No.

MINISTRY OF HOUSING, UTILITIES
& URBAN DEVELOPMENT (MOHUUD)
GENERAL ORGANIZATION FOR
PHYSICAL PLANNING (GOPP)

JAPAN INTERNATIONAL
COOPERATION AGENCY (JICA)

THE STRATEGIC URBAN DEVELOPMENT MASTER PLAN STUDY FOR A SUSTAINABLE DEVELOPMENT OF THE GREATER CAIRO REGION IN THE ARAB REPUBLIC OF EGYPT

FINAL REPORT

VOLUME 3: SUMMARY

(PRE-FEASIBILITY STUDY FOR WESTERN DEVELOPMENT CORRIDOR)

JANUARY 2009

NIPPON KOEI CO., LTD.

KATAHIRA & ENGINEERS INTERNATIONAL

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PREFACE

In response to a request from the Government of Arab Republic of Egypt, the Government of Japan decided to conduct “The Strategic Urban Development Master Plan Study for a Sustainable Development of the Greater Cairo Region in the Arab Republic of Egypt”, and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA dispatched a study team headed by Mr. YAMADA Koji of Nippon Koei Co., Ltd. to Egypt between February 2007 and June 2008 and consisting of Nippon Koei Co., Ltd. and Katahira & Engineers International.

In collaboration with the Government of Egypt, the JICA study team conducted field surveys and formulated the Strategic Urban Development Master Plan for the Greater Cairo Region. The JICA study team held discussions with concerned officials of the Government of Egypt and carried out the Pre-feasibility Study for the Western Development Corridor. Upon returning to Japan, the JICA study team conducted further studies and prepared this final report.

I hope that this report will contribute to the sustainable development of the Greater Cairo Region and to the enhancement of the friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the concerned officials of the Government of Egypt for their close cooperation and assistance extended to the study team.

January 2009

HASHIMOTO Eiji

Vice President

Japan International Cooperation Agency

January 2009

Mr. HASHIMOTO Eiji

Vice President

Japan International Cooperation Agency

Tokyo, Japan

Subject: Letter of Transmittal

Dear Sir,

We are pleased to submit herewith the Final Report of "The Strategic Urban Development Master Plan Study for a Sustainable Development of the Greater Cairo Region in the Arab Republic of Egypt". This study was conducted by Nippon Koei Co., Ltd. in association with Katahira & Engineers International, under a contract to JICA during the period from February 2007 to June 2008. The report comprises a Summary (Volume 1) and Main Report (Volume 2) for the Strategic Urban Development Master Plan for the Greater Cairo Region, plus a Summary (Volume 3) and Main Report (Volume 4) for the Pre-feasibility Study for the Western Development Corridor.

The report sets out recommendations for policies to improve the living environment in the Greater Cairo Region. These recommendations reflect the results of the Strategic Urban Development Master Plan and the Pre-feasibility Study for the Western Development Corridor.

We would like to take this opportunity to express our sincere gratitude to your Agency and the Ministry of Foreign Affairs. We are also most grateful for the cooperation and assistance from the concerned officials in Egypt, the JICA Egypt Office, and the Embassy of Japan in Egypt. The Final Report is the fruit of excellent collaboration between all participants in this study.

Yours faithfully,

YAMADA Koji

Team Leader, JICA Study Team

The Strategic Urban Development Master Plan Study for a Sustainable Development of the Greater Cairo Region in the Arab Republic of Egypt

Preface

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ABBREVIATIONS

AUC	American University in Cairo
ADT	Average Daily Traffic
ATC	Automatic Train Control System
BAT	Best Available Technology
BC	Before Christ
BOD	Biological Oxygen Demand
BOT	Build, Operate and Transfer
BOOT	Build, Own, Operate and Transfer
CAPMAS	Central Agency for Public Mobilization and Statistics
CAPWO	Organization for Execution of Greater Cairo and Alexandria Portable Water and Wastewater Project
CBD	Central Business District
CCTV	Closed Circuit Television
CDC	Cairo Demographic Center
CEPC	Cairo Electricity Production Company
CMO	Cairo Metro Organization
COD	Chemical Oxygen Demand
CREATS	Transportation Master Plan and Feasibility Study of Urban Transport Projects in Greater Cairo Region
CSC	Centralized Substation Control
CTA	Cairo Transport Authority
CTC	Centralized Train Control System
DB	Design Build
DBO	Design Build and Operate
DBFO	Design Build Finance and Operate
DC	Direct Current
DF/R	Draft Final Report
EDHC	Egypt Demographic and Health Survey
EEA	Egyptian Electricity Authority
EEAA	Egyptian Environmental Affairs Agency
EEHC	Egyptian Electricity Holding Company
EETC	Egyptian Electricity Transmission Company
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
ENIT	Egyptian National Institute of Transport
ENR	Egyptian National Railway
ESIA	Environmental and Social Impact Assessment
EU	European Union
F/R	Final Report
F/S	Feasibility Study
FDI	Foreign Direct Investment
FIRR	Financial Internal Rate of Return
GAFI	General Authority for Investment and Free Zones
GARBLT	General Authority for Roads, Bridges and Land Transport
GAID	General Authority for Industrial Development
GCBC	Greater Cairo Bus Company
GCR	Greater Cairo Region
GCSDC	Greater Cairo Sanitary Drainage Company
GCWSC	Greater Cairo Water Supply Company
GCRUPC	Greater Cairo Region Urban Planning Center
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographical Information System
GOE	Government of Egypt
GOJ	Government of Japan
GOPP	General Organization for Physical Planning
GRDP	Gross Regional Domestic Product
GTZ	Deutsche Gesellschaft fur Technische Zusammenarbeit
GWWC	Giza Water and Wastewater Company
HCWW	The Holding Company for Water and Wastewater
HB	Home Based
HFO	Heavy Fuel Oil
HH	Household
HIS	Household Interview Survey
IBRD	International Bank for Reconstruction and Development (World Bank)
IC/R	Inception Report
ICT	Information Communication Technology
IDA	Industrial Development Authority
IEE	Initial Environmental Examination
IPP	Independent Power Producer

IT/R	Interim Report
JBIC	Japan Bank for International Cooperation
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
ktoe	kilo ton oil equivalent
LFO	Light Fuel Oil
LIM	Linear Introduction Motor
LRT	Light Rail Transit
MENA	Middle East and North Africa
M/M	Minutes of Meeting
MOF	Ministry of Finance
MOHP	Ministry of Health and Population
MOHUUD	Ministry of Housing, Utilities and Urban Development
MOI	Ministry of Investment
MOIC	Ministry of International Cooperation
MOT	Ministry of Transport
MOTI	Ministry of Trade and Industry
MSEA	Ministry of State for Environment Affairs
MSLD	Ministry of State for Local Development
MSW	Municipal Solid Waste
MSWM	Municipal Solid Waste Management
MWRI	Ministry of Water Resources and Irrigation
NAT	National Authority for Tunnels
NHB	Non Home Based
NOx	Nitrous Oxides
NUC	New Urban Community
NUCA	New Urban Community Agency
OD	Origin and Destination
OCC	Operating Control Center
OECD	Organisation for Economic Co-operation and Development
OHD	Overhead Catenary
Pax.	Passenger
PC	Pre-stressed Concrete
PCU	Passenger Car Unit
pphpd	passenger per hour per direction
PPP	Public Private Partnership
PSU	Primary Sampling Units
PTPS	Public Transport Passenger Survey
R&D	Research and Development
ROW	Right of Way
S/W	Scope of Work
SCF	Standard Conversion Factor
SDMP	The Strategic Urban Development Master Plan Study
SOx	Sulfur Oxides
STRASYA	Standard Urban Railway System for Asia
SWM	Solid Waste Management
TOR	Terms of Reference
UCA	Urban Control Area
UDA	Urban Development Area
UGB	Urban Growth Boundary
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPA	Urban Planning Area
USAID	United States Agency for International Development
VOC	Vehicle Operating Cost
WHO	World Health Organization
WPP	Water Purification Plant
WWPT	Wastewater Treatment Plant

MEASUREMENT

Length

mm	=	millimeter
cm	=	centimeter
m	=	meter
km	=	kilometer

Area

cm2	=	square centimeter
m2	=	square meter
ha	=	hectare
km2	=	square kilometer

Volume

cm3	=	cubic centimeter
m3	=	cubic meter
l	=	litter

Weight

mg	=	milligram
g	=	gram
kg	=	kilogram
t	=	Ton
mg/l	=	Milligram per liter

Time

s	=	second
min	=	minute
hr	=	hour
d	=	day
yr	=	year

Electrical Measurement

V	=	volt
kV	=	kilovolt
A	=	ampere
VA	=	voltampere
MVA	=	megavoltampere
kW	=	kilowatt
MW	=	megawatt
GW	=	gigawatt
kWh	=	kilowatt hour
MWh	=	Megawatt hour
GWh	=	Gigawatt hour
ktoe	=	kiloton oil equivalent

Other Measures

%	=	percent
HP	=	horsepower
℃	=	Celsius degree

Currency

USD	=	US Dollar
LE	=	Egyptian Pound
JPY	=	Japanese Yen

Exchange Rate
(As of 15 February, 2008)

US$1 = JPY 110.0= L.E. 5.5

Introduction

(1) Background of the Study

i In response to a request from the Government of the Arab Republic of Egypt (hereinafter referred to as "GOE"), the Government of Japan (hereinafter referred to as "GOJ") decided to implement "the Strategic Urban Development Master Plan Study for a Sustainable Development of the Greater Cairo Region" (hereinafter referred as "the Study") within the framework of the Agreement on Technical Cooperation between the GOJ and the GOE, as signed on June 15th, 1983.

ii Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for technical cooperation programs, decided to undertake the Study and dispatched a JICA Study Team. The Study is being done in close cooperation with the GOE authorities concerned with this work.

iii The Ministry of Housing, Utilities and Urban Development (hereinafter referred to as "MOHUUD") is the responsible agency represented by General Organization for Physical Planning (hereinafter referred to as "GOPP"). GOPP is the counterpart agency for the JICA Study Team and was the coordinating body for other relevant organizations to ensure the smooth implementation of the Study. The Study was being done in close cooperation with the GOE concerned authorities, particularly the Greater Cairo Region Urban Planning Center (GCRUPC) under GOPP.

iv In accordance with the Scope of Works agreed between GOPP and JICA, the objectives of the Study on the Strategic Urban Development Master Plan for a Sustainable Development of the Greater Cairo Region (GCR) in Arab Republic of Egypt consist of the following:

1) To formulate a strategic development master plan for the GCR and new urban communities for the target year of 2027 to achieve sustainable socio-economic development though balanced urban development;

2) To formulate an implementation scheme for priority development corridors, considering the effectiveness of urban development integration with transportation development; and

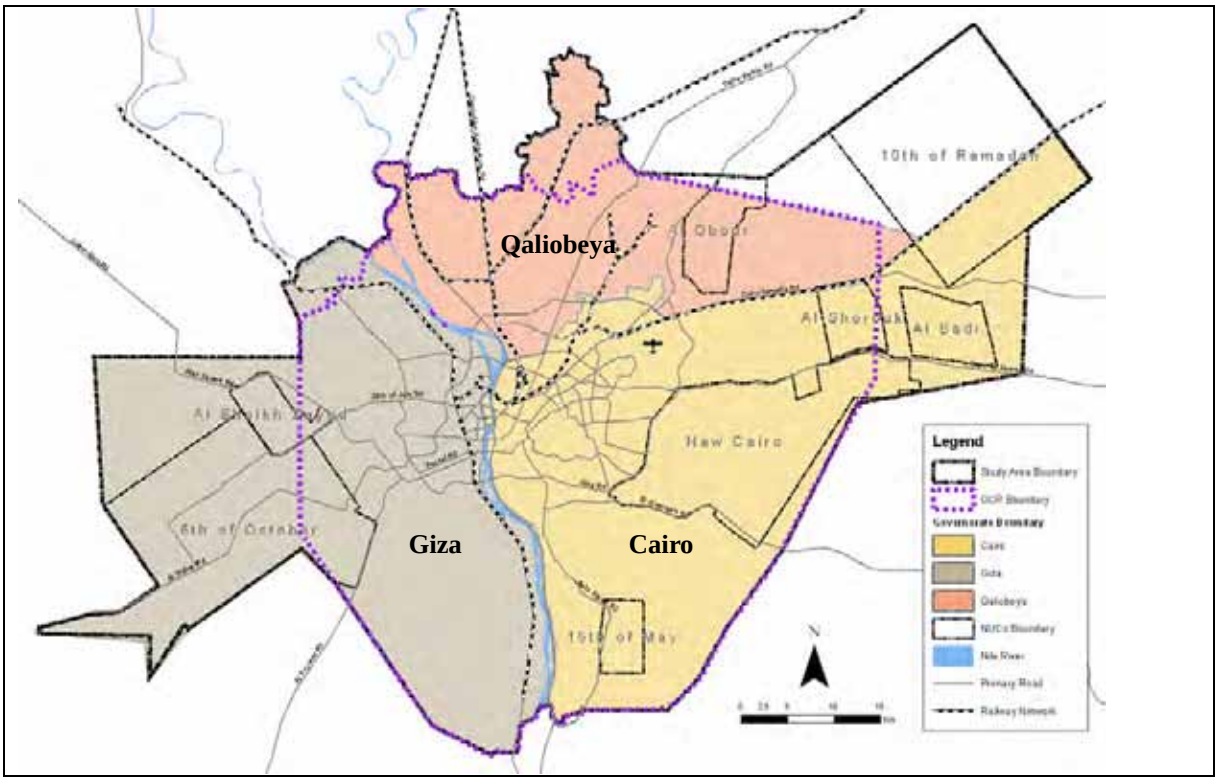
3) To exchange experience related to urban planning and urban development.

v The study consisted of two phases: (i) The first phase, for the strategic development Master Plan; and (ii) The second phase, for the pre-feasibility study for the development corridor. This report contains part of the outcomes of the pre-feasibility study for the priority development corridor, which was selected in the first phase.

(2) Future Growth Pattern of the Greater Cairo Region in 2027

vi The study area for the Master Plan phase includes Cairo governorate, part of Giza and Qaliobeya governorates, and 10th of Ramadan new urban community (NUC) as shown in

Figure 1. The study area consists of 529 administrative units, and covers an area of 4,367 km^2, as shown in the Table 1.



Source: Census, CAPMAS, 2006

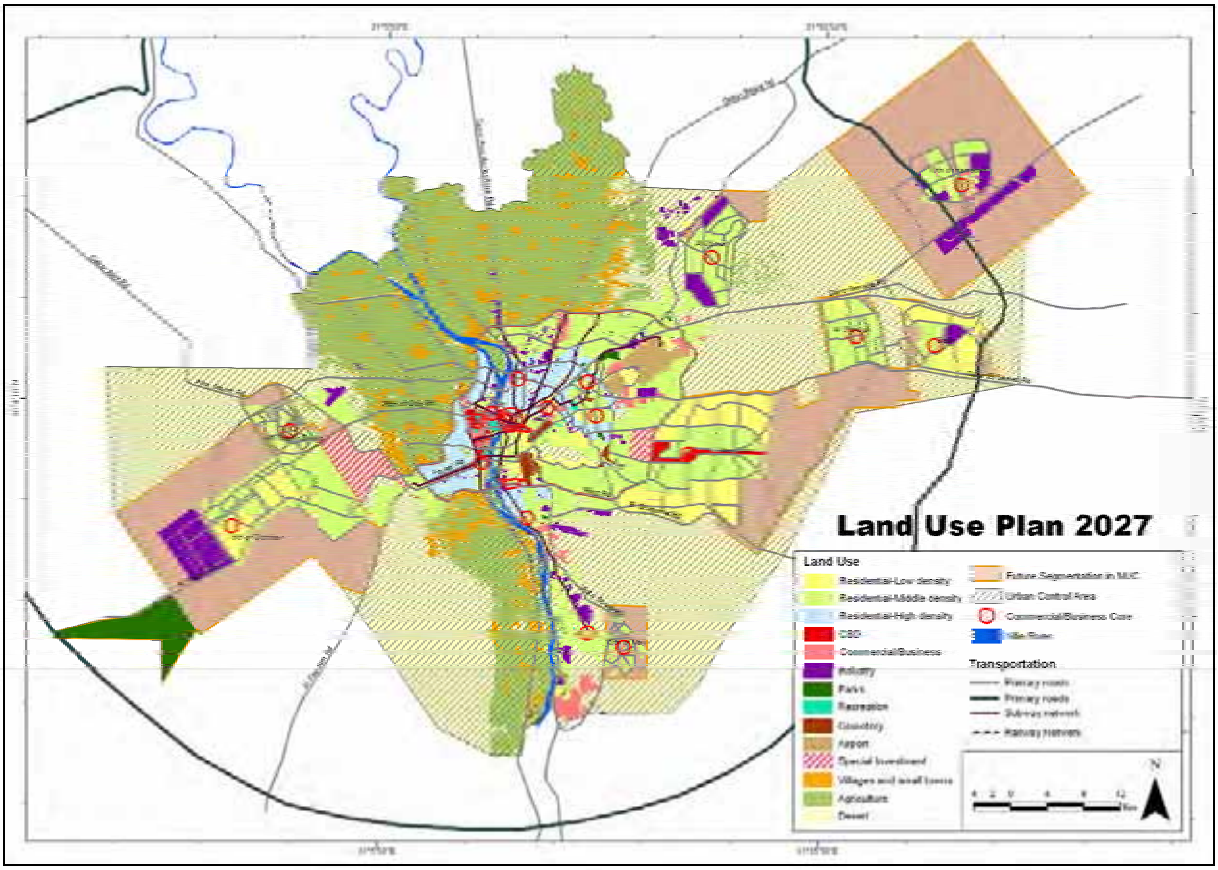
Figure 1 Location Map of the Study Area (Master Plan Phase)

Table 1 Administrative Unit, Land Area, and Population in the Study Area (Master Plan Phase)

Governorate	No. of Administrative Units (units)	Land Area (km^2)	Population in 2006 (1,000)
Cairo	325	1,636	7,787
Giza	95	1,550	5,131
Qaliobeya	122	788	3,059
10th of Ramadan NUC (Sharqia)	2	393	124
Total	544	4,367	16,101

Source: Census, CAPMAS, 2006

vii In the Master Plan phase, the future growth pattern was formulated for the study area with the target year of 2027. Among three alternatives for the future growth pattern that were proposed, the most favorable alternative was the one that accommodated the largest population in new urban communities (NUCs) and restrained further development in the main agglomeration, villages and small towns. Based on the proposed future growth pattern, a general land use plan was formulated for the year of 2027. This plan is designed to reform the urban structure, changing it from the mono-centric from to multi-polar cores based on NUCs as shown in Figure 2.



Source: JICA Study Team

Figure 2 General Land Use Plan of the Study Area in 2027 (Master Plan Phase)

(3) Western Development Corridor

viii A review of the transport model of CREATS was conducted during the first phase of the study. The population projections were updated to conform to the Master Plan estimates, the transport network was adjusted, and other relevant parameters were reviewed and updated. As a consequence, the revised transport model revealed changes to CREATS recommendations that will be need to be implemented in the GCR transport network in the future. These proposed changes are incorporated into the recommended solution for the Master Plan, as listed in Table 2.

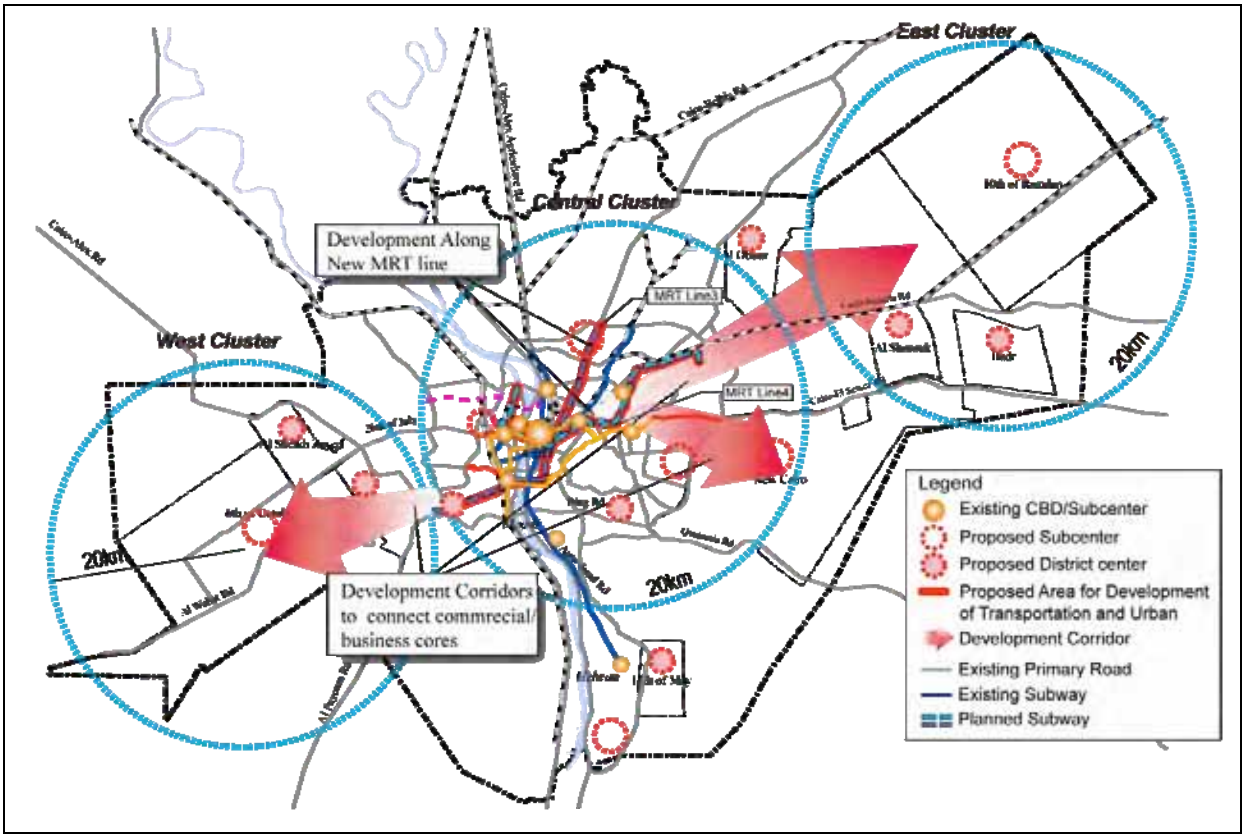
Table 2 Proposed Changes in CREATS Recommendations

Project	CREATS Phase	SDMP Phase
MRT L4 Whole Line	Long term	As listed separately below:
MRT L4, El Malik-Pyramid Section	Long Term	Short Term
MRT L4, Extension from Pyramid to 6 Oct.	Not considered	Medium Term (New)
MRT L4, El Malik to eastward	Long Term	Long Term
Super Tram 1	Short Term	Not considered
MRT L3 Branch (Alternative to Super Tram 1)	Not considered	Short Term
Extension to New Cairo	Not considered	Medium Term (New)
Al Farag Road (Ext. of E4-3 to 6 Oct)	Not considered	Short Term
Extension of Exp. Way to RR bordered on New Cairo	Not considered	Short Term

Source: JICA Study Team

ix To achieve the goals, objectives, and development strategies proposed in the Master Plan phase, three development corridors were proposed to interlink the main agglomeration and NUCs. These were:

1) Central Development Corridor: Cairo - New Cairo;
2) Western Development Corridor: Northern Giza – 6th of October; and
3) Development Corridor: Cairo – 10th of Ramadan.



Source: JICA Study Team

Figure 3 Proposed Development Corridors in the Study Area for 2027

x Among the three development corridors that were proposed, the Western Development Corridor was selected as the subject of the pre-feasibility. Selection of the Western Development Corridor for the pre-feasibility study was based on the JICA Study Team's discussions with GOPP and GCRUPC, and consideration of the goals, objectives, and strategies elaborated in the strategic Master Plan. The needs and priorities of the Western Development Corridor were examined in view of the Master Plan sub-sector strategies, as summarized below:

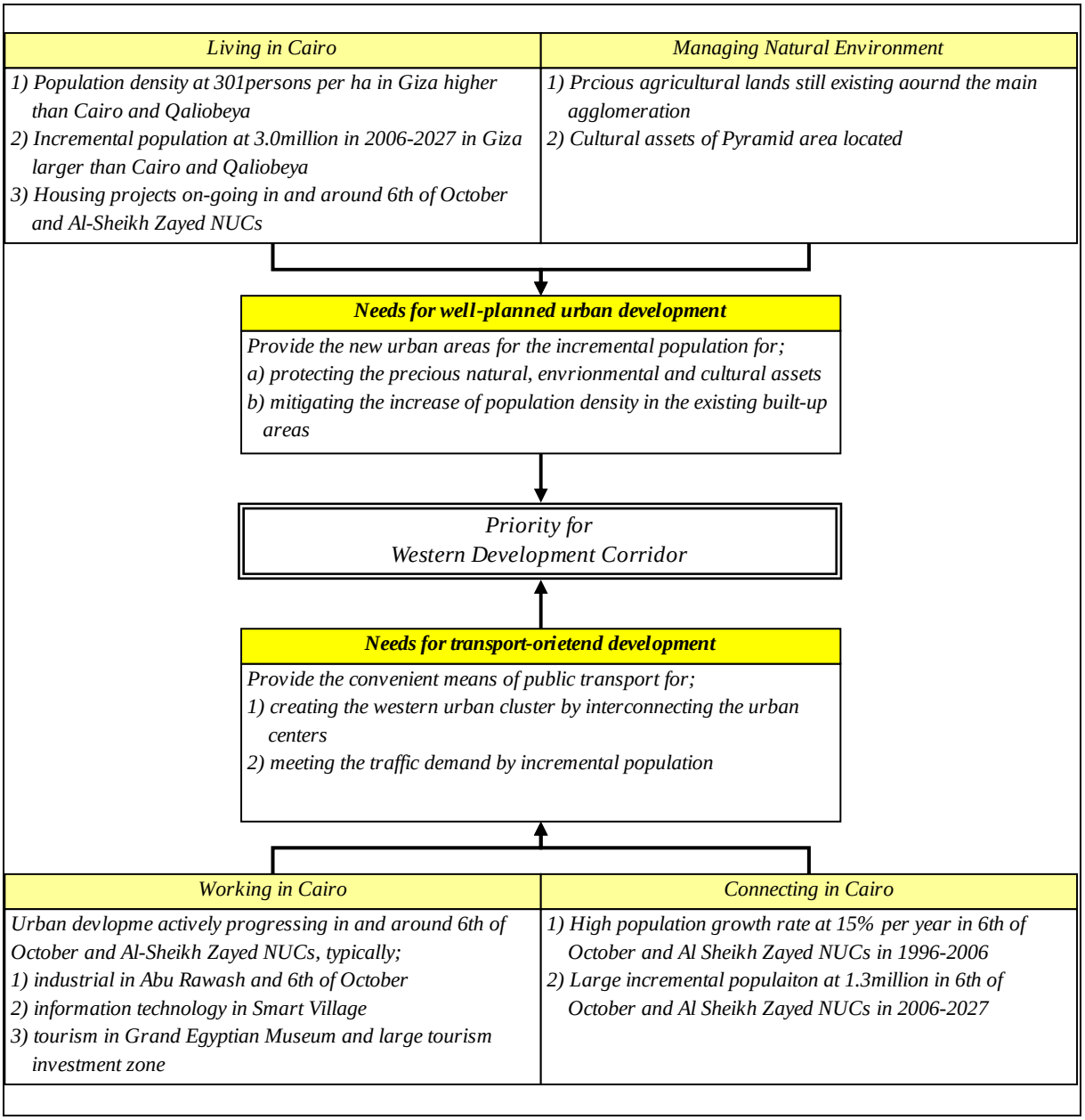
1) *Living in Cairo*: Giza governorate's population will increase by three million between 2006-2027, which is larger than that of Cairo and Qaliobeya governorates. Its population density in the existing built-up areas was already rated as high with more than 300 persons per ha in 2006. Well-planned new urban areas need to be developed so that they are capable of accommodating the population increase and reduce the population concentration in the existing built-up areas.

2) *Managing the Natural Environment*: Scarce agricultural land and valuable archeological areas (Pyramids) exist on the outskirts of the main agglomeration area. These precious resources need to be managed by providing well-planned urban areas.

3) *Working in Cairo*: Urban development is actively progressing in and around 6th of October and Al-Sheikh Zayed. This development will create hubs for different industrial sectors, including manufacturing in Abu Rawash and 6th of October, information technology in Smart Village, and tourism in the Grand Egyptian Museum and Tourism Investment Zone.

4) *Connecting Cairo and NUCs*: The Master Plan estimated that the incremental population of 6th of October and Al-Sheikh Zayed NUCs will be 1.3 million in 2027. A public transport system will be needed to interconnect the new urban centers, housing areas, and main agglomeration.

Figure 4 shows the needs and priorities of the Western Development Corridor in accordance with the sub-sector strategies.



Source: JICA Study Team

Figure 4 Priority for the Western Development Corridor

(4) Objectives, Study Area, and Approach for the Pre-Feasibility Study

xi The pre-feasibility study (Pre-F/S) for the Western Development Corridor aimed at formulating a preliminary implementation scheme for effective urban development that was integrated with transportation development. The proposed implementation scheme included the following tasks.

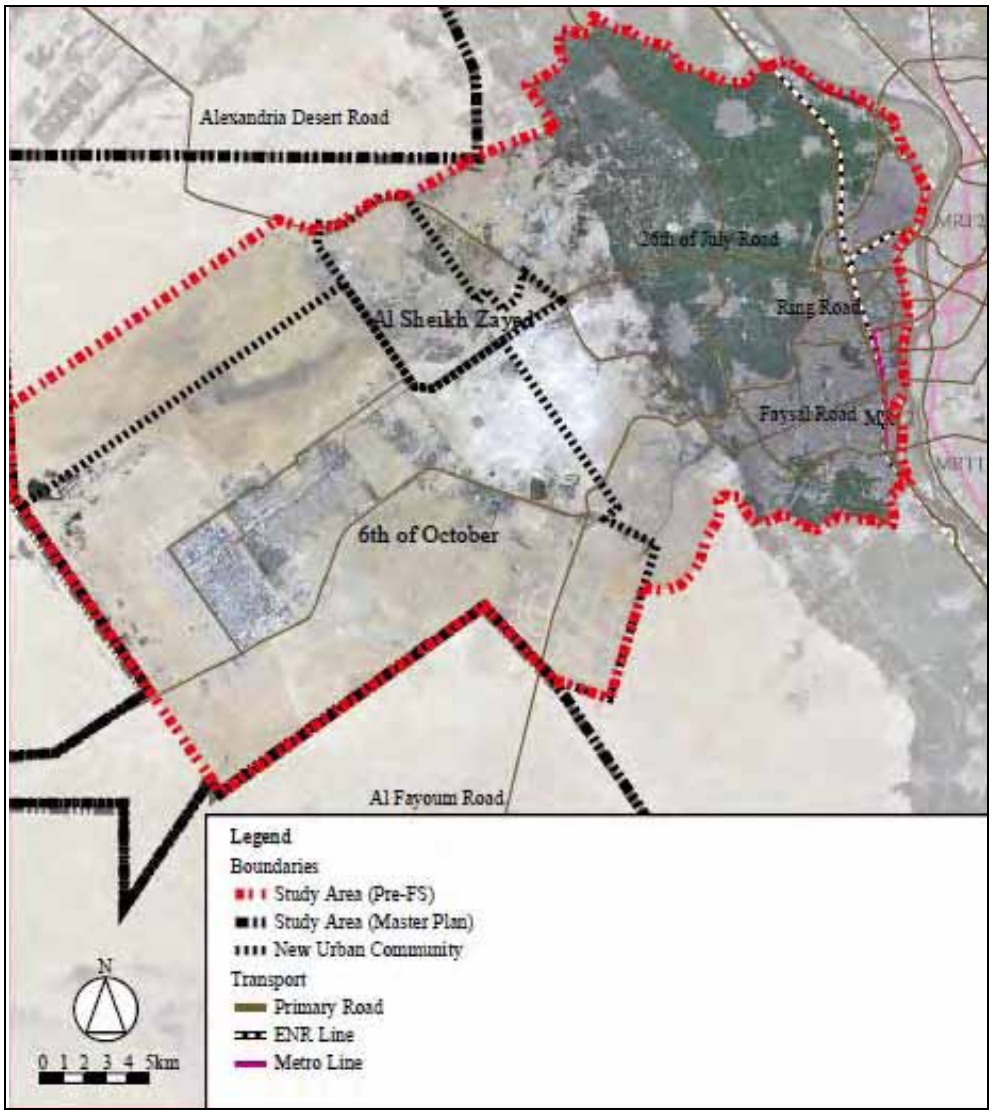
1) To formulate general land use plans for the pre-feasibility study area and the selected stations/terminals of the public transport systems to be installed along the Western Development Corridor;

2) To prepare a preliminary design for the public transport systems;

3) To carry out a pre-environmental impact assessment (Pre-EIA) for the urban development and public transport system;

4) To recommend a Public Private Partnership (PPP) scheme for implementation of the public transport system.

xii The study area for the Pre-F/S is located on the west bank of the River Nile. The study area covers the main agglomeration of Giza Governorate and two NUCs, namely 6th of October and Al Sheikh Zayed. It also includes villages and small towns dispersed in the agricultural lands and located on desert lands between the main agglomeration and NUCs. Figure 5 shows the boundary of the Pre-F/S study area. The study area covers an area of 843.4 km^2 and it accommodated a population of 4.1 million in 2006. The boundary of the study area is adjusted to the *shiakha*[1] boundaries designated in the latest CAPMAS census for 2006.

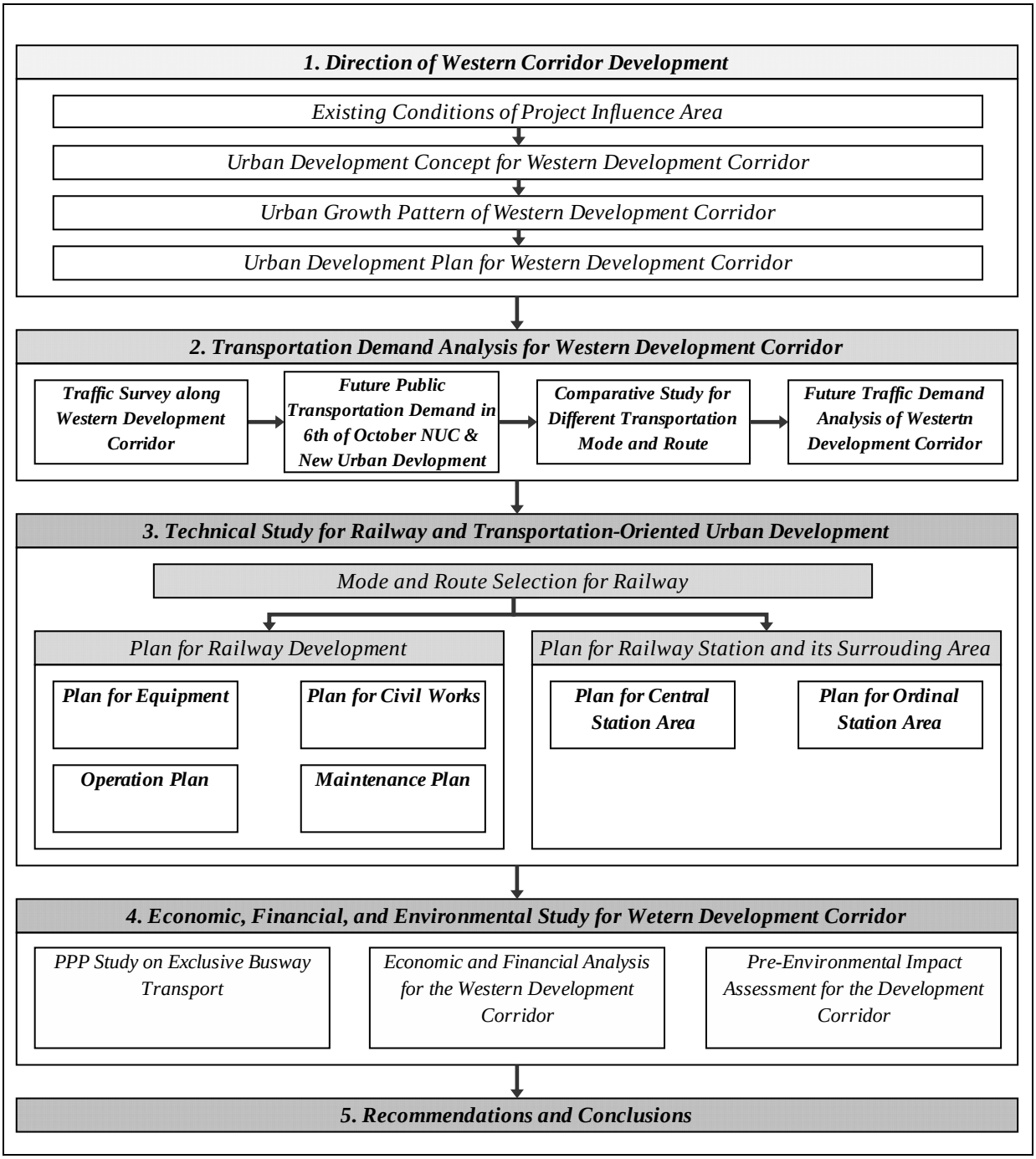


Source: CAPMAS, Census, 2006
Source : Landsat Satellite Imagery, 2007

Figure 5 Location Map of the Study Area for the Pre-Feasibility Study

[1] *Shiakha* is the minimum sub-division of the administrative unit.

xiii Figure 6 shows the work flow for the Pre-F/S study. This consisted of five stages: (i) formulation of the planning direction for the Western Development Corridor; (ii) carrying out the transportation demand analysis for the Western Development Corridor; (iii) formulating the plan for railway and transportation-oriented urban development, with cost estimates; (iv) carrying out economic and financial analyses and an environmental study; and (v) to preparing recommendations and conclusions.



Source: JICA Study Team

Figure 6 Work Flow for Formulation of Pre-Feasibility Study

1 Western Corridor Development Plan

1.1 According to the latest census by CAPMAS in 2006, the population in the study area was 4.1 million in 2006 as compared with 2.9 million in 1996. The growth rate was 3.6% per year between 1996-2006. This is higher than that in the full Master Plan study area, which was 2.2% per year for the same period. The new urban communities (NUCs) experienced a rather high population growth rate at 14.8% per year in this period, while the growth rates for the main agglomeration and villages and small towns were 3.1% and 4.1% per year, respectively.

Table 1.1 Existing Population and Growth Rate by Built-up Area in the Study Area

Built-up Area	Population (1,000)				Growth Rate in 1996-2006 (% per year)
	1996		2006		
		%		%	
Main agglomeration	2,386	83.4	3,232	79.6	3.08
Villages and small towns	427	14.9	639	15.7	4.11
New urban communities (NUCs)	47	1.6	187	4.6	14.82
6th of October	27	0.9	157	3.9	19.12
Al Sheikh Zayed	20	0.7	30	0.7	4.22
Total	2,860	100.0	4,058	100.0	3.56
Study area for the Master Plan	13,045		16,101		2.22

Source: CAPMAS, Census, 2006

1.2 The main agglomeration accommodates a large part of the existing population of GCR, accounting for more than 80% of the total population in both 1996 and 2006. Villages and small towns followed, with a share of 16% in 2006. Although the NUCs experienced a considerably high growth rate in the period from 1996 to 2006, their share of the total population was less than 5%. Further population shift to NUCs needs to be accelerated in order to reducing the population concentration in the main agglomeration and to regulate random development in villages and small towns.

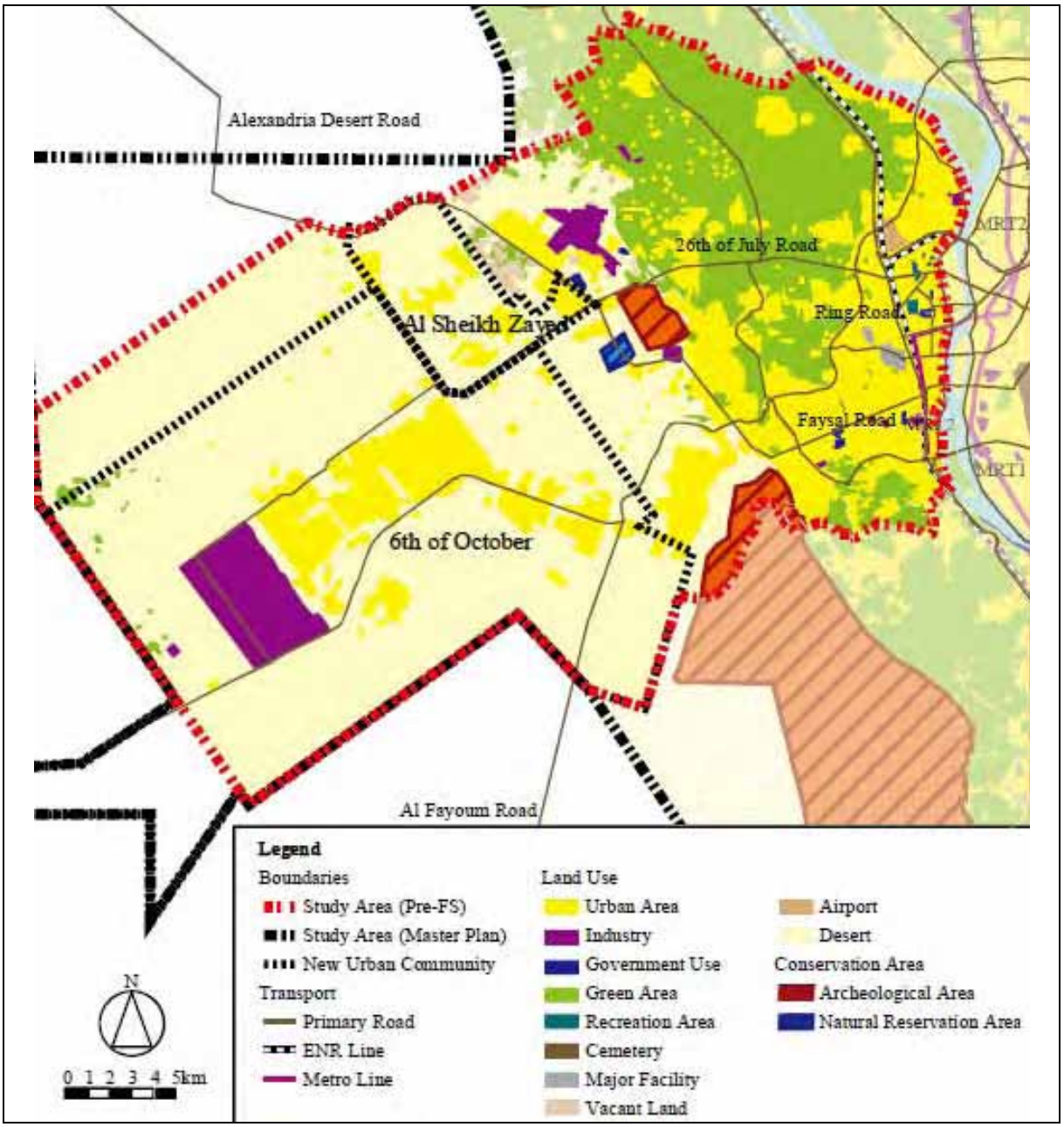
1.3 The existing land use (2007) of the Pre-F/S study area is shown in Figure 1.1. The eastern part includes main urban centers, such as Giza, Dokki, and Muhandeshin. The outskirts of the main agglomeration extend in part to the Ring Road fringe. Agricultural lands extend to the north and south outside the main agglomeration. Small groups of the existing built-up areas (villages and small towns) are dispersed over the agricultural lands. Desert land accounts for a large part of the western section of the study area. Two new urban communities, namely 6th of October and Al Sheikh Zayed have been developed in the study area. In the north, industrial developments are in progress, including the Abu Rawash Industrial Park and the Smart Village being developed for the IT industry.

1.4 The New Urban Communities Authority (NUCA) initiated the development of 6th of October and Al Sheikh Zayed NUCs. 6th of October occupies a large area of land (415 km^2) and it is planned to accommodate an ultimate population 3.8million. Al Sheikh Zayed has a land area of only 45 km^2 and it will eventually accommodate a population of 0.5 million. Existing housing units in 6th of October and Al Sheikh Zayed total 253,000 and these provide a capacity to house more than one million residents.

1.5 6th of October offers a large area for industrial development. In 2007, 57% (2,135 ha) of the designated industrial area of 3,740 ha was already developed. There were 906

establishments with a total annual production value of LE9,538 million and providing a total of 82,000 job opportunities.

1.6 The Egyptian Environmental Affairs Agency (EEAA) has delineated a nature protection area called the Qubet El Hassana Dome Protectorate in the study area. This protectorate is quite small, with an area of 1 km^2. In addition, Law 117/1983 has delineated an extensive archeological protection area, which covers the vicinity of the Pyramids and their hinterlands, and extends a considerable distance to the south. However, only a small part of this archeological protection area is within the Pre-F/S study area.



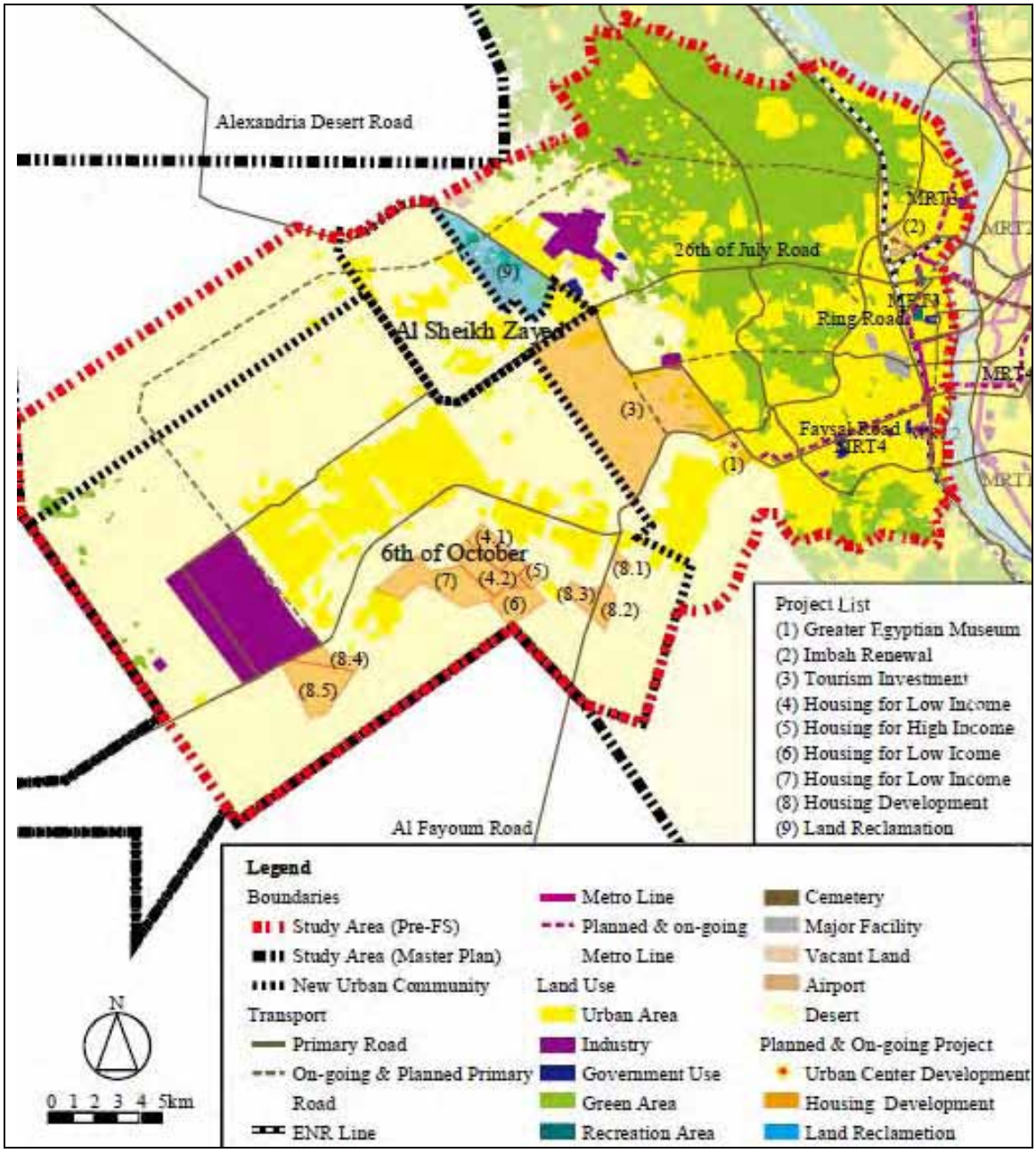
Source: Giza governorate

Figure 1.1 Existing Land Uses and Regulated Areas for Archeology and Natural Protection

1.7 Large-scale urban and transport projects are on-going or in preparation by the relevant authorities. These projects will enhance the urbanized areas between the main agglomeration and 6th of October and Al Sheikh Zayed. The General Authority for Investment and Free Zones (GAFI) contemplates a new housing development project in the area between the 26th of July Road and Al Fayoum Road, located in the desert areas between the main agglomeration and 6th of October. Other housing development projects have been initiated by the public and private sectors in the southern part of 6th of October. There are five housing projects that have been implemented in ten different locations. These developments supply housing units to low income groups and medium to high income households.

1.8 In addition to the above, a large-scale urban development projects has been initiated by the Ministry of Housing, Utilities, and Urban Development (MOHUUD). The project aimed at urban renewal near Imbaba Airport and its surrounding areas in the northern par of Giza. Furthermore, a new national museum, known as the Greater Egyptian Museum, is planned to be constructed along the Alexandria Desert Road to the north of the Giza Pyramids.

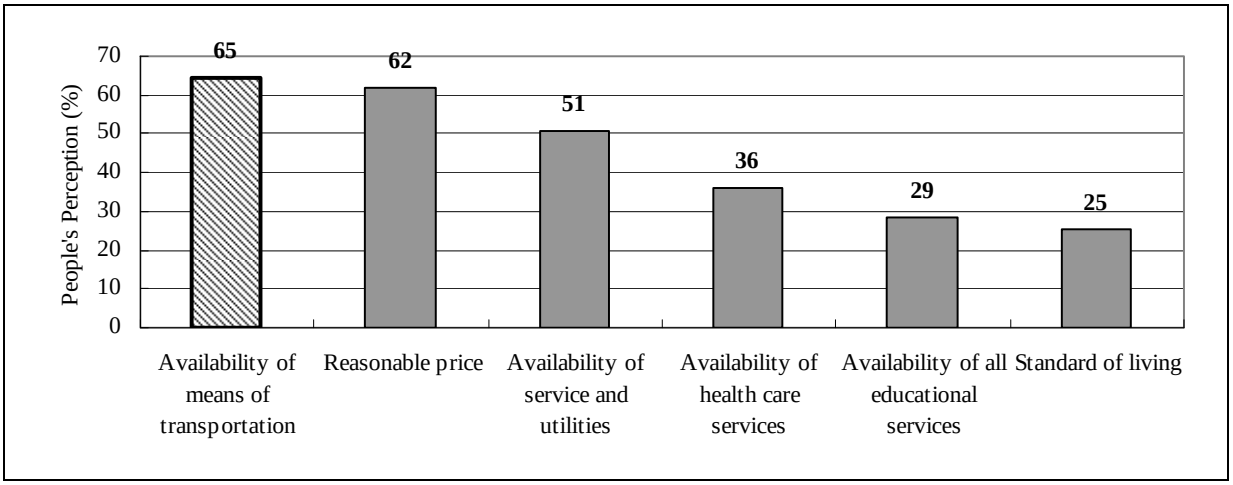
1.9 Ministry of Transport (MOT) and MOHUUD has carried out a preliminary study for the new Al Farag trunk road that would run across the northern part of the study area, extending from the main agglomeration to the NUCs. It is said that there is a possibility to combine the road with a railway that would be a branch for ENR line. The railway would be for freight and possibly passengers as well.



Source: JICA Study Team

Figure 1.2 Location of Related Urban Development and Urban Transport Projects

1.10 The vitalization of NUCs is one of the main issues to be addressed in the study area. An opinion poll survey undertaken during the Master Plan phase revealed that 80% of respondents had no intention to move to NUCs. However, 79% of respondents preferred NUCs for their children's residence in the future. The survey also revealed that the conditions which need to be changed to encourage people to move to NUCs included a convenient means of transport, which was the most important condition (65%), followed by provision of affordable housing (62%) and well-planned services and utilities (51%).



Source: Opinion Poll Survey for Urban Planning in GCR, JICA Study Team, 2007

Figure 1.3 Conditions Required for Moving to NUCs

1.11 The issues in the study area were determined on the basis of technical analyses, an opinion poll survey of people's perceptions of the current living environment in NUCs, and comments made by local government officials in workshops, as summarized in Table 1.2.

Table 1.2 Main Challenges and Assets in the Study Area

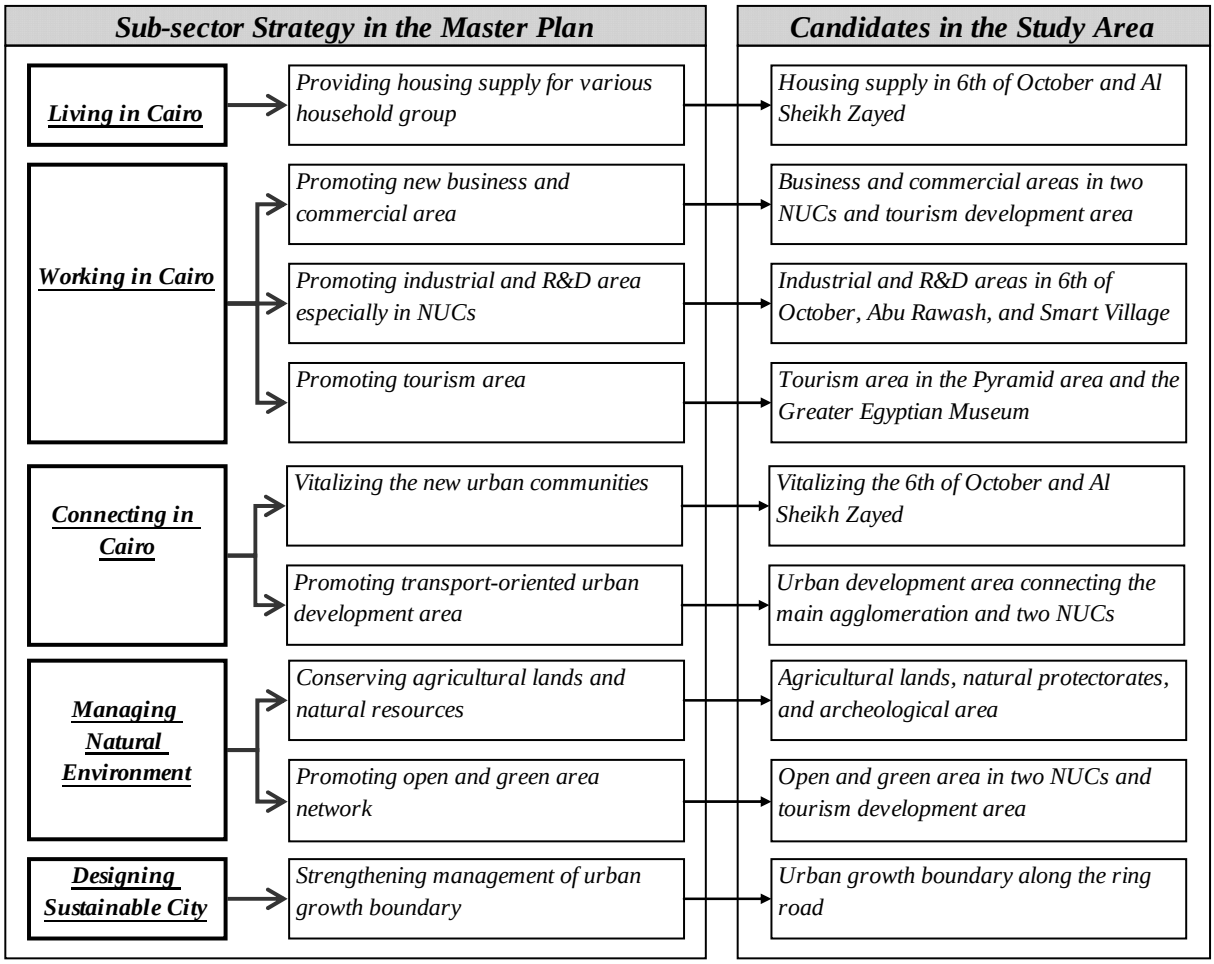
Sector	Urban Development Aspect	Urban Transport Aspect
Technical Analysis	1) Encroachment on agricultural lands outside the Ring Road. 2) High population density in the main agglomeration. 3) Low population shift to NUCs, in spite of active development in their entities and vicinities. 4) Inefficient urban expansion in NUCs and desert areas with low density.	1) Insufficient connection between the NUCs and the main agglomeration. 2) Insufficient provision of public transport between the NUCs and the main agglomeration.
People's Perception	1) Insufficient provision of infrastructure including solid waste management and natural gas. 2) Insufficient provision of parks and social welfare.	1) Insufficient provision of paved roads. 2) Insufficient provision of pubic transport.
Issues by Governorate Officials	1) Insufficient provision of green areas, parks, and recreation areas. 2) Insufficient management of cultural, natural, and historical assets. 3) Need to promote the urban renewal in the main agglomeration. 4) Need to relocate markets and factories.	1) Insufficient provision of car parks.

Source: JICA Study Team

Note: An opinion poll survey and workshops for governorate officials at the district level were undertaken in the Master Plan stage for the GCR.

1.12 The SDMP proposed goals, objectives, and development strategies up to 2027 for GCR. By following the proposed goals in the Master Plan, and taking into account the main challenges and assets of the study area, the priority for future urban development in the study area was determined, as shown in Figure 1.4.

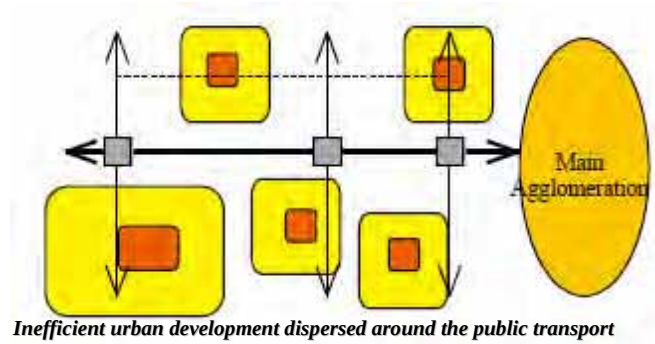
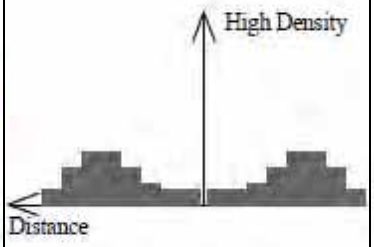
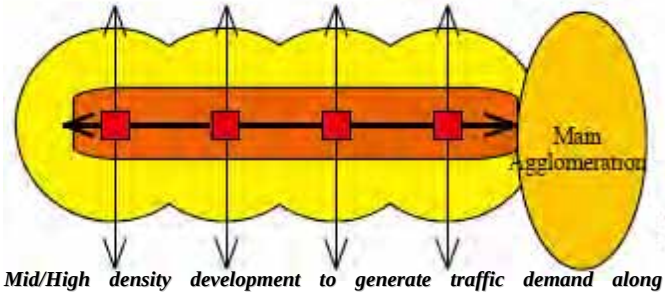
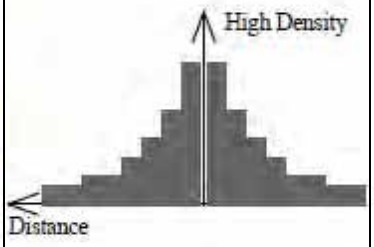
1.13 The NUCs and surrounding area in desert lands will be the focal point for realizing the proposed directions and addressing the main challenges. This area could accommodate various urban development projects including housing, commercial, business, and manufacturing. Urban development in these areas will contribute to mitigating the population concentration in the main agglomeration and lead to new prospects for future urban growth in NUCs. The provision of public transport to these areas will be a key factor for vitalizing the NUCs.



Source: JICA Study Team

Figure 1.4 Sub-sector Strategies in the Master Plan and their Priority Areas in the Study Area

1.14 The areas along the development corridor for the public transport system need to be relatively densely inhabited, so as to generate sufficient traffic demand for public transport. However, at present, the urban development along the proposed new transport corridor has a rather low in density. Over time, these urban centers and the surrounding localities will become medium to high density urban areas. Ideally, the urban centers will be best interlinked by public transport systems and connected to the surrounding localities by feeder transport. Figure 1.5 shows the current and proposed characteristics of urban development along the development corridor.

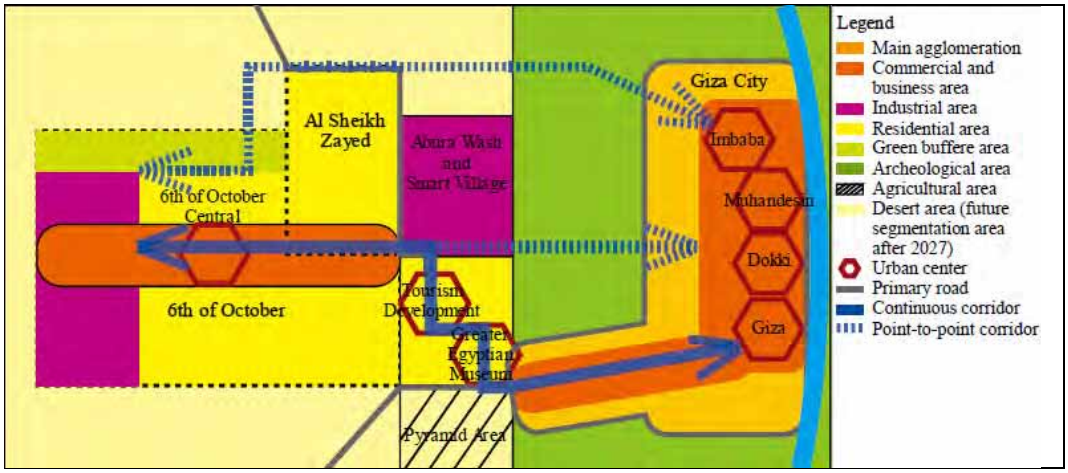
Type	Spatial Pattern	Density of Built-up Areas
Existing Development Pattern	 ***Inefficient urban development dispersed around the public transport***	
Proposed Development Pattern	 ***Mid/High density development to generate traffic demand along development corridor***	

Source: JICA Study Team

Figure 1.5 Concept of Transport-oriented Development for Western Development Corridor

1.15 The future growth pattern along the proposed Western Development Corridor is envisaged as depicted in the Figure 1.6. The NUCs and the main agglomeration will be interlinked by three corridors, consisting of two point-to-point corridors and one continuous urban/transport corridor. On-going and planned development projects will create new urban centers in the areas between NUCs and the main agglomeration. Those urban development projects will be sufficient for providing housing units required for the future demand. After 2027, the northern and southern areas of the study area will remain as desert lands.

1.16 The agricultural areas in the north and northwest need to be protected from urbanization. In particular, when Al Farag Road is developed, pressure for urbanization will be high. In order to stop the random spread of urbanization, the urbanization boundary should be enforced. In addition, it should be noted that the new road should be designed so that it does not allow people to gain easy access to the agricultural area. For example, providing a physical gap or obstacles should be considered, such as making the road partially underground or elevated, and installing fences wherever the urbanization of agricultural lands alongside is the road might be expected.



Source: JICA Study Team

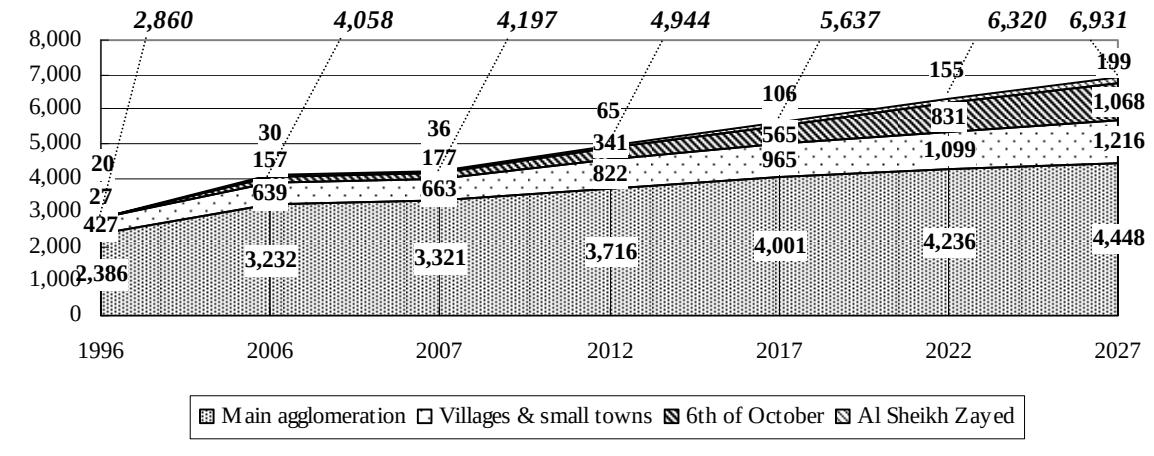
Figure 1.6 Future Growth Pattern of the Western Development Corridor until 2027

1.17 The Strategic Urban Development Master Plan projected the population, number of workers and students up to the target year of 2027. Based on these projections, the planning framework for the study area was set out, as shown in Table 1.3. The total population will increase from 4.1 million in 2006 to 6.9 million by 2027. Consequently, it was estimated that the number of workers will be 1.5 million and the number of students will be 2.0 million in 2027. Table 1.3 shows the population in the study area from 2006 through 2027 with the intermediate years from 2007 being the benchmarks, separated by the five years.

Table 1.3 Number of Population, Workers, and Students in the Study Area in 2006-2027

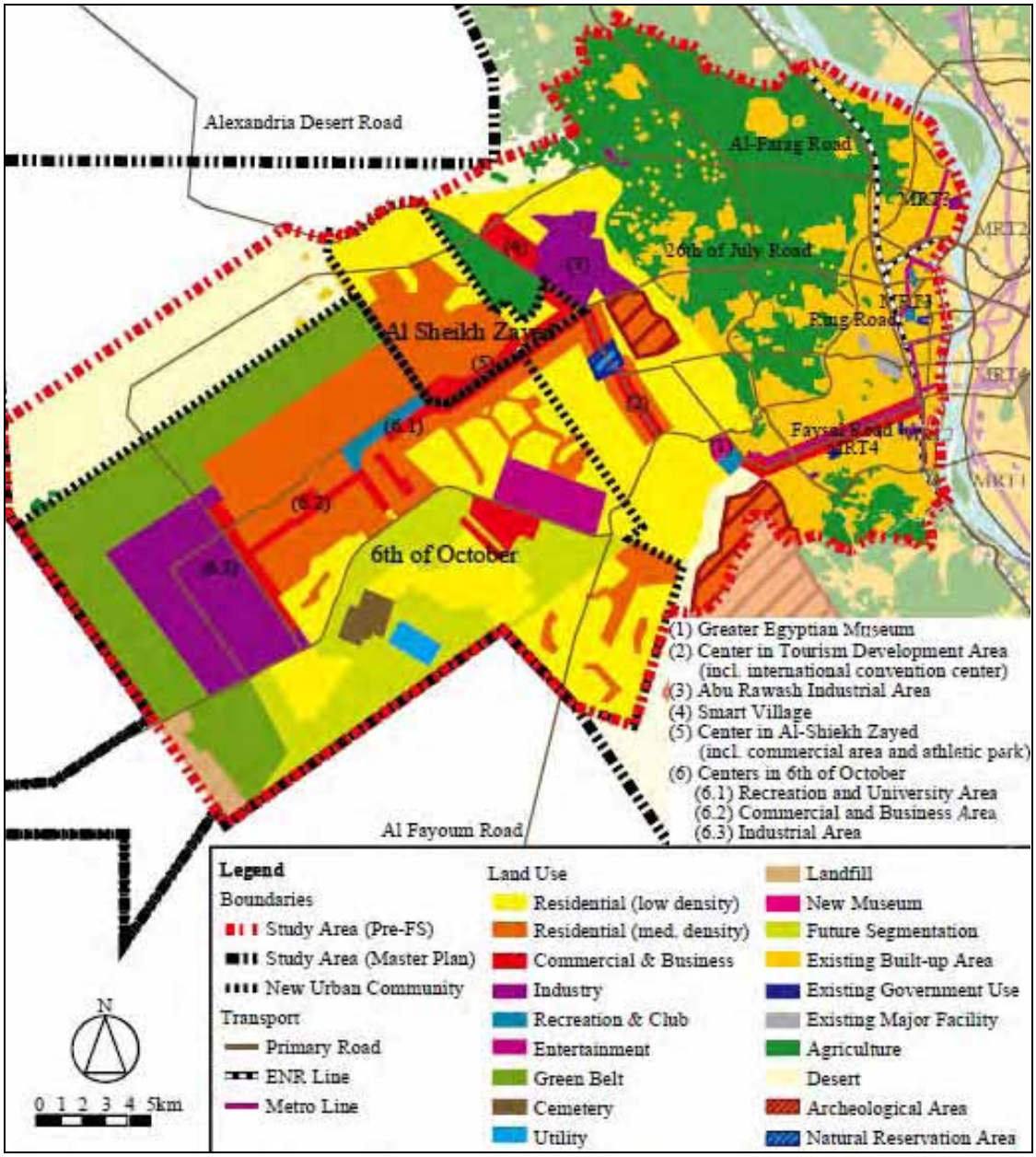
Category		Unit	2006	2007	2012	2017	2022	2027
Population		1,000	4,058	4,197	4,944	5,637	6,320	6,931
No. of Workers	Primary	1,000	42	43	48	53	60	64
	Secondary	1,000	335	343	388	440	505	539
	Tertiary	1,000	587	601	678	758	849	907
	Total	1,000	964	987	1,114	1,251	1,413	1,510
No. of Students	Primary, Preparatory, and Secondary	1,000	674	669	865	1,091	1,337	1,647
	University	1,000	255	262	277	300	330	386
	Total	1,000	928	931	1,142	1,391	1,667	2,033

Estimated Population by the Built-up Area in the Study Area in 1996-2027



Source 1) Census, CAPMAS, 2006 for 2006
Source 2) JICA Study Team for 2007-2027

1.18 A general land use plan of the study area was prepared, as shown in Figure 1.7. There are protectorate areas, while in the south there are the Pyramids and other archeological sites that must be preserved. Medium and high density urban areas will be created by connecting the urban centers in the study area. The medium and high density continuum will start from the Pyramid / Faysal Road areas and interlink a new tourism center at the Greater Egyptian Museum, a new business and commercial areas within the tourism development area, and the industrial hubs of Abu Rawash Industrial Area and Smart Village. The new urban areas will finally connect to the urban centers for commercial, business, and industry in 6th of October and Al Sheikh Zayed. The North Giza area, including a new urban center focused on Imbaba and its surrounding areas, will be linked to NUCs by a new primary road (Al Farag Road) to mitigate traffic concentration on primary roads in the South Giza area.



Source: JICA Study Team

Figure 1.7 General Land Use Plan of the Study Area in 2027