZAWA) and ZAWA releases wild animals such as antelopes and zebras like small grass eaters. The LS-MFEZ provides an extension of grass land for Lusaka Park in the southern part of the LS-MFEZ.

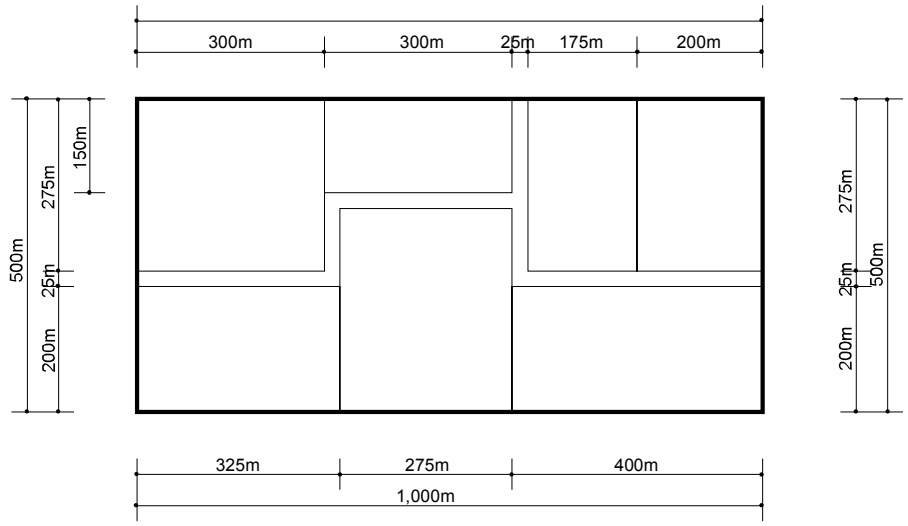
(3) MCTI and ZAWA have a good relationship which is a mutual benefit for both developments of the LS-MFEZ and Lusaka Park.

(4) The LS-MFEZ will provide ZAWA this area for releasing wild animals in the site and this concept may achieve in bringing in tenants' researchers who are conscious of the environment for their ideas.

(5) ZAWA provides land for industrial roads such as the access road to Kafue Road and the MCTI shall set up an access road to ZAWA's eastern property land.

(6) The LS-MFEZ and ZAWA are enabling to develop water resources in the ZAWA area, and the LS-MFEZ shall use underground water for the first phase development of the site.

(7) The sub-division lot size of the HTP should be relatively large, about 300 m x 300 m, for keeping the natural environment and large scale of industry.



Source: JICA Study Team

Figure 5.6.2 High-Tech Park Zone Module

5.6.3 COMMON SERVICE FACILITY ZONE MODULE

The LS-MFEZ can be a vehicle for developing the Zambian industries, especially in Greater Lusaka. Any kind of activities and services provided by the government organizations can be made available in the Common Service Facility Zone (CSFZ). Under the Triangle of Hope (ToH), there are 12 projects, including the MFEZs which are now underway. All of these projects can be established in the LS-MFEZ (see Figure 5.6.3). Thus, this project shall provide sites for any supporting facilities for industrial activities, including manufacturing support facilities in the LS-MFEZ, too.

Understanding concerns of the establishment of the CSFZ is described as follows:

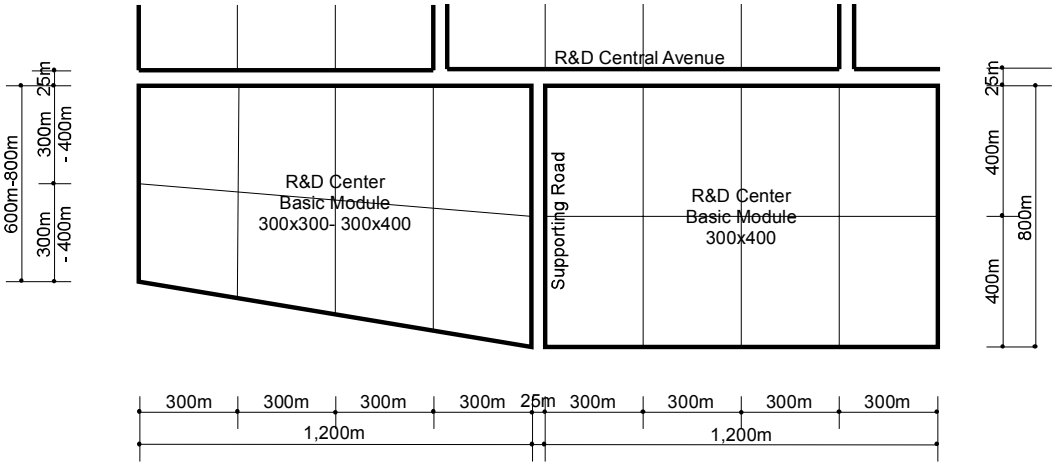
(1) Tenants of the CSFZ are government organizations.

(2) The following Publicly-operated Common Service Facilities (CSF) shall be invited;
- Schools and universities
- Polytechnic institutes,
- Vocational training centres,
- R&D institutes,
- Post offices,
- Libraries,
- Hospitals,
- Police stations,
- Fire stations,
- Customs' offices,
- International conference centres,
- Exhibition halls,
- Science parks,
- Aquarium,
- Amusement parks, etc.

(3) The sub division module lot size in the CSFZ is expected to be relatively large, 300 m x 300 m to 300 m x 400 m, for keeping an eco-friendly environment, and the LS-MFEZ can provide a larger or smaller lot upon tenant's request.

(4) Sinkholes and/or depressions in the CSFZ shall be designed to be utilized as public water parks for working staff and visitors to enhance comfortable environments.

(5) Greeneries and public parks shall have actively maintained groundwater resources for Lusaka citizens by well-arranged landscaping of the CSFZ.



Source: JICA Study Team

Figure 5.6.3 Common Service Facility Zone Module

5.6.4 CENTRAL BUSINESS DISTRICT MODULE

The Central Business District (CBD) zones are the symbol of the Twin Growth Poles (TGPs) development's concept. In this area the developer's liaison office and operation and management offices shall be established in the first phase. The CDB shall accommodate any kind of services and businesses that shall serve as a new green business centre of the LS-MFEZ (see Figure 5.6.4).

Four (4) buildings at the intersection of each Twin Growth Pole, as intersection centre buildings should be developed in a unified manner. Moreover, since Lusaka City is rapidly becoming a motorized society where passenger of automobiles are the most common form of personal transportation, car parking spaces including parking lots for guests' cars shall be made available in each building. Dedicated buildings for car parks are also expected to be located in the CBD, in order to avoid traffic congestion.

The following are some of the key considerations for establishing the Central Business District:

(1) Each CBD site with an area of 150 m x 150 m, basically has 9 lot sub-division modules. Thus, the total number of lot modules in the CBD amounts to thirty-six (36).

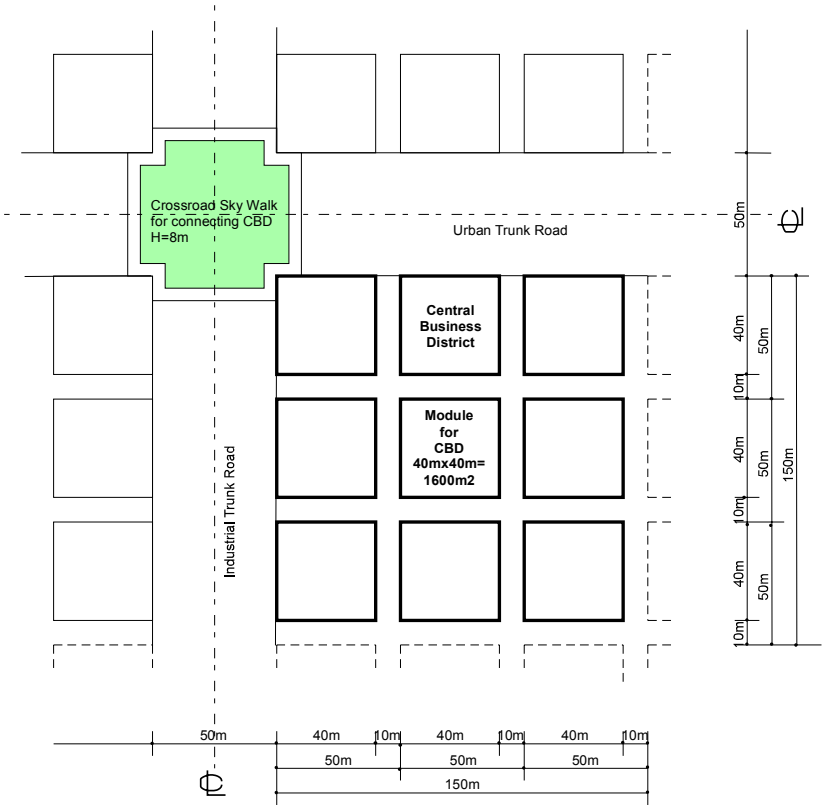
(2) A lot module in the CBD is 50 m x 50 m, which is the typical size of blocks in the city center of Lusaka.

(3) It is possible to have larger lots by merging two or three modules, except for the four corner lots at the intersection, in the case tenants or locators make such a request.

(4) Relevant regulations shall be considered for the CBD by a management organization or management committee, such as;
- maximum building height (ex. shall not exceed 40 meters and/or 10 stories in consideration of geological conditions which is a uniquely dolomite formation),
- buildings should be arranged for classy and elegant designs and harmonized color coordination.

(5) The Intersection Centre Buildings are the symbols of the Twin Growth Poles Development and they should be cooperatively designed to emphasize that point.

(6) Elevated walkways or skywalks shall be planned at the intersections of the CBD, which allow pedestrians to move directly to and from other buildings and/or to safely descend to outside pedestrian walkways on the ground level directly.



Source: JICA Study Team

Figure 5.6.4 Central Business District Module

5.6.5 HOUSING ZONE MODULE

Since the Ministry of Land (MOL) and the Lusaka City Council (LCC) have developed real estate properties around Lusaka City for their citizens, land costs of these properties are affordable for middle-class staff/workers. On the other hand, housing lots in the LS-MFEZ development shall be expensive, because this development will entail huge development plans, including infrastructure (see Figure 5.6.5).

The lot sub-division module for the housing zone (HZ) in the LS-MFEZ development has considered the following items:

(1) The southeast satellite town development by the JICA Luseed Team has planned for a population of 50,000 people. However, the LS-MFEZ shall accommodate 10,000 people, this population will be mainly for high-class staff and officers working in the LS-MFEZ.

(2) Target population of the HZ in the LS-MFEZ are tenant owners and/or managerial staffs and researchers who can afford housing lots for high income families.

(3) Mainly detached housing lots of low density shall be arranged in the HZ.

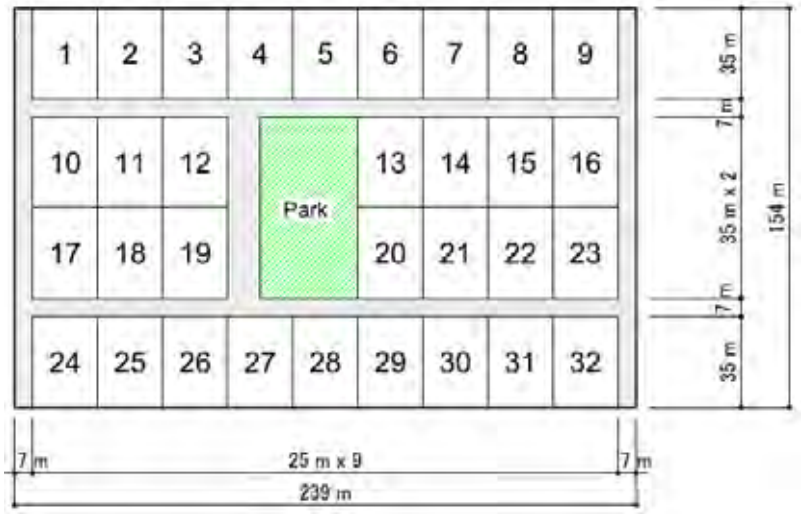
(4) Housing lot sizes of middle to high-class families in Lusaka City will mostly be 25 m x 35 m.

(5) To create a good relationship among inhabitants in low density areas, Regional Park shall be arranged every 30 to 40 housing lots for recreational purposes for community.

(6) High density housing lots, such as apartment buildings will be placed between the CBD and low density housing lots.

(7) Apartment buildings are expected to be less than 10 stories (average 7 stories).

(8) Rights of ways of inner roads in low density housing provide 7.0 m.



Source: JICA Study Team

Figure 5.6.5 Housing Zone Module

5.7 ADJUSTED DRAWINGS OF THE LS-MFEZ

Considering thorough discussions with the Local Expert Team (LET) and JST, they have reviewed the existing conditions of the vicinity of the LS-MFEZ, property land and the main road network in the LS-MFEZ and have decided on the following which are tabulated in Table 5.7.1 and Figure 5.7.1 to 5.7.4;

(1) Parallelogram Property Land as shown in the figures.

(2) Alignment of main roads has been designed to avoid hilly areas, depression areas and sinkholes.

(3) Vertical sections of the main roads have been designed with less than 1 percent with gentle slopes.

(4) Direction of the main road alignment has been designed to avoid strong sunlight at sunrise and sunset. (Main road alignments will go in certain angles from the east-west direction.)

(5) Outer Ring Road is laying on the northwest to the north-centre inside the LS-MFEZ. The Outer Ring Road has been designed as an access-controlled motorway.

(6) The Industrial Road has been designed from the southwest to the northeast by way of centre of the LS-MFEZ site with a contortive road.

(7) The Urban Road has been designed from the northwest to the northeast by way of a centre crossing with the Industrial Road twice.

(8) The access road from the LS-MFEZ to Lusaka Park passes on the east side through the north to the south.

(9) The development site of the first phase has been designed to be located on the west cross section, so called the West Growth Pole with five functional zones about 100 ha.
- General Industrial Zone (GIZ) has about 23 ha of land.
- High-Tech Park Zone (HTPZ) has about 22 ha of land.
- Common Service Facility Zone (CSFZ) has about 19 ha of land.
- Central Business District (CBD) has about total 8 ha of land.
- Housing Zone (HZ) has about 22 ha of land.

(10) The development site of the second phase has been designed to be located on the east cross section, so called the East Growth Pole with five functional zones about 95 ha.
- GIZ site area is about 23 ha.
- HTPZ site area is about 21 ha.

- CSFZ site area is about 21 ha.
- CBD site area is about 8 ha.
- HZ site area is about 22 ha.

(11) The development site of the third phase has been designed to be located between the East and West Growth Poles about 490 ha.
- GIZ site area is about 133 ha.
- HTPZ site area is about 145 ha.
- CSFZ site area is about 200 ha.
- Water Park site area is about 25 ha.

(12) Site areas of the west and east Miombo Reforestation covered the area about 210ha+13ha in the west and 180ha in the east.

(13) Site area of the Citizen Park is located in the northwest hilly area about 101 ha.

(14) Site areas of the green buffer zones between the HTPZ and Lusaka Park make up about 169 ha of green grass field at south center and 37ha and 51ha of Miombo Reforestation are located in the southwest and southeast corners.

(15) Utility areas are planned as follows;
- The southeast water supply facilities consist of a treated water supply station and a sub-station, which of site areas are 25 ha and 22 ha, respectively.
- The site area of the northwest treatment plant and retention pond is 60 ha.
- The site area of the northeast treatment plant and retention pond is 54 ha.
- The site area of the southwest treated water supply station is 22 ha.

(16) Long term future expansion area has been planned as follows:
- The GIZ expansion area is expected to be about 280 ha after year 2030.
- The HZ expansion area is expected to be about 72 ha after year 2030.

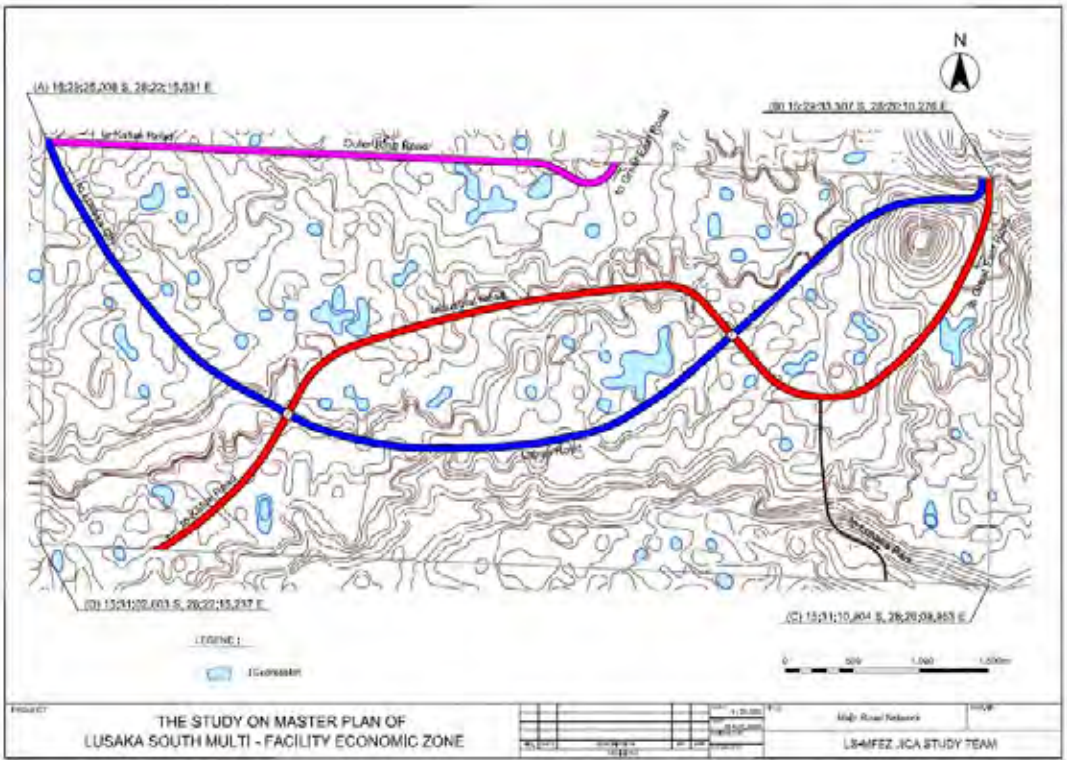
(17) Road Hierarchy
- The Main Road, namely Urban and Industrial Road has been designed as a 50 m rights of way.
- The Main Road has been designed exclusively for bus mass transit lanes with bus stops and overhead pedestrian bridges by year 2020.
- The rights of ways of the Collector Roads have three sizes of 25 m, 12.5 m and 10 m widths.

Table 5.7.1 Development Area by Year 2030

Plan of JST (Unit:ha)

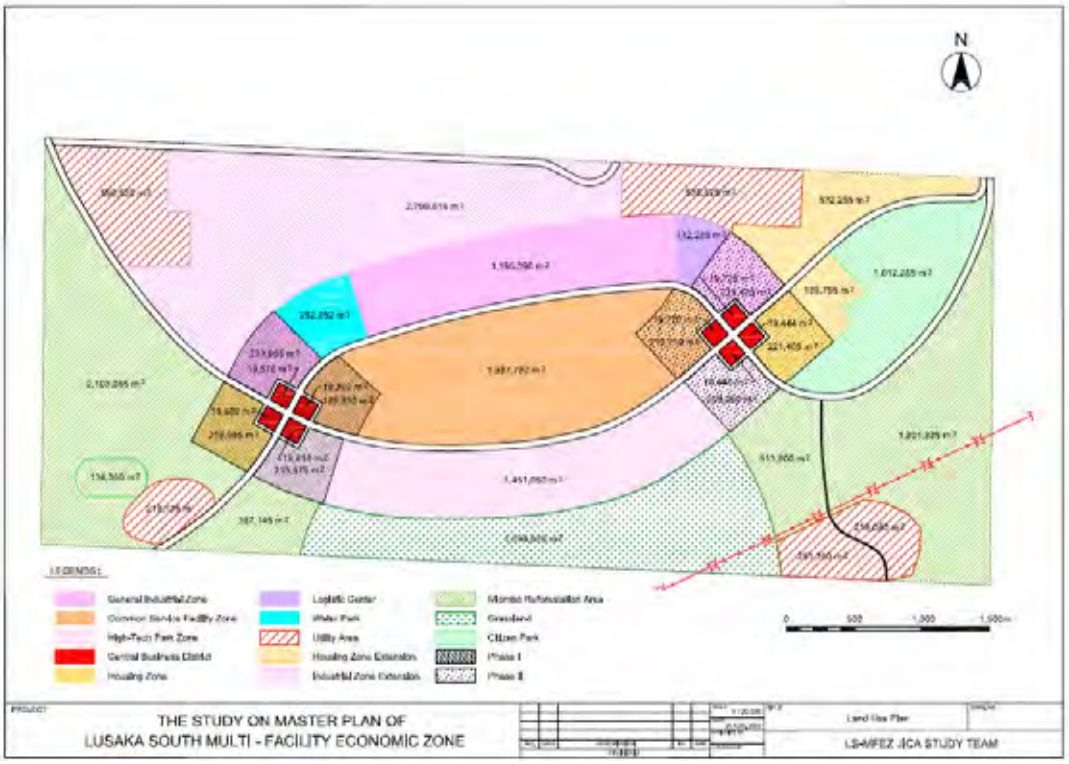
Target Year	2015	2020	2025	2030	-	-	After 2030	Final
Land use	Phase1	Phase2	-	Phase3	-	-	Expansion	Total
Central Business District (CBD)	10.88	10.88	-	0.00	-	-	0.00	21.76
Accumulation CBD	10.88	21.76	-	21.76	-	-	21.76	21.76
Housing (Residential)	21.86	22.14	-	0.00	-	-	71.91	115.91
Accumulation Housing Zone	21.86	44.00	-	44.00	-	-	115.91	115.91
General Industrial Zone (GIZ)	23.40	22.54	-	119.54	-	-	279.92	445.40
High-Tech Park (HTPZ)	21.56	20.90	-	145.11	-	-	0.00	187.57
Logistic Center (Industry)	0.00	0.00	-	13.23	-	-	0.00	13.23
Sub-total Industrial Zone (Logistic, GIZ and HTP)	44.96	43.44	-	277.88	-	-	279.92	646.20
Accumulation of Industry	44.96	88.40	-	366.28	-	-	646.20	646.20
CSF (R&D, Institution and Community Facility)	18.98	21.01	-	198.78	-	-	0.00	238.77
Accumulatoin CFS	18.98	39.99	-	238.77	-	-	238.77	238.77
Park (Open Space)	0.00	0.00	-	126.51	-	-	0.00	126.51
Greenery (Open Space: Forest)	260.48	209.08	-	169.46	-	-	0.00	639.02
Sub-total of Park and Greenery	260.48	209.08	-	295.97	-	-	0.00	765.53
Accumulation of Park and Greenery	260.48	469.56	-	765.53	-	-	765.53	765.53
Transmission Line	22.49	0.00	-	0.00	-	-	0.00	22.49
Utility Zone (Institution)	25.13	0.00	-	0.00	-	-	0.00	25.13
Waste etc (Institution)	81.67	75.47	-	0.00	-	-	0.00	157.14
Sub-total Utility Zone	129.29	75.47	-	0.00	-	-	0.00	162.27
Accumulation Utility Zone	129.29	204.76	-	204.76	-	-	204.76	162.27
Road	42.43	62.74	-	0.00	-	-	0.00	105.17
Accumulation Road	42.43	105.17	-	105.17			105.17	105.17
Total	**528.88**	**444.76**	-	**772.63**	-	-	**351.83**	**2098.10**
Total Accumulation	**528.88**	**973.64**	-	**1746.27**	-	-	**2098.10**	

Source: JICA Study Team



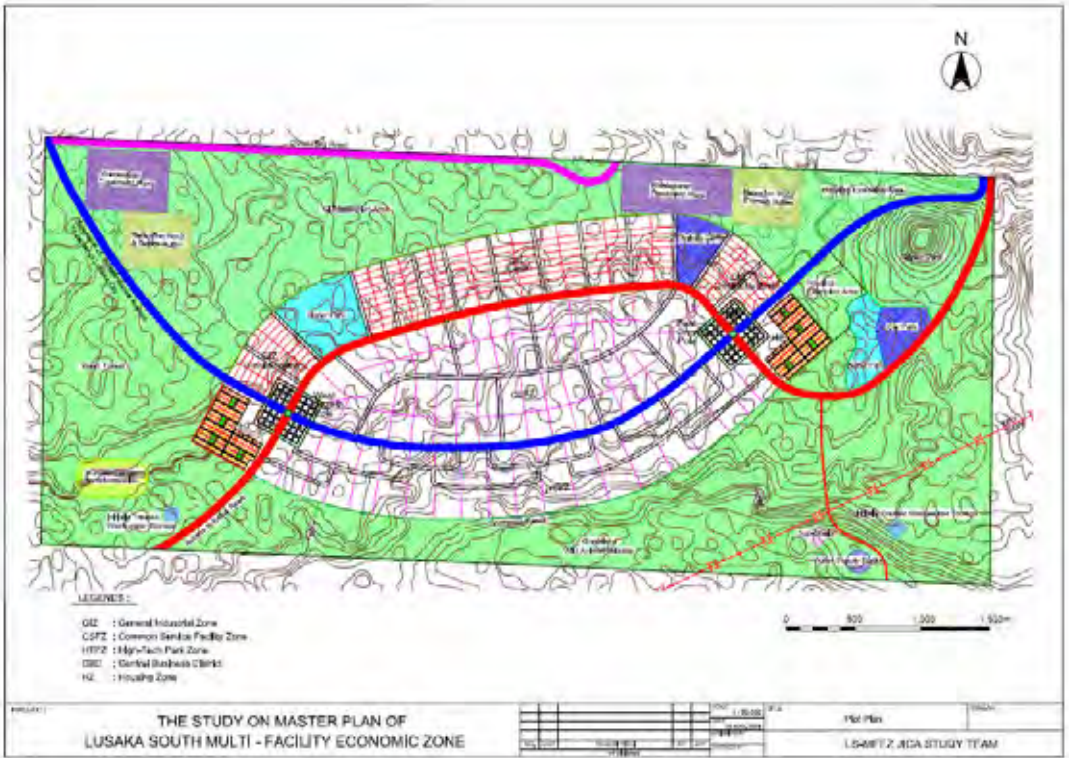
Source: JICA Study Team

Figure 5.7.1 Main Road Network



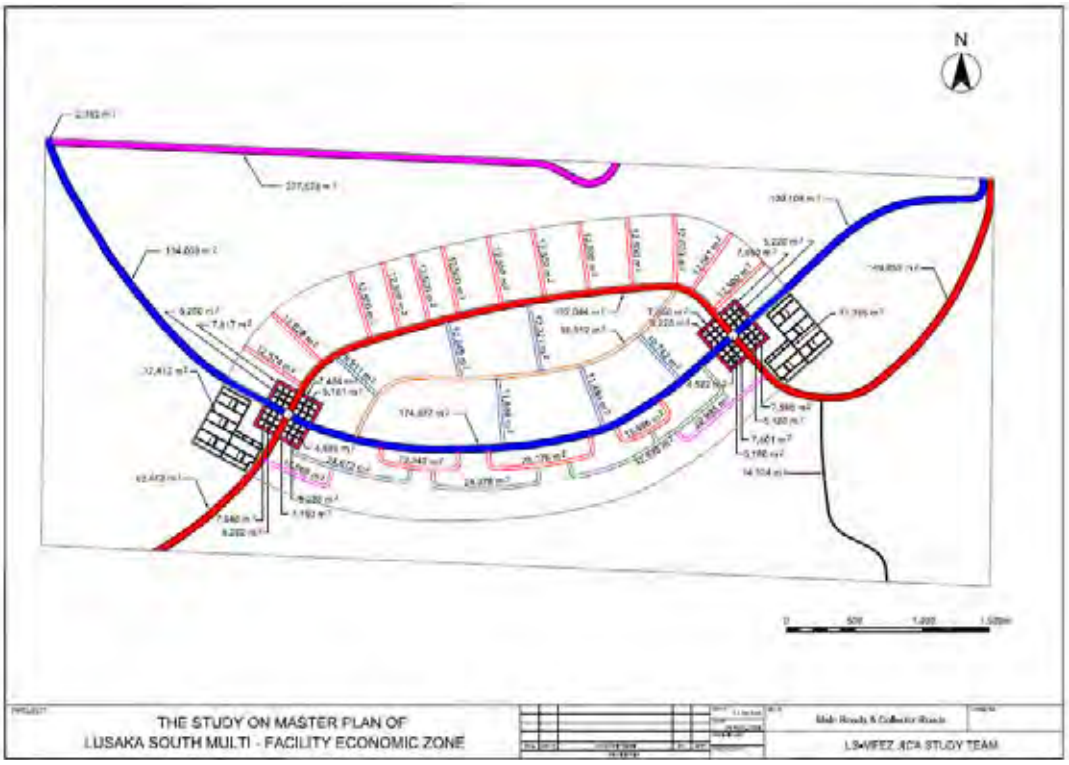
Source: JICA Study Team

Figure 5.7.2 Land Use Plan



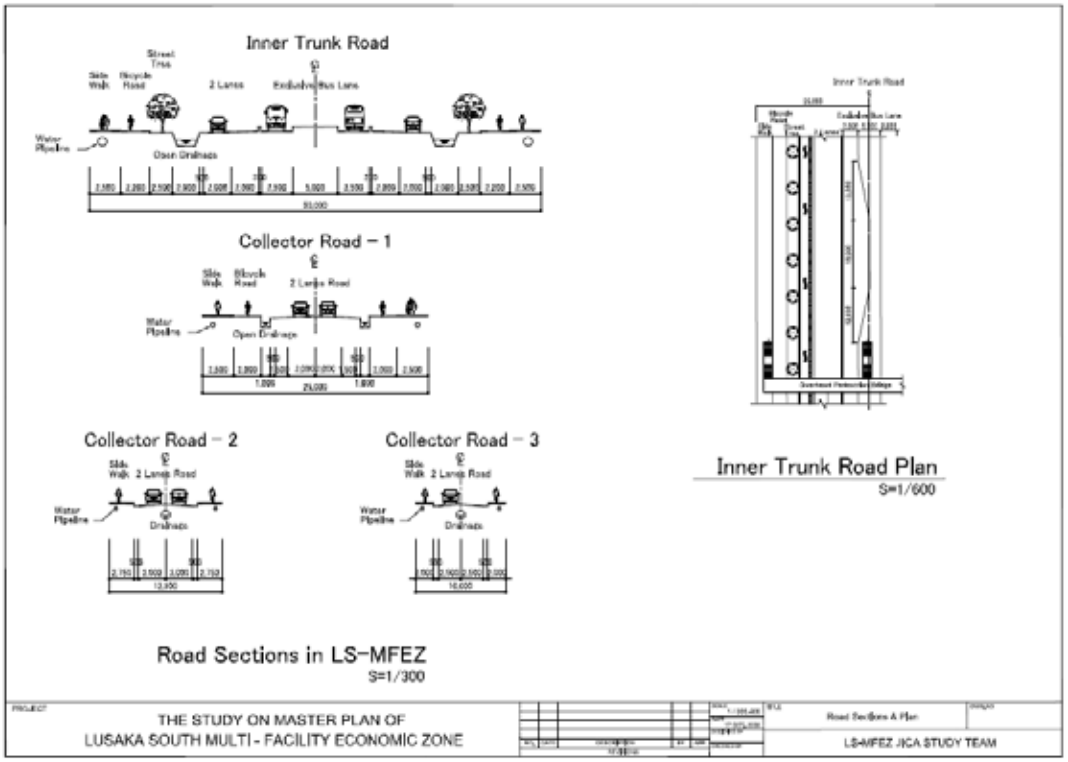
Source: JICA Study Team

Figure 5.7.3 Plot Plan



Source: JICA Study Team

Figure 5.7.4 Main Roads and Collector Roads



Source: JICA Study Team

Figure 5.7.5 Road Sections and Plan

5.8 PRE-CONDITIONS OF IMPLEMENTATION OF THE LS-MFEZ PROJECT

The LS-MFEZ is a one of a kind international and/or world class Special Economic Zone, so international organizations, including international donor governments and/or international non-governmental organizations are closely watching this project.

A Zambian citizen is also expecting the LS-MFEZ to generate job opportunities, lead economic developments, and diversification for future industrial developments. The LS-MFEZ must be launched under the well-coordinated governmental management systems and well-developed infrastructures for them without any trouble as a whole.

Moreover, the conditions of the LS-MFEZ are the huge developments of a 2,100ha site, water resources and natural environment of Lusaka citizens.

Unfortunately, there was no consideration for access roads for the LS-MFEZ even though the site area is quite huge. The access road alignments to the LS-MFEZ must be designed at the first stage and the land for access road construction must be obtained.

Theses preconditions or arrangements have to be provided before implementation of the LS-MFEZ.

(1) Under Environmental and Social Considerations, SEA for the M/P and EIA for the F/S shall be carried out under the governmental designation and governmental law and also JICA Category-A.

- SEA for the Master Plan
- EIA for the Feasibility Study

(2) The LS-MFEZ is located in the Kafue District and very close to Lusaka City while as the center of Kafue is far from Lusaka. The LS-MFEZ must be coordinate under Lusaka City.

- The LS-MFEZ shall include the greater Lusaka enhancement administration boundary
- The LS-MFEZ shall be managed under the Central Government and the Lusaka City Council
- The LS-MFEZ shall be establish several management bodies

(3) Land acquisition for the main access roads is the first priority of preconditions. These access roads are as follows;

- Expansion of Moshi-O-Tunya Road by ZESCO,
- Extension of Moshi-O-Tunya Road,
- West Industrial Road or West Outer Ring Road,
- Expansion of Chifwema Road and
- North Industrial Road or Outer Ring Road.

5.9 RECOMMENDATION AND CONCLUSION

5.9.1 TRANSPORTATION

(1) International Flight

International direct flights are the key point for inviting Foreign Direct Investments (FDI). The government of Zambia is starting negotiations with international direct flight carriers. On the other hand, the strengthening of existing flight routes are also important that;

- Establishment of supporting systems for foreign visitors, namely information centres and lounges at the Johannesburg International Airport making a good sense of arrival.
- Joyride or joy flight over to the LS-MFEZ by international flight when it begins to be developed.
- Improvement of the immigration system to give a good and lasting impression of Lusaka International Airport to foreign visitors.

(2) International Road Network

- Construction of wide paved roads met with international standards, at least 3.0 m + 3.0 m = 6.0 m for safer driving
- Reduction of police check-points along international roads for smooth cargo transportation
- Adaptation of weighing facilities to be used for trucks at outskirts of major cities
- Application of divided lanes at checking-points for passenger cars and trucks
- Provision of milestones

(3) International Railway Network

- Strengthening of management system
- Additional locomotives and goods wagons/vans for up-grading international standards of cargo transportation
- Improvement of direct cargo transportation connections between TAZARA (Dar Es Salaam-Kapiri Mposhi) and Zambia Railway (Kapiri Mposhi-Lusaka)

(4) City Road System

- Maintenance for the road pavements in existing industrial zones
- Keeping a clean environment for existing industrial zones for maintaining good impressions with tenants or investors
- Maintenance of the pavement for small roads in nearby towns for maintaining the tenants' impressions and amenities

5.9.2 INDUSTRY

(1) Investment Related Agency

- Provision of easy access to investment related agencies
- Provision of One Stop Service Centres as international standards for investors and tenants
- Concentration of public industrial service agencies, all in one area, especially for the small and medium scale of industries
- Provide the related documents such as brochures, pamphlets and application forms

(2) Improve Industrial Power

- Improvement of the entrepreneurial knowledge and intelligence for industries
- Improvement of the production of technical skills in the factories
- Establishment of vocational and technical training centres

(3) Provide Database and Supply Data

- Provision of libraries and internet libraries
- Provision of exhibition centres for introducing new technologies, products and presenting the existing products of tenants
- Information services for tenants namely, raw materials, labor force, production technology, production machinery, logistics, markets, new products, etc.

(4) Up-grading of Utilities

- Information for introducing the utilities' conditions to the investors and tenants
- Providing steady electricity supply step by step
- Providing industrial water for industries and citizens
- Up-grading internet technology

5.9.3 LIVING CONDITIONS

(1) Provide Good Amenity

- Improvement of living environments such as security, safe, infrastructure etc.
- Aiming for an affordable international living cost in town
- Establishment of city hotels and accommodations with reasonable prices
- Provision of international schools
- Provision of shopping centres and restaurants
- Concert halls
- Museums
- Hospitals
- Churches and Mosques
- Fire stations
- Police departments / stations

(2) Provide Good Environment

- New regulation for green covered ratio in each of the functional areas
- Reforestation of typical Miombo Forests
- Provision of citizen parks
- Pedestrian walks
- Bicycle roads
- Creation of green belts along main roads and collector roads by typical trees (ex. red flamboyant, yellow Acacia, purple Jacaranda, white Namamina, etc)

(3) Children Amenities

- Schools
- Day nurseries
- Amusement parks
- Science parks
- Aquariums
- Zoos (Lusaka Park)
- Aquarium
- Libraries
- Cinemas

CHAPTER 6 INFRASTRUCTURE DEVELOPMENT PLAN FOR LS-MFEZ

6.1 TRANSPORT DEVELOPMENT PLAN

6.1.1 JICA LS-MFEZ STUDY TEAM CONCEPT ABOUT ACCESS ROAD TO LS-MFEZ

As mentioned in section 4.3, LS-MFEZ has only one unpaved access road. Even if the road is improved, the access road to LS-MFEZ is insufficient for developing and attracting economic activities. The study team proposes four (4) access roads with the follow functions. (Note: Especially, (a) (b) and (c) should be improved / constructed before the opening of the LS-MFEZ.)

(a) Access Road between Leopards Hill Road and the LS-MFEZ (short term project)

The connecting road between the LS-MFEZ and the international road network is only Leopards Hill Road. Existing access road between Leopards Hill Road and the LS-MFEZ is unpaved and narrow. This street should be improved by widening and paving

In addition, Leopards Hill Road also needs improvement as an industrial road such as overlay and widening, since it is a 2-lane road and paving thickness is minimal.

This access road will handle the main commuter and cargo traffic to/from Lusaka. The Lusaka international airport traffic will also use this route.

(b) Access Road between Lusaka City and the LS-MFEZ (short term project)

Moshi-O-Tunya Road which connects Independence Avenue currently extends to the south. The access road will be connected to this road. This route will build up a strong economical relationship between the existing Lusaka City economic activities and new LS-MFEZ activities. In addition, the road will provide high quality traffic service to a developing area along the road.

This road will connect to the symbolic gateway road in the LS-MFEZ.

The main traffic expected on this access road will be commuter, business and cargo traffic to/from Lusaka. The Lusaka international airport traffic will also use this route.

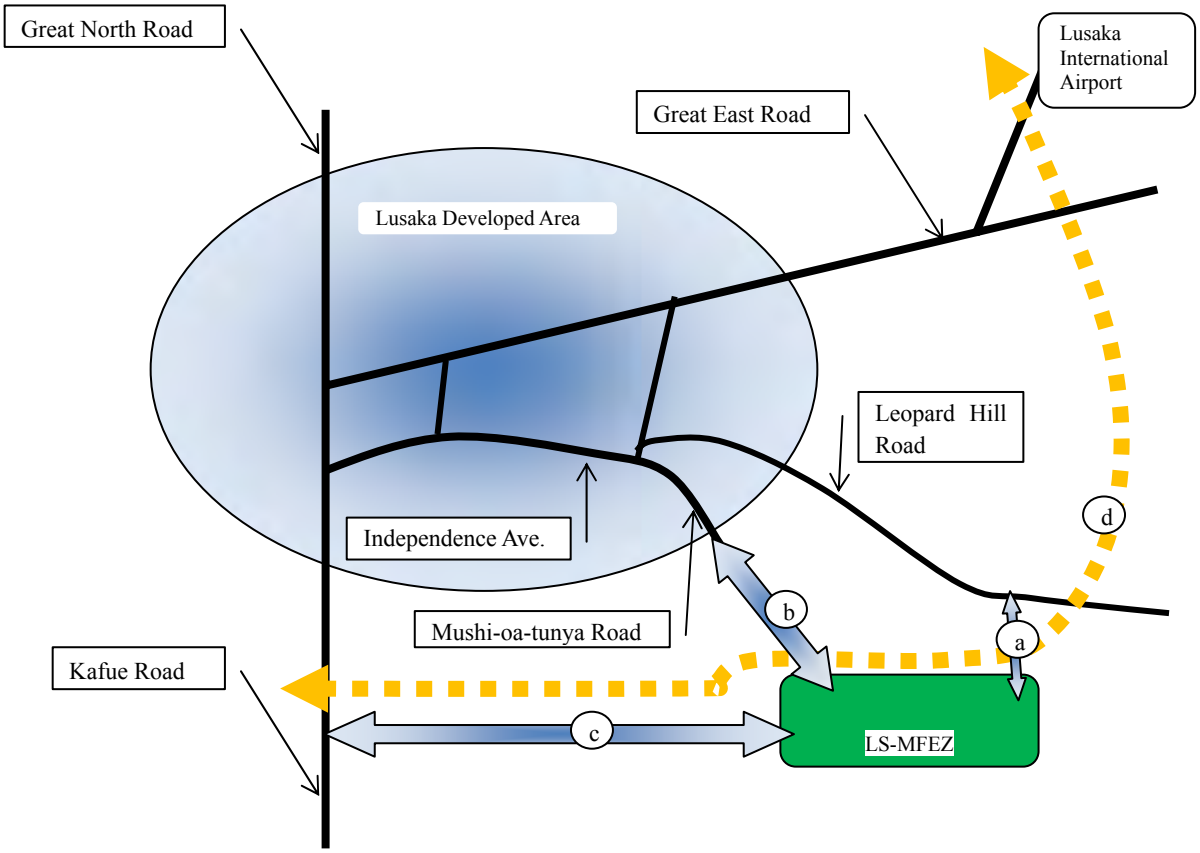
(c) Access Road from/to Kafue Road (T2) (short term project)

This access road will connect the LS-MFEZ to Kafue Road (T2) which is an international road. This access road will provide a route to neighboring countries and will especially carter for traffic to/from the southern African countries such as South Africa and Zimbabwe which will have the benefit of bypassing traffic congestion in Lusaka center. This road will become a part of the Outer-Ring Road being planned by LUSEED.

The main traffic will be international and domestic cargo traffic.

(d) Outer Ring Road as Access Road among Kafue Road, the LS-MFEZ, Great East Road and International Airport (short - medium term project)

Air cargo volume to/from the LS-MFEZ will increase following the LS-MFEZ development, since high-tech and high added-value industries will be located in the LS-MFEZ. Therefore, access road between Lusaka International Airport and the LS-MFEZ should be constructed in the future. Outer Ring Road with ramp in the LS-MFEZ is planned to pass near the Airport, and therefore, the LS-MFEZ traffic can take this route to the airport. It will also connect the LS-MFEZ with Kafue Road and Great East Road.



Source: JICA Study Team

Figure 6.1.1 Proposed Access Roads Concept

6.1.2 JICA LUSEED Study Team Road Plan

The JST held discussions with related organizations such as MCTI, ZDA, Lusaka City Council (LCC), KTPC and JICA LUSEED Study Team. All related organizations agreed with the transport concepts for the LS-MFEZ. LCC has started to investigate land development conditions of an access road passing the area.

As shown below in a figure made by LUSEED, LUSEED's Lusaka road network plan includes access roads to the LS-MFEZ.

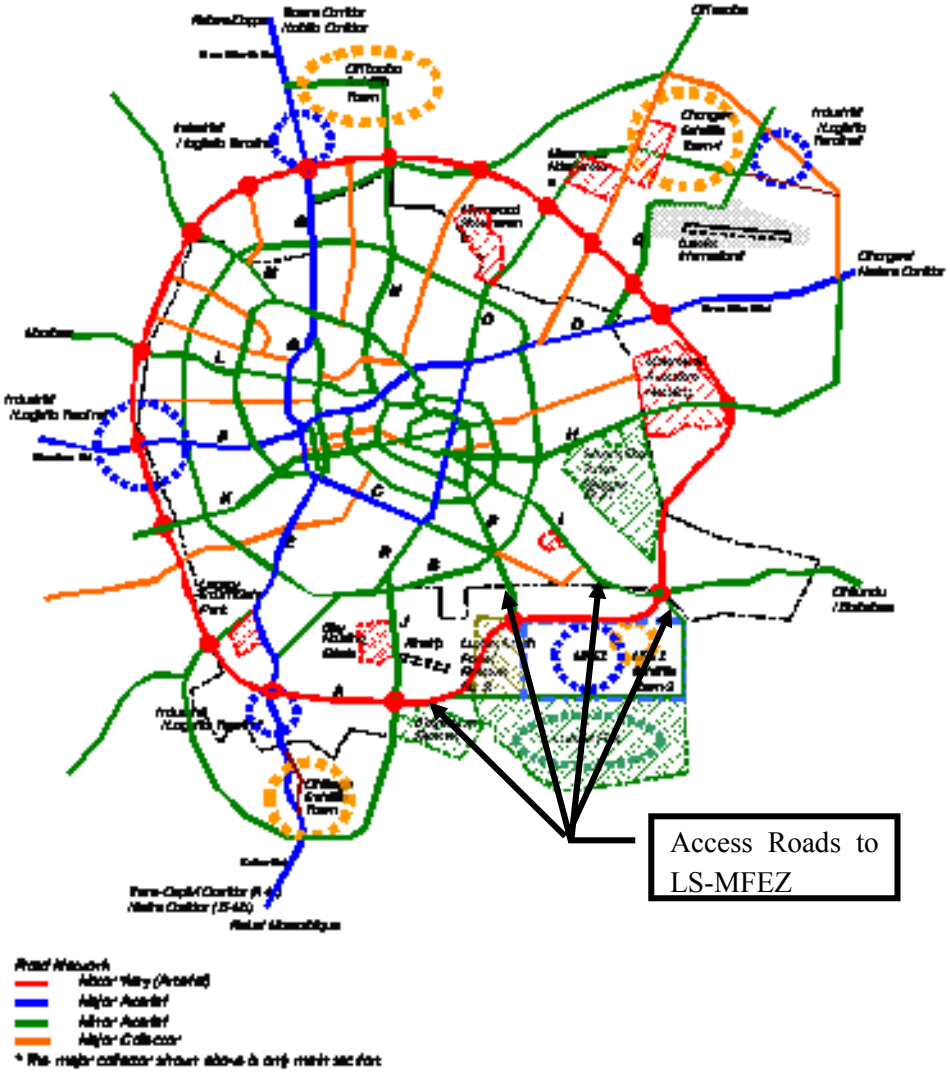


Figure 6.1.2 LUSEED's LUSAKA Road Network Development Plan (Draft)

LUSEED proposes "Urban Road Classification (Draft)" and "Standard Road Widths (Draft)" as shown in Tables 6.1.1 and 6.1.2.

Table 6.1.1 Urban Road Classification (Draft)

Road Category		Road Classification	Design Speed	Intersection Interval
Major Division	Minor Division			
Arterial	Motor Way	I	80 or more	1 km or more
	Major	IA	60 - 80	0.5 km or more
	Minor	IB	60 - 80	No limit
Collector	Major	IC	40 – 60	No limit
	Minor	II(ID)	40 – 60	No limit
Access	-	III	40 or less	No limit

Source: LUSEED

Table 6.1.2 Standard Road Widths (Draft)

Road Classification	No. of Lanes	Standard Road Widths (m)						
		Carriage way	Shoulder	Marginal Strip	Median Strip	Pedestrian way	Service Road	Buffer Zone
I	4 or more	3.75	3.00	0.20	3.00	Restriction	3.00	(5.0: minimum) If required
IA	4 or more	3.50	1.50	0.25	1.5 (min)	3.00	3.00	-
IB	2 or more	3.50	1.50	(0.25) If required	(0.5: min) If required	(1.5: min) If required	-	-
IC	2	3.25	1.00	-	-	2.00	-	-
II(ID)	2	3.00	0.50	-	-	(1.5: min) If required	-	-
III	1	5.5(min)	1.00	-	-	-	-	-

Source: LUSEED

6.1.3 TRANSPORT CONCEPT OF THE LS-MFEZ

It was confirmed at a meeting with the Zambian government, JICA, KTPC and JICA Study team, that KTPC will prepare the LS-MFEZ Master Plan and Feasibility Study of Phase 1 of Transport field, and JST Transport planner will support KTPC.

JST's Transport planner held discussions with a KTPC transport planner and transport engineer. Arising from the discussions, the JST has confirmed the LS-MFEZ transport concept as follows:

1) The LS-MFEZ has 4 access roads (as mentioned in section 6.1.1)

2) Road design should consider sustainability and environmental-friendliness. It should also consider various factors such as passenger/cargo vehicles, pedestrians, bicycles, public transportations and planting strip.

3) Bus terminals will be installed for commuters between Lusaka and the LS-MFEZ, and within the LS-MFEZ.

4) Physical distribution center (such as truck terminal) will be present.

5) KTPC will consider possibilities of a new railway, since the present railway activity is very low and new construction is very difficult. LUSEED has no plan to extend a railway to the LS-MFEZ.

6) Road alignment will be decided with consideration of geological conditions (to avoid sinkholes).

7) Arterial road alignment is basically loop line, with feeder roads and the 4 access roads (to Leopards Hill Road, Lusaka International Airport, independence Avenue and Kafue Road) connected to the arterial road.

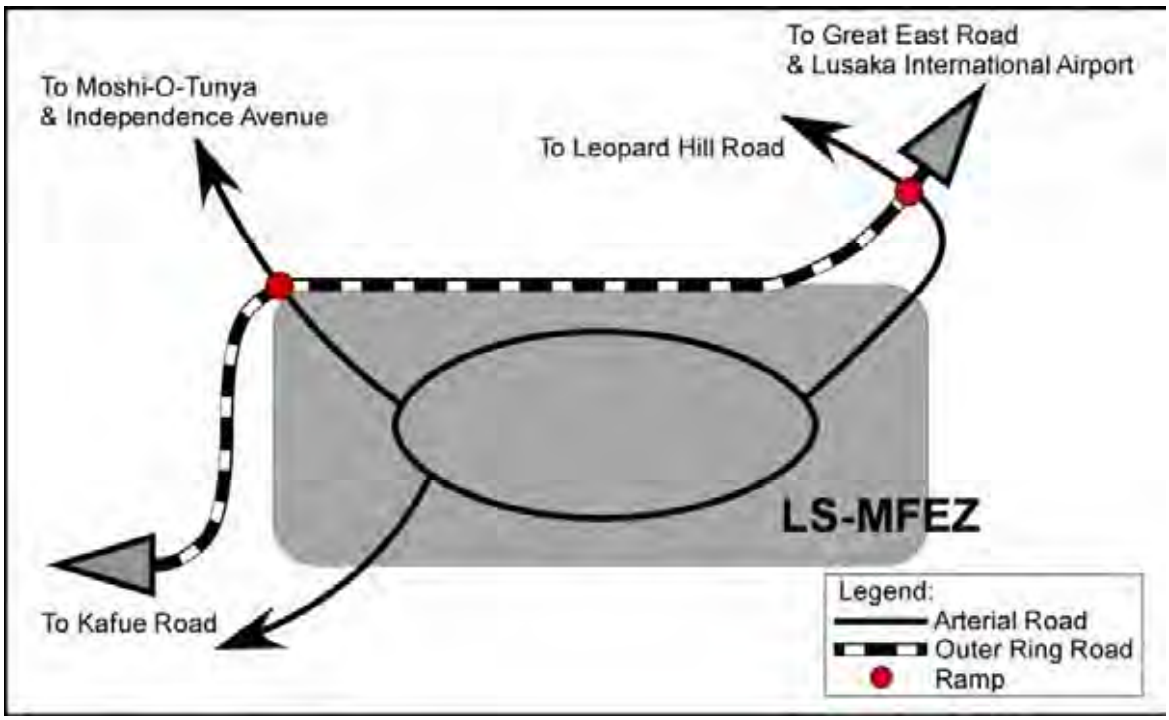
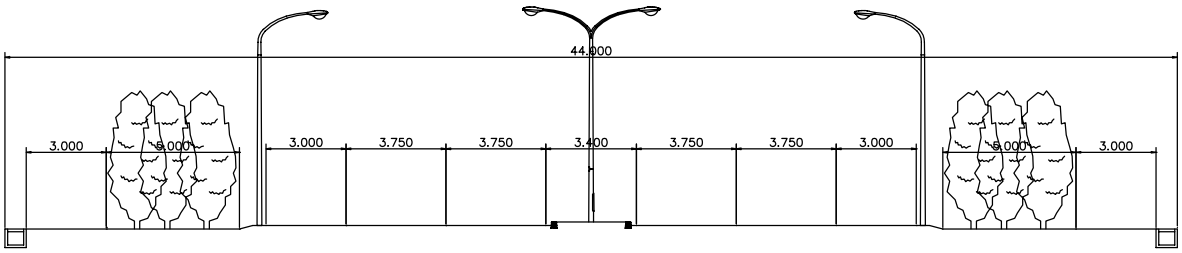


Figure 6.1.3 Arterial Road Network Basic Concept Plan

8) Outer ring road will be located at the north edge of the area in the LS-MFEZ

Specifications;
Outer Ring Road Typical Cross Section (Draft)
Road Type：Arterial-Motor Way（Class I）
Design Speed：Over 80 km/hr
Required right of way: 50 m
Typical Cross Section：



Source: LUSEED

Figure 6.1.4 Typical Cross Section of Outer Ring Road (Draft)

6.2 WATER SUPPLY SYSTEM

6.2.1 WATER DEMAND

According to the master plan, it is assumed that the resident population of the LS-MFEZ will be 10,000 and an additional 30,000 workers will come from outside the LS-MFEZ.

Unit water demand for domestic use is shown in Table 6.2.1, in accordance with the Zambia Standard for Water.

Table 6.2.1 Unit Water Demand for Domestic Use

No.	Housing Category	Per Capita Demand (L/c/d)
1	High Cost Housing	280
2	Medium Cost Housing	150
3	Low Cost Housing	100
4	Informal Cost Housing	40

Source: Zambia Standard for Water Supply System

Unit water demand of 280 L/c/d has been adopted for calculation of water demand since the housing zone was basically prepared for high class families in the LS-MFEZ.

Water demand of commercial and Industrial area is shown in Table 6.2.2 in accordance with the Zambia Standard for Water.

Table 6.2.2 Unit Water Demand

Item			Standard	Unit
Commercial Use		Shopping	30,000	L/ha/day
		Retail Market	30,000	L/ha/day
		Offices	30,000	L/ha/day
		Licensed Premises	30,000	L/ha/day
		Petrol	30,000	L/ha/day
		Post Office	30,000	L/ha/day
Public Uses	Educational Facility	Nursery School	25	L/pupil/day
		Primary school	25	L/pupil/day
		Secondary School	30	L/pupil/day
		College/University	120	L/student/day
	Medical Facility	Hospital	365	L/bed/day
		Clinic	10	L/patient/day
	Administrative Office	Council Office	30	L/staff/day
		Other Office	30	L/staff/day
		Government Office	30	L/staff/day
Industry		Light Industry	30,000	L/ha/day
		Heavy Industry	90,000	L/ha/day

Source: Zambia Standard for Water Supply System

According to the Table 6.2.1 and Table 6.2.2, unit water demands are determined and shown in Table 6.2.3. Unit water demand without domestic use for industrial zone is 15m^3/ha/day, because it is necessary to invite companies which do not use much water. Since the maximum volume of the final treated wastewater, which will be infiltrated into the groundwater, is 10,000m^3/day, it is necessary that unit water demand will be reduced in the phase 3. Water demand is shown in Table 6.2.3.

Table 6.2.3 Water Demand

(m^3/day)

Item(Unit demand)		Unit	1st Phase	2nd Phases	3rd Phases
Housing (0.28 m^3/cap/day)		capita	5,000	10,000	10,000
Workers(0.10 m^3/workers/day)		capita	3,500	7,000	30,000
Commercial Area (30 m^3/ha/day)		ha	10	21	21
Industrial Area (GIZ&CSF)(15 m^3/ha/day)		ha	65	129	605
Water Demand	Housing	m^3/day	1,400	2,800	2,800
	Workers	m^3/day	350	700	3,000
	Industry and others	m^3/day	1,250	2,500	4,200
	Total	**m^3/day**	**3,000**	**6,000**	**10,000**

Source: JICA Study Team,

6.2.2 WATER SOURCE

(1) Lusaka City Water Works

The nearest existing and available water supply network to the LS-MFEZ is located in Woodlands Extension, approximately 4.4 km away from the north-west corner of the LS-MFEZ (refer to Figure 4.4.1). Although WSS can be extended to the LS-MFEZ, current water demand of Lusaka City is far beyond the capacity of the LWSC supply system. Meanwhile, the amount of unaccounted for water(UFW), including leakages is estimated at more than 50% by LWSC and therefore LWSC has a plan to repair leaking pipes. However, it will be too late to repair them during the 1st phase development of the LS-MFEZ. Therefore, the extension from the existing water supply system of Lusaka must not be allowed for the 1st phase of the LS-MFEZ.

Implementation plan of LWSC by the study on "Comprehensive Urban Development Plan for the City of Lusaka" is summarized in Table 6.2.4.

Table 6.2.4 Development Strategy for Water Resources and Water Supply Sector

Short Term (2015)	Mid Term (2020)	Long Term (2030)
Development Strategy for KAFUE River Water Development		
160,000 m^3/d by rehabilitation of Iolanda WW.	260,000 m^3/d by development of Iolanda II	460,000 m^3/d by development of Iolanda II
Development Strategy for Water Supply Production Development		
Construct Iolanda-II WW with minimum cap. 50,000 m^3/d.	Expand Iolanda-II WW with planned capacity 100,000 m^3/d	Expand Iolanda-II WW with planned capacity 200,000 m^3/d
Development Strategy for Water Supply Distribution Development		
Improve UFW ratio with target of 40%	Improve UFW ratio with target of 32%	Improve UFW ratio with target of 20%

Source: Luseed IT/R (August, 2008) summarized by the LS-MFEZ JST

From the above table, water volume of 50,000 m^3/d will be supplied from Kafue River to the water supply system of Lusaka City after 2015. Therefore, an independent water supply system should be provided for the first phase of the LS-MFEZ, since the water supply system of Lusaka City can be introduced from the second phase.

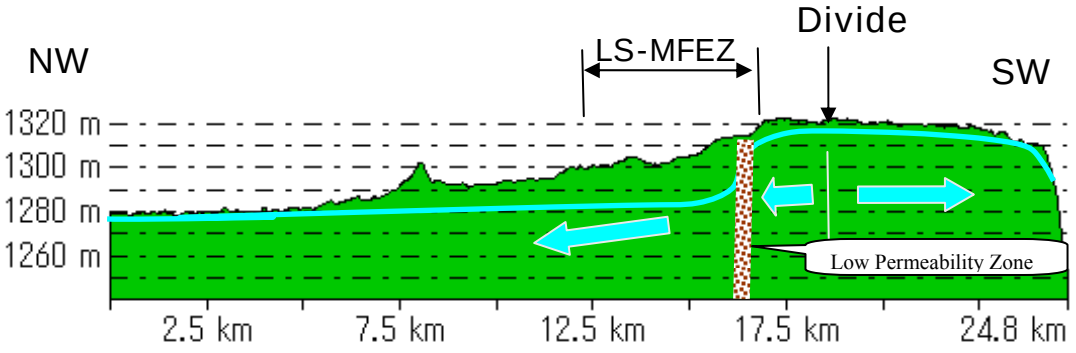
(2) Groundwater Utilization

Lusaka area has no river which has sufficient water for the water supply system. Therefore, groundwater is a unique resource which can be used for the LS-MFEZ water supply.

The LS-MFEZ is located in the uppermost area of the catchment of Lusaka City as mentioned in section 4.1.4. Lusaka City is currently facing an issue of groundwater shortage. If groundwater is to be taken from inside the LS-MFEZ, the same amount of groundwater would be reduced from the catchment area of Lusaka City. And therefore, the current water supply system may be affected by that.

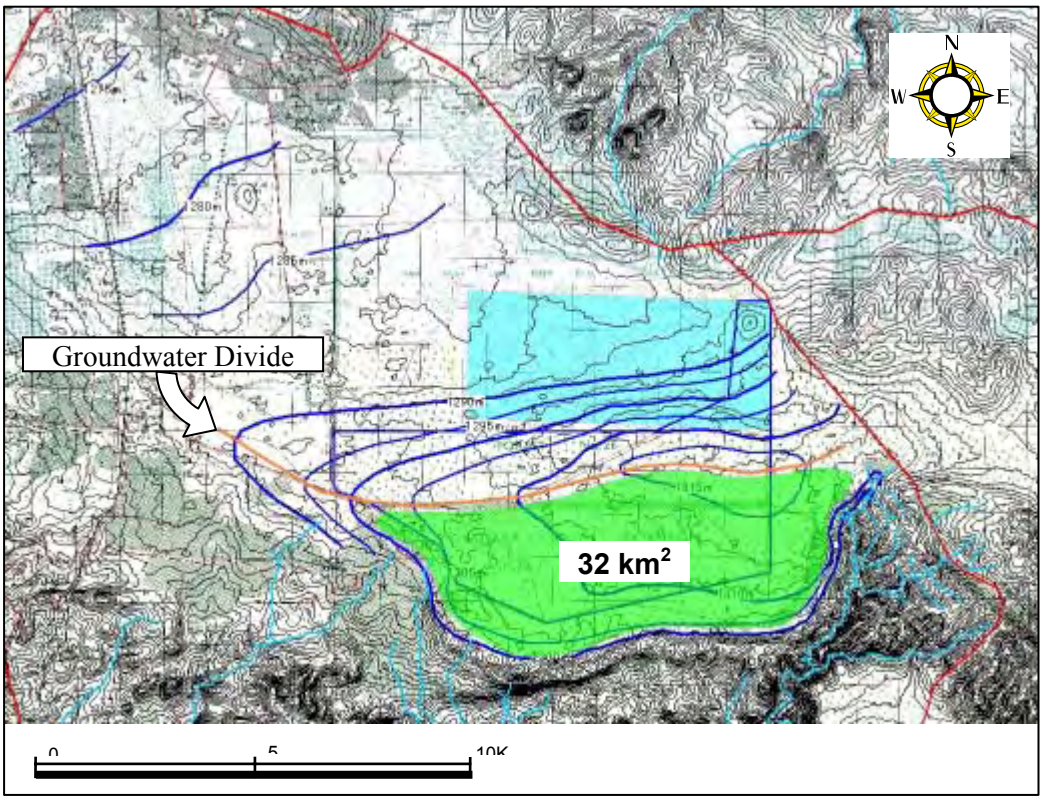
On the other hand, it was found that the groundwater divide is located in the southern area of the LS-MFEZ (Figure 6.2.2) from the result of a hydrological survey carried out by the JST, Groundwater utilization in the southern part of groundwater divide would not largely affect the water supply system of Lusaka City since groundwater is flowing to the south. Additionally, groundwater of this area is divided by some kind of low permeability zone with the northern part which is a catchment of Lusaka City. Since it is dammed up by the low permeability zone of the north, and by the geological boundary of the south, groundwater level is kept shallow through out the seasons (see Figure 6.2.1). It means that the groundwater possess a high potentiality to be a water resource in the first phase of the project.

Initial hydrological analysis has been carried out as shown below.



Source: JICA Study Team

Figure 6.2.1 Conceptual Diagram of Groundwater



Source: JICA Study Team

Figure 6.2.2 Area of the Catchment in the Southern Part of the Groundwater Divide

1) Groundwater Volume

Retained area of groundwater is approximately 32km^2.

There are two zones of aquifer (refer to Appendix D), and zone A is the main aquifer. The average thickness of zone A is assumed to be 10 m (minimum assumption on the safe side). As the water retained in zone B is fissure water and the amount of retained water compared with that of zone A is quite small, the aquifer of zone B is not considered to be utilized as the groundwater.

Porosity of Zone A is estimated from the result of the pumping test as shown below. Aquifer conditions assume that the Karst gap is filled with semi-consolidated soil. A Relational expression between permeability and particle size is shown by the Creager. From the result of soil test, permeability of 1 x 10^{-2} ~10^{-3}(cm/s) is obtained and therefore the soil can be classified into fine sand. Porosity of the fine sand is usually 30～50%, therefore, porosity is presumed on the safe side to be 30%.

The total amount of groundwater in the southern part of the groundwater divide is calculated as follows:

Groundwater Quantity = 32,000,000(m^2) x 10(m) x 0.3 =96 MCM

2) Recharge amount of the groundwater

Rainfall is the only water resource of recharge water for groundwater as the recharge area does not exist behind the concerned area. The amount of average annual rainfall is assumed to be 800mm. Infiltration ratio to the ground is at least 80% for natural flat land. Assuming that 20% of which is evapo-transpiration in the LS-MFEZ, an amount of infiltration is assumed to be 60%.

Therefore total recharge amount of this area can be calculated as;

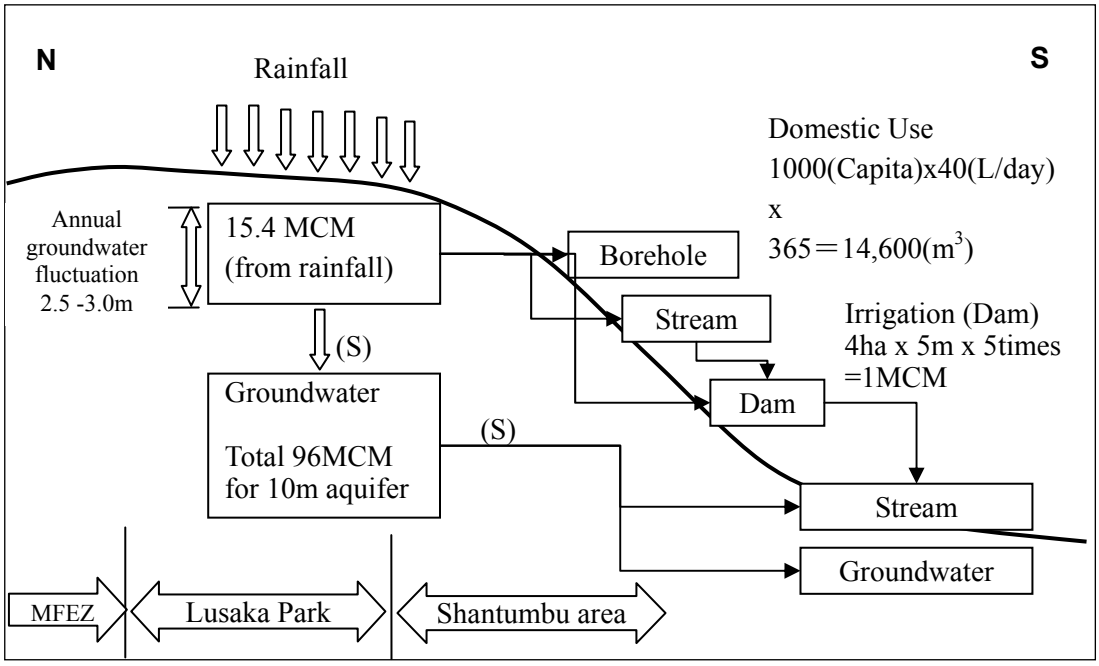
32,000,000 (m^2) x 0.8 (m/year) x 0.6 = 15.4 MCM/year

Confirmation of the calculation

Highest groundwater level is observed after rainy season. Also lowest groundwater level is observed at the end of the dry season. Groundwater level of BH-J3 was observed at 4.10m on July 25th and at 5.37m on September 30th . The difference of level was 1.27m. If porosity of aquifer is 30%, total discharge amount is calculated as 32,000,000 (m^2) x 1.27 (m) x 0.3 =12.19 MCM. From a hydrological viewpoint, recharge amount and discharge amount must be equal. Recharge amount which is 15.4 MCM/year is not far from 12.19 MCM/year of the recharge amount calculated by the groundwater difference and thus it can be thought that a great error is not in the estimation of the recharge amount. In addition, annual fluctuation of groundwater level is considered to be around 2.5 to 3.0m.

3) Hydrological balance

Hydrological balance of the southern part of the groundwater divide is shown in Figure 6.2.3.



Source: JICA Study Team

Figure 6.2.3 Hydrological Balance of the Southern Part of the Groundwater Divide

Part of the recharge amount (S) of 15.4 MCM will be deep groundwater and the source of a perennial stream. The amount of domestic and irrigation utilization is estimated at 1.15MCM which is approximately 8% of the estimated recharge amount. Demand in the first phase of the LS-MFEZ of 3000m^3/day (1.095MCM/year) is approximately 7% of the annual recharge amount. Total amount is less than 20% of the annual recharge amount; therefore, it probably will not have a significant impact on the groundwater resources.

4) Effect of groundwater level

The effect of groundwater level is evaluated as follows:

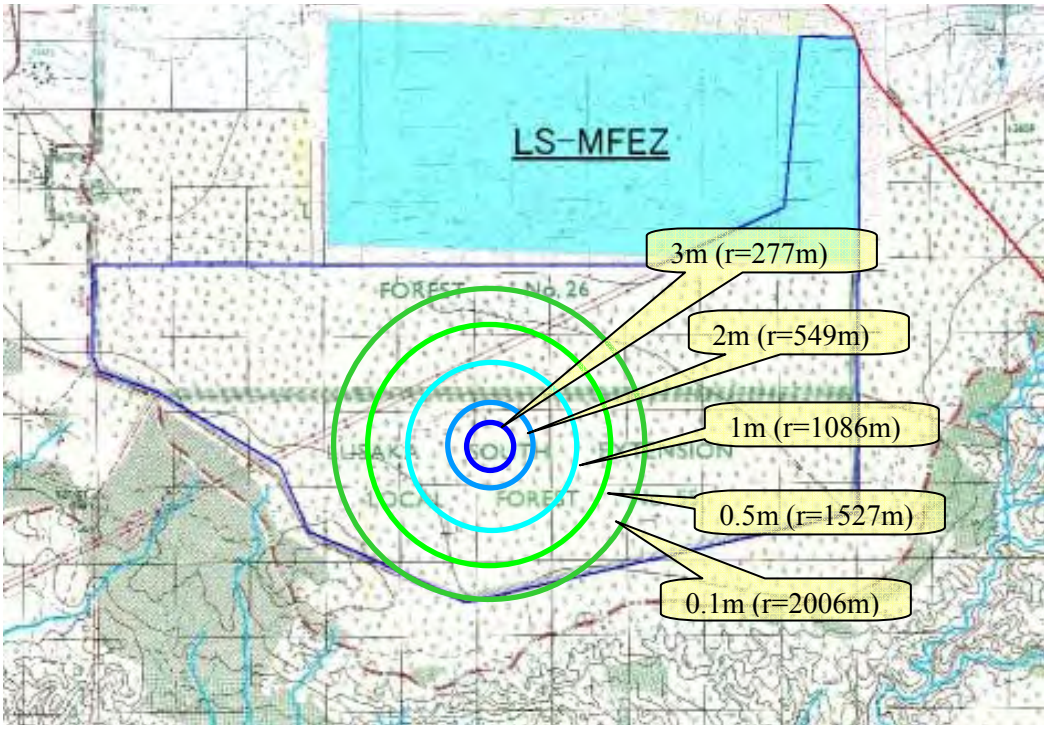
The influence radius of a well is calculated by employing the Modified Cooper - Jacob equation (5 years of pumping duration, pumping ratio: 3000m^3/day). The influence radius is calculated as Table 6.2.5. Hydrological coefficient of the BH-J3 test well was used for the calculation.

Table 6.2.5 Influence Radius and Drawdown (after 5 years: 2015)

Case	Allowable Drawdown: s (m)	Pumping Duration: t (day)	Pumping Rate: Q (m^3/day)	Influence Radius: r (m)
1	0.1	1800	3000	2006
2	0.5	1800	3000	1527
3	1	1800	3000	1086
4	2	1800	3000	549
5	3	1800	3000	277

Source: JICA Study Team

From the above table, the influence circle by drawdown of groundwater is shown in Figure 6.2.4.



Source: JICA Study Team

Figure 6.2.4 Diagram of Groundwater Drawdown (after 5 years)

Around Shantumbu Road, groundwater drawdown is estimated at less than 10cm. It is therefore considered that the production of groundwater would not greatly affect the groundwater use in the Shantumbu area.

In addition, the influence radius after 10 years pumping is shown in Table 6.2.6.

Table 6.2.6 Influence Radius and Drawdown (after 10 years: 2020)

Case	Allowable Drawdown: s (m)	Pumping Duration: t (day)	Pumping Rate: Q (m^3/day)	Influence Radius: r (m)
1	0.1	3650	3000	2859
2	0.5	3650	3000	2177
3	1	3650	3000	1548
4	2	3650	3000	783
5	3	3650	3000	396

Source: JICA Study Team

According to Table 6.2.6, the area of 10cm drawdown will be spread to the end of Lusaka plateau. An equation is based on the aquifer which distributed to infinity. In case of discharge at finite areas such as this site, drawdown of groundwater can be increased in comparison with the result of the calculation. Therefore, it is necessary to consider based on the groundwater monitoring in the first phase of operation for groundwater long term use or expansion of discharge ratio.

Groundwater for the first phase and city supply water in the second and third phase are considered in this plan.

6.2.3 PROPOSED WATER SUPPLY SYSTEM FOR THE FIRST PHASE

(1) Discharge Site

The center of the catchment in the southern part of the groundwater divide (around BH-J3) is proposed for the location of production wells from a hydrological viewpoint.

(2) Required Number of Deep Wells

According to the result of the test well BH-J3, more than 700 m^3/day (dia. 6 inch) can be discharged from one well. Diameter should be more than 10 inch for production wells, according to the potential. It will be able to discharge more than 1000m^3/day per well. Therefore, 4 wells (including one spare well) will be constructed for the first phase demand of 3,000 m^3/day.

(3) Drawdown for group well and Interval

In case the wells are provided in the same well field, the groundwater level will influence one another. Maximum drawdown can be observed on the well provided at the centre of the group well. Maximum drawdown is calculated and shown in Table 6.2.7.

((Conditions))

Wells are provided at equal spaces in the same straight line

Hydrological coefficients obtained from the BH-J3 test well are used

Modified Cooper - Jacob equation is used to calculate drawdown

Maximum drawdown = $\Sigma (s_n+s_0)$ (m)

Table 6.2.7 Drawdown for Group Wells

Case	Interval (m)	Drawdown at Production Well a (m)	Drawdown at interval b (m)	Maximum Drawdown a+2b(m)
1	5m	4.68	2.96	10.6
2	10m		2.62	9.92
3	20m		2.28	9.24
4	100m		1.50	7.68

Source: JICA Study Team

Production wells should be provided at a space of more than 20 m, otherwise drawdown of groundwater rapidly increases. Moreover, submersible pumps should be installed at a depth below the static water level, considering the annual groundwater fluctuation and the calculated value (if spacing is 20m, depth will be 9.24m).

Proposed installation depth of submersible pumps is 25 to 30m below ground surface.

(4) Water Supply System

The highest point of the LS-MFEZ is the south-west part which is 1334m above sea level and the lowest part is the north-west corner which is 1295m above sea level. Altitude of the proposed pumping sites around BH-J3 is 1314m above sea level. It is possible to supply water directly with the pressure of submersible pumps. However, to avoid the risk of a blackout, a gravity supply system using an elevated reservoir tank should be applied. Elevated reservoir tanks should be constructed at the highest place in the south east area of the LS-MFEZ. The installed capacity of reservoir should be 1500m^3 which would cover 50% of estimated demand per day in the first phase.

(5) Treatment facility

The result of water quality test reveals that groundwater is acceptable for drinking with an exception of coliforms (refer to Appendix D). A disinfection mechanism such as chlorination should be installed at the reservoir.

6.2.4 WATER SUPPLY SYSTEM FOR 2ND PHASE

The supply capacity of LWSC of water shall be increased from 210,000m^3/day to 300,000m^3/day by rehabilitation of Iolanda Water Works (Iolanda II Phase-1) and repair of leakages in the distribution pipe (LUSEED Interim Report). Therefore, the distribution pipe of LWSC will extend to the

Moshi-O-Tunya extension road from Woodland Extension area to first phase area of the LS-MFEZ to carter for the second phase. It will supply 6,000m^3/day.

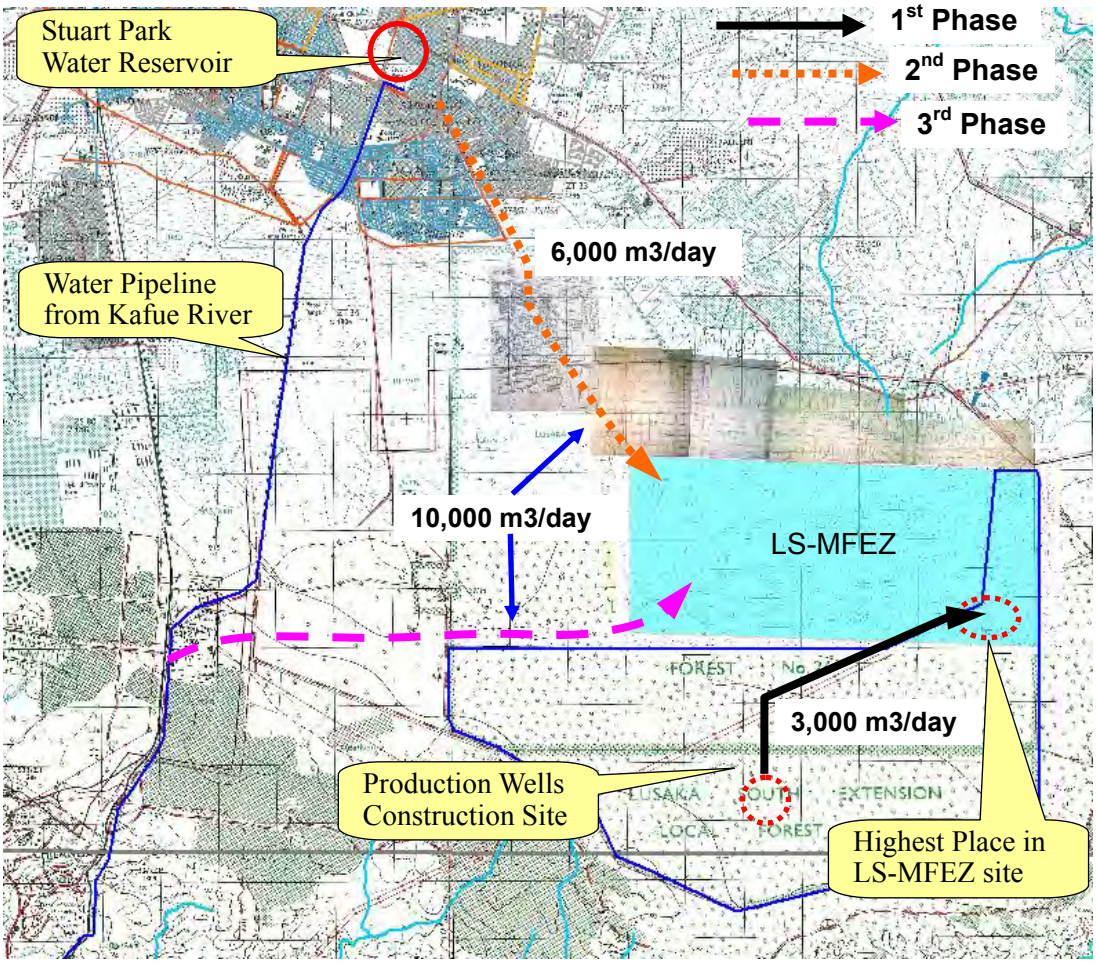
Water supply system of the first phase from production wells will operate only as a supplementary water source and observation of groundwater.

Elevated reservoir tank (1,500m^3) will be constructed at the same area for the second phase.

6.2.5 WATER SUPPLY SYSTEM FOR 3RD PHASE

The construction of additional water pipeline from Kafue River will be completed and 100,000 m^3 of water is expected to be added to LWSC water supply system by 2020 (Iolanda II Phase 2). The capacity of LWSC shall be expanded from 300,000m^3/day to more than 400,000m^3/day. For the stabilization of water supply, direct connection from this pipeline will be considered in the third phase. Water demand for the third phase estimated at 10,000m^3/day will be supplied by two systems of the second and third phase. Elevated reservoir tank (2,000m^3) will be constructed at the same area for the third phase.

Water supply plan of outside the LS-MFEZ is shown in Figure 6.2.5.



Source: JICA Study Team

Figure 6.2.5 Phasing Plan of Water Supply

6.2.6 WATER USAGE IN THE FUTURE

All amount of Water will be supplied from Kafue River in this M/P. However, trend of climate change shows temperature raise up, and it is showing that there is possibility to expand water shortage area. Therefore, water saving should be carried out in constant. On the other hand, the hydrological survey has been started by DWA supported by BGR in Lusaka area to evaluate groundwater. In accordance with this result water usage of Lusaka City will be determined.

6.3 SEWERAGE AND DRAINAGE SYSTEM

6.3.1 PROPOSED SEWERAGE SYSTEM IN THE LS-MFEZ

(1) General

The LS-MFEZ will consist of multi facilities, such as industry, research & development (R&D) institutes, public institutes, high tech parks, residential area and others. The proposed sewerage system in the LS-MFEZ is to maintain sustainable the LS-MFEZ activities and development in harmony with the environment around the site, is discussed below.

The location of the LS-MFEZ is about 15km away from the center of Lusaka City to the south-east side and the site is a groundwater recharge area for Lusaka City. There is no existing and planned sewerage system around the site; furthermore, there are neither rivers nor major drainages around the site to discharge potential treated wastewater from the site. There are four (4) rivers around the site. One is about two (2) km from the site to the northern and north-east side, called Chalimbama River, although there is a hill in between the LS-MFEZ site and the river. The other is about four (4) km from the site to the south-west side, called Chilanga River, although it is difficult to drain water by gravitational force to the river because of the topographic condition. The last two (2) are about 4km from the site to the south and south-east sides, called Shalubanje River and Kanyanja River. It is also difficult to drain water by gravity. The topographic condition of the site is shown in Figure 6.3.1.

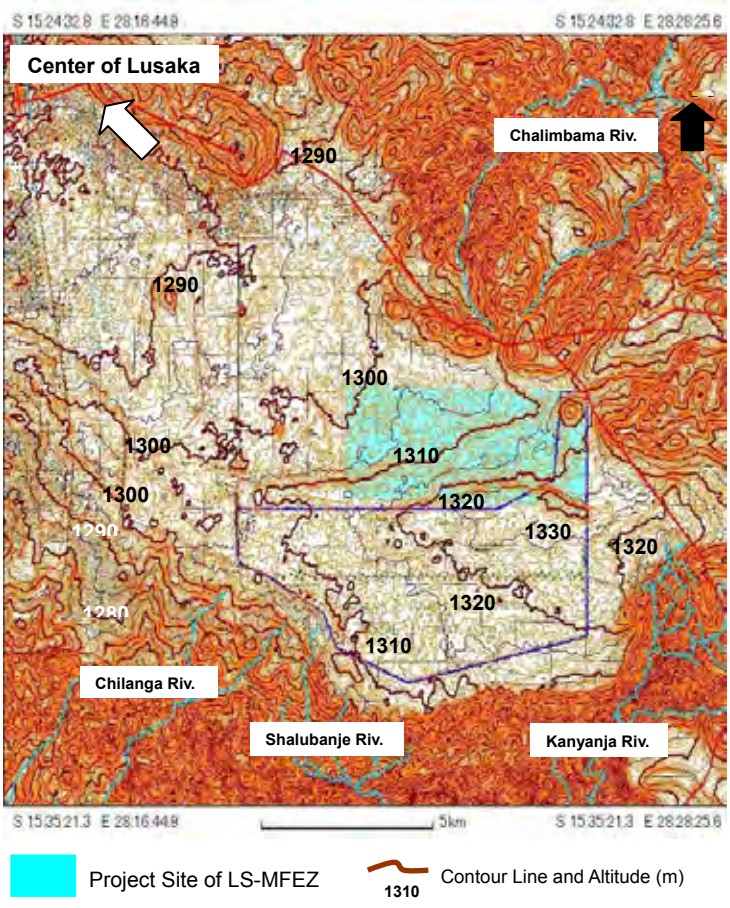


Figure 6.3.1 Topographic Conditions of LS-MFEZ Site

A study of the topographic condition indicates that the water infiltration rate into ground at the site is

very high, estimated at between 13,000-19,000mm/day (550-800mm/hour). It is evident that rainwater filters into the ground at the site, since there are no rivers / drainages at the site.

Based on the above assessment of the present conditions, management of wastewater for the LS-MFEZ is required and that wastewater generated in the LS-MFEZ should be treated and disposed within the site of the LS-MFEZ.

(2) Concept of the Proposed Sewerage System

- A separate system is applied to wastewater and drainage system, so wastewater collected by off-site systems and storm water are separately collected.
- Treated wastewater is discharged into the ground, and must not deteriorate the groundwater quality especially that it will be used by the people in the LS-MFEZ site and surrounding areas.
- Wastewater is treated biologically by wastewater treatment plants (WWTP) and soil-based treatment systems
- Pre-treatment must be done by wastewater generators if they discharge wastewater above the maximum limits prescribed in the LS-MFEZ.
- It will be a requirement that all industrial tenants, research & development institutions, public institutions and high tech parks, should declare the types, quantities & quality of chemicals used in their processes in the LS-MFEZ.

(3) Conditions of Proposed Sewerage System

1) Wastewater discharge flow

Wastewater generation is estimated at the same rate as the water consumed and the inlet of the groundwater into sewer is avoided since the groundwater level is low. Estimated wastewater generation is shown in Table below,

Table 6.3.1 Estimated Wastewater Generation in the LS-MFEZ

(m^3/day)

Category	Phase (Target Year)		
	1 (2015)	2 (2020)	3 (2030)
Residents	1,400	2,800	2,800
Visitors	350	700	3,000
Industry and other Water	1,250	2,500	4,200
Total	3,000	6,000	10,000

Note: Wastewater Generation = Water Demand as the safe side (refer to Table 6.2.3)
Source: JICA Study Team

2) Wastewater Quality

There is a Zambian Standard for discharging wastewater to aquatic environment. The typical figure of the standard is 50 mg/L in BOD_5. This standard is not applicable in the project as the treated

wastewater is disposed into groundwater that is used for drinking. There are no standards in Zambia regarding the disposal of wastewater into groundwater. It will therefore be vital to set a standard for the wastewater discharge into the ground. Estimated wastewater quality of raw wastewater and treated wastewater by WWTP and soil-based treatment systems is shown in Table below.

Table 6.3.2 Proposed Quality of Raw Wastewater and Treated Wastewater

Item	Unit	Raw wastewater	Treated wastewater		Remark
			WWTP	Soil-based treatment	
BOD_5	mg/L	250	30-50	< 2	
Temperature	^oC	16	16	16	Min Temperature in July
No. of Intestinal Nematode Eggs in Raw Wastewater	pcs/L	250	*1 < 1	0	

*1: Restricted irrigation use

Source: JICA Study Team

The quality of the treated wastewater by WWTP is restricted for irrigation use. Restricted irrigation refers to crops not grown for direct human consumption and food crops that are not consumed in raw form such as for cereal crops, industrial crops, fodder crops, pastures and trees. In the case of fruit trees, irrigation should cease two weeks before fruit is picked, and no fruit should be picked from the ground. WHO (1989)

3) Effluent Standard for Pollution Sources Discharging Wastewater to Sewer

If industries use any toxic chemicals, it may deteriorate the treatment process at the WWTP. There is an LWSC standard as mentioned before, but the figure is too large at 1200mg/L in BOD_5 to apply it in this project. So, the proposed wastewater discharge standard to sewers is set for the LS-MFEZ project as shown in Table 6.3.3. Several standard values proposed (temperature, pH, BOD_5, SS, total nitrogen, total phosphorus, vegetable oil, phenols iron and colour and odour) as shown in Table 6.3.3 are based on the standard of Osaka City and so on, Japan, which is applied to receive wastewater from industries into the public sewerage system. Proposed standard values for copper and manganese are obtained from health-based provisional guideline of WHO for drinking water. A standard value for aluminium is obtained from the limit level of consumer complains in guideline of WHO for drinking water.

A facility in which toxic substances as shown in *Table N.1* will be used cannot move into the LS-MFEZ area in principle. If a facility in which toxic substances will be used is permitted in the LS-MFEZ area, the industrial wastewater will be separately treated in each facility of factories, research institutions and so on as a closed system.

Other proposed effluent standard values for pollution sources discharging wastewater to sewer are values in guidelines values of WHO for chemicals that are of health significance in drinking water as shown in *Table N.1*.

These proposed standard values for pollution discharging wastewater to sewer shall be discussed with

the Environmental Council of Zambia and shall be finalized.

Table 6.3.3 Proposed Wastewater Discharge Standard to Sewers

Item	Unit	Discharge Standard
Temperature	°C	40
pH	-	5-9
Electric Conductivity	Micro-S/cm	1500#
Biochemical Oxygen Demand (BOD_5)	mg/L	300
Suspended Solid (SS)	mg/L	300
Total-Nitrogen	mg/L	120
Total-Phosphorus	mg/L	16
Mineral Oil	mg/L	2
Vegetable Oil	mg/L	20
Phenols	mg/L	5
Iron (Fe)	mg/L	10
Copper (Cu)	mg/L	2*
Zinc (Zn)	mg/L	2
Manganese (Mn)	mg/L	0.5*
Aluminium (Al)	mg/L	0.2**
Colour and odour	-	not affective to WWTP

* Health-based provisional guideline of WHO for drinking water;

** Levels to give rise to consumer complaints (WHO, 0.2 mg/L);

Electric Conductivity of groundwater 500 microS/cm;

the other parameters are from wastewater discharge standards to Sewers in Japan;

(4) Wastewater Treatment System

1) Proposed wastewater treatment system

The proposed wastewater treatment system consists of a wastewater treatment plant as the primary treatment of the wastewater and soil-based treatment system as the final treatment as shown in Figure 6.3.2.

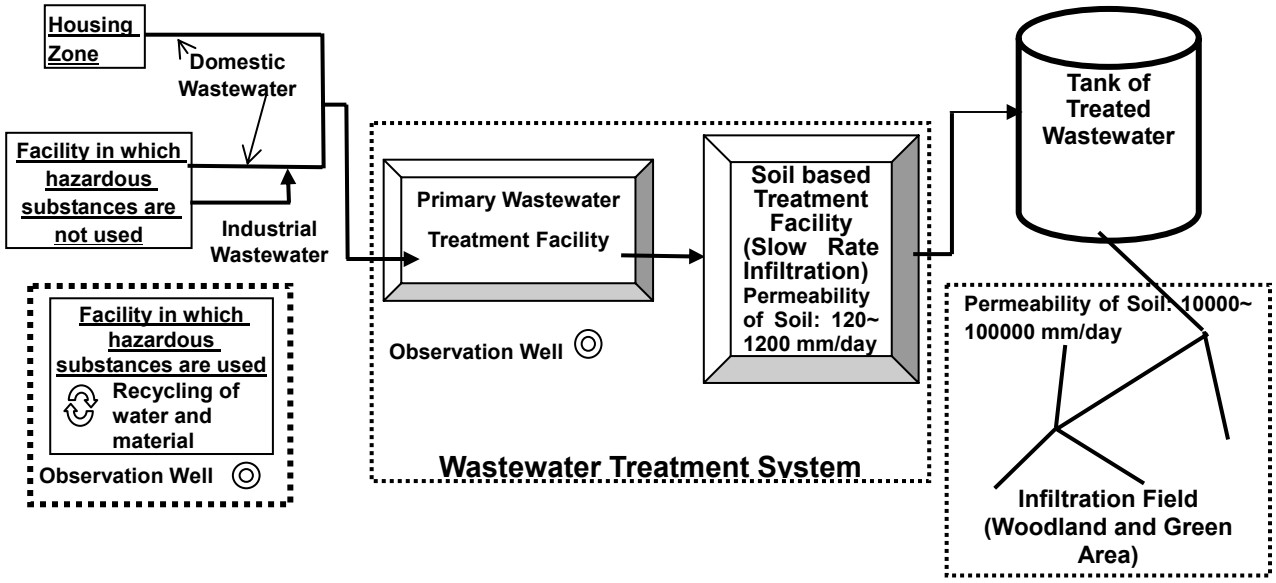


Figure 6.3.2 Proposed Wastewater Treatment System of the LS-MFEZ

2) Comparison of the primary wastewater treatment system

The following is a comparison of the primary wastewater treatment methods,

Table 6.3.4 Comparison of the Primary Wastewater Treatment System

Scale: Q=10,000 m^3/day

Wastewater treatment method	Required area (ha)	Removal rate of BOD_5&SS	Manageability of OM	Construction cost (Million USD)	O/M cost (Million USD/year)	Remark
Activated sludge	1.8	Over 90%	Difficult	27.0	1.1	Mechanical wastewater treatment system
Rotating biological contactor	5.4	80-90%	↑	27.0	0.9	
Oxidation ditch	3.0	Over 90%		22.2	0.7	
Tricking filter	5.4	80-90%		20.0	0.7	
Aerated lagoon	11	80-90%	↓	10.8	0.7	
Stabilization pond	57	80-90%	Easy	10.4	0.2	

Remark: Construction cost and O/M cost is shown in magnitude order.
Source: JICA Study Team

Disadvantage of the mechanical wastewater treatment system

- Electric power is necessary. If power failure occurs, generators must operate without the power supply stopping.
- Maintenance for the equipment is necessary. If equipment is broken, it must be repaired to maintain its proper functions. It would be difficult to maintain the equipment in good condition following the departure of donors of such equipment.
- Tricking filter system has been applied in Zambia, although it is observed that some equipment is damaged and is not in working condition.
- The equipment for the mechanical wastewater treatment system, such as the activated sludge method, is much more difficult to operate to treat wastewater properly. The system has not been applied in Zambia.

Advantage of Stabilization pond

- Electrical power is not required for the treatment.
- Operation and maintenance is easy and the system is easily applied in Zambia. It is required for removing solid waste from the screen and analysis of water quality for monitoring purposes. So, the current system employed by the Lusaka Water and Sewerage Company (LWSC) is adequate to maintain the treatment system.

Other Consideration

- There is enough space to fit a wastewater treatment facility of the stabilization pond system even in phase 3, although the treatment system requires a huge area. It is possible to upgrade the treatment system from the stabilization pond to any other mechanical treatment system to reduce the plant area. If the LS-MFEZ develops much faster than expected and industrial space is

required in future, the wastewater treatment plant area of the stabilization pond can be converted to another treatment system such as an aerated lagoon. The aerated lagoon system has advantages on the OM and construction cost compared to other mechanical treatment systems.

As previously discussed, a stabilization pond system is selected based on the above-mentioned comparison.

3) Soil-based Treatment System (Natural Treatment System)

This section on soil-based treatment system is discussed in reference to "Wastewater Engineering, Metcalf & Eddy".

i) Efficiency of soil-based treatment system

Treatment of wastewater in soil-based treatment systems is provided by physical, chemical, and biological processes that occur in the soil-water-plant system. These systems are capable of removing, at least to some degree, almost all of the major and minor constituents of wastewater that are considered pollutants – suspended solids, organic matter, nitrogen, phosphorus, trace element, trace organic compounds, and micro-organisms.

Reported removal efficiencies for most metal generally range between 80-95 %. Removal mechanism for bacteria and parasites (protozoa and helminthes) common to most natural treatment systems include die-off, straining, sedimentation, entrapment, predation, radiation, desiccation, and absorption. Viruses are removed almost exclusively by absorption and subsequently die-off. The slow-rate and rapid filtration systems, which feature the flow of wastewater through the soil profile, are capable of complete removal of wastewater microorganisms in the percolates.

ii) General condition and plan

Generally two soil-based treatment systems, slow-rate and rapid infiltration, are applied. In the rapid infiltration system, pre-treated wastewater is applied on an intermittent schedule to shallow infiltration or spreading basins. The rapid infiltration system, to maintain maximum hydraulic – loading rates, needs higher level treatments, as discharging high concentrations of SS and algae cause clogging of the soil surface, that deduce failure of the rapid infiltration system. So, rapid infiltration is not adequate because pre-treatment with it is selected with the stabilization ponds that discharge algae.

In the slow-rate system, the applied water either is consumed through evapo-transpiration or percolates through the soil profile. The slow-rate system needs pre-treatment of screening and primary sedimentation as the slow-rate degrades them. Intermittent application cycles are used in the same way as the rapid infiltration system. The slow-rate system is applied with various methods such as surface application or sprinkler systems.

Proposed application of slow-rate system is a surface application system of the furrow system. Furrow irrigation/infiltration is applied by gravity flow of reclaimed wastewater down the length of furrows from which it seeps into the soil. Wastewater is distributed into the furrows using gated aluminium pipes.

Drip system is not recommended because algae in the water often plug emitters as the stabilization pond that discharges algae is applied in this project. The Sprinkler system is easily damaged and has as short expected life span because of corrosion, so it is not recommended in this project.

Requirement of the slow – rate is shown in the Table below,

Table 6.3.5 Required Condition of the Slow-Rate System and Plan on the LS-MFEZ

Item	Condition	Plan on the LS-MFEZ
Minimum Pre-treatment	Screening + Primary sedimentation	Anaerobic Pond + Facultative Pond + Maturation Pond (AP+FP+MP)
Climatic condition	Storage often needed for cold weather and during precipitation	Storage pond is settled for precipitation of 105mm/day, 150mm/2day
Depth of groundwater	Minimum 0.9 – 1.2 m (120mm/day – 1,200mm./day)	This treatment will be carried out in the condition where infiltration of treated wastewater into groundwater is prevented
Slop	Less than 15% on cultivated land, less than 40% on forested land	Average slop is 0.5-1%, there is no concern on soil erosion.
Soil permeability	Moderately slow to moderately rapid	Site infiltration rate is high, about 10,000mm/day-100,000mm/day. Permeability of soil will be improved with soil improvement
Design value for soil permeability (Safety factor)	2-6% of minimum soil permeability	2-6% is applied
Plants	Natural vegetation, tree or crops	Suitable crops will be chosen in order to remove nitrogen and phosphorus components

Source: JICA Study Team

As shown in the Table above, it is understood that slow-rate system is applicable except the soil permeability. Regarding the soil permeability, the details are discussed in the following section.

iii) Soil permeability

Desirable soil permeability is as shown in the following Table,

Table 6.3.6 Site Characteristics of Soil Permeability

(mm/day)

	mm/day	(mm/hour)
Desirable	120 – 1200	(5 – 50)
Less desirable	40 – 120, 1220 – 3700	(1.5 – 5), (50 – 150)
Poor	< 40, >3700	< (1.5), > (150)

Source: “Wastewater Engineering, Metcalf & Eddy”

Infiltration rate of the LS-MFEZ site was surveyed and the following results were obtained; detailed survey result is attached in Appendix J2 and J3.

Table 6.3.7 Infiltration Rate of the LS-MFEZ Site

unit	Test 1	Test 2	Minimum Rate	Applied Infiltration Rate
(mm/day)	19,146	13,594	13,594	13,594
(mm/hr)	798	566	566	566

Source: JICA Study Team

Result of the detail test is shown in Appendix J.2, and J3.

Site infiltration rate, 13,594 mm/day is over the less desirable rate of 3700 mm/day for the slow-rate system, so the site is not suitable for the slow-rate system with normal application. To remedy this, the following measures are taken to overcome the condition.

- Minimum required pre-treatment of the slow-rate system is primary sedimentation, and the expected treated wastewater quality by only the primary sedimentation is about more than 100 mg/L in BOD. In the project, the stabilization pond system consisting of an Anaerobic Pond (AP) + Facultative Pond (FP) + Maturation Pond (MP) is applied in the pre-treatment system of slow-rate system to achieve the 19 mg/L of BOD, as shown in Appendix J5.
- Permeability of soil will be improved with soil amendments.
- Application rate is 7 days as it is recommended 4-14 days, to keep the soil condition aerobic.

iv) Expected effluent quality of treated wastewater by the slow–rate treatment system

Expected effluent quality of treated water by slow-rate treatment system is shown below based on the "Wastewater Engineering, Metcalf & Eddy".

Table 6.3.8 Expected Effluent Quality of Treated Water by Slow-rate Treatment System

Constituent	Average (mg/L)	Maximum (mg/L)
BOD_5	< 2	< 5
Suspended solids	< 1	< 5
Ammonia nitrogen as N	< 0.5	< 2
Total nitrogen as N	< 3	< 8
Total phosphorus as P	< 0.1	< 0.3

Source: "Wastewater Engineering, Metcalf & Eddy"

Expected treated wastewater, that is to be recharged to groundwater, is of better quality than highlighted by the figures shown in the Table above. With the above mentioned measures, it is expected that the water quality will become good enough for drinking when it reaches the groundwater and this water does not affect the present groundwater quality.

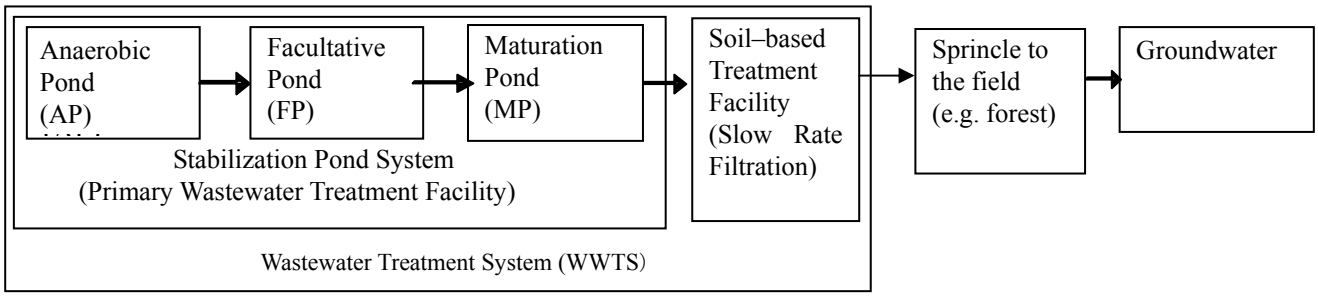
v) Recommendation

It is recommended to carry out a pilot test to ensure the function/characteristic of the soil-based treatment system and to find out the best way of applying the slow-rate infiltration test. Based on the results of the test, if necessary, filling the low permeability soil or improvemented soil at the soil-based treatment field.

4) Selected wastewater treatment system

As discussed in the above section, the proposed wastewater treatment system is selected with "Stabilization Pond + Soil-based Treatment Facility".

The LET, Environmental Council of Zambia (ECZ), Geological Survey, Ministry of Mines and Minerals Development and LWSC, agreed to apply the wastewater treatment system. Selected wastewater treatment system (WWTS) is as shown in Figure 6.3.3.



Source: JICA Study Team

Figure 6.3.3 Selected Wastewater Treatment System (WWTS)

(5) General Components on the Idea of the Sewerage System

The wastewater management system is composed of the sewers, wastewater treatment facility, soil-based treatment facility (slow-rate filtration), pumping station, pressure pipes, treated wastewater storage, and sprinkler trucks.

The pumping station is for transferring the treated wastewater which is in turn treated at the soil-based treatment fields and transferred to a treated wastewater storage located in the upper land. From the storage, the treated wastewater is delivered to the forest, roads, parks and other places by gravity pipe system and sprinkler trucks.

The LS-MFEZ Project is planned to proceed along three (3) phases, and the first phase development area is located on the western side while the second phase development area is located on the eastern side of the LS-MFEZ. The third phase development area will be located in between the two areas to be developed in the first and second phases.

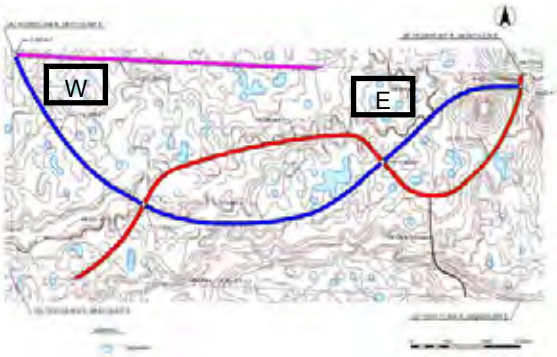
The layout of the wastewater treatment system (WWTS) is planned to consume minimum energy and will utilize the vacant area of the LS-MFEZ taking the following issues into account:

- Wastewater will be collected as far as possible by gravity, implying that the WWTS will be located at low points.
- The equipment, materials, and associated products for the system will utilize normal standard specifications and not special standards which are considered expensive.
- Stepwise development of the wastewater management will be applied on the basis of the project phasing.

(6) Alternative Study on Placing Wastewater Treatment System (WWTS)

There are two alternatives relating to the number of wastewater treatment systems to be sited in the LS-MFEZ. The general layout of the alternative study is as shown in Figure 6.3.4.

a) Alternative 1: Placing one (1) wastewater treatment system (WWTS)



b) Alternative 2: Placing two (2) wastewater treatment systems (WWTSs)

Figure 6.3.4 General Layout of the Alternative Study on Placing Wastewater Treatment System (WWTS)

a) Alternative 1: Placing one (1) wastewater treatment system

The LS-MFEZ generally slopes down to the west and north side, and therefore the WWTS can be sited at the north-western point. All wastewater generated in phases 1,2 and 3,can be pumped to this WWTS.

b) Alternative 2: Placing two (2) wastewater treatment systems

Should the requirement be for two WWTSs, one could be sited at the north-western point for the phase 1 area, and the other one can be placed at the north-eastern point for phase 2. Wastewater generated in phase 3 can be sent to the both WWTSs in equal proportions.

c) Comparison of the alternative cases

With regard to sewer costs, alternative 1 is more expensive than alternative 2, although the coverage area and length of sewers are almost the same. This is because the diameter of the sewer near the WWTS in alternative 1 will grow bigger as wastewater accumulates through phases 1, 2 and 3.

WWTS construction cost of alternative 1 is also more expensive as depth of the inlet sewer will grow

deeper than alternative 2 at West WWTS. This is because the length of the sewer is long from the east side to the west side, and the West WWTS needs to be deeper or the WWTP needs an inflow pumping station.

Regarding Operation and Maintenance (OM), there is not much difference between alternative 1 and 2, although one WWTS is slightly easier to maintain.

Results of the comparison are shown in Table 6.3.9.

Table 6.3.9 Comparison of the Alternative Study on the No. of the WWTP

Alternative	Component	Construction of Sewer	Construction of WWTS	OM	Overall
1	One WWTS	×	×	○	×
2	Two WWTSs	○	○	○	○

Source: JICA Study Team

As the result of the comparison, alternative 2, with two (2) WWTS plan, is recommended.

(7) Considerations on Applying the Stabilization Pond and Soil-based System

a) Planning and designing stage

i) The bottom of the stabilization pond is lined with the following, ordinary Portland cement ($8kg/m^2$), plastic membranes or 150-300mm layers of low permeability soil to achieve the satisfactory lining.

ii) Monitoring wells are constructed.

iii) The depth of every pond is not less than 1 m so as to avoid consequent hazards of breeding mosquitoes and snails.

iv) The bottom of the soil-based field is covered with the waterproof sheet to avoid direct infiltration of treated water into ground and to collect treated water for water quality inspection.

v) Soil-based field consists of three layer from the bottom such as sand layer (10 cm), gravel layer (15~20cm) and low permeability soil layer (more than 100cm).

vi) WWTS has green buffer of more than 50m with an access road.

b) Construction stage

After the construction of the pond, leaching tests are carried out to ensure that the ponds have no leakages.

c) Operation stage (Monitoring stage)

Treated water and groundwater quality is checked with inlet, outlet and monitoring wells.

(8) Development Plan of Wastewater Treatment System

The development plan of the wastewater treatment systemt is as follows,

1) The number of WWTS recommended is two (2) with one at the north-western point for phase 1 and the other at the north-eastern point for phase 2, named as Western WWTS and Eastern WWTS respectively.

2) Both of the stabilization pond systems in the WWTSs will have the two parallel lines with one line of the WWTP having the treatment capacity of wastewater generated at phase 1 and phase 2, respectively. The other line of WWTS will be a standby in case of trouble. In other words, the stabilization pond systems have twice the capacity of effluent wastewater of phases 1 & 2. Wastewater generation of phase 1 and phase 2 is same at 3000m^3/day. So, total capacity of both stabilization systems is 6,000 m^3/day.

3) In phase 3, half of the generated wastewater is sent to the Western WWTS and the other half of the wastewater is sent to the Eastern WWTS. Total wastewater in phase 3 is 10,000 m^3/day, effluent of wastewater to both WWTSs is 5,000 m^3/day, which is less than each WWTS capacity of 6,000m^3/day.

   In case of the occurrence of any trouble with the one line of the WWTP, the remaining line of 3,000 m^3/day capacity would treat the inlet of 5,000 m^3/day while the other line is undergoing rehabilitation. This operation is designed to cover the WWTP capacity of about 70 % (5,000/3,000 = 1.66), and is still designed in such a way as to ensure that the treated wastewater BOD_5 is less than 50 mg/L. Initial treated wastewater is discharged into the soil-based treatment facility and BOD5 of treated water is less than 5 mg/l. It is suitable to spray to the ground. .

4) There will be no particular requirement for the development of a wastewater management system in phase 3, because the present land use allows placing of the wastewater treatment plant of the stabilization pond in the LS-MFEZ site. If it is anticipated that the LS-MFEZ would require additional land for developing many other facilities such as industries, research & development institutes, public institutes, high tech parks, residential area housing, and others, a WWTS applying the mechanical system such as the aerated lagoon system instead of the stabilization system may be considered.

   While developing in phase 2 and 3 using the stabilization pond system, it is recommended that the wastewater treatment process in phase 1 and phase 2 is revised to ensure that the design conditions corresponds to achieve the required wastewater quality. If necessary, the size of the pond should be revised with the appropriate condition for developing WWTSs at phase 1 and 2.

(9) Design of the Wastewater Treatment System

a) Sewer

Planning of the sewer is as attached in Appendix J.4.

b) Wastewater Treatment Facility

Calculation of designing stabilization pond is attached as Appendix J.5. Typical layout of the stabilization pond is also attached.

Calculation of designing aerated lagoon is attached Appendix J.6 as a reference.

c) Soil-based treatment facility

Planning of the soil-based treatment system is as attached as Appendix J.7.

d) Pumping station

Calculation for planning the pumping station is as attached as Appendix J.8

(10) Summary of the Facilities on Sewerage System

Summary of the facilities on wastewater management system is shown in the Table 6.3.10.

Table 6.3.10 Summary of the Facilities on Sewerage System

Item	Specification/Remark		
	Phase 1	Phase 2	Phase 3
Main Sewer	Dia 300-600mm, Depth 0.5-1.5m, L-6300m	Dia 300-600mm, Depth 0.5-1.5m, L-5400m	Dia 300-400mm, Depth 1.0-2.0m, L-19900m
Tertiary and Secondary Sewer	Area: 75ha, Dia150-250mm, Depth 1.0-1.5m, Sewer length: 250m/ha	Area: 75ha, Dia150-250mm, Depth 1.0-1.5m, Sewer length: 250m/ha	Area: 500ha, Dia150-250mm, Depth 1.0-1.5m, Sewer length: 125m/ha
Inflow Pumping Station of East WWTP	-	-	Q: 1.36m^3/min, Head: 5m x 3pcs, including one (1) standby 6m x 8m pump house with suction pit, 140ha is pump up area in east side of phase 3 development area.
Stabilization Pond System	Consist of AP+FP+MP AP: D4.5mxW37mx L55m FP: D2.5mxW98mx224m MP: D:2.2mxW89.4mxL203.4m 2 parallel lines, Monitoring wells: 2wells, Depth:30m Fence	Consist of AP+FP+MP AP: D4.5mxW37mx L55m FP: D2.5mxW98mx224m MP: D:2.2mxW89.4mxL203.4m 2 parallel lines, Monitoring wells: 2wells, Depth:30m Fence	There is no construction of WWTP in phase 3.
Soil-based Treatment Facility	Area: 10ha 1)Pipe installation, Pipe :Diameter 100mm Length 4100m 8 Valves and fitting is included. 2)Making layer, Soil : 250,000m^3 3)Removing rock Rock volume: 50,000m^3, This is not included.	Area: 10ha 1)Pipe installation, Pipe :Diameter 100mm Length 4100m 8 Valves and fitting is included. 2)Making layer, Soil : 250,000m^3 3)Removing rock Rock volume: 50,000m^3, This is not included.	There is no construction of soil-based treatment facility in phase 3.
Treated Wastewater Storage	Area: 1ha, Excavation Rock: 2,900m^3 Soil: 6,800m^3 Landfill 9800m^3	Area: 1ha, Excavation Rock: 2,900m^3 Soil: 6,800m^3 Landfill 9800m^3	System of phase 1&2 covers phase 3.

Item	Specification/Remark		
	Phase 1	Phase 2	Phase 3
Pumping Station for Treated Wastewater at WWTS	Installed at West WWTS, Q: 1.05m^3/min, Head: 30m x 3pcs, including one (1) standby 6m x 12m pump house with suction pit	Installed at East WWTS, Q: 1.05m^3/min, Head: 50m x 3pcs, including one (1) standby 6m x 12m pump house with suction pit	PS of West WWTS Q: 1.05m^3/min, Head: 30m x 2pcs, including one (1) standby PS of East WWTP Q: 1.05m^3/min, Head: 50m x 2pcs, including one (1) standby, Installing additional pumps, pump house is same with phase 1&2.
Pressure Pipe	Dia 300mm, Depth 1.0m, L3800m	Dia 300mm, Depth 1.0m, L3700m	System of phase 1&2 covers phase 3.
Sprinkler Truck	No. of truck: 1, Volume: 10m^3, Suction pump is attached.	No. of truck: 1, Volume: 10m^3, Suction pump is attached.	No. of truck: 2, Volume: 10m^3, Suction pump is attached.

Source: JICA Study Team

(11) Cost Estimation of Sewerage System

The cost estimation of the sewerage system is as attached in Appendix J.9,

(12) Operation and Maintenance (OM) of Sewerage System

The concept of the proposed operation and maintenance of sewerage system in the LS-MFEZ is as follows,

- Sewerage system is managed by the management organization of the LS-MFEZ.
- The management organization supervises the OM and monitoring system.
- The organization contracts out some work, such as repair of the equipment, pumps, pipes, and others to Zambian enterprises such as, LWSC, as it is would not be economic for the management organization of the LS-MFEZ to maintain all technical staff and special maintenance devices for the sewerage system.
- The organization takes care of the simple OM work such as removing solid waste at screens, and also monitoring water quality and also reading water meter and charging water & wastewater fees by itself or by subcontract.
- The organization and LWSC cooperate to make a future development plan along with the LS-MFEZ development.

6.3.2 DRAINAGE SYSTEM

(1) Existing Drainage System in Lusaka City

1) General

As mentioned before, a separate system is applied to collect wastewater and storm water in Lusaka City. The major drainage system of the Lusaka City is unlined ditches dug alongside roads. The drainage system is maintained by the Engineering Service Department of LCC. Lusaka City has been experiencing floods every year but localised pondings on some troughs or depressions. The major causes of the flooding are recognized below, based on the Luseed Study,

- Increasing the run-off coefficient due to urbanization
- Lack of sufficient drainage systems (drainage, retention ponds, diversion channels)
- Insufficient maintenance, e.g. outfall drains filled with garbage and blocked by illegal development on the surface.

(2) Proposed Drainage System in the LS-MFEZ

1) General

As mentioned in the previous section, there are no existing nor planned drainages around the site to discharge the storm water, and it is understood that rain water is infiltrated at the site as the site infiltration rate is high. Based on these conditions, the requirements of drainage system for the LS-MFEZ is that rainwater in the LS-MFEZ is disposed within the site of the LS-MFEZ.

2) Concept of the Proposed Sewerage System

- A separate system is applied to wastewater and drainage system, so wastewater and storm water are separately collected.
- Run-off volume generated by development of the LS-MFEZ is disposed into ground as hereto before. It recharges the groundwater; and thus the LS-MFEZ site is a groundwater source for Lusaka City.

3) Conditions of Proposed Drainage System

a) Amount of Rain fall (Precipitation)

Past rainfall data is obtained from the Meteorological Department Mount Makulu Research Station, and Zambia Agriculture Research Institute (ZARI) as follows:,

- Daily rainfall data (January 1978 – April 2008) at Lusaka 01 Station located at the Meteorological Department : Sourced by Meteorological Department
- Hourly rainfall data (May 1959 – April 1962) at Lusaka 01 Station located at the Meteorological Department: Meteorological Department
- Hourly rainfall data (17-18th April 1986) at a farm of University of Zambia: Mount Makulu Research Station, Zambia Agriculture Research Institute (ZARI)

The data is attached in Appendix K.1, K.2 and K.3, respectively.

b) Design Daily Rainfall

Probability of exceedance is calculated as attached in Appendix K.4. Return period of 10 years is applied for the project as follows,

Design daily rainfall: 99.3mm/day with a return period of 10 years

c) Distribution of rainfall

Major hourly rainfall is summarized in Appendix K5, referring to the original data of hourly rainfall data mentioned above. It is identified that the majority of the rainfall pattern is front shifted rainfall and continuous rainfall time is about 10 hours, based on the Appendix K5.

d) Run-off coefficient

Run-off coefficient is a discharging rate of rainfall over the ground level out of 100% of rainfall. The proposed run-off coefficient is 0.65 for this project, the figure is set taking into account the land use of the residential area with a small garden or an industrial area with some gardens.

It is important that every land use plan and industrial institute shall keep the run-off coefficient less than this figure. It is needed that garden or green area shall be plotted to secure the figure. Storm water discharge flow becomes bigger and the storm water facility becomes bigger if the run-off coefficient becomes bigger. the LS-MFEZ supervisory organization shall check the institutes developing plan to ensure that the figure is secured before construction. If it is not secured, the LS-MFEZ supervisory organization will instruct the institutions concerned to amend their plan.

The organization shall also check the built housings or buildings to ensure thatthe rate is secured. If it is not secured, the LS-MFEZ supervisory organization will accordingly instruct the institutions concerned to rectify their structures.

e) Infiltration Rate

The design infiltration rate is determined by multiplying the minimum soil permeability rate by an application factor. The application factor of 4-10% of the conductivity of the most restrictive soil layer is utilized for a rapid infiltration system, when field measurements of vertical hydraulic conductivity measurements were applied. In this practice the rainwater is applied but not treated wastewater, so that 10% of the factor is adopted. The result of the design infiltration rate are shown in the Table 6.3.11,

Table 6.3.11 Infiltration Rate for Appling Rainfall into the Ground

Unit	Test 1	Test 2	Minimum figure	Application factor	Applied Infiltration Rate
(mm/day)	19,146	13,594	13,594	10%	1,359
(mm/hr)	798	566	566	10%	57

Source: JICA Study Team

4) General Components and Ideas of a Drainage System

The drainage system is composed of the drainages and retention / infiltration basins. The drainages are generally installed along roads. Culverts are applied at cross sections of roads. Collected storm water along the drainages is sent to the retention / infiltration basins. Storm water is disposed into the ground at the basins, but if it is over the capacity of the infiltration rate of the basins, it cannot

smoothly infiltrate into the ground, so a retention pond is required to hold it. In the project, the function of the basins is to infiltrate the storm water and to retain the water.

As mentioned before, the LS-MFEZ Project is planned to proceed along three (3) phases, and the first phase development area is located on the western side and second phase development area is located on the eastern side. The third phase development area is located between the two phases.

Layout of the drainage system is planned to be reasonable to use minimum energy and to utilize the vacant area of the LS-MFEZ with the following ideas,

- Storm water is collected by gravity, so the retention / infiltration basin shall be located at low points.
- Materials, products and equipment for the system are utilized with normal standards but not special standards, as the latter one is more expensive.
- Stepwise development of the drainage is applied, based on the project phasing.

5) Alternative Study on a Placing Retention / Infiltration Basin

There are two alternatives on placing the number of retention / infiltration basins, as one (1) basin, and two (2) basins for drainage system of the LS-MFEZ. The idea of the alternative study is almost the same as the alternative study on placing a wastewater treatment plant. The general layout of the alternative study is as shown in Figure 6.3.4.

a) Alternative 1: Placing one (1) Retention / Infiltration Basin

The land in the LS-MFEZ area generally slopes down to the west and north sides, so location of the basin is placed at the north-western point for one (1) retention / infiltration basin. All run-off volume in phases 1, 2 and 3, is to be sent there.

b) Alternative 2: Placing two (2) Retention / Infiltration Basins

Locations of the two basins are placed at the north-western point for the phase 1 area, that location is at the same location of alternative 1, and the other one is placed at north-eastern point for phase 2. Run-off volume in phase 3 is to be sent to the both retention / infiltration basins half and half.

c) Comparison of the alternative cases

Regarding drainage cost, alternative 1 is more expensive than alternative 2, although the coverage area and length of drainages are same. It happens because dimension (size) of the drainage near the basin of alternative 1 will become bigger as the run-off volume accumulates through phases 1, 2 and 3.

Basin construction cost of alternative 1 is also more expensive as depth of the basin will become deeper than alternative 2. It happens as the depth of drainage around the west basin becomes deeper as the length of the drainage is long from the east side to the west side.

Regarding Operation and Maintenance (OM), there is not much difference between alternative 1 and 2, although one basin of alternative 1 is slightly easy to maintain the basin.

Results of the comparison are shown in the Table below,

Table 6.3.12 Comparison of the Alternative Study on the No. of the Basins

Alternative	Component	Construction of Drainage	Construction of Basin	OM	Overall
1	One basin	×	×	○	×
2	Two basins	○	○	○	○

Source: JICA Study Team

As a result of the comparison, alternative 2, the two (2) basin plan, is recommended.

6) Development Plan of Retention / Infiltration Basins

Development plan of the Basin is as follows,

1) No. of Basin is two (2) at the north-western point for phase 1 and at the north-eastern point for phase 2, named as Western Basin and Eastern Basin.

2) Both Basins are designed based on the inflow (run-off volume) and soil infiltration flow.

3) East Basin and West Basin are constructed in phase 1 and phase 2 respectively with the minimum requirement for each phase.

4) In phase 3, half of the generated run-off volume is sent to the Western Basin and the other half of the run-off volume is sent to the Eastern Basin. Each basin of the additional volume for phase 3 is constructed in phase 3.

5) The retention / infiltration basins of phase 2 and phase 3 will be constructed after the basin of phase 1 is constructed and is in operation. When the basin of phase 2 and 3 is designed, it is recommended that design conditions such as infiltration rate, run-off coefficient, and rainfall intensity is revised to make more reasonable basins.

9) Design of the Drainage System

a) Drainage

Planning and designing of the drainage is as attached in Appendix K.6.

b) Retention / Infiltration Basin

Calculation of designing the basins is attached in Appendix K.7.

10) Summary of the Facilities on a Drainage System

Summary of the facilities on a drainage system is shown in the Table below.

Table 6.3.13 Summary of the Facilities on the Drainage System

Item	Specification/Remark		
	Phase 1	Phase 2	Phase 3
Drainage	Most of drainage is along road.	Same to left	Same to left
Retention pond / Infiltration basin	Area: 4ha Depth: 1.5m Unit size: 1ha Excavation Rock: 19,200m^3 Soil: 44,800m^3	Area: 4ha Depth: 1.5m Unit size: 1ha Excavation Rock: 19,200m^3 Soil: 44,800m^3	Area: 10ha x 2sites, Depth: 1.5m Unit size: 1ha Excavation Rock: 48,000m^3 Soil: 112,000m^3

Source: JICA Study Team

General layout of the drainage system is shown in Drawing No. 6.4.2.

11) Cost Estimation of the Drainage System

The cost estimation of the drainage system is as attached in Appendix K8. Drainages along roads is not included in the cost estimation of the drainage system, as they are included in road construction cost.

12) Operation and Maintenance (OM) of the Drainage System

The concept of the proposed operation and maintenance of the storm water system in the LS-MFEZ is as follows,

- Storm water system is managed by a management organization of the LS-MFEZ.
- The management organization supervises the OM and monitoring system.
- The organization contracts out some work, such as repair of the drainages, basins, and others to Zambian enterprises such as the Engineering Service Department of LCC, as it is not effective and economic for the management organization of the LS-MFEZ to hold all technical staff and special maintenance devices for the drainage system.
- The organization takes care of the simple OM work such as checking / monitoring the drainage and basin conditions.
- The organization and Engineering Service Department of LCC cooperate to make a future development plan along with the LS-MFEZ development.

6.4 SOLID WASTE MANAGEMENT

6.4.1 VOLUME OF SOLID WASTE IN THE LS-MFEZ

(1) Domestic Waste

The Waste Management Unit (WMU) estimated solid waste volume based on the data in 2002, and prepared the volume of residential and non-residential solid waste as highlighted in Table 6.4.1. According to this table, specific unit of domestic waste is 0.4kg/habit/day.

Table 6.4.1 Volume of Solid Waste in Lusaka City

Source of waste	Specific waste amounts Kg/inhab./day	Inhabitants Projection 2002	Inhabitants Per cent of total	Waste amounts Thousand tonnes/year	Waste amounts Per cent of total
Households, peri-urban	0.4	759,421	66.2	110,875	49.4
Households, high density	0.4	69,464	6.1	10,142	4.5
Households, medium density	0.4	151,054	13.2	22,054	9.8
Households, low density	0.4	166,644	14.5	24,330	10.8
Sub-total, residential		**1,146,583**	100.0	**167,401**	74.6
Hotels				4,394	2.0
Markets/supermarkets				9,567	4.3
Industry & commerce				23,363	10.4
Hospitals & clinics				4,181	1.9
Institutions & schools				5,733	2.6
Street sweepings				9,673	4.3
Sub-total, non-residential				**56,911**	25.4
Total MSW				**224,312**	100.0

Source: Strategic Municipal Solid Waste Management Plan for Lusaka City (LCC 2003)

According to the WMU's informal information, waste amount of 0.45 kg/habit./day is applicable these days. On the other hand, approximately 1 kg/habit./day of waste is used in the developing country.

Waste amount of 0.45 kg/habit./day is applied for a unit discharge amount of the domestic waste considering that the inhabitants in the LS-MFEZ zone are high-income class.

(2) Industrial Waste

As to the waste generated from business establishment (industries and public offices), the domestic waste discharged from other than the households is indicated in Table 6.4.1. Waste amount of 0.80 kg/habit/day is obtained by dividing waste amount of 56,911(t/year) by number of officially estimated employees of 194,170 in Lusaka City (Progress Report of LSEED JICA Study Team (February 2008). According to the analysis the result of generated amount of the waste from business activities, unit waste amount of 1090/habit/day is estimated, which shows a similar result obtained from using number of employees in Lusaka City(On causes/affect on the disposal amount of waste for business activities : Ritsumeikan Univ. AMANO Koji et. al). Therefore, waste amount of 0.8 kg/habit/day obtained from number of employees in Lusaka City is to be adopted as unit waste amount generated from business establishment.

(3) Estimation of Volume of Solid Waste in the LS-MFEZ

The waste amount obtained from the above unit waste amount, which is generated during operation in the LS-MFEZ, is indicated in Table 6.4.2. However, total amount of hazardous waste generated from industries is estimated to be small and therefore is stipulated as "small amount" in the Table based upon that the pollution industries are not invited as a general.

Table 6.4.2 Amount of Solid Waste the LS-MFEZ (O/M stage)

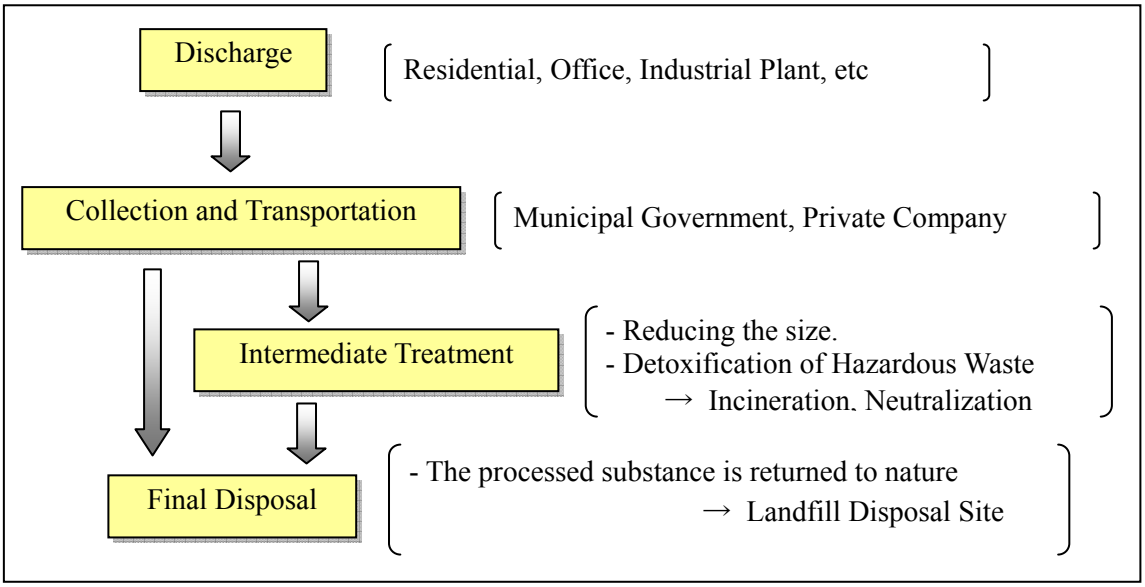
Unit of Waste Generation		Phase 1	Phase 2	Phase 3	Total
Population	0.5 kg/capi./day	5,000 cap	5,000cap	0	10,000 cap
Industries	0.8 kg/worker/day	2,850*cap	2,850*cap	23,000 cap	35,000 cap
Quantity of Waste (t/day)					
Domestic Waste (Residential)		2.5	2.5	0	5.0
Industrial Waste (Non-residential)		2.28	2.28	18.4	22.96
Hazardous Waste		-	-	-	Small Amount
Total		4.78	4.78	18.4	27.96
Accumulating total		4.78	9.56	27.96	

* 50 % of the inhabitants is assumed to employ in the LS-MFEZ, and 350 of workers coming from outside is considered.

Source: LS-MFEZ JST

6.4.2 SOLID WASTE MANAGEMENT FOR THE LS-MFEZ

The domestic waste is usually disposed with a flow of collection→transportation→treatment→ disposal as indicated in Figure 6.4.1.



Source: JICA Study Team

Figure 6.4.1 Flow Chart of Solid Waste Management

Separation/recycle facility, incineration facility, and detoxifying facility are furnished for the function of an intermediate disposal as in Figure 6.4.1. However, intermediate treatment system is not

introduced in Lusaka City presently. UTH currently undertakes the incineration of medical waste and hazardous waste only but UTH does not have sufficient capacity for such disposals..

Study on the treatment of domestic waste in the LS-MFEZ is made below.

(1) Domestic Waste

The amount of generation of domestic waste from households, business offices, and public offices in the LS-MFEZ is estimated to be 10t/day as aforementioned. The disposal method of waste, incineration, compost, methane fermentation, and landfill are considered. Construction cost of incineration is approximately 150,000 (USD/t) and initial investment cost is large while operation/maintenance cost is equally expensive (refer to Table 6.4.3 and Figure 6.4.2). Considering the disposal capacity of 30t/day, construction cost of approx. 4.5(million USD) and maintenance cost of approx. 0.1(million USD) are required.

Table 6.4.3 Construction Cost of incinerator in the Countries

Country	Place	Type of Incinerator	Manufacturer	Construction Cost (million USD/ton)
Taiwan	Taipei	Stoker Furnace	Mitsubishi Hev.	0.19
Taiwan	Taipei	Stoker Furnace	Takuma	0.17
Taiwan	Taipei	Stoker Furnace		0.21
Singapore	Senoko	Stoker Furnace	Mitsubishi Hev.	0.12
Indonesia	East Java	Stoker Furnace		0.14
Korea	Pucyong		Hitachi Zosen	0.21
America	-	Stoker Furnace		0.15
England	East London			0.16
Japan	Koto ward	Takuma	Takuma	0.47
Japan	Minato ward	Martin	Mitsubishi Hev.	0.50
Japan	Saitama prefecture	Stoker Furnace	Hitachi Zosen.	0.50

Source: Cost Comparison Survey for Countries (Plant Research Institute)

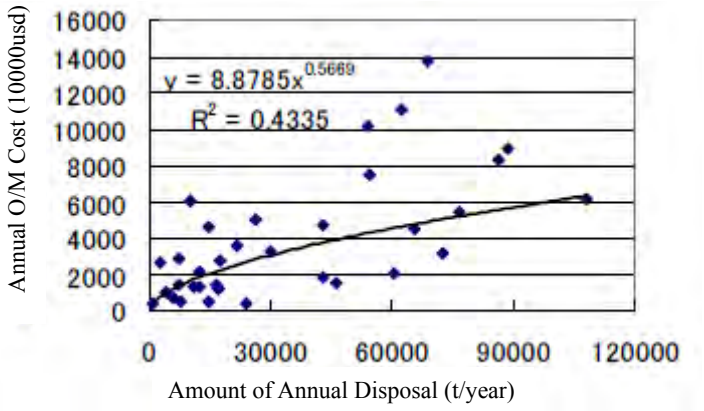


Figure 6.4.2 Relation between Annual Disposal Amount and Maintenance Cost obtained from Questionnaire

Introduction of incineration is difficult since incineration has problems of smoke, fly ash (usually treated as hazardous waste) and disposal of incinerated ash.

Since compostization and methane fermentation can not be expected to fulfill function for mixed waste, such works are currently difficult to introduce. These options may be studied in the future and training for the generators of waste will be an important aspect as well as consideration of establishment of the separate collection system.

On the other hand, the amount of waste generated from the LS-MFEZ is estimated to be 4.78 t/day for Phase 1 and this is approximately 0.8 % of the estimated figure (221,385 t/year) of 2009 as indicated in Table4.5.1 and will not significantly affect the capacity of Chunga disposal area.

Therefore, it is recommended that solid waste collection, transport and disposal is carried out by WMU as new WMD in the LS-MFEZ in phase one and two as long as Chunga landfill site is under operation. Before Chunga landfill closed, new waste disposal site will be considered by Lusaka City Council. If location of new landfill site is far from the LS-MFEZ, it may need to consider new landfill site by MFEZ itself as alternatives.

(2) Hazardous Waste

At present, there is no facility which disposes of hazardous waste in Lusaka City. Classification of hazardous wastes are defined as shown in Table M.5 to M.11 in Appendix M, however, these are not under control except medical waste.

It is not expected that large amounts of harmful waste will be generated since industries which treat such amounts of harmful substances are avoided as much as possible.

Hazardous waste will be kept in hazardous waste storage or disposal facility which will be constructed by the LS-MFEZ in Common Service Facility Zone.

Basically, the Zambian Act. should be applied for hazardous waste management. However, currently the regulation of hazardous waste management has not yet been prepared sufficiently and it is therefore necessary to prepare regulation showing structural regulations of hazardous waste storage shed or hazardous waste disposal site. Generally there are three type of Landfill of hazardous waste in the world;

1) Open Dumping Type

The facilities which has the structure that leachate doesn't permeate into the ground by sealing system, and has leachate treatment plant.

2) Underground Disposal (Geological Disposal)

The cavity type, which is constructed under the ground at a stable geology, such as non crack granite and/or salt rock layer without groundwater.

3) Blocked Cell Type Disposal

It has cell structures which is made of concrete and waterproof management is given inside of each cell to protect leakage of leachate. It has canopy to avoid rainfall.

1)and 2) is applied for huge scale of disposal site. Type 3 which depends on the amount of necessity waste generator can be constructed in generators own site as recommended. The construction cost is approximately 500 (USD/m^3) and is therefore not a significant cost to enterprises..

In addition, hazardous waste disposal sites which store the waste such as type 2) and 3) are just long term storage before applying treatment technology or recycling technology. It is sure that a final disposal is required in the future. However, the final disposal is not only for the issue of LS-MFEZ but also of entire Lusaka City. Despite amount of hazardous waste in Lusaka City is much larger than the LS-MFEZ, there is no disposal plant for hazardous waste even in Zambia. Therefore, it must be considered by the local government. It is recommended that hazardous waste dispersal must be considered in the future under the GRZ and/or Lusaka City initiative.

6.5 POWER SUPPLY SYSTEM

6.5.1 BASIC DESIGN CONDITIONS

Electric power for the LS-MFEZ will be supplied from ZESCO power grid. The basic design concepts essential for the LS-MFEZ are as follows.

1) Sufficient power supply system
2) High reliable power supply system
3) High stability of supplying voltage
4) Environmental harmony

6.5.2 POWER DEMAND

The power demand for the LS-MFEZ is estimated for basic design as shown in Table 6.5.1 and 6.5.2.

Table 6.5.1 Power Demand Calculation

< Phase-1>

Land Use Category			Unit rate Demand		Phase-1				
			Rate	Unit	Net Area (ha)	Population (Total)	Max. Demand (MVA)	Load Factor	Demand (MVA)
1		General Industrial Zone	0.3	MVA/1ha	25	2,500	7.5	0.7	5.25
2		High-Tech Park	0.4	MVA/1ha	25	2,500	10	0.7	7
3		Central Business District	800	VA/1p	5	150	0.12	0.45	0.054
4		Common Service Facility Zone	500	VA/1p	15	500	0.25	0.6	0.15
5		Housing Zone							
	a	High Grade Residential Zone	300	VA/1p	15	1,500	0.450	0.7	0.3150
	b	Housing complex	250	VA/1p	10	3,500	0.875	0.7	0.6125
6		Infrastructure	0.03	MVA/1ha	50		1.5	0.7	1.05
Total					95	10,650			14.4315

< Phase-2>

Land Use Category			Unit rate Demand		Phase-2				
			Rate	Unit	Net Area (ha)	Population (Total)	Max. Demamd (MVA)	Load Factor	Demamd (MVA)
1		General Industrial Zone	0.3	MVA/1ha	25	2,500	7.5	0.7	5.25
2		High-Tech Park	0.4	MVA/1ha	25	2,500	10	0.7	7
3		Central Business District	800	VA/1p	5	150	0.12	0.45	0.054
4		Common Service Facility Zone	500	VA/1p	25	500	0.25	0.6	0.15
5		Housing Zone							
	a	High Grade Residential Zone	300	VA/1p	15	1,500	0.45	0.7	0.315
	b	Housing complex	250	VA/1p	10	3,500	0.875	0.7	0.6125
6		Infrastructure	0.03	MVA/1ha	50		1.5	0.7	1.05
Total					105	10,650			14.4315

< Phase-3>

Land Use Category			Unit rate Demand		Phase-2				
			Rate	Unit	Net Area (ha)	Population (Total)	Max. Demamd (MVA)	Load Factor	Demamd (MVA)
1		General Industrial Zone	0.3	MVA/1ha	25	2,500	7.5	0.7	5.25
2		High-Tech Park	0.4	MVA/1ha	25	2,500	10	0.7	7
3		Central Business District	800	VA/1p	5	150	0.12	0.45	0.054
4		Common Service Facility Zone	500	VA/1p	25	500	0.25	0.6	0.15
5		Housing Zone							
	a	High Grade Residential Zone	300	VA/1p	15	1,500	0.45	0.7	0.315
	b	Housing complex	250	VA/1p	10	3,500	0.875	0.7	0.6125
6		Infrastructure	0.03	MVA/1ha	50		1.5	0.7	1.05
Total					105	10,650			14.4315

Note: VA/1p : VA (demand) per one person
MVA/1ha: MVA per one hectare
Demand = Max. Demand x Load Factor

Source: JICA Study Team

20 MVA power demand is estimated for Phase-1, another 20 MVA for Phase-2 and 70 MVA for Phase-3. In total, 110MVA power demand is forecasted for the LS-MFEZ.

Table 6.5.2 Power Demand Forecast by Phase

Land Use Category	Phase-1	Phase-2	Phase-3
General Industrial	4.2 MW	4.2 MW	16.8 MW
High-Tech Park	5.6 MW	5.6 MW	28 MW
Central Business District	0.043 MW	0.043 MW	-
R & D zone	0.12 MW	0.12 MW	0.468 MW
Residential Zone	0.741 MW	0.741 MW	-
Infrastructure	0.84 MW	0.84 MW	2.52 MW
Public Zone	-	-	0.14 MW
Total	11.54 MW	11.54 MW	47.93 MW

Source: JICA Study Team

6.5.3 POWER SUPPLY SYSTEM

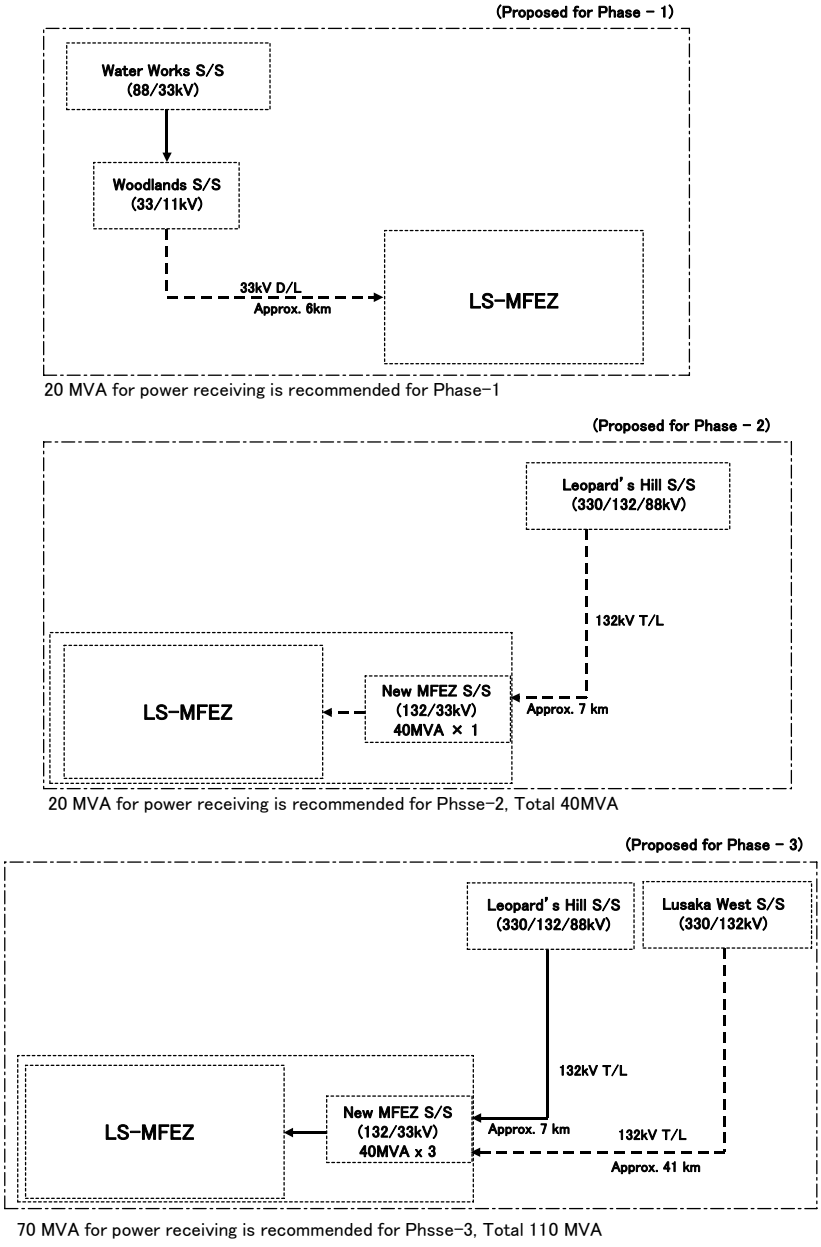
The available power source, currently, is only ZESCO's power grid. The nearest power tapping point from the ZESCO's power grid is Leopards Hill Substation. This is located 7 km away from the LS-MFEZ site. The substation distributes mainly to Lusaka City and other areas. The power for the existing Leopards Hill substation is transmitted from the Kafue Gorge P/S, Kafue West S/S and Kariba North P/S through 330kV transmission line, consisting of 5 circuits which have 700MVA sending capacity per circuit. There is enough capacity for power supply to the LS-MFEZ.

Therefore, power for the LS-MFEZ should be supplied from Leopards Hill Substation by construction of a new 132kV transmission line and main power transformer. 132kV transmission line may be mostly constructed as overhead line. For interconnection of these 132kV transmission line, expansion of outgoing feeder bay is required at Leopards Hill substation.

Lusaka West Substation, which is the second nearest sufficient point in the ZESCO's power grid is located approximately 41km away from the LS-MFEZ, It is recommended that this be interconnected with the LS-MFEZ 132/33kV Substation by the new 132kV transmission line. The power for the existing Lusaka West substation will be connected from the New Itezhi-Tezhi P/S by a 330kV transmission line

Consequently, the 132kV transmission line will be interconnected with the ZESCO's power grid by the ring formation.

Overall power supply diagram is shown in Figure 6.5.1.



Source: JICA Study Team

Figure 6.5.1 The LS-MFEZ Power Supply Network

(1) External System

Phase-1

The estimated demand for Phase-1 is 20MVA as shown in Table 6.5.1.

In order to cope with power demand of the LS-MFEZ, power for the LS-MFEZ should be supplied from Woodlands Substation by construction of a new 33kV distribution line to the LS-MFEZ area. A 33kV distribution line and expansion of outgoing feeder bay is required at Woodlands Substation. The implementation of Phase-1 main works is as follows.

New MFEZ switching station, 33/33kV
33kV distribution line (Overhead line) from Woodlands Substation to the new switching substation
33kV distribution line one bay in Woodlands Substation
33kV upgrading facilities of Woodlands Substation

Phase-2

The estimated demand for Phase-2 is 20MVA as shown in Table 6.5.1.

In order to cope with power demand of the LS-MFEZ, a new 132/33 kV substation with capacity of 40MVA (132/33kV Tr. x 1) is planned to be constructed in the LS-MFEZ site. The new substation will receive power from the existing Leopards Hill (330/132/33kV) Substation to a new 132 kV transmission line and distribute power to the 33kV switching stations to be constructed in the respective zones of the LS-MFEZ.

The existing 33kV substation which supplies to Phase-1 area may be changed over to this new substation. The implementation of Phase-2 main works is as follows.

New MFEZ substation, 132/33kV (40MVA x 1)
132kV transmission line-1 (ACSR158 x 1/7km) from Leopards Hill Substation to the new MFEZ substation.
330kV transmission line 1 bay in Leopards Hill Substation
330kV upgrading facilities of Leopards Hill Substation (Step-down Tr. (40MVA x 1), CB, etc.)

Phase-3

The estimated demand for Phase-3 is 70MVA as shown in Table 6.5.1.

In order to enhance the reliability of power supply, one more new 132kV transmission line should be constructed between Lusaka West Substation and the new substation. The estimated increase of 70MVA after Phase-2 is shared with three 40MVA transformers in the LS-MFEZ Substation. Consequently, the 132kV transmission line will be interconnected with the ZESCO's power grid by the ring formation. The implementation of Phase-3 main works is as follows.

Expanded MFEZ substation, 132/33kV (40MVA x 2)
132kV transmission line-2 (ACSR158 x 1/41km) from Lusaka West Substation to the new MFEZ substation.

330kV transmission line 1 bay in Lusaka West Substation
330kV upgrading facilities of Lusaka West Substation (Step-down Tr. (80MVA x 1), CB, etc.)

(2) Internal System (for reference)

The internal power supply system is composed of 33kV switching stations and the distribution system. The 33kV switching stations are to be constructed at the entrance point of each zone, in order to receive power from the new substation via 33kV distribution lines. The 33kV distribution lines will be constructed to feed power from the switching station to respective consumers in the zone.

The 33kV distribution lines are designed as open ring formation in order to secure the reliable power supply. 33kV ring main switching units are installed at the service entrance point of each consumer.

In addition to the above, ring-main units should be arranged at each line of switching stations and ring main units to establish the open ring management system.

In order to distribute power to the respective consumers, 33kV, 11kV and 400/230V distribution lines are planned in accordance with the ZESCO's regulation.

The 33kV cables are designed to be laid in PVC pipes buried underground. Some spare pipes should also be installed for the future expansion of the power supply system. The pipes shall be buried at a depth of not less than 1.2 m under the road, and 0.6 m under the pedestrian way.

6.6 TELECOMMUNICATIONS SYSTEM

6.6.1 BASIC DESIGN CONDITIONS

The telecommunication system should meet not only the basic telephone demand but also special requirements of the LS-MFEZ such as high speed digital data-communication. The telecommunication network currently available is only ZAMTEL's Network. To cope with the above advanced demands, the telecommunication system for the LS-MFEZ should be interconnected securely with the national and international networks. These requirements will be satisfied by the following systems;

1) Optical fiber trunk lines to interconnect the national and international networks

2) Optical fiber local transmission lines between a new switching station and remote terminals in the LS-MFEZ

3) Digital switching and transmission system to carry digital information including computer data-communication

6.6.2 TELECOMMUNICATION DEMAND

The basic telephone demand in the LS-MFEZ is estimated at 19,875 subscriber lines in the the LS-MFEZ as shown below.

Table 6.6.1 Telephone Demand Projection by Phase

Land Use Category			Phase-1			Phase-2			Phase-3		
			Net Area (ha)	Popula-tion (Total)	Dema-nd	Net Area (ha)	Popula-tion (Total)	Dema-nd	Net Area (ha)	Popula-tion (Total)	Dema-nd
1		General Industrial Zone	25	2,500	1,250	25	2,500	1,250	100	10,000	5,000
2		High-Tech Park	25	2,500	1,250	25	2,500	1,250	125	12,500	6,250
3		Central Business District	5	150	75	5	150	75	0	0	0
4		Common Service Facility Zone	15	500	250	25	500	250	275	1,950	975
5		Housing Area									
	a	High Grade Residential Zone	15	1,500	300	15	1,500	300	0	0	0
	b	Housing complex	10	3,500	700	10	3,500	700	0	0	0
6		Infrastructure	50			50			150		
Total			95	10,650	**3,825**	105	10,650	**3,825**	500	24,450	**12,225**

Source: JICA Study Team

In this table, the following assumptions are applied.

Demand for Residential Area:

Demand (No. of subscriber) = Population / 5 (5/household)

Demand for Another Area:

Demand (No. of subscriber) = Population × 0.5

In addition to the above, the following demands are assumed as digital data-communication services.

Additional 50% of telephone demand for the LS-MFEZ area.

6.6.3 TELECOMMUNICATIONS SYSTEM

(1) External System

In order to satisfy basic telephone demand and special requirements of the LS-MFEZ, a new transmission system of optical fiber cables shall be constructed in Phase 1. The trunk lines of optical fiber cables are recommended to be laid as a network which interconnects securely the new switching centre of the LS-MFEZ with the rest of the telecommunications infrastructure through appropriate switching centres. The new switching centre is planned to be located in the LS-MFEZ in accordance with the Telecommunications Guidelines. Construction of Chalala Switching Station is proposed at a short distance from the northwestern corner of the LS-MFEZ under the New Generation Network (NGN) Project. When the proposed station is constructed, it could be a switching centre for the LS-MFEZ. However, if Chalala Switching Station has not been built in time, Woodland Switching Station should be used. The line should be installed along the Independence Avenue which will be extended. A new switching station is planed to be located in the centre of the LS-MFEZ.

Another local network of optical fiber cable and metallic cable are planed in the LS-MFEZ, in order to link the new switching station, and remote terminals to be installed in the respective zones.

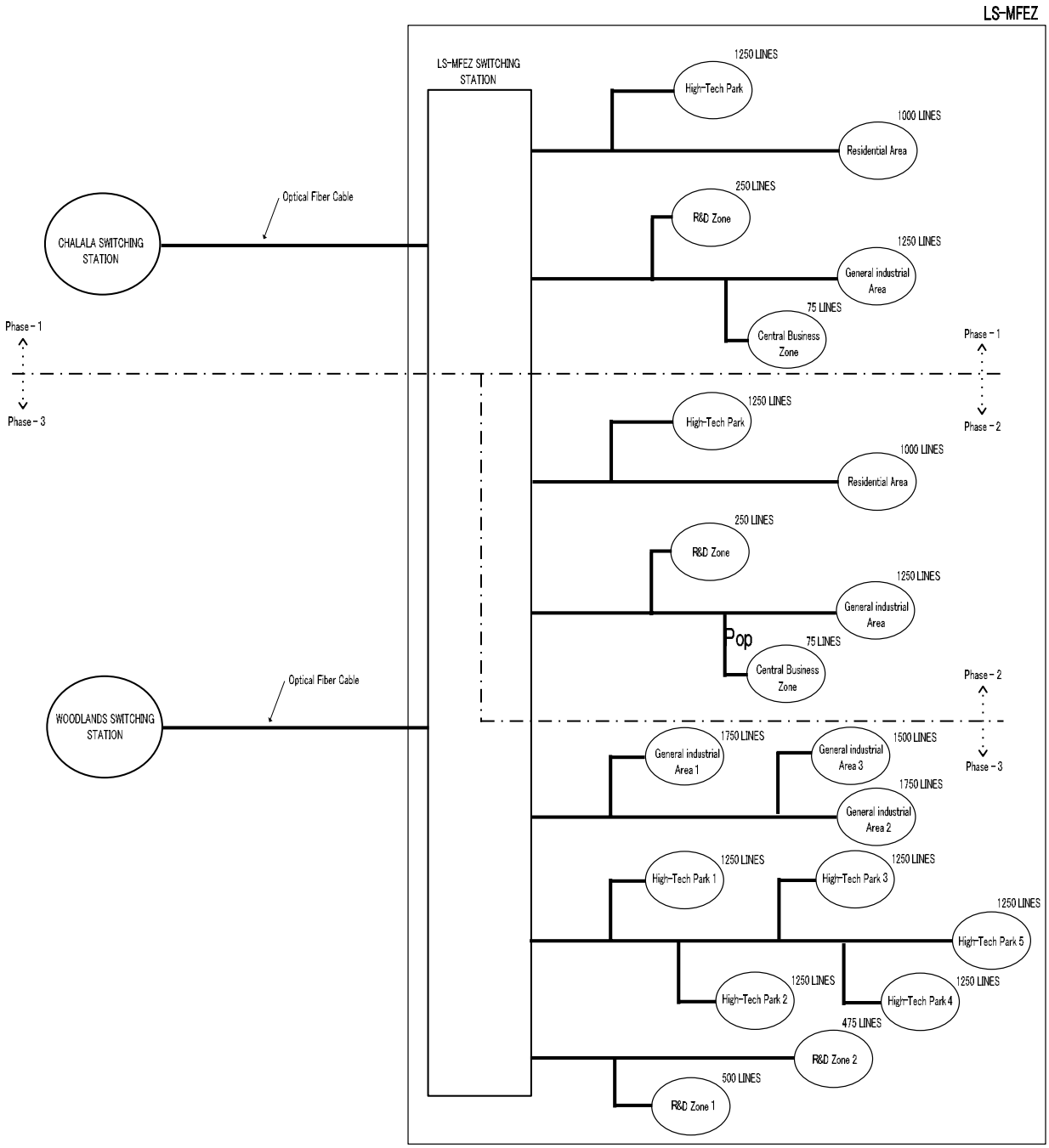
All cable is to be laid in PVC pipes under the ground in view of environment harmony.

(2) Internal System

The internal telecommunication system of the LS-MFEZ is composed of distribution lines, and splice boxes at the service entrance point of subscribers, so that subscribers can easily join from the box at any time. The distribution line by optical fiber cables and metallic cable are proposed to cope with the requirements of advanced telecommunication services.

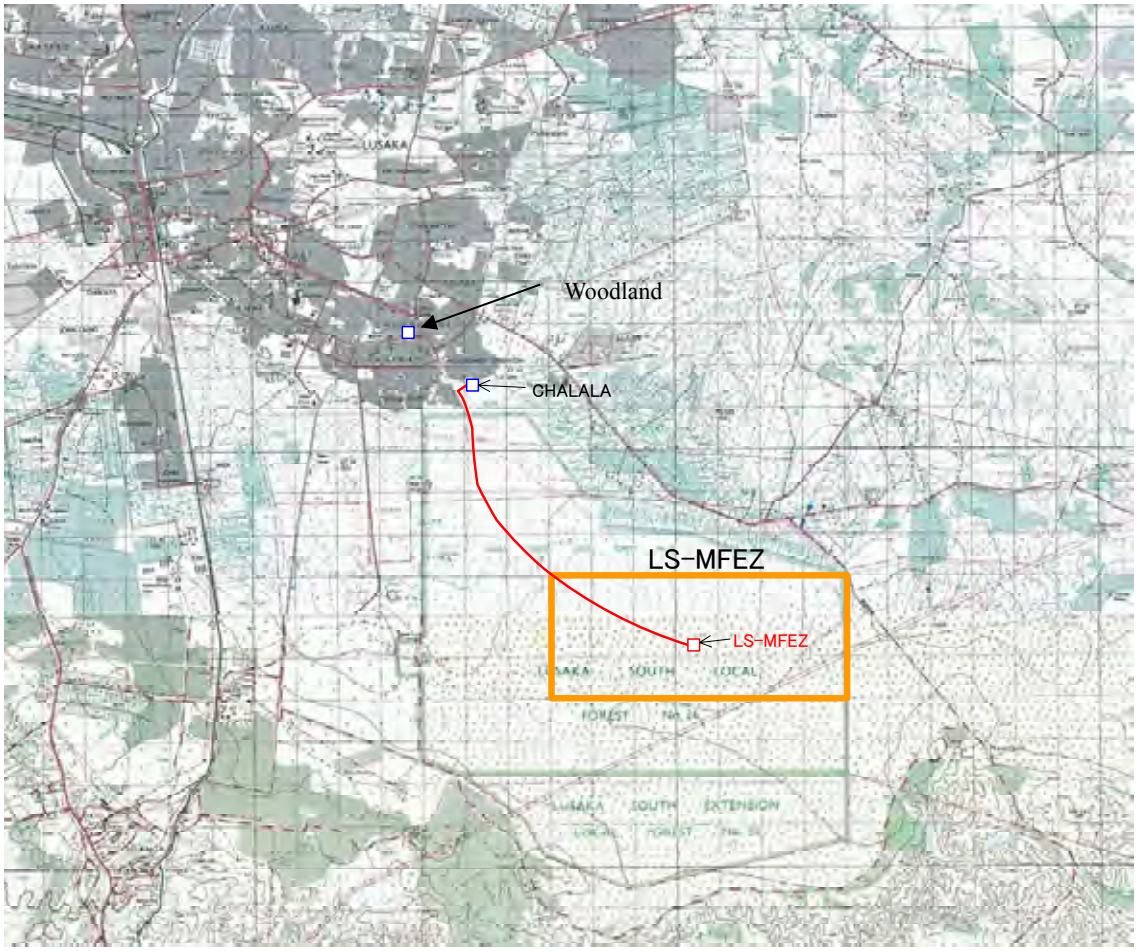
Cables will be laid in PVC pipes in the ground along pedestrian ways of roads. The buried depth of PVC pipes shall be not be less than 1.2m under carriage ways and 0.6m under pedestrian ways. Some spare pipes should be installed for the future expansion of the telecommunication system.

The telecommunication system diagram, schematic diagram and route plan of the telecommunication system are shown in Figure 6.6.1 and 6.6.2.



Source: JICA Study Team

Figure 6.6.1 Telecommunication System Diagram



Source: JICA Study Team

Figure 6.6.2 Route Plan of the Telecommunication System

CHAPTER 7 INSTITUTIONAL FRAMEWORK FOR THE LS-MFEZ

7.1 LEGAL AND REGULATORY FRAMEWORK ON MFEZ

Establishment of Special Economic Zone (SEZ) has spread all over the world and some of them provide us with best practices for establishment and management of SEZ. This chapter shows what sort of legal and regulatory frameworks should be prepared for successful launch of the LS-MFEZ.

7.1.1 REVIEW OF CURRENT FRAMEWORKS

Legal and regulatory frameworks on MFEZ are announced in Laws, Regulations and Orders. The latter two are issued by name of "Statutory Instrument". The details of current frameworks are as follows:

(1) Basic law: The Zambia Development Agency Act (Act No.11 of 2006)

After defining the "MFEZ" in Sec.3 as

"multi-facility zone" means any area or premises in Zambia that has been declared a multi-facility economic zone under section eighteen,

The ZDA Act stipulates MFEZ as follows:

1) The Agency, as one of its functions, develops MFEZ, or facilitates the development of MFEZ by investors, administers, controls and regulates MFEZ, monitors and evaluates the activities and performance, and promotes and markets MFEZ among investors.

2) The Minister of Commerce, Trade and Industry declares an area, premises or building to be a multi-facility economic zone, on the recommendation of the board after consultation with the Minister responsible for finance and with the approval of Cabinet, by statutory instrument. In the statutory instrument, following are prescribed:
   - Limits of the area, premises or building declared as a multi-facility economic zone;
   - Facilities to be provided and maintained within a multi-facility economic zone;
   - Terms and conditions under which such goods produced and services provided in a multi-facility economic zone may be sold, exported or otherwise disposed of;
   - Activities which are prohibited within a multi-facility economic zone;
   - Conditions under which goods may be removed from a multi-facility economic zone;
   - The powers and obligations of an investor in a multi- facility economic zone;
   - Such other matters which are necessary for the effective and efficient operations of multi-facility economic zones.

3) In addition, ZDA Act identifies investment priorities in Second Schedule. The sectors have been revised twice and been expanded. Apart from the ZDA priorities, MFEZ priorities are stipulated and modified through issue of Statutory Instruments. Current MFEZ priority sectors cover so many areas as is shown below (Statutory Instrument No.11 of 2006 and No.27 of 2007).

- Information and communication technology (ICT)
  * Development of Computer Software
  * Assembly / Manufacture of ICT Equipment
- Health
  * Manufacture of Pharmaceutical Products
  * Repair and Maintenance of Medical Equipment
  * Provision of Laundry Services to Medical Institutions
  * Ambulance Services
  * Diagnostic Services
  * Other Medical Service
- Education and Skills Training
- Manufacturing
  * Machinery and Machinery Components
  * Iron & Steel Products
  * Electrical and Electronic Products & Components & Parts Thereof
  * Chemicals & Petrochemicals
  * Pharmaceutical & Related Products
  * Wood & Wood Products
  * Palm Oil & Their Derivatives
  * Pulp, Paper & Paper Board
  * Textile & Textile Products
  * Transport Equipment, Component & Accessories
  * Clay-Based, Sand-Based & Other Non-Metallic Mineral Products
  * Plastic Products
  * Professional Medical, Scientific, & Measuring Devices / Parts
  * Rubber Products
  * Leather & Leather Products
  * Packaging & Printing Materials
  * Fertilizer
  * Cement
- Tourism
- Processing of
  * Agricultural Products
  * Forest Products
  * Non-Ferrous Metals & Their Products
  * Gemstones

4) Investment in MFEZ is offered incentives as specified by or under the Income Tax Act or Customs and Excise Act consisting of the followings.

- Zero percent tax on dividends for five years
- Zero percent tax on profits for five years from the first year profits are made, for year six to eight years, only 50% of profits are taxable and years nine and ten only 75% of profits are taxable.
- Zero percent import duty rate on raw materials, capital goods, machinery including trucks and specialized motor vehicles
- Deferment of Vat on machinery and equipment including trucks and specified motor vehicles

(2) Regulations

In order to supplement or deepen the above basic law, The Multi-Facility Economic Zones (General) Regulations, 2006 was issued as Statutory Instrument No.65 of 2007. The regulations stipulate investment application procedures in MFEZ as follows:

- Interpretation
- Facilities and services to be maintained on multi- facility economic zone
- Production of goods and services in multi-facility economic zone
- Prohibition of unauthorized activities
- Application of permit
- Application for license
- Consideration before applying for license or permit
- Issue of license or permit
- Application for variation of license or permit
- Renewal of license or permit
- Inspection of register
- Records to be kept by investor
- Notification of incentives to investor
- Rights and obligations of investor in multi-facility zone
- Types of business enterprises
- Supervision or revocation of license or permit
- Offences and penalty

The Customs and Excise (General) (Amendment) Regulations, 2007 is another regulation, which was issued by Statutory Instrument No.17 of 2007. It amends a part of The Customs and Excise Act as follows.

89C(1) The Minister may, on the recommendation of the Director-General of the Zambia Development Agency approve a rebate, refund or remission, for five years, of the whole or any part of the duty paid or payable in respect of raw materials, machinery, equipment and such other capital goods, other than spare parts thereof, required for use in priority sectors of multi- facility economic zones.

(3) Orders

In accordance with and in line with the above Act and Regulations, the first MFEZ in Zambia was created by Statutory Instrument No.16 of 2007, “The Chambishi Multi-Facility Economic Zone

(Declaration) Order". The outline is as follows.

- Infrastructures and facilities: buildings, electricity, telecommunication facilities, water and waste disposal facilities and roads
- Investment industries: copper processing industries, mechanical industries, light engineering industries, electrical appliance industries, clothing industries, food industries and medical industries
- Piece of land: around 7,500ha in10 areas
- Declaration: the above area is declared a Multi-Facility Economic Zone to be known as Chambishi Multi-Facility Economic Zone
- Licence holder: China Nonferrous Metal Mining(Group) Corporation

In addition to the Chambishi MFEZ, another MFEZ project is proposed. It is Sub Sahara Gemstone Exchange project in Ndola. The developer has already submitted its proposal to ZDA in March, 2008. The project concept is reported as follows.

- Site: the former Ndola Copper refinery
- Investment industries: manufacturing and processing industries such as machinery and its components, iron & steel products, and gemstones trading, cutting and polishing
- Development plan: total investment of US$10 million in three stages.
- Investors: more than 20 foreign owned enterprises and 40 local companies
- Projected employment: 4,000

In terms of its size, it is small compared to Chambishi MFEZ and the LS-MFEZ.

7.1.2 ASSESSMENT OF CURRENT FRAMEWORKS

Basic frameworks already exist and Chambishi MFEZ has been created within the frameworks. Considering further development of MFEZ in Zambia, however, the current frameworks contain weak points.

In the first, though MFEZ is to be declared by Minister of Commerce, Trade and Industry with consultation with Finance Minister, the location for the MFEZ is an economic decision of the developer. There are no requirements to confine developers to specific locations except in the case of export trade MFEZ (excerpt from" Questions and Answers: A presentation to the Licence Committee of the Board") as is shown in the Regulation 7 below. MFEZ is established by private sector's initiative. Therefore, it does not necessarily reflect the Government strategy. The Government' strategic thinking should be reflected more and more in selecting the area and the industry.

7. A person who wishes to develop an area, premises or buildings as a multi facility economic zone pursuant to Section sixty eight of the Act (ZDA Act) submit an application for a permit to the Board.

In the second, with respect to its contents, as is stated in details later, there are areas for improvement. For examples, different investment incentives should be prepared considering the different situation of MFEZ. However, they are unanimous for every MFEZ. More attention should be given to labor issues

such as employment of foreign nationals and training of local workers. As well as policies and strategies, how to implement One-stop service should be made clear. These matters are to be discussed before specific frameworks are developed for specific MFEZ, such as the LS-MFEZ.

7.1.3 NECESSITY OF NEW FRAMEWORKS FOR THE LS-MFEZ

(1) Reasons

Considering that Chambishi MFEZ has been created in line with the current legal and regulatory frameworks, people may feel it a good idea to follow the case as necessary legal and regulatory frameworks for creation of the LS-MFEZ, too. In other saying, it is enough to issue the similar statutory instrument for the LS-MFEZ. However, the LS-MFEZ shares the following unique characteristics.

- A national project which is initiated by the Government.
- A symbolic project which the Government appeals to the world.
- A MFEZ which locates closed to Lusaka, a capital of Zambia.
- A high–tech MFEZ unlike Chambishi MFEZ which is natural resources oriented one.
- A MFEZ which should be a world class and competitive.
- A newly created MFEZ unlike Chambishi which has been created based on existing industrial complex.

Considering the uniqueness, it is necessary to develop other statutory instruments, which meets these requirements, than Chambishi case.

For examples, they are statutory instruments regarding to

- New incentive schemes targeted for high-tech industries
- Creation of efficient one-stop service mechanism
- Creation of a special administration body for the LS-MFEZ
- Creation of a trouble shooting body within the LS-MFEZ
- Creation of environment friendly and local community friendly the LS-MFEZ

(2) Development strategy for frameworks for the LS-MFEZ

In developing new legal and regulatory frameworks for the LS-MFEZ, the following three alternatives are available.

1) A new statutory instrument for the LS-MFEZ: An Order for the LS-MFEZ

All legal and regulatory frameworks are incorporated into one statutory instrument, the Lusaka South Multi- Facility Economic Zone (declaration) Order. Since all items are to be included under the Order, it is very long and contains many “Schedule”

2) A new LS-MFEZ Act

All legal and regulatory frameworks are incorporated into a new act. The frameworks include not only items which are specific to the LS-MFEZ but also items common to all MFEZ.

3) Combination of A new LS-MFEZ Act and Order

The frameworks which are common to all MFEZ are excluded from the LS-MFEZ Act and incorporated into several Orders. A new LS-MFEZ Act deals only items specific to the LS-MFEZ

Among the above three alternatives, the third 3) is recommended for its flexibility and simplicity.

7.2 NECESSITY OF DEVELOPMENT OF NATIONAL DEVELOPMENT PLAN AND ACT FOR MFEZ

Prior to investigation on modification and new arrangement of legal and regulatory frameworks for the LS-MFEZ, it is necessary to develop national development plan for MFEZ and MFEZ Act.

7.2.1 MFEZ DEVELOPMENT PLAN

(1) Necessity

ZDA selects site of MFEZ from various view points such as social, economic and regional development. Their policies and strategies are reflected in evaluation process of application submitted by MFEZ developers. The Multi-Facility Economic Zones (General) Regulations, 2007 states in article 8 that, in considering an application for a license or permit, the Board shall have regard to ---

(a) the level of local and foreign direct investment;
(b) the attraction of local and foreign indirect investment;
(c) the amount and quality of local employment creation;
(d) the extent of skills development and transfer to local entrepreneurs and communities;
(e) the extent to which the project will lead to expansion of local production;
(f) the level of utilization of local raw materials and intermediate goods;
(g) the introduction and transfer of technology;
(h) the production of new products;
(i) the impact that the proposed investment is likely to have on the environment and the measures proposed to deal with an adverse environmental consequence in accordance with the Environmental Protection and Pollution Control Act;
(j) (the extent to which the project will lead to the diversification of the economy;
(k) the extent to which the project will lead to increased foreign exchange earnings;
(l) the degree to which the project is export oriented;
(m) the extent to which the project leads to import substitution;
(n) the extent to which the project leads to utilization of preferential trade agreements;
(o) the extent to which the project leads to social development; and
(p) any other considerations relevant for purpose of the Act.

These items are comprehensive and so long as they are seriously taken into account for selection of developers, ZDA will not fail in selecting desirable developers. However, MFEZ site should be determined by the Government considering the necessity of regional development. Therefore it is recommended to set up a committee which formulates and reviews overall development plan for MFEZ in a context of national economic and regional plans in Zambia. Such a framework should be authorized in a law.

- Regional growth center
- Strategic industrial sectors to be developed
- Strategically located
- Availability of infrastructure and land
- Availability of water source and electric power supply
- Easily controlled

(2) Establishment of the Committee

For the above work, a Committee is established. The task is as follows.

1) Review of economic, industrial and regional development
2) Formulate policies and strategies for MFEZ
3) Propose MFEZ
   - Site and scale
   - Development schedule
   - Expected sectors to be invited
   - Special considerations such as special incentives
4) Review and assess of existing MFEZ

The Committee consists of representatives from relevant ministries, local government, business society, employee association and citizens. The Committee is chaired by Minister of Commerce, Trade and Industry

(3) Order on national development plan of MFEZ

An order formulating the national development plan of MFEZ is to be set. The contents are as follows.

- Purposes and objectives for the plan
- Contents of the plan
- Review and assess of the plan
- Establishment of the Committee for the development of the plan

In order to designate the MFEZ areas, research section at ZDA conducts periodically the site survey for MFEZ under collaboration of MCTI. The study result is submitted to the Committee mentioned above.

7.2.2 THE MFEZ ESTABLISHMENT ORDER

Based on the above plan, "Order on The MFEZ Establishment" is formulated. The core is designation of MFEZ areas to be developed. The major contents of the Order are as follows.

1) Title
2) Declaration of policy
3) Purposes, Intents and Objectives
4) Definition of Terms
5) Establishment of MFEZ

To ensure the viability and geographical dispersal of MFEZ through a system of prioritization, the following areas are initially designated as MFEZ, subject to the criteria specified in (6) (name of each area).

- Name and site

- Availability of infrastructure: Power, Roads, Telecommunications
- Availability of labor force
- Opportunities for investors: Industry and infrastructure development

6) Criteria for the establishment of MFEZ

- Regional growth center
- Strategic industrial sectors to be developed
- Strategically located
- Availability of infrastructure and land
- Availability of water source and electric power supply
- Easily controlled

7) MFEZ to be a Decentralized community

The MFEZ shall be developed, as much as possible, into a decentralized, self-reliant and self-sustaining center with minimum government interference. It shall administer its own economic, financial, industrial and tourism development without help from the national government .It shall also provide adequate facilities to establish linkages with surrounding communities and other entities within the community.

The MFEZ may establish mutually beneficial economic relations with other entities within the country

8) Foreign citizens and companies owned by Non-Zambians may set up enterprises in the MFEZ. Their assets, profits, and other legitimate interest shall be protected.

9) MFEZ to be operated and managed as separate custom territory

10) Defence and security

11) Immigration

12) MFEZ Board: its functions and powers

13) Administration of each MFEZ

14) Incentive scheme

Two frameworks are presented. One is basic frameworks which are common to every MFEZ and the other is specific ones which are provided to special MFEZ.

15) Leases of lands and buildings

16) Protection of environment

17) One stop shop service

18) Industrial harmony in the MFEZ

7.3 MODIFICATION AND NEW ARRANGEMENT OF LEGAL AND REGULATORY FRAMEWORK

7.3.1 AREAS AND REASONS

Successful launch of the LS-MFEZ requires modification and or enrichment of current legal and regulatory frameworks in the following areas.

(1) Investment incentives at THE LS-MFEZ

In order to attract foreign direct investments into the LS-MFEZ, it is necessary to design a new incentive scheme. Recently, the Government of Zambia revised investment incentive schemes. In this revision, for the first time, investment incentives for the LS-MFEZ were clearly stated. However, there is still room for improvement. Depending on type of the LS-MFEZ, necessary incentives may differ the LS-MFEZ needs investment incentive specific to the zone. In addition, considering the necessity of developing a balanced partnership between investors and employees, non-fiscal incentive scheme for accelerating employment of local technicians should be developed. These necessitate modification on or addition to current investment law and labour law.

(2) Physical establishment of THE LS-MFEZ

The LS-MFEZ is a new investment area and differs from other investment area. First, the zone is developed collectively and various types of actors are involved in, therefore, coordination among parties concerned is very important. There are three main actors: Government as policy and strategy maker, developer(s) of the LS-MFEZ and investors (tenants) in the LS-MFEZ.

Second, it is necessary to clarify each party's responsibility and obligation. If developer(s) is fully responsible for development of necessary infrastructure, the development cost shall be fully transferred to investors. It will lead to weakness of competitiveness of the LS-MFEZ. If the Government is ready to take up some portion of the cost, basic strategy for cost sharing scheme should be stated in a legal framework.

The most crucial matter is "Developer's responsibility". There is a wide variety in developer's responsibility taking a business risk or, only as an agent of ZDA. Depending on the answer, the contract between the Government and the developer differs. MFEZ Regulations 2007 of the MFEZ expect that the developer is the former, a full risk taker. On the other hand, the regulations do not exclude the case that the Government takes a role of a developer.

(3) Operation in newly established the LS-MFEZ

The third is an area of the LS-MFEZ operation. The establishment of the LS-MFEZ will bring about various changes in investment approval procedures as well as in function sharing between the LS-MFEZ and ZDA management.

There seems to be two alternatives. One is that ZDA handles all investment approval procedures as is currently done and supervises the LS-MFEZ. In this case, there will not be a substantial change in ZDA's function and responsibility. The other is that investment approval functions will be transferred to the LS-MFEZ. In this case, the LS-MFEZ becomes a management board. In the latter case, ZDA's

function has to be newly defined. Also, ministries involved in investment approval procedure will change their operation style depending on the management style of the LS-MFEZ.

(4) Smooth management of the LS-MFEZ

After the LS-MFEZ is established, its daily management becomes important. The management includes assess of whether the LS-MFEZ works as expected. If something wrong happens in daily operation, the LS-MFEZ management section will take remedial action. Since the operation management is so important, basic regulations on this matter should be developed. Operation and management of the LS-MFEZ is discussed in Section 7.4.

7.3.2 VIEWPOINTS FOR DESIGNING THE ABOVE NEW LEGAL AND REGULATORY FRAMEWORKS

The LS-MFEZ is the first full-fledged special economic zone in Zambia. The zone invites not only local investors but also international investors. The LS-MFEZ is a prototype model of special economic zone in Zambia. In this sense, the LS-MFEZ should be a world class zone which is able to provide first class services to investors.

In designing new legal and regulatory frameworks for the world class the LS-MFEZ, the following viewpoints should be seriously considered. These are also applied to other MFEZ.

(1) Enhancing MFEZ' competitiveness

In order to attract foreign direct investments, it is necessary to establish the LS-MFEZ to be highly competitive. Competitiveness can be strengthened through in the following five ways. They are

- Follow best practices in other countries
- Provide effective and efficient incentives
- Take into consideration harmonious partnership among investors, employees and local community
- Build streamlined operation system
- Establish a trouble shooting organisation

Recent research by Bearing Point Inc., a New York based management consultant, itemizes factors in successful and unsuccessful cases of special economic zones as follows[1].

1) Successful case

- Private sector-led and operated zones
  - ✓ Streamlined legal and regulatory frameworks: competition on the basis of facilitation and services rather than incentives
  - ✓ Autonomous Zone authority
  - ✓ Develop robust legal and regulatory frameworks
  - ✓ High capability of regulatory authority

2) Unsuccessful case

- Uncompetitive policies

[1] © Bearing Point Inc.

- ✓ Reliance on tax holidays
- ✓ Rigid eligibility requirements
- ✓ Poor labour policies and labour relations

- Public sector development
  - ✓ Poor physical development
  - ✓ Subsidized or over designed facilities
  - ✓ Poor locations
  - ✓ Poor maintenance, services, promotion, crowded facilities
- Bureaucratic procedures and controls
  - ✓ Complex investment approval procedures
  - ✓ Cumbersome customs procedures
  - ✓ Excessive monitoring / reporting requirements
- Inadequate institutional structure
  - ✓ Too many agencies involved in zone regulation
  - ✓ Lack of authority and funding in regulatory body
- Lack of an integrated development approach
  - ✓ Lack of public-private partnership

Among these, the suggestion that facilitation and services are more important than incentives is to be noted. It is also stressed that streamlined investment approval procedure and custom clearance procedures are important for attracting investors.

(2) Harmonizing with local conditions in environment, labour market and communities

In order to attract foreign direct investments, it is necessary to appeal to their profit motive and evaluation of risk. However, it is also necessary for investments in the LS-MFEZ to harmonize with local conditions in environment, labour market and communities. In this regard, specific consideration should be addressed to participation by local enterprises. It is said that local enterprises are weak in fund raising for investment and even though they are given chances to participate in business development in MFEZ, due to lack of capital, they are crowded out. Legal and regulatory frameworks for solving the problem are necessary.

Citizenry partnership is also important. For example when sports centre is established by MFEZ for its parties concerned for their employees and working people, not only these people but also local people outside of the zone should be allowed to utilize these facilities.

Another area where special consideration is needed is environment. Considering environmental constraints such as scarcity of water resources and attention to environment conservation, environment friendly economic activities should be paid to the most extent.

(3) Drawing a design looking at the future ahead

Legal and regulatory frameworks developed will have short term and long term perspectives. In the short term, since the focus is efficiency, the management style may not be so different from the current style. However, when we take into account that the Government is considering to develop several MFEZ all over Zambia in the medium term, the suitable management style for the LS-MFEZ

will be more decentralized, especially, when the next MFEZ is established in an area far from Lusaka.

the LS-MFEZ will be the third SEZ after Chambishi, which is now under construction, and Sub Sahara Gemstone Exchange project in Ndola. In addition, it is expected that similar zones will be created in the future. Based on the possibility of such expansion, it is necessary to prepare open legal and regulatory frameworks which will be able to accommodate such expansion.

(4) Flow of the LS-MFEZ development

Contents of legal and regulatory frameworks are influenced by actors involved in the project. In turn, the type of actors differs by the process of the project. The following chart outlines the flow of the LS-MFEZ development. The flow is expected to be the same for other MFEZ.

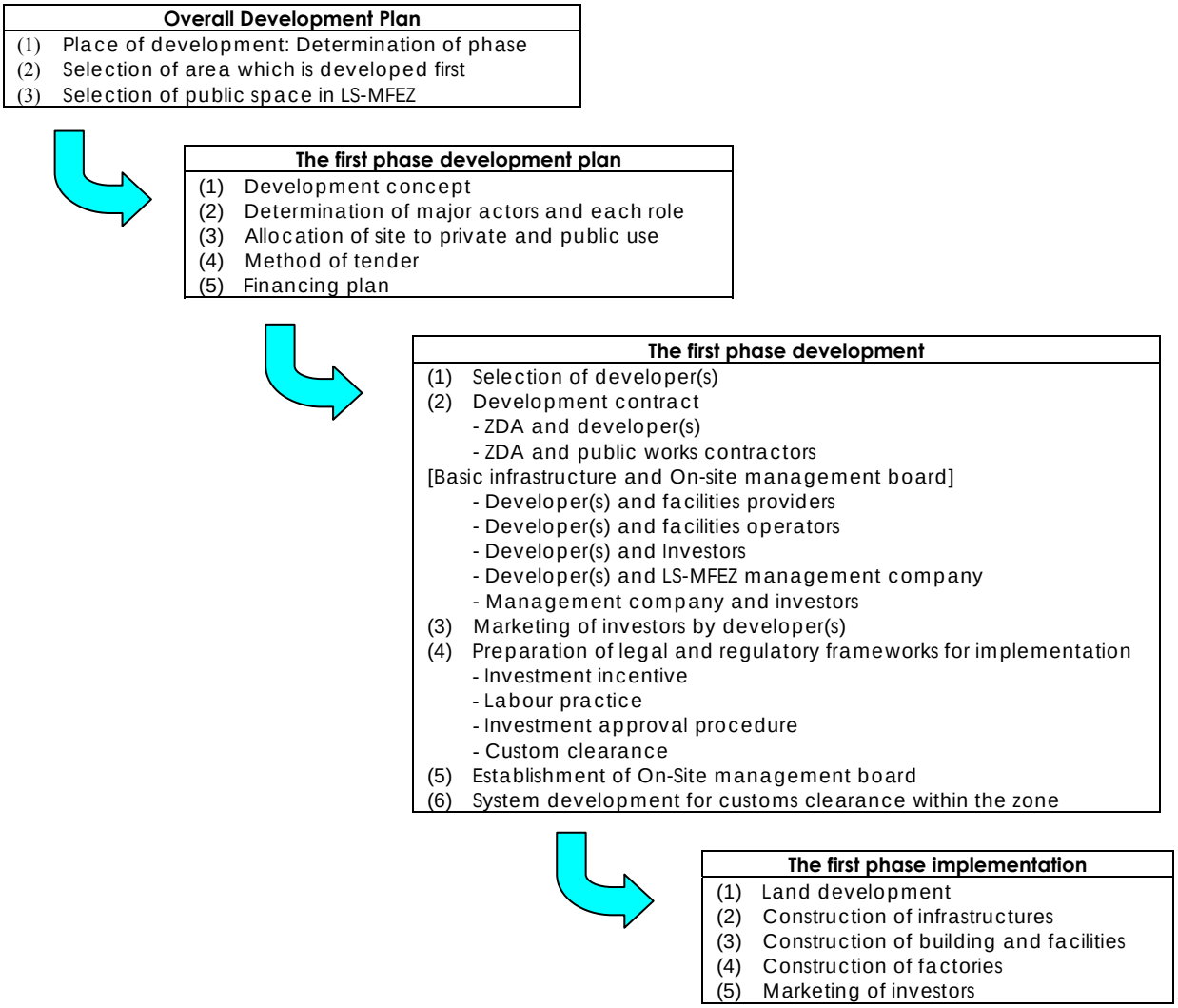


Figure 7.3.1 Flow Chart of the LS-MFEZ Development

7.3.3 PARTIES CONCERNED IN LS- MFEZ

(1) Identification of main actors

Before discussing modification and new arrangement of legal and regulatory frameworks for the LS-MFEZ, relevant actors are specified below. They are almost the same for other MFEZ.

1) MFEZ Board

The Board is created for governing MFEZ in Zambia and is expected to have its office under ZDA by Act of Parliament. The function is as follows.

(a) To initiate plans and set directions for the development of MFEZ

(b) Determine the principles and regulations to the appointment of MFEZ Administration

(c) To provide license of development of MFEZ to developer(s)

(d) To give the tax and non-tax incentive to the MFEZ developer(s)

(e) To provide guidance to MFEZ Administration on eligible incentives for MFEZ Investors

(f) To prepare guidelines on management and workers training, environment, construction, import / export, entitlement to investment incentives and other technical affairs

(g) To conclude a contract on infrastructure development with investors based on BOT scheme

(h) To address issues relative to the interests of the MFEZ investors, workers, employees, and employers.

2) The LS-MFEZ Administration

The Administration is a State administration management unit which is the ”One-Stop Service” mechanism at the site of each MFEZ and has the duties to approve and issue permits, licenses and registration to the Zone investors, including the approval of incentives.

3) The LS-MFEZ developer

This is the entity that develops the premise at their own risk. In addition to private sector, the Government sector or joint venture between the Government and private sector is expected to take part. It could happen that the developer participates in the project as an investor too. The role is to invest in the development of physical infrastructures in the zone, organize business and services, and ensure the safety and security of the Zone investors.

4) The LS-MFEZ contractor

This is the entity who constructs infrastructure, factory or other facilities under a contract agreement with the Board or developer(s). Their project risk is related to the strength of the Board or developer. Even if a project for which developer is responsible, fails, so long as the developer’s financial position is strong and his credibility is high, the contractor does not feel any serious risk for the project.

5) The LS-MFEZ operator

This is the entity that operates infrastructure and facilities, which are constructed by the above constructor, under service contract with developer. The operator is a service provider to investors. Usually, the service fee will be paid by beneficiaries of services, i.e., the investor (tenants).

6) The LS-MFEZ Management Company

This is the entity who manages LS- MFEZ daily for investors or the Government staff who works in the LS-MFEZ. The cost is shared among investors and the Government offices.

7) The LS-MFEZ Sanitary (Conservancy) Services Company

This is the entity who manages environmental sanitation including sewage and solid waste born by activities of investors, Government offices and resident. The cost is shared among them.

8) The LS-MFEZ Investor (tenant)

This is the entity who operates a business in the LS-MFEZ, no matter whether it is manufacturing sector or service sector. It is to be noted that investment includes not only new investment in Zambia but also investment for expansion or relocation by companies which currently operate in Zambia. It implies that targeted investors for the LS-MFEZ are not foreign investors but also existing domestic investors.

9) The LS-MFEZ resident

There are two types. One is the entity who conducts R&D activities in the LS-MFEZ. Since the private sector engaged in R&D activities falls under a the LS-MFEZ investor, only non-profit organisation is covered under this classification. The other is individual who lives within the LS-MFEZ for works.

The table below describes each party's function. There will be no difference as to the case for other MFEZs.

Table 7.3.1 Major Party's Function

Party	Main functions or duties	Ref.
MFEZ Board	• Govern Zambia's MFEZ • Select Developer(s) • Conclude BOT contract • Determine principles and regulations	• Office locates within ZDA • Independent from ZDA
For the LS-MFEZ Administration (One Stop Service Centre)	• Manage investment approval procedure	• Provide "One-Stop Service"
Developer(s)	• Develop the the LS-MFEZ	• Take risks
Contractors	• Construct the building and infrastructure under contracts with MFEZ Board and /or developer(s)	• Contract with developer
Operators	• Provide public service such as electricity and water to resident in the LS-MFEZ	• Contract with developer
Management company and Waste management company	• Total management of the site under contract with developer(s)	• Assigned by developer
Investors (tenants)	• Invest for business operation	Take risks

(2) Types of enterprise

In relation to the above specification of actors, type of enterprise in the LS-MFEZ should be clearly defined as follows. Such definition is important because investment incentives will differ by type of enterprise.

- The LS-MFEZ Export Enterprise
- The LS-MFEZ Domestic Market Enterprise
- The LS-MFEZ Free Trade Enterprise
- The LS-MFEZ Utilities Enterprise
- The LS-MFEZ Facilities Enterprise
- The LS-MFEZ Developer
- The LS-MFEZ Operator
- The LS-MFEZ Service Enterprise
- The LS-MFEZ Tourism Enterprise

Here, the word of "investors" is not used. In this regard, answering to the questions of Who are investors and What are their activities "Question and Answers on Multi-Facility Economic Zones" prepared by ZDA, states as follows.

a. An investor to develop a multi-facility economic zone
b. An investor to operate a business enterprise in a multi-facility economic zone.
c. The investor to develop a multi-facility economic zone who is responsible for provision of infrastructure and facilities or shell factories in a multi-facility economic zone
d. the business enterprise operating in a multi-facility economic zone responsible for providing machinery and equipment for the purpose of undertaking manufacturing or processing activities.

Function of *a, b,* and *c* are clear. The difference between *a* and *c* is that while *a* is a project organizer, *c* is a provider of infrastructure and facilities under a contract between *a* and *c*. However *c* is responsible, not only for construction of infrastructure and facilities but also their maintenance. Function of *d* is rather limited. It is a supplier of machinery and equipment to investors. However, it should cover a vendor who provides various services such as maintenance to original investors. Generally speaking, this type of vendor does not feel any necessity of setting up its own office within the LS-MFEZ. Therefore, the vendor stations at one of developer's offices. Since this kind of activity does not require so much capital, it is not classified as "investor"

The Government sponsored R&D organisations are also one of important and potential actors, even though they are not classified as investors.

With respect to the above classification, what should be mentioned is that actors play their roles in multi-phases. For example, a developer acts as an investor and even as a contractor in construction of infrastructures. Diversified function by each actor is discussed later.

With respect to investment motivations, two types are considered. They are new investment in Zambia and investment for business expansion by existing corporations. The former motivation is paid a high attention. However, the latter motivation is also important in a sense that it composes of major marketing targets. The investors feel a difficulty in expansion of operation due to lack of space or environmental issues.

Among the parties, other actors than ZDA are basically private enterprises. However, it could happen that the LS-MFEZ developer is a public enterprise. In these cases, public entity develops the zone

with government funds and covers a part of the cost by selling developed premises. When many investors invest in and expand their production, the tax payment to the government increases. By the increase in tax, the government covers the funds spent for the development. This is a typical scheme.

7.3.4 NEW OR ADDED FRAMEWORKS

(1) Utilization of the LS-MFEZ land

Purpose of development of MFEZ is to stimulate investment in the premise and to create job opportunities. On the other hand, it is also necessary to preserve the environment and good scenery and quiet, necessary for daily life of the local people. The utilization pattern may differ by type of MFEZ. Therefore, it will be determined considering the characteristics of each MFEZ.

As a natural matter of course, land utilization at the LS-MFEZ is to be restricted in some ways. It is necessary to regulate land utilization at the LS-MFEZ by laws and regulations. The laws or regulations will be specific to the LS-MFEZ. Critical matters are as follows, though the figures are to be decided in a stage of implementation.

- Restriction of land use for industrial activities: limited to some percentage
- Use by non-manufacturing sector is limited to certain percentage
- Environmental considerations inside of the LS-MFEZ : green space etc
- Regulations on appearance for factory and building
- Regulations for harmonized landscape
- Regulations on traffic mode inside of the LS-MFEZ

Above regulations shall be set out so that basic and ideal concepts which the LS-MFEZ targets can be realized.

(2) Investment incentives

1) General observation

① Type of incentives

Investment incentives are commonly divided into three categories: fiscal, financial and regulatory incentives.

- Fiscal incentives
  * Reduced direct corporate taxation: Reduced rates of corporate income tax, Tax holidays, special tax-privileged zones
  * Incentives for capital formation: special investment allowances, Investment tax credits, reinvested profits
  * Reduced impediments to cross-border operation: withholding tax, taxation of foreign trade and taxation of employees.
- Financial incentives: three types
  * “Site equalization outlays” such as infrastructure subsidies and job training subsidies
  * “Relocation incentives” such as relocation and expatriation support, administrative assistance and temporary wage subsidies

* Correct market imperfections and overcome transaction costs such as credits to investors, real estate and cost participation.

- Regulatory incentives: by means of offering derogations from national or sub-national rules and regulation

Since the current ZDA has been created, legal and regulatory frameworks in investment incentives have been developed in both fiscal and non-fiscal areas. However, in line with the above three viewpoints, current frameworks have to be modified or to be strengthened with supplemental articles when MFEZ is established.

② Efficiency of tax incentives for attracting investment

Needless to say, investors regard tax incentive as the more the better. The problem is whether tax incentive is really effective and efficient or not. Study in effectiveness and efficiency of tax incentive is not so ample. However the past survey[2] offers thoughts as follows.

- Tax incentives are costly due to high administrative and revenue cost
- Tax incentive does not appear to be the primary determinant of investment
- There is little evidence that discriminatory tax incentives do a better job of promoting investment than simple, uniform regimes with low to moderate rates of taxation
- If tax incentives are to be used, accelerated depreciation is likely to be more efficient and has fewer drawbacks than tax holidays.

③ Types of tax incentives

Tax incentives can be separated into the following categories:

- Reduced corporate income tax
- Tax holidays (no taxes for a period of time)
- Investment allowances and tax credit (reductions in taxes that are based on the amount of investment and are in addition to depreciation)
- Accelerated depreciation (allowing business to write-off more rapidly)
- Exemptions from indirect taxes such as import tariff on inputs
- Tax exemption at export processing zones (enterprises in the zones are exempt from all indirect tax and sometimes from direct tax)

All of them are used more or less in every country though the importance of each incentive differs by country.

④ Comparison with neighboring countries

Zambia competes with neighboring countries in attracting foreign direct investments. It is useful to compare attractiveness in incentives among these countries. For comparison, two countries were studied: Tanzania and Mozambique.

[2] For example, Kevin Fletcher "Tax Incentives in Cambodia, Lao PDR and Vietnam" (a presented paper at IMF conference in Aug.2002)

Table 7.3.2 Tax Holidays in Neighboring Countries

Country	Tax holidays in SEZ (CIT)
Zambia	0% for five years 18.5% for 6-8years 26.25% for 9-10 years
Tanzania	0% for export processing zone
Mozambique	50% reduction in corporate income tax for up to 10 years

Source: ZDA and website for other countries

2) Current incentives in Zambia

① Current incentive schemes

Current incentives prevailing in Zambia are summarized in Table 7.3.3. Incentives differ by type of investment. Incentives for investments in MFEZ fall under Second category. Compared with other category, they are given the most preferential treatment.

Table 7.3.3 Current Investment Incentives

	First category	Second category	Third category
Type of investors	Invest not less than US$10 mil.	Invest not less than US$0.5mil in MFEZ and / or in priority sectors	SMEs investor
General incentives *)	Yes Under Cutoms and excise act, Income tax act and Value added act	Yes Under Cutoms and excise act, Income tax act and Value added act	Yes Under Cutoms and excise act, Income tax act and Value added act
Special incentives	Additional incentives under negotiation with the Government	(1) Tax on Dividends :0 for 5 years (2) Tax on profits:0 for 5 years from first profit-making year, 50% of profits for 6-8 years 75% of profits for 9-10 years (3) Import duty on raw materials, capital goods and machinery : 0% for 5 years (4) Defeerment of VAT tax on machinery and equipment(it is usually 17.5%)	(1) Income tax exempt for first three years:urban area investment (2) Income tax exempt for first five years:rural area investment

	Fourth category	Fifth category
Type of investors	Invest less than US$0.5mil.in priority sectors	Invest any amount in non-priority sectors
General incentives *)	Yes Under Cutoms and excise act, Income tax act and Value added act	Yes Under Cutoms and excise act, Income tax act and Value added act
Special incentives	None	None

Genral incentives relevant to the project
(1) Income tax
1) Allowance of cost per year in the first two years:machinery and manufacturing :50%---Machinery and plant
2) Allowance of cost per year in the frst year and in subseequent years:10% and 5%---Building
3) Corporation tax is fixed at 35%, while it is 15% on income from non-traditional exports
4) Carryforward of losses: non-mining and non-traditional exports 5 years
(2) VAT general incentives:relief or zero rate
(3) VAT specific incentives:Refund or input tax claim
(4) Custom duty incentives:
Non-fiscal incentives
To nvestors who invest at least US$0.25 mil. and employ not less than 200 local persons
Self employment permit and employment permits up to 5 expatriates

Source: ZDA

② A salient feature: flat over sector or activity

The incentives in MFEZ are the same over any kind of investment within MFEZ. For example, investment in a high-tech sector receives the same incentives as investment in a traditional sector such as food processing and manufacturing of textile & textile products. In addition, there is no difference in incentives among MFEZs. Even though a MFEZ locates in distant area from Lusaka, there is no difference with other area as far as incentives are concerned.

In some Asian countries, they follow a policy of differentiating incentives by sector and by region. Such as in Viet Nam and Cambodia, the policy is meaningful when both budget constraints and effectiveness of incentives for attracting investment are considered. In both countries, tax holidays and tax reduction period differ by type of sector invested. In addition, incentive differs by type of activity, too.

Table 7.3.4 A Case for Different Incentives by Type of Investment Project (Corporate income tax)

Sector	Tax rate	Non profit making years	Exemption	Decreasing 50%	Paying 100%	Total 28%
Export processing enterprises	Preferential tax rate 10%, applied 15yrs (Usually tax rate 28%)	0	4yrs	7yrs	4yrs	From 16th yr
Industrial park enterprises	Preferential tax rate 15%, applied 12yrs (Usually tax rate 28%	0	3yrs	7yrs	2yrs	From 13th yr
High-tech project.	Preferential tax rate 10%, Applied for project life (Usually tax rate 28%)	0	4yrs	9yrs	-	-
Service	Preferential tax rate 20%	0	2yrs	6yrs	2yrs	-

3) Incentives to be added to the current schemes

① Different incentives by type of activity of investors

Considering the rationale above, it is proposed to introduce a different scheme by type of activity instead of flat incentive in Zambia, too. For example, in case that Zambia feels it necessary to promote export. Export oriented investment should be given a different incentive than domestic market oriented investment.

② Different incentives by type of sector invested

Considering that one of the strategic industries for the LS-MFEZ is high-tech industries, it is very important to design a special finance scheme for such industries. High-tech industries are highly capital intensive and have to deal with constantly changing technology. Therefore a necessary incentive is injection of capital and equity in the project or capital subsidy in the form of investment grant and interest subsidy.

Considering the unique features which the LS-MFEZ has, investment to be attracted may not be the traditional one whose production process is labor intensive, but rather capital and technology intensive. If such the case, it is necessary to provide specific incentives for investment which attract super high-tech processes. This means that process-wise incentives may be necessary as well as sector-wise incentives.

Also, some service sectors which provide high-grade service employing many staff such as telecommunication service or software development service should be given another special incentive. In addition, following incentive schemes are also effective.

Table 7.3.5 Incentives for Service Sector

Type of incentives	Type of subsidy	Industry
Incentives for renting a space in an office building	6 months' rent	IT, biotechnology, design environmental, health care
Incentives for large-scaled business location(Acquisition of fixed property)	City tax reduction, Subsidy on 2%of investment capital	
Incentive for factory location	Subsidy on 2% of investment capital	Industrial area

The following table which shows type of incentive for high-tech is referred, too.

Table 7.3.6 Incentives for High Tech Areas in Japan

Eligible facilities	Eligible business	Requirements		Subsidy	
		Initial fixed asset investment	Number of newly hired regular employees	Amount	Maximum amount
Office	Software business, information processing business, information providing business,	US$300,000 more	5 or more	Less than 1/10 of initial fixed asset investment	US$ 10 mil.
	Call center	US$500,000 more	20 or more	Less than 1/10 of initial fixed asset investment	US$5 mil.
	Data center, Solution center	US$500,000 more	5 or more	Less than 1/10 of initial fixed asset investment	US$ 3 mil.
Research facility	High tech, Biotech, nanotech, etc.	US$1mil or more	5 or more	Less than 1/10 of initial fixed asset investment	US$10 mil.
Factory	High tech, Biotech, nanotech, etc.	US$3 mil. More	10 or more	Less than 1/10 of initial fixed asset investment	US$10 mil.

③ Different Incentives for local SMEs investors

Investors in MFEZ are requested to invest not less than US$500,000, regardless of size of company. Small companies can not afford to invest. Comparing with foreign investors, local investors' funding capacity for investment in MFEZ is weak. Even though MFEZ is developed so as many local investors to participate, due to lack of investment fund, they can not afford to do. Especially it is true for SMEs. To cope with the situation, it is recommended to prepare some solutions for local SMEs' investment in MFEZ.

One of solutions is for the Government to extend some loan with low interest rate or to lower rent rate for local SMEs under a condition that they stay in standardized factory. The other is to evaluate SMEs' investment from a viewpoint of quality. In case that SMEs' investment is quality investment,

SMEs are allowed to become investors in MFEZ even though their investment is less than US$500,000. Whether their investment is high quality or not is evaluated paying attention to innovativeness of product or process. Whichever solution is to be followed, it is necessary to issue a new statutory instrument.

④ Different incentives by region

By region, the current incentive scheme is set the same as all over Zambia and there is no special incentive in any specific area. However, it will be necessary to set special incentive for some areas where economic development is lagging a lot compared to other areas.

⑤ Incentives for ICT introduction

Regardless of what kind of industrial sector advances to the LS-MFEZ, investors are required to be equipped with ICT to enhance their competitiveness. It is because process in production of products and services are nowadays largely computerized. For supporting investors' introduction of ICT, following two special incentives are provided. One is accelerated depreciation of equipment for ICT and the other is tax reduction on training cost for employees. In this relation, import of second hand computers is largely liberalized in terms of volume and custom duty in case they are used for training purpose. It is necessary to secure trainers of ICT. Training center is established within the LS-MFEZ. The center provides two kind of training service. One is general and basic training which will be provided by gathering employees and the other is specific training which is provided upon enterprise's special request.

⑥ Incentives based on SWOT analysis

Efficient and effective investment incentives should be developed taking analysis of SWOT which Zambia embraces for foreign investment promotion into consideration. The result is summarized in the following table.

Table 7.3.7 SWOT Analysis for Foreign Investment Promotion

Strength	Weakness	Opportunity	Threats
• Endowed with rich natural resources • Political stability • English speaking country • Close to South African market • A few hours flight to capitals of neighbouring countries • Rich tourism resources: power to gather tourist from the world • Relatively good governance • Strong governmental administration • Good country image	• Land locked country • Relatively small domestic market (not so big population) • Relatively high production cost • Unsophisticated industrial structure • Weak business association • Underdeveloped cross- border infrastructure • Far from Asian growth centre	• Gathering attention of Asian countries • Complementary projects among neighbouring countries	• Carouse of natural resources • Development plan of SEZ in neighbouring countries

It is necessary to develop new incentives to utilize the above "Strength". The incentives are to be strong and powerful enough to attract investment and to be delivered not only to local investors but also to foreign investors. The incentives should cover both of fiscal and non fiscal ones. The followings are examples.

- Incentives for development project of international public goods
- (Target) International educational centre, International high-tech research centre, International medical centre and international convention centre
- Incentives for development project of distribution centre for neighbouring countries
- (Target) International trade centre and International distribution centre
- Incentives for infrastructure development
- (Target) R&D and software centre for infrastructure development (investment for
- materials such as cement or iron rod is carried out of the LS-MFEZ)
- Incentives for information technology based service centre
- Incentives for low cost production development
- (Target) R&D development centre for low cost production of cheap products, which are mainly addressed to poor rural area

It should be noted that the above incentives are related to service sectors. When service economy is progressing with high speed, advanced service sector should be developed with effective incentives.

4) Optimization of tax incentives

① Proposed effectiveness oriented tax incentives

When requests for incentives are strong from various sectors, one of methods to optimize tax incentives is to rate the necessity of incentive by target areas and to calculate total scores. The following is an example. When a country needs to attract the following four targets areas, the necessity is quantified. Target areas are development of high technology, export expansion, job creation and development of rural area. Scores are given to each factor from 1(low) to 5(high). Depending on the total score, the tax holidays incentive is set. For example, when total scores are more than 10, it is 6 years while less than 7, it is 4 years.

While this method has an advantage that various important targets are taken into consideration, it has a disadvantage that it lacks of transparency in evaluation of each project by target. Taking "A" project as an example, investor insists that the investment score in High-tech is more than 3 and score of Job creation is also more than1. Therefore, it is necessary to develop an objective indicator judging each score for each project. In this regard, "High tech" factor will be evaluated in terms of capital investment per employee, while "Export oriented" factor will be evaluated in % of export in total production.

Incentives for high-tech industry are justified for the following reasons.

- Facilitate technology transfer to Zambia
- Contribute to modernization of Zambian industry
- Spill over effect on traditional and non high-tech industries

Problem is definition on "high-tech" industry. It should be defined by using some indicators such as

investment amount per worker. In this regard, "high-tech" should cover not only product but also process. Even though a company produces traditional products, if it produces these products in high-tech process, it should be classified as "high-tech" sector.

Table 7.3.8 Determination of Tax Incentives by Project

Factor	High tech oriented	Export oriented	Job creation oriented	Regional economy balance oriented	Total	Tax holidays (years)*)
Score for each factor	5	5	5	5	20	--
"A" project	3	4	1	2	10	5
"B" project	4	5	1	1	11	10
"C" project	1	2	5	4	12	10
"D" project	1	1	4	3	9	9

*) 1-4: 3 years
5-7: 5 years
8-10:9 years
11-12:10yeras
12- 11years

② Desirable tax incentive structure

Among several types of tax incentives, considering the advantages and disadvantages for each scheme, it is recommended to form a package of four schemes of lower ICT rate, tax holidays and, investment allowances and tax credits, and accelerated depreciation.

(Advantages and disadvantages)

- Lower ICT rate: It is simple to administer and revenue costs are more transparent but large benefits tends to go to high-return firms
- Tax holidays: It is simple to administer and it allows taxpayers to avoid contact with tax administration but it attracts short-run projects rather than long-run projects, revenue costs are not transparent and it creates competitive distortions between old and new firms
- Investment allowances and tax credits: It can be targeted to certain investment and revenue costs are more transparent but it distorts choice of capital assets and qualified enterprises may attempts to abuse the system. In addition, administrative burden is greater
- Accelerated depreciation: Benefits are distributed over all investment and it does not discriminate against long-term assets, while administrative burden is not very small and it discriminates against investments with delayed returns

5) Other incentives

① Indirect tax incentives

Among the above schemes, a new regulation on duty free status of imported materials, machinery and equipment used in multi-facility economic zones is to be noted, even though the term is limited to five years. The incentive is given to *MFEZ or priority sector investors only.* The relevant regulation states as follows.

The Customs and Exercise (General) (Amendment) Regulation, 2007

89C (1) The Minister may, on the recommendation of the Director-General of the Zambia Development Agency approve a rebate, refund or remission, for five years, of the whole or any part of the duty, paid or payable in respect of raw materials, machinery, equipment and such other capital goods, other than spare parts therefore, required for use in priority sectors or multi-facility economic zones.

② Incentives for training of local employee

It is usual for host country to allow the investor to employ a certain percentage of foreign workers for the reason that he cannot find local workers equipped with skills required. Based on the necessity of expanding local employment, the host country encourages investors to make every effort to train local people using the incentive scheme. This is to cap number of foreign workers and to force investors to be serious about training local workers. On the other hand, the Government allows investors to deduct some percent for training expenses*) from corporate profits.

**) Generally, training expenses refers to the direct, ordinary and necessary expensesincurred by the LS-MFEZ enterprise in training program or activity designed to develop skilled or unskilled labor or for managerial or other management development program.*

These shall include the following expenses or any combination of them

1. *Training materials, books and supplies;*
2. *Cost of raw materials and non-depreciable tools actually consumed and used during the training;*
3. *Honoraria for resource speakers and training coordinators and other fees;*
4. *Traveling expenses of resource speakers and training coordinators while away from home on account of the training program;*
5. *Salaries of trainees and training staff for the duration of training*
6. *Traveling expenses of trainees and training staff while away from home on account of the training program*
7. *Tuition, registration or similar fees paid for sponsored trainees:*
8. *Cost of repairs of traveling equipment facilities and other fixed asset used in the training program*
9. *Others (not to exceed 5% of the total training cost)*

One-half of the value of training expenses incurred n developing skilled or unskilled labor or for managerial or other management development programs incurred by an LMFEZ developer / investors may be deducted from. final tax

③ Other incentives

The following incentives should be clearly stated in laws and regulations

(Fiscal incentives)

- Relief from double tax exemption
- Remittance of royalty, technical and consultancy fees
- Duty free import of several number of vehicles

(Non-fiscal incentives)

- Full repatriation of capital and dividend
- Foreign currency loan from abroad

6) Summary of incentives

The above incentives are summarized in the incentive matrix by beneficiary and type of incentive below. For clarification, such a table is made clear by table for investor's convenience.

Under the current incentive scheme, all MFEZ are treated as equally. Even though the policy is to be maintained, since each MFEZ has specialty in its economic and industrial structure, incentives which each MFEZ enjoy differ.

Table 7.3.9 Incentive Matrix by Type of Beneficiary and Incentive

Type of Incentives	Type of enterprises								
	Developer	Operator	Export	Free Trade	Pioneer	Domestic Market	Tourism	Utility	Service
Tax and duty-free importation	*		*	*	*	*			
Income tax holiday	*	*	*	*	*	*			
Special tax rate after income tax holiday	*	*	*	*	*	*	*	*	
Tax credit for import substitution			*	*	*	*			
Exemption of wharf dues, export tax and import fees			*	*	*	*			
Tax credit on domestic capital equipment			*	*	*	*			
Additional deduction for incremental labour expenses and training expenses			*	*	*	*			
Additional deduction for training expenses					*	*	*	*	
Unrestricted use of consigned equipment			*	*	*	*			
Permanent resident status for foreign investors and immediate family	*	*	*	*	*	*	*	*	
Employment of foreign nationals			*	*	*	*			
Remittance of earnings without prior approval from central bank			*	*	*	*			
Other tax credit for increase in export			*						

Source: JICA Study Team

(3) Establishment of a new management or administration body

Considering that tasks needed for the LS-MFEZ management is too many to be handled under the current operation structure in ZDA, establishment of a new institutional framework is recommendable. Table 7.3.10 shows the alternatives for the LS-MFEZ management. As shown in the table, modification on current legal and regulatory frameworks differs depending on which type of

management style is selected. In type of a new institutional framework, legal and regulatory frameworks have to be drastically changed. In the other types, even though changes are not so drastic, some fundamental changes are indispensable because a new management team is added in both ZDA head office and the LS-MFEZ liaison office. The changes in the LS-MFEZ management bring about substantial changes in activities by the relevant Ministries. When an established MFEZ is located near Lusaka capital, it is not difficult for the Ministries concerned provide their services from their headquarters. However, if the MFEZ is located far from Lusaka, it will become necessary for them to set up a liaison office at each MFEZ site.

Table 7.3.10 Alternatives for Management of the LS-MFEZ

Function	Current System	Creation of a New Sub-Section under MFEZ Section of ZDA	Establishment of a New Institutional Framework
Total management and supervision	Board of ZDA	Board of ZDA	Board of ZDA
Administration body	Current ZDA MFEZ Section & Lusaka Liaison Office	A new sub section created under MFEZ Section & Lusaka Liaison office	Current ZDA MFEZ Section, a newly created MFEZ Board (off-site) & a newly created on-site administration (One Stop Service Centre)
Necessity of new laws or regulations	Yes Internal circular within ZDA is necessary for establishment of Lusaka liaison office.	Yes Internal circular within ZDA is necessary for establishment of a new sub-section and Lusaka liaison office.	Yes (1) Establishment of a new Board and the LS-MFEZ Administration (2) Transfer of power for handling investment approval procedure to the LS-MFEZ Administration
Content of the law or regulation	(1) Total management for the LS-MFEZ at ZDA (2) Delegattion of some power to liaison office	(1) Total management for LMFEZ at ZDA (2) Delegattion of some power to liaison office	(1) Establishment of the Board for MFEZ in Zambia (2) Establishment of one stop service centre for the LS-MFEZ (3) Delegation of representation (4) BOT scheme
Other considerations needed	-	-	(1) Revision of the current investment approval procedure (2) Dispatch of the officers from the relevant Ministries to the on-site office
One stop service	- ZDA staff facilitates services for investors by themselves. - The services are rendered at ZDA head office.	- ZDA staff facilitates services for investors by themselves. - The services are rendered at ZDA head office.	- Relevant organisations providing services get together in the new the LS-MFEZ office. - The services are rendered at the LS-MFEZ on-site office.

The functions shared by the main three actors, ZDA (MFEZ Section), MFEZ Board, and the LS-MFEZ Administration (One stop service center), are shown in Table 7.3.11.

Table 7.3.11 Summary of Functions Shared by Key Actors

Function	ZDA (MFEZ Section)	MFEZ Board	MFEZ Administration (One Stop Service Centre)
Establishment	Under ZDA Act	Under New the LS-MFEZ Act	Under New the LS-MFEZ Act
Dispatch of representative(s) by the relevant Ministries	-	-	1) ZDA 2) Custom and Excise Dept. 3) Ministry of Finance and National Planning 4) Patents and Companies Registration Office 5) Immigration Office 6) Ministry of Labor and Social Security 7) Environmental Council of Zambia
Duties	- Control the implementation of the work of the zone developer(s) and zone investors - Control the entry and exit of goods, means of transport and people - Evaluate the investment proposal for registration - Prepare reports on monitoring results to MCTI	- Initiate plans and set directions - Determine principles and regulations - Give tax and non-tax incentives to Zone developers - Provide guidance to MFEZ on eligible zone investors - Prepare guidelines on management and workers training, environment, construction, import/export and entitlement to investment incentives	- Evaluate application from the investors - Award incentives and issue licenses and permits - Prepare reports on activities of the zone to the relevant ministries
Approval of license	-	To zone developer(s) To BOT contractor(s)	To Zone investors

(4) Challenge to "One-Stop Service"

1) Current status

Current investment approval procedure consists of following steps:

- Register name of company and obtain certificate of registered company : Patents and Companies Registration Office
- Obtain secondary license: Relevant Ministries, City council etc.
- Obtain investment license: ZDA
- Obtain work permit: Immigration office
- Obtain tax incentive: Customs Credibility & Controls

Even though each process is handled outside of ZDA except the investment license, since ZDA officer supports investors to obtain registration and another license or permits by visiting relevant authorities on behalf of investors, ZDA claims that investment approval procedure is following "One - Stop Service".

The Issue is whether the same approach can be followed in the LS-MFEZ which is located far from the centre of Lusaka City. In this regard, there is not any serious bottleneck for relevant organisations to set up a local office within the LS-MFEZ and serve to investors on site.

Officers at Immigration office, Customs Credibility & Controls, Company registration Office and City council unanimously say that it is possible to dispatch their representative to the site of the LS-MFEZ. The difficult matter is to what extent power of the authorized officers will be delegated to officers stationed in the LS-MFEZ. Some high ranking officers of the above organisations say that it is no problem to let them make documents and check them, but to delegate power of final approval is another thing. In order to realize delegation of power for final decision, alternation of law or regulation becomes necessary.

2) Different type of "One-Stop Service"

As suggested above, better service is more important than investment incentives. It is necessary to construct a scheme of "One-Stop Service" for better services. If the LS-MFEZ succeeds in developing the service, it will be able to enhance its competitiveness vis-a-vis other SEZs in neighboring countries.

One-Stop Service means that all procedures are carried out in one site, but it does not exclude a partial mechanism that only some procedures are carried out in one place. For example, in case both a central government permit and local government permit are necessary, each permit can be issued by a different one - stop service. Or, both permits might be submitted in two offices in the same building or under the same roof.

a. Cambodia

As an instance, one stop service centre in Cambodia is shown in Figure 7.3.2. The SEZ Administration (ASEZ) issues investment licenses to investors in SEZ under One-Stop Service, while Cambodia SEZ Board (CSEZB) issues license to developers. In order to realize the One-Stop Service, the relevant Ministries dispatch their representatives and delegate powers to issue necessary permits.

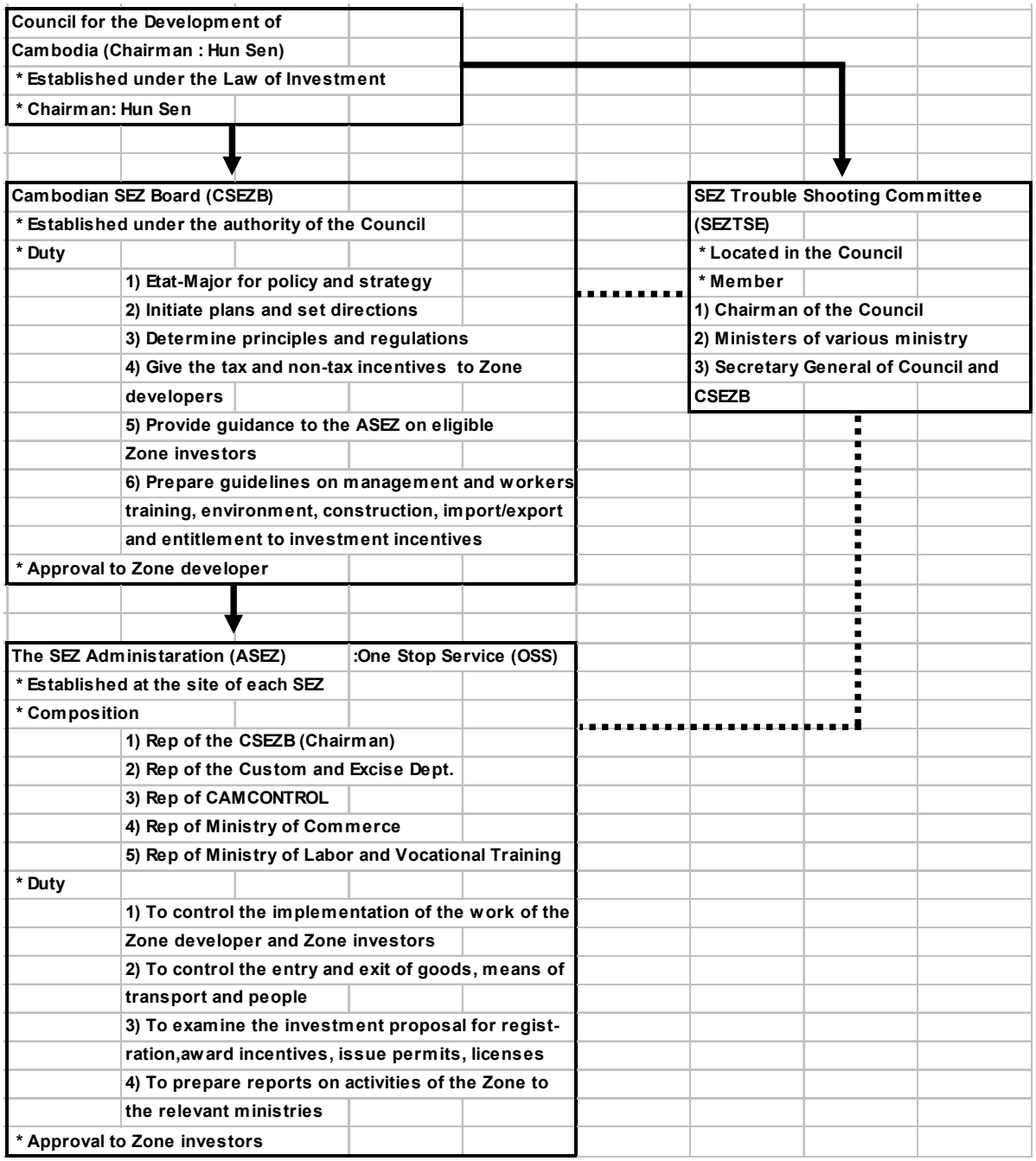


Figure 7.3.2 One-Stop Service in Cambodia

b. Syduarjo (Indonesia)

Syduarjo scheme in Indonesia illustrates that many kinds of "local" permits are issued at the same office. An investor visits a single reception desk at the office with the necessary documents and submits them. Several local officers inspect the documents one by one and if there is no deficiency, these documents are sent to a manager. The manager confirms them, signs them and returns to the reception office. The investor pays fees for the services and picks up the documents.

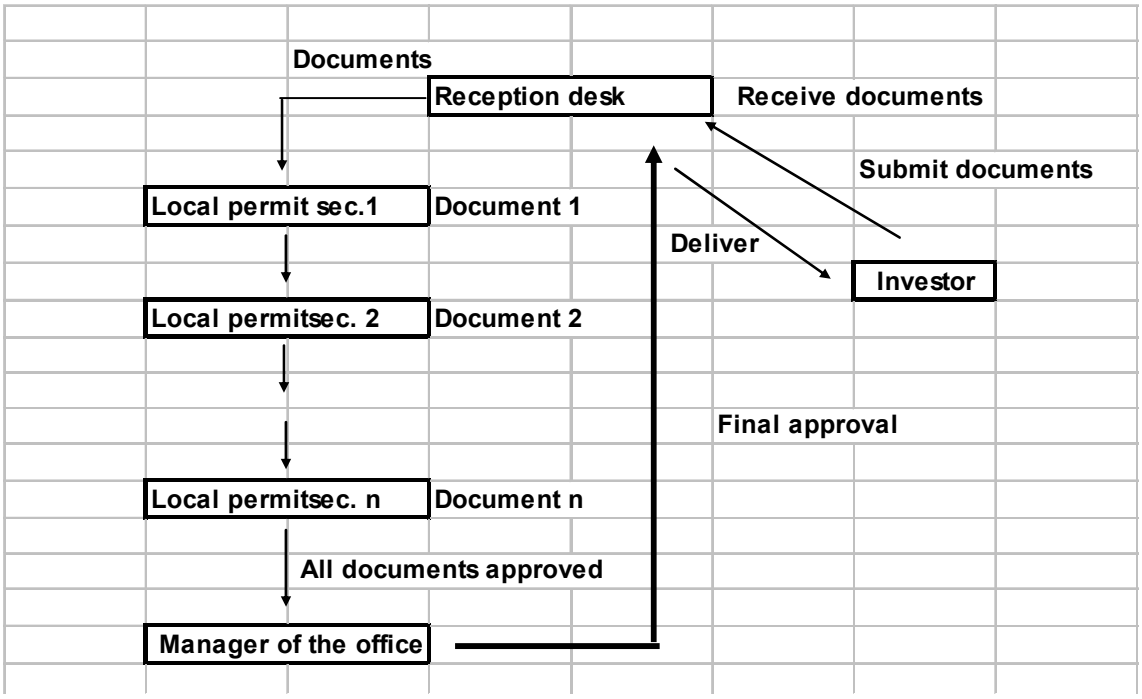


Figure 7.3.3 One-Stop Service in Syduarjo

c. Batam-Singapore SEZ

Batam-Singapore Special Economic Zone illustrates a different case. The Zone provides one - stop service in a sense that all procedures are handled within one building. Local permit section is located on the first floor of the building, while central government permit section is located in the second floor. Each permit is issued independently, but an on-site management office coordinates them. Investors have to go around to obtain investment licenses and various permits in the building, but they do not need to visit various offices outside of the building. Further central government permit is also available since officers from central government station the site, though some procedures such as confirmation of name of registered company are handled by officers at head office of the central government through information network.

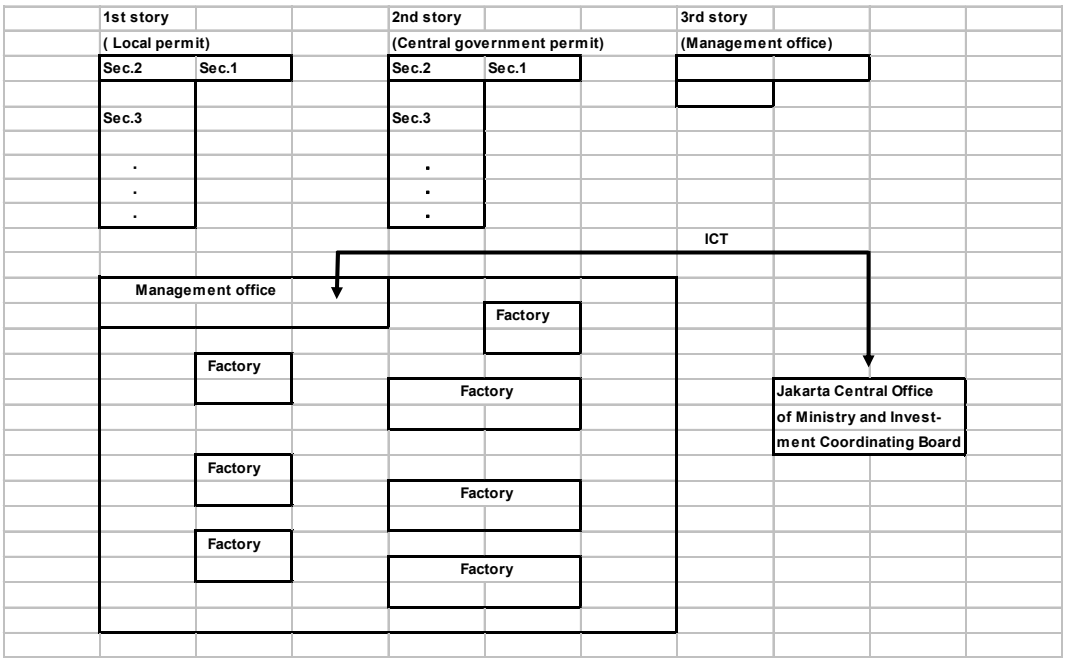


Figure 7.3.4 Example of Batam-Singapore SEZ

3) Idea for efficient One-Stop Service

Needs for One-Stop Service may be not so strong because investment in the LS-MFEZ is not large in terms of number and their investment procedure could be easily handled by the current procedures. However, considering the future, it is better to establish the basis of One-Stop Service at the the LS-MFEZ site. One idea of how would work is as follows. Relevant ministries would dispatch their officers to the office at the LS-MFEZ once or twice in a week. By doing so, it would be possible to start the idea of One Stop Service in full-fledged way. When investment to the LS-MFEZ expands, each ministry could take the next step to dispatch their officers for a full working week.

4) Delegation of power to representatives at the LS-MFEZ by each Government office

Under One-Stop Service, each Government office concerned will dispatch its representative to the site. In this case, each Government office is required to delegate its power to the representatives. This should be clearly mentioned in the laws or regulations. Following is an example on how to make clear necessary words in laws and/ or regulations

(Ref.)
The MFEZ Board shall establish a one stop shop center for the purpose of facilitating the registration of new enterprises in the MFEZ. Thus all appropriate government agencies that are involved in registering, licensing or issuing permits to investors shall assign their representatives to the MFEZ to attend to Investor's requirements
(An Act Providing for the Legal Framework and Mechanisms for the Creation, Operation, Administration, and Coordination of the Special Economic Zones in Zambia)

The SEZ administration is the "One-Stop Service" mechanism set up by the Zambian Multi-Facility Economic Zones Board in order to be permanently stationed in each MFEZ and is structured and has the duties as follows:

All--relevant ministries or institutions shall delegate to their representative sufficient power to make decisions on behalf of the ministry or institution in accordance with their respective authority in the zone.

(Sub-Decree on the Establishment and Management of the Multi-Facility Economic Zone) through the "One-Stop Service" mechanism located on the site and in accordance to the

Any incentive provided to the Zone investors shall be decided by the MFEZ Administration relevant laws and regulations

(Sub-Decree on the Establishment and Management of the Multi-Facility Economic Zone)

5) Establishment of efficient custom clearance system

Streamlined custom clearance is another important issue. Current procedures for cross-border trading in Zambia are shown in the table below. It takes much time and cost for documents preparation. Custom clearance at LS-MFED should be dramatically streamlined.

Table 7.3.12 Current Custom Clearance

Item		Duration (days)	US$ Cost
Nature of Export Procedures	Documents preparation	36	100
	Customs clearance and technical control	4	100
	Ports and terminal handling	4	198
	Inland transportation and handling	9	1,700
	Totals:	53	2,098
Nature of Import Procedures	Documents preparation	33	100
	Custom clearance and technical control	4	120
	Ports and terminal handling	9	220
	Inland transportation and handling	18	2,420
Totals:		64	2,840

Export documents to be prepared	Import documents to be prepared
Bill of lading	Bill of lading
Certificate of origin	Cargo release order
Commercial invoice	Certificate of origin
Customs export declaration	Commercial invoice
Equipment interchange receipt	Customs import declaration
Form SAD 500 (Transit document)	Customs transit documents
Packing list	Equipment interchange receipt
Technical standard / health certificate	Form DA 500
	Packing list
	Pre-shipment inspection clean report of findings
	Transit document

(Source) World Bank

Streamlining the customs clearance procedure through on-site clearance is one way to enhance the LS-MFEZ's competitiveness. It involves setting up a facility within LS-MFEZ where procedures for import- export are done by "One-time declaration, one-time check and one-time inspection" as is shown in Figure 7.3.5.

The system works as follows. Supposing that Export processing zone is established within the LS-MFEZ as well as Free trade zone, customs office and clearing agent office are set up inside of the Export processing zone. This is because the importance of an Export processing zone is large than a Free trade zone.

Cargos related to imports and exports flow in the following three ways. First, imported goods move to general industrial zone and products manufactured the zone are directed to local market. Second, imported goods go to Free trade zone and these goods are directly exported overseas after repacking or some minor arrangement. Third, imported goods go to Export processing zone where new products are produced with imported products and are directed to overseas market.

In the first case, custom clearance at border is everything and there is no involvement by customs office at the LS-MFEZ. In the second case, as it is bonded zone, customs office locates in Export processing zone checks outgoing of the cargos in the site by checking documents and products at the site. In the third case, the same procedure as the second one is followed.

The advantage of the above scheme lies in that producers and exporters are able to shorten time from manufacturing to shipment for export since customs office and clearance agent stay very near to exporters' factories. Also, documents handling becomes very efficient.

In order to materialize the above system, it may be necessary to open an office for custom clearance and, for the sake; a new regulation will become necessary. Further, it will become necessary to prepare a regulation which allows cargos departed from the zone to be inferred as cargos, whose inspection is over, if they are sealed on the Zone.

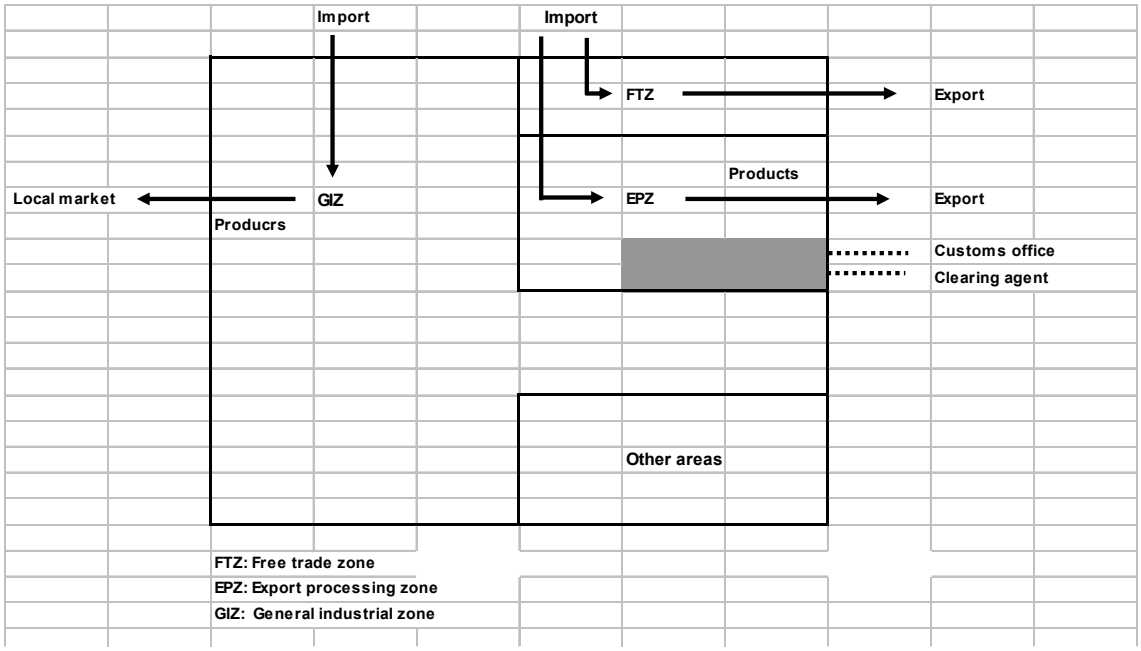


Figure 7.3.5 Custom Clearance in the LS-MFEZ

6) Application to other MFEZ

The above operation system should be applied to other MFEZ than the LS-MFEZ. In this sense, legal and regulatory frameworks mentioned above are shared all over Zambia. Especially, legal and regulatory frameworks on one-stop service are to be announced as Zambian - wide ones in a statutory instrument.

(5) Finance Scheme

Cases in many countries show that a private sector acts as a developer of SEZ. However, as discussed in Section 7.4, a different scheme is proposed in the LS-MFEZ case. The MFEZ Development Corporation functions as a developer. The Corporation obtains necessary funds for the project mainly from government budget, sub-leasing fees from investors and owner of government complex, soft loan from foreign countries and borrowing from commercial banks for which land is extended as collateral by the Agency. The Company does not take any financial risk for the project. In order to avoid its financial burden as much as possible, the Corporation divides its premise to several areas and leases each to investors one by one.

Core part of the financial schemes is lease finance. When the premise is to be developed under leasing system, several legal and regulations should be prepared. Followings are examples.

- An act on leasing term for nation's land: 50 years, but extended up to 99 years
- An act which allows the Government to lease its land to developer(s)
- An act on creation of an agency which becomes a shareholder of developer(s) as leasing rights being equity
- An act which allows the developer(s) to borrow money for the LS-MFEZ development with the leasing rights as collateral
- An act on leasing of land to investors: pricing formula and duration of leasing

Rule for lease of lands in the LS-MFEZ is summarized as follows.

Section 1. Qualifications -- Land within the LS-MFEZ can be leased only to the LS-MFEZ enterprises / entities authorized by or registered with MFEZ and owned or controlled either Zambian nationals or by aliens such terms and conditions as the Board may formulate.
With respect, however, to lease of lands to MFEZ enterprises wholly owned or controlled by aliens, the following limitations and conditions shall apply.
The lease period shall not exceed 50 years extendible for a period not more than 45 years
The area leased shall be used exclusively for the purpose of investments as approved by the Board.
In case the LS-MFEZ enterprise desires to extend the lease after the initial period of fifty years, it shall present proof that it has made social and economic contributions to the country.
Section 2. Cancellation of lease -- Any long term lease contract referred to Section 1 hereof may be cancelled at the instance of the MFEZ authority, if the project is not initiated within the period as stated in the contract.
Section 3. Transfer of leasehold rights -- All leasehold rights acquired under long term contracts in accordance with this Rule and the Act may be sold, transferred, assigned or conveyed.

Rule for sale of building in the the LS-MFEZ is summarized as follows.
Section 1. Building acquisition-- A MFEZ enterprise duly registered with the MFEZ may construct, buy or sell building(s) / structure(s) subject to the terms and conditions as may be prescribed by the Board

Balance sheet of the Corporation is as follows.

(Starting year)		*(A few years later)*	
Assets	Liability & Equity	Assets	Liability & Equity
Cash	Borrowing	Cash	Borrowing
Land	Equity (land)	Lease asset	Equity (land)
	Equity (Government fund)	Land	Equity (Government fund)

In relation to the above scheme, another case is to be considered that the Corporation retains such experts who are to be employed by the Company in the above case. Advantage of the idea is simplification of the structure. On the other hand, there is a disadvantage that the Corporation becomes too large organisation.

(6) Alternative scheme

The above Corporation scheme is proposed considering the substantial high financial risk in a case that a private sector acts as a developer. As a method to reduce the risk, two ways are considered. One is that the Government subsidizes the project and the other is that the Government and a private sector form a joint venture of the developer. The former case has a weak point that the private sector falls in moral hazard. The latter case has no such a demerit but there exists a concern that the private sector's financial risk is still large. However, the latter case is introduced as a reference below.

1) Structure

It is assumed that the Government, owner of the land, leases the land for both public and private sector. Both sectors pay fee for the lease and obtain rights to construct, hold and use infrastructures, facilities and factories. Utilizing these assets, they gain benefits or profits and recover the leasing fee.

In this relation, it is assumed that government management offices are settled in one corner of developer's office. The government pays fee for office rentals to the developer. Needless to say, R&D related government facilities are constructed independently in near area of R&D facilities which private sector owns. Main structures at the LS-MFEZ are investors' factories, commercial areas, residential areas, institution area, community facility and developer's office where government officers and vendors stay.

An issue for development under leasing scheme is that when it takes many years to sell out the rights, developer(s) face financial difficulties. It is because leasing fee payment to the Government starts immediately after the leasing contract is made, while income through lease payment by investors occurs later. In order to solve the problem, the Government agency becomes one of shareholders of the developer(s) and the Government agency brings in leasing assets as capital. To form a joint venture of developer among the Government and private sector is one way to solve the difficulty.

2) Finance scheme

Here again, core scheme is lease finance as is shown in the below.

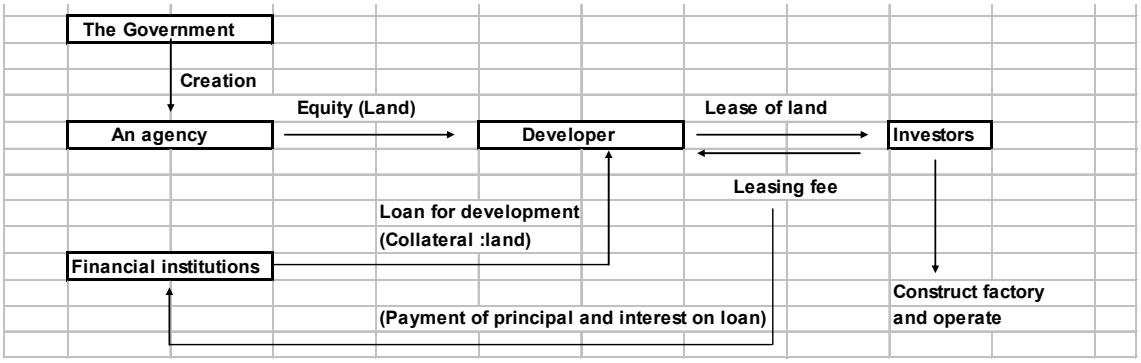


Figure 7.3.6 Creation of Developer and Delegation of Leasing Rights

Funding scheme for the case is shown in Figure 7.3.7

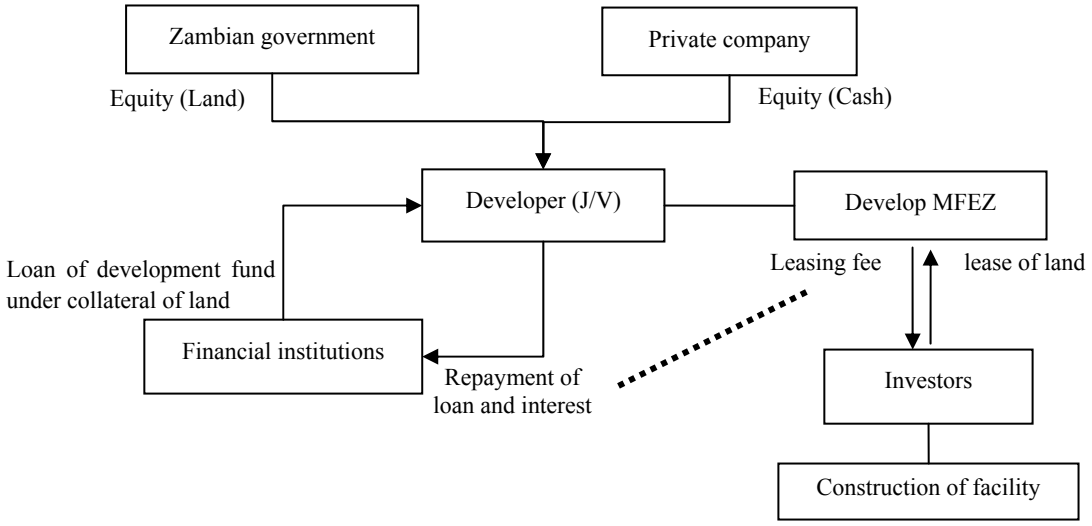


Figure 7.3.7 Funding Scheme for Alternative Case

(7) BOT (Built-Operate-Transfer) or BTO (Built-Transfer-Operate)

Under current situation that detailed development process is not yet determined, it is assumed that the development will be realized under the following process.

The Government develops necessary fundamental infrastructures by BOT or BTO. The fundamental infrastructures includes not only access roads to the LS-MFEZ but also infrastructures within the zone when it is commonly used by every parties concerned in the zone. Putting some examples, they are trunk road passing the zone and water supply sewage and wastewater treatment. Small road within each plot allocated to each investor is not included.

While the above basic infrastructures are being developed, developer will develop common infrastructures such as park and community centre by way of BOT or BTO or usual contracts with infrastructure developers. Each investor develops infrastructure within its own premise.

After the above basic and common infrastructures within the zone, developer leases each plot to investors.

For the above scheme being realized, regulations on BOT or BTO have to be prepared.

Basic concept of BOT is as follows.

- Private sector concludes an agreement on BOT and BTO with Government
- Based on the agreement, the private sector build specific infrastructures with their funds and operates the infrastructures for a period of years determined in the contract
- When the due comes, the private sector transfers the infrastructures assets to Government
- The private sector is allowed to charge fees to the users and covers investment cost with the fees.
- The principles for determining prices, rates, fees and other charge of BOT and BTO project must be provided for in BOT and BTO contracts.
- BOT enterprises are entitled to receive incentives such as tax incentives
- BOT and BTO contracts are popular in the fields of transportation, production and sales of electricity, water supply and drainage and wastewater treatment

BTO is similar to BOT except that in case of BTO, private sector builds infrastructures, transfers them to Government and, after that, operates them upon request from Government. Private sector builds the infrastructures with own funds and recover the cost when private sector transfers to Government. In operation stage, private sector receives operating fee from government.

Since BOT or BTO deals with infrastructures, Zambian enterprises are to be given chances to participate. Where necessary, the Government shall, depending on the nature of each project, delegate the authorized State to act as a guarantor for the fulfillment of undertakings relating to financial obligations by Zambian enterprises participating in the project.

In case of the LS-MFEZ, the scheme works as follows. A newly created MFEZ Board within ZDA makes a contract with BOT enterprises or the LS-MFEZ developer(s) for construction and maintenance of infrastructures. The BOT enterprises or the LS-MFEZ developer(s) may conclude a contact of the construction with sub-constructor(s) and of maintenance with operator(s) of the infrastructure under BOT schemes. The Board provides the BOT enterprises or developer(s) a right to set tariff of service based on appropriate tariff scheme which is to be determined in advance. Infrastructures for BOT may be limited to electricity, water supply, sewerage and waste management.

Since the above schemes are quite new in Zambia, it is necessary to develop law or regulation on BOT or BTO. Essential clauses of the law or regulation are shown in Attached paper.

(8) Cost sharing scheme: contract between the Government and developer(s)

Current MFEZ regulations set forth that developer will prepare *necessary infrastructures* (Regulations 3). This means that if government does not share any cost, the developer will have to share all cost and transfer the cost to investors. If it is applied, fee charged to investors by the developer will become very expensive and the the LS-MFEZ will lose its competitiveness. In order to avoid the situation, it is necessary to prepare a cost sharing scheme between the Government and developer(s) and price formula to investors for each premise in the LS-MFEZ. An example of the cost sharing scheme is as follows.

Table 7.3.13 Cost Sharing for Infrastructure Construction

Infrastructure	Government	Investors or tenants (through developer)
Trunk road	(100)	
Inner road		(100)
Electricity		(100)
Water supply	(50)	(50)
Waste management	(80)	(20)
Police station, Fire station	(100)	
Environment protection	(60)	(40)

In developing MFEZ, it is imperative to determine basic policy and strategy on infrastructure development by regulations. In this regard, prevailing The Multi-Facility Economic Zones (General) Regulations, 2007 is too ambiguous and details should be formulated.

(9) Local procurement clause

MFEZ is one of national infrastructures. In its construction, the works should be given to local constructing companies as much as possible where they can meet requirements for construction. Local procurements clause should be developed. In case local construction companies lack of financial capability, the Government should guarantee them.

(10) Environment management

Environment management and waste management should be carried out by companies who are specialized in such management. In this regard, environmental standard specific to the LS-MFEZ should be laid and regulations for observing the standard should be prepared. The standard includes not only noise, exhausted gas, garbage but also scenery of buildings and green belt. Areas where new law and regulatory frameworks are required are as follows.

- Environmental standards
  MFEZ Board, in coordination with appropriate government agencies, establishes policies and guidelines to ensure environmentally and socially acceptable development in each MFEZ.
- Agreements
  MFEZ shall enter into a Memorandum of Agreement with various governmental agencies for an integrated and simplified implementation of environmental regulations, resources conservation compliance, monitoring and development controls.
  MFEZ Board policies and guidelines for the development and implementation of development of

the LS-MFEZ industrial estates shall be based on the technical details of the eco-file of the area determined by the Committee which proposes MFEZ.

- Pre-Registration requirement
  As a pre-registration requirement, a LS-MFEZ developer and operator shall be required to subject itself to the compliance procedures of the Environment Impact Statement system.
- Regulatory functions
  The MFEZ Board shall formulate and implement environmental policies and regulations, issue permits and /or clearance and grant franchise to entities that will engage in environmental management within the LS-MFEZ
  An environmental unit shall be established within each MFEZ to monitor compliance in the area and conduct regular sampling and testing of regulated emissions, dusts, particulates, effluents, sludge, noise levels and other concerns
- Waste management program
  Each MFEZ shall be required to establish and adopt sound waste management program specifically but not to limited to solid waste, sludge and effluents.
- Environmental management services
  The MFEZ Board shall have the option to develop, establish, manage and operate, or to privatize the services, through the grant of franchise, or under BOT

Environmental management is common to every MFEZ. Therefore, the above regulations on environment are equally applied to all MFEZ.

(11) Harmonization with employees

There is no other area than labour issue that legal and regulations at national level are equally applied to each MFEZ

1) Usage and management of labour force

ZDA Act sets forth conditions for use and management of the foreign nationals. However, it may become necessary to add other articles depending on the necessity. If the LS-MFEZ is a high-tech park, it may be necessary to allow investors to employ foreign nationals in technical areas more than the number indicated in ZDA Act, which is up to five employees. With respect to way to amend the Act, the following two regulations seen in other countries will be referred to

- Employment of foreign nationals
  MFEZ enterprises may employ foreign nationals in executive, supervisory, technical and advisory positions. Executive positions shall pertain only to the president, vice-president, treasurer, and general manager, or their equivalents. The total numbers of foreign nationals employed by MFEZ enterprises in supervisory, technical or advisory positions shall not at any time exceed 5% of its workforce. Foreign nationals may be employed in supervisory, technical or advisory positions only if it is certified by Ministry of Labour and Social Welfare that no Zambian people within the MFEZ possesses the technical skills required therefore.
  Foreign managers, technicians or experts may be employed, provided that the number of foreign staff does not exceed 10% of the total number of its personnel
  A MFEZ Enterprise may employ foreign nationals for a period not exceeding 5 years from its registration, exceeding within limited periods. MFEZ Enterprise seeking such extension must have satisfactorily compiled with the training program

A MFEZ Enterprise employing foreign nationals exercising supervisory, technical or advisory functions shall provide a training program for Zambian people.
The Zone developer has the duty to cooperate with the Ministry of Labour and Social Security in order to facilitate the training of Zambian workers, employees and promote new knowledge and skills to workers and employees with specific and effective programs

Two cases in Asian countries are shown for reference.

Table 7.3.14 Employment of Foreign Nationals

	Cambodia	The Philippines
Type of staff	Managers, technicians or experts	Executive*1), supervisory, technical and advisory poitions*2)
Limitation	Not exceed 10% of the total number of its personnel	*2) shall not exceed 5% of total its workforce
Years		Not excceding 5 years
Spouse and dependants	Resident visa is provided	Resident visa is provided
Others		*1)President, vice-president, treasurer, and general manager *1) *2): It is neceassary to be certified by Dept. of Labor and Employer to that no Fillipino possesses the technical skills required Enterprises provide a training programa and submit an annual progress report Additional deduction for training expenses

2) Work permit and visa, and Residency visa

Next table shows how several countries deal with "Necessary and urgent work visa". Zambia is generous in this matter and there is no necessity to add other regulations

Table 7.3.15 Working Visa

	Indonesia	Thailand	Zambia	Tanzania
Working visa	yes	yes	yes	yes
Urgent and necessary visa	no	yes Only for specific jobs	yes Business visitors 30 days	yes Temporary visa at the point of entry to key technical, management and training staff for a maximum of period of 30 days
General business visa	yes	yes	yes	yes

Residency visa

Foreign zone developers and Zone investors may be accompanied by their spouse and dependents whose age is under 21 years old and shall have the right to obtain a resident visa in accordance with The Immigration Law

3) Severance pay

Considering that MFEZ is to be a world-class zone, labour practices at the zone should be also high standard one. One of the issues is severance pay. Even though the current Employment Act (Chap.267) sets forth severance pay as is shown below, the details are not shown. Taking the opportunity of establishing quite a new economic zone, it is advisable to establish such details. The following table contains a sample.

The Employment Act (Chap.276)

> *The Minimum Wages and Conditions of Employment Act (Laws, Volume 15, Cap.276): Statutory Instrument No.56 of 2006*
>
> *Redundancy pay*
>
> *10. Where an employee's contract of service is terminated by reason of redundancy, the employee shall be entitled to at least one month's notice and redundancy benefits of not less than two month's basic pay for each completed year of the service*

In this relation, the same Statutory Instrument sets force "Retirement benefits" as follows.

> *Retirement benefits*
>
> *9(1) An employee who has served with an employer for not less than ten years and has attained the age of fifty-five years, shall be entitled to three months basis pay for each completed year of service.*

Current laws and regulations on severance pay and retirement pay contain following problems. First, with respect to severance pay, employers are obliged to pay redundancy benefits to employees in addition to contribution to pension fund for employees. Employers claim that these payments are duplicated and not fair. Further, in case employers enable to pay redundancy benefits due to their heavy liabilities, they have to pay wages too. Second, with respect to retirement pay, employers feel too much burden to them. In order to avoid, employers choose casual employment which is not regular one and for which employers are not obliged to pay retirement benefits. As a result, irregular employment increases, Ministry of Labour and Social Security states. In order to solve the problems, it is necessary to set up a strong pension scheme under which employers, employees and the Government contribute to the fund. Taking a chance of establishing MFEZ, it is advised for these parties to be serious in designing a new pension scheme and incorporating it into a law.

With respect to schedule of severance pay, taking the opportunity of establishing quite a new economic zone, it is recommended to review it and, to revise it in case that the regulation does not fit to the reality. Following table is at sample seen in Asian countries.

Table 7.3.16 Severance Pay

Case of dismissal	Severance pay	Reference
■ Unjust dismissal	Yes	Invalid Employee shall be entitled to retirement Compensation shall be paid
■ Wrong doings (a) Serious misconduct or willful disobedience (b) Gross and habitual neglect of duties (c) Fraud or wilful breach (d) Commission of a crime	None	Employer can dismiss
■ Dismiss due to the installation of labor-saving devices or redundancy	Yes: One month pay or one half month pay for every year of service, whichever higher	It is necessary to inform workers and the Ministry of Labor and Employment at lease one month before the intended date
■ Dismiss due to retrenchment to prevent losses and closure of establishment or undertaking not due to serious business losses	Yes: One month pay of one-half month pay for every year of service, whichever higher	It is necessary to inform workers and the Ministry of labor and Employment at lease one month before the intended date
■ Disease as ground for termination	Yes: One month pay or half-month pay for every year of service, whichever higher	Only in case that continuous employment is prohibited by law or is prejudicial to employee's health
■ Termination by employee	None	
■ Retirement from the service upon reaching the retirement age	Yes: the age of 60 years or more but not beyond 65 years-one half month salary for every year service	Retirement benefits The service should be at least five years

(Example)

Case	Retirement pay	Reward pay	Compensation pay
Dismissal	Yes	Yes	Yes
Grave wrongdoings	No	No	Yes
Guilty of crime	No	Yes	Yes
Violations of provisions	No	Yes	Yes
Resignation	No	No	Yes
Changes in the status of enterprise (workers are not willing to work)	Yes	Yes	Yes
Changes in the status of enterprise (employers are not willing workers to work)	Yes	Yes	Yes
Closure	Yes	Yes	Yes
Closure by rationalization	Yes	Yes	Yes
Bankrupt	Yes	Yes	Yes
Worker's death	Yes	Yes	Yes
Enter pension age under pension program	Yes/No	Yes/No	Yes/No
Absent from work for more five days without submitting a written explanation	No	No	Yes
Worker makes a file for the settlement of industrial relations and terminate	Yes	Yes	Yes
Worker makes a file for the settlement of industrial relations and terminate and employee is not guilty	No	No	Yes
Ill for a long time	Yes	Yes	Yes

4) Outsourcing and contract-based employment

Reflecting world wide competition and technological change in work place, enterprises are developing various type of work style. Outsourcing and contract-based employment are typical ones. These kinds of work style will be introduced to a newly established MFEZ and the LS-MFEZ. Since

these work style are not always beneficial to employees, the Government should regulate them so as both parties of employers and employees to gain benefits.

With respect to contract-based employment, In order to normalize relation between employers and employees and secure stable employment on employee side, it is necessary to revise casual worker clause toward limitation on its usage. One of ideas is that employer is not allowed to hire the same employee in three times successively as a casual worker.

Table 7.3.17 Outsourcing and Contract-based Employment: Case for Some Examples

		Indonesia	Viet Nam	Thailand	Philippines	China
Outsourcing	Areas where outsourcing is allowed	a) Separate from main activity b) Auxiliary activity c) Not directly inhibit the production process d) Non-core business	No regulation	No regulation	No regulation	No regulation
Contract-based employment		a) Temporary by nature b) No longer three years c) Seasonal work d) Related to new product and new activity	Specific or seasonal job	No regulation	No regulation	No regulation
	Duration	At longest three years in an initial stage	At longest three years	No regulation	No regulation	No regulation

5) Housing, transport and lunch allowance

The Statutory instruments cited above sets forth also housing, transport and lunch allowance as follows. Since work style in the LS-MFEZ may be different from one in Lusaka City area, some measures to meet the requirements of the Instruments should be seriously taken. It will influence on facilities of the Zone.

Housing allowance 17

An employee who is not accommodated by the employer shall be paid a housing allowance at the rate of thirty per centum of the basic salary

Transport allowance 19

An employee whose duty station is beyond a three kilometers radius from their area of residence shall be paid a monthly allowance of eighty thousand kwacha for transport expenses unless the employer provides transport for the employee

Lunch allowance 20

An employee shall be entitled to a lunch allowance of seventy thousand kwacha per month unless the employer provides a canteen at which the employee may obtain wholesome and adequate meals, provided free of charge.

6) Strengthen monitoring and trouble shooting function

Now that necessary legal and regulation frameworks are developed, it is necessary to construct a system to monitor the observance of the law and regulation. If dispute arises in the course of monitoring, the disputes are to be solved smoothly. For the sake, it is recommended for MFEZ Board to set up monitoring office and trouble shooting office at the LS-MFEZ.

For monitoring, Ministry of Labour and Social Security dispatches representatives and delegates necessary powers to them. When, after the monitoring, it is made clear that law or regulations are not observed, the Administration will take action for the observance. However, when disputes arise among parties concerned, arbitration becomes necessary. For the arbitration, it is proposed to set up a tripartite body consisting of Ministry of Labour and Social Security, employee and industrial sector for quick solution of the issues.

In addition, the LS-MFEZ Trouble Shooting Committee is created for solution of more serious labor problems which are difficult to solve. The Committee has the duty to promptly settle these problems in the the LS-MFEZ, whether pertaining to technical or legal aspects, or issues under the joint jurisdiction of ministries or institutions and beyond the competence of the the LS-MFEZ Administration or The MFEZ Board. The Committee has the further duty to be a mechanism to receive any complaint, and find solutions to that complaint filed by MFEZ developers and investors. The composition of the Committee is as follows:

- Minister of Labour and Social Security — Chairman
- Chairman of ZDA — Member
- Minister of Finance — Member
- Minister of Commerce, Trade and Industry — Member
- Minister of Land — Member
- Minister of Environment — Member

(11) Lusaka South Multi-Facility Economic Zone Act

When the LS-MFEZ is to be established, each items stated above needs to be incorporated into the Act. Outline of the Lusaka South Multi-Facility Economic Zone Act[3] is shown in Appendix L.

[3] Made reviewing cases in Asian countries such as The Philippines, Vietnam, Cambodia and Thailand

7.4 ORGANISATIONAL FRAMEWORK

7.4.1 DEVELOPMENT, OPERATION AND MANAGEMENT

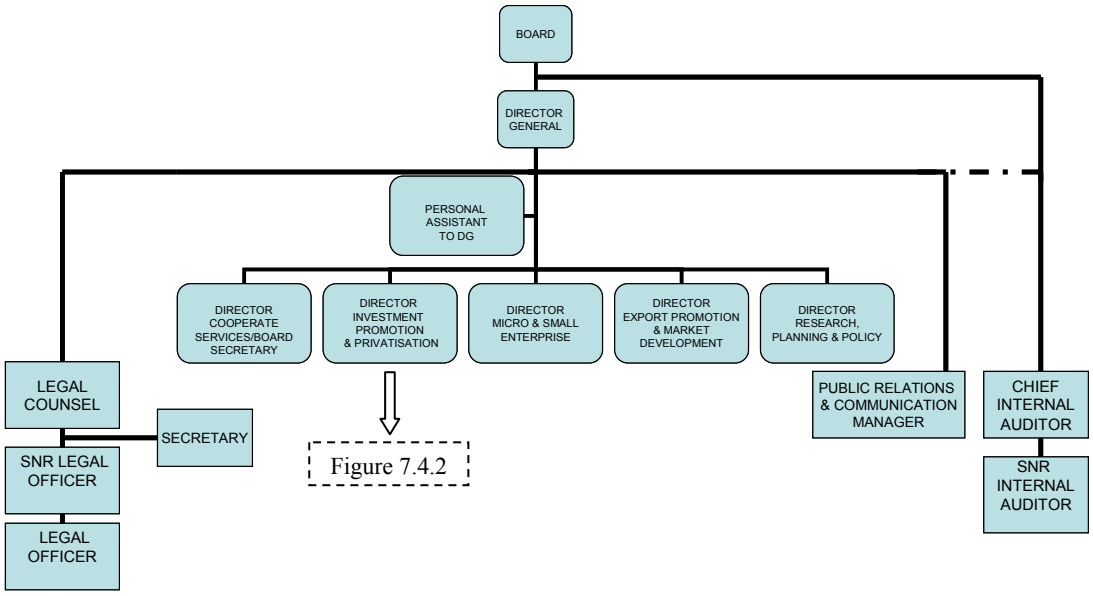
Operation and management of MFEZ is one of the important conditions to attract the investors to MFEZ. If the service quality is insufficient to meet their requirements, MFEZ will not sufficiently contribute to the economic development of Zambia. Therefore, the operating organisation has large responsibility for successful support to attract investors. Examples of services to be provided by the operating organisation are one-stop point of reference for investors, general affairs related to the zone facility for tenants, security services in the zone, etc.

It is also very important to take into account the conditions of financing in examining an institutional framework for the LS-MFEZ. Public and private loans are indispensable for execution of the LS-MFEZ development, especially bilateral and multilateral aid could be a main financial source for the development.

ZDA is one of the organisations' responsible for the operation and management of MFEZ. Under the Zambia Development Agency Act, ZDA has the following functions on MFEZ.

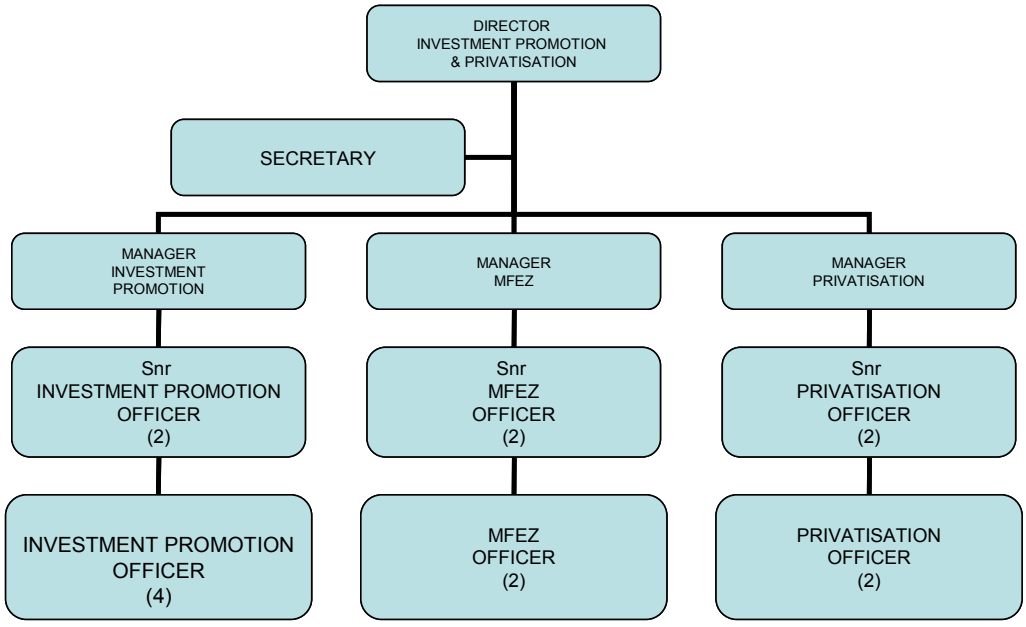
- Develop multi-facility economic zones or facilitate the development of multi-facility economic zones by investors
- Administer, control and regulate multi-facility economic zones and ensure compliance with the ZDA Act and any other laws relevant to the activities of multi-facility economic zones
- Monitor and evaluate the activities, performance and development of enterprises operating in multi-facility economic zones and prescribe and enforce measures, for the business or acitivity carried out within multi-facility economic zones so as to promote the safety and efficiency of its operations
- Promote and market multi-facility economic zones among investors

ZDA has a section to handle matters relevant to MFEZ and investment promotion. Figures 7.4.1 and 7.4.2 show the organisation structure of ZDA and Investment Promotion and Privatization Division which is in charge of the matters related to MFEZ.



Source: ZDA

Figure 7.4.1 Organisation Structure of ZDA



Note: The numbers in brackets are required staff for each position.
Source: ZDA

Figure 7.4.2 Investment Promotion and Privatisation Division

Regarding ownership arrangements and development approach, the report, "Special Economic Zones: Performance, Lessons Learned, and Implications for Zone Development" by Foreign Investment Advisory Services (FIAS), indicates that the most notable trend over the past 15 years has been the

growing number of privately owned, developed and operated zones worldwide and 62 percent of the 2,301 zones in developing and transition countries are private sector developed and operated, where less than 25 percent of zones worldwide were in private hands in 1908s. The report also mentions that public-private partnerships have also become increasingly popular around the world. The evolving models of public-private partnerships are as follows.

- Public provision of off-site infrastructure and facilities (utilities connections, roads) as an incentive for private funding of on-site infrastructure and facilities
- Assembly of land parcels with secure title and development rights by the government for lease to private zone development groups, development of better land use/ownership laws and regulations and adoption of enforceable zoning and land use plans
- Build-Operate-Transfer (BOT) and Build-Own-Operate (BOO) approaches to on-site and off-site zone infrastructure and facilities, with government guarantees and/or financial support.
- Contracting private management for government-owned zones or lease of government zone assets by a private operator (beneficial ownership).
- Equity-shifting arrangements whereby a private contract manager of a government zone can exercise a purchase option once pre-defined performance levels have been reached

In Zambia, the ZDA Act stipulates that developing MFEZs is one of the functions to be taken by ZDA, however, ZDA is also an agency responsible for monitoring and evaluation of activities, performance and development of enterprises operating in MFEZs. The FIAS Report indicates that conflicts of interest arise when regulatory bodies are also engaged in zone development activity, especially when existing zones compete directly with new private zones as the experience in many zone-sponsoring countries has shown. Therefore, ZDA should supervise the execution of the LS-MFEZ development and a new body should be established to be exclusively engaged in development, operation and management of the LS-MFEZ. The institutional framework for the the LS-MFEZ development is shown in Figure 7.4.3. A development corporation, which will be under the supervision of the Ministry of Commerce, Trade and Industry, should be established for the purpose of development, operation and management of the LS-MFEZ.

As discussed above, recent development and operation of special economic zones, export processing zones, and industrial parks are popularly practiced on private initiative even though the original plan was formulated by public sector. When development of MFEZs is initiated by a private company, the company will take a risk for the development. The Chambishi MFEZ follows the case as is shown in a fact that the developer is China Nonferrous Metal Mining (Group) Corporation. In this case, the risk is no tenants after completion of infrastructure development and no payback from the investment. This means that the company cannot get leasing and management fee from the lots, which is financial sources for giving operation and management services and further development, but has to absorb maintenance cost. Development of the LS-MFEZ has the following conditions.

- National project
- Very ambitious MFEZ
- It takes many years to cover investment cost

- Financial risk is expected too large for a private sector to undertake the role of its developer.
- It is desirable to promote the project with the Government's initiative.

With respect to the investment cost, even in Asian countries where foreign direct investment is increasing at a high pace, it takes many years for a zone to become full of investment. In some Vietnamese SEZ, investment counted only one or two for the first five years after completion of the SEZ. After five years, the number began to increase and in around ten years from the start, the number rapidly increased to extent that the expansion of the SEZ became necessary.

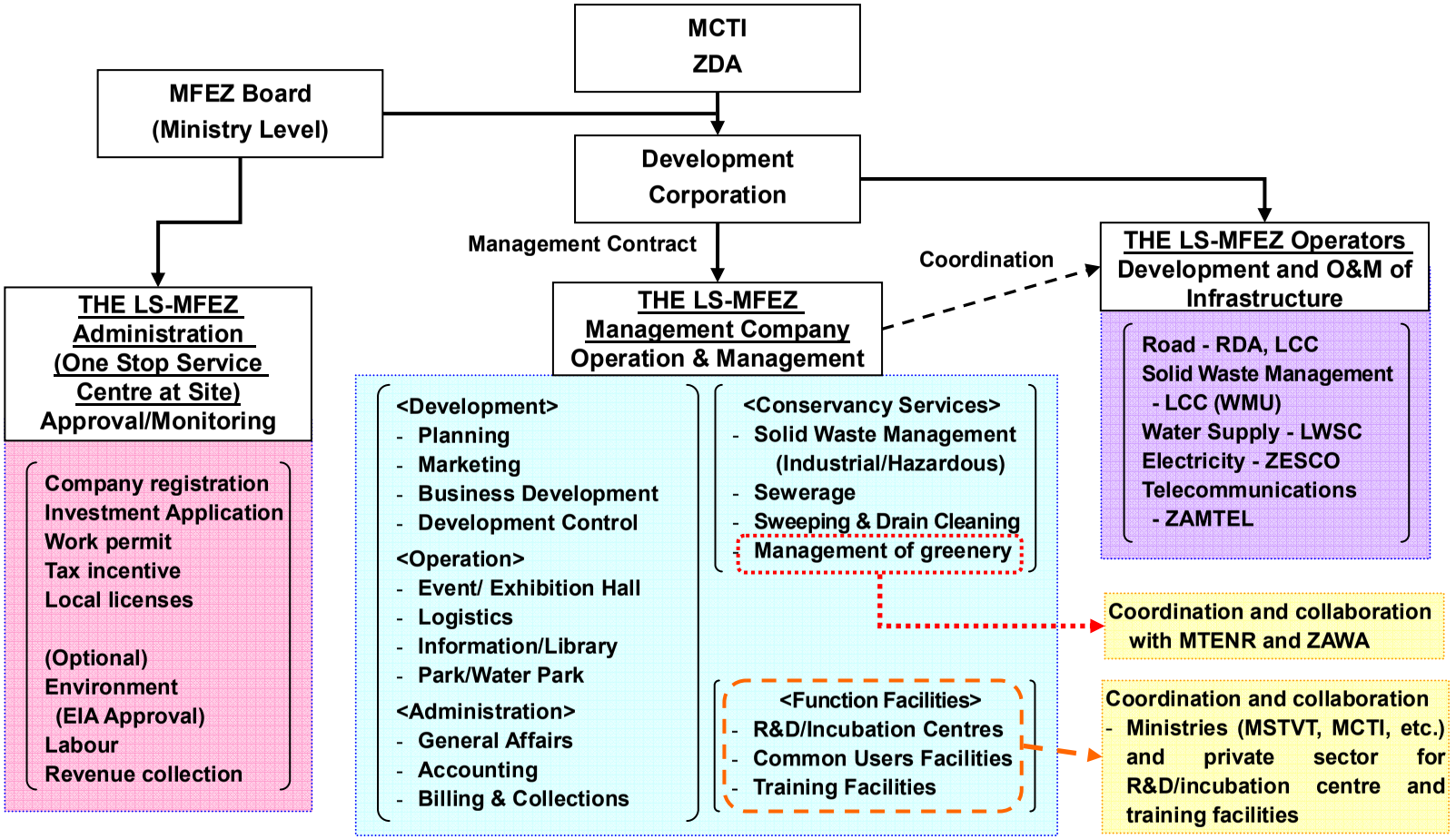
Therefore, in order to promote entry of private sector, it is necessary to reduce risks of entry/investment in development, operation and management of the LS-MFEZ, and utilize the public-private partnership framework. At least a risk on infrastructure development and construction of unprofitable facilities should be taken by the government by using national budget and/or lending from the donors. Establishment of a new public corporation responsible for the development of MFEZ is a method to reduce the risk on infrastructure development and enhance involvement of private sector in operation and management based on fee collection from tenants. In this case, the development company becomes a LS-MFEZ Developer.

The development corporation will develop infrastructure in the LS-MFEZ in cooperation with the LS-MFEZ Operators such as RDA, LCC, LWSC, ZESCO and ZAMTEL. For the purpose of operation and management of the LS-MFEZ, the LS-MFEZ management company, which is privately owned and run on a commercial basis, should be established. The operation and management works will be contracted out to the company because operation and management services are one of the most important factors for the investors to decide an investment site and the services provided by private sector is better than those by public sector.

Southern part of the LS-MFEZ is used for reforestation area as a buffer zone to the Lusaka Park and harmonizes with the Lusaka Park where wild animals will be released. The Lusaka Park is developed and operated by ZAWA which has experience of forest management. Therefore, management of the reforestation area in the LS-MFEZ can be coordinated with ZAWA. This helps coordinate the development of the LS-MFEZ and Lusaka Park from the view point of environmental conservation. It also gratifies the vision of LUSEED, environmentally sustainable and well controlled development.

R&D/incubation centers and training facilities also can be developed and operated in collaboration with the relevant ministries such as MSTVT and MCTI, and also private sector.

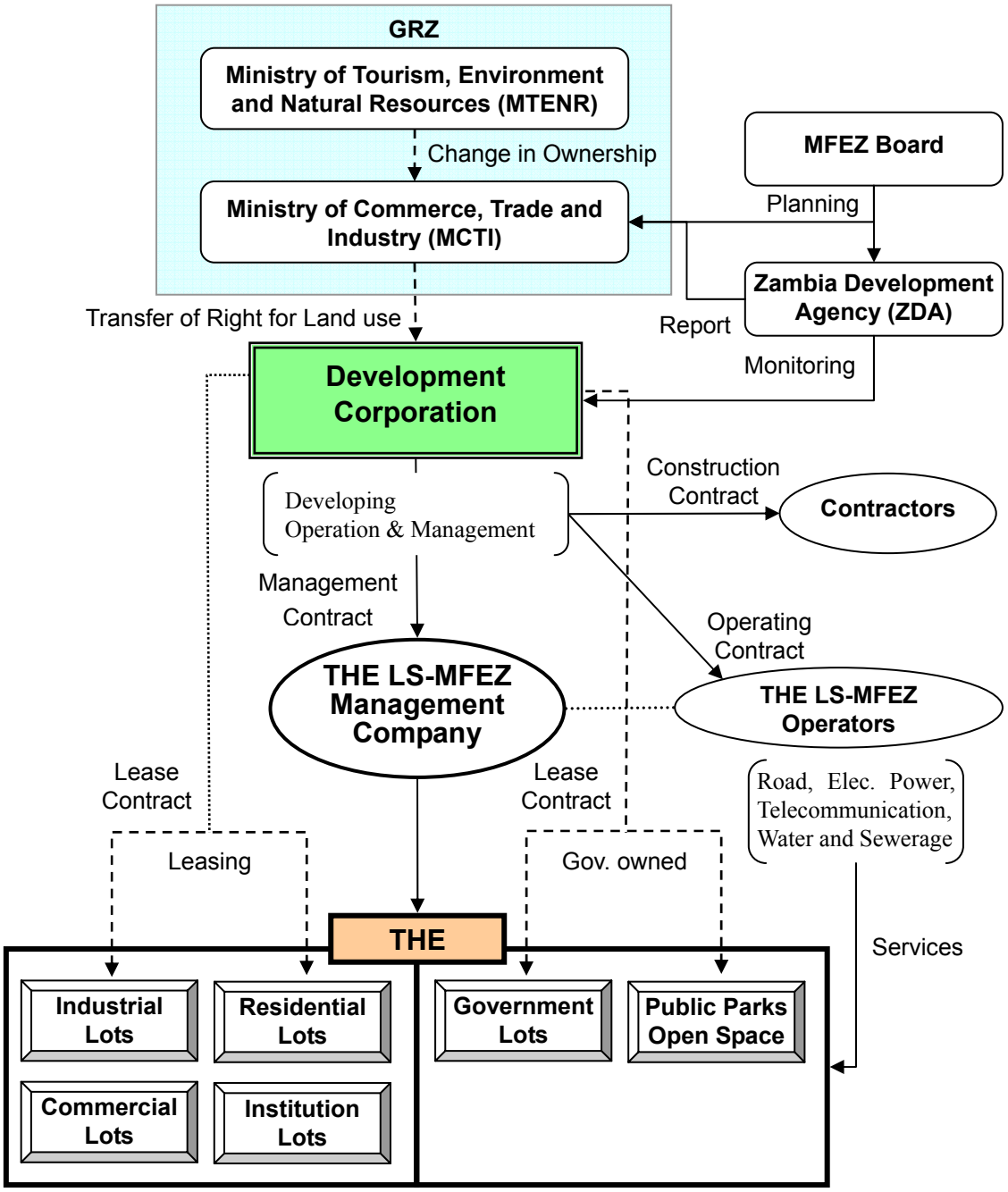
As discussed in Section 7.3.3, the MFEZ Board will be established to initiate plans and set directions for the development of the MFEZ. Besides, a crucial aspect of successful the LS-MFEZ development is the simplification and streamlining of investment approvals, work permits, customs inspection procedures and so on. Therefore, one stop centre should be established in the LS-MFEZ to consolidate and expedite government approvals in collaboration with the authorities relevant to investment, immigration, labour, custom, and environment.



Source: JICA Study Team

Figure 7.4.3 Institutional Framework for Implementation of the LS-MFEZ Development

Figure 7.4.4 shows the contractual relationship of the relevant actors on development, operation and management. Ownership of the LS-MFEZ site is being changed from the Ministry of Tourism, Environment and Natural Resources to the Ministry of Commerce, Trade and Industry, based on the government decision on the LS-MFEZ development. When the development corporation is established, the land for the LS-MFEZ development will be conveyed to the corporation. The agency will enforce the right to use the land for the LS-MFEZ development in cooperation with the service agencies, make leasing contracts with tenants, and contract out the provision of operation and management services to the management company. Operation and maintenance of infrastructure will be outsourced to the service agencies through the management company. ZDA will monitor and evaluate the activities of tenants operating in the LS-MFEZ and performance of the development corporation and the management company, and report the monitoring results to MCTI.



Source: JICA Study Team

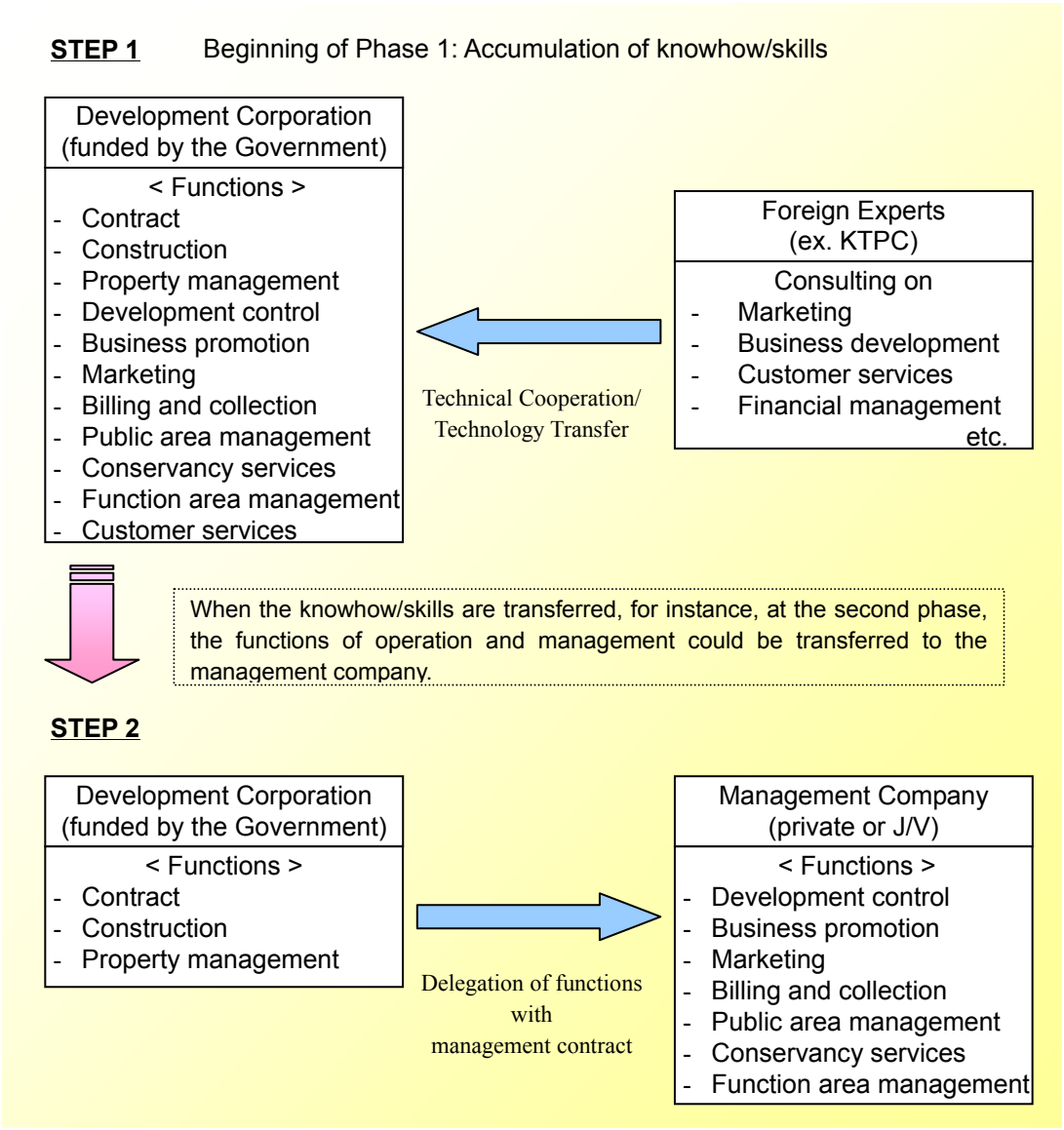
Figure 7.4.4 Contractual Relationship of Relevant Actors

7.4.2 Step-Wise Development of Organisational Framework

(1) Development Corporation and Management Company

The proposed organisational framework is a system considering involvement of private sector in operation and management of the LS-MFEZ in order to provide efficient management services. Functions which require business knowhow or skills, such as marketing, business development,

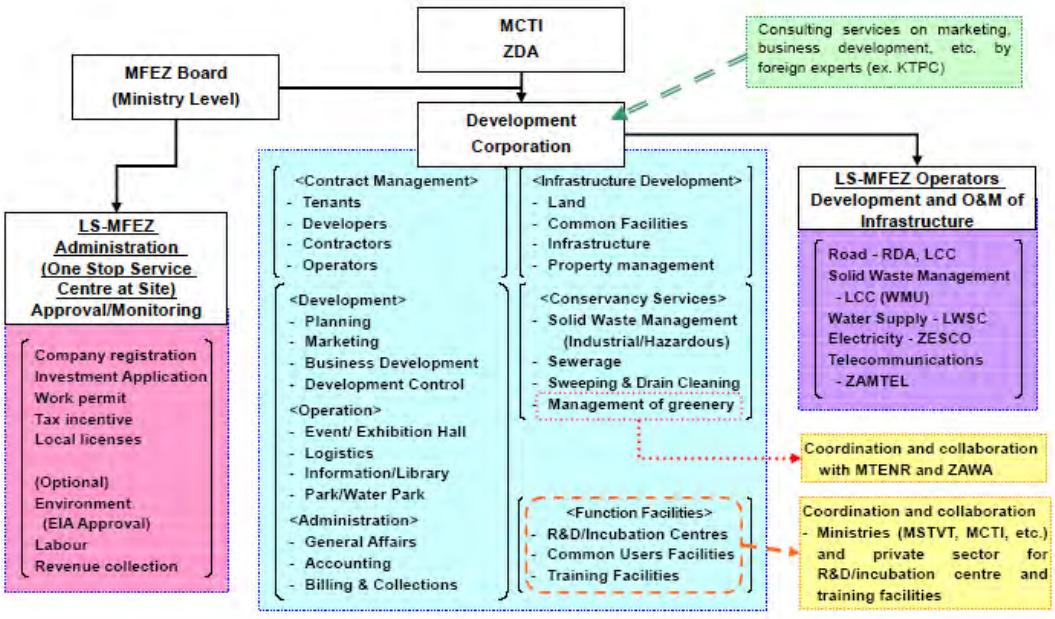
customer services, etc., are demarcated to the management company. However, it could be difficult to get cooperation of private enterprises or business partners for the operation and management at the beginning of the first phase. In such a case, the development corporation will carry out the functions of the operation and management. What could be a difficulty in this case is that the knowhow or skills of the development company to promote FDI is not matured. Utilising foreign experts such as KTPC could be a solution in order to fill in the capacity gap and enhance technology transfer on business promotion. When the knowhow/skills are transferred, the management company could be established and the functions of the operation and management could be delegated gradually to the company in order to make the operation and management more efficient by utilising private business manner (see Figure 7.4.5). Those knowhow or skills transferred are also utilized for MFEZs development in other areas.



Source: JICA Study Team

Figure 7.4.5 An Example of Stepwise Development of Organisational Framework

Figure 7.4.6 shows an example of organisation structure of the Development Corporation on the basis of step wise development of the organisational framework. The operation and management works should be taken by the Development Corporation with assistance of foreign experts such as KTPC. After the completion of technology transfer from the foreign experts, the operation and management works could be taken over to the management company which would be newly established.



Source: JICA Study Team

Figure 7.4.6 Organisational Framework of the Development Corporation

(2) Staff Requirement for the New Institutional Framework

Deployment of staff also can be executed in response to the progress of the LS-MFEZ development. At the beginning, the required number of staff should be at the minimum. Table 7.4.1 shows the staff requirement for the development corporation at the beginning of the first phase.

Table 7.4.1 Staff Requirement for the Development Corporation (at the Beginning of the First Phase)

Job Title/Division	Number	Remarks
Director General	1	
Assistant to Director General	1	
Director Administration	1	Supervise Administration Division and
Director the LS-MFEZ	1	Supervise Contract Division, Infrastructure Division and Operation Division
Legal Officer	1	
Auditor	1	
Administration Division	5	3 for general affairs including ICT and humans resources, and 2 for financial management
Contract Division	2	Manage contracts for development, operation and management
Development Division	4	Manage construction of infrastructure and facilities, and property
	2	Planning, marketing and business development
	2	Development control and customer services
Operation Division	6	Manage common facilities such as exhibition hall, library, park and public area, provide conservancy services including maintenance of utilities, and bill and collect fees.
Total	27	

Source: JICA Study Team

7.4.3 KEY ACTORS

(1) Development Corporation

Basically, the development corporation should take responsibility for implementation of all the MFEZ because MFEZ in other cities as well as other areas in Lusaka is also planned. However, at the initial stage, the corporation will be engaged in implementation of only the LS-MFEZ development. Divisions in charge of promoting and monitoring implementation of each MFEZ can be added in time with progress of the MFEZ development plans. An example of organisation structure of the development corporation is shown in Figure 7.4.7. Advisory board should consist of the representatives of the relevant authorities, the service agencies and industry.

Basic functions of the development corporation are as follows.

- Control/management of land and property
- Implementation of MFEZ development in line with the decelopment plans
- Construction of infrastructure in collaboration with the service agencies
- Contract with the service agencies, operation and management company, developpers, tenants, etc.

At the initial stage, the development corporation could be fully subsidised or owned by the government as a government institution. In accordance with the progress of the development,

shareholding with private sector or reducing the proportion of subsidies or shareholding by the government can be expected to promote private sector entry into the LS-MFEZ development.

For the purpose of providing better operation and management services, the works should be contracted out to a private operation and management company.

Figure 7.4.8 shows the organisation structure of the development corporation in case of applying the stepwise development.

(2) The LS-MFEZ Management Company

The management company will take responsibility for operation and management of the LS-MFEZ on the basis of a contract with the development corporation for providing the services. Basic functions of the management company are as follows.

- Investment promotion (planning, marketing and business development)
- Development control in line with the master plan
- Provision of customer services (information sercice on investment environment and labour market, assistance of investment approval procedure, etc.)
- Contract with tenants, developers, etc.
- Operation and maintenance of common facilities such as exhibition hall, library and parks
- Operation and maintenance of infrastructure
- Collection of leasing fee, service charge and levies
- Public relations

An example of organisation structure of the management company is shown in Figure 7.4.9.

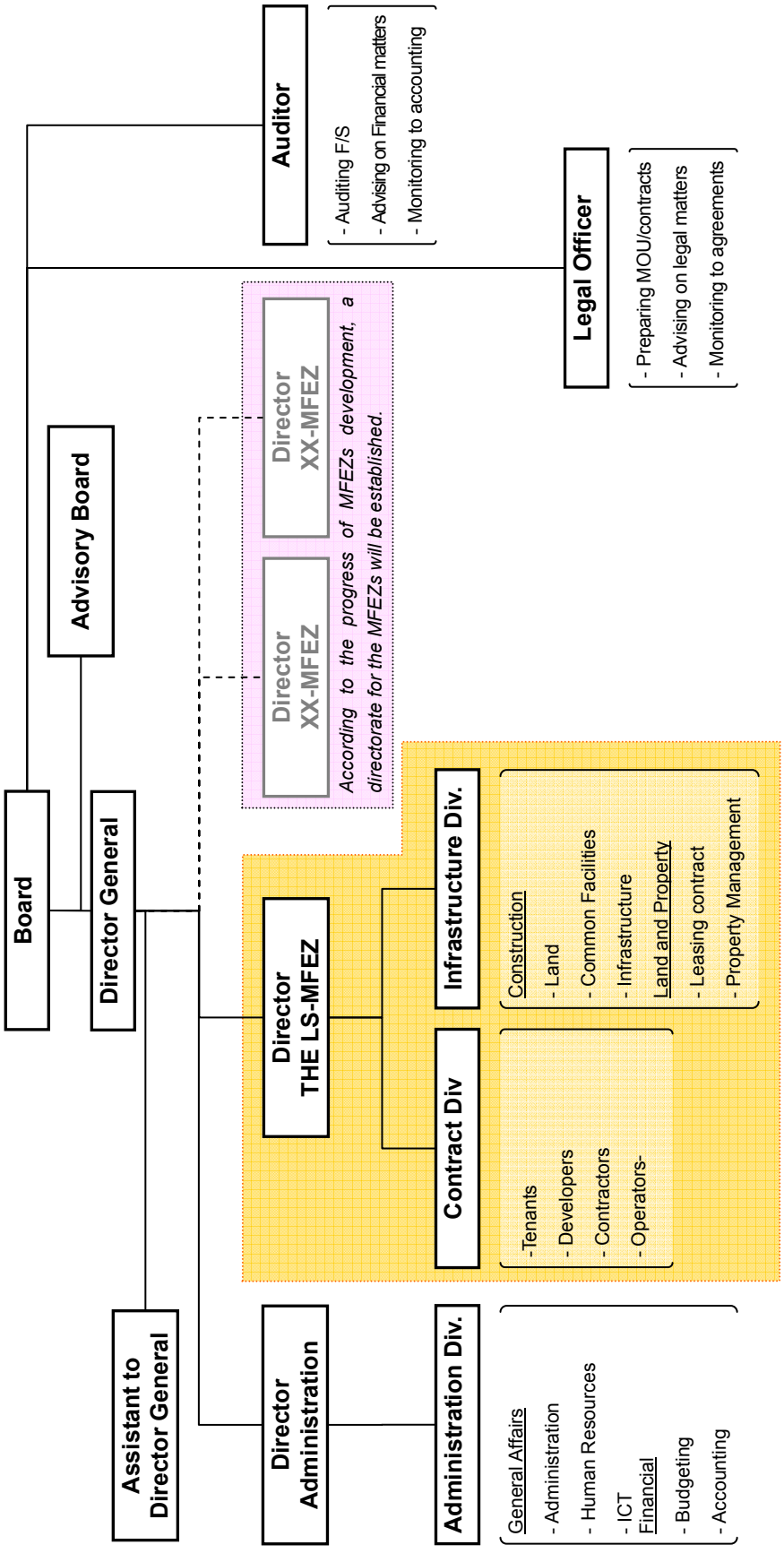
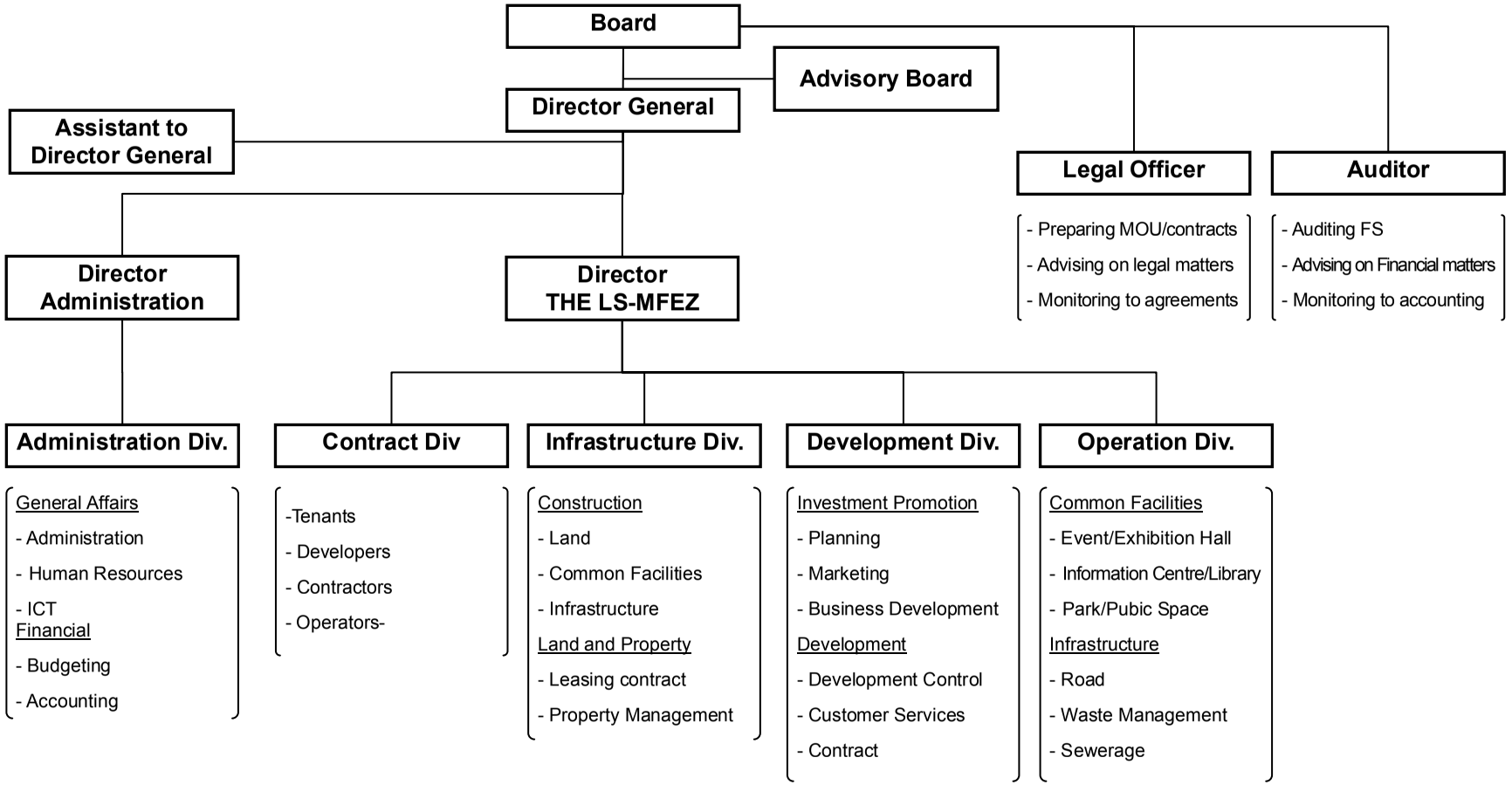


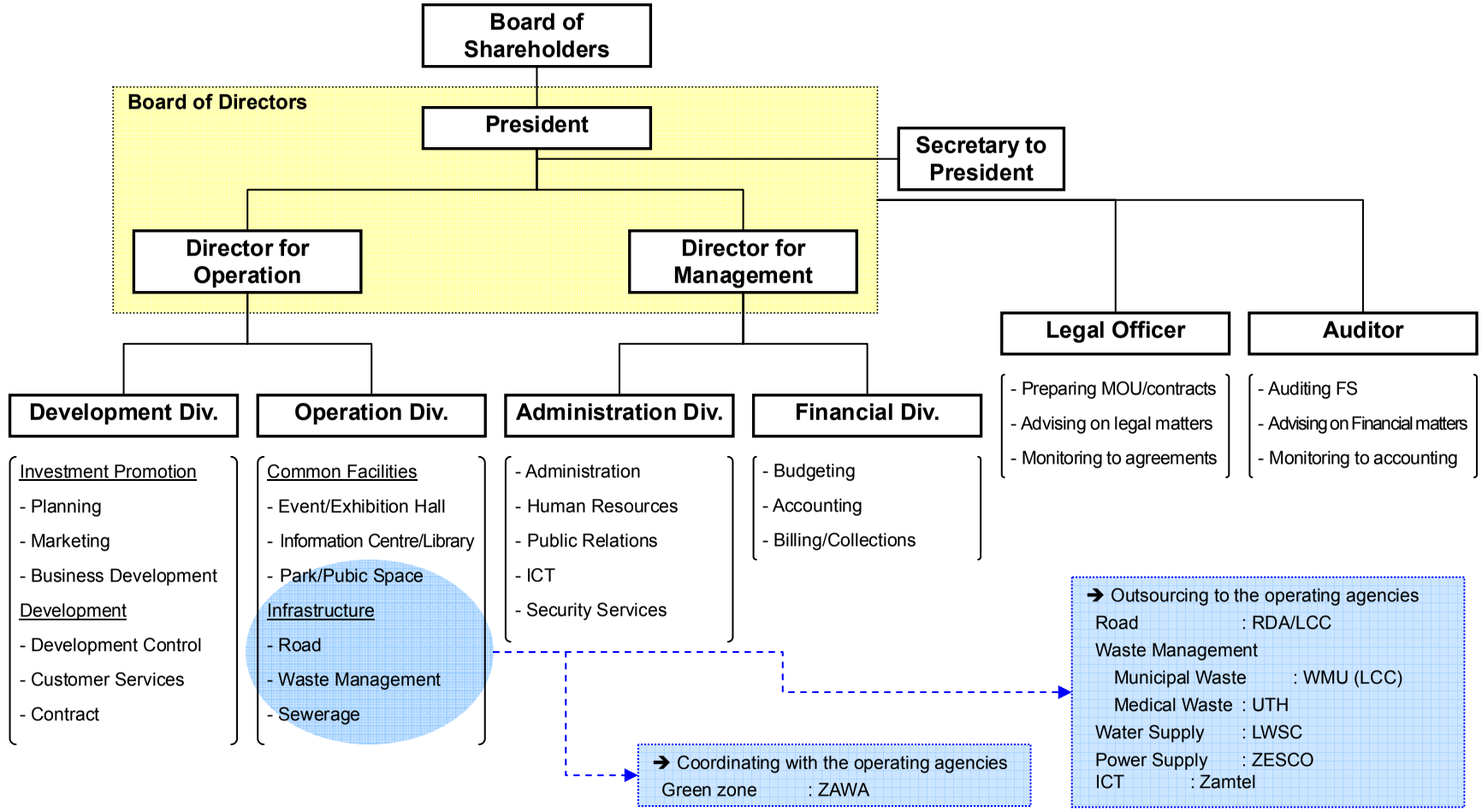
Figure 7.4.7 Example of Organisation Structure of MFEZ Development Corporation

Source: JICA Study Team



Source: JICA Study Team

Figure 7.4.8 Organisation Structure of the Development Corporation (Stepwise Development)



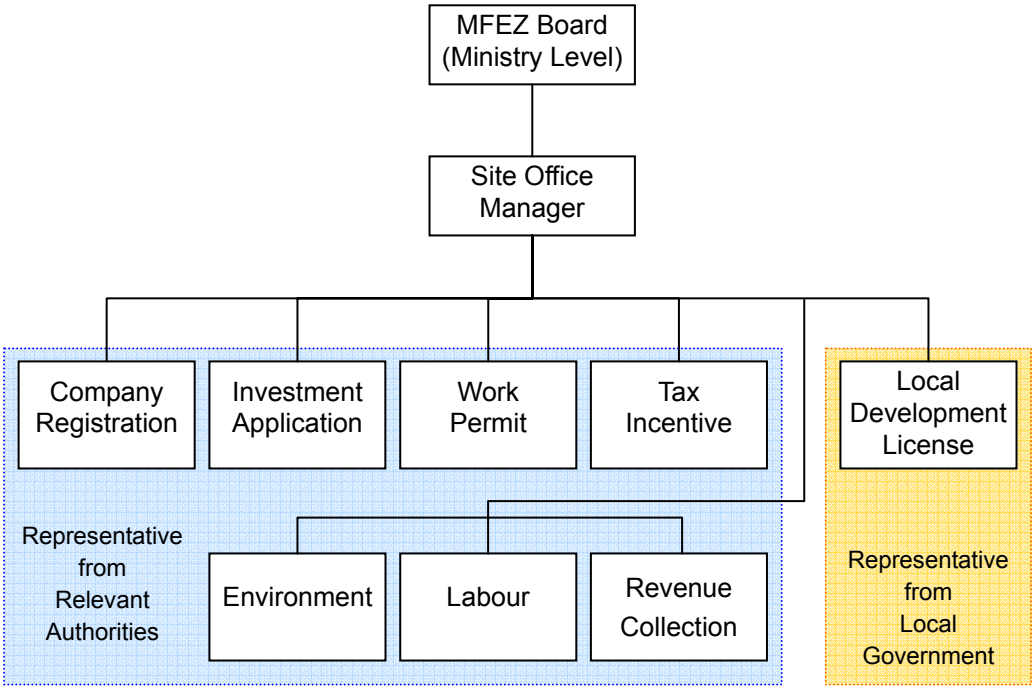
Source: JICA Study Team

Figure 7.4.9 Example of Organisation Structure of MFEZ Development Agency/Corporation

(3) The LS-MFEZ Administration (One Stop Service Centre)

Establishment of the one stop service centre (OSCC) aims at providing the investors with efficient permit services to investment application on site. Each MFEZ should have an on-site one stop service centre to ensure efficient assistance to the investors.

It is inferred that the number of investors might not be so many at the initial stage of the LS-MFEZ development and utilisation of the one stop centre could be limited. Thus, the number of officials working for the one stop centre or working days could be reduced at the initial stage. However, in preparation for the period of following phase development when more investors' entry into the LS-MFEZ will be expected, a premeditative recruitment and capacity building of OSSC staff should be implemented. Technical cooperation with the similar authorities in the neighbouring countries such as Tanzania Investment Centre will be efficient for the capacity building of the one stop centre and the development agency. Figure 7.4.10 shows an example of organisation structure of OSSC at site.



Source: JICA Study Team

Figure 7.4.10 Organisation Structure of One Stop Service Centre at Site

(4) Collaboration with the LS-MFEZ Operators

Infrastructure development should be harmonized with the existing conditions / facilities / systems and future plans of the operators such as RDA, LCC, WMU, LWSC, ZESCO and Zamtel in order to avoid overinvestment and make operation and maintenance works efficient. The management company can contract the operation and maintenance works of infrastructure with the LS-MFEZ Operators by using the leasing fee and service charge collected from investors and tenants.

- Roads : Roads Development Agency (RDA), Lusaka City Council (LCC) and Kabue District
- Water supply and sewerage : Department of Water Affairs (DWA), Ministry of Energy and Water Development (MEWS) for groundwater develoment
  Lusaka Water and Sewerage Company (LWSC) for water supply and sewerage
- Waste management : Waste Management Unit (WMU), LCC, for municipal waste,
  University Teaching Hopital (UTH) for medical waste
- Powe supply : ZESCO
- Telecommunications : Zamtel

7.5 OPERATION AND MANAGEMENT OF THE LS-MFEZ

7.5.1 MARKETING AND BUSINESS DEVELOPMENT

On the basis of the step-wise organisational development, the Development Corporation will conduct marketing and investment demand survey and business development with the use of the output of ToH and information issued by the government, in order to promote investment in the LS-MFEZ. In this case, it is very important for the Development Corporation to get technical cooperation and technology transfer for the marketing and business development and management skills from the foreign experts such as KTPC. If the Management Company can be established at the beginning of the First Phase, the Company will carry out the works in line with the management contract with the Development Corporation.

7.5.2 DEVELOPMENT CONTROL

(1) Efficient Land Use by Utilising the Fixed-Term Leasehold

MFEZ is a multi-functional area including industry, commerce, housing, public institutions, schools, hospitals, etc. The target year of the development is set at the year 2030. The required functions in the zone would need to be changed in response to the development stage of the zone. Besides, MFEZ Development is accompanied by such risk as huge development cost, insufficient experience of MFEZ operation for public and private sectors, uncertain investment demand, etc. Provisional land use could be considered as a way to reduce such development risk, and to contribute to promotion of investment in the LS-MFEZ from the view point of efficient zone operation. The followings are the advantages of introducing the provisional land use.

- Flexible land use in response to demand or marketing

  The term of leasehold will be fixed under the provisional land use so that the development corporation could make the land use flexible in response to the performance of the tenants, demand of investors, marketing and so on. The provisional land use also enables the development corporation to study the confluence into the area during the contracted period and utilise the study results for the development at the later stage.

- Reducing the maintenance cost

  The provisional land use will contribute to reducing the maintenance cost of the land. If the land use is limited to long-term use, the type of tenants could be confined and no investment could occur in the lands. In that case, the management company should bear the maintenance cost to keep the lands in good conditions. However, the provisional land use enables short and mid term land use and would avoid no tenants for a long time.

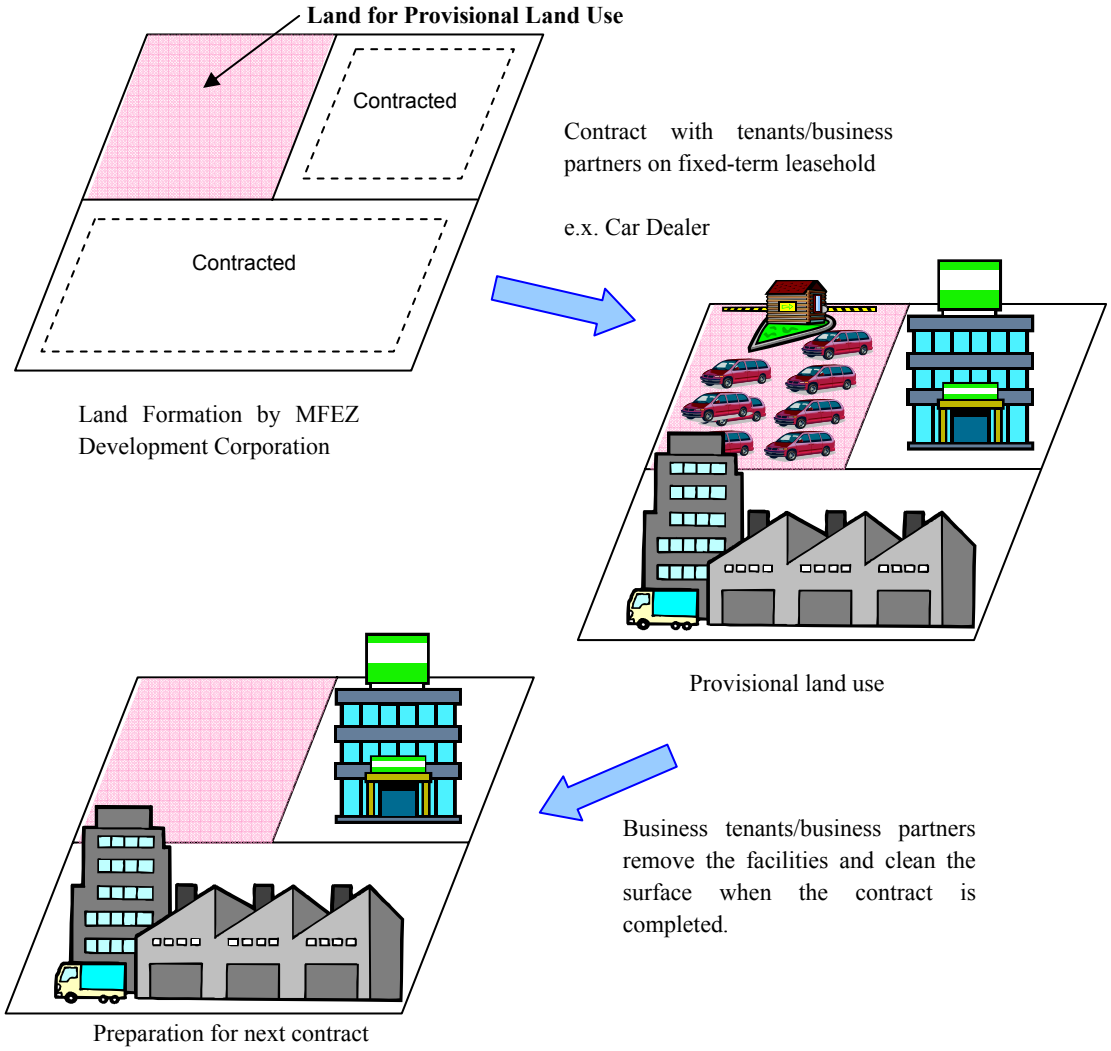
- Attracting further investment

  In addition to reducing the maintenance cost, active business activities would attract further investment. This could increase job opportunities for the people living in the vicinity as well.

- Project implementation in partnership with private sector

  The LS-MFEZ development is accompanied by the massive investment in infrastructure and facilities. Financial source and know-how of project implementation is very important for efficient operation of the zone, however, the development corporation's capacity would be very limited. In such case, provisional land use would promote private sector's participation in the LS-MFEZ development with their fund and/or knowledge as a business partner.

For example, the provisional land use is utilised for the efficient and dynamic regional development in Minato Mirai 21 area, Yokohama City, Japan. The system varies from 10-years leasehold for commercial building, 2-3 years for automobile exhibition hall and sight-seeing bus terminal, and less than one year for events such as exhibition of a Canadian performance group, and contributes to revitalisation of local economy. As the policy for the management of such system, a basic agreement on town development was formulated. The agreement provides basic directions for the town development, use of buildings, standards for buildings and others, matters of urban management and so on. Figure 7.5.1 shows an example of the provisional land use.



Source: JICA Study Team

Figure 7.5.1 An Example of Provisional Land Use

The following items should be provided for the provisional land use as rules or regulations.

- Objectives
- Matters to be considered on the provisional land use
- Target area
- Contract period
- Application procedure
- Change of approved plan

(2) Guidelines on Area Development and Standards for Buildings

The LS-MFEZ development should follow on environmental conservation to the activities which are Activities operated in the LS-MFEZ site are likely to have an impact on the environment as the site is an area of groundwater recharges for Lusaka City. The geological conditions of the site also would affect the LS-MFEZ development, especially on location of facilities and building standards. Besides, harmony with the environment is an important item for development control since the relevant authorities like LCC promote the environmental friendly development. Therefore, it is necessary to formulate guidelines or rules to be followed. The Development Corporation controls the development works and activities operated in the LS-MFEZ under the supervision of ZDA. The followings are the examples of guidelines/rules for the LS-MFEZ.

- Rules of land sales/lease
- Efficient land use by utilising the fixed-term leasehold
- Area development and standards for buildings
- Urban management (urban disaster management, promotion of barrier-free society, consideration to environment and the surrounding areas, urban traffic, etc.)
- Rules of solid waste discharge and management
- Environmental criteria such as effluent standard

7.5.3 CONSERVANCY SERVICES

As discussed in Section 7.5.1, if the step-wise organisational development is adopted for the LS-MFEZ, the Development Corporation should take responsibility for providing the conservancy services such as solid waste management, sewerage and sweeping and drain cleaning. Where the Management Company can be established at the beginning of the First Phase, the Company will provide the services on the basis of the management contract with the Development Corporation.

The Development Corporation will manage the solid waste management in cooperation with the authorities concerned. With regard to the municipal solid waste, The Development Corporation will follow the existing system operated by the WMU, LCC. As for the hazardous waste, clinical waste can be treated with support of the UTH since the UTH has an incineration for treatment of clinical wastes. However, other hazardous industrial wastes need to be stored and treated carefully in line with the provision of the relevant acts.

7.5.4 ROAD MAINTENANCE

Keeping the roads in good conditions is one of the important factors to attract investors and enhance economic activities. Key players of the task are Road Development Agency (RDA) and the local authorities such as Lusaka City and Lusaka Province. Close consultation and cooperative works with those players are indispensable for securing the budget for the road maintenance and realising the good maintenance. The management company should monitor the road conditions and report the results to the Development Corporation periodically. According to the report from the management company, the Development Corporation should consult with RDA and the local authorities on the maintenance works.

7.5.5 OPERATION OF MASS TRANSIT SYSTEM

Major modes of transportation for the people working in Lusaka City are walk and bus. Currently, there are five bus terminals in Lusaka City. Those terminals are located in the city centre and the bus routes are radial to/from the terminals. No bus is operated to the LS-MFEZ site at moment. The LS-MFEZ is a zone which has multifunction such as industrial zone, residential zone, commercial zone, etc. Some people come from the city centre and others go out from the LS-MFEZ. Therefore, it is necessary to establish a mass transit/commuter system between the Lusaka City centre and the LS-MFEZ as well as inside the LS-MFEZ.

During the commuting time, many people move to/from the LS-MFEZ at the same time within a short period. At the beginning of the fist phase development, new bus route under the current bus system could be useful because the development area of the first phase is one-fifth of the total area and development period is from 2010 up to 2020. However, transport capacity of the bus system currently operated cannot meet the requirement of the LS-MFEZ development. If keeping the current system, lots of busses should be operated and it would cause the congestion and cannot support the functions of the LS-MFEZ. Mass transit system such as exclusive bus lane is one of the solutions to overcome the problem and could be operated under a transportation service company in collaboration with the LS-MFEZ management company.

7.5.6 LAND MANAGEMENT UNDER THE HIGH-TENSION TRANSMISSION LINES

ZESCO's high tension transmission lines have been laid in the LS-MFEZ area. The land under the transmission lines is the area where ZESCO has responsibility in line with the provision of the Electricity Act. When a new power supply facility is constructed in the LS-MFEZ area, the Ministry of Lands will fix the area for such facility and assign an administrative number for the land. After the procedure, ZESCO becomes an responsible body for the land. Therefore, the development corporation and the management company should coordinate with the Ministry of Lands and ZESCO on the land management in the LS-MFEZ.

7.6 CONCLUSION

For successful launch of the LS-MFEZ, it is advised to formulate the LS-MFEZ Act with relevant regulations and / or orders especially on the following areas.

- Order on national development plan of MFEZ
- The MFEZ Establishment Order
- Establishment of MFEZ Board under ZDA
- Establishment of MFEZ Development Corporation
- Investment Incentives including new incentives for local SMEs' investment in MFEZ
- Delegation of Powers for One-Stop Service
- Outsourcing and Contract-Based Employment
- Working Permit for Foreign Nationals
- Creation of Trouble Shooting Organisation
- BOT or BTO