Accident by	2004	20	200 200		06	2007	
Severity	No.	No.	Increase Rate	No.	Increase Rate	No.	Increase Rate
Fatal	689	855	1.24	725	0.85	738	1.02
Serious Injury	691	735	1.06	707	0.96	604	0.85
Slight/Minor Injury	2,209	2,534	1.15	1,950	0.77	1,482	0.76
Animals	25	55	2.20	36	0.65	34	0.94
Damage only	3,104	3,012	0.97	2,168	0.72	1,567	0.72
Total	6,718	7,191	1.07	5,586	0.78	4,425	0.79

Table 3.2.18	Recent Tren	d of Traffic	Accidents	in Malawi
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Source: Road Accident Statistics for 2007, National Road Safety Council of Malawi



Source: Road Accident Statistics for 2007, National Road Safety Council of Malawi Figure 3.2.13 Traffic Accident in Malawi (2007)

3.2.6 Development Plans, Program and Projects

(1) Malawi Growth and Development Strategy (MGDS)

The Malawi Growth and Development Strategy (MGDS) is the overarching operational medium-term strategy for Malawi (2006-2011) designed to attain the nation's vision 2020. The main thrust of the MGDS is to create wealth through sustainable economic growth and infrastructure development as a means of achieving poverty reduction.

1) Transport Infrastructure Development

Better domestic and regional connectivity entails improving the current state of transport infrastructure in the country. However, the state of Malawi's transport infrastructure is characterized by poor road network, poor and limited access to ports, and limited air links, freight and rail capacity. The inadequacy of the transportation infrastructure results in high costs of production. With the new policy direction, it is expected that improved transportation will aim at contributing to i) decrease of domestic trucking transportation cost, ii) reduction of cross-border time and cost, iii) improved mobility and connectivity of rural communities to markets.

Road Transport

High transport costs and poor accessibility to the major cities are the principal bottlenecks to foster economic growth in Malawi. High transport costs are partly due to

the country's landlocked position, small market size, and inefficient operation of domestic and international operators in spite of liberalization of the transport sector.

Poor accessibility is mainly ascribed to the deteriorating condition of the country's overall road network, especially in the rural areas. This problem is compounded by the enormous backlog for maintenance of the road infrastructure, unsafe and impassable road network (37% is in poor condition), lack of competition, and high road taxes which increase the cost of trucking. Feeder roads with poor quality also constrain economic activities in the rural area.

(2) Road Sector Program

The MGDS provides a long-term goal in the road transport sector as well as the Road Sector Program.

The Road Sector Program is a five-year program from 2006 to 2011 providing:

- Policy statements,
- Investment plan in the road sector, and
- Institutional action plan which includes monitoring, consultation and management systems.

The sources of funds for the construction, maintenance and rehabilitation of the road network come from fuel levy, transit charge, budget from the central government and financial assistance by donors. The Road Fund Administration divides the use of these funds into road development programs, targeted or certain projects.

The Malawi National Road Sector Programme is outside the jurisdiction of the Department of Engineering and Public Works (LCC). LCC only takes responsibility for community roads including some minor projects for the maintenance and rehabilitation of secondary roads (classified as urban road).

- (3) Nacala Corridor Development Initiative
- 1) Background of Nacala Corridor Development

Malawi is a small, landlocked country whose development depends on the development of international key corridors and deregulation of cross-border transactions with neighbouring countries. The Nampula-Cuamba Road in Mozambique is an important component within the Nacala Corridor, an initiative that was jointly launched by the Governments of Mozambique, Malawi and Zambia in 2000. In addition, it serves to link the landlocked Zambia and Malawi to the Mozambican coast.

Southern Malawi and Blantyre used to have a good railroad connection (530 km) to the port of Beira in Mozambique, which is also the gateway to Zimbabwe and Zambia. However, upheaval in Mozambique in the 1980's essentially cut off Malawi from its traditional trade routes. The country started to rely on very long land routes through Tanzania or South Africa for its supplies as well as its exports.

International cargo volume to and from Malawi is so small that "economy of scale" would be a major constraint for improving transport cost efficiency. For instance, petroleum imports do not fill a tanker, tea exports hardly fill an ordinary cargo, and the container traffic of Malawi is only a fraction of the Beira port capacity. This implies that



Malawi must take advantage of cargo volumes generated by other countries' trade in order to improve "economy of scale".

Source: International Trade Department, World Bank Figure 3.2.14 Road and Railway Network in Malawi and the Neighbouring Countries

The objective is to develop the untapped economic potential of specific geographical areas by upgrading their key infrastructure. This will be done through "anchor projects" based on public private partnerships and projects in natural resources, agriculture, mining, manufacturing or tourism. Therefore, the scope is much wider than transport and trade facilitation.

2) Nacala Corridor Road Development

The promotion of the Nacala concept has been supported by studies commissioned by donors and/or the corridor organization. The following are the common arguments in favor of Nacala:

- It has a substantial cost advantage over other existing routes including transport by road from and to the port of Beira.
- The Nacala port is a deep-water port that can accommodate larger vessels than Beira and save on dredging costs. However some investments for improving the handling are needed.
- There is a market potential for the extension of the line into Zambia.



Figure 3.2.15 Nacala Corridor Development

Among others, the following documents include a comprehensive analysis of the Nacala corridor:

- The 2002 Emergency drought recovery project (World Food Programme (WFP) and World Bank), which includes a detailed comparison of transport cost for grain and corn shipments for the WFP.
- The August 2003 "Final Strategy Document for the Nacala Development Initiative" supported by the Public Private Infrastructure Advisory Facility (PPIAF) for the Government of Malawi.

The WFP/World Bank document provides a cost comparison between imports by road from Beira and multimodal operations from Nacala. The typical cost advantage of Nacala over Beira is 40 to 50%.

Destination	Northern Route	Beria	Nacala	South Africa
Lilongwe	115 – 124	87 - 101	64	125
Blantyre	122 – 137	76 - 80	60	-
Liwonde	120 - 132	76 - 90	55	-
Mzimba	96 - 100	111	84	-
Transport Time	5 - 6 days	2 days	3 days	-

Table 3.2.19 Road Transport Cost for Relevant Corridors (Unit: USD/ton)

Source: WFP and World Bank 2003

(4) Bypass Road Projects in Lilongwe City

Lilongwe has experienced rapid traffic growth over the past decade and as a result, traffic congestion has become a problem in the City. Unplanned developments resulting in many access roads from the main arterial roads led to pressure on the roads. Eastern and Western Bypass routes have been proposed in order to ease congestion in the centre of Lilongwe as well as to facilitate through traffic.

These bypass road projects were part of the road sections designated by the Lilongwe

City Council based on the 1986 Outline Zoning Scheme. The detailed information is shown in Table 3.2.20.

Table 5.2.20 Dypass Road Trojects in Lindigwe City						
Caption			Distance(km)			
Section	Section			Total		
Eastern bypass	Central Poulty - Kamuzu Barracks	0.0	20.2	20.2		
Central Poultry (M1) - Salima Road - the State House - Kamuzu Barracks - Biwi	Kamuzu Barracks - Biwi Triangle (Chidzanja road)	5.0	0.0	5.0		
Triangle (M1)	Sub-total	5.0	20.2	25.2		
Western bypass Central Poultry(M1) – Area 25 Rail	Central Poulty - Area25 Rail Crossing	0.0	10.6	10.6		
Crossing – Customs (Mchinji road) - Bunda (M1)	Kaunda road (Muchinji road (Customs) to Area 25 Rail Crossing (Plus 400m))	9.2	0.0	9.2		
The total length of the Western bypass is 30.57 km and the works will include the construction of 20.2 km of new road in the existing road.	Mchinji road (Customs) - Bunda (M1)	0.0	11.7	11.7		
	Sub-total	9.2	22.3	31.5		
Grand total		14.2	42.5	56.7		

Table 3.2.20	Bypass	Road	Projects	in]	Lilongwe	Citv
		ALOW				UIU ,

Source: Roads Authority

Western Bypass Project

The Nacala corridor will be the main transit route to Malawi by rail and road through Mozambique, which is a gateway to the sea for Malawi, Zambia and Zimbabwe.

The City of Lilongwe falls within the Nacala Development Corridor. The Government of Malawi intends to upgrade the bypass roads in Lilongwe in order to alleviate traffic congestion in certain localities of the city.

The project is financed by African Development Bank. The Western Bypass has the following section: between Kaunda road/M12 Junction (Customs) through the Likuni road/Bypass Intersection and crossing the Lilongwe River to join the M1/Bunda road Junction (Bunda Turn off).

The outline of the bypass project is shown in Table 3.2.21. Typical cross section for the bypass road is shown in Figure 3.2.16.

Tuble 5.2.21 Outline of the Western Dypuss 110jeet				
Item	Remarks			
Section	Kaunda road/M12 (Customs) – M1/Bunda road (Bunda Turn off)			
Total Length	13.2 km			
Right of Way(ROW)	60 m			
Cost	USD 20.7 million			
Construction period	August, 2010 – February, 2014			

Table 3.2.21 Outline of the Western Bypass Project

Source: African Development Bank, Detailed Design of Bypasses for Lilongwe and Blantyre Cities, & Consultancy Services for the Design Review of the Lilongwe Bypass in Lilongwe City.





3.2.7 Development Issues

(1) Road Capacity of Main Roads

Road capacities of main roads vary between 9,000 and 12,000 passenger car unit (pcu)/day. Road sections with more than 10,000 (pcu)/day may cause traffic congestion during the peak period. In particular, traffic volume of the section between the Lilongwe Town Hall (Glyn Jones) roundabout and Malangalanga road alternative exceeds the road capacity of M1. Long vehicle queues are always observed at the entrance point of the Lilongwe Town Hall (Glyn Jones) roundabout during daytime. The Lilongwe Town Hall (Glyn Jones) roundabout is a serious bottleneck point in the city.

Traffic congestion section during the peak period is shown in Figure 3.2.16 as follows:

- Colby road on Likuni road (S124 Lilongwe Town Hall roundabout Lilongwe river bridge – junction at Kawale road on M1
- Lilongwe Town Hall (Glyn Jones) roundabout junction with Paul Kagame road on M1
- Junction with M1 Central hospital roundabout junction with Youth Drive on Kenyatta road and periphery of the junction at Mzimba street
- Around Area 18 roundabout on M1
- Periphery of Junction with Salima road (M14) on M1
- Entrance point to M1 on Kawale road



Source: JICA Study Team

Figure 3.2.17 Traffic Problems on Road Network in Central Area, Lilongwe City

The main issues are summarized as follows:

Inadequate capacities of some sections in two-lane roads

- Improvement of congested roundabouts due to their low road capacity compared with signal controlled junctions
- Improper function as road network due to missing links

The following shows typical measures to alleviate traffic congestion:

- Road expansion from 2-lane to 4-lane road
- Installation of exclusive right turn lane on main junctions
- Improvement of congested roundabout
- · Installation of traffic signals and improvement of traffic signal system

(2) Public Transport System

Traffic congestion and chaotic flow between vehicles and pedestrians on carriageways are observed at central market, bus terminal and minibus depot area in Old Town.

Minibus fare is rather expensive compared with the affordable income/transport expenditure of people in Lilongwe City. Therefore, main users of minibuses are merchants at markets, and white-collar workers such as government officers and employees of big private companies. Many people including school students commute by walking over long distances. Further, the 11 minibus routes seem to serve limited areas where middle income families live in the city and suburbs outside the city.

In this connection, the current minibus services do not serve the majority of urban commuters in Lilongwe City. The development issues of public transport system in the city are summarized as follows:

- How to alleviate traffic congestion at bus and minibus terminals and central market in Old Town
- Improvement of chaotic traffic flow mixed with minibuses and pedestrians at/around minibus depot and bus terminal
- · Improvement of pedestrian facility and accessibility to bus and minibus terminals
- Improvement of minibus depots currently concentrated in the Old Town including the dispersed minibus depot allocation for some routes
- Introduction of medium-capacity public transit (large buses serving the trunk routes and minibuses for other routes)
- Necessity of public subsidy for minibus fare in order to lower the current fare to an affordable level, i.e., even commuters from the middle income class can not afford the current fare (central and city governments will subsidize bus operators or will establish a third sector public bus company with minibus operators)
- Alleviation of poor public transport areas
- Minibus/bus route reallocation to meet the future demand

(3) Road Facilities and their Management

Development issues for road facilities are summarized in the following Table 3.2.22:

Item	Photo & Description	Development Issue
Damage on Carriageway	Deterioration without proper construction, maintenance and	 People constriction in terms of materials, technique and supervision Proper maintenance & rehabilitation works Axle-load control for aiding to prevent damage on paved carriageways. Reasonable budget allocation under shortage
	damage to vehicles. The deterioration becomes more serious year after year.	of road.
Damage on Shoulder	Ditch becomes deeper during the rainy season The edge of paved carriageway is damaged by soil erosion.	 Improvement of unpaved shoulder. Installation of roadside ditch.
	Unpaved shoulder condition becomes worse due to soil erosion during the rainy season.	
Poor Condition of Pedestrian Way and Bicycle Lane		 Installation of paved pedestrian ways and bicycle lanes based on the demand.
	Bicycles passing on carriageway are subjected to risk of traffic accidents and could cause slowing down of vehicles' speed.	

Table 3.2.22 Development Issues for Road Facilities

Source: JICA Study Team

Some unpaved urban and community roads become impassable during the rainy season. These sections and deteriorated or unpaved end portions of some minibus routes shall be paved.

Road data base is a basic tool to manage roads including maintenance, rehabilitation, improvement and new construction, and budget allocation for road works. In this context, the LCC shall prepare road data base for the City in coordination with the Roads Authority. The JICA Study Team has been preparing the road data base through its inventory survey during the study period based on the data base provided by Roads Authority.

LCC has a responsibility for the management of urban and community roads. It has the following management problems:

- Lack of coordination with other national bodies e.g. Road Authority, road traffic police, National Road Safety Council
- Limited human resource in terms of number of staffs and skill
- Limited equipment such as vehicles and operation equipment
- Lack of access to funds
- Turnover of staff due to low salaries

(4) Traffic Control and Management

Table 3.2.23 indicates the comparison of handling traffic capacity by intersection type. Main traffic congestion areas are observed around the roundabout in the central area of the city.

In order to sustain smooth traffic movement and expand road capacity, improvement of intersections and installation of exclusive lanes for right turn traffic at congested intersections, and installation of signals are needed to sustain area-wide traffic flow smoothly especially in the central area of the city from the viewpoint of traffic control

	Roundabout	Intersection with Non-signal	Intersection with traffic signal
Type of intersection	$ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} $	」╎∟ 기╎Г	¦ ∟ ∞∞] ¦ ┌
Capacity of intersection	2,000 pcu/h (500 pcu X 4 Inflow) The capacity is depend on the scale of roundabout.	1,000 pcu/h (250 pcu x 4 inflow) This type is suitable for combined traffic less than 1,000pcu/h with 4 streets.	3,600 pcu/h (2,000 pcu x 4 Inflow x 0.5 (green) x 0.9 (Degree of saturation), The reduction rate such as ratio of mixed large vehicles is not considered.)
Safety	Fine	Poor	Good
Reference	Road capacity and traffic safety is dependent on compliance with rules and driving manner.	Since temporary stop is required for passing due to no traffic signal, this type is not allowed for traffic intersection. Disadvantage on safety due to the mixture of traffic movement.	Improvement of traffic capacity providing more time (green time) for heavier street. Secure of safety due to no complicated traffic movement with direct advance and right turning traffic.

Table 3.2.23 Comparison of Handling Capacity by Intersection Type

Source: JICA Study Team

Further introduction of road information system including traffic sign and information sign for convenient road usage, and installation of guardrails for alleviation of the risk of traffic accidents and street lights in terms of security etc. are needed to improve road service level.

3.3 Urban Utilities

3.3.1 Scope of the Study

The scope of this Study includes the formulation of subject plan or sector plan for urban utilities. Urban utilities include water supply, drainage, sewerage, sanitation, solid waste management, electricity, telecommunication and data-communication. However, the 'Scope of Works' concluded between JICA and GoM (Nov, 2008) stipulates that this Study will focus on water supply, sewerage, sanitation and solid waste management in detail while a general review will be made for the other utilities.

Within the city of Lilongwe, water supply service is provided by the Lilongwe Water Board (LWB) while sewerage, sanitation and solid waste management services are under the jurisdiction of different departments of the Lilongwe City Council (LCC).

3.3.2 Water Supply Service

(1) Introduction

The LWB is responsible for providing potable water supply in the city of Lilongwe. The LWB is an executing agency under the Ministry of Irrigation and Water Development (MIWD) and reports both to MIWD and Comptroller of Statutory Bodies (CSB) under the Office of the President and Cabinet. However, LWB also works closely with Lilongwe City Council (LCC). Basic data of LWB's water supply service is given in the following Table 3.3.1.

Total population of Lilongwe City	674,000
Population served (LWB estimate 2009/10)	75%^
Population served (LWB estimate 2008/09)	50%#
Population served (JST calculated based on NSO)	38%**
No. of connection for water supply (June 2009)	33,845^
No. of residential customer (June 2009)	30,620^
No. of public water faucets, Kiosks (June 2009)	453^
Water supply period	24 hr/day
Safe Yield of dams	$86,000 \text{ m}^3 \text{ per day}^*$
Maximum planned water supply volume	85,000 m ³ /day
Installed capacity of treatment plants	95,000 m ³ /day
Average production volume	74,000 m ³ /day (2008 Q4)*
	69,000 m ³ /day (2009 Q1)*
	78,000 m ³ /day (2009 Q2)*
Average sales volume	52,000 m ³ /day (2008 Q4)*
	44,000 m ³ /day (2009 Q1)*
	44,000 m ³ /day (2009 Q2)*
System loss	30% (2008 Q4)*
	37% (2009 Q1)*
	44% (2009 Q2)*
Unit requirements	
High density populated area	25 L/person/day
Medium density populated area	80 L/person/day
Low density populated area	150 L/person/day
Actual average consumption	88 Lpcd**

Table 3.3.1 Basic Data of Water Supply in Lilongwe

Source: LWB Corporate Plan 2009/10, ^= LWB Business Plan 2009/10 #=LWB Business Plan 2008/09 *=Quarterly Reports, **=calculated by JICA Study Team using service population claimed by LWB.

(2) Legal Framework

Lilongwe Water Board, as a utility, was established in 1947 and later constituted as a Statutory Corporation mandated to serve the city of Lilongwe and its surrounding periurban water areas as prescribed (from time to time) by the Honorable Minister (of MIWD) in accordance with the provisions of the Waterworks Act No. 17 of 1995. Lilongwe Water Board By-laws (1991) is an extension of the Waterworks Act.

The Board's core business is the provision of water, either treated or untreated, by way of bulk supply or distribution system to the consumers; and the provision of waste water collection, treatment and disposal facilities within the urban and peri-urban areas within Lilongwe City. According to the Act, LWB is supposed to be operated and managed as a full commercial entity. This therefore entails that the Board is supposed to charge full cost recovery rates for the services rendered thereby ensuring financial self sufficiency.

However, as of now, LWB has not taken over the administration of wastewater management.

- (3) Institutional Organization
- 1) Ministry of Irrigation and Water Development (MIWD)

MIWD has five directorates as shown in the following Figure 3.3.1. Urban water supply and sanitation comes under the Directorate of Water Supply.



Source: JICA Study Team

Figure 3.3.1 Organizational Structure of MIWD

2) Lilongwe Water Board (LWB)

Currently, the Lilongwe Water Board has a three-tiered management structure consisting of the Board of Directors, Corporate Management and staff members as shown in Figure 3.3.2.



Source: LWB Corporate Plan 2009/10

Figure 3.3.2 Organizational Structure of Lilongwe Water Board

LWB is governed by a 12-member Board of Directors, including 3 ex-officio members from MIWD, CSB and LCC. The Board is appointed by government for a specific term of office and is responsible for policy issues. The Board's operations are directed by the Chief Executive who heads the Corporate Management team.

Further breakdown is shown in Table 3.3.2 below:

Table 5.3	5.2 Divisions of Lvv B
Department of Technical Service	Northern Zone
-	Central Zone
	Southern Zone
	Operations
	Planning
	Projects
	 By Laws and Water Audit
	 Water Quality & Environment
Department of Finance	Revenue
-	Finance
	Management
	 Kiosk Management
Department of Human Resource	Transport
and Administration	Human Resources
	Administration

Table 3.3.2 Divisions of LWB

Source: LWB Corporate Plan 2009/10

According to LWB corporate plan 2009/10, the total approved staff number is 468. This gives 14.8 staffs per 1000 connections. This figure is slightly higher than the recommendation on water utilities management for developing countries, which is between 7 and 12 staffs per 1000 connections. However, the Second Quarter (Q2) Report of 2009 mentioned that 416 persons are working leaving a vacancy of 52 (as of June 2009).

LWB can be considered as an efficient organization in the local context. It uses advanced IT-based management tools, regularly prepares 5 year corporate plans that are

yearly updated, annual business plan and comprehensive quarterly reports.

3) Role of Government

The Malawi government has profound influence over the operations of the Lilongwe Water Board. Firstly, the government owns the utility. It gives license on the utility's business and jurisdiction on areas that the utility serves. It sets laws and policies that govern the utility's operations. It also appoints management and board members. It has authority to approve an increase in tariff levels and hence has powers to object proposals that are contradictory to its agenda. The government approves proposals for the utility to seek funding from international financiers and acts as a guarantor in case of any international agreement. It also gives grants to the utility when needed.

(4) Water Sources

The LWB gets its water from Lilongwe River. There are two impounding reservoirs about 25 km upstream of the abstraction point. The general feature is shown in the following Table 3.3.3. The safe yield of the two dams is $86,000 \text{ m}^3/\text{d}$.

Reservoir	Location	Construction	Height	Capacity (m ³)		
		Year	(m)			
Kamuzu 1	Malingunde	1966	20	4,500,000		
Kamuzu 2	Msinja	1992	28	9,200,000		
		1999 (dam raising)	33*	19,800,000*		

Table 3.3.3 Features of LWB Source Dams

*= after dam raising

Source: Lilongwe Water Board, 2008

The two reservoirs act as storage for the dry season when the flow from Lilongwe River cannot sustain supply production. However, this capacity is decreasing on an annual basis at a rate of approximately 66,760m³ per year (LWB Corporate Plan 09/10).

Kamuzu Dam I is generally in good condition but the concrete surface from the weir spillway has peeled off. This needs to be repaired to avoid further progressive deterioration. Also, minor repair works are required at the surface protection of the embankment dam. Kamuzu 2 is in good condition after a recent upgrade.

There is need to carry out real time inflow modelling for the two reservoirs to ascertain the prediction of available water. Besides inflow modelling, there is need to evaluate water losses from the system either by evapo-transpiration or any other consumptive use. This will lead to a reliable water balance equation that can be utilized to indicate the availability of water at any point within the system and indeed support any measure for the conservation of the ecosystem. There is a need to carry out real time sediment modelling in the two reservoirs to ascertain the availability of volume for live storage of water.

According to LWB's estimation, an average daily raw water abstraction of $120,763 \text{ m}^3$ will be required in 2013. This implies that the demand will soon exceed safe yield abstraction. Further, the dams are reaching the limits of their economic abstraction, so further raise of dam height will have limited benefit. As a result, new sources have to be identified urgently. Tentatively, the LWB are considering new dams on Diamphwe River in the south of the city. However, resettlement will be necessary for this new dam construction.

Some of the industries use ground water in isolated manner. Study indicated that ground water is not suitable for city water supply due to quality or quantity constraints of the aquifers. However, it might be possible to tap groundwater either for limited volume or where high quality water is not required. To realise this opportunity, a comprehensive groundwater inventory has to be prepared. Though it is illegal to have bore well within the city limit, LWB overlooks this as it can not cover the unsuppressed demand.

(5) Water Treatment

There are 2 treatment plants operated by LWB at a place called Likuni. Water comes to the plant site by gravity through the Lilongwe River. Treatment process includes sedimentation, flocculation and disinfection. Flocculating agent (Alum) is imported from South Africa while Sodium hypochlorite is procured locally. Water quality of Lilongwe River suffers from seasonal variation and there is an increase of turbidity during the rainy season.

The installed capacity of water treatment plants is $95,000 \text{ m}^3/\text{d}$. The installed plant capacity and main process is shown in Table 3.3.4 below.

Treatment	Construction	Capacity	Filtration
Plant	Year	(m ³ /day)	Method
TW 1	1966	2,250	Rapid filtration
	1972	4,000	Ditto
	1978	12,000	Ditto
	1984	30,000	Ditto
	1986	35,000	Ditto
TW 2	1991	27,000	Ditto
	2000	60,000	Ditto

Table	3.3.4	Features	of LWB	Treatment	Plants
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Note: Location of TW is shown in Figure 7.3.1.

Source: Lilongwe Water Board, 2008

LWB estimates that the 2008 demand was 73,256 m^3/d which will increase to 95,652 m^3/d in 2013. Hence, the demand will exceed the installed capacity in 2013.

Treatment Works (TW) 1 is generally in good condition. However, the life spans of the electro-mechanical and chemical dosing equipment have expired. The plant also suffers from heavy water loss, as valves and penstocks do not close tightly and concrete tanks leak. One of the four production lines is now inoperable due to settling tank problem. Therefore, TW I now produces only 20,000 m³. TW II is in good condition and produces 60,000 m³.

There is a concern of pollution hazard for the Kamuzu Dam source water since there is no solid waste treatment by markets and inhabitants near the dam. This may lead to the flow of high density BOD wastewater to the water source.

The Board also operates a small water treatment plant at Kamuzu Dam 2 with a capacity of 800 m^3 /day to cater to Bunda College of Agriculture.

(6) Transmission and Reservoir

After treatment, water is pumped using high-lift pumps to service reservoirs located around the city, from where water flows under gravity. There are a total of 14 pump sets with a combined capacity of $4,669 \text{ m}^3$ /hour. According to LWB, the demand will exceed the capacity in 2011. Also, there is an urgent need to replace worn out parts.

In cases where service reservoirs are so far or so high that the head from the high lift pumps cannot suffice, booster stations have been put in place to provide additional head for water to reach the target areas. There are 5 booster pumping stations, namely: Mwenda, Mtunthama, Northern Booster Station, Kanengo, and Lumbadzi.

The Board has 16 service reservoirs in different parts of the City. Specifications are given in the following Table 3.3.5.

Location of Reservoir	Reservoir	Туре	Construction Year	Depth (m)	Capacity (m ³)	Coverage Area
Area 3	Mtunthama 1 Mtunthama 2 Mtunthama 3	Ground/ concrete	1966 1972 1978	7.32 7.92 7.62	9,090 4,545 12,000	Area 3, 4, 5, 6, 13, 14, 15, 18, 20, 32, 33, 40
Mwenda	Mwenda 1 Mwenda 2	Ground/ concrete	1966 1991	7.32 7.14	2,272 2,000	Area 1, 2, part of Area 7, Area 8
Area 24	Ngwenya	Steel	2007	4.0	1,500	Area 24, 36
Tsabango	Tsabango	Tower/ concrete	1978	7.62	4,545	Part of Area 7, Area 17, 21, 22, part of Area 23, Area 35
Area 23	Area 23	Tower/ concrete	1991	7.50	650	Part of Area 23
Area 9	Area 9	Tower/ concrete	1991	7.50	650	Part of Area 3, Area 9, Part of Area 47, Mchinji Road
Area 14	Chayamba	Ground/ concrete	2000	8.00	12,000	Part of Area 10, 11, 12
	Kanengo 1		1972	5.18	2,272	Part of Area 25, 26,
Area 20	Kanengo 2	Ground/	1978	7.62	4,545	27, 28, 29, 30, 43,
Alea 29	Kanengo 3	concrete	1991	7.50	7,500	part of Area 10, 44,
	Kanengo 4		2000	7.10	10,600	49, 50, 51, 56
Sadula	Sadula	Ground/ concrete	1978	7.62	4,545	Part of Area 53, 52, 54, 55, part of area 25
Area 53	Lumbadzi	Tower/ concrete	1980	5.50	950	Part of Area 53

Table 3.3.5 Features of LWB Reservoirs

Source: LWB Corporate Plan 2009/10

It has been reported that 5 booster pump stations have worn-out equipment and 13 reservoirs need repair to stop leakage. Further, some of the reservoirs cannot meet the local demand. As reported in LWB's corporate plan (2009/10),

- Area 23 Tower and Tsabango Reservoir have presently 34% storage which is going to drop to 26% by 2013.
- Storage at Mwenda is 15% at present but is going to decrease to 11% by 2013.
- Ngwenya has a storage of 28%.
- Chayamba storage stands at 31% at present but is going to drop to 23% by 2013.

Transmission/trunk mains convey water in bulk from pumping stations to service reservoirs. This normally represents the largest portion of the initial cost of a water system. Table 3.3.6 below shows an inventory of the trunk mains of LWB.

No.	Description	Size	Material
1	TW1 to Mwenda	225	AC
		350	AC
		400	AC
2	Mwenda to Tsabango	350	AC
3	Mwenda to Ngwenya	250	PVC
4	TW2 to Chayamba	800	DI
5	NBS to Kanengo	350	AC
		525	AC
6	Kanengo to Sandula	300	AC
7	Lumbadzi Booster to Tower	200	AC
8	TW2 to Mtunthama	525	AC
9	Mtunthama to Area 9	300	AC

Table 3.3.6 Features of LWB Tra	ansmission Mains
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Note: AC = Asbestos Cement, PVC = Poly Vinyl Chloride, DI = Ductile Iron Source: Lilongwe Water Board, 2008

(7) Distribution System

LWB has detailed inventory of the distribution system. The major features of the LWB distribution network are given in the following Table 3.3.7.

Item	(km)
Total length of distributing pipe	2,672
Cast-iron pipe	368
Steel pipe	463
Polyvinyl-chloride pipe	546
Asbestos-cement pipe	1,250
Average annual expansion length of conduit line	15
Average annual expansion cost of conduit line	45,000,000 (MWK)
Average annual renewal length of conduit line	3.45
Average annual renewal cost of conduit line	14,5000,000 (MWK)

 Table 3.3.7 Features of LWB Distribution Network

Source: Lilongwe Water Board, 2008

Some of the distribution pipes were laid in the 1960's. These mains have lived more than their design life. It is therefore recommended that such old mains should be replaced to reduce the leakage.

The software used by Lilongwe Water Board for distribution analysis is Picolo. It should be pointed out that Picolo has a modelling limitation of only allowing extension of the existing network.

(8) Water Kiosks

Kiosks are owned by the Board, water user associations (WUAs), community committees, or individuals and operated either by Water Board or NGOs. Each kiosk is designed to serve 50 households. There are currently 467 kiosks (LWB Business plan, 2009/10). Considering 4.4 persons per household (Statistical Yearbook, NSO, 2008), the current number of kiosks serves only 104,500 people. According to the Board, there may be 460,000 people in low income area (68% of city population) requiring more than 2,000 kiosks. It is reported that some kiosks are not fully functional. The current shortcomings are as follows:

• Pipes get punctured by vandalism due to illegal water fetching.

- No formal contract exists with kiosk operators.
- Kiosk operators charge higher price.
- (9) Service Provision

Generally, Lilongwe is the service area of LWB. At the moment, LWB also sells water in bulk to the Central Region Water Board (CRWB) to serve areas like Likuni, Chigwirizano, Old Airport, Chitedze Research Station and Natural Resources College in the west and Bunda College in the south.

The integrated Household Survey Report (NSO, 2005) shows that although 95.4% of the households in Lilongwe City have access to improved water source, most of them (79.5%) still access water via communal stand post (Kiosks) while only 9.6% had piped water into their houses. The rest gets water from boreholes (6.3%) and unprotected wells or rivers (4.5%).

Considering an average household size of 4.4 (NSO, 2008), kiosk service size of 50 households, total residential connection of 30,620, 453 kiosks (as reported in 2009/10 business plan as of June 2009), about 2,000 households served by CRWB and institutional service population of about 9,500, the service coverage comes out as about 38%. However, LWB uses 6 persons per household in the calculation and reported that the coverage is around 50% (LWB Business plan 2008/09, at that time residential connection was 28,425 and total kiosk was 475). In the very next Business Plan (2009/10), LWB calculates using 9 persons per household (using December 2008 data of 29,933 residential connections and 467 kiosks) and reported that the coverage is 75%. With an increase of around 1,500 residential connections, LWB claims to increase the total coverage by 25%. This might be an overstatement.

The utility's customers are divided into residential (domestic use), institutional, commercial and industrial, Central Region Water Board and communal water points (kiosks). These customers have different consumption rates and they are charged different tariffs. Table 3.3.8 below indicates the percentage consumption as of 2008. Although a large number of population is served through kiosks, the percentage of consumption through kiosks is very low (7% of the total).

Category	Consumption percentage (July 2008)	Customer Number (July 2008)	Customer Number (June 2009)
Residential	51	28,425	30,620
Institutional	18	587	627
Commercial / Industrial	18	2,014	2,143
Central Region Water Board (CRWB)	6	2	2
Kiosks	7	475	453
Total	100	31,503	33,845

 Table 3.3.8 Water Consumption by User Group

Source: LWB Corporate Plan 2009/10, and LWB Business Plan 2009/10

A water meter is installed for every user and it is calibrated every five years. Cost of water meter and water supply pipe from the main line is charged to the user. Various water supply equipment including water meter are imported from France, India, Germany and South Africa.

(10) System Loss

Tables 3.3.9, 3.3.10 and 3.3.11 below show the overall process and their corresponding losses for first (Q1) and second (Q2) quarters of 2009 and fourth quarter (Q4) of 2008.

	Tuble 5.517 Bystem Losses in Q2 of 2007					
Month	Abstraction (million m ³)	Production (million m ³)	Process Losses (%)	Volume Sold (million m ³)	System UFW (%)	
April	2.399	2.215	9.69	1.173	47.01	
May	2.611	2.398	2.69	1.238	48.37	
June	2.543	2.387	8.43	1.492	37.49	
Total	7.553	7.000	7.11	3.904	44.22	

Table 3.3.9 System Losses in Q2 of 2009

Source: Quarterly Reports of LWB

Table 3.3.10 Sy	ystem	Losses	in	Q1	of 2009

Month	Abstraction (million m ³)	Production (million m ³)	Process Losses (%)	Volume Sold (million m ³)	System UFW (%)
January	2.301	2.078	9.69	1.374	33.90
February	2.042	1.987	2.69	1.262	36.49
March	2.350	2.152	8.73	1.299	39.62
Total	6.693	6.217	7.11	3.935	36.71

Source: Quarterly Reports of LWB

Tuble 5.5.11 Bystem Losses in Q1 of 2000						
Month	Abstraction (million m ³)	Production (million m ³)	Process Losses (%)	Volume Sold (million m ³)	System UFW (%)	
October	2.567	2.224	13.36	1.700	23.56	
November	2.433	2.345	3.62	1.669	28.83	
December	2.110	2.024	4.08	1.261	37.70	
Total	7.110	6.593	7.27	4.630	29.77	

Table 3.3.11 System Losses in Q4 of 2008

Source: Quarterly Reports of LWB

Unaccounted for Water (UFW)/ Non Revenue Water (NRW) was higher against a target of 25%. It was also reported that the highest level of NRW was recorded in Northern Zone followed by Southern Zone.

(11) System Faults

Because of the worn out equipment, service faults occur at various locations. These are reported in the Quarterly Reports. According to 2009 Q1 report, the following faults were reported:

•	Water treatment plant shut down	3 hours
•	Northern Zone	737 faults (24 pipe bursts)
•	Central Zone	479 faults (78 pipe bursts)
•	Southern Zone	944 faults (36 pipe bursts)
•	Customer complaints	122 (Northern Zone only)

It was reported that during Q1 of 2009, a total of 322 plots were inspected and 122 infringements and 39 illegal uses were detected.

(12) Water Quality

The LWB has a division responsible for water quality monitoring. For raw water, a total of 2,469 samples were collected for chemical analysis and 88 samples were collected for bacteriological analysis during Q1 of 2009. Raw water turbidity ranged between 17.4 NTU and 2,950 NTU with a quarterly average of 1,488 NTU. The microbiological load was recorded between 12,000 and 150 colonies of FC/100ml. It indicates that raw water quality varies a lot. For treated water, there is no Malawi standard, hence LWB

uses WHO guidelines. Samplings for treated water were done for 120 bacteriological and 706 chemical analyses during the first quarter of 2009 and all parameters were noted within acceptable limits. Turbidity recorded over the period ranged between 0.4 and 4.7 NTU at TW2 and 0.7 and 5.0 NTU at TW1. Water in the distribution system was also monitored for 323 physicochemical and 111 bacteriological analyses. Apart from some odour problem, all other parameters fell within acceptable limits.

In addition, LWB periodically sends samples to the Central Water Laboratory under MIWD for independent testing. Latest results are available for November 2008. The turbidity values were only 0.8 NTU at the dam site, 0.6 at the inlet of water works, and between 0.2 and 0.6 in the treated water. No bacteriological test was performed by the MIWD laboratory.

The results indicate that the water supply is of good quality.

(13) Tariff Structure

As of July 2008, the tariff structure for different customers is indicated in Table 3.3.12 below:

Category	Volume	Tariff per m ³ (MWK)
Residential	Up to 10 m ³ per month	51.00
	Next 30 m ³	74.00
	After 40 m ³	103.00
	Minimum Charge	508.00
Institutions	Flat rate	95.00
	Minimum Charge	927.00
Commercial	First 100 m ³ per month	108.00
	After 100 m ³	137.00
	Minimum Charge	1,078.00
Central Region Water Board	Flat rate	44.00
	Minimum Charge	445.00
Kiosks	Communal Kiosks	58.00
	LWB Kiosks	65.00
	Minimum Charge	582.00
Meter Testing Fees		667.00
Reconnection Fees		1,000.00

Table 3.3.12 Tariff Structure (July 2008)

Source: LWB Corporate Plan 2009/10

From the tariff structure, it is clear that people in the domestic category may use water according to their status. Those who can pay more can use more water. Commercial and institutional properties are charged flat tariffs because it is assumed that these properties are constructed by clients with financial effluence.

According to LWB Corporate Charter of 2005, tariff adjustment is supposed to be effected automatically depending on rising levels of operational costs. However, it is the Malawi Government that approves increments in tariffs including the level of increase.

The collection efficiency was 93% for the year ending June 2007.

(14) Financial Situation

At present, the Lilongwe Water Board is unable to cover its operation and maintenance (O&M) costs through user charges. Its poor financial performance is due to several

factors, including delayed tariff increases, inefficiencies in O&M, and organizational culture that lacks proper performance incentives and governance. The repayments of loans for the expansion of water facilities as well as the exchange rate also play a negative role.

Both revenue and expenditure between 2000/2001 and 2007/2008 increase every year. The balance is negative every year except in 2002. The biggest expenditure item is generally the labour cost, followed by management costs and exchange rate.

As of December 31, 2008, which is also the end of half financial year (2008-2009), the business situation is as follows:

1.	Total capital employed was	MWK 1,409,622,212.00
2.	Total fixed assets were valued to be	MWK 2,818,288,042.00
3.	Capital work in progress was valued at	MWK 304,380758.00
4.	Total current assets were valued at	MWK 1,018,506,515.00
5.	Total current liabilities were valued at	MWK 2,731,553,103.00
6.	Current Ratio was at	0.37
7.	Quick Ratio was at	0.29
8.	Gearing Ratio was at	1.19
9.	Return on net assets was at	14.83%
10.	Debtors Billing Months was at	3.12
11.	Operating Profit/Water Sales was at	31.24%
12.	Net profit (loss)/Total Income was at	19.94%
13.	Net Profit /Capital Employed was at	11.63%
14.	Revenue /Capital Employed was at	58.31%
15.	Interest cover was at	4.94

(15) Asset Management

Asset management is one of the critical issues that a utility agency needs to implement for proper utilization of the facilities. All water systems are made up of assets, some buried and others visible. These are the physical components of the system and can include pipe, valves, tanks, pumps, hydrants, treatment facilities, and any other components that make up the system. The assets that make up a water system generally lose value over time as the system ages and deteriorate. Along with this deterioration, it may be more difficult to deliver the type of service that the utility's customers want. Costs of operation and maintenance generally increase with the assets' age. Then, the utility may be faced with excessive costs. There is an approach of managing the assets of the system that can assist the utility in making better decisions on managing these aging assets. This approach is called asset management. The techniques involved in asset management have been refined by the international community, particularly in Australia and New Zealand.

The intent of asset management is to ensure the long-term sustainability of the water utility. By helping a utility manager make better decisions on when it is most appropriate to repair, replace, or rehabilitate particular assets and by developing a longterm funding strategy, the utility can ensure its ability to deliver the required level of service perpetually.

The most important step to tap the benefits of asset management is inventory preparation. LWB should prepare/update its inventory and introduce asset management.

(16) Current Problems of Water Supply

- 1. Kamuzu Dam I needs urgent rehabilitation works.
- 2. For existing dams, inflow modeling, water balance and sediment modeling are required to understand the availability of water.
- 3. Demand is about to cross safe yield abstraction, urgent source augmentation is required.
- 4. Increase of water yield from Kamuzu Dams reached the financial viable point, hence new source should be identified.
- 5. There is illegal ground water extraction within the city limit.
- 6. One of the production lines of TW 1 is now out of order.
- 7. Demand will exceed the capacity of TWs within few years; new treatment plant is required thereafter.
- 8. High system loss (last 3 quarter losses range between 30 and 44% while target is 20%)
- 9. Water quality of Lilongwe River suffers from seasonal variation.
- 10. Concern of reservoir pollution coming from upstream. This will lead to high treatment cost.
- 11. Kiosks are not sufficient.
- 12. Some of the kiosks are not operating properly.
- 13. Reservoir capacity is approaching its limit.
- 14. Booster pumps and reservoirs need urgent rehabilitation.
- 15. Advanced distribution model is needed.
- 16. Distribution pipes are old and some of them are made of asbestos cement.
- 17. Water meters and distribution networks are required to extend the supply area to cover more population.
- 18. LWB operates under financial loss.
- 19. Introduction of asset management is required.
- 20. Introduction of Supervisory Control And Data Acquisition (SCADA) is required.
- 21. Staff vacancy in LWB needs to be addressed.
- 3.3.3 Sewerage and Sanitation
 - (1) Introduction

Lilongwe City Council (LCC) is responsible for providing sewerage and sanitation services in Lilongwe City.

(2) Legal Framework

The main legal authority comes from the Public Heath Act (34:01) of 1969. Part X of the Act (Article 78 to 95) mentions that it shall be the duty of local authority (in this case, the LCC) to provide sewerage and drainage for its administrative area.

However, the National Sanitation Policy of 2008 recommends that the sewerage service should be transferred to the Water Boards. Water Works Act 1995 also designates Lilongwe Water Board as the responsible organization for both water supply and sewerage system. There is no specific plan when this merger will take place. So until that happens, LCC will remain responsible for providing sewerage to its administrative area. It was assessed by the JICA Study Team that the LWB itself is reluctant to undertake the sewerage service.

(3) Institutional Organization

Sewerage and sanitation services come under LCC's Directorate of Engineering Services. Sewerage service, headed by a Chief Sewerage Engineer, is placed under the

Civil Engineering Division that also provides building and road construction and maintenance services. Thus, the sewerage service is at the fourth tier of administrative decision making, which makes it difficult to discharge its duties with proper authority (Figure 3.3.3). It gets less focus under this institutional set up and the long chain of command is one of the main hindrances against proper institutional development. Moreover, the current top positions of the Chief Sewerage Engineer, Sewerage Supervisor, Laboratory Technician and Sewage Foreman are all vacant. Currently, one Senior Sewerage Attendant (a skilled labour position) is working as the Acting Sewage Supervisor.

The approved manpower of the sewerage service is 78. Currently, only 52 persons are employed including 1 acting sewage supervisor and 1 administrative clerk. Out of the remaining 50, current allocations are as follows: 8 persons to sewer maintenance, 28 persons to Kauma Sewage Treatment Plant (STP), 12 to other STPs and 2 to laboratory. The current organization of the sewerage service is shown in Figure 3.3.3 below:



Figure 3.3.3 Organizational Structure of Sewerage Service

It may be noted here that the Director of Local Government Services approved a new functional organizational chart for selected assemblies (LCC, September 2005) including Lilongwe. That document provides for a "Waste Management Division" headed by a Chief Waste Officer under the Directorate of Health and Social Welfare to operate both solid and liquid waste management. This would markedly improve the institutional capacity but it has not been implemented yet. The proposed organization is shown in the following Figure 3.3.4.



Source: DLGS, 2005

1x Chief Waste Officer

Figure 3.3.4 Proposed Organizational Structure of Directorate of Health and Social Welfare

The on-site sanitation monitoring is the responsibility of the Water and Sanitation Officer under the Manager of Environmental Health Service within the Directorate of Health and Community Services (Refer to Figure 3.3.). This position is now vacant. In the 2005 proposed set-up, this was to be merged with the Waste Management Division.

The sewerage service issues a monthly operation report with limited information.

It is assessed by the JICA Study Team that skills, human resources and financial resources of the sewerage section of the LCC are extremely inappropriate.

(4) Sanitation Coverage

There are different definitions used in Malawi for 'safe sanitation'. In the Welfare Monitoring Survey Report (NSO, 2007), it was defined as 'use of toilet facilities flushing to sewer, ventilated improved pit latrine, or covered pit latrine'. In the Integrated Household Survey (NSO, 2005), it was defined as 'toilet having a flush, VIP or traditional latrine with a roof'. However, the World Health Organization (WHO) does not recognize a pit latrine as a safe sanitation method just because it has a roof. To qualify as a safe sanitation method, a latrine must have either a water seal or ventilation.

Туре	Household %
Flush toilet (sewer and septic)	29.4
VIP latrine	0.1
Covered pit latrine	53.8
Uncovered pit latrine	16.4
None	0.3
Source: NSO, 2007	

	able 3.3.13	Types	of Sanitation	in Lilongwe	City, 2007
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Although NSO reported that 83% of the households had access to safe sanitation, this number would be only 29.5% if WHO standard is applied. Field investigation by the JICA Study Team revealed that the pit latrines in Lilongwe are a kind of dug hole toilets covered by a slab with a hole. Their working life is rather short and they are major contributors of disease vectors like flies due to lack of ventilation. According to the LCC estimate, about 9% of the population has access to sewer system and 20% is served with septic tank.

(5) Pit Latrine

In most of the traditional housing areas, usually pit/dug hole latrines are used. There is no water seal and no ventilation; thus, they are unsanitary. They have short usage life and new pit sites must be organized in their premises after closing the old pit, usually in 3 to 4 years. In those dwellings, household wastewater is discharged untreated and seeps underground. Human waste also seeps underground from the pit of the latrine and thus, the coliform count and nitrate-nitrogen in underground water may become high. Virtually, LCC does not monitor these latrines.

(6) Septic Tank

For all permanent settlement, septic tank is a requirement and its design has to be approved by the LCC. The National Construction Industry Institute (NCII) under the Ministry of Works (now within Building Department under Ministry of Transport and Public Infrastructure) regulates the standard values of the tank size. The recommended size is shown in Table 3.3.14 below. The supernatant water from the septic tank should seep underground from a soak pit filled with gravel.

User Number	Size	Volume (m ³)
5-11	$4m \times 2m \times 2.5m$	20
12-15	6m ×4m×2.5m	60
16-20	12m ×6m×2.5m	80
Source: NCII		

Table 3.3.14 Size of Septic Tank by User Number

It is a requirement that not only human waste but wastewater from kitchen, laundry and bathroom should also go to the septic tank at private homes. However, this is not always the case.

Sludge accumulates at the bottom of the septic tank gradually. Because the treatment efficiency drops when the volume decreases, it should be removed once every five years. The rubbles of the soaking pits also need to be changed in ten years because the soak pit can be clogged. However, each home is responsible for it and it is not clear if they

maintain it properly. There is no regulation on septic tank de-sludging. People remove septage at their own personal choice.

The Kauma STP receives septage from septic tanks. The fee is MWK 800 for 3,500 L tank, MWK 1,000 for 6,500 L tank and MWK 2,500 for 25,000 L tank. The 25,000 L tank is only owned by Chibuku Beer Co. The 4 septage collection companies charge MWK 7,500 for 3,500 L tank and MWK 8,500 for 6,500 L tank. This indicates that collection companies charge unproportionally high. The five companies have total daily collection capacity of 240 m³ but it is reported that the volume of sludge disposed to STP is only $181m^3$ /month. Considering there are 150,000 households in the city, the prevalence rate of the septic tank is 20%, the volume of sludge per household is 10 m³, and with 300 working days in a year, the calculated cleaning frequency is 165 years (JICA follow up Study, 2008). This clearly shows that septic tank is common during the rainy season.

(7) Sewage Generation

There is no data on total sewerage generation. According to the Guidelines by Japan Sewage Works Association (1999), the average BOD generated is 18 gm/person/day as human waste and 40 gm/person/day as domestic waste. Although BOD load varies between countries due to lifestyle, food habit and climate, these values can be used as the guideline. Considering 9% of the population are served with sewer system (around 60,000), and average actual water consumption as 88 L/c/d, the total sewage generation is around 5,280 m³/d, which is less than the current treatment plants' total capacity (Refer to Sub section 9).

(8) Collection System

The existing collection system is a separate system with no pumping station. Currently, sewerage covers Areas 1, 2, 4 (partial), 6 (partial), 11, 13, 16, 18, 19, 20, 30, 32 (partial), 33, 35, 52 and 53. The location of the sewer line is shown in Figure 8.3.1. Since sewer extension by the LCC is extremely limited, many private companies constructed sewer using their own funds and handed over the pipelines to the LCC for operation. For example, a private developer installed waste pipes connecting with the trunk line in some parts of Area 2. Currently, sewers are also under construction in Area 9 by Shanti Construction (private company, owner of Crossroad Hotel) and will be handed over to LCC. Sewer networks in Area 1 and 2, and trunk sewer pipes for collecting waste water from 6 old treatment plants were constructed by Japanese grant aid project in 1997.

There is no basic information on how many households are connected with the sewage system. There is no information where the sewers are located. According to the Monthly Reports issued by the Sewerage Service, the blockages are cleared regularly. However, deliberate blockings of pipelines are reported in order to use sewage as soil improvers/manure.

Drainage is maintained by the Roads Authority.

(9) Treatment Works

There used to be 13 treatment plants in Lilongwe. They usually covered small areas. Six of them were combined into one new sewage treatment plant (STP) at Kauma and two

of them were combined into one plant located at the cold storage. Both of these two newer plants were constructed with JICA fund. Hence, there are now 7 treatment plants.

Kauma Plant:

In 1997, the Kauma wastewater treatment plant (WWTP) was constructed in Area 41, through a Japanese grant aid at a cost of approximately JPY 3 billion. The treatment method is Waste Stabilization Pond (WSP). Its current capacity is $6,100 \text{ m}^3/\text{d}$. When completed to full scale, its capacity will be 15,600 m³/d. The current set-up includes three Anaerobic Ponds (AP), four Facultative Ponds (FP) and six Maturation Ponds (MP). There are provision for additional two APs, four FPs and six MPs. The treated effluent discharges into the Lilongwe River. The location of the STP is shown in Figure 3.3.5. An aerial view is shown in 3.3.6.

Design quality of influent and effluent are shown in the following Table 3.3.15.

Table 3.3.15 Design	Water	Quality	of Influ	ient and	Effluent
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	0	<u> </u>				
Item	Unit	Influent	Effluent			
BOD	mg/l	300	20			
COD	mg/l	350	30			
Coliform count	MPN/100ml	2.0×107	1.0×103			
Source: O&M Manual, NJS, 1997						

Table 3.3.16 below shows the quantity and structure/specifications of each facility.

Facility name	Quantity	Structure, Specifications	Design Specifications					
Grit chamber	1 set	RC, 2 channels (including spare) W1,200mm×L9,000mm×600mm	Water surface load: 1,800m ³ /m ² /day					
Screen	2 sets	Hand stirring						
Flow meter	1 set	Partial flume, RC						
Anaerobic pond	3	Earth-fill dam, rectangular (1 spare pond) 3000m ² ×D4.0m×3 ponds	Volume load: 160g BOD/m ³ /day, Detention time: 2.1 days					
Septic tank sludge pond	2	Earth-fill dam, rectangular 800m ² ×D3.0m×2 ponds	Volume load 200g BOD/m ³ /day, Detention time: 20 days					
Facultative pond	4	Earth-fill dam, rectangular 1,900m ² ×D2.0m×4 ponds	Volume load: 192g BOD/ha/day Detention time: 16.7 days					
Maturation pond	6	Earth-fill dam, rectangular 8,400m ² ×D1.5m×3 ponds ×2 lines	Detention time: 3 days/pond					
Discharge conduit	2	Asbestos cement						
Bypass pipe	1	Asbestos cement						
Inside piping	1 set	Asbestos cement						
Administrative building	1	1 floor						

Table 3.3.16	Technical	Details of	Kauma	Sewage	Treatment	Plant
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Source: O&M Manual, NJS, 1997



Source: JICA Study Team

Figure 3.3.5 Location of Urban Environmental Utilities Facilities



Source: JICA Follow-up Study, 1998

Figure 3.3.6 Bird's-eye View of Kauma Sewage Treatment Plant

According to the O&M Manual (NJS, 1997), the likely desludging frequencies are every year for the anaerobic ponds and 10 to 15 years for the facultative and maturation ponds. For the last 12 years until now, however, only one septage pond (out of 2) and only one facultative pond (out of 4) had been cleaned. Currently, only one anaerobic pond (out of 3) and the other septage pond are undergoing cleaning. All other ponds including 2 anaerobic ponds have never been cleaned. As a result, treated water quality is compromised and the inflow capacity reduced. It is noted that no special equipment is needed to clean the ponds.

The flow meter is also not working since 1998. As a result, the influent amount is not readily known. Hence, the JICA follow up mission measured the flow manually in June 2008. It was found that the flow is $7,341.5 \text{ m}^3/\text{day}$, which is more than the design capacity for the first phase.

This would usually lead to the conclusion that the facilities need to be expanded. However, it is necessary to examine carefully before deciding on any future development plan due to the following reasons:

- Because the measurement was a simplified one conducted over only two days, more accurate data is needed taking into consideration the seasonal fluctuations for appropriate judgment.
- Considering 9% sewerage access and 88 L/c/d as the unit water consumption, the generation is estimated at 5,280 m³/d, which is less than the current plant capacity of 6,100 m³/d.
- The treatment method is a simple stabilization pond and a certain level of increase in influent can be absorbed.
- Although the design Chemical Oxygen Demand (COD) of the influent water quality is 350 mg/L, the actual inflow is only 100 mg/L (refer to following section). Because the facility capacity is determined based on the influent

organic load, the facility has still more room as the COD value is lower than the designed value.

• Regular removal of bottom sludge can secure the design volume.

The same JICA grant aid project also included:

- Construction of three main sewers,
- Construction of branch sewers covering two areas,
- Provision of sewer cleaning vehicles and other vehicles, and
- Provision of a water quality testing laboratory.

The laboratory was equipped to measure influent and effluent water quality parameters covering pH, BOD, COD, SS, DO, ORP, coliform count and sludge deposition height. However, after a vandalism in 2007, the laboratory is not operating anymore. So water quality data is not available after 2007.

The current condition of the STP can be considered deplorable due to the lack of maintenance and management. Some of the major issues are as follows:

- The water flow meter is out of order.
- The laboratory is not working.
- No security fence.
- Encroachment by neighbouring inhabitants and construction of illegal houses.
- Most of vehicles are out of order.
- Only remaining suction pump vehicle is often used for staff transport.
- Most of the equipment provided by JICA is out of order.
- Some of the equipment have never been used.
- The grid at the upper slab of the distribution tank that will send the overflow water of the anaerobic pond and the septic tank sludge pond together to the facultative pond was lost.
- Low frequency of cleaning of ponds.
- Effluent water is colored green due to poor maintenance.

Other Plants:

As mentioned before, apart from Kauma plant, there are six other treatment plants, three of which are not operated by the LCC. A summary of these plants are given in the following Table 3.3.17:

Area	Treatment method	Treatment cover area	Capacity (m ³ /d)	Discharge to	Remarks
46	Modified* stabilization pond	Cold Storage Co., Ltd. (slaughtering house) and Malawi Dairy Industry	N/A	Underground infiltration	Poor O/M
53	Modified* stabilization pond	Lumbadzi housing estate	1,200	Lumbadzi River	Currently no operation
29	Stabilization pond	Kanengo industrial area	635	Local stream	Poor O/M
35	Stabilization pond	Kamuzu Barracks	N/A	Wetland	Operated by Army
52	Stabilization pond	Kamuzu International Airport (KIA)	N/A	Underground infiltration	Operated by KIA Authorities
22	Stabilization pond	Chipasula Secondary School	N/A	Mchesi River	Operated by school authority

 Table 3.3.17 Other Waste Water Treatment Plants

Note: * = No anaerobic pond, one side of facultative pond is deeper to facilitate anaerobic digestion. Source: JICA Study Team The modified stabilization pond treatment plant at Area 46 was constructed in 1996 with JICA finance replacing two old plants. Because of low influent, all effluent is evaporated and infiltrated.

The Lumbadzi WWTP was constructed in 1984 by the Malawi Housing Corp. to serve the airport housing (Area 53). The steel pipe from the housing area to the WWTP is broken so the plant is not working now and all sewage goes directly to river. The location of the STP is shown in Figure 3.3.5.

The treatment plant at Kanengo serves primarily the industrial area. This was constructed in 1994 with funding from tobacco exporting association and partial support from CIDA. It has two anaerobic ponds, two facultative ponds and two maturation ponds. There is a pumping station to lift sewage to the WWTP. It is expected that waste from industry will enter into this plant after pre-treatment. However, as all industries do not have pre-treatment facilities, this WWTP cannot function properly.

It is to be noted that basic operation data like plant capacity, inflow volume and effluent quality is not available for most of the plants.

(10) Water Quality

Discharge Quality

The Ministry of Natural Resources, Energy and Environment determines the standard value of the quality of water discharged from factory and sewage treatment plant in MS539:2002. The major items are shown in the following Table 3.3.18. (Japanese reference values are also listed for reference.) There is a plan to add other items including heavy metals in the future.

		0	
Item	Unit	Malawi Standard Value	Japanese Standard Value
Water temperature	°C	< 40	
pH	-	6.0 – 9.5	5.8 - 8.6
BOD	mg/L	20	20
COD	mg/L	70	20
SS	mg/L	30	70
DO	mg/L	> 5.0	
Mineral oil	mg/L	2.5	5
Plant oil	mg/L	10	30
	a. 1 (20)	20)	

Source: JICA follow-up Study (2008)

The Kauma sewage treatment plant has not analyzed water quality by itself since November 2007 in spite of its obligation to do so. The Water Quality Research and Pollution Division (WQR&P) and the Water Resources Board (WRB) of the MIWD are responsible for monitoring the quality of river and underground water as well as effluent from factories and sewage treatment plants. The average of their test results carried out between 2006 and 2008 for the Kauma effluent shows a BOD of 54.6 and a COD of 690 mg/L. The JICA follow up mission expressed concern on the validity of such result.

The JICA follow up mission (2008) conducted a simple measurement of influent and effluent COD. The two-day averages were 100 mg/L for influent and 18.8 mg/L for effluent. This is much less than the design COD effluent quality of 30 mg/L.

The WQR&P and the WRB laboratory carried out their periodic test in January 2009, which is the latest discharge quality data available as shown in Table 3.3.19 below. It shows that Kauma and Kanengo STPs cannot meet the Malawian standard of discharge.

Location	рН	DO, mg/L	BOD, mg/L	COD, mg/L	SS, mg/ L
Kauma STP set 1	9.6	19.2	51	62	112
Kauma STP set 2	9.3	19.1	55	72	92
Kanengo STP North pond	9.8	17.4	30	83	60
Kanengo STP South pond	9.1	17.8	30	79	82
KIA STP	8.8	15.5	15	25	24

Table 3.3.19 Effluent Water Quality Data

Source: WQR&P Laboratory Report (2009)

Receiving River's Water Quality

It is to be noted that Malawi does not have any national ambient environmental standards for rivers based on its use.

The WQR&P and the WRB of the MIWD take sample and analyze water quality every three months for river water. They measured water quality at a point downstream from the Kauma STP discharge point five times between September 2006 and June 2008, with the average value of BOD at 27.6 mg/L. The latest test result available from their laboratory (January, 2009) shows BOD levels of 62 mg/L just downstream of the STP and 74 mg/L just upstream of the STP. This result is questionable because river water flow is higher than the effluent flow in January.

The JICA follow up study (2008) carried out a river water quality analysis which showed that the average BOD in Lilongwe River was below 3 mg/L, a result whose credibility is also questionable.

Thus, it can be concluded that there is no credible water quality data available either for STP or for river water.

(11) Financial Situation

Until 2007, the LCC collected a sewerage tariff. It was a flat rate charged per water closet or urinal. The invoicing was done on a quarterly basis and collected as a separate bill. However, due to understaffing of the billing section, it was discontinued. Collective collection with land tax (known as 'city rates') could have avoided such situation.

Hence, there is no sewerage tariff collected at present. Moreover, the city also does not collect any tariff for the communal wastewater treatment plant from factories in the Kanengo Industrial Park since the factories partially funded the construction. The service collects septage treatment fee and one time connection fee. Connection fee for sewerage is MWK 2,350 for residential and MWK 5,850 for commercial.

The sewerage O&M cost now allocated from the 'city rates'. The Department of Financial Affair of the LCC has the responsibility for the financial administration of sewerage services.

(12) Current Problems:

- 1. Poor legal authority.
- 2. Ambiguity on proposed merger with Water Board.
- 3. Low administrative authority over the service.
- 4. Weak institutional capacity.
- 5. Top position of the service is vacant in addition to many other vacancies.
- 6. Inappropriate monitoring regime.
- 7. Inappropriate reporting regime.
- 8. Slow disbursement of funds for regular maintenance.
- 9. Collection of sewerage usage tariff now stopped.
- 10. Definition of 'safe sanitation' is not complying with WHO guideline.
- 11. Most pit latrines used are not sanitary.
- 12. No monitoring of pit latrine.
- 13. Most septic tanks do not receive grey water.
- 14. Sludge removal from septic tanks not performed regularly.
- 15. High charge for septage collection.
- 16. No monitoring of septic tanks.
- 17. No inventory of sewer lines.
- 18. No information on sewer connections.
- 19. Frequent sewer blockage due to undersized pipes and vandalism.
- 20. Urgent need to cover high density areas.
- 21. No records of inflow into treatment works.
- 22. Poor records of water quality.
- 23. Most of equipment and vehicles are out of order.
- 24. Low frequency of cleaning of ponds at the treatment works.
- 25. Effluent quality may not meet standard due to poor operational condition.
- 26. One treatment plant is not operational.
- 3.3.4 Solid Waste Management (SWM)
 - (1) Introduction

The LCC has the overall responsibility for the management of all wastes that are generated within the City's boundaries. The Cleansing Services within the LCC is responsible for waste collection and disposal.

Waste management is mostly focused towards the areas that are formally planned and developed. The informal urban areas which include over 60% of the urban population have little access to waste management services provided by the LCC. The Services also maintains 23 public toilets.

(2) Legal Framework

The main legal authority comes from the Public Heath Act (34:01) of 1969. Article 60 of the Law mentions that it shall be the duty of local authority (in this case, the LCC) to keep its administrative area in clean and sanitary condition.

More specific legal provisions are made under Local Government Act (LGA) 1998 through the General Cleanliness and Solid Waste Management By-Laws 2002.

(3) Institution

The SWM comes under LCC's Directorate of Health and Social Welfare. There are 2 divisions under this Directorate, namely, Preventive health and community services and Cleansing services, each headed by a deputy director. Total current staff of the Cleansing services is 652 including 3 managers, 2 supervisors and 42 captains. This is inconsistent with the approved manpower of 780 including 4 managers, 6 supervisors and 60 captains (Cleaning Service gap assessment report to JICA Study Team, Sep, 2009). The organogram is shown in Figure 3.3.7 below.

There are quarterly and annual reports available. Collection amount, fee collection and major issues are described in the reports.

The institutional capacity is weak, characterized by insufficient technical and management expertise, lack of working tools, and inadequate financial and manpower resources. The laws governing SWM are fragmented and the LCC By-laws are outdated and not developed to involve the private sector.

Overall, the current SWM service can be suggested as a service just "to prevent the accumulation of waste" as opposed to total waste collection followed by sanitary disposal supported by active public participation.



Figure 3.3.7 Organizational Set up of Directorate of Health and Community Services

(4) Waste Generation

The basic information of waste generation is prerequisite for the planning of collection vehicle, collection frequency and landfill management.

The University of Malawi carried out a household waste inventory survey (by D. E. Chogawana, 2004). The survey was carried out in three areas, namely high density area (Kawale and Mchesi), medium density area (Area 15 and 47/4), and low density area (Area 10 and 47/5). It showed that the generation varies between 3.3 and 3.7 kg/household in high density area, between 5.2 and 6.8 kg/household in medium density area and between 6.7 and 14.2 kg/household in low density area.

Based on a waste generation of 0.5 kg/person/day (Application to JICA by LCC, Aug, 2009), it is estimated that the city generates about 335 tons of solid waste per day (based on 2008 population of 674,000). According to the annual report of cleaning service (2007-08), annual collection is 31,431.78 tons translating to an average daily collection of 86 tons/day. Hence, the current collection is estimated to be less than 30% of daily generation.

Collection from medium and high income areas is regular as each household place a bin along the roadside for collection on a designated day. In low income areas, total collection can not be ensured as the households dispose the waste either in waste pits on their plots or in skips located in the neighbourhoods. However, there is no waste collection from informal areas because of accessibility problems.

(5) Waste Composition

The knowledge of waste composition is an important input for the planning of refuge collection and disposal option. The income of people has a direct relationship with the waste composition.

Intermediate Technology Consultants Limited (ITC) carried out a waste composition analysis in 1999 under a DFID-funded project "Research Development and Design of a Simple Solid Waste Incinerator". The analysis showed different compositions for different income groups. For high density (Mchesi) area, most prevalent item was dust/soil (60%) followed by food waste (20%) and wood (9.7%). For medium density area (Area 14, 15 and 47), most prevalent item was food waste (71.8%) followed by dust/soil (8.3%) and plastic bag (6.4%). For low density area (Area 43), most prevalent item was food waste (69.5%) followed by paper (9.4%) and dust/soil (7.9%).

(6) Garbage Collection

LCC's collection practices are summarized below:

- a. In low and medium density residential areas, each household has a collection bin/drum and it is collected once a week on a designated day. The bins are hand emptied into compactor truck.
- b. For the high density residential areas, waste skips are placed in strategic locations where the public is expected to drop their waste. Waste is collected by skip carrier once a week.
- c. Usually, there is limited waste collection from informal areas because of accessibility problems.

- d. For markets, commercial and public places, skips are placed in suitable locations and waste is collected by skip carriers.
- e. Street cleaners are deployed to sweep public places and streets; the collected waste is placed in the skips.
- f. Every year, in Oct, Feb and May, LCC carries out cleaning operation to remove any 'accumulated' waste. This is done by hiring tipper truck.

There are ten compactor trucks and five skip carriers. On average, however, about six compactor trucks and two skip carriers are in a working condition at a given time. The system of using skips for collecting wastes was introduced in 1996. Out of 88 skips, about 60 are in working condition. Skips are loaded into the skip carrier mechanically; however, waste bins are hand-emptied into compactors. Although the skips can make about five trips a day, compactors can make only one to two trips per day.

LCC collects only domestic wastes from industries and hospitals. Hospitals and industries are legally responsible for their medical wastes and industrial wastes. Though some hospitals have incinerator or placenta pit, many industries and some hospitals do not have their waste disposal set up.

Because of the insufficient collection, people indiscriminately dump garbage. It may be noted that there is no litter bins along streets and other places of convenience. Moreover, there is also no public awareness program.

There is no transfer station. A rough check by the JICA Study Team showed that the landfill site is 40 km far from the northern end and it took 37 minutes during the morning peak period to travel the path. However, detailed haul calculations have never been done to determine the transport requirements.

(7) Disposal

All the collected solid waste is disposed to an open landfill site. The site is located about ten km south of LCC at Area 38/2. It is situated on the north east of Lilongwe – Blantyre road (M1) and there are two streams bordering the landfill site. The location of the landfill site is shown in Figure 3.3.5. The average rainfall at the site is 846 mm (New Landfill Site, GIBB report, Vol 3).

The present landfill site was implemented through World Bank finance. Though it was planned as a sanitary landfill site, WB pulled out before the completion and it became an open dump site.

The allocated area for the landfill site is 25 ha, but now a cell of five ha has been used. The present landfill site started in 1996 and a site survey by the JICA Study Team indicates that the cell is nearing its full capacity. However, no study is available to estimate its lifetime.

All LCC-owned landfill equipment like tipper, front end loader, bulldozer or trench excavation machine are out of order. So LCC has to hire such vehicles leading to high operation cost. There was a site office but it was vandalized thus there is no office for site supervisor. The site is not enclosed by fence. Also, there is no groundwater monitoring. The road to the landfill site is a dirt road, which makes access a challenge during the rainy season.

There is no formal sorting or separation of wastes at collection points or disposal site. At the disposal site, separation is crudely done by scavengers who come to pick what is valuable to them. Since LCC has no control over these scavengers, many of whom are children, this might lead to serious health hazard.

Tobacco stem disposal is a problem in the city. Currently, the tobacco processing companies deposit tobacco stem at a designated area at Kanego from where villagers collect those as soil improver/manure. The ashes deposited there coming out from the tobacco processing plants are also recycled as construction material.

(8) Financial Situation

There is no direct fee for garbage collection from residential households. However, LCC provides waste collection service at a fee to commercial and industrial institutions including hotels, supermarkets, hospitals and industries. Arrangements are made to place a skip on customers' premises at a fee. When skips become full, they are emptied also at a fee. The charge is MWK 1,000/visit for bins and MWK 1,200/visit for skips. In case of skips, the customer has to pay 1,500 MWK/month as skip rent. Income generated from refuge collection was around MWK 3 million in 2007-08 (Annual report of Cleaning Service). On the other hand, the operation cost of the services was MWK 52 million in that year. The budget comes from LCC's coffers.

- (9) Current Problems:
- 1. Weak institutional capacity.
- 2. Current solid waste by-law does not have any provision for private sector participation.
- 3. Considerable vacancy of manpower.
- 4. Relatively low position in the administrative setup.
- 5. There is no public awareness campaign.
- 6. Waste composition and generation study needs to be carried out.
- 7. Lack of public litter bin leads to indiscriminate littering.
- 8. Needs to provide service to traditional and informal housing areas.
- 9. Collection is inadequate. Needs more trucks, bins, skips.
- 10. Time and motion study for collection regime planning is required.
- 11. Most of the compactors and skip carriers are out of order.
- 12. High transfer distance from the north end. A landfill site can be established in the north to reduce the transport cost and time. Alternatively, a transfer station can be set up near central area.
- 13. The landfill site is an open dump and unsanitary. There is enough space to expand/construct sanitary landfill.
- 14. Needs equipment at the landfill site urgently.
- 15. Lack of weigh-bridge to confirm the disposal amount coming into the landfill site.
- 16. There is no office at landfill site, so the person in charge has no place to hide during rainfall.
- 17. Potential of alternate disposal options like composting are not investigated.
- 18. The borehole sampling point for water quality measurement near the landfill is not in use.
- 19. Need protection gears for workers both for collection and disposal.
- 20. Possibility to introduce cost recovery exercise by imposing tariff for residential customers.
- 21. Inadequate industrial and medical waste disposal.
3.3.5 Previous, Current and Planned Relevant Studies/Projects

(1) Previous Studies / Projects

Third Lilongwe Water Supply Plan (TLWSP)

The TLWSP has been prepared by SAFEGE, a French consultant. Major components of TLWSP implemented are shown in Table 3.3.20 below.

		milling implement	licu
Component	Completed	Cost (million US\$)	Donor
Raising of Kamuzu Dam II by 5 m	1999	7.3	EIB
Construction of 33 Ml/d WTP + 2 service	2000	3.5	EIB
reservoirs			
Supply and installation of pumps	2001	1.3	WB
Transmission main (800 mm) of 8.9 km	2000	2.3	WB

Table 3.3.20 Major Components of TLWSP Already Implemented

Source: TLWSP

Some of the components identified have not yet been completed including,

- New Water Sources (proposed Diamphwe Dam)
- Kamuzu Dam 1 Rehabilitation
- Expansion of sewerage system

The water demand forecast of the TLWSP can not be used now as the actual population of Lilongwe City in 2008 exceeded the projected population for 2008. Though the plan needs to be updated, this still serves as a sector master plan for water supply in Lilongwe.

National Water Development Project 1(1995-2004)

This is an implementation project primarily funded by the World Bank. Many of the components of this project were proposed in the TLWSP. The components under this project included:

- Dam height raising of Kamuzu Dam (5 m): 9,200,000 m³ to 19,800,000 m³
- Expansion of Treatment Plant No.2: treatment capacity 27,000 m^3/day to $50,000m^3/day$
- Extension of water supply network: Φ 800 mm x 8 km
- New reservoir: 2 places, Chayamba (12,000 m³), Kanengo (10,600 m³)

JICA Follow up Study on Sewerage (2008)

In 2008, JICA carried out a follow-up study for Lilongwe Sewerage Project. The conclusion of the report was that the operation/maintenance and management of the treatment plant and equipment obtained with the grant aid were not properly carried out.

(2) Current and Planned Studies/Projects

A number of projects are now on-going and planned with financing from various donor agencies. However, all of them are essentially part of the National Water Development Program, a sector-wide approach (SWAP) administrated by MIWD with the World Bank as lead partner.

The National Water Development Program is a five-year USD 300 million multi-donor effort to assist GoM to improve the management of the Nation's water resources and to ensure the delivery of efficient, reliable, and sustainable water supply and sanitation services to an increasingly large number of population in the country (Project Paper on Proposed Additional Financing, ACGF-World Bank, 2008, page 2). The lead partner is World Bank and the confirmed other partners are Netherlands/UNICEF, European Union (EU), European Investment Bank (EIB), AfDB, CIDA, OPEC, UNDP, WaterAid, Africa Catalytic Growth Fund (ACGF) and GoM. However, entire funding is not yet committed and a gap of at least USD 78 million is outstanding. Out of various partners, only the World Bank, EU/EIB, and WaterAid have urban water supply and sanitation components. The commitments of various partners by sector are given in the following Table 3.3.21:

			-			_	(in U	USD million)
Development Partner	Proposed Amount	Urban	Town	Market Centre	Rural piped system	Rural WS and Sanitation	Water Resources Management	Prog. Mgt. & Capacity Building
IDA	50*2	7	18	3	2		12	5
Netherlands/ UNICEF	30					28.5		1.5
EU	20	20						
EIB	20	20						
AfDB	40					35	4	1
CIDA	20				4	15		1
OPEC	10		10					
UNDP	1							1
WaterAid	6	1				5		
ACGF	25		4.2	1.3	8.0	8.5		3
JICA	TBD							
DFID	TBD							
GoM	TBD							
Expected	222*2	48	32.5	4.3	1.8	92	16	9.5
Required	300*1	65	63	TBD		130	27	15
Gap	78*3	17	30.5	TBD		17	11	5.5

Table 3.3.21 Summary of National Water Development Program

Notes: Shade = includes components for Lilongwe City.

*1 = The estimate excludes the construction for raw water sources that would cost US\$150m+ and the total estimate for Market Centres and Rural Piped System which are not yet determined.

*2 = US\$2m is for Project Preparation Facility and unallocated

*3 = Excludes total estimate for Market Centres and Rural Piped System which is not yet determined. Source: Project Paper on Proposed Additional Financing, ACGF-World Bank, February, 2008

National Water Development Project 2 (NWDP II), World Bank/IDA

NWDP II is the World Bank funded project under National Water Development Program and includes a credit of USD 27.5 million and a grant of USD 22.5 million, totalling USD 50 million. The total cost of consultant's assignments under the NWDP II is estimated at USD 15.7 million (Project Appraisal Document, 2007, page 92). Implementation is carried out by five water boards under the MIWD, namely, Blantyre Water Board, Lilongwe Water Board, Northern Regional Water Board, Central Regional Water Board, and Southern Regional Water Board. The project was approved by the WB Board on May 24, 2007 and became effective on November 14, 2007. The Project is expected to be completed by 2012.

The objective of the project is to provide increased access to sustainable water supply and sanitation services for people living in cities, towns, market centres and villages, and improved water resources management at the national level. It has four components as shown in Table 3.3.22 below:

Table 3.3.22	Components	of NWDP II
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Component	Target	Estimated Cost (USD million)
Component A	Urban water supply and sanitation for the cities of Blantyre and Lilongwe	7.0
Component B	Town, market centre and rural piped water supply and sanitation	24.0
Component C	Water resources management	12.0
Component D	Sector management and urban water sector reform	5.0
Unallocated		2.0
Total		50.0

Source: Project Appraisal Document for NWDP II, April 2007

The sub-components relevant to Lilongwe City are explained below.

• Under Component A:

Component A is primarily focused on the rehabilitation of existing water supply networks. This is expected to reduce NRW to 26%. This will result in incremental treated water increase of 10,500 m³/day and incremental water flow increase of 12,974 m³/day in Lilongwe River.

Urgent rehabilitation works (plant repair and leak reduction)

This will involve the procurement of essential equipment and spare parts for repairs including on-site electrolyte chlorination plant and dam valves to ensure continuous and reliable water supply. This will also involve the procurement of pipes and fittings for repair of 525 mm asbestos cement (AC) pumping main from Northern Booster Station to Kanengo which is experiencing high failure rate.

- Sanitation and hygiene promotion through "sanitation marketing" approach.
- Procurement of 5,000 water meters
- Funds reserved for future expansion of distribution and new connections

Under this arrangement the Water Board would pre-finance the investments required to connect new customers, and receive the pre-determined cost per connection retroactively on the basis of the number of new customers that have been connected and served with water.

Aqueduct planning

Preliminary design, Environmental Impact Assessment (EIA) and safeguard plans for aqueduct (Kamuzu Dam 2 to treatment Plant No.2) will be carried out. This sub-component is aimed at mitigating raw water pollution in Lilongwe River close to the treatment plant. Estimated consultancy amount is USD 0.25 million.

- Under Component C:
 - Development of Future Water Sources

Full feasibility studies, preliminary design, EIA, and safeguard plans will be carried out for developing new raw water sources for Lilongwe in the medium to long term based on the future demand assessment. The study result will be used for future construction projects funded by any source. These studies will be

contracted by MIWD to ensure that a holistic view is adopted in identifying new water sources that would benefit broader users. In addition, LWB will carry out hydrographic survey for two existing Kamuzu Dams. Estimated consultancy amount is USD 1.6 million.

- Under Component D:
 - > Development of a strategic sanitation plan

This sub-component would support MIWD to carry out strategic sanitation planning for Lilongwe as per the National Sanitation Policy. Estimated consultancy amount is USD 0.3 million.

Design and implementation of a sustainable reform plan, including a regulatory framework, public awareness campaign, and institutional framework for a lease or similar contract with a private operator.

Malawi Peri-Urban Water and Sanitation Project (MPUWSP), EU and EIB

This is another project under the National Water Development Program. The total cost of this 60 month project is EUR 31.8 million (approximately USD 40 million), out of which EU grant portion is EUR 15.4 million, while the rest is a loan from the EIB. It is expected that the tendering process would be completed within 2009 and the implementation would be completed by 2014.

The project will address safe and sustainable water supply and basic sanitation services to low-income areas in the two major cities of Blantyre and Lilongwe, by a combination of i) physical investment in upgrading infrastructure (pipes, pumps, distribution networks, etc.), ii) institutional capacity development through contractual arrangements with private-sector service providers, and iii) close cooperation with local organizations for distribution in the low-income areas (notably WaterAid as a partner). The scope of the project includes:

- Organizational structure and staffing of water board
- Financial and commercial management (including customer data base upgrade, and tariff model)
- Development of Management Information System (MIS)
- Reduction of Non-Revenue Water (through leak detection and repair, GIS mapping of distribution area, pressure measurement, zoning, loss reduction in reservoir, transmission & pumping, and illegal connection detection)
- O&M plan
- Optimizing pumping regime
- Private kiosk management (including basic pit latrine construction)
- Revolving fund for yard or individual connection
- Public relation
- HIV/AIDS program, and
- Investment program at Lilongwe and Blantyre.

The investment program relevant to Lilongwe is shown in Figure 3.3.23 below:

Item	Description		
Kamuzu Dam I	Repair of weir crest		
	Rehabilitation of pumping station		
WTP I	Improvement of process technology for line D		
	Replacement of pumps, including control		
	Replacement of chemical equipment		
Booster pumping stations	Civil repair works		
and reservoirs	Electro-mechanical repair works		
NRW reduction	Equipment for leak detection		
	SCADA telemetry for main facilities		
	Data logger with data transfer		
	Pipe repair material		
	Pressure monitoring and control valves		
Water supply and sanitation	Construction of 372 water kiosks		
to low income areas	Construction of 16,300 service connections		
	Necessary distribution network with booster pumps and reservoirs.		
	Construction of 29,640 VIP latrines.		

Table 3.3.23 Inve	stment Program	n in Lilongwe	under MPUWSP
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Source: European Commission Grant Application Form for MPUWSP, June 2006

About EUR 5 million is expected to be invested in upgrading the water distribution network in Lilongwe. The target beneficiaries include 412,000 in 16 areas in Lilongwe. It is expected that the project will reduce the currently unserved population in the supply area of the LWB from 30% to below 10%.

3.3.6 Current Needs Assessment

The current problems identified for water supply, sewerage and solid waste are listed in the previous sections. The National Water Development Program has some projects to address most of these problems. A comparison between the current problems and the scope of the projects under the National Water Development Program reveals that most of the current investment requirements for water supply and sewerage are included in the projects under the program. However, for solid waste management, capital investment is required to address immediate problems.

For the sewerage and solid waste sectors, institutional weakness has been identified as the root of most problems. Hence, capacity development in these sectors is also required immediately.

Urgent projects should be conceived as follows:

- Institutional capacity development project for sewerage service.
- Provision of flow meter, laboratory equipment and operational equipment for sewerage service.
- Institutional capacity development project for solid waste service.
- Provision of landfill equipment, collection vehicles, weigh-bridge and litter bins for solid waste service.

3.3.7 Other Utility

(1) Power Supply

1) Present Condition of Power Supply in Malawi

Power demand surpasses power supply in Malawi so that frequent blackout affects the living condition of urban citizens as well as the industrial production activities.

The frequent black out is mainly attributed to the shortage of power generation. In order to balance power supply and demand, the power company ESCOM (Electricity Supply Commission) is carrying out planned load shedding throughout the country including Lilongwe City.

Although the electric generators of ESCOM have 302 MW capacities, the actual generation is estimated at 254 MW due to the antiquated under-capacity equipment and the lack of spares in case of repairing works. This actual generation capacity cannot cover the present power demand of 275 MW.

2) Electric Supply Facility

Generator and Power Grid

Electricity in Malawi is supplied by ESCOM. The electric generation capacity of ESCOM in 2006 is 302 MW as shown in Table 3.3.24. Hydro-oriented electric generation occupies more than 95% of the total capacity.



Table 3.3.24	Electric	Generators of	f
	ESCON	1	

Ebeom				
	Installed Capacity	Year		
Name of Power Plant	(MW)	Commissioned		
Nkula Fall A	24.00 (3 x 8.00 MW)	1966		
Nkula Fall B	100.00 (3 x 20.00 MW)	1981		
	(1 x 20.00 MW)	1986		
	(1 x 20.00 MW)	1992		
Tedzani Falls 1	20.00 (2 x 10.00 MW)	1972		
Tedzani Falls 2	20.00 (2 x 10.00 MW)	1974		
Tedzani Falls 3	52.70 (2 x 26.35 MW)	1995		
Kapichira Falls	64.80 (2 x 32.40 MW)	2000		
Wovwe Mini Hydro	4.35 (3 x 1.45 MW)	1995		
Blantyre Gas Turbine	15.00 (1 x 15.00 MW)	1975		
Mzuzu Diesel	1.10 (1 x 1.10 MW)	1980		
TOTAL	301.95 MW			

Source: ESCOM

Figure 3.3.8 Present Power Grid Network in Malawi

The power grid network of Malawi is shown in Figure 3.3.8. The national control centre of the grid is located in Blantyre and regional control centres are distributed in Muzuzu and Lilongwe. The power transmission network is composed of high voltage lines of 132 kV and 66 kV and medium voltage lines of 33 kV and 11 kV. Low voltage lines of 400 V and 230 V are utilized as user's connection.

Power Demand

ESCOM's power sale has been increasing from 902 GWh in 2000 to 1,116 GWh in 2006, as shown in Figure 3.3.9.

Domestic (housing) and bulk users are the main users, accounting for 37% and 46%, respectively, of the total sales.



Source: Analyzed based on information from ESCOM

Figure 3.3.9 Power Sales by Type of User and Peak Demand

Daily power demand usually peaks around 18:00-20:00 during night time, as shown in Figure 3.3.10. (MW)



Source: Analyzed base on information of ESCOM

Figure 3.3.10 Variation of Daily Power Demand in Malawi

Issues of Electric Supply in Lilongwe 3)

In terms of energy sources, electricity shared merely 2.3% of available energy sources in 2000. The Government of Malawi planned to improve the share of electricity to 30% in 2020 and 40% in 2050 in accordance with the 2003 National Energy Policy for Malawi as shown in Table 3.3.25.

	2000	2010	2020	2050
Biomass	93	75.0	50.0	30.0
Liquid fuels	3.5	5.5	7.0	10.0
Electricity	2.3	10.0	30.0	40.0
Coal	1.0	4.0	6.0	6.0
Renewable	0.2	5.5	7.0	10.0
Nuclear	0.0	0.0	0.0	4.0
~ F F !!				

Table 3.3.23 Ellergy What Tojections (70) for Malawi 2000-2030	Table	e 3.3.2	5 Energy	Mix Pr	ojections	(%)	for Ma	alawi	2000-2050
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Source: Energy Policy 2003

In urban areas, the electric connection rate in 2007 was 52% so that the number of electricity connected household was estimated at 45,105 HH. Table 3.3.26 shows the energy sources for lighting and cooking in Lilongwe City. About 46% of households utilize electricity for lighting in 2007, which showed a sharp increase from 38.5% in 2005. While only 18.5% of them utilize electricity for cooking. Firewood and charcoal are still the dominant sources of energy for cooking.

Energy Source	Lighting	Cooking
Electricity	46.0	18.5
Paraffin	43.5	0.4
Candles	10.0	-
Firewood	0.3	43.6
Grass	0.2	-
Solar	-	0
Gas	-	0.3
Charcoal	-	36.6
Other	0	0.6
Total	100%	100%

Source: NSO (2007:73-74) Welfare Monitoring Survey Report

4) Perspective of Power Source Development

Urgent Measures

To counter the imbalance of power demand and supply in Malawi, the international grid connection between Malawi and Mozambique and expansion of Kapichira hydropower station are planned to commence operation soon through the cooperation of the World Bank. Although this plan was cancelled in June 2010, another power source is necessary to be secured.

Short/Medium Term Measures

Electric generating potential in Malawi is estimated at 900 MW. Presently, however, only 285 MW is developed. Location of potential site is shown in Figure 3.3.11.

Other Source

- Coal: MCHENGA coal mine located in northern Malawi produced 51,900 tons in 2005, 38,700 tons of which were consumed in domestic market and 13,200 tons were exported to Tanzania. In the domestic market, manufactures of tobacco, sugar, cement and tea processing industries are the main consumers. In the south region of Malawi, coal is imported from Mozambique and other neighboring countries due to the high transportation cost from MCHENGA mine.
- Geothermal: Malawi has a certain potential fro geo-thermal electric generation;

however, developable capacity is unknown due to lack of detailed survey results.

- Recycling Energy source
 - ✓ Biomass: firewood and charcoal are the major energy source for cooking and heating even in urban household in Malawi. Since deforestation is a serious issue, the Government of Malawi is encouraging substitutes such as LPG, ethanol, and biomass briquette. Biomass-ethanol originating from sugar cane, biomass briquette made from used paper, and agricultural waste are recommended.
 - ✓ Solar: Considering the strong sunray and vast highland plain located in an altitude of more than 1,000 m in Malawi's domain, solar electric generation system is rather suitable in Malawi. Cool climate in the highland will allow high generating efficiency and longer battery life.
 - ✓ Wind power: Wind velocity is not enough for wind power generator in Malawi.



Source: Tabulated based on the information of "Power System Development and Operation Study", "Geothermal Resources Exploration and Modeling of Malawi"

Figure 3.3.11 Hydro Power Resource Potential of Malawi

3.4 Governance of Lilongwe City

3.4.1 Governance of Urban Development

The Local Government in Malawi is part of a two tier system consisting of the Central Government and Local Government. They form part of the executive branch of government, which is complemented by two other branches, namely, the judiciary and legislature. In administrative aspects, the Office of the President and Cabinet is the highest executive entity in Malawi. It coordinates the activities of all other arms of government in order to achieve a strong development potential and ensure the prosperity of the nation. The Central Government spells out the development agenda while all other arms of government including the Local Government, which is coordinated by the Ministry of Local Government and Rural Development, implement the said development program.

The local government functions are established under the Constitution of Malawi which is the supreme law in the country. The development agenda is coordinated through district administration by the 28 district assemblies and a total of 12 town and city assemblies under the Local Government Act. Under this Act, the local assemblies are required to prepare development plans as bases for development and budgeting. The development plan is a mandatory responsibility to guide development in the local assemblies while the local assemblies (city, town and municipality) are allowed to prepare their own development plan under the Local Government Act. However, the physical development plan is a spatial development plan which is prepared under the Country and Town Planning Act and implemented through various legislation and specially instituted committees. This sub-chapter focuses on governance issues of urban development in Lilongwe City.

(1) Overview of Urban Development Management

The 1986 Lilongwe Outline Zoning Scheme was the statutory land use plan for Lilongwe City, prepared under the Town and Country Planning Act, Cap 23.01 of the 1988 laws of Malawi. Under the Act, it was prepared by the Town and Country Planning Department on behalf of the Lilongwe Town and Country Planning Committee. It was approved by the Lilongwe Town and Country Planning Committee and the Minister responsible for town and country planning in September 1986. It had a planning period up to 2000.

Since 2000, urban development in the city has been in the absence of authorized zoning scheme. LCC should have executed an urban development master plan including the zoning scheme immediately after 2000. The absence of new zoning scheme brought about governance issues on urban development management. They are i) inactive coordination among the relevant stakeholders (i.e. LCC, the Department of Lands, the Department of Physical Planning, ministries responsible for infrastructure and utilities), ii) opportunity loss of amendment of the old Planning Standards and Guideline (1986), and the Buiding-by-Law (1961), and iii) weak enforcement of land use/ building control (LCC).

This Master Plan Study ironically appears to trigger off strengthening of cohesiveness of the above mentioned stakeholders. Nevertheless the challenge for these issues would be to what extent the relevant stakeholders view them as significant agenda for urban development management after completion of the Master Plan. Blantyre City Council (BCC) legalized the new zoning scheme, amended the building regulations and empowered its enforcement system for development and building control after the 2000 master plan. There is a good example of BCC so that LCC is requested to follow the BCC's case.

(2) Overview of Land Management

1) Landlords

Land in the city is managed by five main landlords.

- 1. Ministry of Lands, Housing and Urban Development (MoLHUD)
- 2. Lilongwe City Council
- 3. Malawi Housing Corporation
- 4. Airport Development Limited
- 5. Private Individuals/Companies

The Department of Land, MoLHUD is responsible for public land. Public land is comprised of institutional, commercial and residential, which has been subdivided and offered for development under leasehold titles that are usually for 99 years or shorter terms. Previously, some public land can also be offered under freehold title under absolute tenure as private land. However, government has since stopped offering freehold titles. Accordingly, there are few individual lots under freehold title in the city.

The Malawi Housing Corporation owns public freehold land for purpose of subdivisions in residential and commercial development in the city. Most of this land is for high, medium/low density permanent housing, mainly on Areas 1, 2, 3, 15, 18, 47, 49, 43 and some parcels scattered in the city.

The Lilongwe City Council has assumed the responsibility for administration of Traditional Housing Areas (THA) in the city. The City Assembly has been granted long term leases at nominal charge (basically public freehold) on some land. Then, it subdivides THA plots for individual allocation under leasehold titles with terms of 99, 66, or 33 years or on monthly tenancy agreement under ownership certificates. Such high density THAs are located in Areas 7, 8, 21, 22, 23 24, 25, 36, 49 and 53. However, some of the areas are now evolving into permanent residential housing areas.

Airport Development Limited (ADL) is a statutory corporation responsible for airport development activities and land administration in Areas 53, 54 and 55. It is also responsible for airport development activities including residential, commercial and institutional development in the Lumbadzi Area. In Area 55, horticulture and forestry activities have also been incorporated as buffer zone activities even though most of the undeveloped areas are under government control.

Private Individuals/Companies secure land from all the major landlords in Areas 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 43, 28, 29, and 50 or from traditional leaders in private development. In several instances, they subdivide this land for sale or rent to others.

2) Land tenure

Public land management is therefore the responsibility of the five principal landlords.

These landlords own large chunks of public land in the city and offer shorter term titles to tenants. All public land is vested in perpetuity to the President of the Republic of Malawi and such powers are in accordance with the Land Act. It is therefore the responsibility of the ministry responsible for land matters to give bigger lots to the major landlords to promote development in accordance with the structure plan for urban development purposes and offer short term titles to developers. The shorter term titles are in the form of freehold titles, leasehold titles, or certificates of title in accordance with the land registration systems prevailing under the land act.

Freehold title is a private transaction whereby land is held as private property transferable as a private asset. However, the private details of purchase are submitted to the government by both seller and buyer for notice of sale and for registration purposes. On the transfer of freehold land, the purchaser is subject to planning approvals. Any subdivision is subject to land survey and the subdivision act if the plot is not yet surveyed.

Leasehold title is a land holding agreement for a specified time period, which is recorded in the title, and it includes details under which land can be used. Leasehold land is also subject to survey specifications and the details of the land are also attached to the certificate of title called a lease. Leasehold titles are offered by most major developers listed earlier and the period is normally 33, 66 or 99 years.

Certificates of title are in various forms. The most common are those administered in the traditional housing areas by the Lilongwe City Council. They are in the form of an agreement specifying the timeframe and conditions of use. The most common document used by the City Council for this purpose is the monthly tenancy agreement.

Apart from certificate of title, whose records are kept by the City Council, all other land records are kept at the central land registry of the Department of Lands. Any transfers must be subject to the consent of the government. The records specified in this section are the only official transaction of land in the city. However, the capital city has a number of informal and village settlements where traditional transactions under customary titles are rampant. The land management system in the City is shown in Table 3.4.1.

	Tuble et the Lun	a management system	n in Enongve	eng
Responsible	Planned S	ettlement Area	THA Planned Settlement	Unplanned Settlement and Areas/Villages
Authority	Land Management System	Tax System/Other Charges	Occupancy License	Recording
Department of Lands	 Land registration (99 years Title Deed) Cadastral mapping land title management 	• Property Rates – The rating is in two categories.	N/A	Not Done
Malawi Housing Corporation	 Leasehold Titles Land valuation Development charges & ground rent 	• Land value is evaluated for taxation	N/A	Not Done
Lilongwe City Council	 Land registration (99/66/33 years Title Deed) Monthly Tenancy Certificates 	 City property rates lower than those charged by the Department of Lands Ground rent Development charges 	• Occupancy License (Monthly tenancy agreement)	 Illegal settlers without legal land holder Middlemen involved in Black-market Sales Unlawful sale agreement with traditional chiefs in villages
Private Developers	 Freehold titles Leasehold titles Annual/Monthly agreement Certificate of title Sale Agreement 	 Development Charges Ground rent City rates 	N/A	N/A
Airport Development Limited	 Land Registration 99/66/33 year title deed Tenancy Agreement at a prescribed period 	 Development Charges Ground rent City rate 	N/A	N/A
Traditional Authority for Customary area	 Village Headmen administer land as customary tenure Middlemen sales 	N/A	N/A	Illegal Sale of Land
NGOs (CCODE/HFH)	 Certificates of titles Leasehold at agreed periods 	 Development charges Ground rates City rate exempted 	• Housing Loan records	• Informal record/statisti cs for service provision

Source: JICA Study Team

3) Issues of Land Management

a) Customary Tenure

Traditional villages are scattered in various parts of the city especially in Areas 25, 54, 55, 26, 26, 56, 57, 58, 36, 38 and 23 where most land is administered under customary tenure by traditional and block leaders. Most of this land is also managed by private individuals and sold under black market deals for urban activities, e.g., horticulture, residential, commercial, and institutional development. These customary transactions are normally done based on trust and there are no official records of the land registration except in areas where land was registered under adjudication by the Lilongwe Land Development Programmes such as areas on the urban peripheries, e.g., Bunda, Chinsapo, Likuni, Njewa, and Mchinji Road areas. The controversial issue is that the Malawi National Land Policy (2002) legally permits existence of customary tenure. This would be the constraint factor for improvement of land registration in public land.

b) Unplanned Settlement

Unplanned settlement should have been legally stipulated as "Improvement Areas" by the Housing Bill (traditional areas and improvement areas) in 1998. The Bill mandated the City Council to manage unplanned settlement by way of certificate of title or a land record, and to carry out construction and maintenance of community infrastructure. Nevertheless, the Bill was not approved in the Parliament. The absence of authority over unplanned settlement could trigger many problems such as urban poor and improper urban management.

c) Other Issues

To date, the multiplicity of landlords in the city has created several problems of land administration in the city:

- Lack of coordination on development programs
- Duplication of waiting lists of applicants for plot leading to superficial estimation of real demand for plots
- Different criterion for plot allocation and cost estimation of development charges even when plots are of same sizes
- Lack of coordinated enforcement measures on development projects and encroachments
- > Lack of monitoring multiple allocations of land to individual applicants
- > Different systems of land registration and records management

In order to enhance coordination, it is necessary to coordinate land management to ensure an effective city development agenda.

(3) Land Use Control and Building Permission

In connection with the issue of urban development management, land use control is regulated by the 1986 Outline Zoning Scheme and relies on the Planning Standards and Guidelines (1986). Building control is regulated by the Building Bye Law (1961). The significant issue in land use control has been the limited enforcement of the City Assembly to regulate land use changes in the Old Town sector and illegal sub-division of land conducted by traditional chiefs in peripheral areas such as Chinsapo, Likuni and Njewa. This could be attributed to insufficient level of development control conducted by the City Council.

Building permission still relies on the obsolete Building Bye Law which the City Council should have renewed previously.

3.4.2 Living Environment

Despite of the higher standard of average household income in Lilongwe than in the rest of areas in Malawi, shown in Table 2.1.6, many of urban population in the city are nearly at the poverty threshold. Those people are concentrated on THA and unplanned settlement. Housing development by use of the Mchenga Fund and provision of social services by use of the Malawi Social Action Fund (MASAF) has been the typical project enhancing living environment at community level in the city. LCC has been involved in community development together with NGOs in the scheme of MASAF.

Enhancement of living environment in THA and unplanned settlement will be the unavoidable issue on urban development since poverty-stricken unplanned settlement particularly would disgrace the capital city as a face of Malawi. The problem has been in the absence of governance for living environment in THA and unplanned settlement. Malawi is dependent on donors' fund like MASAF and Mchenga. There has been no domestic scheme where the relevant stakeholders are involved in enhancement of living environment in THA and unplanned settlement. To make the matter worse, there has been no authority for management of unplanned settlement so far, as stated in 3.4.1.

Malawi would perhaps need a comprehensive approach to good governance of this issue. They are:

- 1) Land registration system in THA and unplanned settlement,
- 2) Creation of domestic fund for improvement of living environment,
- 3) Community-based public service delivery in place of the direct services by LCC

The above approach shall require institutional arrangement for land management, fund creation and community-based public service delivery respectively. The details are discussed in the chapter 10.

3.4.3 Organizational Structure of LCC

(1) Assembly Body

Local Government Authorities, like the Lilongwe City Council, consist of an elected assembly of councillors and an administrative body providing public services. The structure of an administrative body is central to the successful implementation of master plan recommendations. Lilongwe City Council, like other local governments, comprises two bodies:

1) Elected Council of Councilors (Members of the Council)

The assembly comprises the mayor and ward councillors. In line with Section 5 of the Local Government Act, the elected assembly consists of the following as shown in Figure 3.4.1:

- a) Members (called Councilors) elected from each of the 27 wards within Lilongwe city's local government area,
- b) Five Members of Parliament from the constituencies that fall into Lilongwe City as non-voting/ex-officio members,
- c) Five persons as non-voting/ex-officio members appointed by the elected members to cater the interest of special interest groups determined by the Members of the Council.



Source: LCC

Figure 3.4.1 Institutional Set up of Lilongwe City Council

Members of the Elected Council are required to meet at least four times per year. In their first meeting after elections, councillors are legally required to elect the Mayor and Deputy Mayor. The Mayor is the head of the Council. Local election has not been implemented for almost 5 years recently. In the absence of members of the Council, the City Council will lack political leadership. The interim arrangement is such that all policy decisions are referred to the Ministry of Local Government for direction while day to day issues are resolved by the secretariat and through adhoc committees that have been established.

To effectively discharge its functions, the Members of the Council are now planning to establish and work through the following service or standing committees:

- a) Finance Committee
- b) Development Committee
- c) Works Committee
- d) Education Committee
- e) Health and Environment Committee
- f) Staff and Disciplinary Committee

The assembly can also establish other service committee as it deems necessary.

Other such service committees that are central to the physical development planning process are:

- a) Town Planning Committee (established under the Town and Planning Act)
- b) Plot Allocation Committee
- c) Building by-Law Committee

The Council established provisional organization on the above three committees. These committees are important because they are expected to play the role in balancing the positive and negative aspects in the course of planning.

These service committees examine policy issues, formulate by-laws and propose Assembly projects/activities in a given sector for final approval through a resolution of the full Council. While meetings of the Council are held four times per year, the committees can meet whenever necessary.

The Council is scheduled to establish the Ward and Neighbourhood Committee to complete the structure of decentralisation in urban assemblies. Currently, the Local Government Act does not recognise such levels although they have been proven to be effective in service delivery and communicating development programmes and projects.

2) An administrative body called the Council Secretariat.

The secretariat comprises the Chief Executive Officer (CEO) and Secretariat staff members. The CEO heads the secretariat as stipulated in Section 11 of the Local Government Act. The CEO is the Controlling Officer and adviser to the Council, and is specifically responsible for:

- a) Implementing the resolutions of the Council
- b) Day to day performance of the administrative functions of the Council
- c) Supervision of the departments of the Council
- d) Proper management and discipline of the staff members of the Council
- (2) Directorates /Departments and Responsibilities

The Lilongwe City Council has nine departments which are headed by a director who reports to the CEO (Figure 3.4.1). The departments are responsible for all operation stipulated in the responsibilities of each department in accordance with the departmental mandate, Laws of Malawi, and the Councils owned by- laws.

1) Department of Finance

The purpose of the Directorate is to manage financial resources of the City Council. This Directorate is headed by the Director of Finance (M2). Its functions consist of the four divisions:

- a) Recurrent Account Division: headed by a deputy director of finance (M3),
- b) Development Account Division: headed by a chief accountant (M4),
- c) Debt Management Division: headed by a principal accountant (M7),
- d) Reconciliation Division: headed by an accountant (M7).

2) Department of Administration

The purpose of the Directorate is to provide an efficient and effective administrative support service to the Secretariat. Its functions are to (a) provide legal services (drafting city by-laws and providing legal counsel), (b) manage personnel records/library services and provide information system design and maintenance, (c) service elected assembly councillors, procure and manage stores, and coordinate policing service, and (d) provide human resource planning and human development services. The Directorate has four Divisions as follows:

- a) Legal Service Division: headed by one position of legal officer (M3),
- b) Information and Communication Technology Division: headed by a chief system analyst (M4),
- c) Other Services Division: headed by a service provider officer (M5),
- d) Human Development Management Division: headed by a HRD officer (M5).
- 3) Department of Engineering

The purpose of the Directorate is to provide engineering and rescue services. It functions are to (a) provides engineering services, (b) provide electrical and mechanical engineering services, and (c) provide fire and rescue services. The Directorate is headed by the Director of Engineering Services (see Figure 3.3.3). The Directorate has the following two divisions:

- a) Civil Engineering Division: This division is headed by a deputy director (M3). The three chief engineers (M4) of road, building and sewerage services are placed under the deputy director. Those public services are at the fourth tier of administrative decision-making, which makes it difficult to discharge its duties with proper authority. Moreover the chief sewerage engineer is currently vacant.
- b) Mechanical and Electrical Division: This division is also headed by a deputy director (M3). The two chief engineers (M4) of mechanical and electrical services are placed under the deputy director.
- c) Fire and Rescue Service: There is one position called the Chief Fire Officer handling fire and rescue services directly under the Director of Engineering Services.
- 4) Department of Commerce and Industry

The purpose of the Directorate is to create a conducive environment for the growth and development of trade and industry in the city. Its functions are: (a) provision of business inspectorate and licensing services for small and medium businesses, (b) management of market centres, levying market fees, and managing commercial assets, and (c) investment promotion of industrial development, dissemination of appropriate technology for small scale industries, and promotion of cooperative societies. The department is headed by the Director of Commerce and Industry (M2). It has three divisions

a) Inspectorate and Licensing Division: headed by a chief trade officer (M4),

- b) Commercial Management Division: headed by a commercial management officer (M4),
- c) Investment Development Division: headed by an investment promotion officer (M4).
- 5) Department of Health and Social Welfare

The purpose of the Directorate is to ensure health and well being of the population in order to increase productivity in the city. The Directorate consists of two functions. One is preventive health (water sanitation, health education, communicable disease control) services, community (nursing, clinical community) services. The other is cleansing (waste management, street cleaning, markets and public toilets) services.

- a) Preventive and Commercial Service Division: This division is headed by a deputy director (M3). The four managers (M4) of community service, clinical service, nursing service and environmental service are placed under a deputy director.
- b) Cleansing Service Division: This division is headed by a deputy director. The three assistant managers (M5) of waste management, street cleaning and market & public toilet cleaning are placed under a deputy director.
- 6) Department of Education

This is a new directorate that has been established as part of the devolution process enabling the city to take charge of primary schools within the city. The purpose of the Directorate is to equip pupils and adults with basic knowledge and skills, harness youth potential and promote mental and physical development of individuals.

The functions of the Directorate are therefore (a) provision of primary education services, (b) provision of youth development services (entrepreneurial, family life education, facilitation of anti-drug, and promotion of youth participation in development programs), and (c) provision of functional adult literacy services. It is headed by a director (M2).

- a) Primary Education Division: headed by a deputy director (M3). The three managers of primary school administration (school management, employment of teachers and preparation of text books), methods advisory (advice and supervision on teaching and learning), and inspectorate (enforcement of education standard), are placed under a deputy director.
- b) Youth Development Division: headed by a principal youth officer (M5),
- c) Adult Literacy Division: headed by a principal community development officer (M6).
- 7) Department of Parks, Recreation and Environment

The purpose of the directorate is to entertain city residents and ensure a healthy environment. Its functions are (a) provision of recreation services (parks, sports development services), (b) provision of conservation and landscaping services (woodlots and forests, tree and ornamental plant nurseries, and fruit tree seedling), and (c) provision of environmental protection services (veterinary services, and coordinate and protect environment).

The directorate is headed by a director (M2). It has the following three divisions:

- a) Recreation Division: headed by a deputy director (M3),
- b) Conservation and Landscaping Division: headed by a chief landscape officer (M4),
- c) Environment Division: headed by an environmental affairs officer (M4).
- 8) Department of Internal Audit

The purpose of the Department is to ensure that the assembly utilizes and accounts for resources appropriately and in compliance with relevant stores, finance and accounting regulations. The functions of the Directorate are to (a) examine accounting and stores transactions and (b) to review resources control systems. The Directorate is headed by a chief internal auditor reporting directly to the Chief Executive Officer.

9) Department of Planning and Development

The Department is headed by the Director (M2) of Planning and Development. The two deputy directors (M3) for town planning and economic planning are placed under the Director. The four divisions headed by the five managers (M4) are comprised of (a) Town Planning Division, (b) Development Control Division (c) Building Inspectorate Division, (d) Project Management Division, and e) Estate Management Division. This is shown in Figure 3.4.2.



Note: There are many vacant positions especially for the officer level, other than mentioned above.

Source: LCC

Figure 3.4.2 Organizational Structure of Planning and Development Department

a) Town Planning Division: This division is responsible for local physical

development plan. Local physical development plan is further comprised of i) a land use plan, ii) a layout plan (a detailed land use plan of part of an urban area), and iii) an urban civic plan (a more elaborate design of a special area). This division is the counterpart of the Lilongwe Urban Development Master Plan. The City Development Strategy (CDS) is also coordinated by this division.

- b) Development Control Division: This division deals with the day to day development administration in the city, i.e., receiving development applications, processing them for relevant approvals by the Town Planning Committee and monitoring their implementation. It works with the building inspectorate service, which monitors compliance to the Planning Standards and Guideline. For the proper implementation of the master plan, it is pertinent to review the development control systems and processes to allow for orderly development in accordance with proposals in the zoning scheme.
- c) Building Inspectorate Division: This division deals with the day to day building development administration in the city, i.e. receiving building applications, processing them for relevant approvals by the Town Planning Committee and monitoring their implementation. It works with the development control services, which monitor compliance with the Building by-Law. A parallel system of approvals by this division and the Department of Engineering Services creates unnecessary delay.
- d) Project Management Division: This division currently works for keeping records of NGOs and CBOs (community-based organizations) operating in the city.
- e) Estate Management Division: This division deals with the administration of Traditional Housing areas (THA). Over 50% of urban residents rely on THA for housing and the City Assembly is responsible for the development and management of such areas. The main responsibilities include advising the assembly on management aspects of THAs, servicing the Plot Allocation Committee, coordination of basic infrastructure and services in THAs, revenue collection, and staff supervision.

The main challenge is to deal with issues relating to land administration. Land transfers, plot allocation, conflict, opening of new areas, record management. Other challenges relate to the availability of land for THA development (although the city has many undeveloped land, the areas required for development have to be formally transferred to the Lilongwe City Council). There are several proposals, namely: (1) to change regulations to allow semi-detached and multi storey houses in THAs, (2) to review standards for plot development, (3) to decentralize THA management in various parts of the city, (4) to develop policy and guidelines for private sector participation in land delivery in THAs, and (5) to regularize some unplanned settlements in THA administration.

The division implemented a GIS mapping for its properties in the year 2000 but the system crashed and most data were not recovered. This led to the use of an analogue system, which is an inefficient way of keeping property records, even though most of the key personnel have been trained in computerized record management.

The estate management service has 7 site offices located in Areas 8, 21, 23, 24, 25, 36, and 49. However, they are all closed.

3.4.4 Financial Performance of LCC

The activities in the Lilongwe City Council are basically supported by resources from the Central Government through intergovernmental transfers and revenues. The assembly also collects fees and levies from properties of all residents and various businesses. On an actual basis, about 75% of the income is raised through property rates from private investments in the city while 13% of that comes from the central government transfers in lieu of rates and other grants to the assembly. The remaining 12% is from fees and charges as shown in Table 3.4.2:

		Budg	get	Actual			
	Item	Million MWK	%	Million MWK	%	% to Budget	
	Government & Other Grants	144,976	12%	44,977	5 %	31%	
Taranana	Central Government Property Rates	67,321	6 %	67,321	8 %	100 %	
Income	Property tax	810,181	68 %	627,274	75%	77 %	
	Fees and charges	172,528	14 %	93,409	12 %	54 %	
	Total	1195,006	100%	832,981	100%	70 %	
	Employees	198,196	16%	148,223	17%	75 %	
Expenditure	Other Recurrent Transaction	659,340	55%	669,212	75 %	101%	
	Capital Outlays	337,470	29%	7,790	1%	2%	
	Donor Funds	0	%	67,473	7 %	N/A	
	Total	1195,006	100%	892,698	100 %	75%	

Source: Finance Department, Lilongwe City Council



Source: Finance Department, Lilongwe City Council Figure 3.4.3 Income and Expenditure 2007/2008

In terms of actual expenditure, recurrent transaction comprising of employees and other recurrent such as goods and services, office supplies, debt servicing, capital formation, travel expenses, etc constitutes 92 % of total expenditure. Capital outlays share only 2 % of total expenditure.

LCC has to make efforts to expand property tax base since actual collection of property tax remained to be 77 % of budget income estimated. Given the situation that LCC actually received 70 % of the budget income, LCC should have saved amount of other

recurrent transaction. Some of other recurrent transaction saved would have transferred to capital outlays. LCC would require the balanced recurrent and development expenditure since it is one of the main stakeholders responsible for urban development.

3.4.5 Governance Issues of Urban Development

(1) City Governance and Capacity

The organizational structure explained in 3.4.3 is the current set-up of the City Council taking into consideration the legal status of the local government system in Malawi. The situation, however, is slightly different considering the political situation in the country. The local government elections have not taken place since the Council was dissolved in 2005. LCC is currently administered by the secretariat with the direction of the central government, through the Ministry of Local Government and Rural Development, on matters of policy and, to some extent, senior staff recruitment issues.

LCC has a considerably high vacancy rate situation in all departments estimated at around 30% of the mid-professions. LCC also suffers from the short retention of staff members. The other major capacity issue relates to inadequate facilities such as office space, transport and equipment and policy issues relating to operational mandate.

The organizational structure of LCC has changed over time. It appears to create consistency problems in view of certain activities that call for comprehensive functional review in line with the strategic development plan of the assembly. In September 2005, the Council has adopted an approved functional organization chart, job descriptions and specifications that have been developed by the Ministry of Local Government and Rural Development for selected assemblies. The structure proposed has not been fully implemented yet despite having official positions that create some discrepancies in the operations of some activities.

- (2) Urban Plan and Development Management
- Since the 1986 Outline Zoning Scheme was legally valid until 2000, urban development in the city has been under way without the zoning scheme that was legally approved after 2000. Such circumstance created problems below;
- a) The multi-stakeholder planning coordination and implementation of sub-division of land has been not functional. For instance, LCC has not been informed of sub-division plan of land that is administered by the Department of Lands. To make the matter worse, the multiplicity of landlords brought about improper approval of applications for sub-division plan ageist the 1986 zoning scheme.
- b) Infrastructural development plan has been independently made by respective agency without a physical development plan of the City.
- c) Absence of the city plan did not trigger off improvement of planning standards and guidelines.
- d) Absence of planning standards and guidelines led to weak enforcement of land use control and building regulation. As a result, two functions have not been harmonized to ensure smooth monitoring and enforcement of the development in the city.

The multiplicity of landlords is the City's de facto situation. It is not the practical recommendation that LCC should be responsible for all areas from planning to its enforcement from the viewpoint of LCC's capacity. It would be more practical that planning application and implementation should be made by the multi-stakeholder coordination and enforcement by LCC. The Lilongwe Urban Development Master Plan could trigger off good governance of urban plan and development management.

(3) Infrastructure Development and Operation & Maintenance

Infrastructure development in the city is a fragmented responsibility of several stakeholders in the city development agenda. Thus, there is a need for enhanced coordination among the various stakeholders. The coordination process has been taking place through various ongoing efforts such as the City Development Strategy with the support of the City Alliance and the decentralized cooperation with the City of Johannesburg. The citywide consultation should be a continuous process which should be on a regular basis and as part of a governance agenda.

The decentralization policy appears to make local assemblies become implementers of infrastructure development. Nevertheless the real situation is not the case. LCC is still dependent on design and construction of minor roads that jurisdictionally fall into management of LCC. Under such circumstance, the stage-wise capacity development of LCC could be necessary from planning to operation and maintenance. The joint operation of road development and maintenance by RA and LCC would the most cost effective method of LCC's capacity development. Vacancy and short retention of staff members in the middle management class has been a chronic constraint on operation and maintenance of sewerage and solid waste management. Such a chronic problem would be attributed to i) insufficient level of incentive (salary), ii) lack of competent resource persons, and iii) inefficient organization hampering long retention of them. LCC could require a comprehensive approach to solution of this problem.

The issue of public private partnership (PPP) is also central to the enhanced development of the city as the private sector continues to play a critical role in the provision of infrastructure and basic services such as the construction of roads and buildings, provision of services in the education, health, and several social services, e.g., emptying septic tanks, bush slashing, etc. Public private partnership undertakings are regulated by the public procurement, the anticorruption, and the public finance management act. The government has established PPP to support its own efforts in transferring public operated institutions to the private sector.

(4) Land Management

The Land Act (2000) empowers the state to control and own all types of lands in Malawi. In this sense, the Department of Lands as the central government should be in a position of administering land registration in public land. Nevertheless the situation is not the case. The multiplicity of landlords resulted in the different system of land registration. The utmost concern is illegal settlers in unplanned settlement. No stakeholders have been responsible for land registration in unplanned settlement. The draft Housing Bill proposed in 1998 failed to legalize governance of unplanned settlement. Despite of the failure in enactment of the Housing Bill, LCC was mandated to administer THA without legalization. However unplanned settlement remained to be the area where no stakeholder administers.

The current status of both THA and unplanned settlement remains to be the unstatutory housing area. Thus the focus would be how to bring up THA and unplanned settlement to the statutory housing area. The first step will be legal arrangement for governance of unplanned settlement. Such a legal arrangement includes the responsible authority (LCC), land registration and tenure system in unplanned settlement and its implementation. The second step is to upgrade living environment of THA and unplanned settlement.

The two steps above shall be the minimum condition to upgrade THA and unplanned settlement to the statutory housing area. It would take time to implement this process. Then land management of THA and unplanned settlement shall be transferred to the Department of Lands from LCC in the future.

3.5 Economic and Social Development

3.5.1 Economic Development

The MGDS triggered the upward trend of the Malawian economy. The country's economy achieved a real GDP growth rate of 8.2% in 2006 and 7.9% in 2007. Economic growth in Malawi was dominated by agriculture accounting for nearly threequarters of the economic growth rate until 2003. However, the agricultural sector's contribution to economic growth fell down to a half in 2006 and one-third in 2007. Instead, growth has been structurally different with increasingly important contributions from distribution, finance, construction and manufacturing. It implicates the increasing importance of urban economies in the major cities, namely, Blantyre and Lilongwe, since economic activities in the secondary and tertiary sectors are concentrated in them. This sub-chapter focuses on development issues observed in Lilongwe City.

(1) Formal and Informal Sectors

The size of urban economy in Lilongwe appears to be not large enough to absorb formal sector employment. Many of the urban economically active population in Lilongwe are presumed to work for the informal sector. Needless to say, Lilongwe has a mission of expanding formal sector employment since this could be consistent with the goals of the MGDS and the Vision of GoM.

Due to no official data on formal sector in terms of registered establishments and their employment, the current figures on formal sector are estimated based on establishments registered at the Malawi Revenue Authority (MRA), investment companies registered at the Malawi Investment Promotion Agency (MIPA) and commercial establishments registered at LCC. As a result, establishments are assumed to be 14 (commercial farms) in agriculture, 80 in manufacturing, 3 in mining, and 520 in services.

Economically active population in 2008 is estimated to be 262,000 consisting of formal sector (100,000), informal sector (110,000) and unemployed (52,000). Formal sector roughly shares about 38% of economically active population. It implicates that Lilongwe further needs investment to expand the formal sector economy in the secondary and tertiary sectors.

(2) Industrialization

GoM does not appear to have a clear industrialization policy except Export Processing Zone (EPZ) which is dated back to the EPZ Act in 1995. As a whole, the manufacturing sector in Malawi is inward-looking, i.e., producing domestic market-oriented goods. This could be explained by trade deficit with the neighboring countries, particularly South Africa. Firms in Blantyre export finished goods such as apparel, paper, chemical products, and rubber and plastic products; however, consumer goods in Malawi are almost dependent on imported ones from South Africa. Intermediate inputs are also mainly imported from South Africa.

According to investment data by sector from the MIPA, Lilongwe cumulatively received investment (foreign and domestic) of about US\$ 69 million from 77 companies in the manufacturing area since 1993. Manufacturing investment in Lilongwe is directed to consumer goods such as agro-processing, processed foods (e.g., biscuits, dairy

products), shoes, plastic products, spare parts of automobiles, wood processing, textile and garments.

Country Economic Memorandum (Volume II: Background Papers) published by the World Bank discusses prospects for manufacturing and concludes that as Lilongwe is located in the heart of agricultural belt, tobacco and other cash crops, firms are more linked to domestic market and are adding value to agro-production. This might be appropriate based on geographical location of Lilongwe and investment trend but needs to be reviewed in light of the strategies below:

- a) Diversification of consumer products towards the rising middle-income group
- b) To extend end of supply chain to regional markets for some competitive products

Strategy-a) primarily aims at strengthening existing middle-sized manufactures by diversifying consumer products for the middle income consumer group. It would contribute to restriction of consumers' dependence on imported goods. Strategy-b) primarily aims at expansion of resource-based products to the neighboring countries. Processed food products shall be promising in Strategy-b). Nevertheless Strategy-b) should be carefully made in terms of competitiveness, transportation cost, and SADC regional market.

(3) Transport from Lilongwe to Regional Market

Malawi is better off than other landlocked countries since it is served by four transport corridors to the sea. They are i) the Beira corridor, ii) the Nacala corridor, iii) Durban, and iv) Dar-es-Salaam. Nacala appears to be the best port for Lilongwe in light of the distance from the capital city to the port as shown in Table 3.5.1.

Tab	le 5.5.1 Distance Dy	Koau from the M	and Centres to the	FOUL FOLLS
	Beira	Nacala	Durban	Dar-es-Salaam
Lilongwe	1,194	1,085(994)	2,687	1,667
Blantvre	846	959(798)	2.323	2.031

Table 3.5.1 Distance by	Road from the Main	Centres to the Four Ports
-------------------------	---------------------------	---------------------------

Remarks: Railway distance (in km) in parenthesis

n

B

Source: Country Economic Memorandum (CEM), Volume II: Connecting Malawi to Markets to Compete, the World Bank

The CEM explains that Malawian traders choose their preferred route depending on the trade-off between cost and time reliability. Nacala is apparently the low cost route because of the shortest distance between Nacala and Lilongwe. However, its reliability is low due to i) being a feeder port where cargos are transshipped from the hub port (Durban), ii) port delays caused by inefficient port handling and customs, iii) poor conditions of the Nacala corridor, i.e., railway to reach the Malawian border and road between Nampula province (Mozambique) and Malawian border. Nacala is therefore suitable for non-time sensitive products such as sugar for export and fertilizer for import.

If low reliability of Nacala is improved, a deep water port (draft up to 14 meters) would accommodate larger vessels including container ships handling time sensitive products such as consumer products. Currently, traders choose Durban for non-traditional exports such as African Growth and Opportunity Act (AGOA) garments and Beira for import goods. Nevertheless, Nacala is geographically advantageous to Lilongwe for export to

regional market and import of goods. Industrialization in Lilongwe would depend on the improvement of the reliability of Nacala.

3.5.2 Social Development

(1) Education

In terms of literacy rate, almost 90% of people above 15 are literate in Lilongwe. Although this figure is much higher than the national average, the literacy rate of women is slightly lower compared to other major cities in Malawi as shown in Table 3.5.2.

	Male	Female	Total	
Malawi	80	60	70	
Malawi Urban	96	89	93	
Malawi Rural	77	56	66	
Lilongwe City	95	86	90	
Blantyre City	97	92	95	
Zomba Municipality	96	87	91	
Mzuzu City	96	94	95	

 Table 3.5.2 Proportion of Literate Persons Aged 15 and Above (2007)

Source: Integrated Household Survey 2004-2005

The school system in Malawi has an 8-4-4 system which consists of primary school, secondary school and college/university. Eight years of primary school education starting at age six is compulsory. The schools are run by various organizations including government, religious organizations, private sector and individuals. In case of Lilongwe, almost 80% of pupils go to public schools, both in primary and secondary levels. There are 93 primary schools, 43 secondary schools and 17 colleges and universities in Lilongwe, as shown in following Table 3.5.3:

Table 3.5.3 Number of Primary, Secondary Schools and Universities and Colleges in Lilongwe (2008)

U		
	Public	Private
Primary School	55	38
Secondary School	28	15
University/College	5	12
0 I'I O' D	1	(DI I

Source: Lilongwe City Development Strategy Phase I

Primary enrolment rate in Malawi is generally high, partly due to the introduction of free primary education in September 1994. Net enrolment rate of primary schools in Lilongwe is 89 % for both boys and girls as shown in Table 3.5.4. Access to primary school is good in Lilongwe. More than two thirds of pupils have the nearest primary school in less than 30 minutes' distance, as shown in Table 3.5.5.

 Table 3.5.4 Primary School Net and Gross Enrolment Rate (2007)

	Net I	Net Enrolment Rate			Gross Enrolment Rate		
	Male	Female	Total	Male	Female	Total	
Malawi	74	77	75	105	102	104	
Malawi Urban	88	88	88	114	110	112	
Lilongwe City	89	89	89	112	109	110	

Source: Welfare Monitoring Survey 2007

lable 3.5.5 Percentage Distri	ibution of Households by Time Taken in Minutes to
Get to the	e Nearest Primary School (2007)
	(minutos)

					(minutes)
	0-14	15-29	30-44	45-59	60+
Malawi	23	27	25	13	12
Malawi Urban	39	29	24	4	4
Lilongwe City	36	31	22	3	8

Source: Welfare Monitoring Survey 2007

There was no available data regarding dropout and repetition rate in Lilongwe. However, national or urban dropout rate in primary level is relatively low. Table 3.5.6 shows that drop-out rate is one percent and repetition rate is slightly over 10% in urban areas in Malawi.

As for dropped out pupils, a survey in 2005 revealed the reasons for giving up education. The most common reason was no longer interested (32%), followed by no money for fees/uniform (28.3%), had to work at home or other (22.1%), and married/become pregnant (11%), among others.

						· · · ·
	Drop Out Rate			Repetition Rate		
	Male	Female	Total	Male	Female	Total
Malawi	2	2	2	20	19	20
Malawi Urban	1	1	1	11	10	11
C 11/1 M 1/1	a	2007				

Table 3.5.6 Primary School Drop Out and Repetition Rate (2007)

Source: Welfare Monitoring Survey 2007

Although enrolment and dropout rate shows rather positive situation of education, the increasing number of pupils since 1994 is exacerbating the quality of education. There is not enough number of school facility and infrastructure to accommodate pupils, and the number of teachers is not sufficient. Quality indicators on Table 3.5.7 implies overcrowded primary schools, with insufficient number of teachers, facilities and infrastructure. In view of the future population growth in the City, it would be necessary to increase the number of schools and teachers in order to secure the quality of education.

Table 3.5.7 Primary School Quality Indicators, Lilongwe District (2007)

	2007	Government Norm
Pupul/ Teacher Ratio	47:1	40:1
Pupil/ Desk Ratio	19:1	2:1
Pupil/ Classroom Ratio	130:1	60:1
Pupil/ Latrine Ratio	103:1	10:1 for girls, 25:1 for boys
Teacher/ House Ratio	18:1	1:1
Female/ Male Teacher Ratio	8:1	1:1
G D' () (DI 000	0/00 0010/1	1

Source: District Education Plan, 2008/09- 2010/11

Net enrolment rate for secondary schools is approximately 50% in Lilongwe as shown in Table 3.5.8. This rate is significantly higher compared to the national average. Dropout and repetition rates for Lilongwe were not available, however, average dropout and repetition rates of urban areas in Malawi were 4 % and 9 %, respectively as shown in Table 3.5.9.

	Net Enrolment Rate			Gross Enrolment Rate		
	Male	Female	Total	Male	Female	Total
Malawi	17	18	18	36	34	35
Malawi Urban	54	53	54	122	109	115
Lilongwe City	51	47	49	110	94	102

Table 3.5.8 Secondary	School Net and	Gross Enrolment Rate	(2007)
Tuble 5.5.0 Decondully	Demoti 1 tet anu	Oross Lin onnent Rate	

Source: Welfare Monitoring Survey 2007

Table 3.5.9 Sec	ondarv Schoo	ol Dropout and	Repetition	Rate (2007)

	Drop Out Rate			Rep	petition R	ate
	Male	Female	Total	Male	Female	Total
Malawi	5	6	6	13	13	13
Malawi Urban	4	4	4	12	7	9
3 XX 10 X '	· .	2007				

Source: Welfare Monitoring Survey 2007

In terms of quality of education, although infrastructure and facilities are not enough to accommodate the current number of students, a sufficient number of qualified teachers is allocated as shown in Table 3.5.10. It would be necessary, however, to increase the number of both facilities and teachers in order to correspond to the increasing number of population and future increase of enrolment rate.

Table 3.5.10 Secondary School Quality Indicators, Lilongwe District (2007)

	2007	Government Norm			
Pupil/ Qualified Teacher Ratio	28:1	40:1			
Pupil/ Desk Ratio	4:1	1:1			
Pupil/ Classroom Ratio	61:1	40:1			
Source: District Education Plan 2008/00, 2010/11					

Source: District Education Plan, 2008/09- 2010/11

(2) Health

Life expectancy at birth in Malawi is 48 in 2007. It is lower than the average life expectancy in Sub-Saharan Africa as shown in the following Table 3.5.11:

Country	Life Expectancy
Sub-saharan Africa	51
Malawi	48
Mozambique	42
South Africa	50
Tanzania	52
Zambia	42

 Table 3.5.11 Life Expectancy at Birth (2007)

Source: World Development Indicators Database, April 2009

This short life expectancy is largely due to the spread of infectious diseases such as HIV/AIDS and tuberculosis, as well as malaria and lower respiratory infections as shown in Table 3.5.12. Poor sanitary conditions and malnutrition are among the main factors which exacerbate health conditions, especially of young children.

1		0 / \			
Courses	Estimated Nu	Estimated Number of Death			
Causes	(thousand)	(%)			
All causes	227.1	100.0			
HIV/AIDS	65.3	28.7			
Lower respiratory infections	29.0	12.8			
Diarrhoeal diseases	20.7	9.1			
Malaria	15.7	6.9			
Cerebrovascular disease	6.4	2.8			
Tuberculosis	6.2	2.7			
Ischaemic heart disease	5.3	2.3			
Prematurity and low birth weight	4.6	2.0			
Neonatal infections and other conditions	4.4	1.9			
Protein-energy malnutrition	3.7	1.6			
	c				

 Table 3.5.12 Top Ten Causes of Death in Malawi (All Ages) (2004)

Source: WHO Health Statistics and Health Information Systems

Main healthcare providers in Malawi include hospitals and clinic, health centres, mobile clinic, traditional healers and pharmacies. Hospitals and clinics are run by various entities including government, City Council, religious organizations and private individuals as shown in Table 3.5.13.

 Table 3.5.13 Number of Health Facilities in Lilongwe by Ownership (2009)

	Number of
	Health Facilities
Ministry of Health	7
Private	13
Lilongwe City Assembly	18
	a 51

Source: Lilongwe City Development Strategy, Phase I

Another problem besides the lack of doctors is the accessibility to health facilities. More than a third of residents in Lilongwe have to travel for one hour or even more to get to the nearest hospital or clinic as shown in Table 3.5.14.

Table 3.5.14 Percentage Distribution of Households by Time Taken in Minutes to
Get to the Nearest Health Clinic/Hospital (2007)

					(minutes)
	0-14	15-29	30-44	45-59	60+
Malawi	5	9	14	15	57
Malawi Urban	12	18	27	18	26
Lilongwe City	6	17	27	16	34
G 1111C 14	· · · a	200	-		

Source: Welfare Monitoring Survey 2007

Although there is not much Lilongwe-specific health statistics, in order to improve the quality of life and health services in the City, measures to reduce infectious diseases and to improve sanitation would have to be implemented.

In terms of HIV/AIDS infection, UNAIDS/WHO Working Group estimates that the HIV prevalence rate among adults aged 15 to 49 years old in Malawi is 11.9 % in 2007 as shown in Table 3.5.15. Prevalence rate has declined compared to that of 2001. However, it has to be noted that urban area shows higher prevalence rate in Malawi, as the following Figure 3.5.1 shows.

Table 5.5.15 III (AID) Kelated Hule		
	2001	2007
Estimated Number of People living with HIV (Adults & Children)	850000	930000
Estimated Adult (15-49) HIV Prevalence Rate	13.3%	11.9%
Estimated Number of Death Due to AIDS (Adults & Children)	60000	68000
Source: Report on Global AIDS Epidemic UNAIDS 2008		



oal AIDS Ep



Source: Report on Global AIDS Epidemic, UNAIDS, 2008 Figure 3.5.1 Rate of Pregnant Women Tested Positive for HIV in Urban and Outside Urban Areas in Malawi (1992-2005)

With regard to access to safe water and sanitation, statistics shows that 99% of households in Lilongwe have access to safe water¹ and 83% to proper sanitation² as shown in Table 3.5.16. Although these figures are much higher than the national average, it has to be noted that there are outbreaks of cholera in Lilongwe, especially during the rainy season, due to water contamination. In some high density areas and unplanned settlement, access to safe water and proper sanitation still remain as critical issues and causing serious health problems.

	(2007)		
	Access to Safe Water (%)	Access to Proper Sanitation (%)	
M alawi	81	47	
Urban	98	79	
Rural	79	43	
Lilongwe City	99	83	
Blanty re City	97	73	
Zomba Municipality	99	79	
M zuzu City	99	87	

Table 3.5.16 Proportion of Households	with Access t	to Safe	Water and	Proper	Sanitation
	(2007)				

Source: Welfare Monitoring Report, 2007

(3) Unplanned Settlement – Consideration for the Urban Poor

Social migration into the city causes many problems as time goes by. Unplanned settlement is one of the unavoidable issues to be tackled in city planning. Social development issues relating to the living environment in unplanned settlements are low level of household income, poor housing and poor community infrastructure. This section focuses on the improvement of the living environment of the poor in unplanned

¹Welfare Monitoring Report defines 'safe' water sources as boreholes (or communal standpipes), protected wells, and tap water (piped into dwelling unit or compound).

 $^{^{2}}$ Welfare Monitoring Report defines 'proper' sanitation as use of toilet facilities that are flush to sewer, ventilated improved pit latrine or covered pit latrine.

settlement areas.

a) Living conditions in Unplanned Settlements

The area of unplanned settlements accounts for 3,700 km² or occupies 9.4% of total land of the city. Lots of residents in unplanned settlement areas dwell on grass thatched houses where the sanitary conditions are terribly bad without proper pit latrines. There is no water supply system inside unplanned settlements so that people transport water from the near-by traditional housing area where water is supplied by Kiosks. Income of residents is entirely dependent on temporary employment as labourers or vendors selling various goods prevailing at local markets inside unplanned settlement areas. According to an interview survey conducted in Chinsapo, one woman earns around MWK 5,000 per month, which is not big enough to sustain her family. Accordingly, she borrowed MWK 10,000 from the Machenga Fund under the Centre for Community Organization and Development (CCODE). She plans to repay loans by use of the proceeds from sale of maize that is harvested in her tiny garden.

b) Good Practice on Improving Living Environments of Informal Settlers

In order to improve financial and living environments of unplanned settlers, some NGOs have taken development activities. Among them, the Centre for Community Organisation and Development (CCODE), established in 2003, is a well known local NGO in Malawi. As a partner of City Alliance, the CCODE is one of the members contributing to a City Development Strategy (CDS) in the areas of shelter and community development. The CCODE implements its activities in 27 out of 28 districts in Malawi, working in alliance with the Malawi Homeless People's Federation established in 2003, which is a grassroots networking NGO, mainly focusing on implementing micro-finance projects.

b-1) Micro Credit

The CCODE and the Federation work together to address issues of i) land tenure, ii) affordable housing, iii) water and sanitation access, iv) health and HIV/AIDS, and v) livelihoods. They also established Mchenga Fund, which is a micro-credit revolving loan fund used for housing, sanitary facilities, home improvement, and small-scale business projects. The CCODE deals with the financial matters of the fund, and provides members of the Federation with technical expertise, training, and capacity building. The Federation manages each project.

The outline of the Mchenga Fund is shown in Table 3.5.17.

Objective	To provide group loans to empower the members of the Federation				
International	Shack Dwellers International (SDI) and Homeless International provide monetary and				
Partner	technical support.	technical support.			
Management	The CCODE is responsible for financial administration and technical support.				
	The Federation is responsible for project operation.				
Recipient	To be a member of the Federation.				
-	To form a group with $10 - 20$ members.				
Fee	Each member pays MWK 20 monthly. (not refundable and not deposit for a loan)				
Loan scheme	Interest Rate	Repayment Year	Max Loan Size (MWK)		
	Housing loan:	Q voors	70,000 - 140,000		
	1% / month, 12% / year	8 years			
	Housing improvement:2 years2% / month, 24% / year2 years		20,000		
	Sanitation loan:	2 years	25,000		
	2% / month, 24% / year 2 years		23,000		
	Business loans:	6 months	10,000		
	2% / month, 24% / year	0 monuis			
	Pipe water installment loan:		20.000		
	2% / month, 24% / year	2 years 20,000			

Table 3.5.17	Outline	of the	Mchenga	Fund
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Source: The Mchenga Urban Poor Fund (CCODE)

Apart from the above, international partners of the Fund consist of United Nations organisations, bilateral donors and NGOs, such as United Nations Development Programme (UNDP), German Development Service (DED), Norwegian Church Aid, etc. The Malawi Savings Banks is the financial institution managing the Fund.

The members contribute MWK 20 monthly and some partner organisations also sponsor the fund. However, the Fund is still not large enough to meet the demand of the members.

Donor	Amount (MWK)	Duration	Purpose
SELAVIP*	22,400,000	2003-2006	Housing loans
SDI	31,500,000	2005-2008	Sanitation and housing loans
Water for People	1,400,000	2003-2008	Sanitation loans
Homeless International	82,175,000	2003-2011	Business, sanitation and housing loans
Canada Fund	1,780,000	2007	Sanitation loans
Total	139,255,000		

 Table 3.5.18 Investment in Mchenga Fund

Source: The Mchenga Urban Poor Fund (CCODE)

* SELAVIP: Latin America, African and Asian Social Housing Service

The Fund has so far contributed to building of 768 new homes and 100 new sanitation facilities, and improvement of 200 homes. Also, 20 members have received small-scale business loans in all districts.

Furthermore, a pipe water instalment project has started in Area 49 in November 2009. Eight members have joined the project and they have paid MWK 20,000 to the Water Board for installation.

The repayment rate is quite high, averaging 85% (except that of housing construction scheme). This high repayment rate is due to the introduction of group loan system. Unlike individual loan system, once a member of the group fails to repay, the rest of the members have to repay on behalf of the defaulting member. If a group fails to repay, all the groups in the district cannot apply for another loan.

b-2) Housing Scheme

The CCODE provides members of the Federation with two types of housing schemes, namely, housing construction and housing improvement. These schemes enable the CCODE to tackle the issues of inadequate shelter for the poor.

The process of the scheme is as follows. The CCODE offers land to the LCC, and the LCC approves the offer after confirming effectiveness of the project. The CCODE pays development fees to the LCC. The fee is MWK 11,333 per plot, which is to be included in the members' loan. After construction, the members pay ground rent fee (MWK 250) twice a year to the LCC. Through the scheme, 193 houses have been constructed in Area 49 in Lilongwe until December 2009.

Regarding the housing loan, the repayment rate is 50%, rather lower than that of other schemes by CCODE. The low repayment rate is due to the members' perception that housing and land should be given to them, not at their cost, but at the donors'.

This section then covers the following two cases of the housing schemes. In the first case, one member received the housing loan and the other case shows a member who attended carpentry training.



One member of the Federation applied for housing construction. There are six members in her family, her husband, three children, and her sister. It costs MWK 81,500 to construct a house with two bedrooms, one living room, one kitchen, ecosan toilet - sanitary improved toilet, garden, and solar system. The house size is 49 km² (7 m x 7 m) in a property of 180 km² (12 m x 15 m). Her husband works at borehole construction getting paid MWK 20,000 monthly, and her family managed to pay all the loans in three years, while the repayment period is set at eight years as mentioned in Table 3.6.1 above.



A member who attended carpentry skill training in Mutandele, THA near Area 49

She attended free carpentry training provided by the CCODE, and is now making toilet doors with her peer members. The members can make one door per day, with a sale price of MWK 700 while the material of door frame costs MWK 450. Her husband earns MWK 5,000 monthly as a truck driver, and the couple has to raise five children, three of them going to governmental school. The couple settled here 15 years ago and paid MWK 10,000 to the traditional chief to buy a house, which is equivalent to MWK 50,000 – 70,000 at the present currency value. They do not have to pay house rent fee but they have to manage daily life mainly depending on the husband's MWK 5,000 monthly salary.



The CCODE is planning to implement two-storey housing construction to avoid highly dense population in Mcheshi area in Area 8. The LCC already approved the plans but this project has not been implemented because the plot size proposed by the LCC was different from that as planned at the time of implementation. Based on talks as of December 2009, the project is expected to be implemented in early 2010.
CHAPTER 4

DEVELOPMENT VISION AND STRATEGY OF LILONGWE CITY

CHAPTER 4 DEVELOPMENT VISION AND STRATEGY OF LILONGWE CITY

4.1 Development Vision

4.1.1 Mission of Lilongwe City¹

Malawi is a long, narrow country situated in the Rift Valley and bordered by Tanzania, Mozambique and Zambia. Lilongwe, located in the central region of Malawi, was established as a trading centre in 1906 and became the capital city with a purpose-built new town in 1975. Lilongwe is now equal to Blantyre in terms of population size. The focus of the development in Malawi appears to have moved from Blantyre to Lilongwe.

Unlike the old city of Blantyre, the new capital city is expected to play a new role in the region (Southern African Development Community or SADC) in the new era. The geographical advantage of Malawi being located at the centre of eastern Africa and the regional integration among SADC states, would trigger off to make Lilongwe play a new role in diplomacy, cultural exchange and international conferences. The change of trade pattern caused by the SADC Free Trade Area (FTA) would make Lilongwe become the gateway to its neighbouring countries.

Domestically, Lilongwe is expected to be the model of Malawi Vision 2020 as it will be environmentally sustainable, self-reliant with equal opportunities for active participation by all, and a technologically-driven middle-income economy. Lilongwe could also become a model of the Malawi Growth and Development Strategy (MGDS) for the five fiscal years from 2006/07 to 2010/11 that primarily aims at a balanced path between economic and social development. Taking account of the development trend of the city and its likely status in the national context, the mission of Lilongwe is predicted to be:



Figure 4.1.1 Missions of Lilongwe City

¹ Development vision of Lilongwe was shared and acknowledged in the second Steering Committee meeting.

(1) Status as a Primary City

Lilongwe is expected to have the mission to develop as a primary city in order to attract new business, international tourists and various international conferences. This mission meets the Malawi Vision 2020 stating that Malawi could belong to a middle-income economy. Image/status of Lilongwe should be upgraded as not a mere capital city but a modern/regional city attracting the attention of its neighbouring countries.

(2) Capital City with Environment, Economic, Social Harmonization

The city of Blantyre, founded in 1896 and developed in the 20th century, is a typical business and commercial city. On the other hand, Lilongwe, which could continuously progress in the 21st century, needs to become a new type of modern capital city, harmonizing environmental, economic and social development. Lilongwe is not a prime city where the economy and urban population is concentrated as observed elsewhere in Africa. In this sense, environmentally sustainable and balanced development embodied as the concepts in the Malawi Vision 2020 and MGDS could be adaptable to Lilongwe with less constraint.

(3) Gateway to Neighboring Countries

Zero tariff and reduction of the most favoured nation embodied by the SADC trade regime would change the external trade pattern between Malawi and other countries, even among the SADC states. Increase of trade exchange linking Zambia with Mozambique would make Lilongwe become a strategically important passing point. The Nacala Corridor development could bring about transportation-related businesses to Lilongwe. Accordingly, Lilongwe would play the role as a gateway to neighbouring countries in the east-west direction.

4.1.2 Development Direction of Lilongwe City

As shown in the figure below, the long-term development direction of Lilongwe to fulfil its missions would be towards a new type of modern and thriving capital that can not be observed in other landlocked countries. The characteristics of a new type of modern and thriving city are as follows:



Figure 4.1.2 Development Direction of Lilongwe City

(1) Well-planned and environmentally friendly urban development

Well-planned and environment-friendly urban development should be realized by introducing land use control, gradual conversion of unplanned settlement to another land use, and greenery policy for land use plan.

(2) Multi-disciplinary purpose-built town

Economic agglomeration is not the prime purpose of Lilongwe City. Rather, Lilongwe is expected to play a lead role in diplomacy, cultural exchange, business transactions and international conferences. In this sense, Lilongwe can be different from Blantyre.

(3) Industrial base

Lilongwe could be suitable for the promotion of the industrial sector. There would be opportunities on import substitution or export-led industries such as the high premium agro-industry. Such industries could make the best use of the new economic corridor, i.e., Nacala Corridor.

(4) Logistics base

Demand for transportation-related services, i.e. logistics, would be expected in the middle- and long-term perspective, when Lilongwe as a passing point in the Nacala Corridor, becomes the gateway to its neighbouring countries. The city would need an area for logistics services. Such new business could boost the economy of Lilongwe so that urban transportation and road development becomes the prerequisite for investment promotion of these industries/services.

4.1.3 Urban Development Strategy

Because of the present low density land use in the Old Town and City Centre areas, urban concentration in these areas will continue. Urban concentration will positively benefit from the efficient usage of urban infrastructure and realization of low cost and effective urban development. However, in case population of the city increases more than 2-3 million after 2030, adverse effects on traffic congestion, for instance, will be serious as this may cause irreversible damage to urban activities. Planned distribution of a new city centre as the satellite development should be discussed for the city development strategy at that time.

In order to increase formal sector employment, business and commercial, manufacturing and logistics sectors should be enhanced. Expansion of existing industrial land use in Kanengo area and new developments of the logistics/distribution industry along Nacala Corridor are to be developed.

To realize diversified urban functions in Lilongwe City as the national capital, high quality commercial and business zones should be developed through the utilization of vacant lands in the City Centre area, and land reuse of urban factory plots if the relocation to the suburbs is done. Furthermore, an international tourism base should be established near the international airport.

Poor living environment in THA and unplanned settlements should be improved to attain the appropriate urban environment development. Further encroachment of unplanned settlements should be controlled by strict land use control and building construction permit. Enhancement of building control through the upgrading of LCC's control capacity and the preceding urban infrastructure development are necessary to guide the planned urban settlement.

For the realization of eco-friendly urban development, which balances the natural environment preservation and urban development, the existing greenery resources such as nature reserves and waterfront greens in the centre area should be continuously preserved, although urban concentration in the Old Town and City Centre area is accelerated.

Lack of appropriate technology in urban planning, land development control, building construction permit, monitoring and sanction is one of the reasons for the land use confusion in Lilongwe. Capacity of implementation of urban infrastructure and utilities development and maintenance/operation is also limited in the LCC. Capacity enhancement for institutional and organizational rearrangement is a prerequisite for planned land use and urban development.

Development and improvement of insufficient infrastructure and utilities should be accelerated to support the living environment improvement and economic expansion.

The urban development strategy mentioned above is rearranged with the connection of the development vision targeting 2030 and analysis results of development issues as shown in Figure 4.1.3. Strategies that will contribute to the envisioned achievement are conceptually explained in Table 4.1.1.



Source: JICA Study Team

Figure 4.1.3 Strategy to Contribute to Vision Realization

Table 4.1.1 Matrix Showing the Relationship between Development Vision and
Development Strategy

Development Vision Development strategy	To have the status as primary city in Lilongwe	To be the capital city with environment, economic and social harmonization	To become the international gateway to neighboring countries
Efficient land use in both commercial/business land use and residential land use to absorb increasing population and economic activity	O	0	0
Appropriate expansion of industrial area	0	0	0
Diversified urban functions	O	O	0
Preservation and utilization of abundant greenery to create green network & buffer green	0	O	0
Improvement of living condition in THA/ unplanned settlement prevention of further encroachment of unplanned settlement	0	O	0
Improvement of transportation infrastructure and urban utility	0	0	0
Strengthening urban management capacity	0	0	0

Note \bigcirc : Direct contribution, \bigcirc : Indirect contribution Sour

Source: JICA Study Team

4.2 Development Framework

In 2000, the government launched the Malawi Vision 2020. This policy framework sets out a long-term development perspective for Malawi. The Vision Malawi 2020 states that the country will be secure, democratically mature, environmentally sustainable, self-reliant with equal opportunities for active participation by all, and a technologically driven middle-income economy. The MGDS started as a five-year development strategy from 2006/7 to 2010/11 fiscal years. It emphasizes key priority areas such as i) agriculture and food security, ii) irrigation and water development, iii) transportation infrastructure development, iv) energy generation and supply, v) integrated rural development, and vi) prevention and management of nutrition orders and HIV/AIDS.

Based on the national development context such as the Millennium Development Goals (MDGs) and the MGDS, the LCC launched the City Development Strategy (CDS) providing long-term vision and goals, and implementation plan consisting of i) governance, ii) shelter and land, iii) infrastructure and environment, iv) community development, and v) economic development. The preparation of CDS is divided into three phases: preparatory step (Phase I), completion of the CDS (Phase II) and implementation (Phase III). The CDS completed Phase II was completed an launched on 12 February 2010.

To accomplish the vision of Lilongwe discussed in the preceding section, the time frame of Lilongwe's development is divided into three stages, namely, 1st stage (present to 2015), 2nd stage (2016-2020) and 3rd stage (2021-2030). This section deals with the development framework up to the year 2030 where the basic indicators such as population and macro-economy are predicted.

4.2.1 Population

(1) Urban Population Trend

Urban population in Malawi has been dominated by Blantyre and Lilongwe. Urbanization of Blantyre and Lilongwe is measured by the ratio of urban population in both cities to the country's population which was 9.47 % in 1998 and 9.76 % in 2008. It implies that urbanization of both cities would not increase progressively in the future. It is noted that Lilongwe is now almost equal to Blantyre in size of urban population. It implies that Lilongwe would develop as the city with the largest population from 2008 onwards. The following figure shows urban population trend of Malawi's four major cities between 1966 and 2008.



Figure 4.2.1 Urban Population Trend

The following tables show historical change of urban population of the four major cities between 1967 and 2008, and the average annual growth rates between the census years.

				F
	Lilongwe	Blantyre	Zomba	Mzuzu
1966	19,425	109,461	19,666	8,490
1977	98,718	219,011	24,234	16,108
1987	223,318	333,120	43,250	44,217
1998	440,471	502,053	65,915	86,980
2008	674,448	661,256	88,314	133,968
Source: I	Dopulation Car	NCO		

Table 4.2.1 Historical Change of Urban Population in 4 Cities

Source: Population Census, NSO

Table 4.2.2 Annual Average Growth Rate of Population of 4 Cities

	66-77	77-87	87-98	98-08	
Lilongwe	15.9%	8.5%	6.4%	4.3%	
Blantyre	6.5%	4.3%	3.8%	2.8%	
Zomba	1.9%	6.0%	3.9%	2.9%	
Mzuzu	6.0%	10.6%	6.3%	4.0%	
Source: Population Census					



Source: Population Census

Figure 4.2.2 Annual Average Growth Rate of Population of 4 Cities

In the long span from 1966 to 2008, the average annual growth rates of urban population in the four major cities show a decreasing trend, which was mainly ascribed to the decreasing growth rate of the country's population. It implies that urban population of Lilongwe would increase with a decreasing annual average growth rate in the future.

Based on the past urban population trend, key approaches to urban population projection of Lilongwe are i) the likely urbanization of the capital city and ii) the likely annual average growth rate of the capital's population in relation to the country's projected population.

(2) Scenario 1

According to World Urbanization Prospects: The 2001 Revision published by United Nations (UN), Population Division, urbanization of a few African countries including Malawi is shown in the table below:

Table 4.2.5	Orbanizatio	n menu or	All Call Cit	IUC
Country	1950	2000	2030	
Uganda	3.1	14.2	29.5	
Malawi	3.5	14.7	30.1	
Ethiopia	4.6	15.5	31.0	

Table 4.2.3 Urbanization	Frend of A	frican Cities
--------------------------	-------------------	---------------

Remarks: The figure shows percentage of urban population out of national population in 1950, 2000 and 2030.

Source: World Urbanization Prospects, UN Population Division



Source: World Urbanization Prospects, UN Population Division

Table 4.2.3 Urbanization Trend of African Cities

Most countries in Africa are known as areas with low population living in urban areas. Uganda, Malawi and Ethiopia maintain a rural character longer than countries with larger population. The three countries had very low level of urbanization and exhibited a large degree of homogeneity. The UN projected urbanization rate of around 30% in the year 2030 for these countries. The median of urbanization for overall African countries projected by UN was 36.4 in 2000 and 56.4 in 2030. Accordingly Malawi is categorized as the lower quartile of urbanization.

Scenario 1 is shown based on the UN urbanization and national population projection.

Table 4.2.4 Linding	ic si op	ulation	i i oječite		
	2000	2008	2015	2020	2030
National population (,000)		13,630	17,998	20,537	25,897
Urbanization in Malawi (%)	14.7	18.8	22.4	25.0	30.1
Lilongwe population (,000)		674	1,043	1,334	2,019
Lilongwe urbanization (%)		4.9	5.8	6.5	7.8
Source: IICA Study Team			-	-	-

Table 4.2.4 Lilongwe's Population Projection for Scenario 1



Source: JICA Study Team

Figure 4.2.4 Lilongwe's Population Projection for Scenario 1

Lilongwe urbanization is expected to increase in proportionately to urbanization in Malawi projected by UN. Lilongwe's population is estimated by national population and Lilongwe's urbanization. Lilongwe's population would grow by an annual average growth rate of 5.14% between 2008 (the census year) and 2030. It is expected to have a population of 2 million in 2030. Nevertheless, this growth rate appears to be much higher than the annual average growth rate (4.3%) between 1998 and 2008. Scenario 1 is interpreted as a high growth model.

(3) Scenario 2

Scenario 2 is based on the implication that urbanization rate of Lilongwe would be less than that predicted in Scenario 1. It will be likely that the decreasing trend of annual average growth rate of Lilongwe's population until 2008 shown in Table 4.2.2 and Figure 4.2.5 will continue further in future. It is assumed that the annual average growth rate of Lilongwe's population will change proportionately to the decreasing trend of national population growth rate.

Table 4.2.5 Lilongwe's Population Projection for Scenario 2

	1998		2008		2015		2020		2030
National population (,000)	9,993		13,630		17,998		20,537		25,897
AAGR of national population		3.15		4.05		2.67		2.32	
(%)									
Capital population (,000)	440		674		972		1,160		1,580
AAGR of Capital population		4.27		5.49		3.61		3.14	
(%)									

Remarks: AAGR means annual average growth rate. Source: JICA Study Team



Figure 4.2.5 Lilongwe's Population Projection for Scenario 2

Lilongwe's population would grow at an annual average rate of 5.49% between 2008 and 2015, 3.61% between 2015 and 2020, and 3.14% between 2020 and 2030. It would have a population of 1.58 million in 2030. Its urbanization is estimated to be 6.1% in 2030.

(4) Population Framework

The Study creates two scenarios for Lilongwe's population projection. The difference of population projections between the two scenarios would be 0.174 million in 2020 and 0.439 million in 2030. Scenario 1 is projected in a way that the City primacy rate (share of Lilongwe in total urban population) would continuously be the same in the future as

its present rate of 26 %. With a slight increase of the primacy rate, Lilongwe's population would be more than that projected in Scenario 1. In this sense, Scenario 1 and the higher projection with an increase of its primacy rate would be the likely urbanization of areas encompassing the Greater Lilongwe, including Lilongwe City.

On the other hand, Scenario 2 involves the more likely projection of the City's population and urbanization. Urbanization of the City would modestly increase from 4.9% in 2008 to 6.1% in 2030. Although its primacy rate is expected to decrease from 26% in 2008 to 20% in 2030, the difference of such rates would be absorbed into the suburban area.

The Study proposes Scenario 2 as the likely population framework of Lilongwe.

						0	
		Populati	ion (,000))	I	Increase (,000)
	2008	2015	2020	2030	2008-2015	2015-2020	2020-2030
Lilongwe	674	972	1,160	1,580	298	188	420
Source: JICA Study Team							

Table 4.2.6 Population Framework of Lilongwe City

4.2.2 Macro- Economy

(1) GDP shared by Lilongwe City

Due to the limited data on regional GDP, data on revenues gained from VAT by Lilongwe was used to estimate the approximate GDP shared by the City. GDP shared by Lilongwe was estimated based on the latest national account (GDP in 2005) and VAT shared by Lilongwe by economic sector.

Lilongwe's GDP in 2005 was roughly estimated to be about MK 65,250 million in real terms, which was approximately 20% of the national GDP in 2005 (MK 326,246 million) before tax on production and customs duties.

(2) Prospect for Economic Growth in the National Context

According to the MGDS, Annual Review 2008 (An assessment of annual achievements for the 2007/2008 government financial year), the country achieved a growth rate of 8.2 percent in 2006, 7.9 percent in 2007 and 7.4 percent (estimated) in 2008. The per capita GDP at 2005 constant prices increased from MK 26,400 in 2005 to MK 30,000 in 2008. MK 30,000 at 2005 constant prices is almost equivalent to USD 260 at current prices based on GDP deflator and the average exchange rate (Kwacha against USD) of 2008. The World Bank also estimated the per capita gross national income of Malawi as USD 290 in 2008. Malawi is placed at the lower quartile of low income countries (USD 975 or less).

The agricultural sector is currently the important sector, employing about 80% of the labour force, contributing to more than 80% of foreign exchange earnings through export. Agricultural export products are primary commodities such as tobacco, sugar, maize and live animals. Nevertheless, the agricultural sector-led economic growth which primarily depends on the production of low value-added commodities would be limited to a long time development term.

The Malawi Vision 2020 proposed an ambitious goal which is to make the country to reach the middle-income status. Annual average economic growth rate required between

2008 and 2030, to achieve a per capita GDP of MK 123,000 (equivalent to USD 1,000 in 2005, the minimum threshold of the lower middle income country category) at 2005 constant prices, is estimated to be 9.8 percent. Moreover, the country's GDP in 2030 would be nearly eight times the GDP in 2008 at 2005 constant prices. This could force the country to make tremendous efforts towards the achievement of high economic growth. The likely growth path of the country's economy in the time framework is assumed to be:

- a) 1st stage (2008-2015): 6.0 percent
- b) 2nd stage (2016-2020): 7.0 percent
- c) 3rd stage (2021-2030): 6.5 percent

The economic growth scenario in the 1st stage would be achievable based on the latest performance of GDP growth during 2006-2008. Since the country would enter into a Free Trade Area of SADC in the 2nd stage, it will need diversification of economy based on investment-led economic growth on manufacturing and transportation services. The 3rd stage will be in the post agriculture era and needs a steady economic development towards the middle income economy. The above growth path would achieve the GDP in 2030, which is nearly four times that in 2008 at 2005 constant price. Annual average economic growth rate between 2008 and 2030 is estimated to be 6.5 percent.

(3) Economic Framework of the Lilongwe City

Per capita GDP of Lilongwe in 2005 is estimated to be MK 97,500 (equivalent to USD 790), which is 3.75 times of the national average. Lilongwe was placed at the upper quartile of the low income category (USD 975 or less) in 2005. To accomplish a technologically-driven middle-income economy stated in the Vision 2020. Lilongwe is expected to play the vital role in non-traditional fields such as manufacturing, transportation services, R&D for energy conservation, IT, and financial market. Such path of development could raise Lilongwe to the status of a regional city, which could further stimulate other business opportunities such as tourism and international conference. Tourism and international conference can establish value chain by linking to hotel, transportation, printing, catering and other services.

Annual average economic growth rate required between 2005 and 2030 to achieve a per capita GDP of MK 195,000 (equivalent to USD 1,720, double of per capita GDP of Lilongwe in 2005) at 2005 constant prices is estimated to be 6.4 percent. Moreover, its GDP in 2030 would be 4.7 times of that in 2005. The income level of USD 1,720 as a per capita GDP is categorized as the lower quartile of middle income. The economic growth rate of about 6.5 percent per annum between 2005 and 2030 in Lilongwe appears to be possible as the country's economy is also expected to grow at the same rate. In other words, provided that Lilongwe's economy grows up in the context of national economic growth, the City would attain the status of lower middle income economy. The growth path of Lilongwe economy is assumed to be the same as the national economic growth. Lilongwe GDP in the projected time frame is estimated in Table 4.2.7 and Figure 4.2.6. Lilongwe GDP in 2030 will be almost five times as large as that in 2005.



Table 4.2.7 Estimation of Lilongwe GDP at 2005 Constant Price

Figure 4.2.6 Estimation of Lilongwe GDP at 2005 Constant Price

4.2.3 Industrial and Commercial Establishments

Economic survey in Malawi is poor and fragmented if based on the sampling survey only since the inaccuracy of the current data could have a risk of distorting projection of economic entities and employment in the future. Thus, the current number of industrial and commercial establishments was collected from the Malawi Investment Promotion Agency (MIPA), the LCC and the Malawi Revenue Authority (MRA). The current number of industrial and commercial establishments in the City is estimated in Table 4.2.8.

Sector	MIPA	LCC
Agriculture	14	
Manufacturing	77	
Mining	3	
Services	52	436
Tourism	20	
Total	166	436

 Table 4.2.8 Estimated Number of Establishments by Sector (2008)

Source: Establishments registered at MIPA and LCC

Establishments registered at MIPA covers the cumulative number of foreign and domestic investors in the City since 1993 when MIPA was established. Establishments in agriculture include commercial business companies for agro-processing and cattle breeding. Those registered at the LCC covers offices, retailers/wholesalers, transportation, tourism companies which pay property taxes. About 600 establishments are certified as those paying corporate and property taxes. This is verified by the gross data on corporate tax payers collected from the MRA, with slight discrepancy is observed.

Table 4.2.9 shows the projection of manufacturing industries during the time frame of the

Study. Those establishments are assumed to increase in proportion to the growth rate of Lilongwe, estimated in 4.2.2.

Table 4.2.9 Projection of Manufacturing Establishments					
	2008	2015	2020	2030	
Number of Establishment	80	144	200	376	

Source: JICA Study Team

Table 4.2.10 shows the projection of commercial establishments during the time frame of the Study. Commercial establishments cover those of retailers/wholesalers, offices, warehouses, transportation/tourism companies and small businesses. Population per commercial establishment as of 2008 is estimated to be about 1,300. In the future, those figures are assumed to decrease to 1,000 in 2015, 900 in 2020, and 700 in 2030. Population is divided by the population per establishment in order to estimate the number of commercial establishments in the future.

Table 4	Tuble 4.2.10 I rejection of Commercial Establishments							
	2008	2015	2020	2030				
Population	674,000	972,000	1,160,000	1,580,000				
Population per	1,320	1,000	900	700				
establishment								
Number of	520	970	1,290	2,260				
establishments								
0 110101	-							

 Table 4.2.10 Projection of Commercial Establishments

Source: JICA Study Team

4.2.4 Employment

(1) Formal sector employment

There are no official data on formal sector employment figures and hence those figures have to be estimated based on companies/institutions registered at the MRA at first.

Establishments registered at the MRA are those under formal sector mainly because they pay corporate income tax. Employees working for these establishments are categorized as formal sector employment. Such employees paying personal income tax (earning a monthly income of more than MK10,000) are reported to be about 20,000. The number of employees who does not pay personal income tax is assumed to be 40,000, according to the explanation of the MRA officials. Formal employment in the private sector is then roughly estimated to be 60,000.

Government functions are concentrated in Lilongwe City. The number of government officials, including central and local government (the Council), is roughly estimated to be 40,000. Formal employment in both private and public sectors, therefore, is about 100,000 at present.

Primary sector	Secondary sector	Tertiary sector	Total
Agriculture: 3,200 Manufacture:		Government:	100,000
	18,300	40,000	
	Mining: 200	Tourism: 2,900	
		Others: 35,600	

 Table 4.2.11 Estimation of Formal Sector Employment (2008)

Source: MRA, MIPA, and JICA Study Team

Table 4.2.11 shows the breakdown of formal sector employment estimated based on

employment data of MIPA and personal income of tax payers of MRA.

(2) Employment Framework

This section deals with the employment framework of the Study area, encompassing i) formal sector employment, ii) informal sector employment and iii) unemployment. The definition of informal sector is not clear, however, establishments in this sector would be defined as those that do not pay corporate income taxes and employees in this sector are those who do not pay personal income taxes and do not receive social benefits.

Economically active population corresponds to the sum of employees consisting of formal sector, informal sector and the unemployed. Table 4.2.12 shows projection of economically active population in time frame of the Study.

	2008	2015	2020	2030	Remarks
1) Population	674,000	972,000	1,160,000	1,580,000	
2) Labor force rate	56.5%	60.5%	60.3%	65.0%	
Labor force	381,000	589,000	700,000	1,027,000	1)x 2)
4) Economically	262,500	393,660	487,200	711,000	3)x 0.75
5) Formal sector	100,000	157,800	201,900	332,900	
Agriculture	3,200	5,800	8,000	15,100	
Manufacturing	18,300	33,000	45,800	86,100	
Government	40,000	45,000	50,000	60,000	
Commercial	38,500	74,000	98,100	171,700	
6) Unemployment	52,500	74,800	73,100	71,100	
7) Informal sector	110,000	161,060	212,200	307,000	

 Table 4.2.12 Employment Framework

Source: JICA Study Team



Figure 4.2.7 Employment Framework

Economically active population in the year of 2030 would increase to 0.711 million or which will be about 2.7 times of the current figure (2008). Expansion of formal sector employment shall be a key issue in strengthening the economic foundation of the City. Formal employment sector in 2030 is estimated to be about three times of the current figure (100,000) estimated. Nevertheless informal sector will share a sizable part of economically active population, which is about 40 % of the economically active population even in 2030.

4.2.5. Social Framework

The following table shows population of the City by five (5) years age group in 2008 2015, 2020 and 2030. Population projection of the City in 2015 onwards is based on Scenario 2. Distribution of population by age group in 2015 onwards is estimated based on the prevailing birth and death rate²s in the census year of 2008.

Population between 5 and 14 years old was about 167,000 in 2008 and would increase to 196,000 in 2015, 264,000 in 2020 and 325,000 in 2030. Population of age groups (5-14) is expected to be almost double during 2008-2030. In Lilongwe, about 80 % of pupils in primary schools go to public school. The City Council as the authority of public primary school in the City is advised to make an education investment plan on building of primary schools and their curriculum.

	2008			2015			2020		2030			
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
0-4	109,808	54,375	55,433	150,160	72,520	77,640	167,130	80,850	86,280	166,600	79,940	86,660
5-9	90,232	43,948	46,284	118,410	58,590	59,820	151,290	73,020	78,270	172,760	83,470	89,290
10-14	76,966	36,723	40,243	97,510	47,420	50,090	119,490	59,060	60,430	173,310	83,650	89,660
15-19	66,705	32,383	34,322	86,680	41,390	45,290	99,240	48,290	50,950	160,850	77,720	83,130
20-24	84,146	39,656	44,490	94,160	45,890	48,270	92,940	44,500	48,440	147,220	73,170	74,050
25-29	83,745	44,178	39,567	117,440	55,730	61,710	100,160	49,050	51,110	120,300	59,120	61,180
30-34	57,162	32,752	24,410	114,320	61,070	53,250	122,860	58,880	63,980	108,840	53,190	55,650
35-39	36,124	21,408	14,716	76,910	44,230	32,680	118,480	63,470	55,010	114,900	56,630	58,270
40-44	22,122	12,329	9,793	47,430	28,040	19,390	78,390	45,000	33,390	136,210	64,970	71,240
45-49	15,372	8,505	6,867	29,180	16,150	13,030	48,480	28,530	19,950	132,200	70,030	62,170
50-54	10,581	5,790	4,791	13,710	7,470	6,240	26,930	14,750	12,180	66,200	37,200	29,000
55-59	8,056	4,539	3,517	9,450	5,140	4,310	12,660	6,870	5,790	41,040	23,960	17,080
60-64	4,822	2,621	2,201	6,910	3,850	3,060	8,480	4,580	3,900	21,430	11,530	9,900
65-69	3,338	1,810	1,528	4,000	2,130	1,870	6,050	3,330	2,720	9,550	5,020	4,530
70-74	1,945	979	966	2,400	1,240	1,160	3,200	1,650	1,550	5,090	2,520	2,570
75+	3,324	1,535	1,789	3,330	1,490	1,840	4,220	1,930	2,290	3,500	1,480	2,020
Total	674,448	343,531	330,917	972,000	492,350	479,650	1,160,000	583,760	576,240	1,580,000	783,600	796,400

Table 4.2.13 Population by Five Years Age Group during 2008/2030

Source: 2008-Population & Housing Census, 2015, 2020, 2030-JST estimates

As shown in Table 4.2.12, the formal sector economy will be able to absorb about 47 % of the economically active population in the year of 2030. With increasing number of labour force between 15 and 64 aged shown in Table 4.2.13, a great number of youth and the middle aged with low education and qualification will be forced to work for informal employment sector. The self-employed constitutes of the majority of informal employment. They need to undergo vocational training to uplift their skills. There would also need opportunity in Lilongwe for apprenticeship posts after graduating from vocational schools. Both vocational schools and apprenticeship will be increasingly significant for both youth and the middle aged in the future.

Zambia has a history of technical and vocational education and training (TVET) for almost 15years and TVET there is organized into three major parts: i) the Ministry of Science, Technology and Vocational Training for policy making, ii) the Technical Education, Vocational and Entrepreneurship Training Authority for regulation, and iii) registered private training institutions for training offer. Training in TVET in Zambia has been offered at the following fields:

² Crude birth rate: the number of births that occurred in a particular year per 1,000 population (35.0) Crude death rate: the number of deaths that occurred in a particular year per 1,000 population (9.0)

- a) Trade test
- b) Craft
- c) Technician
- d) Diploma certificate

Trade test means basic training to do trade (export/import) business. Craft covers basic skills required for carpentry, furniture and metal works. Private demand for technicians has been growing by both foreign and domestic direct investment.

Malawi, on the other hand, is still at the infant stage, needing institutionalization of TVET. As Zambia did before, entrepreneurship and informal sector training will be the acute task to augment informal sector employment. A craft field would be recommendable since lots of people earn their living by sale of simple craft works. Within a timeframe of this master plan, TVET will be increasingly highlighted here in Malawi, particularly in the capital city. Sustainable expansion of both informal and formal sector employment could depend on the GoM's policy for TVET.

4.3 Economic and Urban Spatial Development

4.3.1 Economic Development

Malawi would need a decade or more to strengthen its MGDS' key priority areas such as agriculture, irrigation/water development, road transport infrastructure, and HIV/AIDS prevention in association with health improvement. The country will also have to tackle challenges on economic diversification structure in order to primarily increase value added in the secondary and tertiary sectors. Urban economy formed by agglomerations of the secondary and tertiary sectors has a mission to take off from subsistence towards a more diversified economy. Lilongwe, with its attributes, is endowed with the country's hub, land resource, and proximity requirements (markets, suppliers, supporting industries and government) to its neighbouring countries. The following table shows the SWOT analysis for Lilongwe.

Strengths	Opportunities			
1. Ample labour force	1. SADC as Free Trade Area			
2. Land resource for the secondary sector	2. Nacala Corridor development			
3.Lesser development cost than the capital cities in its	3. Industrialization supported by middle income			
neighbouring countries due to low primacy rate of urban	consumer group			
population				
Weaknesses	Threats			
1. Lack of information	1. Sprawling unplanned settlements			
2. Absence of urban economic policy	2. Expected competition from neighboring countries			
3. Challenge for creation of formal sector employment	3. Dependence on donors for infrastructure and social			
	development			

 Table 4.3.1 SWOT Analysis for Lilongwe

Source: JICA Study Team

Strengths and Opportunities

Lilongwe enjoys a flow of working age male population into the capital city. As shown in Table 2.1.4, the sex ratios of population aged 18 and over in Lilongwe is about 111.85, which is significantly higher than that (91.62) of the national average. It implies that Lilongwe is endowed with ample labour force. The industrial land planned under the 1986 zoning scheme was 2,050 ha while the present land use for industrial activities turns out to be 457 ha only. Kanengo Industrial Zone has been appointed as a major industrial location under the 1986 zoning scheme but the Zone has not been expanded as planned. It implies that Lilongwe is still expected to accommodate new industrial factories. In surrounding countries, city primacy measured by the proportion of the urban population living in capital cities is very high. For instance, the city primacy rate of Lusaka and Harare was around 40% in the year 2000. Meanwhile Lilongwe's city primacy rate is 5% in 2008. In addition to that, it currently has two reserved areas, namely, the Lilongwe Nature Sanctuary and National Herbarium and Botanic Gardens. Moreover, existing rivers and streams are classified as protected areas. It implies that Lilongwe has development potential to become a compact and environmentally friendly capital city, suitable for the profile of the country's capital in the 21st century. This is attributed to its small size urban population and flexibility of land use for economic activities in the future, as Lilongwe would require less development cost than the capital cities in its neighbouring countries.

SADC currently enjoys high economic growth and the emergence of SADC FTA could increase trades among its member countries. Lilongwe is strategically located as a passing point of the Nacala Corridor between Mozambique and Zambia. SADE FTA and

the Nacala Corridor could make Lilongwe a trade centre and bring about transportation-related businesses to Lilongwe. Malawi as viewed by foreign direct investment (FDI) appears to be at the end of the supply chain so far. The emergence of the SADC FTA could make FDIs change their policy in relation with the reduction of transportation cost attributed to the Nacala Corridor. Some FDIs would then view Lilongwe as an intermediate base to neighbouring countries. Lilongwe could have the potential of plunging into international business, with private sector development as the key issue. The rising middle income consumer group gives rise to growing urban consumption of imported food products, vehicles and sanitary products. This could trigger off strengthening of the existing middle-sized manufacturers by diversifying consumer products for the middle income population.

Weaknesses and Threats

Lilongwe is still subordinate to Zomba and Blantyre in terms of information control. Most of the economic information/data such as business establishments and employment are managed by Blantyre and Zomba. This could give rise to higher transaction cost borne by investors who require a complicated registration procedure. Lack of correct economic data could hamper the LCC's formulation of the economic development planning for the city. Accordingly, the City Development Strategy prepared by the LCC seems ambiguous with regards to its economic plan.

In the future, Lilongwe would face fierce competition with its neighbouring countries such as Zambia, in the areas of FDI promotion and trade policy. This is primarily because both countries are similar in terms of geographical feature (landlocked) and foreign economic policy. The LCC, in cooperation with the Malawi government, would need to research on the economic policies of the neighbouring countries and should launch its own economic policy. The future creation of a formal employment sector in Lilongwe could depend on the initiative of the LCC, supported by the central government. Establishment of a sound policy shall be followed by financing from donors and international financial institutions.

The SWOT analysis would guide the needed stage-wise economic development of Lilongwe. Figure 4.3.1 below shows the proposed strategies to achieve economic development in Lilongwe.



Figure 4.3.1 Strategies for Lilongwe Economic Development

First Phase (Present to 2015)

The first phase will be the crucial period for the strengthening of capacity of the LCC and creation of an urban economic structure that comprises legally registered or formal economic sectors. The LCC, as the implementer of various projects/programs, shall be responsible for planning, implementation and monitoring. Tremendous efforts will be required for the LCC to carry out such projects/programs. Nevertheless, proper management of these would result in the institutional capacity strengthening of the LCC.

Two approaches can be taken into account in order to expand the formal economic sector. One is investment promotion of FDI/DDI for commercial and manufacturing development. The LCC's department responsible for economic and town planning should coordinate with other stakeholders administering investment promotion and industry/commerce development. The other approach is to motivate the creation of legally registered, self-employed businesses, which could require training on basic skills and financial programs for small and medium enterprises (SMEs). The LCC should pay attention to fostering such local SMEs, which would contribute to increasing the LCC's revenue collection through various local duties/taxes. Formal sector development will need associated measures such as improvement of tax policies (i.e. expansion of corporate tax base, efficient collection system of property tax) and simplified company registration system so as to shift from informal to formal entities and land policy relating to land use regulation. Lilongwe could kick off urban infrastructure development in the areas of main roads and urban utilities (water supply, sewerage and solid waste collection).

Second Phase (2016 to 2020)

The second stage is regarded as the intermediate path to Lilongwe in becoming a multi-purpose built town and regional city. SADC is scheduled to form a uniform trade

regime, which is the SADC Customs Union, by 2010 and the SADC FTA by 2015. Lilongwe as a gateway to the SADC market will have to be promoted to a regional city status where both FDI and DDI are established. It would accelerate most of the large and middle-scale industries, and business establishments would consequently shift their headquarter functions to Lilongwe by 2015 onwards. The status as a regional city could require redevelopment of part of the unplanned settlements into business and commercial areas. In addition, more efficient urban transportation services should be provided for commuting purposes.

Third Phase (2021 to 2030)

The third stage is interpreted as the lead stage towards middle-income economy. Development of the business core centre and logistics/service area is vital in further upgrading the status of Lilongwe at this stage.

Industrialization

Malawi exports tobacco, cotton, and textiles to the EU and the USA under preferential schemes. It thus enjoys modest trade surplus with industrial countries. At the regional level, Malawi is a member of COMESA and SADC. However, it has massive trade deficits with its regional trade partners, such as South Africa in particular. It suggests that the major challenge for Malawi is how to improve its trading performance with neighbouring countries. Malawi needs to broaden its variety of export products and facilitate import substitution on consumer products.

Industrialization would be initiated through strategies presented as follows:



Figure 4.3.2 Industrialization for Lilongwe Economic Development

Strategy-A aims at initiating export of processed food products, made from domestic

resources, to regional markets. The target products are milk (long life), processed meat (beef and poultry), cooking oil, and potato crisps. Most of these products are currently imported from South Africa.

Strategy-B aims at strengthening the existing middle-sized manufacturers by diversifying consumer products for the middle income consumer group in order to restrict their dependence on imported products. The target products are frozen vegetables, jams, biscuits, margarine, detergents and sanitary products (non-food products). Many manufacturers in Lusaka City and Zambia started product diversification of non-food products.

Both strategies A and B need promotion of FDI/DDI that would view Lilongwe as not the end of supply chain but as the intermediate base to neighbouring countries.

Strategy-C aims at strengthening of Malawian trucking industry. Large Malawian trucking industry operating in cross-border enjoys the relatively lower fuel cost supplied from South Africa. The Nacala Corridor's development would allow domestic trucking industry to enter into the Mozambican market, making it less difficult for them to share part of cargo delivery business along said corridor.

The Malawi Investment Promotion Agency (MIPA) has been the only stakeholder implementing facilitation of both FDI and DDI. Investments promoted to Lilongwe so far include agribusiness, construction, textile, tourism and others. The major bottleneck is the lack of policy support from the GoM that has no clear-cut industrialization policy except for the export processing zones enacted in 1995. Zambia already launched a comprehensive promotion of investments, export and small businesses by creating the Zambian Development Agency (ZDA) in 2006. Since the industrial and trade structure is identical between Malawi and Zambia, such a comprehensive promotion carried out by the ZDA shall be a good example to be followed by Malawi. The LCC must bear the responsibility of investment promotion and industrialization in the capital city, in cooperation with the GoM and MIPA.

4.3.2 Urban Spatial Development

Based on the results of the current land use study, the present urban structure of Lilongwe is shown in Figure 4.3.2. Actual urbanization has not resulted in an even and independent growth of the four sectoral areas: i) Lumbadzi, ii) Kanengo; iii) Capital Hill, and iv) Old Town. On the contrary, the city's growth has been concentrated in two big economic centres (the Old Town and the City Centre).



Source: JICA Study Team



The basic condition of residential location is determined by its distance from the economic centres, particularly from the Old Town. The time for commuting to the economic centres on foot or by minibus is regarded as a very important factor for the people. Since they want to dwell close to the economic centres, the actual urban structure formed is a unified organic shape in which most residential areas are closely linked to the economic centres. Reflecting such factors, the current urban expansion axis is now extending to the south, southeast, southwest, and to the west. The urban expansion movement is not extending much in the northern direction. Meanwhile, as the State House is located in the eastern side, the urban expansion axis is not extending to the East.



Figure 4.3.4 Current Trend of Urban Expansion Axis

With reference to the general type of urban development structure, a one-pole urban structure is a very typical shape. Physically, almost all small and medium scale cities have one-pole, radial-shaped development. Growing cities naturally tend to have this sort of shape. The one-pole development pattern is not necessarily wrong as long as the city does not develop into a mega city class with two to three million population. The concentration of all important functions of economy, culture and society into one centre is a natural phenomenon of urban economic activities, since one centre concentration is essentially efficient in terms of urban economy. When the city's population expands up to such a mega city class, the urban development pattern will need to be restructured into multi-nuclear structure of one centre and plural sub-centres.

Lilongwe is new in terms of urban history and has been emerging as a new city. The city is not naturally developed. The planning was done using urban planning theory. According to the 1986 Outline Zoning Scheme, one-concentration is an unfavourable issue. Self-sufficiency within each sector was adopted as one of the key planning principles. Accordingly, the four-sector dispersal urban structure was pre-set up at the outset. On the contrary, the actual growth of Lilongwe has been taking place considering the natural urban concentration phenomena, since it accords urban economic efficiency. As a result, the current urban structure appears to be more like a one-centre concentration pattern, focusing on the two economic poles of the Old Town and City Centre.

With reference to the future urban structure for Lilongwe City, the JICA Study Team has envisioned three alternatives as follows:

Alternative 1: Linear Shape Development Alternative 2: Radial Shape Development Alternative 3: Cluster Shape Development

(1) Alternative 1

Since the jurisdiction area shape of Lilongwe City is along the North-South axis, one of the alternatives for the future urban structure will be linear shape development. This pattern would need development of a mass transit mode axis (railway line/ major roads).

The following figure is a schematic image of the future urban structure if the linear shape development pattern is applied to Lilongwe City.



Source: JICA Study Team

Figure 4.3.5 Alternative 1 - Future Urban Structure: Linear Shape Development

Construction of a long-distance mass transit transport is essential to the feasibility of this urban development pattern. However, it seems difficult to construct and operate mass transit facilities in scarcely populated areas. Moreover, many commuters in the city do not take minibuses and prefer to walk to their workplace to save money. Thus, for the time being, it will not be feasible to construct such mode of transport for commuters in the City. In this context, this linear shape development may not be necessarily suitable as the future urban development structure for Lilongwe.

(2) Alternative 2

The radial urban structure is observed in many big cities in the world. This alternative structure can be applied on condition that Lilongwe City is to be developed in pursuit of large-scale urban economic development.

The following figure is the schematic image of the future urban structure if the radial shape development pattern is applied to Lilongwe City.



Source: Prepared by JICA Study Team

Figure 4.3.6 Alternative 2 - Future Urban Structure: Radial Shape Development

The merit of Alternative 2 is its less development cost compared to the other alternatives. The demerit is that it causes the decrease of the city's greenery and nature. City expansion will extend in any direction, and urban conurbation will spread throughout the area indiscriminately.

(3) Alternative 3

To mitigate the disadvantage of greenery and natural environment damage in the radial shape pattern, the cluster shape development pattern shown in Figure 4.3.7 is recommendable for the future Lilongwe City.



Figure 4.3.7 Alternative 3 - Future Urban Structure: Cluster Shape Development

In recent years, the cluster shape development is popular among urban planners in the world because it is a suitable pattern for delineation of area on the selective development purpose and prevention of endless and indiscriminate extension of urban conurbation.

Table 4.3.2 shows an assessment table presenting the comparison among the future urban structure pattern alternatives. Alternative 4 is added as a zero option (no positive action) from the viewpoint of Strategic Environmental Assessment (SEA).

	Item	Alternative 1: Linear Shape Development	Alternative 2: Radial Shape Development	Alternative 3: Cluster Shape Development	Alternative 4: Zero Option	
Char Nece	acteristics/ essary Conditions	 Suitable for suburban development Mass transit transport axis must be constructed 	 Most mega cities usually have this urban structure Natural extension shape 	 Suitable for environmental preservation by avoiding zones with valuable nature Favorable pattern in recent years 	 No revision of land use plan No project for urban development 	
itive Impact	Economic Impacts	Public investment for the development of railway transport infrastructure will generate economic benefits.	Economic activities will be strengthened through the merit of a one-pole concentration of urban and economic functions.	It will be easy to make spatial characterization by urban clusters. Economic development strategy can be applied by cluster.	No investment will be required.	
Pos	Social Impacts	Low density living environment is secured.	Social fairness is secured since all the directions are developed evenly.	Social activity and inter-linkages within the community will be more active and dense	Resettlement and other negative social impact will not occur due to urban development projects.	

 Table 4.3.2 Comparison of the Future Urban Structure Pattern Alternatives

	Item	Alternative 1: Linear Shape Development	Alternative 2: Radial Shape Development	Alternative 3: Cluster Shape Development	Alternative 4: Zero Option
	Environmental Impacts Emission of CO ₂ is reduced due to the decrease in number of minibus and private cars.		Densification in the central area will be increased more easily.	It will be easier to preserve greenery/nature between clusters.	Negative environmental impact will not occur due to the urban development projects.
	Economic Impacts	A vast amount of investment for railway construction is required.	Traffic congestion will cause economic inefficiency	It will be more costly to construct infrastructure in view of avoiding destruction of greenery.	Urban sprawl and traffic congestion will bring adverse impacts on economic activities.
Adverse Impact	Social Impacts	It will be quite difficult to set a reasonable fare price in view of cost recovery. Hence, it has adverse impacts to the urban poor.	The disparity between the commercial centres and the suburban areas will be widened	It will be more difficult to create social integration within the City.	Traffic congestion will occur and informal settlements will increase.
	Environmental Impacts	Urban expansion will tend to extinguish forestry and agriculture along the line, irrespective of nature endowments.	It will lead to a risk where greenery will disappear within the built-up areas.	None	Urban sprawl will cause adverse impacts on environment. Traffic congestion will increase CO ₂ emission
Total Evaluation		In less developed countries, constructing the linear transport axis will be extremely difficult in terms of attaining financial viability.	It will result to indiscriminate urban developments in all directions, causing damage to nature/ greenery.	It will make it possible to achieve not only the necessary urban development but also greenery preservation in consideration of natural endowments	Zero option or no positive action will result in adverse impacts on social and natural environment.
Necessary Countermeasure		Spinal public transport is almost not feasible.	Some modification of this type by resembling Alternative 3 will be a possible option, keeping the merit of Alternative 2.	Demerits will not come out by elaborating physical planning design.	Urban development and land use shall be managed properly.
Recommendation It is recommended to adopt Alternative 3 as the main solution. In view of econom and urban size, it would be efficient and reasonable to concentrate efforts on developments mostly in the central area					of economic efficiency efforts on commercial

Source: JICA Study Team

Alternative 3 will make it possible to achieve not only the necessary urban development but also greenery preservation in consideration of natural endowments. Based on the above, it is concluded that Alternative 3 will be the most appropriate development for the future urban structure of Lilongwe City.

CHAPTER 5

LAND USE PLAN OF LILONGWE CITY

CHAPTER 5 LAND USE PLAN OF LILONGWE CITY

5.1 **Population and Employment Target Framework**

(1) Population Framework

Two scenarios of population projection in Lilongwe City was presented in the preceding chapter (Chapter 4: Development Framework) where Scenario 2 is proposed as the likely population increase and urbanization of the City. In accordance with said scenario, the population of Lilongwe City shall increase as follows:

	p and the set			
Year	2008	2015	2020	2030
Population of Lilongwe City	674,448	972,000	1,160,000	1,580,000
Source: JICA Study Team				

Table 5.1.1 Population Framework of Lilongwe

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(2) Employment Framework

The target employment for the Year 2030 is based on the employment framework as shown in chapter 4. It is projected based on the labor force and economically active population of the City. Employment in the City is comprised of the formal and the informal sectors. The formal employment sector is classified into four: 1) manufacturing; 2) commercial; 3) government; and 4) agriculture/mining, as shown in Table 5.1.2.

Year		2008	2015	2020	2030	
Break-down E		Agri+Mining	3,200	5,800	8,100	15,100
	Formal Employment	Manufacturing	18,300	33,000	45,800	86,100
		Commercial	38,500	74,000	98,100	171,700
		Government	40,000	45,000	50,000	60,000
		Sub-Total	100,000	157,800	202,000	332,900
Informal Employment		al Employment	110,000	161,100	212,200	307,000
	Total		210,000	318,900	414,200	639,900

Table 5.1.2 Employment Framework of Lilongwe

Source: JICA Study Team







5.2 Work Flow of Land Use Plan



Figure 5.2.1 Work Flow of Land Use Planning

Note: Consensus Building among Stakeholders

Since the beginning of this study (June 2009), this urban development master study has been undergoing, putting priority on consensus building and capacity development. The three working groups (Group 1: Land Use, Group 2: Transport, Group 3: Water/Sewerage) were established from the beginning and intensive discussions have been held among stakeholders and the JICA Study Team. The Land Use Working Group held discussion meetings 15 times from June 2009 to March 2010. Various urban planning and development issues have been raised and intensively discussed in the course of study progress. In particular, four Steering Committee Meetings as well as three seminars have been held at each important event of consensus building. The JICA Study Team has intended to provoke frank and straight-forward discussions, particularly in relation to the development vision, planning concept, future urban structure, and land use planning principles. As a result of these discussions, consensus building has been made.

(For further details, please see Section 11.2 of Chapter 11.)

The above figure shows the work flow of land use plan for Lilongwe City and is explained in detail below:

(1) Prior to formulating a comprehensive land use plan, it is important to prepare the current land use map. This current land use map was prepared based on the topographic map of the City including that of surrounding areas prepared by another JICA mission, and the field survey including the GIS database prepared by the JICA Study Team. Urban spatial development was then analyzed based on the current land use map. (Related items: ①)

(2) The social and economic framework of the City provides basic inputs for the land use plan. The projected urban population was further broken down into each planned urban zone and area. The projected formal sector employment was also allocated into each newly planned zoning category. (Related items: 2900)

(3) Economic competition among countries in the world has intensified, which further challenged the country's comparative advantage. Malawi, as well as other SADC countries, is also subject to such challenges. Lilongwe City definitely requires an economic development strategy that is closely linked to urban planning, physical development study. For Lilongwe City, it is essential to formulate appropriate economic development strategies in response to the projected future population growth. Otherwise, Lilongwe will face the risk of being congested by the vast expansion of informal settlements and becoming a city of jobless people. It would be impossible for the City to prevent informal settlements from further spreading out if relying only on physical planning measures. The issue of informal settlements is rooted in urban poverty. Without sound economic development, the issue will not be solved. (Related items : $\Im(\overline{7})$)

(4) Since transport planning is another important aspect of urban planning, it should be well coordinated with land use planning. The future traffic calculation and projection are based on the future spatial distribution scenario of population and employment, which will also formulate the basis of land use planning. At this juncture, urban structure planning and development will be based on both land use planning and transport planning. (Related items: (II)(II))

(5) In accordance with the economic development strategy and sound socio-economic policies, key physical developments such as industrial estates and commercial centres should be planned with due consideration. In this context, the urban development vision and strategies are envisioned in a spatial-wise nature and future development scenario for each area and zone will be accordingly described. In order to attain this objective, area diagnosis and urban profiling by zone are to be conducted. These will suggest insights and implications for future emerging structure and development directions. (Related items : (7)(1)(2)(4))

(6) With reference to the quantitative aspect of land use planning, it is essential to work out a projection of future demand for lands in residential, industrial and commercial zones, before allocating future population and employment in each zone. (Related items: ③)

(7) A land use planning model is prepared for the purpose of integrating all the requirements and overall adjustment as well as examining appropriate density. In general, land use analysis and planning are done by i) unit activity analysis (analyzing by population density, worker density, industrial output ratio, etc.), ii) trend analysis (projecting from past time-series data analysis), iii) decomposition model analysis (decomposing land use in-detail and conversely integrating them), iv) regression model (finding out a certain function with the use of several factors), v) other similar area comparison analysis (using analogy as compared with similar cities), and/or vi) system analysis (using econometrics or system dynamics model). By conducting simulation analysis with variant factors of density, a future appropriate land use situation will be derived. This is why land use planning is also referred to as density planning. Herein, the approaches and methods have been used in the various aspects to conceive

individual planning directions as well as make future projections. Thereafter, in the course of the finalization and comprehensive adjustment of all the planning elements (population by area, employee by area, land area by land use category, etc.) as a whole, density (population density, worker density, etc.) is used for the systematic integration and total adjustment. (Related items: 405689)

5.3 Spatial Distribution of Target Framework in Lilongwe City

- 5.3.1 Principles of Target Population Distribution
 - (1) Guideline for spatial distribution of population

The guideline for spatial distribution of the target framework (population and employment) is based on the urban development strategy shown in Chapter 4 as follows:

- A. Preservation and utilization of abundant greenery within the city
- B. Efficient land use in the city area for increase of urban population
- C. Expansion of industrial and logistics function for economic growth
- D. Improvement of living conditions in THA/unplanned settlements
- E. Diversification of urban functions with qualified business/commercial area

The spatial distribution of the 2030 population is forecast based on the following principles that explicitly explain the basic considerations to achieve the target:

(2) Densification of low density permanent housing area (LDPHA) and medium density permanent housing area (MDPHA)

The current land use of Areas 3, 9, 10, 11 and 12 is regulated as low density residential (LDR). In fact, the population density in these areas is lower than in medium/high density area and much lower than in unplanned/THA settlement areas. For instance, the gross and net population densities in Area 9 are only 5.8 persons/ha (gross density: divided by total area) and 10 persons/ha (net density: divided by current LDR land use area), respectively. On the other hand, the population density in THA, high density permanent housing area (HDPHA) and unplanned settlements is very high. Population increase in Lilongwe City has been taking place mainly with the influx of social migration into THA and unplanned settlements. Population in LDPHA and MDPHA remained unchanged or had decreased in some areas. Currently, the minimum land-plot size regulation in LDPHA is 2,000 m² while actual land-plot size is, in many cases, much bigger than the minimum. In view of land use efficiency and social equality, population densification in LDPHA and MDPHA must take place. Blantyre City already adopted a densification policy so that the minimum land-plot size in low density residential area was already reduced from 2000 m²to 1,000 m². Table 5.3.1 shows net population density and the percentage shared by respective residential zoning category by Area.

	Area No.	Pop density	Unplanned 9	6	Area No.	Pop density	LDR %	
TT	Area 57	135	100%		Area 9	10	57%	
Sattlamant	Area 36	98	94%	LDR A	Area 3	19	100%	
Settlement	Area 38	35	71%		Area 10	10	98%	
	Area 56	173	98%		Area 11	28	100%	
	Area No.	Pop density	Unplanned 9		Area 12	10	100%	
THA+	Area 22	98	49%		Area No.	Pop density	MDR %	
Unplanned	Area 23	106	60%	MDR	Area 47	7	72%	
	Area 24	72	76%		Area 15	17	100%	
	Area No.	Pop density	THA %		Area No.	Pop density	HDR %	
	Area 7	188	92%	HDK	Area 18	53	100%	
THA main	Area 8	157	97%	LDR	: Low Densit	y Residential		
	Area 21	128	85%	MDR : Medium Density Residential				
	Area 25	69	77%	HDR : High Density Residential				
THA · Traditional Housing Area								

Table 5.3.1 Current Population Density in the Residential Areas in Lilongwe City

Pop Density : Persons/ha

Source: JICA Study Team

(3) Allocating night-time population (living population) in the City Centre Area (Areas 13, 16, 19, 31, 40)

The City Centre is an exceptional business centre area in Lilongwe City. It is the only place where high-rise (more than ten-stories) office buildings are located. Many governmental and international organizations set up their offices in the City Centre area. Small commercial service/ retail/ wholesale companies also have their offices/shops in said area considering its proximity to big customer companies or related governmental institutions.

The City Centre area is significantly crowded with not only formal office workers but also informal commercial workers. During daytime, the place is active and crowded. On the contrary, however, there are almost no people in the area during night time, since no residential developments exist in the area that is limited to commercial establishments only. In recent years, however, mixed-use has been more favored in the urban planning society. It has become common globally for resident population to exist in business centres, and that a business centre should not be limited to its commercial functions. In this context, high-rise apartment buildings should also be established within the City Centre. Similar functions such as hotels or lodges are also beneficial and necessary to be located in the city centre area.

(4) Persistent efforts for acceleration of planned and organized residential development

As afore-mentioned, High Density Residential (HDR), THA and unplanned settlements are densely populated. As a whole, the average population density in such areas is approximately 100 persons/ha at present. According to the JICA Study Team's estimate, THA is the most densely populated (120 persons/ha) area, followed by unplanned settlements (92 persons/ha) and HDR (86 persons/ha). Some of the most densely inhabited areas are within the range of 150~200 persons/ha. For instance, the density of

the THA in Area 7 and Area 8 are 188 and 157 persons/ha, respectively. Meanwhile, the density of unplanned settlements in Area 56 is 173 persons/ha and that of Area 18 is 97 persons/ha. It is projected that the population of Lilongwe City will increase to more than double in 2030. If the government fails in promptly providing high density housing for lower income class people, it would definitely lead to a situation where THA's population density would continue to upsurge rapidly, and might exceed more than 300 persons/ha twenty years later. Such an increase of population density will worsen the living environment in THA and unplanned settlements. In order to avoid this unfavorable situation, it is deemed essential to exert strenuous efforts for accelerating development of new subdivisions and housing in the outer area. Such expansion should be targeted for new development of high density residential areas, particularly for lower-medium income class.

According to the JICA Study Team's estimate, it would be necessary to prepare a new subdivision plan in high density residential areas (around 4,700 hectare) having a population of around 350,000, and allocate the subdivided areas to approximately 78,000 lower-medium income class families until 2030. The most plausible and promising sites for such development exist in Areas 25, 38, 47, 49, 50, 53, 58 etc.

(5) Stage-wise upgrading and legitimization of unplanned settlements

The expansion of unplanned settlements is exceptional in Lilongwe City, particularly in Areas 21, 23, 24, 38, 49, 50, 56 and 57. Ironically, unplanned settlements occupy the largest share (about 40 %) of residential land, accounting for about a half of the city's population. In other words, much of the housing provision was given to unplanned settlements in Lilongwe City while those in formal residential areas seem to be very minimal in terms of quantity. Similar situation is observed in capital cities of other developing countries. The majority of people living at the threshold of urban poverty are observed in the southern area of the city. Unplanned settlement shelters with half of the city's population represent the target for a substantial portion of fixed private capital investment. The existence of unplanned settlements is the inevitable reality of the present socio-economy. Taking a look at such current situation, the Lilongwe City Council (LCC) and GoM cannot neglect the existence of unplanned settlements.

In this context, the most important and immediate work to be done will be the improvement and regulation of unplanned settlement areas. This is a common and major challenging concern in developing countries. The LCC and GoM should take a de facto policy of upgrading and legitimizing unplanned settlement.

(6) Monitoring and control to avoid biased concentration of population in THA

In general, THA is the more densely populated area than unplanned settlements. This is because THA is located in an inner area where the infrastructure provision is slightly better than those in unplanned settlements. Most of THA in Lilongwe City are located close to work places. Although the density is substantially high, it has not gone beyond the unmanageable level yet. In consideration of future rapid population increases, due care should be given in the aspect of preventing further influx of population into THA. Otherwise, there would be a risk that the population density of THA will increase to an unmanageable level in the near future.
(7) Necessary effort of increasing multi-story buildings

Currently, most of the houses in Lilongwe City are single storey structures. In general, land-intensive development has been taking place in the past. Taking into account that rapid population growth will continue until 2030, building technology innovation and new lifestyle values should be highlighted in the housing and office building development in the city. In view of the future population increase (more than double of the present population) without environmental deterioration, it is deemed essential to build more multi-storey buildings. In this context, the concept of a compact land use should be borne in mind, i.e., from the horizontal to a more vertical direction development.

(8) Establishing two-centres for more attractiveness and efficiency

Lilongwe is the capital city of Malawi. It is expected to play an important role in terms of leading the national economy and society as well as winning the international competition among regional capital cities. Particularly in the context of securing its comparative advantage from the other capital cities of surrounding countries, attractiveness of the city is deemed essential. City amenities and attractiveness are an important factor to attract foreign direct investment. At this juncture, the city should be attractive, efficient, clean and beautiful. For such purpose, it is essential to make the two areas (Old Town and City Centre) more attractive and efficient. These two areas are noted as the face of the city. In order to achieve sound growth of Lilongwe as well as of Malawi as a whole, urban renewal and redevelopment in the central parts should be firmly undertaken. For instance, the central market and its surrounding areas adjacent to the Lilongwe Bridge are always crowded and far from the beautiful cityscape. It is of great necessity to improve the chaotic traffic congestion as well as to undertake renewal and redevelopment projects in view of creating a neat and attractive cityscape.

(9) Mixed land use promotion in the central area

A mixed land use is one of the key words in recent major urban redevelopment/renewal projects in the world. The functional land use segregation used to be a golden rule, however, too much segregation of land use by function is now thought to be inappropriate for urban activities. A mixed land use can be applied in the City Centre area in the form of redevelopment and renewal projects. Mixed-use of office, shopping, residential functions will bring about good harmony. As afore-mentioned, it is important to introduce residential functions in the City Centre in order to avoid the risk of being an idle zone at night-time. The cliché "a city within the city" expresses the concept of large-scale urban redevelopment projects in the world.

(10) Relocation of industries from the central area to the suburban area

As shown in Figure 3.1.10, many small light industries/workshops are concentrated in the central part of the city, particularly the Old Town. These include wood processing, furniture manufacturing, food processing, durable goods manufacturing and warehouses. In view of amenity and landscape of the Old Town, it will be necessary to relocate these industries from the centre to the suburban area. The area that will be left after relocation of such industries should be utilized for urban renewal. These areas are located mainly in the Old Town Zone. The zone is the centre of the city's economy. The Old Town commercial centre is expected to attract cleaner and more sophisticated functions, since the Old Town is one of the twin largest commercial centres and is required to be developed further. These include financial services such as banking, insurance and

securities; and trading firms and professional services such as law firms and accounting firms. Attractive and efficient commercial centres need to have comfortable and safe urban environment.

(11) Diversification and Upgrading Development of Industries

In Lilongwe City, there exists a zone of industrial compound in Kanengo. Based on the future industrialization in the city, the purpose-built industrial zones should be taken into account. These industrial estates are:

- Small- and medium-scale industrial estates (light industries, market accessoriented), in proximity with the Old Town
- Capital-intensive or large-scale industries, in Kanengo area.
- Airport-oriented high value industries

To ensure viable development of each industrial estate, each one should be better specialized in a certain sub-sector or there should be some kind of grouping characteristics.

(12) Necessity of urban redevelopment in the Old Town

One of the bottlenecks for urban planning of Lilongwe City is the traffic jam around the central market, bus terminal and mini-bus terminal. Particularly, the Lilongwe Bridge is the place subject to the worst traffic gridlock in the city. In order to improve traffic jam as well as to make the marketplace more beautiful, urban renewal and redevelopment projects will be needed. In general, urban redevelopment is time-consuming considering necessary agreements to be arranged. It may take time to build consensus that needs to be obtained among concerned parties.

(13) Creating parks

Lilongwe City boasts of the existence of a nature sanctuary in the middle of the city. It lies just between the City Centre and Old Town. The nature sanctuary serves as a place for relaxation. However, taking a look at the residential, business centre, industrial and other areas, there are almost no spaces for parks in the built-up area. In view of urban amenity, it seems necessary to create parks in the city. Several different sizes of parks will be necessary: i.e. large size urban parks adjacent to central business districts, and children's playgrounds and pocket parks in residential neighborhoods.

(14) Preservation of greenery for urban growth control as well as for reserving development after 2030

In order to preserve the abundant greenery environment of the city, forestry, agriculture, and natural greenery conservation are essential. It is important to examine future density as well as develop reasonable and necessary locations. Ad-hoc development activities, which are thought to be inappropriate from the viewpoint of distributing the population and economic activity through density planning, should not be implemented. The land use plan of the city must be based on quantitative density analysis and planning. As a result, it will lead to reserving future long-term development rooms after 2030.

5.3.2 Future expansion of the jurisdiction area of Lilongwe City

Lilongwe City is currently composed of Areas 1~57. In addition, Area 58 is scheduled to be under its jurisdiction. The 2008 census has already included Area 58 in Lilongwe City, converting it from the previous Lilongwe District. This case is not limited to Area 58 as Lilongwe City has historically expanded its jurisdiction area. When the Outline Zoning Scheme (OZS) was prepared in 1986, Area 56 and Area 57 were converted from

the district to form part of the city. The actual gazetting of the administrative borderline of Areas 56 and 57 was done thereafter in 1995. This situation is also observed in many big cities in the world. When rapid population increase and expansion of the built-up area take place, many big cities have expanded their jurisdiction areas.

As afore-mentioned in Chapters 3 and 4, housing development and urban sprawl are very active in Lilongwe City and particularly in the southern region. As such, urban expansion axis is now extending mainly to the south, southwest and southeast, and to the west to a limited extent. In fact, urban sprawl is already expanding beyond some of the southern borderlines (Area 36, 38, 46, 56, 57 and 58).

In this context, it will be appropriate to formulate the 2030 land use plan over the slightly larger expanded areas, which includes Area 59, 60, 61 and 62 as shown in the following figure. The current land area (Areas 1-58) is 393 km² (39,300 ha). It will further increase to 474 km² (47,400 ha).

Area 59: to the north from Area 57 and 58 Area 60: to the south from Area 36 and Area 45 Area 61: to the east from Area 38 Area 62: to the west from Area 56



The pink color parts are the areas which will be newly included in the jurisdiction area of Lilongwe City Council in the future. Area 59: 1,431 ha Area 60: 1,662 ha Area 61: 4,552 ha Area 62: 439 ha Source: JICA Study Team



5.3.3 Population Distribution of Target Framework

(1) Population Distribution in Lilongwe City by Urban Zone

The target population of 1.58 million is distributed by the urban zones of Lilongwe City. The urban zones are presented in spatial zones shown in Section 3.1.2 of Chapter 3 (Urban Profile by Spatial Macro Zoning of Lilongwe City). As four areas are additionally included, the urban zones have increased from 393 km² to 474 km².

							Annual
		Population	Population	Population	Population	Increase	Increase
Urban Zone	Area No.	(2008)	(2015)	(2020)	(2030)	Rate (%)	Rate (%)
Airport	52 and 53	21,600	54,737	73,103	110,407	411%	7.7%
Alimaunde/Lumbadzi	54 and 55	20,200	21,644	28,382	39,518	96%	3.1%
Mvunguti	25, 26 and 27	72,752	98,392	116,171	178,135	145%	4.2%
Kanengo	28, 29, 39, 50 and 51	45,867	48,336	53,322	68,760	50%	1.9%
Mariya	49, 56 and 62	62,151	92,996	116,227	147,527	137%	4.0%
Nyama	10, 12, 30 and 43	10,136	33,047	46,210	89,610	784%	10.4%
Chimutu	3, 6, 9, 15, 18, 47 and 48	32,487	66,361	86,401	114,354	252%	5.9%
	11, 13, 14, 16, 17, 19, 20, 31,						
City Centre	32, 33, 34, 40 and 42	5,044	8,365	17,302	30,571	506%	8.5%
Tsabango	35, 41 and 44	33,215	41,035	46,390	58,086	75%	2.6%
Chinsapo	45, 46, 57, 58 and 59	87,075	134,205	159,035	213,238	145%	4.2%
Old Town	1, 2, 4, 5, 7, 8, 21 and 37	129,108	137,472	145,268	158,881	23%	0.9%
Ngwenya	22, 23, 24, 36, 38, 60 and 61	154,813	235,410	272,189	370,913	140%	4.1%
	Total	674,448	972,000	1,160,000	1,580,000	-	-

Table 5.3.2 Population Distribution (2008/2015/ 2020/2030)and Growth Rate by Zone





(2) Population Distribution in Lilongwe City by Area

Breakdown of the target population for 2030 by area is further shown below:

Annual increase Increase rate Area No. 2008 2015 2020 2030 2008-2030 rate (per annum) 13.828 13 968 14 210 Area 1 13.684 104% 0 17% Area 2 3.041 3,072 3.981 4,984 164% 2.27% 7.23% 4,471 8,440 14,353 20,779 465% Area 3 94 1,514 2,528 4,557 4848% 19.29% Area 4 755 1.210 1.535 2.186 290% 4.95% Area 5 Area 6 2,498 3,838 4.797 6.715 269% 4 60% 39,966 41,795 43,153 46,004 115% 0.64% Area 7 26,249 26,850 27,155 27,777 106% 0.26% Area 8 1,866 4,321 7,523 12,138 650% 8.88% Area 9 4.800 6,429 11.532 362% 6.02% Area 10 3,189 Area 11 935 1,119 1,257 1,549 166% 2.32% Area 12 2,311 3,399 4,481 7,777 337% 5.67% 450 2,528 Area 13 0 1,650 1,157 1,590 1,999 3,156 273% 4.67% Area 14 2,210 292% 1.571 5.00% 3,220 4.595 Area 15 Area 16 25 297 492 882 3528% 17.58% 4 1,050 4,900 8,727 218175% 41.83% Area 17 13,942 14,973 15,758 17,453 Area 18 125% 1.03% 100 500 908 Area 19 0 7636% 21.78% 300 600 Area 20 14 1.069 Area 21 44,764 45,638 46,273 47,571 106% 0.28% Area 22 29,458 29,710 29,893 30,263 103% 0.12% Area 23 45,606 45,634 45,655 45,698 100% 0.01% 26,144 Area 24 22,708 28.914 35,366 156% 2.03% Area 25 65.672 81.378 128.857 3.11% 89.583 196% Area 26 4.847 12,400 18,826 35,841 739% 9.52% 2,233 4,614 13,437 602% 8.50% Area 27 7,762 Area 28 48 85 129 297 619% 8.64% 539 790 147% 1.75% Area 29 608 663 2 329 2 5 5 4 2 729 134% Area 30 3 1 1 5 1 33% Area 31 0 538 868 951 346 1,040 2,605 753% 9.61% Area 32 657 Area 33 2,496 1,606 2,542 6,369 255% 4.35% Area 34 46 0 0 0 284% 10 176 12 523 20 711 4 85% Area 35 7 304 Area 36 47.308 48,158 48,663 50,042 106% 0.26% 11,592 2089% 14.81% Area 37 555 3,565 6,675 9,733 23,381 35,349 67,443 693% 9.20% Area 38 4,742 7,973 15,823 Area 39 4,690 337% 5.68% Area 40 8 214 363 423 5288% 1976% Area 41 0 3,423 5,288 6,359 13 444 1,091 1,404 10800% 23.72% Area 42 2,307 22,294 32,571 2912% Area 43 67,186 16.56% 25,911 27,436 28,579 31.016 120% 0.82% Area 44 Area 45 170 944 1,470 1,586 933% 10.68% Area 46 3,198 8,339 12,794 17,277 540% 7.97% 32,579 Area 47 8,139 40,750 52,674 647% 8.86% 0 0 0 Area 48 0 25,509 47.459 64.917 89.271 350% Area 49 5.86% Area 50 26.881 32.882 37,159 46,709 174% 2 54% Area 51 13,709 10,019 7,398 5,141 38% -4.36% 3,268 3,912 9,273 11,642 356% 5.94% Area 52 18,332 50,825 63,830 539% 7.96% Area 53 98,765 322% 15.110 5.46% Area 54 4.695 4,708 10.166 Area 55 15.505 16.936 18.216 24,408 157% 2.08% Area 56 36,642 39,370 41,443 45,922 125% 1.03% 59,805 64,399 67,896 75,469 126% 1.06% Area 57 Area 58 23,902 44.790 54.066 81.945 343% 5.76% Area 59 15.733 22.809 36.961 Area 60 10.450 25.343 23.263 Area 61 51,933 58,372 118,838 6,167 12,334 Area 62 9,867 3.93% 676.456 972.000 1.160.000 1.580.000 234% Total

Table 5.3.3 Population Distribut	on (2008/2015/2020/2030) by Area
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Source: JICA Study Team Figure 5.3.3 Population Increase by Area for the Period from 2008 to 2030

5.3.4 Employment Distribution of Target Framework

(1) Employment Distribution in Lilongwe City by Urban Zone

According to the economic development framework and urban development direction, the target employment in Lilongwe City of 639,900 for 2030 is distributed by urban zone as follows.

Zono namo			Formal Sectot			Informal	Total
Zone name	Government	Commercial	Manufacturing	Agri/Mining	Sub-total	Sector	Totai
Airport Zone	1,870	6,688	5,319	0	13,877	16,529	30,406
Alimaunde/Lumbadzi Zone	348	937	243	6,403	7,931	2,857	10,788
Mvunguti Zone	1,588	8,993	15,736	312	26,629	12,883	39,512
Kanengo Zone	603	1,604	32,827	0	35,034	22,238	57,272
Mariya Zone	1,298	3,498	3,749	0	8,545	10,669	19,214
Chimutu Zone	2,323	16,673	6,354	0	25,350	29,342	54,692
Nyama Zone	3,261	3,107	0	0	6,368	6,755	13,123
Tsabango Zone	3,056	885	309	3,006	7,256	3,202	10,458
City Center Zone	38,150	62,366	31	0	100,547	70,348	170,895
Old Town Zone	2,354	35,177	1,515	0	39,046	90,046	129,092
Chimsapo Zone	1,883	7,442	4,503	4,523	18,351	15,307	33,658
Ngwenya Zone	3,266	24,330	15,514	856	43,966	26,824	70,790
Total	60,000	171,700	86,100	15,100	332,900	307,000	639,900

 Table 5.3.4 Employment Distribution for 2030 by Urban Zone

Source: JICA Study Team

(2) Employment Distribution in Lilongwe City by Area

Breakdown of the target employment by area is further shown below:

Area No.	Population (2008)	Population (2030)	Increase Rate (%)	Annual Increase Rate (%)
Area 1	13,684	14,206	3.8%	0.2%
Area 2	3,041	4,984	63.9%	2.3%
Area 3	4,471	19,637	339.2%	7.0%
Area 4	94	4,558	4748.9%	19.3%
Area 5	755	2,185	189.4%	4.9%
Area 6	2,498	6,144	146.0%	4.2%
Area 7	39,966	46,002	15.1%	0.6%
Area 8	26,249	27,784	5.8%	0.3%
Area 9	1,866	11,490	515.8%	8.6%
Area 10	3,189	10,936	242.9%	5.8%
Area 11	935	1,551	65.9%	2.3%
Area 12	2,511	8,140	252.5%	5.9%
Area 14	1 157	2,616	-	- 5.20/
Area 15	1,137	4 268	171.7%	1.5%
Area 16	25	4,208	2248.0%	4.0%
Area 17	4	7.963	198975.0%	41.2%
Area 18	13.942	17.453	25.2%	1.0%
Area 19	0	605	-	-
Area 20	14	1,285	9078.6%	22.8%
Area 21	44,764	47,566	6.3%	0.3%
Area 22	29,458	31,683	7.6%	0.3%
Area 23	45,606	46,186	1.3%	0.1%
Area 24	22,708	36,337	60.0%	2.2%
Area 25	65,672	96,205	46.5%	1.8%
Area 26	4,847	46,753	864.6%	10.9%
Area 27	2,233	12,093	441.6%	8.0%
Area 28	48	297	518.8%	8.6%
Area 29	539	790	46.6%	1.8%
Area 30	2,329	3,115	33.7%	1.3%
Area 31	0	675	-	-
Area 32	346	2,179	529.8%	0.2%
Area 33	2,496	5,688	127.9%	3.8%
Area 34	7 204	18 004	-100.0%	-100.0%
Area 36	7,304	55 127	140.5%	4.2%
Area 37	555	10 005	1702.7%	14.0%
Area 38	9.733	75,373	674.4%	9.8%
Area 39	4,690	19,948	325.3%	6.8%
Area 40	8	423	5187.5%	19.8%
Area 41	0	5,464	-	-
Area 42	13	1,161	8830.8%	22.7%
Area 43	2,307	58,989	2457.0%	15.9%
Area 44	25,911	32,439	25.2%	1.0%
Area 45	170	10,565	6114.7%	20.6%
Area 46	3,198	15,806	394.2%	7.5%
Area 47	8,139	57,127	601.9%	9.3%
Area 48	0	0	-	-
Area 49	25,509	88,004	245.0%	5.8%
Area 50	26,881	50,664	88.5%	2.9%
Area 51	13,709	5,012	-63.4%	-4.5%
Area 52	3,268	6,382	95.3%	3.1%
Area 54	18,332	93,01/	410.7%	10.2%
Area 55	4,095	23 740	53 1%	2.0%
Area 56	36 642	41 303	12 7%	0.5%
Area 57	59,805	74 397	24.4%	1.0%
Area 58	23.902	87.703	266.9%	6.1%
Area 59	-	38,760	-	-
Area 60	-	23,806	-	-
Area 61	-	109,226	-	-
Area 62	-	12,754	-	-

	Table 5.3	3.5 Targe	t Emplo	vment l	ov Area
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5.4 Proposed Land Use Classification for Lilongwe City

The new zoning scheme in the 2030 land use plan is proposed based on the urban spatial development (Section 4.3.2, Chapter 4) and principles of target population distribution (Section 5.3.1). As previously discussed, the JICA Study Team judges that institutional measures for land use zoning should be modified in order to take up new urban development policies and directions. Therefore, the proposed land use category differs slightly from the categories which were used in the 1986 OZS.

The following are the proposed land use categories.

(1) Residential Land Use

Residential land use consists of the following five sub-categories.

- 1) Low density residential
- 2) Medium density residential
- 3) High density residential
- 4) High-rise flat area
- 5) Quasi-residential

The existing classification of residential land use into "traditional" and "permanent" seems to be the legacy of the colonial era. The term "traditional housing area (THA)" is no longer appropriate for the urban residential area of the capital city in the 21st century. Furthermore, THA is not a statutory housing area so that it should be included in the planned housing area. In this context, such a legacy as THA shall be abolished. Residential land use shall basically be classified into three simple categories: 1) Low Density Residential; 2) Medium Density Residential; 3) High Density Residential.

In order to further promote densification and compact land use in the central area, a fourth category which is the high-rise flat area, shall be set up. The fourth category is the area where multi-storey flat buildings are built. In general, land use zoning in almost all the developed countries is divided into a central area with high population density and the countryside area with low population density. Detached housing developments usually take place in the suburban areas. It is regarded as inappropriate to implement real estate development for detached housing developments in the central area. Meanwhile, high-rise flat buildings are promoted in the business centre areas. Taking a look at such a world trend, the high-rise flat zone should be set up as a new category in residential land use.

With reference unplanned to settlements, it is not recommendable that such a residential land use category be maintained in the 2030 land use plan map. The issue is how to improve the current unplanned settlements where about 40% of the population stav. The city's appropriate approach would be the stepwise upgrading/legitimization of unplanned settlements, rather than strict enforcement of the law to unplanned abolish settlements.



Image 5.4.1 Future image of High-rise flat area

International donor agencies, including JICA, would follow this approach. The stepwise upgrading and legitimization of unplanned settlements would take the form of a transitional land use category in the process from unplanned to planned settlement. It will take considerable time to legitimize the current unplanned settlements. Therefore, the LCC shall take the stepwise improvement approach and it is proposed herein to introduce a new category, "Quasi-Residential". The term "quasi-residential" implicates an intermediate status between the unplanned and statutory housing areas. Stepwise upgrading means that LCC is requested to upgrade part of the current unplanned settlements and the improved area should be worthy of the High Density Residential (HDR) which is the statutory housing area.

(2) Commercial Land Use

Commercial land use consists of the following two categories.

- 1) Commercial
- 2) High-rise commercial

The category of "commercial" used to be the sole classification applied to commercial land use in the 1986 Zoning Scheme. In order to achieve a compact land use and to make the City Centre more efficient and attractive, there needs another category called "high-rise commercial" where multi-storey buildings are concentrated. This zoning category shall be applied to the City Centre area. As the Old Town is a conventional commercial centre, it seems difficult and inappropriate to convert it to new and modern office areas, even if it may undergo substantial densification process in future. The land use of the Old Town shall therefore be regulated as commercial.

The adherence to compact land use allows both commercial and high-rise commercial areas to be mixed up with residential areas. Such a mixed land use of residents and commerce activities brings about increase of nighttime population. Meanwhile, a mixed land use of commerce and industry is not recommended since this is against urban amenity. Industrial land use should be, in general, separated from the commercial area in the central part.



Image 5.4.2 Future Image of High-rise Commercial Area (promoting mixed land use)

(3) Industrial Land Use

Industrial land use consists of the following two categories

- 1) Heavy/large-scale industries
- 2) Light/small-scale industries

The term "industrial" used to be the only category of industrial land use in the 1986 Zoning Scheme. In view of upgrading and diversification of industries, industrial land use shall be classified into two categories One "heavy/large-scale is industries" locating in the Kanengo area. The other is "light industries". The existing light industries in the Old Town should be relocated to other areas. Further, there is a need for a new type of industrial area focusing on the export-oriented or highvalue added industries (i.e. cut flowers, fresh vegetables and fruits) in proximity with the Kamuzu International Airport.

(4) Institutional Land Use

Generally speaking, institutions



Image 5.4.3 Future Image of Light/Small-Scale Industries (Left-side: Logistics Centre/ Right-Side: Small and Light Scale Industries)

are located anywhere irrespective of land use category such as commercial, industry or residential. Their location does not tend to be concentrated in a specific area. Institutions are scattered in various zones in the city. The bigger the city grows, the wider the distribution of institutions is. Therefore, the category for institutional land use is not considered herein.

(5) Government

Governmental institutions use sizable land. For instance, the land area of the State House in Area 44 accounts for approximately 555 ha. The Capital Hill is comprised of a complex of national governmental institutions. It substantially occupies a large size of land in Area 20. Meanwhile, the police headquarters is located in Area 30. It will be appropriate to accord a specific category to such land where governmental institutions are concentrated in the future. This is primarily because development and building control is easily applied to such a specific zoning. Nevertheless, Area 35 where the military base and logistics are concentrated should be limited to military activity land use.

(6) Open Space/ Greenery

Land use for open space and greenery are comprised of the following five subcategories:

- 1) Nature Sanctuary
- 2) Park and Recreation
- 3) Greenery/ Natural Open Space
- 4) Agriculture
- 5) Forestry

Taking into consideration the current global concern on environment preservation, it is of great importance to further divide open space into the new zoning in accordance with the above five categories. Lilongwe City boasts of the existence of a Nature Sanctuary in the very central location of the city. This should be preserved and maintained for future generations. Creation of parks and recreational spaces in residential and commercial areas contributes to the improvement of urban amenity. Abundant nature and greenery remain in Lilongwe City, but there are no recreational parks and children's playgrounds in the residential areas. Except for the Nature Sanctuary, no major urban parks exist.

At present, the GoM has no clear policy for urban agriculture. Urban agriculture consists of illegal farming practiced



Image 5.4.4 Future image of Nature Sanctuary (Looking over City Centre Area from NS)

seasonally in open spaces in the city. Agriculture in the city is represented by commercial farms producing dairy and poultry products. Particularly, commercial farms are located in Area 45, 46 and a part of Area 44. LCC should regulate agricultural land use for commercial farms in the future so that sizable parts of open space used for illegal farming can be used for other purposes such as parks and recreation, and forestry.

Land use inside Lilongwe City is supposed to be mainly for residential and urban economic activities. However, it is regarded important to reserve some parts of the land for future development. Forestry is an independent zoning and to be used for the purpose of reserving the land for future long-term development after the target year of 2030.

(7) Water Bodies

Water bodies consist of rivers and wetlands known as 'dambos'. Many of wetlands are obstacles to urban development and should be avoided in areas where this development takes place. There exist some wetlands in the central part and in the suburban areas. In case wetlands are very big and are connected with rivers, these are preserved as water bodies. On-site investigations have been done to distinguish wetlands to be preserved from those to be not preserved. The new zoning of water bodies indicates wetlands to be preserved.

(8) Cemetery

Cemetery lands are scattered in Lilongwe City. The land use category for cemetery is set in the legend.

5.5 Future Land Demand and Density Planning

5.5.1 Future Land Demand by Land Use Category

(1) Residential Areas

Residential land planned under the 1986 Zoning Scheme with 2000 as its effective target year was 11,735 ha. This is shown in Table 2.2.3 of Chapter 2. Looking into the actual land use situation as of August 2009, which is presented in Table 3.1.1 and 3.1.2 of Chapter 3, the total land area, planned, developed and actually now being used for residential purposes, accounts for only 4,287 ha. In fact, to fill up the gap, unplanned settlements have expanded rampantly and catered to the actual residential needs in terms of quantity. As already mentioned in Chapter 3, the area occupied by unplanned settlements and indigenous villages are included, the total land for residential use is 9,316 ha. In reality, it is very difficult to prevent further expansion of unplanned settlements. It will be too optimistic and unrealistic to assume that immediate and comprehensive measures to prevent further expansion of unplanned settlements will be taken from now. Although there are efforts to eradicate unplanned housing activities, certain expansion remains foreseen.

In order to respond to the future residential needs, vigorous efforts are needed to accelerate the planning and development work for housing areas, particularly for high-density housing areas which a vast majority of the Lilongwe citizens will occupy. Otherwise, housing provision through unplanned settlement expansion remains.

Outline zoning schem	ne (1986)	Current land use (Aug	Difference	
Low density housing	2,005	Low density housing	1,338	-667
Medium density housing	1,855	Medium density housing	846	-1,009
High density housing	1,135	High density housing	346	-789
THA	6,740	THA	1,757	-4,983
Total	11,735	Total	4,287	-7,448

Table 5.5.1 Comparison of Residential Land Use between OZS (1986) andCurrent Land Use Situation as of August 2009 (Unit: ha)

Source: JICA Study Team

The residential areas for 2030 are comprised of i) low density residential area, ii) medium density residential area, iii) high density residential area, iv) quasi-residential area and v) high-rise flat area. Cumulative land requirement in 2030 for residential areas by land use category is shown in Table 5.5.2. High density residential area is expected to occupy a substantial area of 6,795 ha. Quasi-residential area and high-rise flat area are the new zoning scheme for residential land. The former is expected to account for 6,175 ha and the latter for 1,155 ha. The cumulative land requirement for residential land by category is based on the average density (persons/ha) shown in Table 5.5.2 and the regulations of building coverage ratio (BCR)/floor area ratio (FAR)/minimum land plot size and maximum land plot size shown in Table 5.5.3. For instance, the minimum land plot size for low density residential area is reduced from the current size regulation (2000 m²) to 1000 m² in line with the concept of efficient land use. The land requirement for low density residential area is estimated to be 2,670 ha, which is almost double of the current land area (1,338 ha) for low density residential area.

Land use category	Land area (ha)	Population	Average Density (Persons/ha)	Normative Density (Persons/ha)
LDR	2,670	80,090	30	30
MDR	1,987	99,335	50	50
HDR	6,795	591,230	87	80-90
Quasi-Residential	6,171	600,047	97	90-100
High-rise flat area	1,155	80,876	70	70

Table 4	552	Cumulative	Land II	se Zoning	for Resid	lential Us	e for 2030
Table .	J.J.4	Cumulative		se Loning	IUI INCSI	utilital US	CIUL 2030

Source: JICA Study Team

Table 5.5.3 Regulations of BCR/FAR/Minimum Plot Size/Maximum Plot Size for Residential Use

	Maximum Regul	ation BCR/FAR	Minimum	Maximum
Land use category	Building Coverage	Floor Area	Regulation of L and Plot Size	Regulation of L and Plot Size
LDR	30%	40%	1000 m ²	2000 m ²
MDR	40%	40%	500 m ²	1000 m ²
HDR	50%	80%	200 m ²	-
Quasi-Residential	50%	80%	150 m ²	-
High-rise flat area	30%	100%	5000 m ²	-

Source: JICA Study Team

(2) Commercial Areas

The commercial land planned under the 1986 Zoning Scheme was 295 ha, which occupies only 0.9% of the whole planned area. The existing commercial area is 339 ha as of August 2009. When Lilongwe City was only a very small town, the commercial area might have been sufficient with such a trivially small occupancy rate (less than 1%). As population and economy grows, such areas have to be expanded. Since Lilongwe City is the capital of Malawi, the central business district and commercial centre is the face of the city. Its population will continue to grow rapidly and expected to reach more than 1.5 million in 2030.

As afore-mentioned, the JICA Study Team proposes the future land use category as not only the conventional "Commercial" but also "High-Rise Commercial". The background and details were already presented in Section 5.4.

Taking a look at the current situation, building density is still very low even in the City Centre as well as in the Old Town. The top retail commercial buildings even in the very heart of Lilongwe City are those of one story. Most commercial buildings are those of one to three stories high at most. On the average, the floor area ratio (FAR) actually achieved seems to be less than 50% in the Old Town. As represented by a shopping mall, a commercial building of a single story is popular in the Old Town. In fact, most of the new projects which are planned and proposed around the area are buildings of a single-story.

In the City Centre, however, there exist several exceptionally tall buildings. These are buildings of more than five-storey structures, namely, Kang'ombe (10F); Gemini (5-6F), Reserve Bank (7~8F), and Tikwen (7F). In line with the proposed policy of achieving efficient land use and building up an attractive commercial business centre, the densification of commercial areas is essential. Most buildings in the City Centre shall be

those of more than five stories by 2030. CBD areas of many capital cities in the world are bristling with many skyscrapers. It would however be unnecessary and unrealistic to make the centre of Lilongwe City bristling with buildings of 30 to 50 stories. (In terms of FAR, it would be around 1000%.) From the viewpoint of cityscape harmonization, organized height control for the buildings by land use category as well as block area must be applied. This is also the case with FAR and BCR. The building regulation shall not lack in unity by classification. On the average, a FAR shall be around 170~130% in the high-rise commercial area in Lilongwe City and maximum regulation for FAR should be between 200 and 250%.

A mixed land use shall be promoted for commercial zoning in order to increase the night-time population in the City Centre. In this connection, residential development shall be done within the commercial function area in the City Centre as well as in the Old Town.

In addition to commercial and high-rise commercial, small commercial centres shall be constructed within the residential areas. These are called local centres in Malawi.

The proposal of high-rise commercial zoning requires changing of the BCR and FAR. This is mainly because the current building regulations are too simple to be effective according to the different zoning. Use of the current building regulations would surely damage the orderly cityscape as well.

The JICA Study Team takes all the above matters into account for the land use simulation work with the use of land use planning model. The land requirement for commercial and high-rise commercial zones is estimated based on indicators such as the required floor space per employee, and desired FAR and BCR floor space per employee. These are shown in the following Figure 5.5.1. This is based on the desired density target range for commercial land use

	Land use category	Building use image	Located in the Area No:	Commercial worker density	Commercial worker allocation	Living population density
Underlying	Commercial	Mainly shops, restaurants, service office etc.	1, 2, 3, 4, 5, 6, 8, 9, 11, 14, 18, 22, 27, 32, 33, 36, 37, 38, 43, 46, 47, 52, 53, 58, 59, 60, 61	50-80/ persons/ha	60% (103,020)	30/ha
Assumption	High-rise commercial	Mainly office buildings	13, 16, 19, 31, 32, 42	200-240/ persons/ha	30% (51,510)	30/ha
	Other small commercial areas existing in residential zones	Mainly shops, restaurants, service office etc.	All the areas	_	10% (17,170)	-
	areas existing in residential zones	restaurants, service office etc.	All the areas	-	(17,170)	-

Land use planning model (Simulation)

			♦			
Simulation	Land use category	Land area (ha)	Population	Residential buildings (m ²)	Commercial buildings (m ²)	Total buildings
Result	Commercial	1,611ha	48,308	1,188,895	1,650,820	2,839,715
	High-rise commercial	219ha	6,580	263,200	1,296,692	1,559,892

Note 1: Spatial distribution by area is based on the analysis on the current situation of the location of commercial functions as well as the planning policies of (1) strengthening twin poles and (2) distribution of sub-commercial centres in each expanding direction. The numbers of areas are the results of these considerations.

Note 2: Commercial worker density by land area is estimated in reference to corporate establishment statistics of Japan. High-rise commercial areas correspond to such commercial areas with 5~10 storey buildings. Commercial areas correspond to such commercial areas with 2~3 storey buildings.

No.3: Commercial worker allocation is determined through planning by the JICA Study Team on lump-sum basis. Source: JICA Study Team

Figure 5.5.1 Simulation of Land Use Demand for Commercial Purpose

The land requirement for commercial area is estimated to be 1,830 ha consisting of commercial (1,611 ha) and high-rise commercial (219 ha). Figure 5.5.1 also shows floor area required for residential and commercial buildings. Total floor area of buildings is estimated to be about 440 ha consisting of residential buildings (145 ha) and commercial buildings (295 ha).

(3) Industrial Area

Manufacturing in Lilongwe, featured by relatively low-technology and domestic market-oriented goods, is limited to the production of semi-processed tobacco leaves and food/beverage/furniture of low quality. Industrialization for economic development in Lilongwe could lead to the exportation of processed food products, diversification of consumer products responding to the demands of the rising middle-income families, and development of Malawian trucking industries. The Kanengo area would accommodate middle/large industries while the city needs a special area to accommodate the light industries that are currently located in the Old Town. In this context, industrial estate development shall be split into two streams: 1) heavy/large-scale industries; 2) light industries.

In the course of industrial development, some agro-processing industries shall be established, while some medium high-technology and knowledge-intensive industries may be invited to establish their base in Kanengo or the Airport Industrial Zone. In the development phase from 2021 to 2030, Lilongwe City is anticipated to lead the way into developing as the industrial heartland of Malawi.

Particularly in reference to the medium/small scale light industries, their physical location shall preferably be near the workforce's residential areas (high density residential, THA or informal settlements) in view of economic efficiency, transport efficiency and spatially balanced developments.

	Land use category	Sub-sector/Type	Located in the Area No:	Industrial worker density	Industrial worker allocation	Living population density
Underlying	Heavy/Large-scale industries (Industrial esates)	Large-scale, equipment intensive, capital intensive industries, export-oriented	26, 27, 28, 29, 39, 50, 51, 52	35-45/ persons/ha	60% (51,600)	2/ha
Assumption	Light industries (Industrial estates)	Wood processing, food processing, furniture, etc.	38, 46, 47, 49, 58, 60, 61	35-45/ persons/ha	30% (25,800)	10/ha
	Other small-scale industries (scattered in commercial area)	Repair shops, handicraft workshop etc.	1, 2, 7, 8, 14, 18, 21, 22, 23, 24, 25, 36, 37, 43, 44, 45, 49, 53, 55, 56, 57, 59, 61, 62	-	10% (8,700)	-

Simulation Result	Land use category	Land area (ha)	Population	Residential buildings (m ²)	Industrial buildings (m ²)	Total buildings
	Heavy-large scale	1,280ha	2,819	56,380	1,687,561	1,743,941
	Light industries	616ha	12,311	163,520	1,254,883	1,418,403

Land use planning model (Simulation)

Note 1: Spatial distribution by area is based on the analysis on the current situation of the location of industrial functions as well as the planning policies of (1) strengthening Kanengo as heavy/large-scale industrial base, (2) promotion of relocation of light/small industrial factories to suburb area, and (3) building light/small-scale industrial estates in the city edge area along major roads. The selection of the areas is the result of these considerations. Note 2: Industrial worker density is based on the Japan Location Centre Statistics, particularly in reference to inland

industrial estates. No 3: Industrial worker allocation ratio is determined through the planning by the JICA Study Team on lump-sum

basis. Source: JICA Study Team

Figure 5.5.2 Simulation of Land Use Demand for Industrial Purpose

Figure 5.5.2 shows the cumulative land requirement for the two categories of industrial land, namely, heavy/large industry and light industry. The areas required for industrial buildings are comprised of those for industrial factory and residential buildings. The former is estimated based on the number of industrial workers per ha while the latter is based on the industrial worker allocation and population per ha. The total area of industrial buildings is estimated to be 316 ha, consisting of 174 ha for heavy industries and 142 ha for light industries. The indicators of BCR and FAR shown in Table 5.5.4 are used to project the industrial land requirement. The total land requirement is estimated to be 1,896 ha, comprising of 1,280 ha for heavy industries and 616 ha for light industries.

Table 5.5.4 Regulations on BCR/FAR/Minimum Plot Size/Maximum Plot Size for Industrial Use

T 1	Maximum Regu	lation BCR/FAR	Minimum	Maximum
Land use sub-category	Building Coverage Ratio (BCR)	Floor Area Ratio (FAR)	Regulation of Land Plot Size	Regulation of Land Plot Size
Heavy/Large scale Industries	30%	50%	-	-
Light Industry	30%	50%	-	-

(4) Open Space and Greenery

Open space and greenery shall be composed of five categories, as follows:

- 1) Nature sanctuary
- 2) Park and recreation
- 3) Greenery/Other natural open space
- 4) Agriculture
- 5) Forestry

From the viewpoint of urban development, the three categories of greenery/other natural open space, agriculture and forestry do not fall into urban land use. On the other hand, the nature sanctuary exists in the very central part of the city. Parks and recreational spaces should also be made available within the city. In particular, public parks are important in view of improving urban amenity.

(Nature Sanctuary)

The nature sanctuary is located mainly in Area 34, in the very central part of Lilongwe City. It contributes to the recreation of citizens and tourists as well as the preservation of greenery within the city. The existence of the nature sanctuary is in conformity with "preservation and utilization of abundant greenery", which is one of the urban development strategies presented in Chapter 4. It is strongly recommended that the nature sanctuary shall be preserved continuously with due care. The area accounts for approximately 132 ha.

(Parks and Recreation)

Parks and recreation shall be comprised of public parks, public sports/leisure facilities (ex. national stadium), and private sports/leisure facilities (ex. golf course). There is a plan of constructing a national stadium in Area 48. The construction will be funded under a Chinese economic assistance. One sports/leisure complex exists in Area 3. It is composed of one 18-hole golf course, tennis courts, swimming pool, etc. There is also a botanical garden in Area 14. One of Lilongwe City's defects is the shortage of public parks. Although the citizens can boast of abundant greenery within the city, it is regrettable that small-scale public parks and/or children's playgrounds do not exist in residential neighborhoods, and medium-scale parks do not exist in the urban zones.

It is proposed that a hierarchical park system be introduced through a city-area-sector jurisdiction hierarchy. Land use demand for parks and recreation can be calculated as follows:

Public park classification	Land area scale	Service standard	park area /per city	Zoning location
Urban park	20-70 ha	4-5 m²/capita	6-8 within the city	Park and recreation
Area park	6-10 ha	1-2 m²/capita	1 within an area	included in residential zoning
Neighborhood park	2-3 ha	2 m ² capita	1 within 2-3 communities	included in residential zoning
Children's playground	0.5-1 ha	1 m ² /capita	1 within a community	included in residential zoning

 Table 5.5.5 A Model Plan of a Hierarchical Park System for Lilongwe City

Note: The proposed service standards and other planning guidelines were determined through discussions made during the Working Group meetings.

Urban Parks: These will be large-scale parks to be used for the purpose of providing urban amenity for the city's residents as a whole. The standard of allocating an urban park in the city is based on a population size of approximately 200,000. The total area of urban parks is estimated to be about 400-600 ha. With the additional inclusion of the private sector's recreational spaces, urban parks are expected to expand to around 800-900 ha.

Area Parks: These will be medium-scale parks to be used for the purpose of area-wide amenity. In principle, one area park shall be allocated per area. The extent of area parks shall be approximately 250-320 ha in total within the residential zone.

Neighborhood Parks: These will be used for the purpose of providing urban amenity for neighborhood residents. In principle, one neighborhood park shall be allocated per neighborhood. A neighborhood unit is generally defined as a residential zone whose size is around 1 km² or a catchment area for one elementary school. The extent of neighborhood parks shall be 250-300 ha in total within the residential zone.

Children's Playground: This will be used for the purpose of providing amenities within a small residential area. It shall be allocated per residential area within walking distance, or per small residential area divided by a quarter of a neighborhood unit. The extent of children's playgrounds shall be approximately 100-150 ha in total within the residential zone.

5.6 Land Use Plan for 2030

- 5.6.1 Conceived Urban Structure in Distant Future
 - (1) Spatial Composition of Future Built-Up Area in Lilongwe City

The built-up area in Lilongwe City forms an oval shape centering on the Old Town and the City Centre. Practically, central commercial and economic functions shall concentrate in this twin-pole area. This twin-pole zone is divided into the Old Town and the City Centre.

The built-up area clusters in Lilongwe City shall be surrounded and interspersed by greenery/open spaces (agriculture, forestry, natural open space). In the western side, the agricultural area of Areas 45 and 46 shall be reserved between the central built-up area and the south-western built-up area (Area 57, 58, etc.). In the south-eastern part, the grassland, forestry and natural open space, which currently exist outside Area 38, shall continue to remain as the boundary limit to prevent further expansion of the urban sprawl. Likewise, the greeneries of Areas 44 and 54 shall serve as boundary to restrict urban sprawl in the eastern side. The greenery (forestry and agriculture) in Areas 55, 25, and 54 shall likewise be reserved and intended to control urban sprawl. Surrounded and wedged by the greenery, each urban cluster's living environment shall be maintained in good condition. Spatial composition of the future built-up area and greenery/open space is shown in Figure 5.6.1.



Source: JICA Study Team



(2) Land Use Plan for 2030

1) Overview

The jurisdiction area of Lilongwe City is to be enlarged in response to the urbanization progress (393 km² \rightarrow 474 km²). As a result, the land use planning area encompasses the future jurisdiction area of 474 km². The population is projected to increase by more than twofold (approximately 2.4 times larger). Thus, the urban land use area will also be increased in line with the population growth. Due to the densification effort, the increase in urban land use area shall be 11,300 ha (from 12,600 ha to 23,900 ha). Almost half of the planning area shall be used for urban land use purposes (residential, commercial, industrial and government), while the remaining half shall be preserved as greenery/ open space. As a whole, the built-up area of Lilongwe City shall form an oval shape. The built-up area shall be surrounded and interspersed with such abundant greenery to achieve a physical cluster-shaped development, with due consideration of the environmental preservation aspect.

The 2030 land area by land use zoning category is shown in the following Table 5.6.1

			Average density	Normativa Danaity
Land use category	Land area (ha)	Population	Average density	(D (L))
		-	(Persons/na)	(Persons/na)
LDR	2,670	80,090	30	30
MDR	1,987	99,335	50	50
HDR	6,795	591,230	87	80-90
Quasi-Residential	6,171	600,047	97	90-100
High-rise flat area	1,155	80,876	70	70
Commercial	1,611	48,308	30	30
High-rise commercial	219	6,580	30	30
Heavy/large scale industries	1,280	2,819	2	2
Light industry	616	12,311	20	20
Government	1,836	18,394	10	10
Airport	358	0	0	0
Nature Sanctuary	137	0	0	0
Park and recreation	1,149	0	0	0
Greenery/natural open spac	6,840	0	0	0
Agriculture	4,309	11,583	3	3
Forestry	9,564	28,427	3	3
Water bodies	0	0	0	0
Cemetary	701	0	0	0
Toral	47,400	1,580,000		

Table 5.6.1 Land Area Composition by Land Use Category in 2030





2) Urban Land Use Area

The following figure shows the zoning area, designated for urban land use regulation (residential, commercial, industrial, government).







3) Open Space/Greenery





4) Residential Land Use





5) Commercial Land Use



Source: JICA Study Team



6) Industrial Land Use





5.7 Development Scenario by Phasing

5.7.1 Phase 1 (~2015)

(1) Overview

Phase 1 is interpreted as the significant period when the concerned parties, including LCC, should arrange legal and institutional measures supporting the new zoning proposed in the 2030 land use plan. It is of great importance to conduct institutional improvements/developments in the early stage. It encompasses various aspects such as land registration, investment promotion measures for foreign capital, industrial estates, housing bill, and regularization measures of unplanned settlements. The legal and institutional aspects are discussed in Chapter 10 in more detail.

(2) Spatial development

1) **Residential areas:** During Phase 1, it is projected that the population in the city will increase by around 200,000. In order to accommodate such increase, it will be necessary to develop new sub-divisions (2,840 ha) for residential areas, allocating 420 ha for low density residential, 330 ha for medium density and 1,850 ha for high density. In addition, pilot projects for high-rise residential developments shall be launched in view of strengthening densification, with another 240 ha allotted for this purpose. The current residential houses are characterized by one-story structures that are observed in low and medium density residential areas. It appears to have been prioritized for the up-market population (low density and medium density) rather than for those who can only afford low cost housing (high density). In Phase 1, demand for houses in high density residential areas. It should be realized that the housing policy and implementation projects for Lilongwe City should give more consideration to the urban poor.

2) **High-rise flat area:** High-rise residential developments shall be carried out in Areas 3, 9 and 17 in Phase 1. The locations are regarded as highly potential area for urban development. Although these areas have been designated as low density residential area by OZS, the remaining available lands must be used for high-rise residential area.

3) **Light/small industrial area:** It is essential to secure in advance land for industrial development. Otherwise, there will be the high risk for unplanned settlements to encroach on the land planned for industrial use. To date, Areas 50 and 51 have actually been intruded already by unplanned settlements, although these were designated as industrial land. As much as possible, land acquisition for industrial land use will have to be done at an early stage. The 1st phase development for industrial purposes shall comprise 320 ha for heavy/large-scale industries and 220 ha for light/small- and medium-scale industries.

4) **Heavy industrial area:** Heavy /large-scale industries shall be expanded in Areas 50 and 51.

5) **Central business district:** To date, light/small- and medium-scale industries are located mostly in the Central Business District (CBD). The central business area should be developed towards amalgamation of commerce/financial services of high order. If such industries continue to exist in the CBD, these would not match with the CBD function. Such industries shall be relocated from the CBD to the city border areas. The

promising alternative locations are Areas 38, 60 and 61 along the Western Bypass in the south, as well as Areas 46 and 47 along the Western Bypass in the west, and Area 49 in the north-west.

6) **High-rise commercial area:** With reference to high-rise commercial buildings, pilot projects of such urban redevelopment shall take place in some available lands in Areas 13, 16, 19, 31 and 32.

7) **Quasi-residential area:** So far, there have been no responsible departments/sections in the organization of Lilongwe City Council to address the issue on unplanned settlements. Thus, LCC should set up sections/ departments that are responsible for management of unplanned settlements. Secondly, the regularization measures for unplanned settlements shall be institutionally established. Thirdly, the new zoning category for quasi-residential lands should be launched in view of the improvement and upgrading of unplanned settlements into transition status.

5.7.2 Phase 2 (2016~2020)

(1) Overview

Phase 2 will be characterized by the active transformation of the urban structure in Lilongwe City. This would involve the urban road network formation, including the completion of the inner ring road, improved intersections and more effective north-south and east-west links. This would propel changing the distribution of employment opportunities in various sectors and sub-sectors. It will also help optimize the person-trip distribution throughout the area and contribute to the reduction of economic opportunity cost.

This phase will also be characterized as the take-off to a diversified economic development. Most of the industrial estates shall be completed during this phase, whether these are heavy/large-scale or light/small and medium-scale. Urban redevelopment projects for densification as well as for establishment of high-rise commercial areas shall be mobilized on a full-scale dimension.

Based on the institutional development during the previous phase, active private sector investments shall expand in Phase 2 of the designated areas (industrial zoning/ high-rise commercial zoning/ commercial zoning). The government shall take the initiative to accelerate attraction of foreign capital direct investment with the full use of investment promotion measures already introduced in Phase 1.

(2) Spatial development

1) **Residential area**: During this phase, it is projected that the population will increase by approximately 190,000. To address this increase, housing development should progress actively. It is estimated that around 1,820 ha of residential area will have to be newly provided in Phase 2. It shall comprise 850 ha for high density population, 350 ha for low density population and 350 ha for medium density population. In addition, highrise flat areas of 270 ha shall be provided.

2) **High-rise flat area:** High-rise flat areas shall be increasingly expanded in Areas 3, 9 and 17, and a new development shall take place in Area 39. About 270 ha of high-rise flat area shall be constructed in Phase 2.

3) **Heavy industrial area**: Heavy/ large-scale industrial estates shall be expanded in Areas 50, 51, 26 and 27. About 400 ha of industrial estates shall be developed in Phase 2.

4) **Light/small industrial area**: The relocation of small- and medium scale factories from the central part to the city edge area shall be fully mobilized in Phase 2. In order to accommodate the out-flux of such small factories and repair shops, it is deemed essential to construct and supply the necessary volume of industrial estates for light/small- and medium-scale enterprises. The expansionary development shall take place in Areas 38/60, Area 61, Area 46/47 and Area 49. In total, the expansion accounts for around 290 ha.

5) **Central business district**: It is presumed that relocation of industrial factories and workshops from the Old Town will stimulate and mobilize business opportunities for its urban redevelopment. It will be very plausible that vacant lands to be created in the Old Town after relocation will likely have good potential for commercial and housing redevelopments, or mixed use. These urban redevelopment projects will be driven mostly by private investors as business ventures. In principle, the market mechanism of real estate will push through with these urban redevelopment projects. Some projects which may include public benefits or raise public concerns will be implemented under the initiative of the government, municipalities or semi-governmental institutions.

6) **Mixed use of high-rise flat/commercial area**: Densification of land use and economic vitalization shall be promoted with the progress of urban redevelopment projects. Some of them would be implemented in high-rise commercial areas, while others would be undertaken in the Old Town. These urban redevelopment projects will include various real estate developments such as i) high-rise office buildings; ii) mixed use of hotel/shopping mall/apartments; iii) high-rise residential towers, and iv) public facilities

7) **Parks/recreation areas**: Development of parks and recreational spaces shall be actively initiated as well. Harmonization of green space and buildings shall be pursued with the view of a beautiful cityscape.

8) **Quasi-residential area**: It is expected that unplanned settlements will rapidly expand even during Phase 2, although relentless efforts for prevention should be made by the LCC. As rapid urbanization is unlikely to terminate, encroachment of unplanned settlements will persistently continue. Accordingly, it will be necessary to take responsive measures, i.e. transitional and step-by-step regularization through quasiresidential zoning.

5.7.3 Phase 3 (2020~2030)

(1) Overview

The new urban structure will be completed in this phase. Lilongwe City in 2030 shall embody the four concepts: i) abundant greenery within the city; ii) efficient land use; iii) strengthening of Lilongwe economy through economic diversification; and iv) a compact urban land use.

A compact urban land use shall be achieved through establishment of high-rise commercial and residential zones, and mixed-use redevelopments in the central areas.

The twin-pole urban centre (City Centre and Old Town) shall be developed to become attractive as well as efficient locations in order to promote Lilongwe City as an internationally competitive city among neighboring countries' capital cities. Simultaneously, comfortable living environment shall be maintained with the preservation of abundant greenery as well as creation of parks and recreational spaces.

A variety of industries will evolve and develop as a result of economic diversification efforts. In the aspect of physical development, heavy/large-scale industrial zones shall be fully established in Kanengo and light/small- and medium-scale industrial zones in the suburban areas.

(2) Spatial development

1) **Residential area**: During this phase, it is projected that the population will increase by around 420,000. In order to accommodate the population increase, new subdivisions of 3,670 ha will be necessary for residential areas. It shall comprise 1,990 ha for high density residential area, 460 ha for medium density residential area, 570 ha for low density residential area, and 650 ha of high-rise residential area.

2) **High-rise flat area**: As a new lifestyle emerges due to residents in high-rise flats in Lilongwe City, the sales of these flats will rise significantly in Phase 3. The provision of high-rise flat areas shall be increasingly expanded particularly in Areas 26 and 43 in the northern part. In terms of land area, it will account for around 650 ha.

3) **Quasi-residential area**: It is projected that the unplanned settlement growth pressure will continue even in Phase 3 because of continuous social migration from outside. To mitigate the persistent encroachment of unplanned settlements, it will be necessary to include 540 ha under the newly designated category of quasi-residential zoning. It shall undergo regularization and upgrading.

4) **Heavy industrial area**: With reference to heavy/large-scale industrial estates, the remaining 100 ha will be supplied in Areas 50, 39 and 26. The effort of the supply side in Phase 3 shall be placed on sales promotion and attraction of direct foreign investment rather than physical development.

5) **Light/small industrial area**: In terms of industrial estates for light/small- and medium-scale enterprises, the remaining 100 ha shall be provided in Phase 3.

6) **High-rise commercial area**: In order to achieve full-fledged development for high-rise commercial establishments, many urban development/redevelopment projects shall be implemented in Areas 13, 16, 19, 31, 32 and 42. As a result, new high-rise buildings shall be erected in these areas.

The following table highlights the contents/components of the development phasing discussed above.

Phase	1	2	3
Period	Now-2015	2015-2020	2020-2030
Characteristics	 (1) Capacity Development (2) Institutional and legal arrangement (3) Information dissemination 	 Transformation of urban structure Taking-off to the diversification of economic development 	 Completion of new urban structure Maturing and approaching to the planning concept
Population Increase	Approx. 200,000 (674,448→972,000)	Approx. 190,000 (972,000→1,160,000)	Approx. 420,000 (1,160,000→1,580,000)
Expansion of Built-Up Area	4,900ha (13,042 ha →17,959 ha)	4,600ha (17,959 ha →22,589 ha)	4,000ha (22,589 ha →26,549 ha)
Housing supply	2,840 ha of new sub-division	1,820 ha of new sub-division	3,670 ha of new sub-division
New sub-division, Low density	420 ha	350 ha	570 ha
New sub-division, Medium density	330 ha	350 ha	460 ha
New sub-division, High density	1,850 ha	850 ha	1,990 ha
New sub-division, High-rise flats	230 ha	270 ha	650 ha
Employment Increase	Approx. 110,000 (210,000→318,900)	Approx. 95,000 (318,900→414,200)	Approx. 226,000 (414,200→639,900)
Heavy/large- scale industry	320 ha (Area 50 and 51)	400 ha (Area 50, 51, 26 and 27)	100 ha (Area 50, 39 and 26)
Light/small-scale industry	220 ha (Area 38, 46, 47, 49, 60 and 61)	290 ha (Area 38/60, 61, 46/47 and 49)	100 ha (Area 38, 47, 60 and 61)

Fable 5.7.1	Phasing	for Urban	Development	(~ 2030)
				· · · · /

Source: JICA Study Team

The following figure shows the expansion and the changing image of the built-up area of Lilongwe City from the current situation to 2030. In line with the cluster shape development plan (see Figure 4.3.7), the built-up area shall be firstly expanded inside the inner ring road from present to 2020 and inside the outer ring road from 2020 to 2030. The built-up areas in Area 57 and 58 (Chinsapo), and Area 53 (Lumbadzi) are to be fully developed from 2020 to 2030.



Source: JICA Study Team



5.8 Institutional Measures to Implement Land Use Zoning

5.8.1 General

Urban land use planning and regulation aims to establish order in land use aspects. Its purpose is to ensure efficiency of various activities of people and industries, to protect the quality of the natural and living environment, and to create an organized townscape. Since the future land use master plan broadly and generally proposes the future direction on land use, it is necessary to have a package of regulatory measures to enforce the master plan in a mutually complimentary manner.



Zoning (Fundamental Regulation)

Source: JICA Study Team

Figure 5.8.1 Package of Regulatory Framework of Land Use Based on Zoning

The fundamental zoning regulation is physically embodied in the future land use map (2030). In order to achieve the planning concept and deliberately enforce the land use plan in detail, a systematic regulatory package as shown above is necessary and shall be applied in the aspects of development control and building application examination.

5.8.2 Clarification of Building Usage/ Activity for Each Land Use Category

The Standards and Guidelines (SG) stipulates in detail the technical aspects of how to build at each zone. However, the SG does not provide explicit and concrete stipulations about the types of buildings that can be constructed or prohibited to be built at each land use zone, although it provides related general statements.

In Japan's zoning regulation, there are 13 categories of land use. Japan's zoning institution includes an explicit and concrete stipulation in the form of a matrix table, stating what sorts of buildings can be built or are prohibited to be built. There is a contrast chart showing a clear cut relationship between each zone category and building types.

In Lilongwe City meanwhile, many offices, hotels and lodging facilities are recently found to be located in residential areas. This is attributed to the lack of such clear matrix table. Whenever an application is submitted by citizens, the evaluation and judgment must be done objectively, and should not be based on the individual planner's discretion. In this connection, the SG should include such a clear cut contrast chart/table which is presently not available for Lilongwe City.

The Blantyre City Council has already introduced such a matrix table for development control and building use monitoring. Hence, LCC must also formulate and introduce such matrix table.

In this context, the JICA Study Team proposed the following table for Lilongwe, as the guideline for building use control and spatial control by land use category.
A ativity/Duilding Use	Activity/Building Use Classification of Land Use Zoning															
Activity/Building Use	LDR	MDR	HDR	QUR	HRR	COM	HRC	HID	LID	GOV	ARP	AGR	NTS	PAR	FOR	GNO
Detached house	Р	Р	Р	Р	Р	\triangle	\times	\times	×	\triangle	\times	\times	\times	\times	\times	\times
Semi-detached house	Р	Р	Р	Р	Р	\triangle	\times	×	\times	\triangle	\times	\times	\times	\times	\times	\times
Flats	\triangle	\triangle	Р	Р	Р	Р	Р	×	\times	\triangle	\times	\times	\times	\times	\times	\times
Hotels/Other Accommodation	\times	\times	Р	Р	Р	Р	Р	×	\triangle	\triangle	\triangle	\times	\times	\times	\times	\times
Retail shops, small storage *1	\triangle	\triangle	Р	Р	Р	Р	Р	Р	Р	\triangle	\triangle	\times	\times	\triangle	\times	\times
Retail shops, small storage *2	\times	\triangle	Р	Р	Р	Р	Р	Р	Р	\triangle	\triangle	\times	\times	\triangle	\times	\times
Retail shops, small storage *3	\times	\times	Р	Р	Р	Р	Р	×	×	×	\triangle	\times	\times	\times	\times	\times
Retail shops, small storage *4	\times	×	\triangle	\triangle	\times	Р	Р	×	×	×	\triangle	\times	\times	\times	\times	\times
Commercial office *5	\triangle	\triangle	\triangle	\triangle	\triangle	Р	Р	Р	Р	×	\triangle	\times	\times	\triangle	\times	\times
Commercial office *6	\times	\triangle	\triangle	\triangle	\triangle	Р	Р	Р	Р	×	\triangle	\times	\times	\times	\times	\times
Commercial office *7	\times	×	\times	\times	\times	Р	Р	Р	Р	×	\triangle	\times	\times	\times	\times	\times
Commercial office *8	\times	\times	\times	\times	\times	Р	Р	Р	Р	×	\triangle	\times	\times	\times	\times	\times
Government Office	\triangle	\triangle	\triangle	\triangle	\triangle	Р	Р	\triangle	\triangle	Р	\triangle	\times	\times	\times	\times	\times
Entertainment/Leisure bldg. *9	\times	×	\triangle	\triangle	\triangle	Р	Р	\triangle	\triangle	×	\times	\times	\times	\times	\times	\times
Entertainment/Leisure bldg. *10	\times	\times	\times	\times	\times	Р	Р	\triangle	\triangle	×	\times	\times	\times	\times	\times	\times
Public facilities (Police,	~	~	р	р	р	Б	р	Б	п	Б	~	~	~	~	~	~
fire station, post office)	\square		Р	Р	Р	Р	Р	Р	Р	Р	\square	~	~	~	~	· ~
Church/Religious bldg.	Р	Р	Р	Р	Р	Р	Р	×	\triangle	\triangle	\times	\times	\times	\times	\times	\times
Primary and secondary schools,	р	р	р	р	р	р	р	~	^	^	~	~	~	~	~	\sim
library, culture center, museum	r	r	Р	Р	r	r	Р				^	^	^	^	^	^
University/College	\times	\times	Р	Р	Р	Р	Р	Р	Р	×	\times	\times	\times	\times	\times	\times
Clinics	Р	Р	Р	Р	Р	Р	Р	\triangle	Р	\triangle	\triangle	\times	\times	\times	\times	\times
Hospitals	\triangle	\triangle	Р	Р	Р	Р	Р	\triangle	\triangle	\triangle	\times	\times	\times	\times	\times	\times
Social welfare facilities	\triangle	\triangle	Р	Р	Р	Р	Р	\times	×	\triangle	\times	\times	\times	\times	\times	\times
Wholesale/Distribution	\sim	\sim	\sim	\sim	~	~	~	р	р	~	~	\sim	\sim	\sim	\sim	\sim
/Large storage facilities	^	^	^	^	^	^	\square	Р	Р	^	\square	^	^	^	^	^
Light industry	\times	\times	\times	\times	\times	\times	\times	\triangle	Р	\times	\times	\times	\times	\times	\times	\times
Heavy/large-scale industries	\times	\times	\times	\times	\times	\times	\times	Р	\triangle	\times	\times	\times	\times	\times	\times	\times
Small workshop/repair	\times	\times	\times	\times	\times	\triangle	\triangle	Р	Р	\triangle	\times	\times	\times	\times	\times	\times
Petrol filling station	\times	\times	\times	\times	\times	\triangle	\triangle	\triangle	\triangle	\triangle	\times	\times	\times	\times	\times	\times
Bus terminal	×	×	×	×	×	\triangle	\triangle	\triangle	\triangle	×	×	×	×	×	×	\times
Special utility facilities	\times	×	\times	\times	×	×	\times	\triangle	\triangle	×	×	\times	×	\times	\times	\triangle
Outdoor recreation facilities	\times	×	\times	\times	\times	×	\times	×	\times	×	\triangle	\times	\triangle	Р	\triangle	\triangle
Agriculture-related buildings	\times	×	×	×	×	×	×	×	\times	×	×	Р	×	×	×	\times
Forestry-related buildings	\times	×	\times	\times	\times	×	\times	×	\times	×	×	Р	\times	\times	Р	\times

Table 5.8.1 Matrix Table to Control Building Use/ Activity by Land Use Category

Note: *1: Floor area under $50 \, \text{m}^2$

Note: *2: Floor area over $50 \,\text{m}^2$ under $200 \,\text{m}^2$

Note: *3: Floor area over $200 \,\text{m}^2$ under $2000 \,\text{m}^2$

Note: *4: Floor area over 2000 m²

Note: *5: Floor area under $50 \, \text{m}^2$

Note: *6: Floor area over 50 m^2 under 200 m^2

Note: *7: Floor area over $200\,\text{m}^2$ under $2000\,\text{m}^2$

Note: *8: Floor area over 2000 m^2

Note: *9: Cinema, theatre, dance hall etc.

Note: *10: Night clubs, massage parlor, casino, cabaret

Explanation of Land use zoning abbreviation is as follows: LDR: Low density residential, MDR; Medium density residential, HDR: High density residential

QUR: Quasi-residential, HRR: High-rise residential

COM: Commercial, HRC: High-rise commercial

HID: Heavy industrial, LID: Light industrial

GOV: Governmental use, ARP: Airport, AGR: Agriculture, NTS: Nature Sanctuary

PAR: Park and recreation, FOR: Forestry, GNO: Greenery/natural open space

Source: JICA Study Team

*Permitted

Р

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*Special consent required (In condition, permitted) *Not permitted

5-44

5.8.3 Density Control Measures

In terms of density control, the following BCR and FAR shall be used as the main tool in regulating density. FAR is intended to regulate the maximum ratio of the total floor area of a building to the land site area, while BCR regulates the maximum ratio of the covered area of a building to the land site area.



Source: "Urban Land Use Planning System in Japan" 2nd Edition, March 2007, JICA

Figure 5.8.2 Floor Area Ratio (FAR) and Building Coverage Ratio (BCR)

BCR is already adopted in Malawi, but the current usage situation is very simple. About 33% is universally used for all the residential areas while 66% is basically used for both industrial and commercial areas. FAR has not been introduced yet as means of density control measure. Taking into account the future population growth, it is appropriate time for LCC to introduce FAR and elaborate on the BCR regulation. The following table shows the proposed regulation of BCR and FAR by land use category.

	Land Use Category		Maximum Ratio		
Category	Sub-Category	Abbreviation	BCR(%)	FAR(%)	
	Low density residential	LDR	30	40	
Land Use CategoryCategorySub-CategoryLow density residentialMedium density residentialMedium density residentialHigh density residentialHigh-rise residentialQuasi-residentialQuasi-residentialCommercialCommercialHigh-rise commercialIndustryGovernmentGovernmentARPAgricultureForestryNature SanctuaryPark and recreationGreenery/natural open space	MDR	40	60		
Residential	High density residential	HDR	50	80	
	High-rise residential	HRR	30	100	
	Quasi-residential	yAbbreviationLDRLDRLDRHDRHDRHDRHDRQURCOMHRCHIDCOMHIDHIDGOVHIDARPAGRFORFORPARGNO	50	80	
Commercial	Commercial	СОМ	40	100	
Commercial	High-rise commercial	HRC	30	200	
Industry	Heavy industry	HID	30	50	
maasay	Light industry	LID	30	50	
Government	Government	GOV	40	100	
	ARP	ARP	-	-	
Contegory Low density Medium de Residential High density High densit High-rise re Quasi-resid Quasi-resid Commercial Commercial Industry Heavy indu Government Government Government ARP Agriculture Forestry Nature Same Park and re Greenery/matrix Greenery/matrix	Agriculture	AGR	-	-	
	Forestry	FOR	-	-	
Allport	Nature Sanctuary	NTS	-	-	
	Land Use CategorySub-CategoryAbbrLow density residentialIMedium density residentialMHigh density residentialHHigh-rise residentialHQuasi-residentialCCommercialCHigh-rise commercialHHeavy industryILight industryCGovernmentCARPAAgricultureAForestryHNature SanctuaryMPark and recreationFGreenery/natural open spaceC	PAR	-	-	
	Greenery/natural open space	GNO	-	-	

 Table 5.8.2 Regulations on Maximum Ratio of BCR and FAR for Density Control

Source: JICA Study Team

5.8.4 Plot Size Regulation

In addition to FAR and BCR, the minimum land plot size of the residential development should be reduced. It will contribute to the improvement of land use efficiency. The current standard of the minimum land plot size is $2,000 \text{ m}^2$ for LDR, $1,000 \text{ m}^2$ for MDR and 375 m² for HDR. Particularly, the minimum standard of $2,000 \text{ m}^2$ is too big for a land plot. In the past, such a big minimum standard had been beneficial to preserve the colonial luxurious atmosphere. From the viewpoint of promoting land use efficiency, the maximum standard would be important as well as the reduction of the minimum plot size.

The Blantyre City Council has already launched the reduction of the minimum land plot size from 2,000 m² to 1,000 m² for LDR. As in the case of Blantyre City, Lilongwe City should adopt such a policy of land plot size regulation, not only in terms of the minimum, but also of the maximum land plot size.

	Land Use Category		Plot Size	Regulation
Category	Sub-Category	Abbreviation	Minimum	Maximum
	Low density residential	LDR	1,000	2,000
	Medium density residential	MDR	600	1,000
Residential	High density residential	HDR	375	600
	High-rise residential	HRR	10,000	-
	Quasi-residential	QUR	375	600

Table 5.8.3 Plot Size Regulation

Source: JICA Study Team

5.8.5 Height Control by Zone

Height control defines the maximum and/or the minimum height of buildings from the viewpoint of an orderly cityscape, efficient land use and urban amenity. With reference to Lilongwe City, building height control is deemed as essential particularly in view of promoting efficient land use. Blantyre City Council has already introduced such a regulation in terms of buildings storey, i.e., buildings in Blantyre City Centre shall be four-storey or more, while those in Lilongwe City Centre shall be three-storey or more. The following table shows the height control to be applied for Lilongwe City by land use category in accordance with the master plan.

	Land Use Category		The number of stories
Category	Sub-Category	Abbreviation	allowed above the ground
	Low density residential	LDR	1~2
	Medium density residential	MDR	1~2
	High density residential	HDR	1~3
Residential	High-rise residential (1) *1	HRR (1)	3~4
	High-rise residential (2) *2	HRR (2)	8~12
	High-rise residential (3) *3	HRR (3)	5~6
	Quasi-residential	QUR	1~3
Commoraial	Commercial	COM	3~4
Commerciai	High-rise commercial	HRC	8~12
Industry	Heavy industry	HID	1~3
muustiy	Light industry	LID	1~3
Government	Government	GOV	1~5

Table 5.8.4 Height Control	.8.4 Height C	Control	
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*1 HRR (1): located in Area 3 and 9
These areas are located just next to LDR. In view of harmonizing cityscape, the height control shall be restricted to 3-to-4-storey restriction.
In general, the townhouse type residential development shall take place therein.

*2 HRR (2): located in Area 17, 32 and 37

Since these areas are located very near to City Centre ot in the middle of Old Town, the height control shall be restricted to 8-to-12-storey restriction.

*3 HRR (3): located in Area 26 and 43

These areas are very near to industrial zones. The height control shall be 5-to-6-storey Source: JICA Study Team

5.8.6 Regulation for Building Line

In view of amenity, safety and maintenance, building lines are to be specified in order to control the positioning of the building on the land plot.

	Land Use Category Building Line				
Category	Sub-Category	Abbreviation	Front (m)	Rear (m)	Side (m)
	Low density residential	LDR	10	5	5
	Medium density residential	MDR	5	5	4
Residential	High density residential	HDR	5	3	3
	High-rise residential	HRR	10	8	8
	Quasi-residential	alLDRFront (ralLDR10entialMDR5ialHDR5IalQUR3COM2HRC30HID20LID10GOV10	3	3	3
Commercial	Commercial	COM	2	10	-
Commerciai	High-rise commercial	residential MDR 5 idential HDR 5 ntial HRR 10 1 QUR 3 COM 2 ercial HRC 30 HID 20 LID 10	30	20	20
Inductor	Heavy industry	HID	20	10	10
maastry	Light industry	LID	10	5	3
Government	Government	GOV	10	8	8

Table	5.8.5	Regulat	tions for	• Building	y Line
Labie	0.0.0	Iteguiu	10115 101	Dunung	, Line

Source: JICA Study Team

5.8.7 **Regulation for Minimum Car Parking Spaces**

> As transport development is taking place rapidly in recent years, the number of cars is expected to increase significantly in Malawi. Parking problems will become inevitable. To address such situation, the following standard requirements for minimum car parking spaces stipulates that building owners must comply with the regulation based on minimum number of parking lots in proportion to the total floor area of the building.

	Land Use Category		Car parking
Category	Sub-Category	Abbreviation	space (cars/plot)
	Low density residential	LDR	at least 2
	Medium density residential	MDR	at least 2
Residential	High density residential	HDR	at least 1
Residential	High-rise residential	HRR	at least the same number of units
	Medium density residentialMDRHigh density residentialHDRHigh-rise residentialHRRQuasi-residentialQURCommercialCOMHigh-rise commercialHRC	QUR	*5
Commercial	Commercial	COM	*1
Commerciai	High-rise commercial	AbbreviationLDRMDRHDRHDRQURCOMHRCHIDLIDGOV	*2
Industry	Heavy industry	HID	*3
muusuy	Light industry	LID	*4
Government	Government	GOV	*1

Table 5.8.6 Minimum Requirement Standards for Car Parking Spaces

The number of minimum car spaces shall be calculated from the floor area (m^2) of the |concerned by the following formula.

*1 N=F/50

*2 N=F/40

N= the minimum car spaces to be needed $F = Floor areas (m^2)$

*3 N=F/300

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*4 N=F/200
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*5 Common public parking space to be established with the ratio of 1 car/ 3 plots

Source: JICA Study Team

CHAPTER 6

TRANSPORTATION DEVELOPMENT

CHAPTER 6 TRANSPORTATION DEVELOPMENT

6.1 Planning Concept

- 6.1.1 Urban Transportation Development
 - (1) Conditions for urban road network

In sub-section 4.3.2, cluster shaped development is selected as the most appropriate urban structure of the City. Urban road network is planned based on this cluster shape development, with the following development projections taken into consideration for the urban road network plan:

1) Socio-economic condition

- The City has a population of about 674,000 in 2008 and is expected to increase to 1,580,000 in 2030.
- The City's economy would grow with the increase of the formal sector employment and increase of per capita income, as shown in sections 4.2.1 and 4.2.2.
- Prospect for industrialization as per section 4.3.1.

2) Land use plan

- Increase of land demand for residential and commercial areas,
- Prospect for industrial development in Kanengo area and along the western bypass along Nacala corridor,
- Population increase especially in the southern and western part of the City.

3) Traffic demand for vehicles and public transport mode

- Increase of traffic demand between the Old Town and City Centre for business and commercial purposes,
- Increase of trip length due to expansion of residential area to the southern and western part of the City and beyond (proceeding suburbanization);
- Increase of traffic demand for public transport due to increase of employment and improvement of income,
- Introduction of large-sized coaches (buses) for commuting

4) Current situation of the Nacala international corridor development

This development will be subject to "anchor projects" based on public/private partnerships and projects on natural resources, agriculture, mining, manufacturing or tourism.

Several projects on mining and agriculture have been lined up as Build-Operate-Own (BOO) and Build-Operate-Transfer (BOT) arrangements. The projects planned under this initiative include i) the privatization of Chileka Airport (passenger and cargo handling capacity), ii) construction of a dry port at Liwonde, iii) concession of the Nacala-Blantyre railway line by a single operator, iv) construction of a fuel pipeline (400 thousand tons pa), v) a refinery project at Liwonde, vi) rehabilitation of the Salima-Lilongwe-Mchinga rail line and vii) possible extension of this rail line into Zambia.

The western bypass project in Lilongwe City is currently proceeding, financed by the African Development Bank under the Nacala corridor scheme.

(2) Urban road network plan

Primary road network comprises of north-south axis (M1), inner ring road, outer ring road Nacala corridor (part of the western bypass), radial roads and the Kamuzu International Airport (KIA) access road. The inner ring road connects with M1 and other main roads serving the high accumulated commercial/ administration areas in the central business district (CBD). The outer ring road serves industry-related traffic and avoids passing through the main built-up area of the City.





(3) Public Transport Development

Transport development in the City would proceed in accordance with population increase and rise of consumers' income. Road congestion is therefore expected to become severe in the future. The traffic congestion could cause a serious constraint on the urban socio-economic activities.

In order to address the issue, public transport system should be developed through the following conditions;

- Shift from the current public transport system with mini bus operation to that using the large buses that would operate according to time schedule and designated bus stops.
- Introduction of exclusive bus lanes and Bus Rapid Transit (BRT) system for upgrading bus operation system.
- (4) Objectives and Approaches

Table 6.1.1 shows the objectives and approaches for urban transport development.

Objectives	Approach	Description	
Fauel	Provide the entire city with adequate passenger transport services	Extension of public transport services to areas where such services are currently poor and provision of public subsidy to minibus operators or establishment of public bus companies in order to realize the affordable fare for commuters	
accessibility for	Improve transport services	Introduction of the large buses for trunk routes and mini buses for feeder routes, and improvement of the minibus terminals	
an chizens	Provide access roads for all communities	Especially in the southern and western parts of the City	
	Develop road network for smooth access within the City	Elimination of missing links; increase of road capacity	
Safe and	Alleviate traffic accidents Improve security on roads and streets	Installation of traffic signal and guardrail in the busy areas; installation of paved cycle roads	
convenient transport system	Manage and control traffic flow under good condition	Introduction of traffic signal system	
	Provide safe and comfortable pedestrian ways	Installation of paved pedestrian ways with green network	
Compliance with economic development	Improvement of accessibility to air transport services	Improvement of connectivity from the airport to Lake Malawi for promoting tourism development, and for commercial development surrounding the airport	
	Contribute to Nacala corridor development as the international axis	Contribute further development of trucking industry around Nacala international corridor	
	ibility for zens Improve transport services If Provide access roads for all communities Develop road network for smooth access within the City I Improve security on roads and streets Improve security on roads and streets I Inance with mic ort system Manage and control traffic flow under good condition I Improvement of accessibility to air transport services I Improvement of accessibility to air transport services I Support industrial development through transport cost reduction I Veroide sufficient road network to meet the demand I Provide sufficient road network to meet the demand I Provide transport terminal for smooth transfer I I and ged urban h Forwulate efficient urban structure by hierarchical road network I I and ged urban h Reduce vehicle emission I I and ged urban h Formulate efficient urban structure by hierarchical road network I I and het h Provide transport terminal for smooth transfer I I and ged urban h Formulate efficient urban structure by hierarchical road network I I and ged urban h Forwulate traffic congestion I I and ged urban h <td< td=""><td>Contribute to freight transport services with respect to a more efficient transportation cost</td></td<>	Contribute to freight transport services with respect to a more efficient transportation cost	
	Connect the new urban area with adequate transport system	Strengthening of road capacity and public transport capacity	
Sound and	Provide sufficient road network to meet the demand	Road development in areas where transportation is expected to increase	
growth	Formulate efficient urban structure by hierarchical road network	Formulation of efficient road network	
	Provide transport terminal for smooth transfer	Improvement of bus and minibus terminals including dispersed allocation of such terminals	
	Improve deteriorated roads and streets	Improvement of unpaved roads; conducting proper maintenance and rehabilitation activities	
Sustainable	Alleviate traffic congestion	Increase road capacity and improvement of intersection with traffic signal	
quality of life	Reduce vehicle emission	Development of public transport system; reduction of public transport fare	
	Promotion of transport based on cycling	Installation of paved cycle roads	

Table 6.1.1 Objectives and Approaches of the Transportation Developm
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Source: JICA Study Team

6.2 Demand Projection

6.2.1 Vehicle Demand Projection

The vehicle demand projection for Lilongwe City is made based on the following procedure.



Figure 6.2.1 Method of Traffic Demand Projection

(1) Trip generation and attraction

The future traffic demand was estimated based on the future socio-economic framework (population, employment and GDP) presented in Section 4.2.1.

The future trip generation by zone (area) are estimated based on generation and attraction units per hectare by land use category shown in the land use plan for the short-term (to 2015), middle-term (2016-2020) and long-term (2021-2030).

The future trip generation is shown in Table 6.2.1 and Figure 6.2.2.

 Table 6.2.1 Future Trip Generations

	(Unit: thousand persons)				
Area	2009	2015	2020	2030	
Lilongwe City & its suburb	1,900	2,077	2,714	3,792	

Source: JICA Study Team

The total trip generation is close to 3.8 million trips in the study area in 2030. It is expected that future trip generation will increase in new commercial, business and residential areas.

(2) Modal share



The future modal share of vehicles is estimated based on a per capita GDP and vehicle ownership. The future modal share of all types of vehicles excluding buses in Lilongwe is assumed to be 17 % in 2030 while the same ratio is expected to be 30 % in Lusaka City. The modal share of vehicles including buses in Lilongwe is estimated to be 39 % in 2030 while that of Lusaka City is 56%. It implicates that transport development shall be less in Lilongwe than in Lusaka.

 Table 6.2.2 Future Modal Share

			(Un	it: %)
Year	2009	2015	2020	2030
All Vehicles (excluding buses)	10	11	12	17
Buses	17	18	20	22
Walk & Bicycle	73	71	68	61
Total	100	100	100	100

Note: Estimates from JICA traffic survey Source: JICA Study Team



(3) Trip Distribution

Vehicle trip distribution based on an origin and destination (OD) matrix is estimated using the gravity model based on the above trip generation/attraction volume and modal share. Vehicle trips distribution is estimated based on the OD matrix.

(4) Future traffic volume (Without project)

Table 6.2.3 Modal Share of Lusaka (Instance)

(Unit: %) 2007 2030 Year All Vehicles 10 30 (excluding buses) 23 26 Buses Walk & Bicycle 65 44 Unknown 2 Total 100 100

Source: JICA Study Team





The trip distribution is firstly estimated on the exiting road network in the case of without road development.

The comparison of traffic volume without road development in 2030 with the current traffic volume (2009) on the exiting roads is presented in Table 6.2.4.

Traffic volume exceeding the road capacity is observed on the M1 section, from Salima Road to the City border in 2030. The most serious expected in 2030 is the M1 section between Paul Kagame road and the Lilongwe river bridge followed by Kenyatta Road and Mzimba Road sections at the Central Hospital Roundabout, and M1 sections at the Area18 Roundabout.

The Figure 6.2.5 shows the M1 road sections including other main roads in the central area which exceed the road capacities in the case of without road development. Accordingly, road development in the future is indispensable for the urban development of the City.

Table 6.2.4 Traffic Comparison between 2009 and 2030 (without Road Development) on
the Existing Road Network

	Traffic volume		
Major road	2000	2030	
	2009	Without Case	
1.M1 Airport Roundabout	3,800 - 4,000	12,000 - 14,000	
2. Salima Road Junction	10,600 - 12,300	25,000 - 28,000	
3. Area 18 Roundabout	10,300 - 10,400	31,000 - 34,000	
4. Mchinji (Cross Road) Roundabout	9,000 - 9,500	30,000 - 35,000	
5. Kenyatta Road Junction	9,500 - 15,500	35,000 - 74,000	
6. Lilongwe Town Hall (Glyn Jones) Roundabout	15,500 - 27,000	74,000 - 83,000	
7. Malangalanga Alt. Road Junction	10,100 - 27,000	71,000 - 74,000	
8. Chidzanja Road Junction	5,400 - 8,000	35,000 - 28,000	
9. City border	3,500 - 5,400	16,000 - 38,000	
10.Presidential Drive	8,000 - 9,100	28,000 - 33,000	
11.Kenyatta Road (Central Hospital Round about)	10,500 - 13,100	38,000 - 46,000	
12.Murray Road	5,500 - 6,500	18,000 - 20,000	
13. Mizumba Road (Central Hospital Roundabout) 11,400 - 11,600 39,000 -			
Source: JICA Study Team			



Source: JICA Study Team

Figure 6.2.5 Traffic Volume of Main Road in 2009 and 2030 (without Road Development)

6.2.2 Bus Demand Projection

Bus trip distribution based on an OD matrix is estimated using the above bus modal share ratio.

The number of person trips per day in the City is assumed to be about 830,000 in 2030. Table 6.2.5 shows the number of person trips per day and the number of public transport vehicles per day in the north-south movement. The number of person trips using public

transport passing through Capital Hill/City Centre Area (accumulation of government office/business facilities) and Old Town Area (accumulation of commercial facilities) is estimated to be about 104,000 per day. Considering the handling capacity volume, it is equivalent to the range from 6,930 to10,400 minibuses per day, and equivalent to the range from 2,080 to 3,470 large buses. In this case, it becomes operation in each 1 to 2 minutes. (If a couple of buses are used, it may be 2 to 5 minutes.)

The massive trip demands are observed in the western parts of the City, Old Town area and Kanengo (accumulation of industrial facilities).

Type of Vehicles	Possible number of passengers (person/ vehicles)	North-south movement (person/day)	Number of operations required (No./day)	Remarks
Minibus	10 - 15		6,930 - 10,400	
Medium size bus	15 - 30		3,470 - 6,930	
Large-sized bus	30 - 50	104,000	2,080 - 3,470	
BRT(MRT)	50 - 80		1,300 - 2,080	Coupled bus with 2unit
LRT	100 - 120		870 - 1,040	two-cars/ formation

Table 6.2.5 Number of Person Trips and Vehicles per Day in the North-South Movement

Note: MRT: Mass Rapid Transit Source: JICA Study Team

> The major inner-city trip movements among areas are shown in Table 6.2.6 and Figure 6.2.6. Since these inner-city area routes present high trip demands, they become the potential trunk routes. Thereby change in bus type operation from minibuses to large buses in addition to increase of the minibus operation shall be required for smooth and prompt transportation service. The minibus service on feeder bus routes will be connected with the trunk bus routes within those areas.



Figure 6.2.6 Number of Trips of Future Public Transport (2030)

Table 6.2.6 Major	Trip Dem	ands for Public	c Transport in	2030
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Main inter-city connection	Area	a No.
High trip demand between the	2	3
areas		4
		47
		48,49,56
	4	48,49,56
	7,8	21,23
	9	47
	25,50	48,49,56
High trip demand to inner area	11,13,16,19,31,4	40
and neighboring areas	28,29,39,51	
	45,46,57,58,59	
	48,49,56	

Source: JICA Study Team

6.3 Development Strategy for Transport System

6.3.1 Road Network Development Strategy

(1) Development strategy

Based on the objectives and approaches for urban transportation development shown in Table 6.1.1, the development strategies for urban road network are presented below:

- a) Expansion of traffic capacity of roads where traffic volume is expected to increase,
- b) Improve road network including missing links contributing to smooth traffic movement.
- c) Promote good accessibility to community centres with paved roads, particularly quasi-residential areas in order to facilitate redevelopment of such areas and generate employment opportunity there,
- d) Road network contributing to commercial/business activities in high density residential and commercial areas,
- e) Complimenting Nacala corridor development, and industrialization and tourism development,
- (2) Hierarchical road composition

A hierarchical road network is essential to maximize road safety and amenity, and provide adequate service for all road users.

A road classification by function is comprised of primary arterial, secondary arterial, collector and access roads. Figure 6.3.1 shows hierarchical road connection in terms of accessibility and mobility. A primary arterial road is accessed via secondary arterial road, then via collector road and via access road at the start. It is not preferable to directly connect an access road with a primary arterial road.

The outline of respective road function is shown below.



Primary Arterial Road

A primary arterial road serves as a spinal backbone connecting inter-cities, and connects major local centres. The road accommodates long-distance traffic with relatively high speeding vehicles. Main road classified by the Roads Authority correspond to this road category.

Secondary Arterial Road

A secondary arterial road performs as a spinal backbone in a city, and supports the

function of a primary arterial road. This road has high traffic capacity in order for the traffic flow to be smooth and facilitate access between core areas in a city. A secondary arterial road is connected with a primary arterial road to accommodate long-distance traffic from and to a city. The secondary road classified by Roads Authority corresponds to this road category.

Collector Road

A collector road links community areas to a secondary arterial road. This road collects traffic from access roads and handles the traffic leading to a major/main road. Urban road classified by Roads Authority corresponds to this road category.

Access Road

Access road links a collector road to residential area, urban facilities, etc. Community road classified by Roads Authority corresponds to this road category.

Road function	Class description	Road type by Lilongwe City Council	Road type by Roads Authority	
Primary Arterial Road	Main road	Primary distributor road	Main road	
Secondary Arterial Road	Secondary road	Secondary distributor road	Secondary road	
Collector Dood	Main urban road	Major/Minor distributor roads	Urban road	
Collector Road	Urban road	Primary/Secondary shopping streets	District road	
	erbair road	Service road for Industrial area		
Access Road	Others road	Primary/Secondary residential streets	Community road	

Source: Planning Guideline: Providing Rural Transport infrastructure, Ministry of Transport & Public Infrastructure, Town & Country Planning Standards and Guidelines for Development, 1986, JICA Study Team

(3) Development Target by Target Year

Main Development Issue

The development issues for road network development are summarized as follows:

- Formulation of an efficient road network for smooth traffic movement and avoiding through traffic inside of the centre area
- Alleviation of traffic congestion in urbanized areas in the city including the busy commercial and business areas, and M1 sections in the centre area
- Pavement of earth roads connected to city centres, and on minibus routes in order to provide employment opportunity and promote income improvement for the quasi residential areas (informal residential areas) through increase in accessibility by paved roads, and accordingly for supporting to improve their living condition
- Operation and maintenance is implemented intentionally.

Development Strategy

Toward 2030, an efficient road network shall be stepwise formulated including new road construction such as Inner Ring and Outer Ring Roads, missing links and road

improvement in accordance with the city growth during the short to long term period.

In order to meet the traffic demand for each target year, road widening, improvement and new additional road construction for the heavy traffic sections (especially increase in the road capacity of M1 sections in the Old Town area and its vicinity) shall be pursued during the short to long term period.

Earth roads connected to area centres in quasi residential areas and minibus routes shall be paved so that the accessibility could be increased to the subject areas during the short to medium term period. Further new paved roads shall be provided for new residential areas in the southern and western parts of the city in the long term period.

These correspond with future land use. A database improvement & technicalcapabilities upsurge necessary for operation and maintenance aims over a short period of time. And planned operation and maintenance starts to be implemented in the future.

Development Target for Short to Long Term

The development targets focused on the main development issues by the target year are summarized in the following table.

		<u> </u>	
		Development Target	
Current Main Development Issues	Short Term	Medium Term	Long Term
	(2010-2015)	(2016-2020)	(2021-2030)
Formulation of an efficient road	Construction of	Completion of	Completion of
network for smooth traffic movement	missing links	construction (Inner	construction (Outer
and avoiding through traffic inside of	-	Ring Road)	Ring Road)
the city		Construction of	Construction of missing
		missing links	links
Alleviation of traffic congestion	Road widening of	Road widening of	Road widening of
	congested sections	congested sections	congested sections
Pavement of earth roads connected to	Pavement of earth	Pavement of earth	Provision of access
area centres & on minibus routes to	roads for area centres &	roads for area centres &	roads for new
generate employment opportunity and	minibus routes	minibus routes	residential areas in the
improve the living condition			southern part of the city
Operation and maintenance is	Database improvement	Planned operation and	Planned operation and
implemented intentionally.	& technical-capabilities	maintenance is	maintenance is
	upsurge necessary for	implemented.	implemented.
	operation and	_	_
	maintenance.		

Table 6.3.2 Development Targets

Source: JICA Study Team

6.3.2 Public Transport Development Strategy

(1) Bus Transport

Transport development process in Malawi appears to promote use of vehicles without going through a step by step process, from bicycle/motor cycles usage. This tendency could continue in the future.

In view of the growing traffic volume projected in section 6.2.2, it would be difficult to manage traffic demand by utilizing private passenger car and minibus only. Furthermore, traffic congestion on main roads could get worse in the future.

In this connection, public transport system should be introduced in order to manage the

mass transport volume generated in the future. It would be preferable to introduce a trunk line system operated by large size buses as a main public transport mode for the City.

Prior to the implementation of the trunk bus system, road infrastructure shall be gradually improved in accordance with the City's development. The phased development of public transport system is explained below:

Short term period: Improvement of Existing Minibus System

The Minibus Owners Association of Malawi (MOAM) manages the current minibus operation excluding non-member operators. Since the risks of the minibus operation are observed in the areas of traffic accidents and stalled vehicles due to poor maintenance, it is necessary for the MOAM to pay attention to safety and O&M of minibuses.

Many minibuses collect passengers while parking along road sides until their capacity is maximized. It causes traffic congestion in the central area of the City. In view of the exiting minibus terminal (Bwaila Hospital Minibus depot) in the Old Town, there would need another depot area, clarification of waiting places for bus lines, and establishment of safety measures for minibus/bus passengers. Another minibus depot shall be constructed and expanded in the direction of Lilongwe River in order to alleviate the congested condition caused by passengers waiting on the road sides.

General information board and destination display boards shall be installed at minibus depots. Moreover, the minibus carriageway shall be separately constructed at sidewalks of the depot in order to ensure safety of the users. Further standardized destination boards shall be posted on each minibus.

All of the minibus routes shall be paved at least up to local market centres. This would lead to reduction of commuting time as it improves traveling speed of minibuses. It also minimizes vehicle damage and promotes investment opportunity around local centres.

The current minibus operation system shall be reviewed in the light of overconcentration of the routes to Old Town, and involvement of the non-MOAM member operators, and rearrangement of the exiting routes.

Medium term period: Introduction of Large Buses for Strengthening the Handling Capacity of Public Transport System

The feasibility study on public transport operated by large buses and their major routes allocation shall be conducted in order to increase transportation capacity during this period.

Moreover, public transport with operating large buses will be carried out on main roads under the mixed traffic condition during this period.

Long term period: Introduction of New Bus System

A new bus system is functionally composed of shuttle buses, circulation buses and

feeder buses as shown in Figure 6.3.2.

Large size buses shall operate as Bus Rapid Transit (BRT) to serve passengers commuting between Old Town/City Centre and Kanengo, and become the main transport mode toward the target year of 2030.

With increasing passengers, when large buses cannot accommodate the carrying capacity, exclusive lanes for BRT shall be introduced.

Shuttle buses shall operate as a rapid bus transport connecting the Old Town and KIA.

Circular links operated by large buses



Figure 6.3.2 Proposed Future Bus Transport System

collect passengers from feeder bus lines and transport them to Old Town and City Centre. Feeder bus lines are also extended too many local centres.

Bus terminals are the main stations serving trunk and feeder line system at a transport nodal point. Fixed bus stops and timetable will be introduced for shuttle and circular lines to maintain prompt services.

With passengers further increasing, and when exclusive bus lanes for BRT cannot accommodate the passenger demands, Light Railway Transit system (LRT, Tram) might be introduced. Introduction of LRT shall be carefully taken into account in terms of advantage and disadvantage. Its advantage is provision of environmentally-friendly transport compared to a vehicle transport. Its disadvantage meanwhile is the high investment and maintenance cost required including the issue of who would operate the system. As a reference, Table 6.3.3 shows the comparison of the characteristics among public transport systems.

		Public transport system				
Item	Unit	Bus Rapid Transit (BRT)	Tram/LRT	Monorail etc.	Subway	Remarks
Transport capacity per hour	1000 person/h	5 - 15	10 - 15	40 - 50	40 - 50	Per one way
Average operation speed	km/h	10 - 20	10 - 20	10 - 30	25 - 35	
Minimum operation interval	Minute	1.0 - 2.0	1.5 - 2.0	1.5 - 2.0	2.0	
Station interval	m	300 - 500	300 - 500	500 - 1,000	1,000 - 1,500	
Construction cost	million USD/km	5 - 10	20 - 30	50 - 150	200 - 300	General costs*
Advantage		 -Usage of road space is available. - Low construction cost - Comparatively easy Operation control 	 Usage of road space is available. Installation of station is easy at any places Small impact on environment in terms of energy consumption 	- Mass transit system is able to establish without any obstruction on road traffic	- Mass transit system is able to establish without any obstruction on road traffic.	

 Table 6.3.3 Comparison of Urban Public Transport System

		Public transport system					
Item	Item Unit Bus Rapid Transit (BRT)		Tram/LRT	Monorail etc.	Subway	Remarks	
UBF -Traffic is -Road th influenced Disadvantage		-Traffic is inferior. -Road traffic is influenced.	-It becomes the run space mixed with vehicles at the intersection etc. -LRT vehicles are expensive. -Advanced operation control is necessary. -Stable supply of power	-High construction cost -Improvement of traffic connection points are required -High maintenance cost -Advanced operation control is required. -Stable supply of power is required	High construction cost -Improvement of traffic connection points are required -High maintenance cost -Advanced operation control is required. -Stable supply of power is required		
The in of the Africa	nstance city in	-Johannesburg (South Africa) 2009	-Alexandria (Egypt)1860 -Helwan (Egypt)1981 -Tunis (Tunisia)1985 -Cairo (Egypt)1896	-	-Cairo (Egypt)1987	Helwan and Tunis utilize lightweight vehicles type Number and starting year	

Note: General cost is made as a standard figure. Cost varies with local situations, such as a land price and geology, and the vehicles and systems to be installed. Source: JICA Study Team

Source: JICA Study Team

(2) Taxi

There are only a few taxi companies with operation licenses in the City. The taxi business could be prosperous in the future because demand for its services is expected to promote the progress of commercial and tourism development. Firstly, the taxi business could need to strengthen its licensing system without illegal operation. Standardization of taxi vehicles (installation of taxi meters and markings for taxi) and taxi fees is also necessary to attain a reliable transportation status.

(3) Railway Transport

Freight railway transport plays an important role in long-distance trips and delivery of bulky cargoes. The sustainable and safety operation shall be carried out taking into account increase in demand for main commodities like maize, tobacco, and fertilizer.

Railway shall be the possible transport mode for carrying passengers when rehabilitation work will be implemented between Salima and Nkaya section because it links the major cities (ex. Blantyre city). Railway should be connected to the proposed Kanengo bus terminal station since it is expected to function as a transport nodal point.

(4) Airport and Air Transport

The KIA started domestic and international operation in 1982 and 1983, respectively. Nevertheless the navigation system is not standardized yet. The navigation system shall be improved to comply with international standards on air transport operations.

Since both air passengers and cargo handling volume are expected to increase in the future, a feasibility study is recommended for the improvement of terminal facilities including strengthening of hand luggage handling capacity for passengers.

6.3.3 Transportation Facility Development Strategy

(1) Parking Area

The parking area is relatively scarce at present in the City. Moreover, the shortage of parking areas causes a lot of cars parked on road sides along M1 in the Old Town. This is an improper usage of the road sides. The space of short-time parking at road shoulder shall be reserved only for goods loading/unloading on the road.

It is high time for the need to construct parking areas especially in Old Town and City Centre. This is expected to reduce parking at road sides along M1 road with the road widening projects. Further, the demand for parking area shall increase since Old Town is to be developed with the building up of commercial activities and with the City Centre serving administration/commercial function.

The LCC is advised to issue ordinance on parking space installation duty clarifying legal body that manage such areas in order to legalize parking business. After enforcing the LCC's ordinance, car parking on roads will be prohibited in the specified areas.

In the early stage, a grand level parking space is secured, and in the later stage the parking area might be converted to multi-story car park buildings. Since the mechanical car parking equipment need high investment cost, the self-run type is suitable. It will be easily converted to a building type of 3-4 stories when a parking space is further required. The parking lots shall be provided in the busy commercial/business areas and operated by public and private sectors.

As shown in the table, since a mechanical type needs high cost and control, its parking space of a self-run type is suitable. A self-run style is comparatively low cost. If it is a simple prefab type, improvement is easy, but it will become a building type of the 3 - 4 floors, in cases where a parking space is more necessary.

		Ground level car	Self-run style mult	Mechanical multi-level	
		parking	Prefab type	Building type	car parking
Outline		This is an outdoor parking type of a ground level. Although there may be a roof, the number of parking surfaces is one.	This is a 2-story parking type of a self- run style. A slope is used for the parking space of the second floor.	All or some of building is the type which is a parking area. The underground parking and roof parking area of a building are also	 Vertical circulation type Multilayer circulation type Lift type Multi-story style This type carries vehicles to the upper layer by
				included in this type.	machine.
Necessary area per unit (m ² /Lot)		20 - 30 (Include a drive way)	12 - 20	12 - 40	3-15
Appropriate improvement scale (Lot)		1 -	20 -	100 -	5 - 150 (Lot/set)
Construction cost p	er unit	3,000	5,000 -	10,000 -	10,000 -
(USD/Lot)		(Coin type; 6,000)	7,000	15,000	30,000
Operation and maintenance cost (100USD/unit/year)		0.5 7 (coin type)	1	1	10
Method of administration		Unmanned is possible.	Unmanned is possible.	Unmanned is possible.	Manned is necessary for mechanical control.
Minimum wide for	Front	3m	30m	30m	3-11m
area	Depth	6m	30m	30m	5-13m

Table 6.3.4 Parking Space Type Characteristics

Notes 1) Ground level car parking was established from road pavement cost. Others were established according to the track record of Japan based on Ground level car parking. Toll gate is not included.

Notes 2) Maintenance/operation, insurance (a building, a machine), and electric energy are assumed by operation-andmaintenance cost.

Notes 3) Number of a table is a value of a standard. It changes with parking space area, numbers of stories, etc. Source: JICA Study Team

(2) Traffic Safety

Traffic safety shall be highlighted to avoid traffic accidents caused by increasing number of vehicles.

In the City Centre, pedestrians and vehicles should be separated. Traffic safety measures are necessary with respect to i) sign boards on traffic restriction, ii) installation of traffic signs, iii) road markings, iv) pedestrian crossing markings, and v) street lights to maintain safety during the night time.

Generally speaking, discipline in driving is not observed. Some drivers ignore traffic signals and overtake dangerously. Pedestrians are forced to cross roads as there are few designated pedestrian crossing in the City.

Dissemination of traffic safety education to drivers and local people shall be done for enhancement of traffic safety. In particular, traffic safety education should be legalized at the time of license acquisition and renewal. It is preferable that primary and secondary schools should provide time to learn traffic safety as part of their curriculum.