

# The Study on City Master Plan and Urban Development Program of Ulaanbaatar City (UBMPS)

FINAL REPORT / Volume 2

**Main Text**

March 2009

**ALMEC Corporation  
Oriental Consultants Co., Ltd.  
Aero Asahi Corporation**



EID

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JAPAN INTERNATIONAL COOPERATION AGENCY  
MINISTRY OF ROADS, TRANSPORTATION,  
CONSTRUCTION AND URBAN DEVELOPMENT  
ULAANBAATAR CITY GOVERNMENT

THE STUDY ON  
CITY MASTER PLAN AND URBAN  
DEVELOPMENT PROGRAM  
OF  
**ULAANBAATAR CITY**  
**(UBMPS)**

**Final Report**  
**Volume 2: Main Text**

**March 2009**

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## **PREFACE**

In response to a request from the Government of Mongolia, the Government of Japan decided to conduct a study on The Study on City Master Plan and Urban Development Program of Ulaanbaatar City in Mongolia and entrusted to the study to the Japan International Cooperation Agency(JICA).

JICA selected and dispatched a study team headed by Dr. Shizuo IWATA of ALMEC Corporation and consist of ALMEC Corporation, Oriental Consultants Co., Ltd. and Aero Asahi Corporation between February, 2007 and March, 2009.

The team held discussions with the officials concerned of the Government of Mongolia, and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this project and to the enhancement of friendly relationship between our two countries.

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

March 2009

Eiji HASHIMOTO,  
Deputy Vice President  
Japan International Cooperation Agency



March 2009

***Eiji HASHIMOTO***

Deputy Vice President

Japan International Cooperation Agency

Tokyo

**Subject: Letter of Transmittal**

Dear Sir,

We are pleased to formally submit herewith the final report of the Study on City Master Plan and Urban Development Program of Ulaanbaatar City.

This report compiles the results of the study which was undertaken both in Mongolia and Japan from February 2007 to March 2009 by the Team comprising ALMEC Corporation, Oriental Consultants Co., Ltd., and Aero Asahi Corporation.

We owe a lot to many people for the accomplishment of this report. First, we would like to express our sincere appreciation and deep gratitude to all those who extended their extensive assistance and cooperation to the Team, in particular Ministry of Roads, Transportation, Construction and Urban Development in Mongolia and Ulaanbaatar City Government.

We also acknowledge the officials of your agency, and the Embassy of Japan in Mongolia for their support and valuable advice in the course of the Study.

We hope the report would contribute to the sustainable development of Ulaanbaatar City.

Very truly yours,

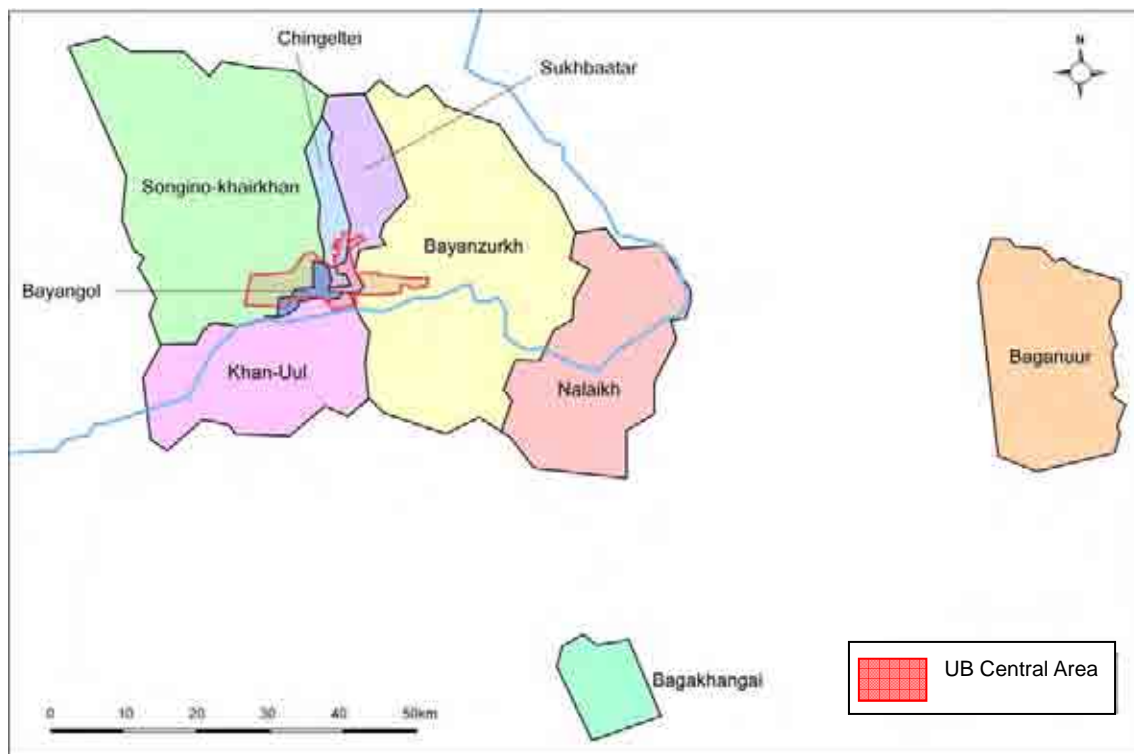
**IWATA Shizuo**

Team Leader

Study on City Master Plan and Urban Development Program of Ulaanbaatar City (UBMPS)



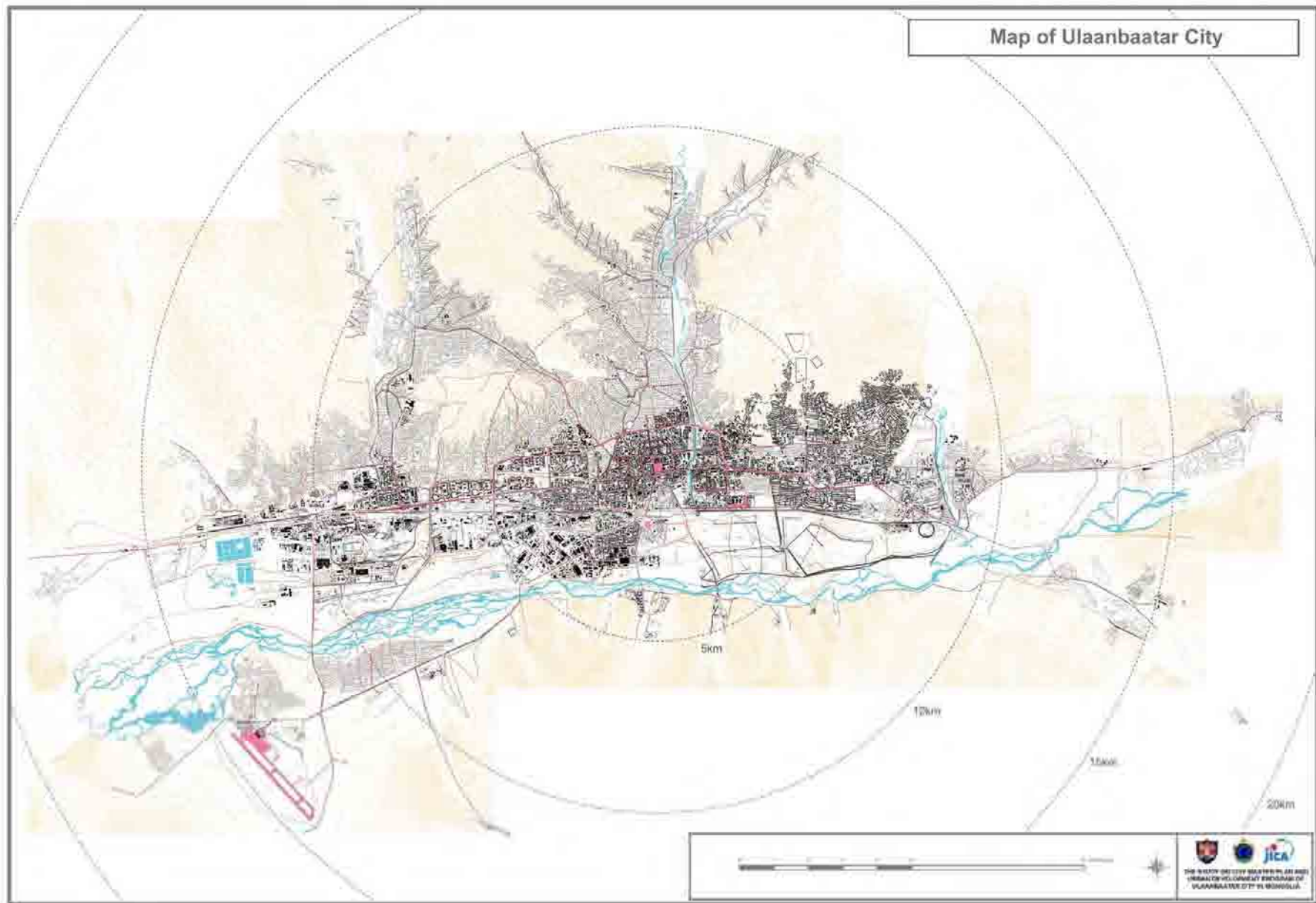




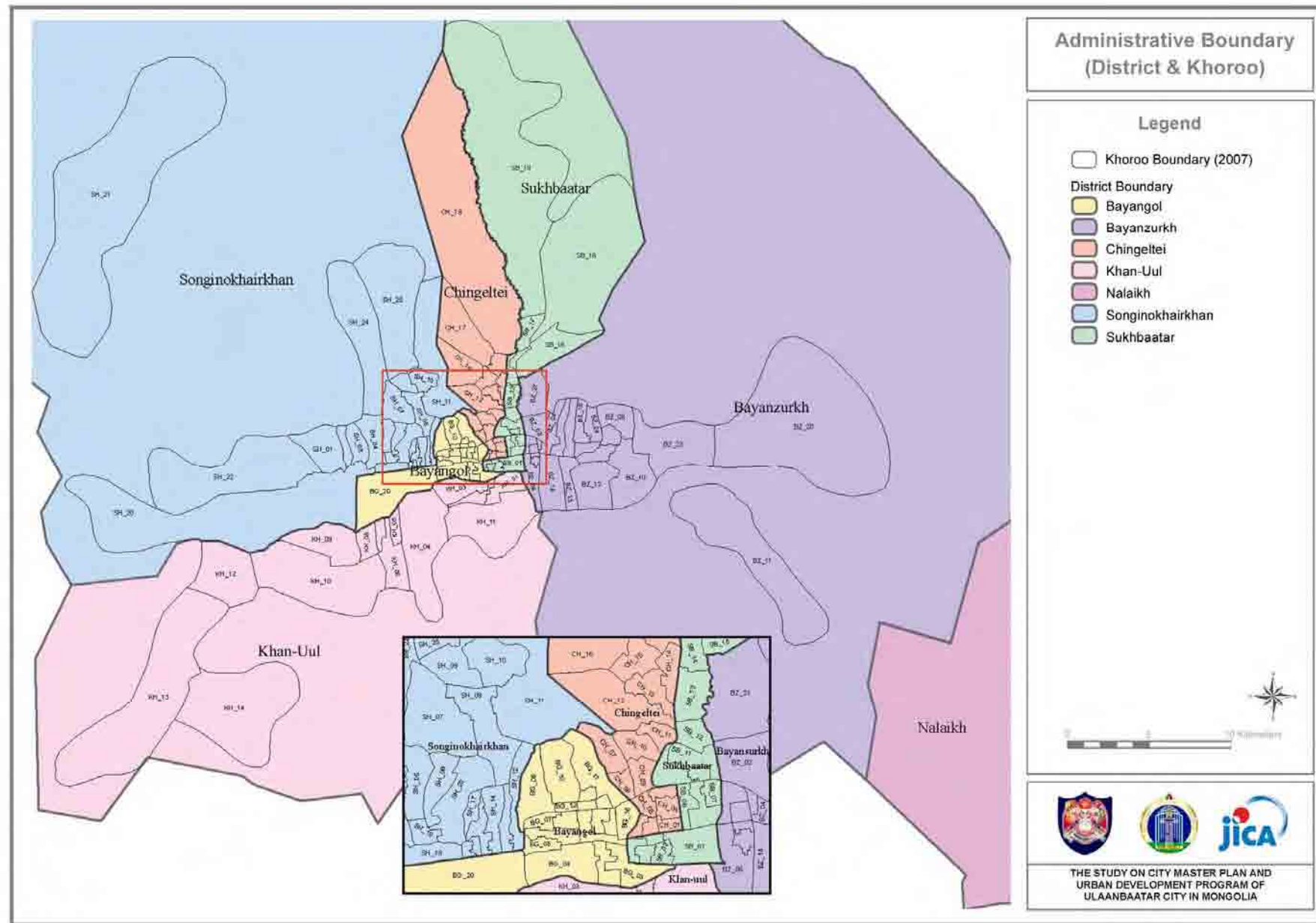
**District Location Map**



**Satellite City Location Map**

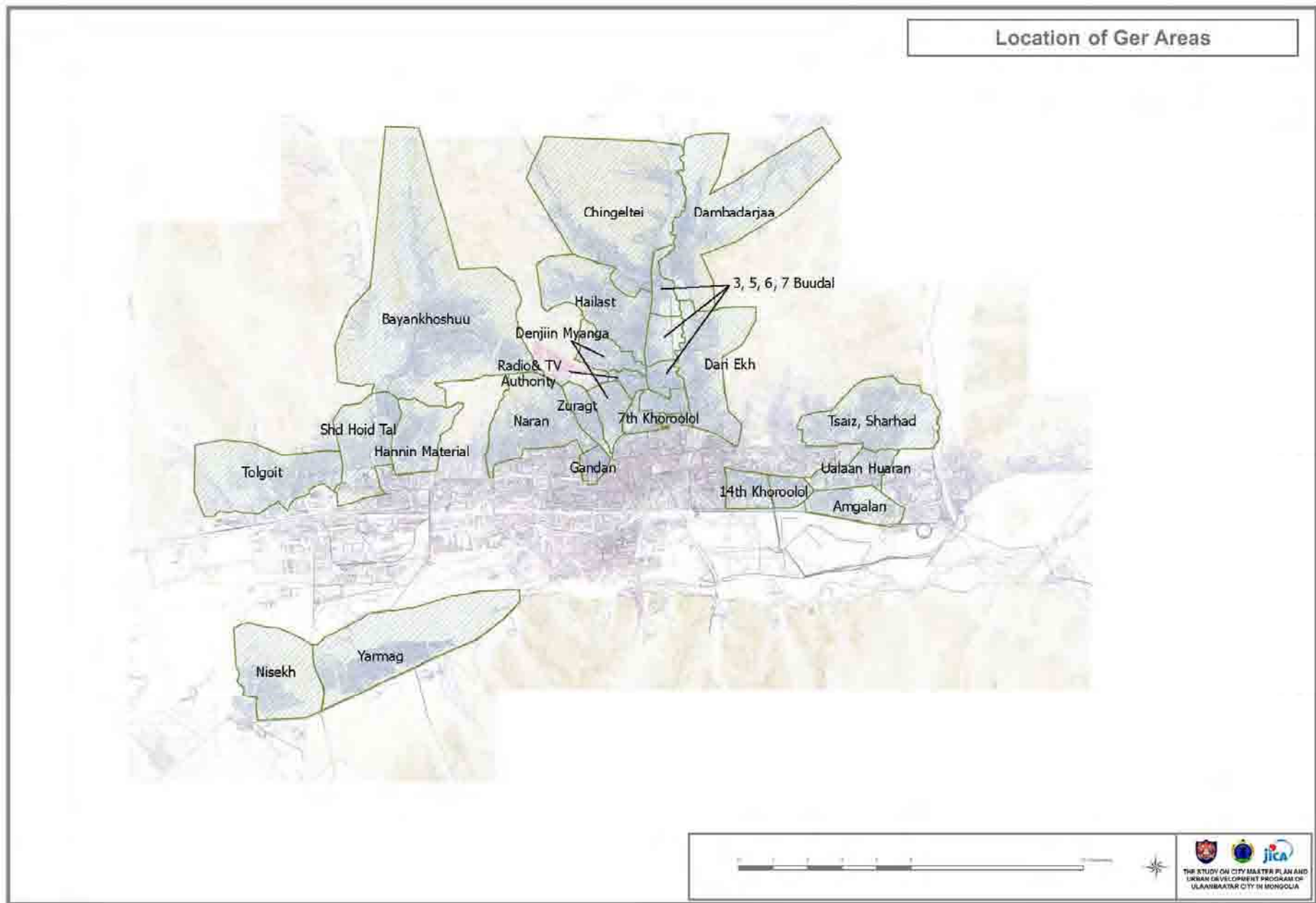


Map of Ulaanbaatar City



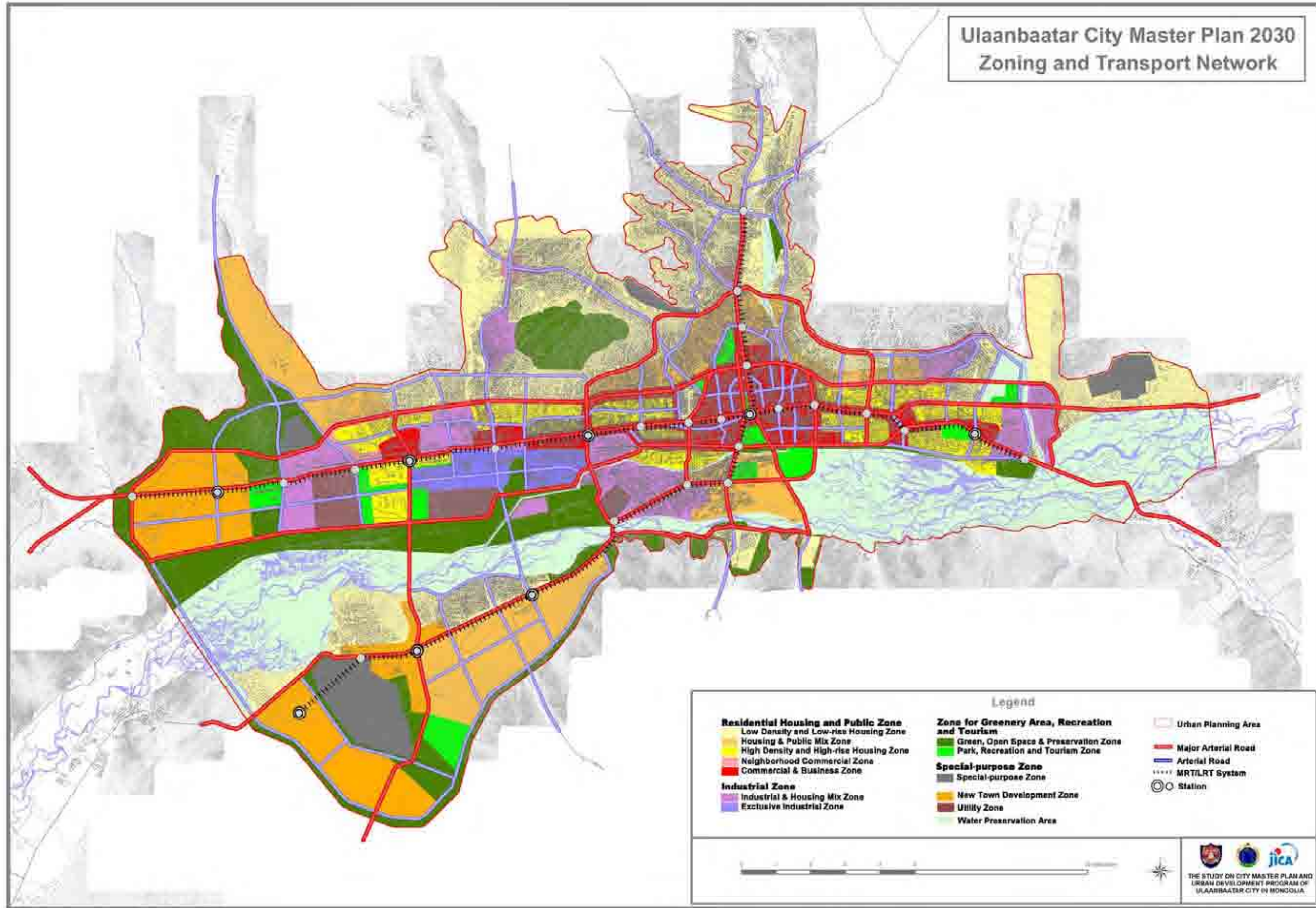
**Administrative Boundary**





Location of Ger Areas

# Ulaanbaatar City Master Plan 2030 Zoning and Transport Network





**The Study on City Master Plan and Urban Development Program of  
Ulaanbaatar City (UBMPS)**

**Final Report  
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## Abbreviations

ADB	Asian Development Bank
AH	Asian Highway
AOTS	Association for Overseas Technical Scholarship, Japan
ATC	Area Traffic Control
BLT	Build-Transfer-Operate
BMP	Baan Mankong Program, Thailand
BCR	Building Coverage Ratio
BOD	Biological Oxygen Demand
BOO	Build-Operate-Own
BOT	Build-Operate-Transfer
BPO	Business Process Outsourcing
BPR	Bonus Plot Ratio
BRT	Bus Rapid Transit
BT	Build-Transfer
BTO	Build-Transfer-Operate
CAAM	Civil Aviation Authority of Mongolia
CBD	Central Business District
CBO	Community Based Organization
CCTV	Closed-circuit Television
CDM	Clean Development Mechanism
CDS	City Development Strategy
CES	Central Electricity System
CF	Community Finance
CHP	Combined Heat and Power
CITES	Convention on International Trade in Endangered Species
CMPUA	City Maintenance Public Utility Agency
CNG	Compressed Natural Gas
COD	Chemical Oxygen Demand
CODI	Community Organizations Development Institute
CO <sub>2</sub>	Carbon Dioxide
CRE	Central Regional Electricity Transmission Grid
	State Owned Joint Stock Company
CSM	Center of Standardization and Measurement
DB	Design-Build
DPPA	Direct Power Purchase Agreement
DO	Dissolved Oxygen
DSS	Dust and Sand Storm
EBRD	European Bank for Reconstruction and Development
ECA	Economic Consulting Associates
ECOSAN	Ecological Sanitation System
EMS	Electric Multiple System
ERA	Energy Regulatory Authority
ETC	Electronic Toll Collection System
FA	Financial Assistance
FAR	Floor Area Ratio
FDI	Foreign Direct Investment
FILP	Fiscal Investment& Loans Program
FIRR	Financial Internal Rate of Return
FSA	Fuel Supply Agreement
GAISP	Ger Area Improvement Subsidy Program
GALP	Ger Area Land Pooling
Gcal	Giga calorie
GCO	General Custom Office
GDP	Gross Domestic Product
GIS	Geographic Information System
GNI	Gross National Income

GRDP	Gross Regional Domestic Product
GOM	Government of Mongolia
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Technical Cooperation)
GUMA	Greater Ulaanbaatar Metropolitan Area
GUSIP	Ger-area Upgrading Strategy and Investment Plan
HAAPs	Housing Action Area Plans
HDF	Housing Development Fund
HDFI	Housing Development Financing Institute
HFP	Housing Finance Project
HIS	Household Interview Survey
HOB	Heat Only Boiler
HRD	Human Resource Development
ICT	Information Communication Technology
IAEA	International Atomic Energy Agency
IEE	Initial Environmental Examination
IMF	International Monetary Fund
IPP	Independent Power Producer
JBIC	Japan Bank for International Cooperation
JFPR	Japan Fund for Poverty Reduction
JICA	Japan International Cooperation Agency
KH21DS	Khoroo 21 Disposal Site
KIP	Kanpung Improvement Program
KOICA	Korea International Cooperation Agency
kWh	Kilowatt hour
MC	Mortgage Corporation
MCC	Millennium Challenge Council
MCUD	Ministry of Construction and Urban Development (then)
MDDS	Morin Davaa Disposal Site
MDF	Mongolian Development Fund
MDG	Millennium Development Goal
MECS	Ministry of Education, Culture and Science
NEDO	New Energy and Industrial Technology Development Organization, Japan
NEDS	Narangiin Enger Disposal Site
MET	Ministry of Environment and Tourism
MFA	Ministry of Food and Agriculture (then)
MFALI	Ministry of Food, Agriculture and Light Industry
MFE	Ministry of Fuel and Energy (then)
MHFC	Mongolian Housing Finance Corporation
MIK	Mongolian Mortgage Corporation
MJIA	Ministry of Justice and Internal Affairs
MME	Ministry of Minerals and Energy
MNE	Ministry of Nature and Environment (then)
MNT	Mongolian National Tugrug / Tg.
MOF	Ministry of Finance
MOH	Ministry of Health
MONCAMP	Development of Master Plan on Civil Aviation
MOSA	Mongolia Software Industry Association
MRT	Mass Rapid Transit
MRTCUD	Ministry of Road, Transport, Construction and Urban Development
MSWL	Ministry of Social Welfare and Labor
MUDI	Mongolian Urban Development Institute
MW	Megawatt
NDS	Nalaikh Disposal Site
NEDS	New Disposal Site
NGO	Non-Governmental Organization
NHA	National Housing Authority, Philippines
NPM	New Public Management
NUIA	New Ulaanbaatar International Airport

NOx	Nitrogen Oxide
NSO-UNFPA	National Statistical Office and United Nations Population Fund
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
O&M	Operation & Maintenance
OSNAUG	Housing and Communal Service Authority in Mongolia
PAP	Project Affected Person
PC	Pre-stressed Concrete
PCU	Passenger Car Unit
PFI	Private Finance Initiative
PMU	Project Management Unit
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PR	Press Release
PSMF	Public Sector Management and Finance
RC	Reinforced Concrete
R&D	Research and Development
RDF	Refuse Derived Fuel
RO	Rehabilitate-Operate
ROT	Rehabilitate-Operate-Transfer
SAPROF	Special Assistance for Project Formation
SCI	Sustainable Cities Initiative
SEA	Strategic Environmental Assessment
SEDC	State Economic Development Corporation, Malaysia
SFC	Social Housing Corporation
SHFI	Social Housing Finance Institution
SPIA	State Professional Inspection Agency
SPV	Special Purpose Vehicle
TA	Technical Assistance
TDR	Transfer of Development Right
TEU	Twenty-foot Equivalent Units
TTC	Travel Time Cost
UB	Ulaanbaatar
UBDH	Ulaanbaatar District Heating State Owned Joint Stock Company
UBEDN	Ulaanbaatar Electricity Distribution Network
	State Owned Joint Stock Company
UBHN	Ulaanbaatar Heating Network co. Ltd.
UB-METS	Ulaanbaatar Metro-Transit System
UBIFC	Ulaanbaatar Infrastructure Financing Corporation
UBMP2020	Exiting Ulaanbaatar Master Plan targeting the year 2020
UBMPS	Study on City Master Plan and Urban Development Program of Ulaanbaatar City in Mongolia
UCA	Urban Control Area
UCDO	Urban Community Development Office, Thailand
UCDS	Ulaan Chuluut Disposal Site
UDRC	Urban Development Resource Center
UK	United Kingdom
UPA	Urban Promotion Area
UPRDI	Urban Planning, Research and Design Institute
USA	United States of America
USAID	United States Agency for International Development
USIP	Ulaanbaatar Service Improvement Project
USUG	Ulaanbaatar Water and Sewerage Authority
VAT	Value-Added Tax
VMS	Variable Message Signs
VOC	Vehicle Operating Cost
VOC	Volatile Organic Compounds
WWTP	Wastewater Treatment Plant
WWWMP	Water & Wastewater Master Plan

## **PART I: Situation Analysis and Identification of Planning Issues**

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# **1. INTRODUCTION**

## **1.1 Background**

Mongolia has been witnessing a rapid reform toward market economy and this has brought a huge change in the structure of the Ulaanbaatar Capital Region since the collapse of the socialist regime in 1992. For one, the population of Ulaanbaatar City has grown rapidly. In 1935 it was around 10,000; in 1944 after World War II it reached about 30,000; and in 1998 it was 650,000. At present the population has grown to more than one (1) million at an average growth rate of more than 4.0% p.a. during the period between 2000 and 2007.

The Master Plan for Ulaanbaatar City was officially launched in 2001 with the target year 2020 (often referred to as UBMP-2020 in this Report). The Master Plan is well organized and adopts international planning methodologies. It also provides a clear insight into the causes and effects of rapid urbanization in Ulaanbaatar City toward the year 2020 and offers appropriate vision on physical urban development based on a rational projection of rapid motorization and on environmental measures to reserve watershed and water resources. However, overall urban growth management and land-use control remain to be issues that need further study.

Various donors and nongovernmental organizations (NGOs) have cooperated with Ulaanbaatar in terms of individual infrastructure and housing programs and projects including Ger area improvement. However, it seems that the Ulaanbaatar City government, as well as the ministries concerned, has not made the best use of these assets, know-how, and experiences gained from these projects/programs to carry out their daily administrative services. Although the coordination of donor contributions is inherently a task of the Mongolian side, a common insight into urban planning issues should be shared among donor organizations.

Under such circumstances, the Mongolian government requested the Japanese government to conduct "The Study on City Master Plan and Urban Development Program of Ulaanbaatar City." In response to its request, the Japan International Cooperation Agency (JICA) selected a consultant team, led by ALMEC Corporation under JICA's procurement regulations. The consultant team, or JICA Study Team, headed by Dr. Shizuo Iwata, was dispatched to Mongolia to commence the study in March 2007.

## **1.2 Objectives**

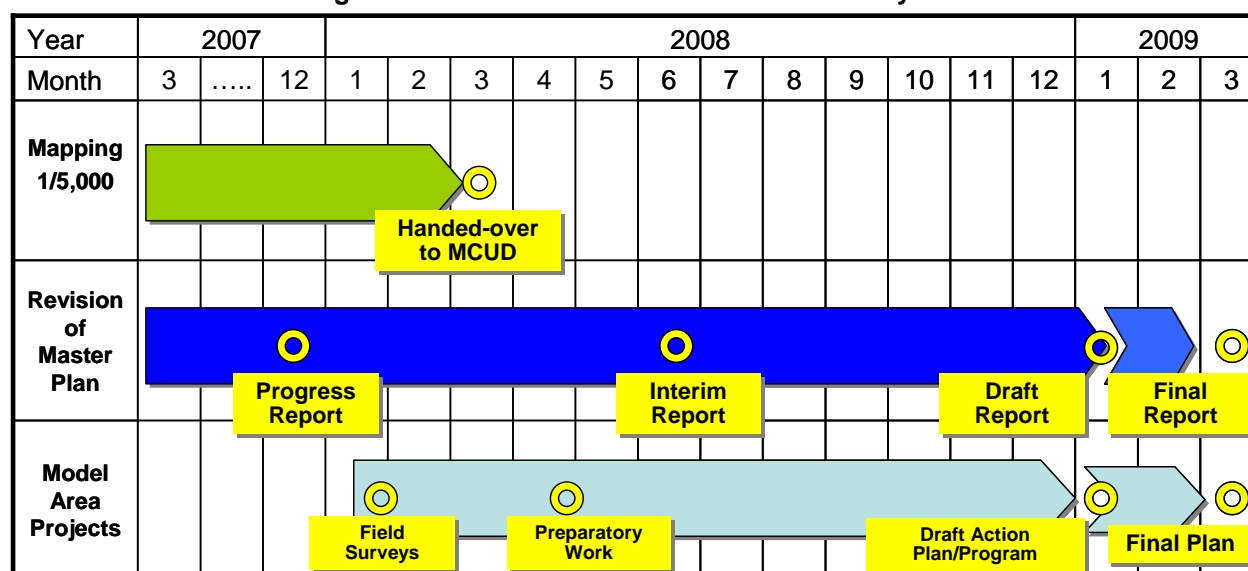
The objectives of the study, which were mentioned in the Scope of Work agreed upon by both governments, are threefold, as follows:

- To revise the current master plan (i.e., UBMP-2020) for the target years of 2020 and 2030 to include measures against expanding Ger areas in response to rapid socio-economic changes;
- To prepare action plans and make recommendations to agencies in implementing the revised master plan; and
- To transfer technology to improve the capacity for city planning of implementing agencies.

### 1.3 Overall Schedule of the Study

This Final Report compiles the outcomes of the study which the JICA Study Team carried out from March 2007 to February 2009. The Study Team completed: 1) Analysis of urbanization trend and urban problems; 2) Assessment of existing conditions; 3) Evaluation of administrative capacity; 4) Planning concepts addressed in the revised plan; 5) Draft proposals for a master plan toward 2030; and 6) Development program containing the recommended projects. Figure 1.3.1 shows the overall schedule of the study.

Figure 1.3.1 Overall Schedule of the Study



Source: JICA Study Team

At the beginning of the Study, the Household Interview Survey (HIS) was conducted. A total of 4,500 households and their members were interviewed to determine their socio-economic characteristics and opinions on existing urban services, such as access to urban services, transport conditions, and others, as well as future development orientations.

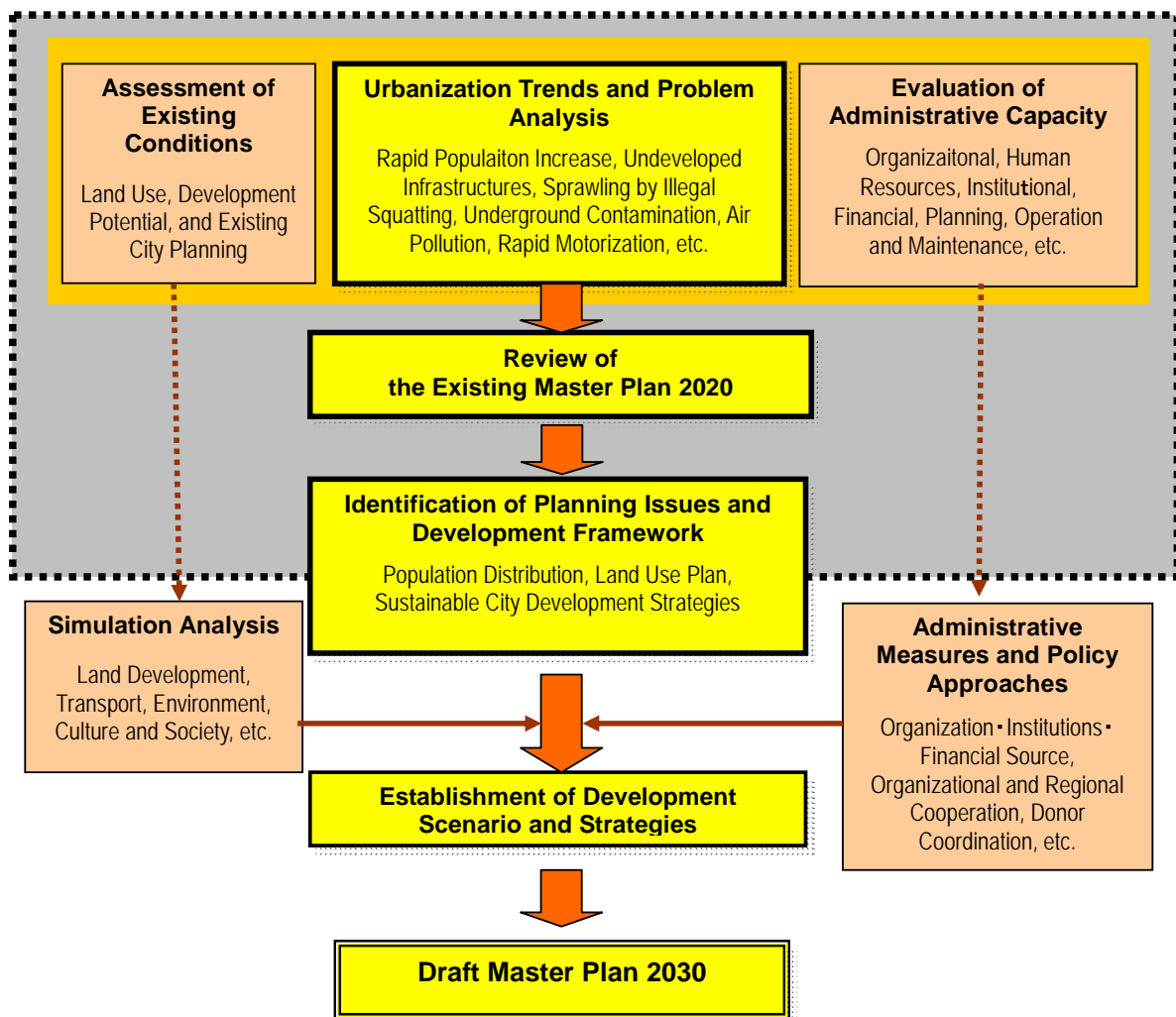
In the course of the Study, the Study Team conducted a Learning Session, entitled “Urban Planning Theory and Technologies and Japanese Experiences” during the summer holiday season 2007, as intensive workshops for counterpart personnel and all those responsible for urban planning. The JICA Study Team provided more opportunities to discuss the study’s draft proposals with local experts, relevant key informants, and international donors, who were deeply interested in improving Ulaanbaatar City. As a result, sectoral workshops on issues, such as land use and zoning policy; housing policy; transportation sector strategies; infrastructure, environment and Ger improvement, were occasionally conducted during planning.

The Final Report is expected to be fully utilized in revising the existing Master Plan 2020 along with the legal process stipulated in the Urban Development Law.

## 1.4 Study Approach

Comprehensiveness is the keyword to building a useful master plan which is practically grounded and based on the realities of social and economic activities. Figure 1.4.1 shows the conceptual process of the comprehensive approach to reviewing the existing master plan. The planning review starts with an assessment of existing landuse and development potential under the private land ownership law.

**Figure 1.4.1 Study Approach and Planning Process**



Source: JICA Study Team

Analyses were made to determine urbanization trends and its problems, caused by the rapid population increase in association with a lack of effective growth management measures and a shortage of administrative resources of budget and human capacity.

Based on these status analyses, planning conditions and development strategies to be employed for Ulaanbaatar City were identified, and the future socio-economic framework will also be projected under a variety of scenarios.

A Household Interview Survey (HIS) was also conducted for randomly selected 4,500 households, or about 2% of the total households in Ulaanbaatar City. Through this survey, Study Team could identify people's needs and assessments on current public services as well as daily transport behaviors. Based on results of such a person trip analysis, a

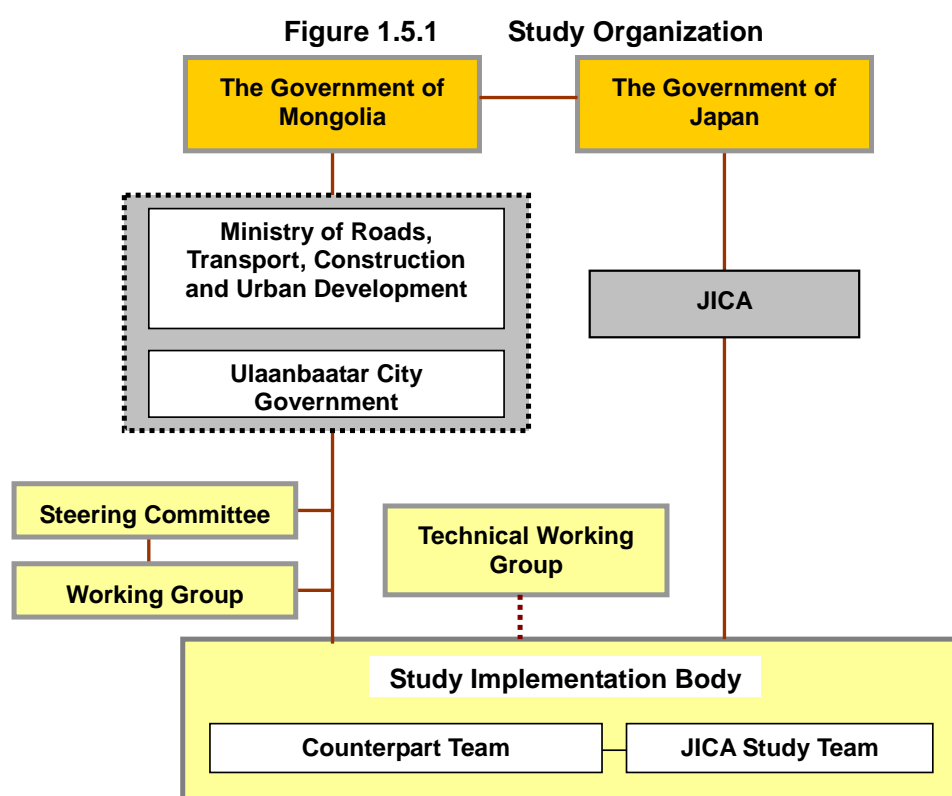
simulation model was built and a time series of simulation analyses were conducted to identify additional bottlenecks, environmentally degraded areas and overall physical changes in the urbanization process. In addition, the results of analysis were utilized to identify current situation, problems and issues, as well as to develop future vision and plans of Ulaanbaatar City.

This analytical process to envisage the future of Ulaanbaatar is a core part of the planning process. At this stage, a wide variety of discussions need to be made, involving outcomes of a number of investigations, for landuse and building use, traffic and transportation, housing and living conditions and environmental conditions as well as statistical findings.

At the same time, the administrative capacity will be assessed in terms of “responsiveness” to increasing financial demands, industrial requirements and people’s needs. Integrating all the outcomes to be derived from the aforementioned investigations, a development scenario will be defined, and then the current master plan will be revised along with the defined scenario.

## 1.5 Study Organization

The Study was carried out by JICA Study Team in close collaboration with the Mongolian counterpart team from Ministry of Road, Transport, Construction and Urban Development and Ulaanbaatar City. The Steering Committee, chaired by the State Secretary of the Ministry, and Working Group were set up to discuss the findings and planning directions and development orientations of future Ulaanbaatar. In addition, Technical Working Groups, inviting about 100 stakeholders, were organized for opportunities of public consultation meetings. The study organization is shown in Figure 1.5.1



Source: JICA Study Team

## 1.6 Structure of the Report

A number of separate volumes of reports were prepared for compilation of outcomes of the Study, as follows:

- Vol.1: Summary (English, Mongolian and Japanese)
- **Vol.2: Main Text (English)**
- Vol.3: Project Profiles (English)
- Vol.4: Technical Appendices (English)
- Vol.5: GIS Maps and Drawings for Urban Planning (English)

“Vol.4 Technical Appendices” includes: (1) Data-book on the result of the Household Interview Survey (HIS), (2) Technical Findings on Transport Analysis in use of “STRADA”, a JICA-tailored transport analytical model, and (3) Learning Session Materials.

## 2 REVIEW OF EXISTING MASTER PLAN 2020 AND PLANNING ISSUES TO BE CLARIFIED BY JICA STUDY

### 2.1 Planning Concepts and Planning Goals on Future Ulaanbaatar City

#### 1) Development Visions

Ulaanbaatar Master Plan targeting year 2020 (UBMP-2020) was prepared by Urban Planning, Research and Design institute (UPRDI) in 2001.

Five (5) future vision of the city of Ulaanbaatar by 2020 are listed in UBMP-2020 as follows:<sup>1</sup>

- **First Vision:** The City to be a well-developed capital city of international level; to have a vibrant economy; to be a world-class business centre having a competitive position in the areas of education, information, science and technology.
- **Second Vision:** The City to have an appropriate policy for land management and urban development, including developing area with appropriate infrastructure, and for improving housing conditions of all citizens.
- **Third Vision:** The City to be healthy, to have safe environment, a well-kept social life and a progressive legal framework.
- **Fourth Vision:** The City to have a responsive and efficient public administration, having a participatory approach involving the community and the private business sector in civic services.
- **Fifth Vision:** The City to be an attractive tourist destination in Asian Region.

#### 2) Development Strategies

To achieve the visions above, the development strategies are proposed as shown in Table 2.1.1.

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<sup>1</sup> The visions are described in Vol. 6, as a result of the City Development Strategy (CDS) exercise.

**Table 2.1.1 Development Strategies**

Vision	Strategies
<b>First Vision.</b> The City to be a well-developed capital city of international level; to have a vibrant economy; to be a world-class business centre having a competitive position in the areas of education, information, science and technology.	1-1 Develop and support industries oriented at export and replacing import, and the small and medium-size businesses; 1-2 Strengthen the banking and finance system; 1-3 Support foreign investment; 1-4 Develop human resource for the purpose to create a production with high technology; 1-5 Support the cooperation between universities, high schools and private sectors; 1-6 Support science development;
<b>Second Vision.</b> The City to have an appropriate policy for land management and urban development, including developing area with appropriate infrastructure, and for improving housing conditions of all citizens.	2-1 Develop city planning and land management system; 2-2 Pay special attention to the Ger area, establish an appropriate infrastructure, build a comfortable housing quarters; 2-3 Support initiatives of organizations, enterprises and citizens to build housing, increase the housing supply considering payment capacity of citizens; 2-4 Develop current infrastructure of residents to meet the need of rapid growth of the population;
<b>Third Vision.</b> The City to be healthy, to have safe environment, a well-kept social life and a progressive legal framework.	3-1 Reduce environmental pollution; 3-2 Develop solid waste management within the integrated system; 3-3 Renovate green zones around the city and increase the number of green parks; 3-4 Have sufficient resources of clean water; 3-5 Create a program to reduce poverty and unemployment level of the city; 3-6 Carry out appropriate preventive measures against crime, prevent citizens from criminalities, and strengthen social integrity; 3-7 Improve the preventive measures against illness;
<b>Fourth Vision.</b> The City to have a responsive and efficient public administration, having a participatory approach involving the community and the private business sector in civic services.	4-1 Enhance the capacity of staff at the mayor's office, strengthen the control system for responsibilities of the state organizations; 4-2 Increase municipal finance authorities, improve financial management of the city, enhance income sources, and collect taxes, fees and duties completely; 4-3 Improve work linkage between organizations and their branches; 4-4 Make transparent the activities of government administration 4-5 Have the honor of delivering the state service fairly and smoothly; 4-6 Involve the non-governmental organizations and private sectors in decision making activities and regularize it;
<b>Fifth Vision.</b> The City to be an attractive tourist destination in Asian Region.	5-1 Create specific features of tourism in Ulaanbaatar through advertising the history, culture, territory, traditional ceremonies of Mongolia to attract more tourists. 5-2 Improve services relating to tourism through organizing professional trainings; 5-3 Improve the infrastructure of tourism, including air transport and hotels; 5-4 Increase the service types during tourist season in summer, and create new tourist services in winter.

Source: Vol. 5, UBMP-2020



### **3) Planning Objectives**

According to UPRDI, planning objectives are stipulated as follows:

- To determine basic approach to establish residents comfortable living conditions for the present and future and support sustainable city development in new socio-economic situations
- To keep equilibrium of national conservation parks and ecological safety of the environment of living activities
- To create comprehensive environment in conformity with territorial affiliation, space and beauty perfection by using traditional methods of urban planning
- To meet safety requirements of transportation and engineering infrastructure
- To re-develop Ger areas and residential district and increase housing supply
- To enhance industrial zoning structure and improve land use
- To establish community centers system and increase level of social infrastructural supply

## **2.2 Conceptual Setting of Ulaanbaatar Regional Development**

### **1) Concept of National Development**

Ulaanbaatar shall be developed as independent region for its leading role in socio-economic activities among the five (5) broad development regions of the country: i.e.: Western Region, Khangai Region, Ulaanbaatar Region, Central Region, and Eastern Region.<sup>2</sup>

To form a hierarchical center system in the regional, the Central Region and Ulaanbaatar City Region have the following regional development centers.

- Major center: Ulaanbaatar City
- Sub-regional Centers: Darkhan, Mandalgobi and Sainshand,
- Provincial Centers: Dalanzadgad, Sukhbaatar, and Zuunmod,
- Local Centers: Choir, Bor-Undur, Sukhbaatar, Zuunharaa, Hutul, Zuunbayan, Tsagaansuvarga, Zamyn Uud and Tavantolgoi,
- Satellite Cities of the Capital City: Baganuur, Nalaikh, Zuunmod, Songino, Bayanchandmani, Bagakhangai, and Bayantsogt,
- Local settlement centers: Jargalant, Ugtaaltsaidam, Erdenesant, Lun, Buren, Yeroo, Huvsgul, Erdenedalai, Ulziit and Sevrei.

### **2) Concept of Ulaanbaatar Regional Development**

Ulaanbaatar City was planned based on the following three (3) major regional development principles.

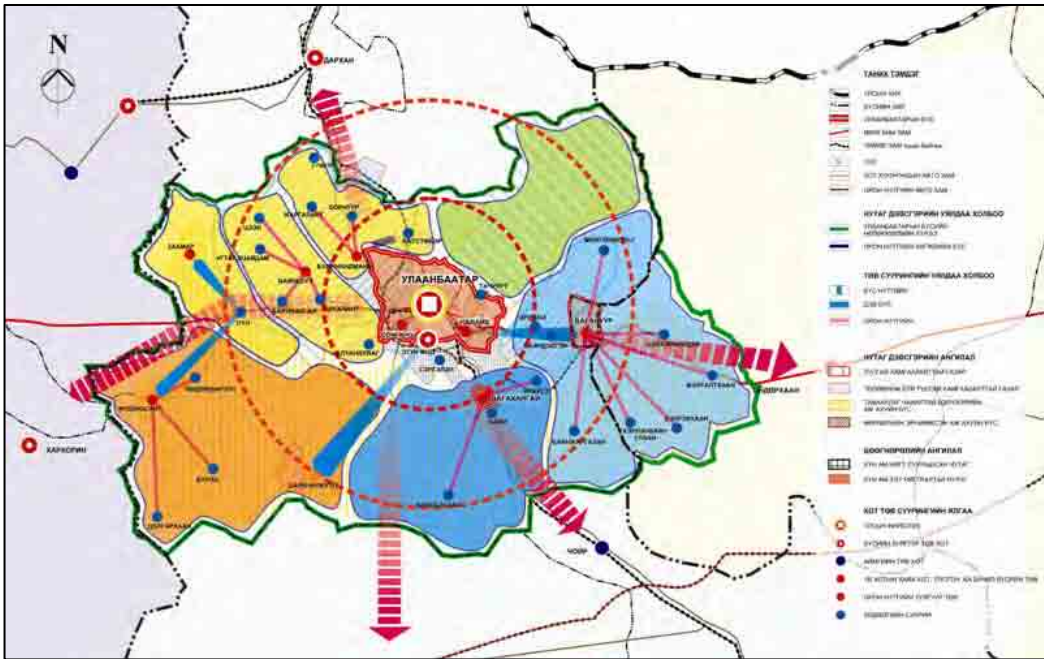
- Development of Ulaanbaatar City shall be linked with the concept of regional development and it will be implemented by principle as special independent region.
- By developing centers of other regions with competitive ability with Ulaanbaatar City, sticking to the policy of connecting horizontal and vertical axis of Mogolian development and infrastructure with method of transferring one-centered system to multi-centered system in sequences, the Government shall use policy to decrease concentrations of Ulaanbaatar City population, production and services.
- Territorial boundaries of intensive influence of Ulaanbaatar region's development shall be fixed in territory of all soums of Tuv aimag, some soums of Khentii aimag such as Delgerkhaan, Kherlenbayan-Ulaan, Tsenkhermandal and Jargaltkhaan, and such soums as Mandal and Bayangol of Selenge aimag. By processing development programs, they shall begin to solve common issues cooperating with each other.

A conceptual diagram of Ulaanbaatar City development in the regional context is shown Figure 2.2.1.

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<sup>2</sup> Western Region: Provinces of Bayan-Ulgii, Govi-Altai, Zavhan, Uvs, and Hovd; Khangai Region: Provinces of Alkhantai, Bayanhongor, Bulgan, Orhon, Uvurhangai and Huvsgul; Central region: Provinces of Govisumber, Darhan-Uul, Dornogovi, Dundgovi, Umnugovi, Selenge and Tuv; Eastern Region: Provinces of Dornod, Suhbaatar and Hentii; Ulaanbaatar Region: Capital City and its district territories and its Satellite Cities.

### Figure 2.2.1



Source: Ulaanbaatar Regional Development Program 2006

## 2.3 Assumed Planning Framework

### 1) Planning Period

Planning period is 20 years from 2000 to 2020.

### 2) Planning Area

The following soums, aimags and districts are covered in planning area:

- In the level of “Ulaanbaatar City Master Plan” all territories of the central six (6) districts to be constructed. The six districts are Districts of Bayangol, Bayanzurkh, Khan-Uul, Songinokhairkhan, Sukhbaatar, and Chingeltei.
- Within the 6 central districts of Capital City in the level of “around Great Ulaanbaatar” and Nalaikh District.
- All soums of Tuv aimag in level of “Capital City Region”, in level of the territory some soums of Khentii aimag such as Delgerkhaan and Tsenkhermandal.

**Table 2.3.1 Land Area of Districts of Capital City**

District	Area (ha)
Bayangol	2,949
Bayanzurkh	124,412
Songinokhairkhan	120,063
Sukhbaatar	20,840
Khan-Uul	48,466
Chingeltei	8,930
Ulaanbaatar City Total	325,660
Baganuur	62,020
Bagakhangai	14,000
Nalaikh	68,764
Sub-total	144,784
Grand Total	470,444

Source: Table 2.4.2, Vol.1, UBMP-2020

### 3) Socio-economic Framework

Socio-economic framework was set as follows:

#### (1) Population

Total population of Capital City is 735,500 (as of 1st January, 2000) and according to the estimation it will reach 1,650,000 within the planning period, of which 1,150,000 will be in Ulaanbaatar City and 500,000 in satellite cities.

Satellite Cities are the following 15 districts: Songino, Tuul, Ulziit, Khonkhor, Bayanzurkh, Gatsuurt, Bayangol, Jargalant, Rashaant, Argalant, Nalaikh, Terelj, International Free Trade Zone, Baganuur, and Bagakhangai.

The average population growth rate was set at 2.74% per annum for Ulaanbaatar City during the planning period from 2000 to 2020 while the satellite cities' more than 10% as shown in tables from 2.3.2 to 2.3.4.

**Table 2.3.2 Population Projection**

(Unit: thousand persons)

Area	2000	2005	2010	2020
Ulaanbaatar City Total	669.7	775	900	1,150
Satellite Cities	65.8	115	235	500
Capital City Total	735.5	890	1,135	1,650

Source: Table 14, Vol. 5, UBMP-2020

**Table 2.3.3 Average Annual Growth Rate of Population**

	2000-2005	2005-2010	2010-2020	2000-2020
Ulaanbaatar City Total	2.96%	3.04%	2.48%	2.74%
Satellite Cities	11.82%	15.36%	7.84%	10.67%
Capital City Total	3.89%	4.98%	3.81%	4.12%

Source: Study Team, calculation based on the figures of Table 2.3.2

Satellite Cities are: 15 districts of Songino, Tuul, Ulziit, Khonkhor, Gatsuurt, Bayanzurkh, Bayangol, Jargalant, Rashaant, Argalant, Nalaikh, Terelj, International Free Trade Zone, Baganuur, and Bagakhangai.

**Table 2.3.4 Population Projection by Khoroolol (Micro-District) of Ulaanbaatar City**

(Unit: thousand persons)

	Name of Khoroolol	2000	2005	2010	2020
<b>Central Area</b>					
1	Baga Toiruu	7.5	7.5	7.5	12
2	Ikh Toiruu	109	127.6	127.6	141.7
3	Nuuriin Khoroolol	28.8	28.8	31.6	32.5
4	Khorshoolol-1			12.3	12.3
5	Sansar	16.7	19.6	19.6	20.8
6	Eermel			4.2	4.2
7	Dundgol		7.1	15.4	24.3
8	Tumur zam	31.5	32.8	32.8	33.1
9	Naran	99.3	105.1	106.5	107.1
10	Zuragt	9.9	9	8.4	8.4
11	Denj	25.2	24.2	15	15.2
12	Oyutan khotkhon	5.2	5.2	15.4	15.4
13	Gandan	4.5	4	4	3.9
14	Khailaast	26.7	26.8	26.9	27.1
15	Chingeltei	12.6	13.2	15	18.9
16	Dambadarjaa	19	21.7	22	24.9
17	Zaisan	3.6	2	2	2
18	Zuslan kotteji	6.2	10	25	35
	Sub-Total	405.7	444.6	491.2	538.8
<b>Eastern area</b>					
1	Khorshoollyn khotkhon	6.7	10.3	10.3	43.4
2	Sharkhad	14.3	25	28	33.7
3	Uliastaj	8.1	13	14	16.6
4	Ulaankhuaran	28.9	35	40	49.7
5	Amgalan	7.7	25	36.3	50.8
6	Akademiin khotkhon	5.5	5.5	5.8	5.8
7	Dari-Ekh	9.8	10.1	10.2	10.3
	Sub-Total	81	123.9	144.6	210.3
<b>Western Area</b>					
1	Unur	90.9	91.9	106.8	107.6
2	Bayankhoshuu	31.3	31.3	35	49.9
3	Tolgoit	26.3	26.3	36	119.4
4	Buyant-Ukhaa	9.5	16.2	23.9	31.7
5	Uildver			20.7	36.4
6	Yarmag	25.2	31	32	39.4
	Sub-Total	183.2	196.7	254.4	384.4
<b>New area</b>					
1	Songolon				6.7
2	Bayangol		9.8	9.8	9.8
	Sub-Total	0	9.8	9.8	16.5
<b>Grand total</b>		669.7	775.0	900.0	1,150.0

Source: Table 1.5, Vol. 3, UBMP-2020

**Table 2.3.5 Satellite Cities**

(unit: thousand persons)

	District	Area (ha)	2000	2005	2010	2020	Current Function	Trend
1	Songino	0.6	3.7	4.5	10	25	Recreation Center & Chemical Industry	Develop Sanatorium & Health Facilities
2	Tuul	8	2.6	5.5	25	60	Industry & Livestock	Develop Poultry & Ger Districts
3	Ulziit	9.6	3.5	10	27	52	Crops	Green House & Ger Districts
4	Khonkhor	0.3	2.4	3	3.5	4.5	Transport & Communication	Undeveloped Region
5	Bayanzurkh	*	-	1	3.5	5		
6	Gatsuurt	74.8	3.7	3.8	4	4.5	Recreation & Tourism	Undeveloped Region & Recreational Zone of City
7	Bayangol	70	-	0.7	2	4	Recreation & Tourism	Recreational & Housing District
8	Jargalant	96.6	3.6	5.5	10.5	25	Livestock & Crops	Supplies Vegetables to Ulaanbaatar
9	Rashaant	5.7	-	1	3	8	Transport & Communication	Ger Districts With Livestock, Milk Farming
10	Argalant	11.4	-	10.5	15	29	Transport & Communication	Light Industry, Storage, Milk Farming
11	Terelj	2.3	0.8	1	1.5	3	Recreation & Tourism	Recreational Zone
12	Nalaikh	66.5	22.2	28	40	70	Chemical & Building Materials	Industrial Center
13	Bagakhangai	62.02	3.4	5.5	10	20	Food & Light Industry, Transport & Communication	Manufacture Meat & Raw Materials
14	Baganuur	14	19.9	25	45	90	Chemical & Building Materials	Industrial Center, Special Zone (Military)
15	Free Trade Zone	24	-	10	35	100	Center Of Foreign Trade	Communicates Baganuur, Nalaikh
TOTAL		445.8	65.8	115	235	500		

Source: Table 3.3, Vol. 4 for area and function, and Table 14. Vol. 5 for population, UBMP-2020

Note: \* As for Bayanzurkh, there is no area data found.

## (2) GRDP

GRDP of Ulaanbaatar City was planned to grow from Tg. 380.5 billion to Tg. 2,900 billion in 2020. Construction and Tourism are targeted to grow considerably and contribute a large portion of the Ulaanbaatar's economy in the future while Industry and Trade sectors will decrease their contribution to the economy.

In the UBMP-2020, the growth rate of GRDP of the City shall reach 6.7% per annum in 2005, 9.0% in 2010, and 10.5% in 2020. Average annual growth rates for GRDP of Ulaanbaatar City is planned to be 9.5% during 2000 to 2005, 8.4% during 2005 - 2010 and 12.4% during 2010 – 2020.

**Table 2.3.6 GRDP**

(unit: Tg. billion)

	2000	2005	2010	2020
Total	380.5	600.0	900.0	2,900.0
Industry	103.1	120.0	130.0	500.0
Construction	8.7	100.0	250.0	900.0
Trade	125.9	140.0	170.0	320.0
Service	25.0	30.0	50.0	350.0
Transportation & Communication	50.0	80.0	90.0	300.0
Tourism & Hotels	14.7	70.0	140.0	450.0
Other	53.1	60.0	70.0	80.0

Source: Vol.3, UBMP-2020, p. 5

**Table 2.3.7 Sector Share of GRDP**

	2000	2005	2010	2020
Total	100.0%	100.0%	100.0%	100.0%
Industry	27.1%	20.0%	14.4%	17.2%
Construction	2.3%	16.7%	27.8%	31.0%
Trade	33.1%	23.3%	18.9%	11.0%
Service	6.6%	5.0%	5.5%	12.1%
Transportation & Communication	13.1%	13.3%	10.0%	10.4%
Tourism & Hotels	3.9%	11.7%	15.6%	15.5%
Other	13.9%	10.0%	7.8%	2.8%

Source: Study Team based on the figures of UBMP-2020.

**Table 2.3.8 Average Annual Growth Rate of GRDP**

	2000 - 2005	2005 - 2010	2010 - 2020
Total	9.5%	8.4%	12.4%
Industry	3.1%	1.6%	14.4%
Construction	63.0%	20.1%	13.7%
Trade	2.1%	4.0%	6.5%
Service	3.7%	10.8%	21.5%
Transportation & Communication	9.9%	2.4%	12.8%
Tourism & Hotels	36.6%	14.9%	12.4%
Other	2.5%	3.1%	1.3%

Source: Study Team based on the figures of UBMP-2020.

### (3) GRDP per Capita

In the UBMP-2020, GRDP per capita was set as shown in the Table below, increasing from Tg. 524,200 in 2000 to Tg. 2.5 million in 2020, almost five (5) times more during 20 years.

**Table 2.3.9 GRDP per Capita**

(unit: Tg. thousand)

	2000	2005	2010	2020
GRDP per Capita	524.2	700.0	960.0	2,500.0

Source: Figure 1.2, Vol. 3, UBMP-2020



## 2.4 Proposed Urban Structure and Transport System

### 1) Basic Development Approach to Urban Structure

Ulaanbaatar City with surrounding area is thought to be an independent zone for development planning. It was pointed out that in the course of development, Ulaanbaatar City needs to reduce population concentration by appropriate urban structure including development of satellite cities. For the purpose to reduce population concentration in the central area of Ulaanbaatar City, the following ideas were proposed:

- Further development of existing towns of Songino, Tuul, Ulziit, Khonkhor, Gatsuurt, Jargalant, and Terelj
- New town developments at Argalant, Rashaant, Bayanzurkh, and Bayangol
- Free trade zone development around Nalaikh town

For the efficient urban structure of Ulaanbaatar City, communications and utilities are planned to be developed in satellite cities with industrial development of small and medium enterprises; thereby, the satellite cities can form integrated settlement clusters.

Further, towns and villages of Central aimags located 80 to 100 km from Ulaanbaatar City shall be developed.

#### (1) Development of Ger Area in Ulaanbaatar City

Percentage of residential housing estate with a full engineering supply shall be raised to 82%, and by redeveloping Ger areas, it shall increase housing supply. Ger areas shall be developed with three objectives :

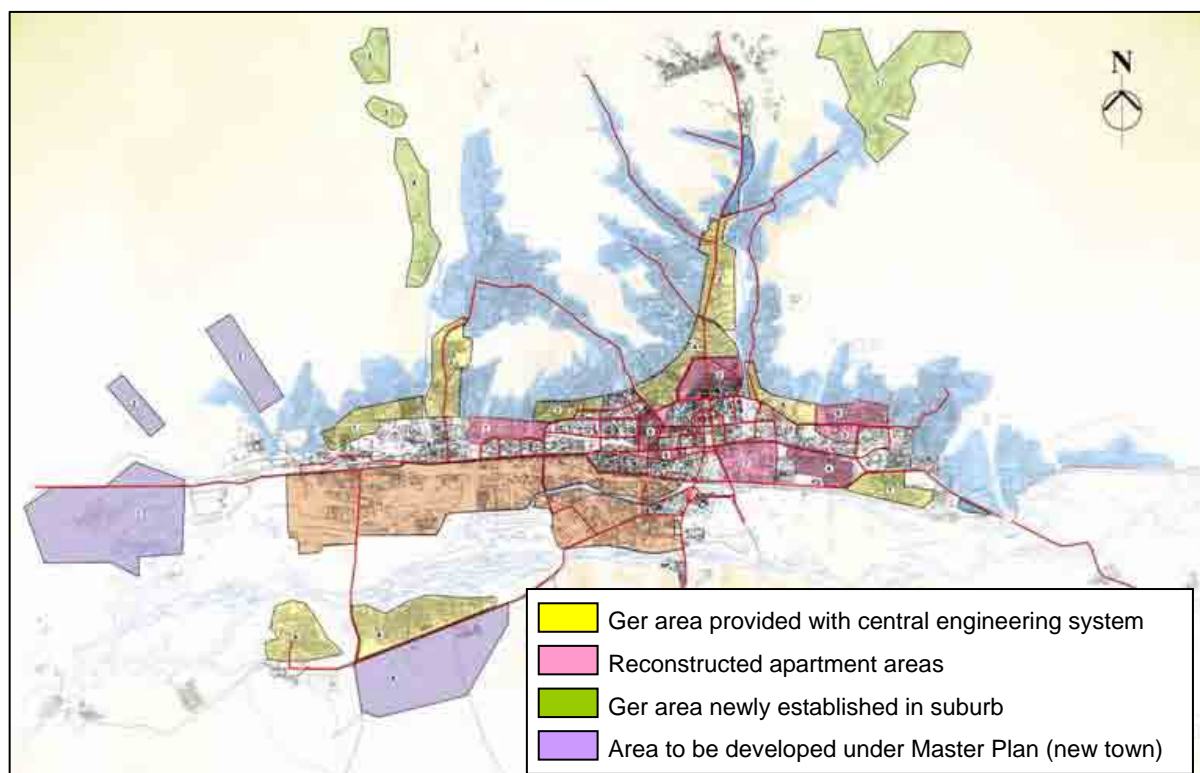
- To improve living condition of Ger areas
- To develop Ger areas changing into private detached houses
- To re-develop and change into apartments

**Table 2.4.1 Techniques to Improve Ger Areas**

Objective	Technique for Improvement
1) To improve living condition of existing Ger areas:	1. To connect the Ger areas with the centralized drinking water supply and sewerage system; 2. To develop independent heating systems where it is possible; and 3. To provide with affordable, comfortable housing
2) To build detached housing residential area through the land readjustment system with infrastructure:	1. Connecting to the centralized network; 2. Connecting to the independent network; and 3. Connecting to the Boiler sub-stations.
3) To build apartment housing residential area through the redevelopment of the central Ger areas with infrastructure:	Central Ger area mean Ger areas, which are located around the city's built-up core

Source: JICA Study Team based on UBMP-2020

**Figure 2.4.1 Three Classification of Development of Ger Area**



Source: UBMP-2020

## **(2) Rationalization of Industrial Area**

Structure of industrial regions shall be improved from an environmental viewpoint and a program to establish industrial park shall be processed and implemented.

## **(3) Development of Urban Public Center and Sub-centers**

Buildings and structures of urban social, cultural and public services shall be built in accordance with normative standards in each planning step, setting up a system of urban public centers and establish sub-centers in new planning region.

## **(4) Land Management**

To form the future urban structure to absorb the growing population of Ulaanbaatar City, the following three land management systems related directions are proposed:

- (i) Satellite cities of Ulaanbaatar City shall be developed more in the level of the Capital City. Based on the improvement of transportation network between cities and villages shall develop infrastructure involving the territory of some functions and loads of Ulaanbaatar City. Some part of population shall be settled in other places outside Ulaanbaatar City.
- (ii) Territory of the Capital City shall be divided into three (3) basic regions of urban planning where land use regime shall be set up and regulated, as shown below.
  - Region to develop the city intensively involves Ulaanbaatar City, south-east strip of land of the development to the direction of Nalaikh, south-west strip of land of the development to the direction of Songino-Tuul, west strip of land of the development to the direction of Argalant
  - Region to develop city not intensively with restricted farming development involves specially protected areas, water source feeding areas, rest houses and summer

houses around the city.

- Region to develop agriculture as a priority field involves north-west strip of land to the direction of Jargalant

(iii) Territorial boundaries of Ulaanbaatar City and satellite cities shall be redrawn.

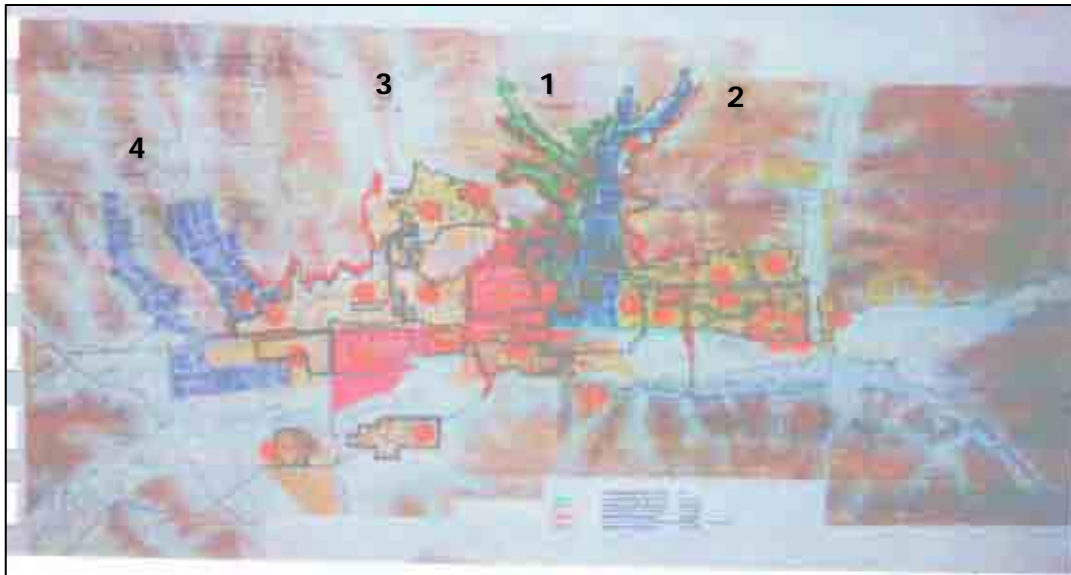
## 2) Basic Development Zones in Ulaanbaatar

Built-up area of Ulaanbaatar City shall be broadly divided into four (4) zones which are connected with appropriate road network. These are:

- (i) Central Zone
- (ii) Eastern Zone
- (iii) Western Zone
- (iv) New City

These planning zones area divided into Khoroolols. Their population size, population density, number of average stories of buildings shall be in conformity with the related norms and standards of Mongolia.

**Figure 2.4.2 Four Major Development Zones**



Source: UBMP-2020

**Table 2.4.2 Khoroolols of Each Zone**

Zone	Khoroolol
Central Zone	- Baga Toiruu - Zuragt
	- Ikh Toiruu - Denj
	- Nuuriin Khoroolol - Oyutan khotkhon
	- Khorshoolol-1 - Gandan
	- Sansar - Khailaast
	- Eermel - Chingeltei
	- Dundgol - Dambadarjaa
	- Tumur zam - Zaisan
	- Naran - Zuslan kotteji
Eastern Zone	- Khorshoolyn khotkhon - Sharkhad
	- Uliastaj - Ulaankhuan
	- Amgalan - Akademiin khotkhon
	- Dari-Ekh
Western Zone	- Unur - Bayankhoshuu
	- Tolgoit - Buyant-Ukhaa
	- Yarmag - Uildver
New City Zone	- Sonsgolon
	- Bayangol

Source: JICA Study Team based on UBMP-2020

**Table 2.4.3 Characteristics of Each Zone**

(1/2)

Zone	Description
Central Zone	<p>&lt; Area&gt;</p> <ul style="list-style-type: none"> <li>- This zone includes City center of Sukhbaatar Square, to the north Khailaast, Chingeltei, Salhit, Damadarjaa, and to the south, Central Stadium, Zaisan area. The zone is central area of the city of more urbanized area in the city with more urban facilities developed than the other area of the city. The zone also includes Bogd Khan Mountain on the south and Chingeltei Mountain</li> </ul> <p>&lt;Development&gt;</p> <ul style="list-style-type: none"> <li>- This zone are densely built up, with historical and architectural heritage of Gandan, Dashchoilon monasteries</li> </ul> <p>&lt;Ger Area development&gt;</p> <ul style="list-style-type: none"> <li>- Chingeltei, Khailaast and Dambadarjaa, currently occupied with Ger area, are planned to be improved into residential area with engineering infrastructure, and with civic service complex facilities in each area.</li> <li>- Industrial complex is planned to hold hide leather, wool and cashmere, auto repair workshops, food and light industries, and construction materials</li> <li>- Along rivers of Selbe, Khailaast and Chingeltei are planned green parks and space, sports and recreational facilities, including water pool, parks, sports complex, replanting of mountain slopes.</li> <li>- Forestation (replantation) and planting shall be also planned along the rivers.</li> </ul>
Eastern Zone	<p>&lt;Area&gt;</p> <ul style="list-style-type: none"> <li>- The zone includes basin of Uliastai River, Khujirbulan, Gatsuurt, basin of the Tuul River on the east, and Bayanzurkh on the south.</li> </ul> <p>&lt;Development aspect&gt;</p> <ul style="list-style-type: none"> <li>- The zone is planned to be developed in the direction of Bayanzurkh Mountain.</li> <li>- Central area shall be located along the main road connected to Shar Khad and Uliastai.</li> </ul>

(2/2)

Zone	Description
Eastern Zone	<p>&lt;Development aspect&gt;</p> <ul style="list-style-type: none"> <li>- Along Uliastai river basin will be a park zone complex.</li> <li>- A new town of science academic and university with 40,000 students</li> <li>- Inter-city railway station and auto station</li> <li>- To relocate factories, warehouses, and military units and develop the evacuated areas into residential areas.</li> <li>- On the basis of a development concept of proximity of work place and residence.</li> <li>- Develop Altan Ulgii into honour-funeral complex.</li> <li>- A 100-150 meter wide green belt is developed between railway and residential areas.</li> </ul> <p>&lt;Ger Area development&gt;</p> <ul style="list-style-type: none"> <li>- Relocation of Ger Area Residences in order to prevent contamination of sources of drinking water.</li> </ul>
Western Zone	<p>&lt;Area&gt;</p> <ul style="list-style-type: none"> <li>- The zone mainly includes the area of Bayangol and Songinokhairkan Districts, Micro Districts III, IV, and I, and West south Industrial area. In this zone there are located many factories of various kinds, power plants, CWWTP.</li> </ul> <p>&lt;Development&gt;</p> <p>(1) Industrial zone</p> <ul style="list-style-type: none"> <li>- Improve the industrial zone and residential zone</li> <li>- Relocation of factories which cause environmental pollution or contamination.</li> <li>- Relocation of some factories for residential area connected to the central infrastructure system.</li> <li>- Creation of green belt for sanitation and hygiene reasons.</li> <li>- Creation of parks and complex of commercial, culture, and sports.</li> <li>- Maintain ecological balance and environmental sustainability.</li> </ul> <p>(2) Residential zone</p> <ul style="list-style-type: none"> <li>- Develop factory area into apartment areas</li> <li>- Develop civic service center</li> <li>- Develop apartment and public service complex along a highway</li> </ul> <p>&lt;Ger Area development&gt;</p> <ul style="list-style-type: none"> <li>- Develop the east side of Naran-Tolgoit and Bayankhoshuu into a private housing area with a complex of commercial, services and cultural.</li> <li>- Public services buildings and mid to high rise apartments of 5, 9, 12 stories are planned in the area connected to the central engineering infrastructure system.</li> <li>- Buyant-Ukhua and Yarmag area are planned to become detached housing areas with public services.</li> <li>- Buyant-Ukhua District is located on the bank of the Tuul River with some cultural and community facilities. This district is easily connected to Millennium road and the highway to International Airport</li> <li>- Yarmag District is located between the Airport and Ulaanbaatar City. Nukht area is planned as an international resort and tourism complex in the future.</li> <li>- A sport complex is planned for Mongolian traditional sports in Yarmag area.</li> <li>- Natural environment of Bogd Khan Mountain and the Tuul River are planned to utilize as valuable natural resource.</li> </ul>
New City	<p>&lt;Area&gt;</p> <ul style="list-style-type: none"> <li>- Reserved area for new towns to accommodate the population of Ulaanbaatar beyond 2020.</li> <li>- East side of Songinokhairkhan Mountain, valley on the north of the Tuul River, basins of the Takhilt River and the Bayangol River.</li> </ul> <p>&lt;Development aspect&gt;</p> <ul style="list-style-type: none"> <li>- New towns located on the west side will be connected to the other districts with greenery and parks, and accommodate 250,000 ~300,000 population.</li> <li>- 15,000 - 20,000 people will live in an apartment micro district.</li> </ul>

Source: JICA Study Team based on UBMP-2020

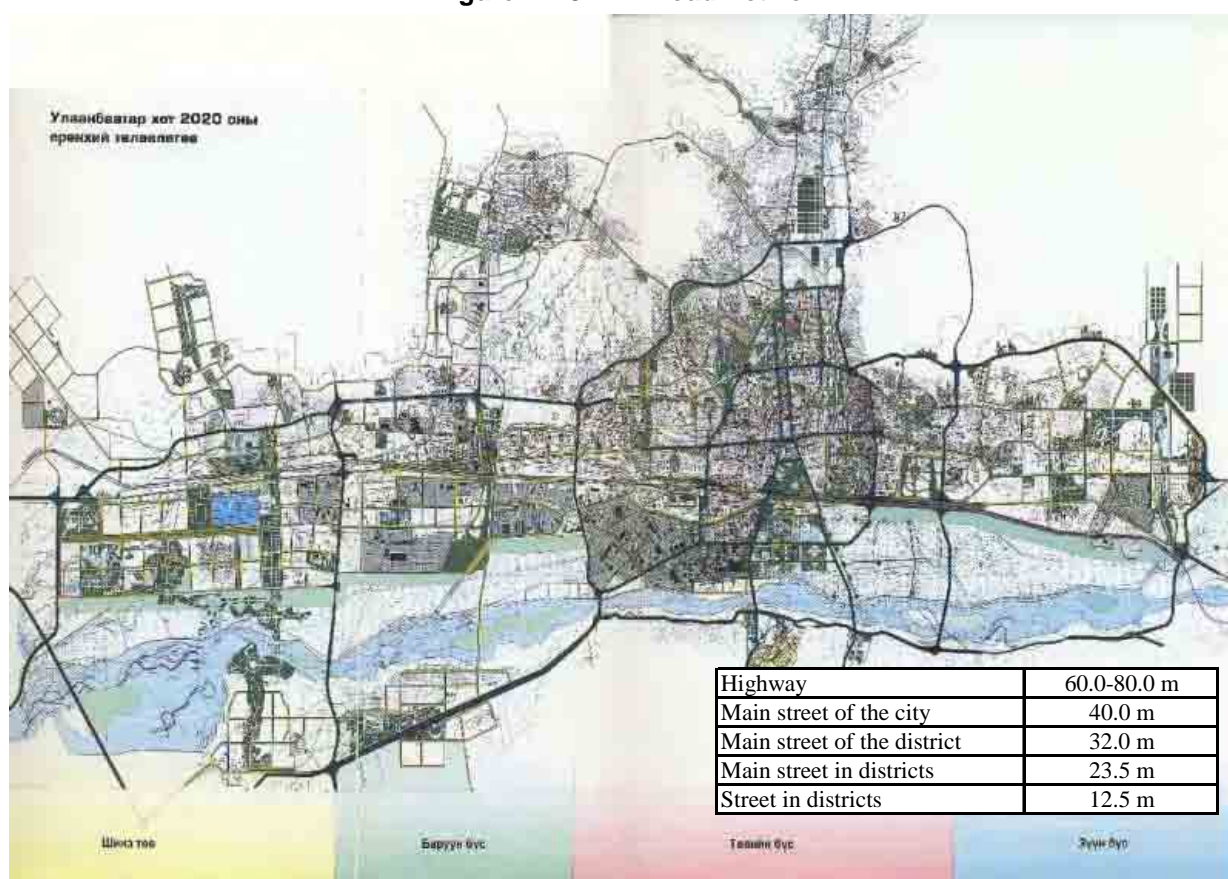
### 3) Road Network

Ulaanbaatar Master Plan 2020 has the future road network covering four districts as shown in Figure 2.4.4, and it proposes additional new roads, totaling 213.5km in length. In the planning period, a 132.5km of city main road and 81km of district main road shall be newly developed. In 2020, main city roads will total 287km, and main district roads 249.8km (see Table 2.4.4).

The proposed future road network comprises functional classification such as highway, main street of city, main street of district, main street in district and street in district. These roads have proposed road Right-of-Way (ROW), ranging 12.5m to 80m.

Peace Avenue between Trade Union Street and Amarsanaa Street and between eastern section of Ikh Toiruu and Ulaan Khuaran Road has 60m wide ROW including wide median. Ard Ayush Avenue also has 60m wide ROW including wide median.

**Figure 2.4.3 Road Network**



Source: UBMP-2020

**Table 2.4.4 Road Development**

(Unit: Km)

Classification	2000	New road development			Sub-Total	After 2020	Total
		2000 - 2005	2005 - 2010	2010 - 2020			
Major Arterial						70	70
Arterial				14	14		14
Collector	154.5	29.5	24	30	240	48	287.0
Local Street	168.5		6	23	197.8	52	249.8
Total	323.3	29.5	30	67	450.8	170	620.8

Source: UBMP-2020

**Figure 2.4.4 Photos of Road Condition in Ulaanbaatar City**



Peace Avenue, Eastern Section



Peace Avenue, Western Section



Ard Ayush Avenue

Source: JICA Study Team



## 2.5 Proposed Urban Facilities

In this section, proposed urban facilities for Ulaanbaatar City are summarized.<sup>3</sup>

### 1) Housing

In 2000, only 46.7% of housings were apartments with full supply of engineering utilities. The rate of apartment fully equipped with engineering infrastructure was planned to reach 82% in 2020. A total number of residents living in apartments with full infrastructure was planned to increase from 313,000 to 942,800 while those living in houses without full infrastructure were planned to grow from 69,500 in 2000 and 209,500 in 2020.

In the Satellite cities, the ratio of apartment dwellers shall rise from 28.5% in 2000 to 52.4%.

**Table 2.5.1 Number of Apartments with Full Infrastructure and Residents**

Apartment	Unit	2000	2005	2010	2020
Ratio of apartment With engineering infrastructure	%	46.7	47.1	50.5	82.0
Ratio of apartment Without engineering infrastructure	%	53.3	52.9	49.5	18.0
People living in apartment with full supply of engineering infrastructure	thousand persons	313	365	454.6	942.8
Number of Apartments	thousand	69.5	81.3	101.0	209.5

Source: Table 2.9, Vol.3, UBMP-2020.

**Table 2.5.2 Housing Supply in Satellite Cities**

Apartment	Unit	2000	2005	2010	2020
Ratio of apartment With engineering infrastructure	%	28.5%	36.1%	42.5%	52.4%
Ratio of apartment Without engineering infrastructure	%	71.5%	63.9%	57.5%	47.6%
People living in apartment with engineering infrastructure	Thousand persons	18.8	30.5	99.9	262
People living in Ger	Thousand	47.1	84.5	135	238

Source: Study Team, Calculated based on Table 4.1, Vol.4, UBMP-2020

Note: Satellite Cities are: 15 districts of Songino, Tuul, Ulziit, Khonkhor, Gatsuurt, Bayanzurkh, Bayangol, jargalant, Rashaant, Argalant, Nalaikh, Terelj, International Free Trade Zone, Baganur, and Bagakhangai.

Floor area per person for Ulaanbaatar City was planned to be increased from 6.74m<sup>2</sup> in 2000 to 9.00m<sup>2</sup> in 2020.

<sup>3</sup> Vol. 4 of UBMPs treat with development frameworks of Satellite Cities which included as part of Ulaanbaatar Capital City, and further Zuunmod, Batsumber, and Sugnegur are included as Satellite Cities in Capital City Region.



**Table 2.5.3 Apartment Floor Area per Person**

Area	2000	2005	2010	2020
Floor area / person (m2)	6.74	9.00	9.00	9.00

Source: Table 2.2 Vo. 3, UBMP-2020

## 2) Social Infrastructure

Social infrastructure including schools, kindergarten, and hospitals are targeted to meet 100% of demand.

**Table 2.5.4 Social Infrastructure in Ulaanbaatar City**

	Unit	2000	2005	2010	2020
School	Seat	75,736	124,000	144,000	230,000
	Seats per 1000 people	113	160	160	200
	Coverage (%)	70	100	100	100
Kindergarten	Children	27,468	52,700	61,200	115,000
	Children per 1000 people	41	68	68	100
	Coverage (%)	60	100	100	100
Hospital	Bed	4,275	6,200	7,200	10,350
	Beds per 1000 people	6	8	8	9
	Coverage (%)	75	100	100	100

Source: Table 2.11, Vol. 3, p.25, UBMP-2020

Note: Satellite Cities are: 15 districts of Songino, Tuul, Ulziit, Khonkhor, Gatsuurt, Bayanzurkh, Bayangol, Jargalant, Rashaant, Argalant, Nalaikh, Terelj, International Free Trade Zone, Baganur, and Bagakhangai.

**Table 2.5.5 Social Infrastructure in Satellite Cities**

	Unit	2000	2005	2010	2020
School	Seat	12,297	19,690	39,780	109,900
Kindergarten	Children	2,953	7,840	16,060	51,140
Hospital	Bed	545	940	1,890	4,610

Source: Table 4.2, Vol. 4, UBMP-2020

Note: Satellite Cities are: 15 districts of Songino, Tuul, Ulziit, Khonkhor, Gatsuurt, Bayanzurkh, Bayangol, Jargalant, Rashaant, Argalant, Nalaikh, Terelj, International Free Trade Zone, Baganuur, and Bagakhangai.

## 3) Heating

As seen in Section 2.5.1 Housing, in 2020, 82% of the total population or 943,000 shall be connected to the central heating system as compared with 46.7%, or 313,000 in 2000.

The increase of heating supply shall be regulated by building a new heating source on supply side and heat saving measures on demand side. 77% of buildings connected to the central system were apartments and improvement of heating efficiency of buildings aims to economize 25-30% of heating.

Using site of the Thermal Power Station No.1 (TPS-1) a new source of power was planned to be built in 2005-2010 to supply as the first priority east region of the city, particularly the first Bayanzurkh District.

In 2010-2020 techniques and technology of TPS-2 shall be renovated to have a capacity of 600MW to supply Western region of the city by centralized heating, and TPS-3 and TPS-4 shall supply Central region and industrial areas.

**Table 2.5.6 Heating Demand**

Year	Population with Centralized System (thousand persons)	Population without Centralized System (thousand persons)	Centralized System (Gcal/h)	Not centralized		Total (Gcal/h)
				Independent Heating Facilities (Gcal/h)	Ger (Gcal/h)	
2000	313.0	356.7	1,622	120	253	1,995
2005	366.7	410.0	1,735	149	290	2,174
2010	480.3	446.0	1,900	132	315	2,347
2020	942.8	207.2	3,044	64	131	3,239

Source: Table 4.2.2, Vol. 3. UBMP-2020

Heating demand for the 15 Satellite Cities is shown in the Table 2.5.7.

**Table 2.5.7 Heating Demand in Satellite Cities**

Year	Centralized Heating System		Ger District		Thermal Power Station/Heating Stove	Total Gcal/h
	Population /thousand	Gcal/h	Population /thousand	Gcal/h	Population /thousand	Gcal/h
2000	18.11	41.35	50.19	35.53	20.97	1,237.71
2005	29.20	65.23	85.80	58.79	36.81	2,814.17
2010	96.30	158.31	149.70	103.95	64.95	2,718.82
2020	263.40	495.03	259.15	188.86	120.54	6,312.92

Source: Study Team, calculated based on Tables 6.1 ~ 6.15, Vol. 4, UBMP.

Note: Satellite Cities are: 15 districts of Songino, Tuul, Ulziit, Khonkhor, Gatsuurt, Bayanzurkh, Bayangol, Jargalant, Rashaant, Argalant, Nalaikh, Terelj, International Free Trade Zone, Baganuur, and Bagakhangai.

#### 4) Water Supply

Demand of drinking of Ulaanbaatar City shall increase up to 310,459 m<sup>3</sup> per day by 2020, almost twice as much as 150,438 m<sup>3</sup> in 2000. A feasibility study shall be conducted to create a dual system to supply surface and underground water.

A new underground source of drinking water is required to be extracted and used to 2010-2020 or into the far future. Based on researches and surveys, measures shall be taken to create and implement dual system to supply with surface and underground water.

**Table 2.5.8 Water Consumption**

Item	Unit	2000	2005	2010	2020
Population	Thousand person	678.9	768.6	816.8	1,150.0
Demand / day	m <sup>3</sup> /day	150,438	191,972	200,241	310,459

Source: Table 4.3.2, Vol.3, UBMP-2020

Note: Water unit consumption for apartment dwellers is set 350 liter per day by 2010, and 300 liters per day for 2020; for Ger dwellers, 50 liters per day per person to 2005 and 2010, and 25 liter per day per person for 2020.

Supply for water demand in Satellite Cities is planned based on the unit consumptions of 276 liters per day per person for apartment dwellers and 30 liters per day per person for Ger dwellers and Satellite Cities.

**Table 2.5.9 Water Consumption in Satellite Cities**

Year	Apartment		Ger		Amount	
	Population	Water Consumption (m <sup>3</sup> / day)	Population	Water Consumption (m <sup>3</sup> / day)	Population	Water Consumption (m <sup>3</sup> / day)
2000	17,510	4,832	36,164	1,496	53,674	6,329
2005	29,200	8,059	86,100	2,683	115,300	10,642
2010	96,300	26,579	140,200	4,206	236,500	30,785
2020	263,400	72,698	250,700	21,021	514,100	80,219

Source: JICA Study Team, based on Tables 6.20~6.23, Vol. 4, UBMP

Note: Satellite Cities are: 15 districts of Songino, Tuul, Ulziit, Khonkhor, Gatsuurt, Bayanzurkh, Bayangol, jargalant, Rashaant, Argalant, Nalaikh, Terelj, International Free Trade Zone, Baganur, and Bagakhangai.

## 5) Sewerage

In 2020, for 1.15 million population, wastewater is estimated at 324,533m<sup>3</sup>, out of which 318,535m<sup>3</sup> shall be treated at the centralized wastewater treatment system

To meet the demand for treatment, a new wastewater treatment plant (WWTP-1) is planned to build to treat wastewater from Sansar, Nuuriin khoroolol and Denjiin Mynga.

In the future, the Central Wastewater Treatment Plan, the Industrial Area Wastewater Plant, and two newly established plants of the Tuul Wastewater Treatment Plant and Tolgoit Wastewater Treatment Plant will treat the wastewater. In addition, Districts of Buyant-Ukhaa and Yarmag will have new wastewater treatment facilities. Buyant-Urkhaa and Yarmag plants will be connected to the central sewerage network.

For the sewerage, in addition to the wastewater treatment plants, 88.85km of network pipes shall be improved by 2020.

A new sewerage network, which connects private housing areas shall be built and it shall be connected to the central network.

For Satellite Cities except for Baganuur and Bagakhangai, 18,061m<sup>3</sup>/day in 2010, and 47,419m<sup>3</sup>/day in 2020 were estimated.

## 6) Power Supply

Electricity demand in 2020 is estimated as 779.33MW increasing from 415.96MW in 2000, 466.6 MW in 2005, and 635.1 MW in 2010.

In order to meet the future power demand, various improvement were made or planned:

- A new power station of 600MW is to be established
- Improvement of capacity of “West” sub-station
- Establishment of a new sub-station of 2x1600kVA of 11kV with 20 km long 11kV transmission line in Khailaast
- Upgrading of “Old” sub-station to 110kV and install two new transformers of 2x16000kVA in 2005
- Increase of capacity of “Tuul” and “Factory” sub-stations by sufficient scale by 2010
- Change in “Bayankhoshuu” sub-station of 35/6kV as sub-station 110kV with 2x16000kVA transformer.
- Power supply shall be increased using 25 sub-stations with capacity of 35-220KW from TPS-4 for the period until 2020.

**Table 2.5.10 Electricity Load**

	Unit	2000	2005	2010	2020
Population	1,000 persons	669.72	775.0	900.0	1,150.0
Domestic (House)	MW	124.7	178.47	204.96	317.04
Non-industry Establishments	MW	179.06	168.04	258.56	244.69
Industry	MW	111.2	120.10	171.60	217.60
Total Electricity Demand	MW	414.96	466.61	635.12	779.33

Source: Table 4.4.8, Figure4.4.5 & 4.4.6, Vol. 3, p. 194-6

Note: Satellite Cities are: 15 districts of Songino, Tuul, Ulziit, Khonkhor, Gatsuurt, Bayanzurkh, Bayangol, Jargalant, Rashaant, Argalant, Nalaikh, Terelj, International Free Trade Zone, Baganuur, and Bagakhangai.

**Table 2.5.11 Electricity Load in Satellite Cities**

	Unit	2000	2005	2010	2020
Population	1,000 persons	65.8	115.0	235.0	500.0
Domestic and Non-industry Establishments	MW	64.3	107.5	264.5	866.1
Industry	MW	26.6	33.7	59.3	135.7
Total Electricity Demand	MW	90.9	141.2	323.8	1,001.8

Source: JICA Study Team, based on Table 6.19, Vol. 4. UBMP-2020.

## 7) Telecommunication

### (1) Telephone

It is planned to have 217,948 permanent telephone users and 356,598 mobile telephone users in 2020, reaching the tele-density of 50 telephones per 100 people by 2020.

**Table 2.5.12 Telephone Supply**

Type of telephone	2000		2005		2010		2020	
	Number	Tele-density (per 100 persons)	Number	Tele-density (per 100 persons)	Number	Tele-density (per 100 persons)	Number	Tele-density (per 100 persons)
Fixed-line	68,037	10.2	101,616	13.1	143,735	16	217,948	19
Mobile	100,000	11.9	165,795	21.4	234,515	26	355,598	31
Total	168,037	22.1	267,411	34.5	378,250	42	573,546	50

Source: JICA Study Team, Table 4.5.9, Vol. 3, UBMP-2020.

**Table 2.5.13 Telephone Supply in Satellite Cities**

	2000		2005		2010		2020	
	Population	Tel points	Population	Tel points	Population	Tel points	Population	Tel points
Telephone Points	65.8	4,157	115.0	10,942	235.0	28,550	500.0	99,100
Telephone Points per 100 persons	6.3		9.5		12.1		19.8	

Source: JICA Study Team, based on Table 5.2, Vol. 4. UBMP-2020

Note: Satellite Cities are the following 15 districts: Songino, Tuul, Ulziit, Khonkhor, Bayanzurkh, Gatsuurt, Bayangol, Jargalant, Rashaant, Argalant, Nalaikh, Terelji, International Free Trade Zone, Baganuur, and Bagakhangai.

### (2) Internet

In 2020, 173,700 users shall be connected to internet network and data communication from 8,000 in 2000.

**Table 2.5.14 Internet Users of Ulaanbaatar City**

	2000	2005	2010	2020
Number of Users	8,000	48,700	77,500	173,700

Source: Vol. 3, UBMP-2020, p.217, pp 224-5

## 8) Parks and Green Areas

Green areas are planned to make 20m<sup>2</sup> per person in 2020 from 3m<sup>2</sup> per person in 2020. Absolute area of the green and parks are to be almost eleven times as much, or from 207ha in 2000 to 2,300 ha in 2020.

In the UBMP-2020, the following measures are to be undertaken:

- To establish one to two mini gardens in each district by 2020
- To establish memorial parks and to build the Zaisan park
- To plant trees and bushes on 35ha of land along the Tuul River
- To establish wind-breaking and sand-prevention green area on the west side of the city
- To develop green area along the rivers Selbe, Uliastai and Dund
- To plant trees on a 50,000ha of land in Ger areas with 2 to 5 trees on each parcel of Ger property by 2010

**Table 2.5.15 Park and Green Area**

Item	Unit	2000	2005	2010	2020
Park Area	ha	207	594.9	900	2300
Per person	m <sup>2</sup> /person	3.1	7.7	10.0	20.0

Source: Table 5.2, Vol. 3, UBMP-2020

## 9) Disaster Prevention (Flood Control Channel)

Comprehensive measures to protect Ulaanbaatar City from torrential rain, flood, and sediment flow shall be taken. To protect the city, the following works were planned in the UBMP-2020. The measures particularly focus on areas prone to disasters caused by melting snow and rain.

- To construct structures to protect from sediment flow
- To improve or construct flood control channels or drainage system
- To improve or construct flood protecting dikes
- To protect and plant trees and bushes on slopes and river sides
- To build flood control basin in the Tuul River
- To set water depth gauges in rivers

## 2.6 Environmental Planning

According to UBMP-2020, it was explained that following issues have aggravated environmental condition.

- Increasing environmental pollution has affected ecological value and balance.
- Lack of housing supply and low social infrastructural service has accelerated environmental deterioration.
- Demand increasing has led shortage of natural resources.

It is concluded that rapid population increasing and unplanned development have aggravated environmental condition, and then city development shall be harmonized with environmental protection.

For solution above issues, Ulaanbaatar City has studied action plans, how to tackle on solution of environmental problems and creation of sustainable development. Some actions showed their effects, however there has been gap between program planning and implementation hence environmental condition has still been aggravated. Therefore it might be important to tackle from various viewpoints with continuing existing activities.

Table 2.6.1 summarizes priority action plans in UBMP-2020 and current status.

**Table 2.6.1 Policy and Strategy for Protection of Environment and Ecology**

Environmental Issue	Priority Action	Current Problem
Air pollution	<ul style="list-style-type: none"> <li>• To improve air quality control system</li> <li>• To rapidly reduce source of air pollution</li> </ul>	<ul style="list-style-type: none"> <li>• Air quality exceeds standard level.</li> <li>• Most of pollution load generates by independent stoves, small/medium heat-only-boilers.</li> <li>• Dust pollution generates from unpaved road.</li> <li>• Health impact leads respiratory illness.</li> </ul>
Water Pollution	<ul style="list-style-type: none"> <li>• To define and build database for surface/underground water resource</li> <li>• To improve water protection and to increase water reserves</li> <li>• To extend water supply to suburbs, villages</li> </ul>	<ul style="list-style-type: none"> <li>• Inadequate sanitation in Ger areas pollutes underground water.</li> <li>• Central wastewater treatment facility has been under capacity.</li> <li>• Industrial wastewater is discharged without proper treatment.</li> </ul>
Soil Pollution and Erosion	<ul style="list-style-type: none"> <li>• To improve soil protection and to rehabilitate eroded soil</li> <li>• To control expansion of cemeteries and to build better management</li> <li>• To study on desertification and protection measures</li> <li>• To reduce soil pollution, erosion and deterioration</li> </ul>	<ul style="list-style-type: none"> <li>• Inadequate sanitation in Ger areas pollutes underground water.</li> <li>• Deforestation and desertification accelerate erosion, it causes flooding problem.</li> </ul>
Waste Management	<ul style="list-style-type: none"> <li>• To improve waste collection system</li> <li>• To raise waste management level up to level of countries with average management</li> </ul>	<ul style="list-style-type: none"> <li>• Low function of garbage collection network leads illegal dumping.</li> <li>• Capacity of existing disposal areas will be under demand soon.</li> <li>• Medical and toxic waste has not been properly treated.</li> </ul>
Forest Resource and Biodiversity Protection	<ul style="list-style-type: none"> <li>• To improve forest protection management and to eliminate illegal and improper usage</li> <li>• To increase forest reserve and to protect from fire accident, diseases and harmful insects</li> <li>• To protect biodiversity and to improve rehabilitation activities</li> <li>• To radically improve biodiversity protection system</li> </ul>	<ul style="list-style-type: none"> <li>• Urban sprawling aggravates natural environmental condition, and disturbs wildlife corridor.</li> <li>• Illegal and unplanned tree cutting accelerate deforestation and desertification.</li> <li>• Lack of legal enforcement cannot control developments in the conservation areas.</li> </ul>
Natural Disaster Mitigation and Protection	<ul style="list-style-type: none"> <li>• To improve protection and mitigation measures any to raise involvement of organizations and individuals</li> <li>• To improve earthquake protection management system</li> <li>• To improve flood protection measures</li> <li>• To improve fire protection system</li> <li>• To improve protection against infectious diseases caused by human and livestock</li> <li>• To provide rapid protection, rescue and recovery measures caused by natural disasters</li> </ul>	<ul style="list-style-type: none"> <li>• Deforestation and desertification accelerate erosion, it causes flooding problem. Many residents live in flood prone areas.</li> <li>• Inadequate land improvement leads serious damage.</li> <li>• Unplanned road network in Ger areas disturbs access of emergency cars.</li> </ul>

Source: JICA Study Team based on the UBMP-2020



## 2.7 Legal Framework for Urban Planning

The law on urban development of Mongolia, approved in 1998, is the major legal basis for urban planning. However, the necessity was recognized in the UBMP-2020 to make amendments to this law to cover practical activities of urban development.

Accordingly, proposals for the legal basis of implementation of the master plan for development of the capital city of Ulaanbaatar were made based on the followings:

- Comparison of laws on urban development of foreign countries
- Creation of laws related to urban development
- Formulation of proposals for legal basis of implementation of the Master Plan

The following amendments to the law on urban development were proposed:<sup>4</sup>

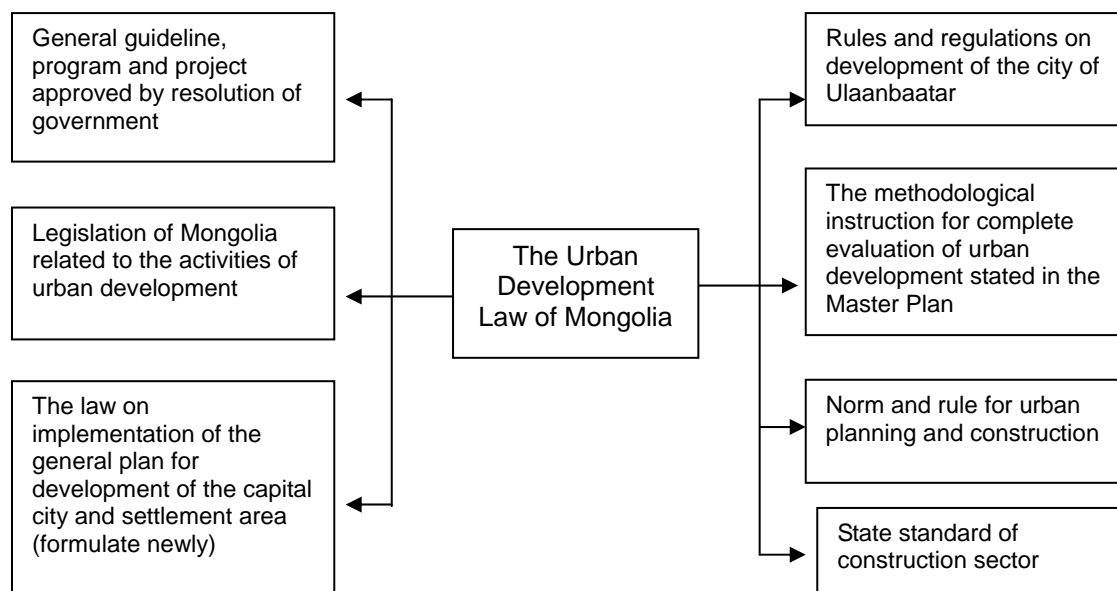
- To enrich definitions of the law with professional definitions
- To describe the classification of urban and settlement area
- To clarify citizen's rights and duties in activities of urban development
- To define the requirements for activities of urban development relating to protection of buildings and land of historical and cultural monuments
- To define the activities of urban development in the nature reserves
- To define the regulations for construction of engineered lines and networks by law
- To provide conditions to establish green areas and related equipment
- To state urban development measures to serve for invalids by law
- To identify the involvement of citizens and dwellers in activities of urban development
- To define the rights and duties of professional organizations in the activities of urban development
- To coordinate the activities of urban development in the areas of natural, climatic and other special conditions.
- To define the rights in and duties of authors to make documents and work orders for urban development
- To formulate provisions for implementation of measures supported by state, enterprises, organizations and citizens
- To define the measures to implement the general plan for population settlement, regional development projects, and urban and town development
- To define the norms and standards of urban development
- To develop the principles for amendments to urban development documents
- To clarify the cadastral map of urban development and its mechanism
- To state the requirements for land use of urban area

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<sup>4</sup> Vol.6, UBMP-2020

- To regulate the control of issues on activities of urban development
- To define the conditions of involvement of organizations, enterprises and citizens of foreign countries in the territory of Mongolia in activities of urban development.

**Figure 2.7.1 Overview of a Packet of Laws on Urban Development**



Source: Vol.6, UBMP-2020

The proposal for the new structure of the law on urban development is comprised of seven (7) chapters as shown in Table 2.7.1.

**Table 2.7.1 Proposed Structure of a New Law on Urban Development**

Chapter	Articles
Chapter 1: General Provision	<ol style="list-style-type: none"> <li>1. Purpose of the present law</li> <li>2. Legislation of urban development</li> <li>3. Definitions</li> <li>4. Basic requirements for activities of urban development in acting the role of the capital city of Mongolia</li> <li>5. The sovereignty of state organizations and governing body of the capital city over the activities of urban development</li> </ol>
Chapter 2: The general tendency for development of urban development of the capital city of Ulaanbaatar	<ol style="list-style-type: none"> <li>6. The main development goal of urban development</li> <li>7. Meeting the requirements for protection of environment</li> <li>8. The general tendency for protection and development of nature and green areas</li> <li>9. Protection of buildings and areas with historical and cultural monuments</li> <li>10. The general tendency for development of housing construction</li> <li>11. The general tendency for development of the construction of public buildings of the city</li> <li>12. The general tendency for activities to newly organize industrial zones</li> <li>13. The general tendency for development of transport infrastructure</li> <li>14. The general tendency for development of the infrastructure of engineering network</li> <li>15. The general tendency for development of equipment of environment</li> <li>16. The general tendency for development of central part</li> <li>17. The general tendency for development of territory of the capital city</li> <li>18. The development order of urban development</li> <li>19. Territories for change of the purpose of use</li> </ol>
Chapter 3: Territorial zoning	<ol style="list-style-type: none"> <li>20. General provision</li> </ol>
Chapter 4: Basic goals and indicators of development for initial period	<ol style="list-style-type: none"> <li>21. Basic goals and indicators of development for initial period until 2005</li> <li>22. Protection of environment</li> <li>23. Protection and development of environment and green areas</li> <li>24. Protection of buildings and areas with historic and cultural monuments</li> <li>25. Development of public and housing sector</li> <li>26. Development of roads and transport</li> <li>27. Development of infrastructure</li> <li>28. Development of urban center and sub centers</li> <li>29. Development of areas which should be readjusted</li> <li>30. Development of urban green area and equipment</li> </ol>
Chapter 5: The regulations on implementation of, monitoring for and control over the master plan of development	<ol style="list-style-type: none"> <li>31. The regulation on implementation of the general plan</li> <li>32. The reestablishment of administrative units according to the general plan</li> <li>33. The regulation on monitoring and control</li> </ol>
Chapter 6: Funding	<ol style="list-style-type: none"> <li>34. Subsidies by the government</li> <li>35. Funding by the capital city</li> <li>36. Other funding</li> </ol>
Chapter 7: Others	<ol style="list-style-type: none"> <li>37. Compensation of loss</li> <li>38. Legal liabilities for offences according the general plan</li> </ol>

Source: Vol. 6, UBMP-2020

## 2.8 Notable Proposals for the Implementation of the Master Plan

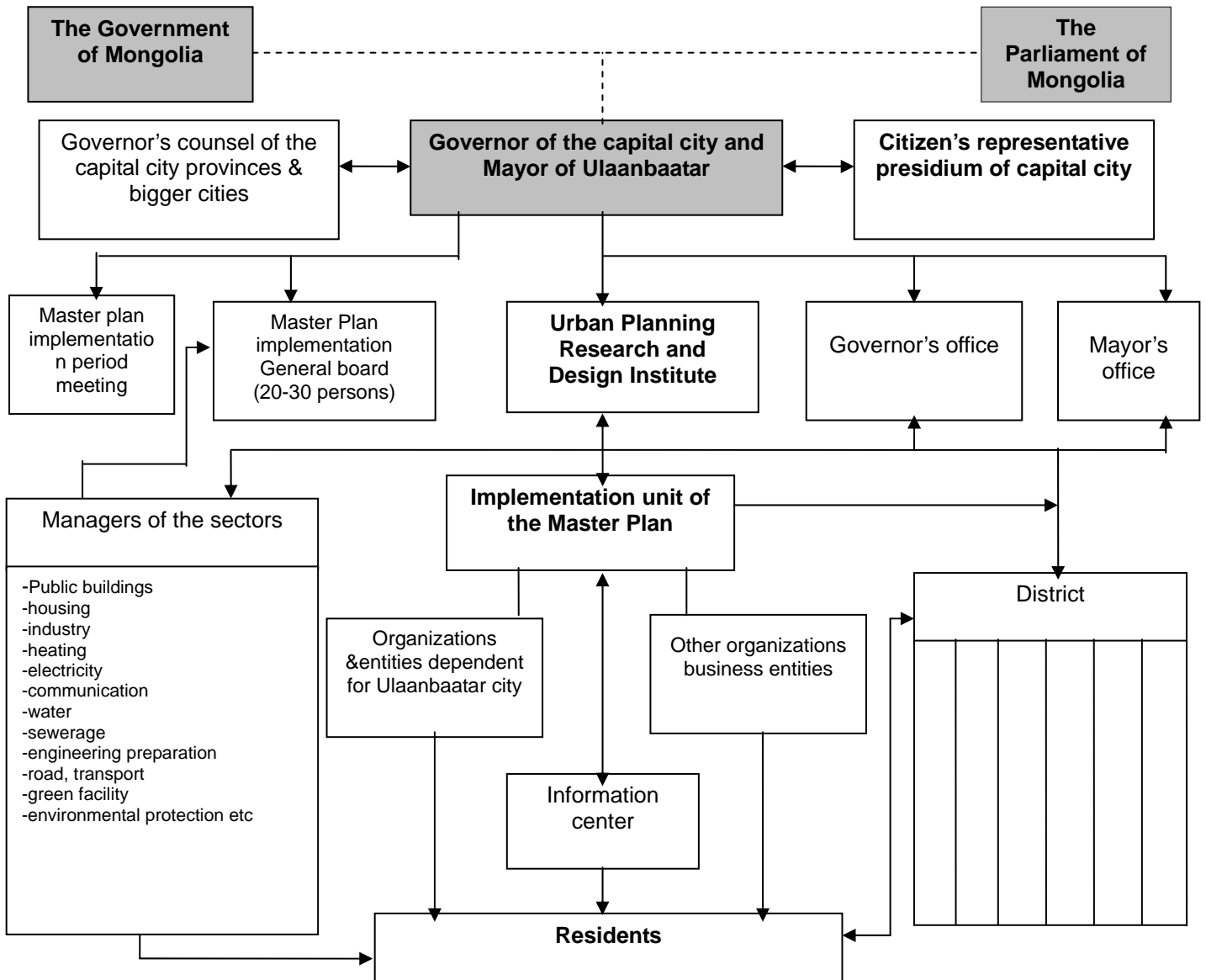
Various conditions required for implementation of the Master Plan were considered in the UBMP-2020. The Table 2.8.1 shows some principles for implementation of the Master Plan. Based on these principles, in addition to the proposal of amendment to the legal framework for urban development, proposals for management system and structure were made as shown in Figures 2.8.1 and 2.8.2.

**Table 2.8.1 Measure to Implementation of the Master Plan**

Category	Description
Organizational Principles	<ul style="list-style-type: none"> <li>• Provide relationship between organizational structure and activity;</li> <li>• have skilled compact structure</li> <li>• implement activities and responsibilities in a cost-effective manner;</li> <li>• be flexible, and appoint a particular person in extreme cases;</li> <li>• have the sensitivity to political matters;</li> <li>• weaken the political concentration;</li> </ul>
Modernization of Increase Urban Finance	<ul style="list-style-type: none"> <li>• Develop and automate the tax collection;</li> <li>• Increase the role of tax organizations through adopting related laws;</li> <li>• Fund in the way of granting loans;</li> <li>• Promote investment;</li> <li>• Provide industries with the required resources;</li> <li>• Create cooperation provincial organizations;</li> </ul>

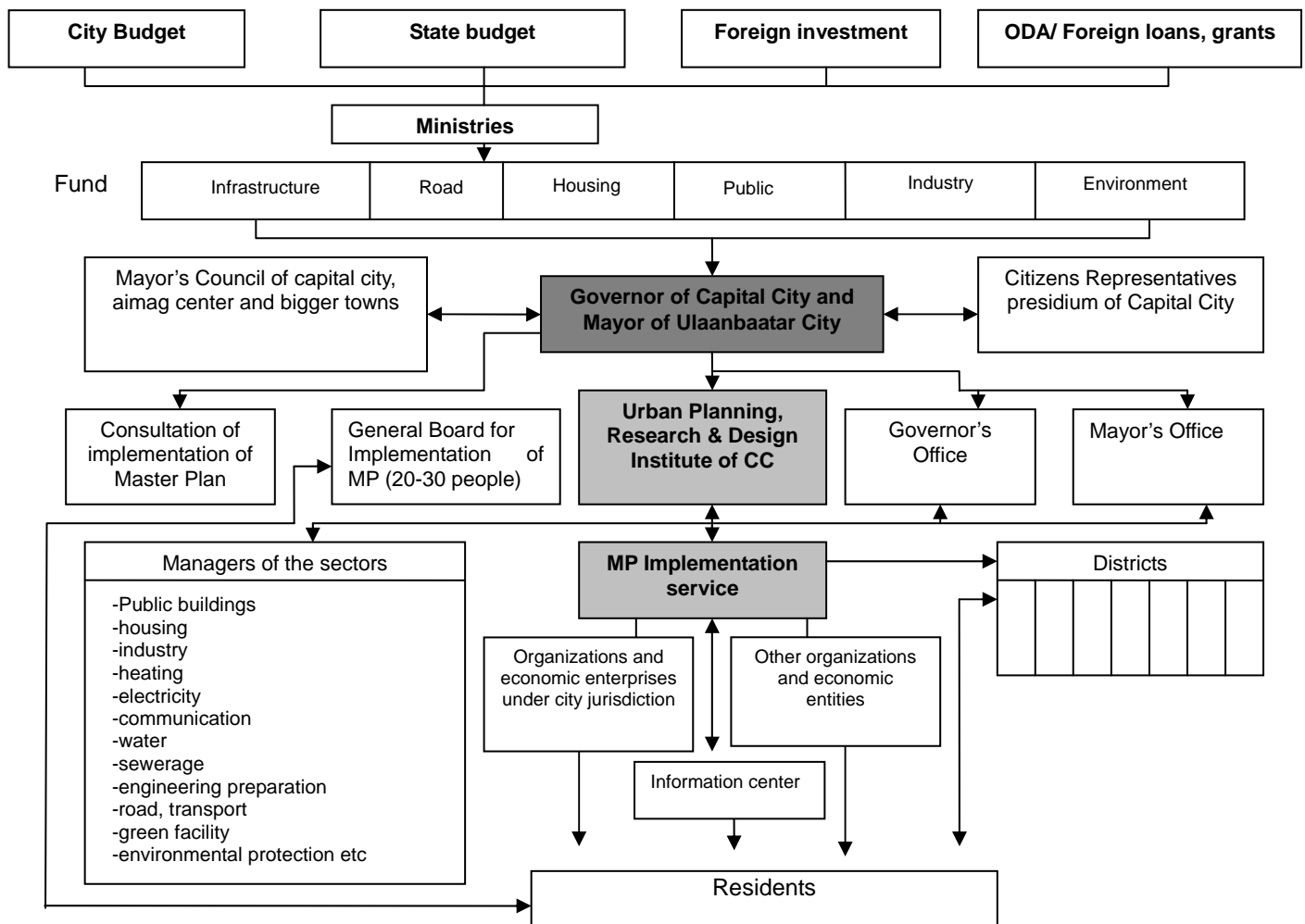
Source: Vol. 6, UBMP-2020

**Figure 2.8.1 Proposed Structure of Implementation**



Source: Chart 2.7, Vol.6, UBMP-2020

**Figure 2.8.2 Proposed Finance**



Source: Chart 2.8, Vol.6, UBMP-2020

## 2.9 Planning Issues to be Clarified by JICA Study

This JICA Study is prepared the revised Master Plan up to 2030, for the area of the central six (6) districts of Ulaanbaatar City and the three (3) remote districts of Nalaikh, Baganuur, and Bagakhangai. As described in the previous part of this chapter, UBMP-2020 planned in 2000 with the target year of 2020 targeted basically for the area of Ulaanbaatar City of the central 6 districts and the 15 Satellite Cities.

During seven (7) years since the UBMP-2020 was planned, the socio-economic situation has changed, and this should be reflected in the JICA Study. The land system in Mongolia was also changed in 2002 to allow people to own land privately based on an official registration process for private land ownership which is still ongoing. The new system has a huge influence on formulation of master plan and implementation of urban development programs and projects.

Based on such changes in the master plan, the following issues should be clarified by JICA Study Team.

- (1) To establish socio-economic development framework which is consistent with the national development strategy
- (2) To formulate urban structure coherent with socio-economic framework and development scenario, including Satellite Cities
- (3) To formulate transportation network and public transportation system
- (4) To formulate rational land use plan to secure environmental sustainability, to accommodate socio-economic activities properly, and to improve living conditions, including relocations of part of factories, universities, and people living in Ger areas or disaster prone areas.
- (5) To control urban growth, particularly in-migrants, under the system of private land ownership
- (6) To develop social and economic infrastructure taking account of improvement and increase of supply capacity such as new sources for supply of water, with power/heating and demand side management to reduce demand.
- (7) To formulate housing supply system under free market economy system, including developers and purchasers
- (8) To consider environmental management including wildlife and watershed management
- (9) To improve urban amenities, including green and park areas and recreation facilities
- (10) To improve urban sanitation including wastewater and solid waste management
- (11) To control pollutions, including air pollution, water pollution, and soil contamination
- (12) To consider disaster management, particularly flood control
- (13) To establish legal system to secure the implementation of the Master Plan under free market economy and private land ownership system
- (14) To improve management and institution system of urban planning and development
- (15) To build capacity of human resources in urban planning
- (16) To secure financial sources for implementation in both public and private sectors.

### 3. REVIEW OF EXISTING AND/OR ONGOING POLICIES, PLANS AND PROJECTS

#### 3.1 National Economic Development Strategies

“Millennium Development Goals Based National Economic Development Strategy” was adopted by the parliament on 1st February 2008. The strategy is viewing the long-term economic achievement, as well as human development. It is divided into two phases namely Phase I for the period 2007-2015 and Phase II for the period 2016 - 2021. A profile of the strategies is shown in Table 3.1.1, showing the major strategic framework.

**Table 3.1.1 Implementation Schedule of National Economic Development Strategies**

	Phase I	Phase II
	2007 - 2015	2015 - 2021
Economic Growth (%, per annum)	14	12
Per-capita GDP (US\$)	5,000 (2015)	12,000 (2021)
Strategy	Building the foundation of a knowledge-based economy	Developing a knowledge-based economy
	Increasing mining output	Enhancing finished-products industries
Priority	“Locomotive Projects” such as road, transportation, energy, IT, and telecommunications infrastructure	
	Focused Public Investment Program (PIP) for education and health	

Source: Ministry of Finance

Note: The current per-capita GDP is assumed to be more or less US\$ 1,000.

The target economic growth rate for Phase I is as high as 14% p.a. It is assumed that the per-capita gross domestic product (GDP) will reach US\$ 5,000 by 2015, compared to about US\$ 1,000 at present. This significant growth will materialize by building the foundation of a knowledge-based economy and increasing mining output.

While economic growth during the next period, Phase II, is assumed to be 12% p.a., showing a slight economic slowdown, this is still an ambitious target. It is projected that this figure can be achieved through a practical development of a knowledge-based economy, for which the foundation would have been laid down in Phase I. At the same time, the manufacturing sector will be enhanced by producing more value-added products instead of exporting raw materials. As a result of these initiatives, the per-capita GDP is targeted to reach US\$ 12,000 by 2021.

It might not be realistic, however, to target such a remarkably high economic growth rate, because no country/economy has ever experienced or sustained a growth of more than 10% p.a. in more than 10 years, based on world history.

Countries with per-capita GDPs of US\$ 3,600 – 11,000 are currently classified as upper middle-income economies. In this group, Brazil, Russian Federation, Turkey, Kazakhstan, and Malaysia are included. Looking at the World Bank’s data of Gross National Income (GNI) per capita as of 2006, Mongolia accounted for US\$ 880, compared to other notable countries such as Vietnam (US\$ 690), China (US\$ 2,010), Kazakhstan (US\$ 3,790), and the Russian Federation (US\$ 5,780). As seen in this comparison, the economic growth target



implies that Mongolia shall become an economy competitive enough to China and Russia.

In order to achieve the goal, priority sectors or “locomotive” projects that will facilitate such an accelerating economic growth have been identified. Special emphasis has been placed on economic infrastructure such as roads, transportation, energy, and information communication technology (ICT). At the same time, it is assumed that the Public Investment Program (PIP) shall highlight the importance of budget allocation for the education and health sectors.

## **3.2 Spatial Structure for National Development**

### **1) National and Regional Development Structure**

Of the national figure of 3.6 million, around 40% or roughly 1.0 million lives in Ulaanbaatar City. This share tends to increase further, due to accelerating rural-to-urban migration. Economic concentration in the prime city, Ulaanbaatar, is inevitable under market forces and as economies of scale work. Eventually, it is predicted that the population share of Ulaanbaatar City to national total will become more or less 60%. As a result, rapid urbanization will take place creating in turn a number of urban problems that will not only be hard to solve but will also require a lot of funds.

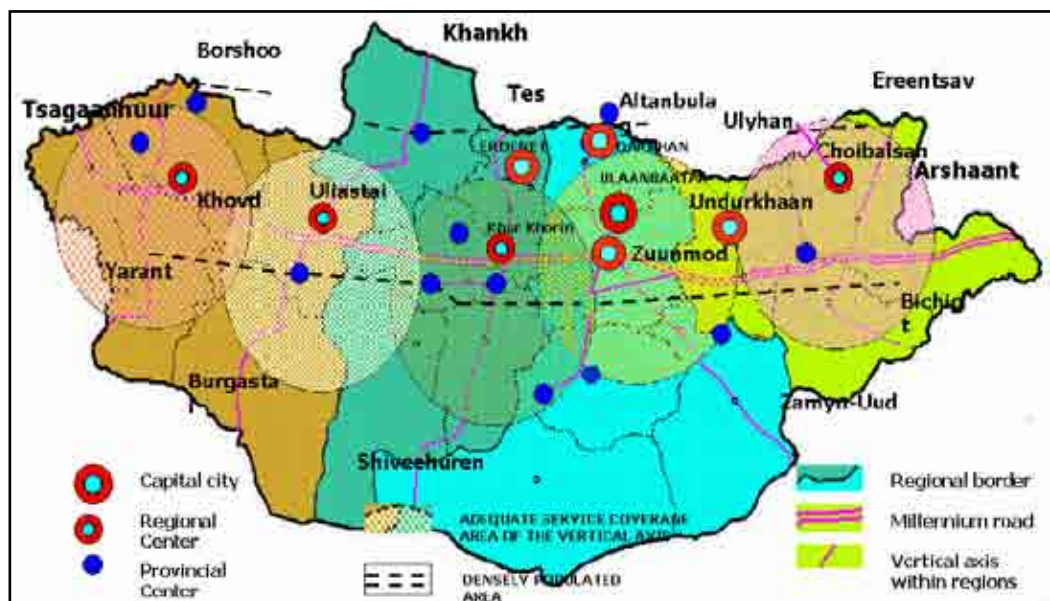
Regional cities should therefore be encouraged in their economic and productive activities. This policy is a must to realize the balanced development over the nation. The Government has launched a national development concept with four (4) economic regions with eight (8) regional core cities which should be strategically developed as regional urban centers. This concept is illustrated on Figure 3.2.1.

- Ulaanbaatar Region
- Central Region: Darkhan, Zuunmod
- Eastern Region: Choibalsan, Undurkhaan
- Hangay Region: Erdenet, Harhorin
- Western Region: Uliastai, Hovd

Importance of the development of such regional core cities is to create job opportunities in the manufacturing and service sectors and encourage urban services such as banking, financing, and transportation. Development of regional cities should also include the improvement of educational, health and commercial services as well as the development of information-communication systems to network with rural hinterland areas or their service catchment areas. In order to accommodate new locations of industries, utility infrastructure systems for power and water need to be provided with special emphasis.

As these core cities will be capable enough to accommodate rural-to-urban migrants, the concentration process on to Ulaanbaatar City will cease and have a moderate social increase in population. Then, the population in Ulaanbaatar City will be saturated at a certain level. With such a situation, a sustainable national economy with balanced resource allocation over the nation will be realized. Therefore, this policy for regional core city development should be strategically encouraged, because this is directly linked with solutions of urban problems encountered by Ulaanbaatar City.

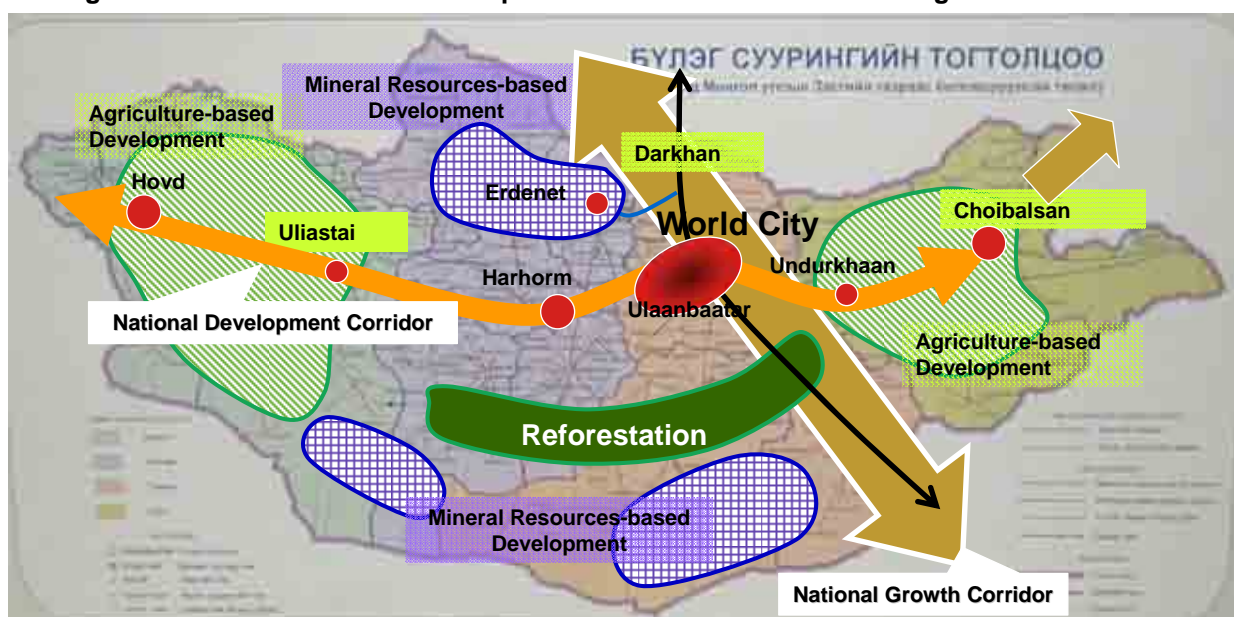
**Figure 3.2.1 National Development Policy for Balanced Regional Development**



Source: JICA Study Team

Ulaanbaatar does/will function as the national center of economic and industrial activities and commodity movements over the nation. Figure 3.2.2 shows a conceptual structure of the Mongolian national development. The corridor along the North-South railway is the backbone of the Mongolian economy and the most active and potential areas. The corridor is named “National Growth Corridor” that involves promising agricultural, mining and industrial development opportunities, should infrastructures such as power, water and ICT trunk network system be well-developed. Mongolian international market integration with Russia in the north and China, Korea and Japan in the south shall be evolved along with the development of this National Growth Corridor.

**Figure 3.2.2 National Development Structure for Resource Integration**



Source: JICA Study Team

Another important structure is the East-West Corridor, connecting regional core cities, that is called “National Development Corridor”. This corridor is extremely important to encourage regional integration with a balanced economic resource allocation mechanism. At present, roads are a significant transportation mode throughout the East-West Corridor. However, in the eastern part, a new railway to connect the North-South Growth Corridor and Choibalsan, the regional core city of the eastern region, deserves to be pursued. Given this new link, Mongol will have another international trade route to/from East Asian countries via China or Russia.

Ulaanbaatar is located at the crossing point of the two strategic economic corridors, say, the North-South Growth Corridor and East-West Development Corridor. The corridor development should hold a strategy to enhance and assure economic infrastructures such as transportation (roads, railways and airways), power, water, telecommunication and information trunk lines with broad-bound optic fiber cables which are directly linked with global gateways. This condition is minimal for new development of the nation as a whole.

## **2) Industrial and Technological Park**

Mongolian Government is promoting establishment of Industrial and Technological Park. According to “Law on Legal Status of Industrial and Technological Park”, it is an industrial and technological complex which is located in a certain assigned area provided with infrastructure in order to constitute a comfortable business environment and materialize certain technological development goals within macro-economic policy. A park administrator which receives a license from the government is responsible for development and operation of the industrial and technological park.

Location of the park is not mentioned in the law, but “Basic Concepts for Establishment and Development of the Industrial and Technological Park”, approved by Resolution No. 54 of the State Great Khural in 2003, states that the cities mentioned below are nominated as well as remote districts of Ulaanbaatar City. The concept aims to develop industrial bases and balanced economic development all over Mongolia. Implementation of the policy is going to have an impact on the future spatial structure of Mongolia.

- Cities: Darkhan City, Zuunmod City, Choibalsan City, Choir City, Erdenet City, Khovd City, Sukhbaatar City, and Uliastai City.
- Districts: Bagakhangai District and Nalaikh District.

### 3.3 Notable Urban Policies, Plans, and Projects

#### 1) Housing Policies and Progress of Implementation

##### (1) “40,000 Housing Units Program”

In 2000, only 46.7% of housing consisted of apartments with complete utilities. Based on the Ulaanbaatar City Master Plan 2020 this share is planned to increase to 82%. To jumpstart this target, the “**40,000 Housing Units Program 2006 - 2009**” was formulated as the major principal plan on urban planning, especially for the housing sector.

The program’s strategies are: i) to establish new housing areas, ii) to improve housing density, iii) to upgrade the Ger areas, iv) to facilitate the development of housing and real estate market relations, and v) to support construction material production and capacity building.

The target of this program is to build 40,000 houses, of which 28,000 in Ulaanbaatar, 8,000 in its satellite towns, and 4,000 in aimags, i.e. 2,500 in pillar cities and 1,500 in aimag centers. Of these figures, more than 20,000 housing units will be built in new towns and new residential projects. Meanwhile, 70% of Ger areas will be redeveloped either by undergoing land readjustment or by living conditions improvement. At present, no new town plans have been launched yet, while some residential projects have already been started by the private sector.

Based on this program, the ADB commenced the “**Urban Development and Housing Sector Strategy**,” with proposals on establishing the implementing body for the 40,000 housing stock, community-based development, housing finance, etc. In October 2006, the “**Mongolian Housing Finance Corporation**” (MHFC) was established as a state-owned implementing body for this program.

**Table 3.3.1 Strategies and Key Issues of “40,000Units Housing Program”**

Strategy	Key issue
1) To develop a new housing complex	a) Construction of 40,000 houses implementation unit in MCUD
2) To develop Ger districts	b) Restructuring Ger area neighborhoods and their urban services
3) To develop infrastructure	c) Low-cost alternative infrastructure and services
4) To develop housing and mortgage market relations	d) Infill and mixed-income housing areas
5) To support building materials manufacture and human resource capacity building	e) Support to CDS-based economic, infrastructure, and housing development
	f) Establishment of an independent housing finance institution

Source: “40,000 Units Housing Programme Master Plan 2006–2009”, Ministry of Construction and Urban Development (MCUD), 2006

The “development of Ger areas” is indicated in Strategy 3 of this program. Three (3) main strategic goals are set for this, as follows:

- (i) To build proper infrastructure for Ger areas;
- (ii) To run mini-projects on improving living environment and conditions in Ger areas; and
- (iii) To provide Ger areas with low-cost, heat-efficient housing.

In this Program, Ger areas in Ulaanbaatar are categorized into three zones, namely: (1) **“central Ger areas”** where access to water supply, roads, and solid waste collection services is at its highest; where more modern buildings are slowly replacing traditional Gers and micro-enterprises are developing as family savings allow; and which will be redeveloped into high- and mid-rise building complexes; (2) **“middle Ger areas”** which currently depend on tankers for their water supply; have pit latrines, meandering access, and generally poor drainage facilities; and which are the target beneficiaries of a plan to improve basic urban service provision and another to realign and reblock plots to accommodate future urban services; and (3) **“peri-urban Ger areas”** which are expanding rapidly but lacking proper guidance and plans; are not connected to primary infrastructure and services and rely only on occasional water supply by tankers and pit latrines; which should be connected to primary infrastructure and services including water; and whose district governments should be supported in terms of capacity building. Based on this categorization, the UN-HABITAT developed the “Ger-Area Upgrading Strategy and Investment Plan” in 2007.

## **(2) Policies and Detailed Development Plans for Ger Area Improvement**

At present, Ger area improvement is the priority of the Ministry of Road, Transport, Construction and Urban Development (MRTCUD)<sup>1</sup>, since the negative environmental impacts of Ger area expansion are complicated, while new-town development plans can be solved by financial investments and the densification of the urban center cannot be tackled because of a lack in the capacity of the central infrastructure. In this context, the developed policies and detailed development plans have tended to focus more on Ger area improvement (see Figure 3.3.1).

Resolutions related to Ger area improvements are as follows: i) No.27 of 2008, “Regarding some actions to be taken to develop Ger area of UB city as residential area”, ii) No. 46 of 2008, “Regarding some implementation measures to reduce air pollution”, and iii) No. 218 of 2007, “Regarding some actions to be taken on mitigating air pollution.”

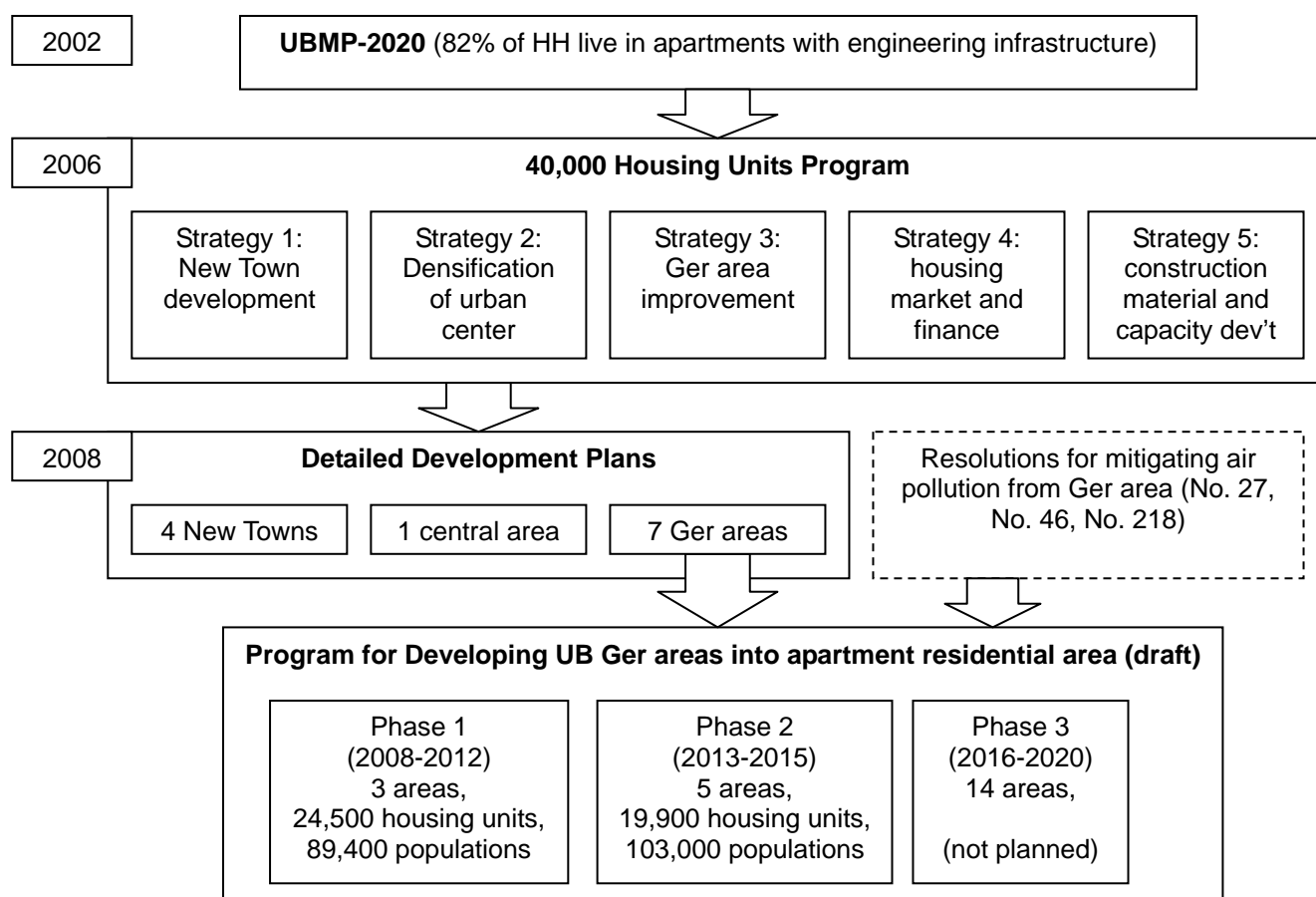
In January 2008, the **“Detailed Development Plans on the Residential Areas to be built in Ulaanbaatar City”** was approved, which include the following areas and planning targets (see Table 3.3.2).

The **“Program for Developing UB Ger areas into Apartment Areas”** has been drafted, and urban redevelopment projects for Ger areas of 14th Khoroolol, 7th Khoroolol, and Radio& TV Authority have been launched as Phase 1.

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<sup>1</sup> Ministry of Road, Transport and Tourism (MRTT) and Ministry of Construction and Urban Development (MCUD) were merged into Ministry of Road, Transport, Construction and Urban Development (MRTCUD) in December 2008.

**Figure 3.3.1 Housing Policies, Programs, and Implementation Plans**



Source: JICA Study Team

These policies and plans by the government are mostly focused on the central area to be redeveloped into a high-density apartment area. However, there have been implementation problems, such as: i) the lack of implementation mechanism and legal framework for urban redevelopment projects, ii) the lack of common regulations and conditions for land exchange and relocation<sup>2</sup>, and iii) the lack of financial resource to develop land, infrastructure, and buildings.

Since the government faces various financial, technical, and institutional difficulties in improving Ger areas, many donors have striven to fill the gap and are highly expected to continue to do so.

<sup>2</sup> In the Phase 1 of the 14<sup>th</sup> Khoroolol, two rooms in old apartments were exchanged for two rooms in new apartments. In the 7<sup>th</sup> Khoroolol, the city government started to negotiate with residents without the common condition of land exchange. It is said that 0.07ha is equal to a two-room apartment (app. 6mil. Tg).

**Table 3.3.2 Existing Development Plans for Ger Areas**

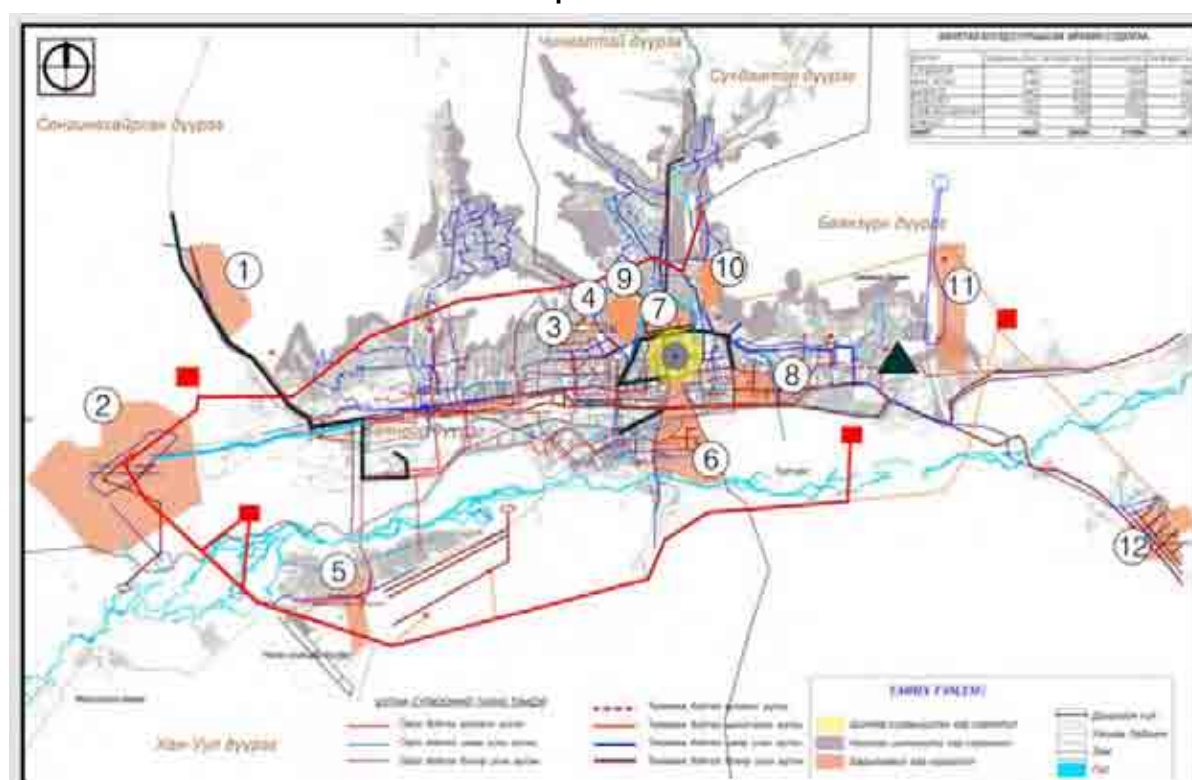
District	No	Name of Ger Area	Present		Development Plan					
			HH	Pop	Detailed Development Plan <sup>1)</sup>	Program for Developing Ger Area <sup>2)</sup>	Housing Type	HH	Pop	Period
Chingeltei	1	Radio & TV Authority	3,732	17,184	X			2,500	10,500	Phase 1 (2008-2012)
	2	Denjiin Myanga	6,382	31,449	X	DDP in 2008		3,600	14,600	Phase 2 (2013-2015)
	3	Khailaast	6,861	33,652		DDP in 2010	Apartments and private houses			
	4	Chingeltei	4,039	19,220		DDP in 2010	Private houses			
Sukhbaatar	5	Dambadarjaa	3,420	14,851		WB project approved, DDP in 2008				
	6	7th Khoroolol	4,301	19,528	X	DDP approved		10,000	42,500	Phase 1 (2008-2012)
	7	Doloon Buudal	3,304	13,828		DDP in 2008				
	8	32 <sup>nd</sup> Roundabout (Guchinkhoyor)	1,691	6,955						
Songino-khairkhan	9	Bayankhoshuu	10,663	48,360		WB project approved				
	10	Khanyn material	3,005	13,555		DDP in 2009				
	11	Tolgoit	8,937	42,031		DDP in 2009				
	12	Unur-B				DDP in 2008				
	13	Orbit								
Bayanzurkh	14	Dari-Ekh	2,723	13,327	X	DDP in 2008	Apartments and private houses	2,100	8,600	Phase 2 (2013-2015)
	15	Shar-Khad	4,641	20,378		DDP in 2009				
	16	Uliastai	4,587	18,470		DDP in 2008				
	17	Amgalan	2,518	11,827		DDP in 2008				
	18	14th Khoroolol (Altantevsh)	3,494	14,253	X	DDP approved		12,000	36,400	Phase 1 (2008-2012)
	19	Ulaankhuan								
	20	Zuun Selbe				DDP approved		4,300	36,400	Phase 2 (2013-2015)
Bayangol	21	Gandan	1,492	6,781		DDP approved	Private houses	800	3,400	Phase 2 (2013-2015)
	22	Naran	5,010	22,741						
	23	7th Micro District			X	DDP in 2008		9,100	40,000	Phase 2 (2013-2015)
Khan-Uul	24	Yarmag	8,404	35,021						
	25	Nisekh	4,131	16,449		DDP in 2009	Private houses			
Total			94,865	426,979				44,400	192,400	

Source:

- 1) "Detailed Development Plans of the Residential Areas to be built in Ulaanbaatar City", January 2008, Ulaanbaatar City
- 2) "Program for Developing UB Ger areas into apartment residential area", 2008, MCUD



**Figure 3.3.2 Location of Ger Areas and New Towns Approved in Detailed Development Plans**



Source: Detailed Development Plan, Ulaanbaatar City, 2008

**Table 3.3.3 Ger Area Redevelopment and New Town Development**

Type of Development	Fig. No. <sup>1)</sup>	Project Area	Area (ha)	No. of population	No. of HH	Estimated cost (mil. US\$)
Ger area redevelopment	4	Residential area around Radio& TV Authority	27	10,500	2,470	131.2
	3	7 <sup>th</sup> Micro district	93	40,000	9,100	577.1
	10	Dari Ekh Residential area	61	8,600	2,043	70.9
	8	14 <sup>th</sup> Khoroolol	235	36,400	9,106	275.8
	7	7 <sup>th</sup> Khoroolol	210	42,500	10,000	497.2
	9	Denjiin 1000	145	14,550	3,600	183.8
	6	Zaisan	700	-	13,200	-
		Sub total	1,471	152,550	49,519	1,736.0
New Town development	5	"Buyant-Ukhua" residential area (Nisekh)	170	42,000	10,200	525.9
	1	Residential area of Bayangoliin Am	180	30,000	7,250	387.1
	2	New City Center	450	50,000	10,262	537.9
	12	"Urgah Naran" Residential area (Nogoon Zoori)	120	45,000	10,750	551.8
		Sub total	920	167,000	38,462	2,002.7
TOTAL			2,391	319,550	87,981	3,738.7

1) Figure No. indicates location number in Figure 3.3.2.

Source: Detailed Development Plan, Ulaanbaatar City, 2008

### (3) Ongoing Projects

The government proposes to apply an urban redevelopment project in the central Ger area and a land readjustment project in the middle Ger area, as implementation schemes. Among the existing development plans for Ger areas, the 14<sup>th</sup> Khoroolol project, which is underway, is the first urban redevelopment project in Ulaanbaatar City. Following this, the 7<sup>th</sup> Khoroolol and the Radio & TV Authority area projects were recently approved. Though there are no detailed development plans which apply the land readjustment scheme on Ger area improvement, the MCUD proposed a land readjustment project in Dambadarjaa.

The 14<sup>th</sup> Khoroolol is located southeast of the city center and south of the city's deep well which supplies water to the city. Wastewater and solid waste affect water and soil in this water source. The project area is 235 hectares and will accommodate 12,000 households or 50,000 persons. At present, approximately 1,600 Khashaa are here. Land ownership is unclear at the moment. The area's population has rapidly increased and with it illegally constructed houses. Based on a recent survey of residents, 53.3% of households wish to live in apartments here, 15.7% in private houses, 15.1% accept to live here, and 11.9% did not want to relocate at all. In sum, half of the households want to live in apartments, if these are affordable, while only 0.9% of households are ready to sell their Khashaa and move out.

The major plans consist of the following: (1) construction of apartments for 1,300 households in the west (7.15ha, 90 households at present) as a first step; (2) Commercial and public facilities<sup>3</sup> will be developed together with apartments, and (3) construction of a trunk infrastructure system by the private sector. The project is estimated at 280 mil US\$ (Tg. 320–330 bil.) including Tg. 32.5 bil. for infrastructure to be shouldered by the government. The plan is to resettle 18 households who currently live in old and degraded row houses into new apartments. Transfer of rights is equivalent to the same area of apartment, which the residents deem to be a good condition. For Ger residents, the Project Implementation Unit (PIU) offers 1m<sup>2</sup> of floor area in an apartment in exchange for 16.5m<sup>2</sup> of land area. In other words, 700m<sup>2</sup> of Khashaa plot is equivalent to 43m<sup>2</sup> of floor area in an apartment. The PIU estimates the unit price of new apartments at 500-600 US\$/m<sup>2</sup>.

The MCUD conducted a model project on improving the Ger area in Dambadarjaa sometime in 2005-2006. This area, which features the Dambadarjaa temple, is far from the city center. At present, the entire area is occupied by illegally and disorderly constructed houses. The project conducted an interview survey among 80 household-respondents, and a model plan was developed. For the next step, an implementation plan (model project on land readjustment system / urban redevelopment system) would be necessary. This project, however, is not financially viable as it will not provide profit (social benefits mainly). It is therefore necessary to encourage the private sector to invest on individual infrastructure systems. Major plans are; (1) Development of the open and green space surrounding the temple; (2) Development of access roads for emergencies; (3) Preparation of a block plan for 10-15 households; (4) Allocation of 0.07ha land with land-use rights permit (smaller than the land currently owned) to each household; (5) Development of 'created' land for public facilities, open space, water well, etc.; and (6) Installation of individual toilets. So far, this proposal by the MCUD has not progressed to detailed planning or feasibility study.

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<sup>3</sup> 5 kindergartens for 3,000 children, 2 schools for 6,000 children, Sport and Cultural Complex, 8 family hospitals, 9,000 m<sup>2</sup> supermarket, 3,000 m<sup>2</sup> wholesale center, 150 bed hotel, restaurants with 1,100 seats, public bath, car services, public service center and Youth Palace are planned.

At present, Dambadarjaa is a pilot project area for the “**Ulaanbaatar Service Improvement Project Phase 2**” (USIP-2) of the World Bank, wherein water supply and sewerage pipelines will be installed.

#### (4) Implementation Issues

It is difficult to promote new-town development without preparing strategic measures such as on its integration with infrastructure development. Likewise, it is challenging to promote redevelopment and land readjustment without the associated legal and institutional support. In the “40,000 Housing Units Program,” the private sector is supposed to play a major role. However, under current housing development schemes by the private sector, securing affordable housing is difficult. Such methods under current socio-economic conditions will therefore not allow the provision of mass housing. Also, since the program is to be mainly by the private sector without an appropriate partnership with the government and since the current capacity for housing provision by the public sector is very low, the supply of affordable housing will inevitably be limited.

Table 3.3.4 below shows the number of apartment buildings and housing units constructed by the private sector and the number of apartment housing units increased from 4,000 in 2004 to 6,000 in 2007. These apartment houses were constructed outside the planned districts of the “40,000 Housing Units Program,” and apartment houses were not yet provided inside the districts. The redevelopment project for the 14<sup>th</sup> district of the Ger area is now under construction and will be the first project in the “40,000 Housing Units Program.” The MCUD counts the housing units constructed by the private sector outside the planned districts as part of the “40,000 Housing Units Program,” but it’s almost impossible to provide such number until the target year of 2009.

**Table 3.3.4 Number of Recently Constructed Apartment Buildings and Housing Units**

District	2004		2005		2006		2007	
	No. of Apartment Buildings	No. of Housing Units	No. of Apartment Buildings	No. of Housing Units	No. of Apartment Buildings	No. of Housing Units	No. of Apartment Buildings	No. of Housing Units
Bagakhangai							1	80
Baganuur	1	40	1	24			2	32
Bayangol	30	1,143	17	1,424	20	1,285	21	1,511
Bayanzurkh	25	1,754	10	861	13	1,227	18	1,867
Nalaikh	9	126						
Sukhbaatar	19	637	12	800	13	1,331	13	726
Songinokhairkhan	2	45	7	334	5	603	9	440
Chingeltei	5	224	5	218	7	310	9	514
Khan Uul	11	328	8	278	10	1,063	16	1,011
Total	102	4,297	60	3,939	68	5,819	89	6,181

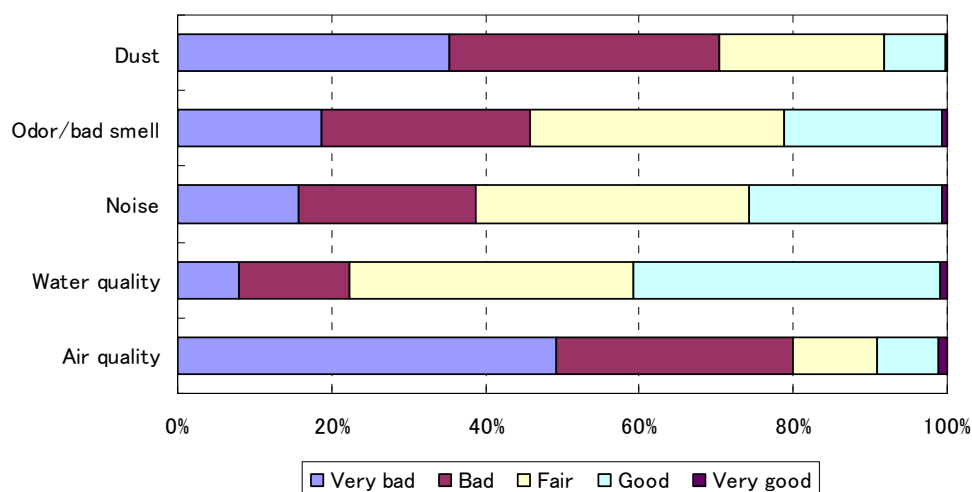
Source: Ulaanbaatar City

## 2) Special Policy/Program on Air Pollution Mitigation

### (1) Current Air Quality in Ulaanbaatar

Air pollution has been recognized as one of the most serious environmental problems in Ulaanbaatar City. Based on the results of the Household Interview Survey (HIS), 80% of respondents recognized that air quality in Ulaanbaatar City was “bad” or “very bad,” and 70% answered dust pollution was a serious problem (see Figure 3.3.4).

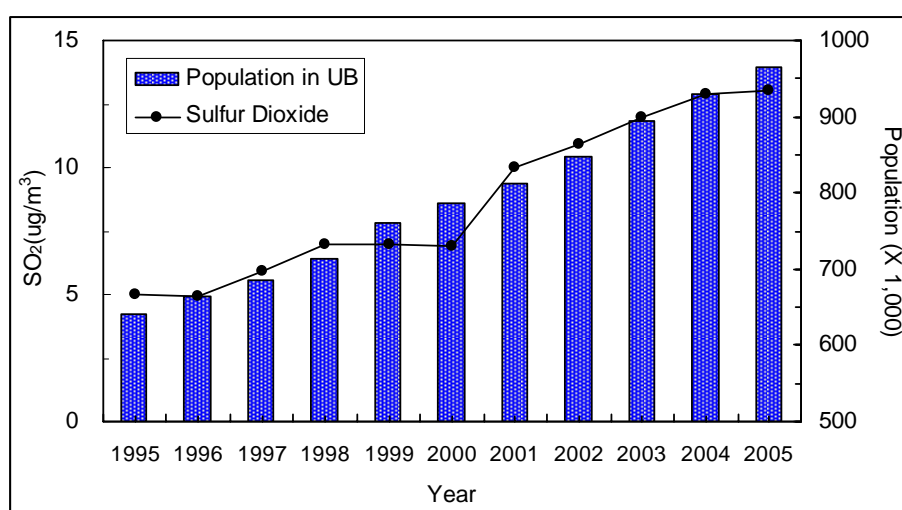
**Figure 3.3.3 Evaluation of Environmental Condition Based on HIS Results**



Source: HIS, JICA Study Team

Figure 3.3.2 shows the annual changes in sulfur dioxide ( $\text{SO}_2$ ) and population levels, showing an increasing trend from 1995 to 2005. The population in Ulaanbaatar City has rapidly increased; in 2000, it was approximately 773,600, but in 2007 it reached more than 1 million. As shown in the figure 3.3.4, it is inferred that a markedly increasing population means increased human activities, causing further degradation of air quality.

**Figure 3.3.4 Annual Changes in  $\text{SO}_2$  and Population Levels**



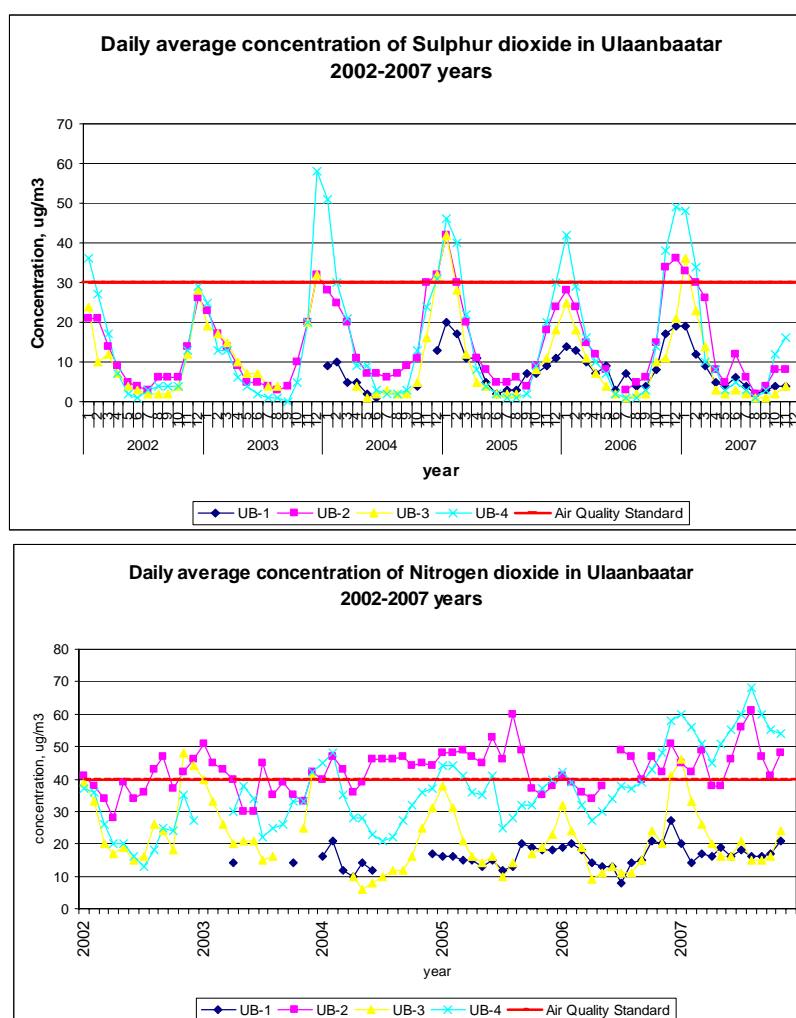
Source: JICA Study Team based on ADB 2006

Major air pollution sources are as follows:

- Emission from CHPs (combined heat and power plants) and HOBs (heat-only boilers);
- Emission from household stoves and refuse burning;
- Vehicle exhaust;
- Dust from dry land, unpaved roads, and waste disposal sites; and
- Forest and/or grass fire.

Figure 3.3.5 shows the daily average of SO<sub>2</sub> and NO<sub>2</sub> in Ulaanbaatar City from 2002 to 2007. Regarding SO<sub>2</sub> variation, its concentration during the winter season was critically high, even exceeding the national standards of Mongolia. Meanwhile, the trend in NO<sub>2</sub> concentration did not show seasonal variation. This might be due to the fact that SO<sub>2</sub> pollution is caused by the heating process, while NO<sub>2</sub> is a by-product of liquid fuel consumption such as driving vehicles.

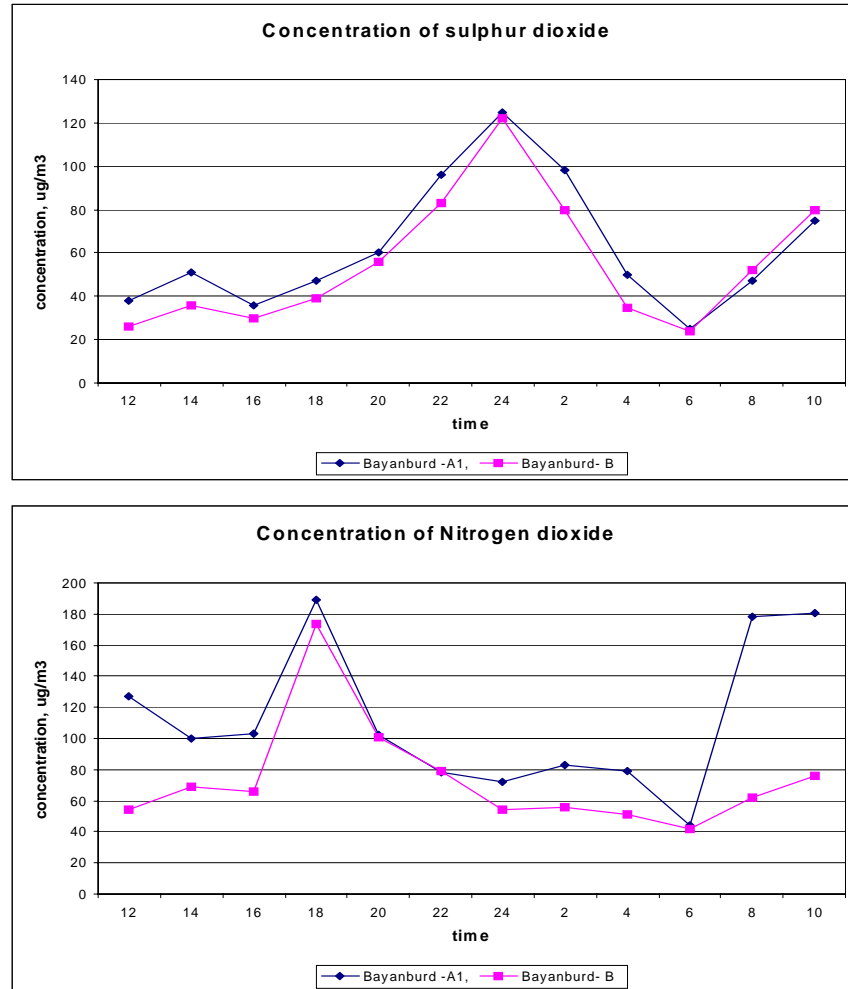
**Figure 3.3.5 Daily Average Concentrations of SO<sub>2</sub> and NO<sub>2</sub>, 2002-2007**



Source: Ulaanbaatar City, 2006

The JICA Study Team conducted an Initial Environmental Examination (IEE) including ambient air pollution measurement. Figure 3.3.6 shows the hourly distribution of SO<sub>2</sub> and NO<sub>2</sub> at the Bayanburd Intersection. Survey point A1 was located beside the road, while point B was set as background.

**Figure 3.3.6 Hourly Average Concentrations of SO<sub>2</sub> and NO<sub>2</sub>**

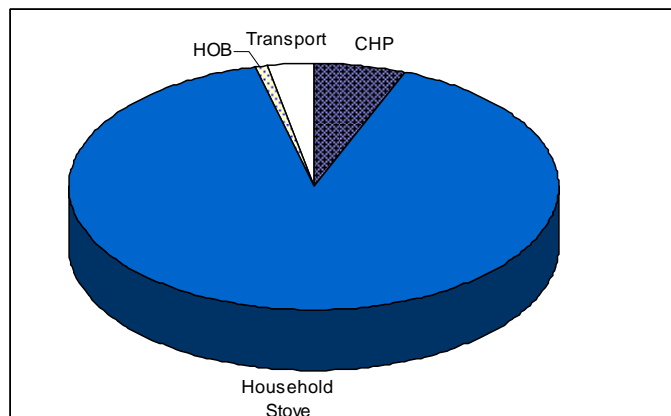


Source: JICA Study team

The survey showed that concentrations of SO<sub>2</sub> increased starting from late afternoon, gaining maximum value at midnight, then decreasing afterward. A major source of SO<sub>2</sub> is assumed to be the use of heating appliances at night. While NO<sub>2</sub> did not show similar changes as SO<sub>2</sub>, it only means that the former's major pollution sources are different from those of the latter.

As indicated in Figure 3.3.7, particle matter (PM) emitted by households and heat-only boilers accounted for 91% of total pollutants in 2006. In addition, Figure 3.3.8 shows that pollution is mainly generated from Ger areas especially those located in the northern part of Ulaanbaatar City.

**Figure 3.3.7 Share of PM Pollution Sources**



Source: Ulaanbaatar City, 2006

**Figure 3.3.8 Distribution Map of Air Pollution During Winter**



Source: Ulaanbaatar City, 2006

## (2) Air Quality Management by Ulaanbaatar City

Ulaanbaatar City has recognized air pollution as one of its most critical problems, so it has formed a special committee to tackle the issue. In Resolution No. 218 of the Parliament of Mongolia dated 5<sup>th</sup> September 2007, several action plans were approved, as shown in Table 3.3.5.

**Table 3.3.5 Action Plans for Air Pollution Management Approved by the Parliament of Mongolia**

	Action Plan	Responsible Agency	Implementation Period
1	Enact new law on "air fee" based on "polluters pay" principle and amend related laws/regulations.	MNE <sup>(1)</sup> , MJIA <sup>(2)</sup>	3 <sup>rd</sup> quarter of 2007
2	Enact law on limited use of raw coal.	UB City, MNE	4 <sup>th</sup> quarter of 200
3	Promote production of smokeless, environmentally friendly, and economical fuel and gas.	MFE <sup>(3)</sup> , UB City, MNE	4 <sup>th</sup> quarter of 2007—4 <sup>th</sup> quarter of 2010
4	Build temporary apartments with infrastructure supply for 100 households to improve Ger areas..	MCUD, UB City	2008—2009
5	Redevelop Ger areas by building apartments in 10 priority sites.	MCUD, UB City	2007—2009
6	Conduct F/S and design new heating and power sources.	MFE, UB City	from 2008
7	Study health impact of air pollution.	MNE, MH <sup>(4)</sup>	2007—2008
8	Improve laboratory equipment and facilities for monitoring impact on human health.	MNE, MOH	from 2008
9	Involve all aimag centers in programs/projects.	MNE, MFE	2009—2010
10	Provide thermal power stations.	MFE, MNE, SIA <sup>(5)</sup>	2008—2009
11	Organize financing work for replacing low-pressure heat-only boilers to electric and gas heaters.	MNE, MFE	2007—2008
12	Restrict use of raw coal by shifting to renewable energy, gas and fuel, and restrict low-pressure heat-only boilers.	UB City, SPIA	2007—2008
13	Reduce smoke pollution generated by transportation sector.	UB City, MRTT	2007—2008
14	Solve land issues for construction and operation of 8 gas stations.	UB City	from 2008
15	Promote environmentally friendly vehicles, such as low fuel consumption vehicles, and enforce law on banning vehicles that do not meet standards.	MJIA, MRTT	2008—2009
16	Enhance legal framework for fuel improvement.	MFE, MIC <sup>(6)</sup> , MJIA	from 2008
17	Prohibit import of used tires.	MIC, MOF <sup>(7)</sup>	
18	Establish "Day without Vehicles", and promote air pollution reduction efforts.	UB City, MRTT, Traffic Police	from 2007
19	Install test laboratory, monitoring and inspection network for oil production.	GCO <sup>(8)</sup> , MRTT	from 2008
20	Take required action to improve pavement of roads connecting Ger areas.	UB City	2008—2010
21	Look for financial sources and strengthen capacity for air quality matters.	MNE, MOF	2007—2010
22	Reestablish the National Board in charge of air quality.	MNE, MECS <sup>(9)</sup>	from 2007
23	Supply Ger areas with night-time electricity at discounted rates for heating purposes.	MFE, MNE	from 2008
24	Change Ger structure and design for more effective heat insulation.	MCUD, UB City	2008—2010
25	Develop optimal financial system on procurement of houses for low-income people.	UB City, MOF	
26	Provide tax exemptions and financial support systems to high-technology businesses.	UB City, MFE, MIC, MOF	2008—2010
27	Increase green areas.	UB City, MNE	2008—2010
28	Improve solid waste management to mitigate dust pollution at disposal sites.	UB City, MNE, MOH	2008 - 2010
29	Develop public information systems to raise public awareness.	UB City, MFE, MNE	2007—2010
30	Issue government and Capital City bonds to promote financial solutions to air quality improvement.	UB City, MOF	from 2008
31	Create job opportunities in economic zones and aimag centers, and intensify improvement of local market conditions.	MIC, MFA <sup>(10)</sup>	2008—2010
32	Develop and establish satellite cities to decongest UB City and conduct a conceptual study to develop highways and metro systems linking these cities.	MIC, MRTT, MOF	2008—2010

Source: Resolution of Parliament of Mongolia No. 5, 2007

Note: The names of responsible agency are as at 2007, before organization reform on December 2008.

(1) MNE: Ministry of Nature and Environment, (2) MJIA: Ministry of Justice and Internal Affairs, (3) MFE: Ministry of Fuel and Energy, (4) MOH: Ministry of Health, (5) SIA: State Inspection Agency, (6) MIC: Ministry of Industry and Commerce, (7) MOF: Ministry of Finance, (8) GCO: General Custom Office, (9) MECS: Ministry of Education, Culture and Science, (10) MFA: Ministry of Food and Agriculture.



Some of the action plans mentioned above were amended to enhance the legal framework on mitigating air pollution, as indicated in Resolution No.46 of the Parliament of Mongolia dated 28<sup>th</sup> September 2007.

In the resolution, the following detailed action plans were approved for implementation:

- (i) Develop draft laws and regulations listed in Resolution No.46.
- (ii) Submit issues on:
  - finding financial sources to be used for Ger area improvement;
  - construction of apartments at 10 primary sites;
  - redevelopment of Ger areas in 2007;
  - construction of temporary apartments for 1,000 households in connection with the Ger area building-up program; and
  - intensification of implementation of housing supply policy and extension of infrastructure network.
- (iii) Implement projects and actions to develop smokeless, economical, human- and environment-friendly fuel, and limit the use of raw coal in Ulaanbaatar City.
- (iv) Conduct feasibility study and design work on new thermal and power sources including appropriate locations and funding.
- (v) Implement projects and actions in cooperation with the public sector, academe, etc. on changing the design and structure of Gers to ensure better heat insulation, and supply Ger areas with night-time electricity at discounted rates for heating purposes.
- (vi) Develop satellite cities to decongest Ulaanbaatar City by:
  - intensifying the improvement of local markets;
  - creating jobs in regional and aimag centers within the framework of reducing air pollution;
  - conducting feasibility studies on highway and/or metro development to connect satellite cities;
  - applying to aimags legal framework and its enforcement which are effective at national level
  - establishing free zones in aimags in accordance with relevant laws and regulations; and
  - studying the increase in investments in developing infrastructures and submitting reports to be discussed in the parliament.
- (vii) Allocate at least Tg. 50.0 billion annually from 2007 to 2010 to implement actions such as the improvement of infrastructure in Ger areas, e.g. incorporating central budget with grant and preferential loans by donor countries and/or international financial institutions.

### **3) Centralized Traffic Management/Control System**

On August 16, 2007, a loan agreement in the amount of US\$ 12.8 million was signed between the Mongolian and Korean governments for the introduction of an area traffic

control (ATC) system in Ulaanbaatar City. Another local fund, amounting to US\$ 4.2 million, will be prepared by the Mongolian government, bringing the total project cost to US\$ 17 million. The loan will be paid back in 30 years at an interest rate of 0.5%/year. During the first 10 years, only the interest will be paid.

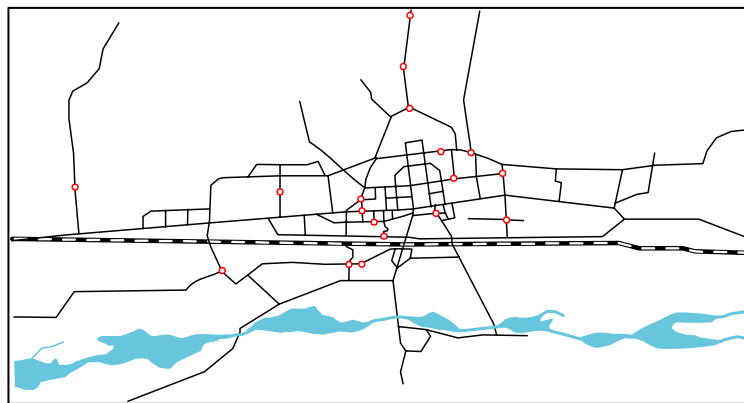
Since the loan is a tied loan, only Korean companies are eligible as contractors. A contract with Daeyong Ubitec Co. Ltd., the selected consultant, was signed on December 27, 2007.

The ATC system to be introduced consists of the equipment listed below and a traffic control center which will be established at the Traffic Police headquarters. The locations where the signal equipment will be installed are shown in Figure 3.3.9 through Figure 3.3.12.

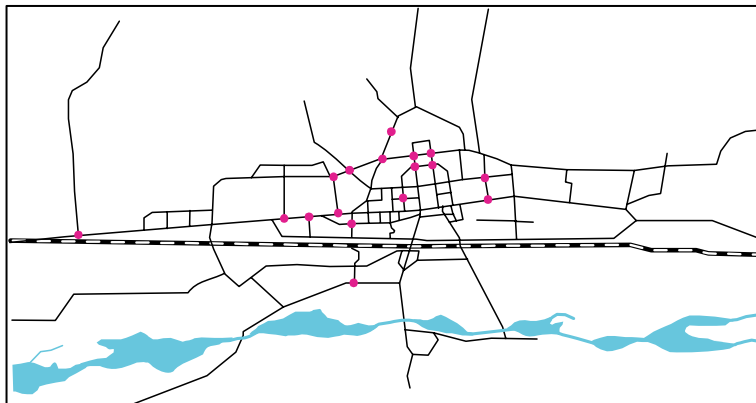
- 45 sets of traffic signal controller, 18 of which will be installed at newly signalized intersections, 17 will replace the existing Russian-made controllers, three will be kept as reserve, and the rest will be installed in yet undetermined locations;
- 22 sets of video-type vehicle detector;
- 26 sets of closed circuit television camera (CCTV);
- 2 units of variable message sign for East Cross and West Cross intersections; and
- Self-owned optical fiber communication network system.

The project is of the design-construction type contract, in which the project consultant prepares the basic design and the contractor to be selected through bidding carries out the detailed design and constructs the system. The project period is 16 months, which includes the period for doing the basic design.

**Figure 3.3.9 Locations of New Traffic Signal Controllers**

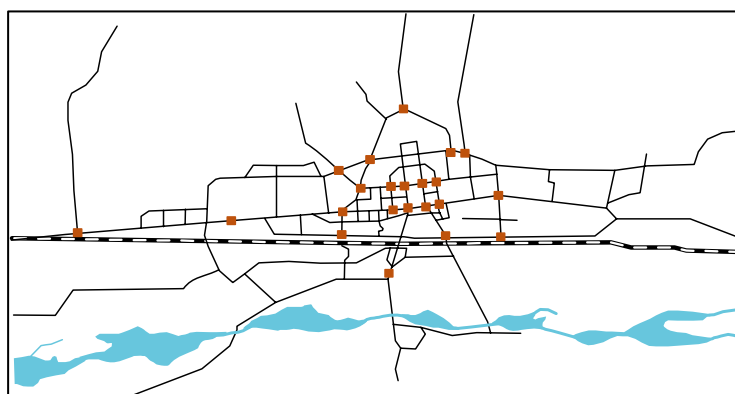


**Figure 3.3.10 Locations of Replacement Traffic Signal Controllers**



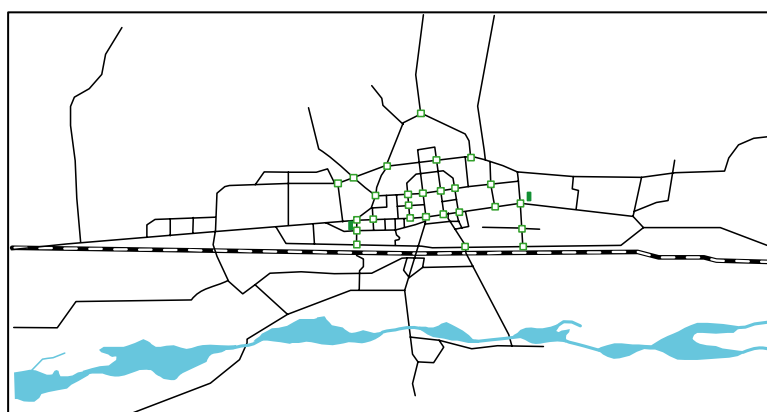
Source: JICA Study Team

**Figure 3.3.11 Locations of Vehicle Detectors**



Source: JICA Study Team

**Figure 3.3.127 Locations of TV Cameras and Variable Message Signs**



Source: JICA Study Team

#### **4) New International Airport Development**

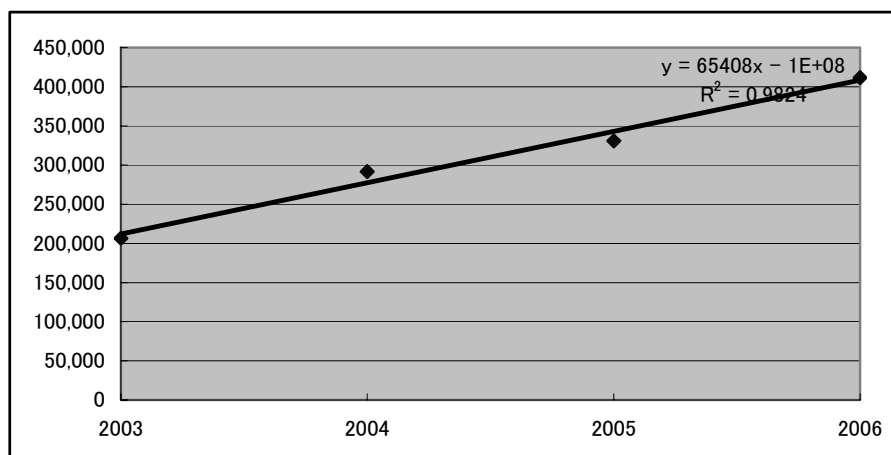
A new international airport is planned for development having a 3,100-meter long runway in Zuunmod located south of Bogd Khan Mountain and some 50 km from Ulaanbaatar City. A Special Assistance for Project Formation (SAPROF) study by the then Japan Bank for International Cooperation (JBIC) has been conducted to confirm the feasibility of the project, following the completion of the Development of Master Plan on Civil Aviation (MONCAMP) in 2003.

The existing Chinggis Khan International Airport has many restrictions that prevent safe and reliable air transportation, as follows: 1) the presence of mountains in the south only allows a northward runway; and 2) strong tailwinds during spring and dense fog during winter result in frequent flight cancellations or delays. Accordingly, the Government of Mongolia has placed high priority to the development of a new international airport in order to contribute to the country's economic development.

The SAPROF study mentioned earlier has revised the 2015 forecast increase in passenger demand made by MONCAMP in view of the rapid growth in international passenger numbers. MONCAMP estimated a passenger volume of 670,000 passengers by 2015; the SAPROF study has estimated that a million domestic and international passengers is possible, as shown in Figure 3.3.13.

**Figure 3.3.138 Passenger Demand Forecast for 2010 and 2015**

	Statistic Data				Forecasted Data	
Year	2003	2004	2005	2006	2010	2015
Passengers	206,591	291,608	330,885	411,525	669,897	996,937



Source: JICA Study Team

The planned new international airport will have bigger facilities, such as runway, taxiway, apron, terminal building, control tower, air navigation system, and utilities (electricity, water supply, etc.), to meet the rapid growth in passenger numbers. The total construction cost is estimated at US\$ 261 million (JPY 30 billion).

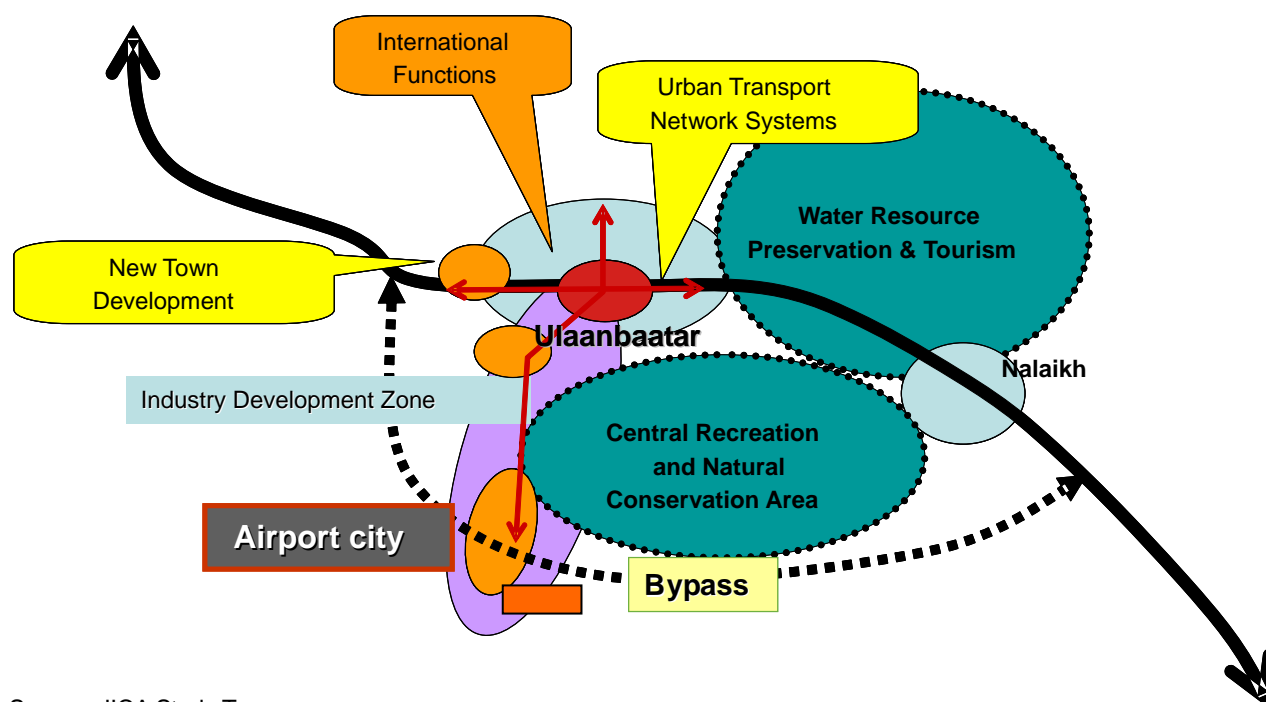
The Civil Aviation Authority of Mongolia (CAAM) under the Ministry of Road, Transport and Tourism (MRTT) will be the executing agency for the project.

## 5) Airport City Development Concept

### (1) Greater Ulaanbaatar Metropolitan Structure

The development of the New Ulaanbaatar International Airport (NUIA) is now under preparation, as described in Section 3.3.4. While its location is outside the jurisdiction of Ulaanbaatar City, it is within the Greater Ulaanbaatar Metropolitan Area (GUMA). Although NUIA will be a mere transportation facility, inherent in its concept is the possibility of stimulating new urban functions for its surrounding area. This airport city concept is based on such an urban planning viewpoint, as shown in Figure 3.3.14. This new city can also be considered as a GUMA subcenter to respond to increasing housing demand and the relocation of industries and functions from Ulaanbaatar city center in the long term.

Figure 3.3.149 Spatial Structure of Greater Ulaanbaatar Metropolitan Area with Airport City



Source: JICA Study Team

The NUIA is located about 50km from the center of Ulaanbaatar. The area along the approach to the airport will have sufficient space to accommodate a variety of developments such as housing, industrial parks, goods distribution or logistic centers, recreational facilities/areas, educational institutions, and so on. Meanwhile, the airport corridor can become an industrial zone with special incentives for industrial locators and the operation of new businesses.

There are other potentials to create new business opportunities in the areas directly adjacent to NUIA such as the following three (3) kinds of airport-related business:

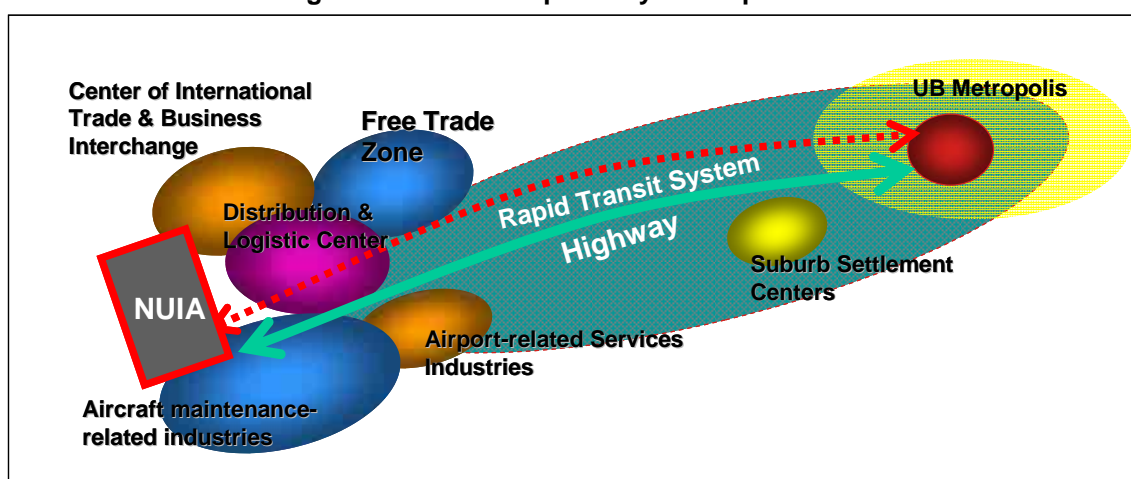
**Aircraft-related Business:** Looking at the strategic locational advantage of Ulaanbaatar in the global logistics network, several kinds of business and industry can be introduced such as aircraft maintenance, aircraft parts distribution, pilot and mechanics training, and other aircraft services.

**Air Transport-related Business:** A number of air transport services can be created, that is catering services, cleaning services, fuel distribution services, warehouse services, parking services and hotels, restaurant and recreational services for NUIA passengers and workers.

**International Gateway-driven Business:** A few possible business opportunities include goods distribution and logistics provision for export-import commodities and international trade and business exchange and conventions, which opens up Ulaanbaatar to a new international function.

Figure 3.3.15 shows a schematic concept of the airport city. New housing areas, hotel zones, and industrial parks will be located in the airport city, as well as higher educational institutions. An “eco-city concept” should be introduced in this 21st century city.

Figure 3.3.1510 Airport City Concept



Source: JICA Study Team

## 6) National Disaster Management Policy

The Energy Management Agency of Ulaanbaatar City is responsible for disaster management in the city. The department has recognized the following issues as priority concerns: flood, earthquake, and fire.

### (1) Flooding

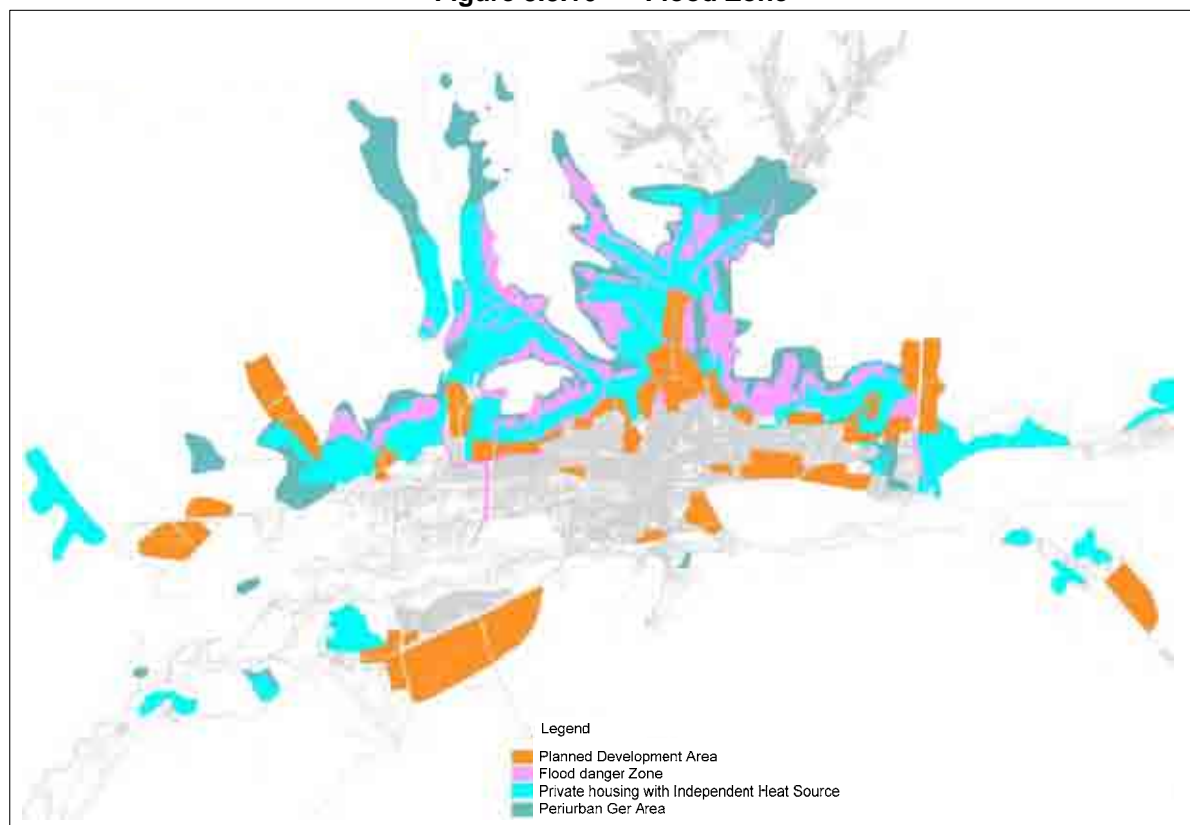
Surface water passing through the city flows through the Tuul, Selbe, and Uliastai rivers, and most of it originates from mountain snow runoff. During summer, these rivers swell due to increased runoff.

There have been many instances of flooding due to insufficient flood control, resulting in considerable damages. Recently, flooding in Songinokhairkhan, Bayangol, Chingeltei, Bayanzurkh, and Bagakhangai districts submerged roads and many houses due to overflowing dikes as a result of heavy rains. The economic loss was calculated at over Tg. 800 million.

According to the city government, the major problems are as follows:

- **Degraded water discharge channels and pipes:** There has been a plan to improve and extend the water discharge channels and pipes. However, due to a lack of budget, the plan was not implemented. In addition, some planned areas have undergone privatization, so it has been difficult to implement such a plan.
- **Deforestation and desertification:** Deforestation and desertification have caused the degradation of the water-retaining capacity of mountains/forests, and as a result, the risk of flooding has increased.
- **Residents in flood zones:** Ulaanbaatar City has conducted various surveys on flooding problems, identifying flood zones, as shown in Figure 3.3.16. However, the study result is not reflected in housing development plans. Residential permits even within flood zones have been issued by the city. In addition, many residents continue to reside illegally in this zone. Ulaanbaatar City has recommended that these residents need to relocate. Still, most residents have not complied because no alternative relocation area has been offered as is stated in the national constitution.

**Figure 3.3.16 Flood Zone**



Source: Energy Management Department of Ulaanbaatar City

## **(2) Earthquake**

Mongolia is in an earthquake zone: in the last 20 years, there were 40 earthquakes with a magnitude of 6.0, and four with a magnitude over 8.0 in the 20th century.

In Ulaanbaatar City, 75% of the area is categorized as seismically active, and 52% of the area, including Chingeltei and Sukhbaatar districts, is in scale 7 seismic area. There is a study estimating that about more than 500 houses will be damaged and 66,000 residents will be injured or killed in case a magnitude 7 earthquake occurs.

## **(3) Fire**

The risk of fire during winter has increased due to little rainfall. The following problems have been observed as more serious cases of fire incidents in Ger areas occurred recently:

- Lack of fire-fighting water since most Ger areas are not connected to the water supply network;
- Emergency vehicles cannot easily access fire sites since residential roads were constructed without planning.

### 3.4 Donor Efforts and Coordination on Urban Development

#### 1) Donor Coordination on Mongolian Development Assistance

It has been recognized that development in Ulaanbaatar and surrounding areas, in particular, infrastructure development will play a key role in the country's future development. Alternatively, this means that infrastructure bottlenecks in Ulaanbaatar will hamper the future development in Mongolia. Besides infrastructure, this JICA study includes other broader aspects such as social and environment issues including Ger settlement, as well as the legal and financial frameworks on urban development. In this connection, the Study should be integrated not only with the National Development Strategy, but also with donor programs.

Moreover, effective coordination with donor agencies is necessary for the successful implementation of the Master Plan this JICA study is proposing. For this purpose, the Mongolian government should ensure that its communication lines with the donor community are always open. Representatives of the private sector in both countries should also be included in periodic dialogues between the government and donors.

Coordination will become even more important as financing is sought for the individual projects which will be identified by the Study. To this end, a PPP (public-private partnership) scheme should be created to supplement existing ODA resources.

At present, Mongolia's External Partners' Technical Meetings are held between the Mongolian government and international donors to coordinate development orientations and the direction that external assistance should take. Six (6) working groups have been established, namely: 1) urban development, 2) transportation, 3) energy, 4) infrastructure strategy, 5) private sector development, as well as 6) environment and rural development. For the urban development sector, the MCUD, Japan and GTZ are the main movers (see Table 3.4.1).

**Table 3.4.1 Role-sharing among International Donors by Sector**

Sector	Donor	Major Issue
Urban Development	MRTCUD, Japan, GTZ	(i) housing, (ii) water supply (iii) privatization, and (iv) human resource development in urban planning.
Infrastructure and Transport	MRTCUD, World Bank	(i) privatization for infrastructure investment, (ii) prioritization of projects, and (iii) acquisition of sustainable financial resources.
Environment	MET, World Bank, Netherlands	(i) air pollution, (ii) land use, (iii) risk management, (iv) DSS (Dust and Sand Storm) monitoring network, (v) environmental indicators, and (vi) finance and capacity development.
Private Sector Development	MFALI, EBRD	(i) strengthening of role of SME in economic development, (ii) privatization of mining sector
Mining	MME, EBRD	(i) privatization of mining sector, and (ii) profit revolving mechanism for social development and poverty alleviation

Note: MET: Ministry of Environment and Tourism, MFALI: Ministry of Food, Agriculture and Light Industry, MME: Ministry of Minerals and Energy

Source: JICA Study Team



## 2) Donor Activities in Urban Development

So far, the “40,000 Housing Units Program” is one of the major master plans in the urban development sector. Although new-town projects under this program have already been agreed to by the government and implemented by the private sector, detailed implementation plans including financing have not yet been designed. Besides, most of the projects are impractical and need institutional as well as financial support to be implemented (see Table 3.4.2).

In general, the types of donor and NGOs support are categorized into: 1) infrastructure development (roads, water supply, etc.), 2) institutional development (land management, etc.), 3) financial support (housing loan, community fund, etc.), 4) community participation and development, and 5) capacity development (management capacity of local government, etc.). Particularly, support for community participation and capacity development is focused on Ger areas.

## 3) Efforts on Air Pollution Control by Donors

Overseas donors and international organizations have provided both financial and technical support for air pollution control in Mongolia. As shown in Table 3.4.3, programs have focused on various directions.

**Table 3.4.2 Summary of Ongoing Actions by Donors Related to Air Quality Management**

Donor	Summary of Assistance
World Bank	<u>Improved Stove Project</u> : aims at reducing coal consumption by improving old-style household stoves.
	<u>Strengthening the Enforcement of Existing Environmental Standard and Regulation</u> : aims at building capacity for reformulating the legal structure and inspection system.
	<u>Improvement of Public Transportation</u> : approach in shifting to public transportation such as MRT/BRT, and installation of environmentally friendly vehicles such as hybrid cars, LNG (liquefied natural gas) bus.
	<u>Energy Sector Project</u> : aims at reducing energy loss and improving electric power revenue collection.
	<u>Capacity Development for Development and Implementation of Carbon Finance Project</u> : aims to strengthen capacity to develop and implement carbon finance transactions eligible for current Kyoto Protocol and international regimes to address climate change.
Asian Development Bank (ADB)	<u>Urban Development Sector Project</u> : for supporting the 40,000 Housing project conducted by the Mongolian government.
	<u>Ulaanbaatar Heat Efficiency</u> : aims to improve district heating system operations and encourage end-user efficiency.
GTZ	<u>Integrated Urban Development</u> : includes construction and maintenance of cost-effective, resource-friendly housing.
Japan	<u>Supporting Small and Medium Enterprises (SMEs) for Poverty Reduction through Industrial Development</u> : supplies long-term finance to SMEs through Mongolian domestic banks to contribute to poverty reduction.
	<u>Feasibility Study on Clean Coal technology</u> : introduces and examines coal improvement and combustion technology.
	<u>Technical Cooperation Project</u> : capacity development on operation and maintenance of power plant No.4.

Source: JICA Study Team

**Table 3.4.3 Donor Activities in Urban Development**

Sector	Donor	Summary of Assistance
Urban Development	GTZ	"Integrated Urban Development Programme" (June 2006 – 2010): (1) Low-cost housing construction (cost- and energy-efficient housing), (2) Rehabilitation of apartments (energy efficient rehabilitation), (3) Integrated development strategies (participatory community development in Ger area), (4) Vocational training
	ADB	"Urban Transport Development": to improve public transportation in Ulaanbaatar (9 June, 2008 approved)
	ADB	"Community Driven development for Urban poor in Ger areas" (Development of urban poor in informal settlements areas) Japan fund US \$ 1.5 million (15 April, 2008 approved)
Housing Finance	ADB	"Urban Development and Housing Finance Project" (completed): (1) Establish market-based housing finance through commercial banks, (2) Japan Fund for Poverty Reduction (JFPR) grant support to micro-finance institutions and savings and credit cooperatives under "Housing Action Area Plans" (HAAPs), (3) Urban redevelopment project in Dari-Ekh Ger area, and (4) Community Development of Ger Area in Erdenet (US\$1.5 mil.)
		"Community-led Infrastructure Development Project" (funded by JFPR): Micro finance was provided by non-bank financial institutions to 11,000 households in UB City (100 – 1,100US\$/HH, with interest of 6%/yr, 3 years of repayment period).
	USAID	"Economic Policy Reform and Competitiveness Project" (completed): Mongolian Mortgage Company (MIK) was established planning for direct subsidy program for down payment and interest payment.
Infrastructure	KfW	Interest in rehabilitation and finance for waste water treatment system
Transport	ADB	"Transport Strategy Paper" (planned): It will include mass transit (pre F/S level), short-term traffic management and capacity building.
Ger area improvement	UN-HABITAT	Ger-Area Upgrading Strategy and Investment Plan (GUSIP) (Mar 2006 – Mar 2008): Comprehensive strategy development for Ger area
	UNICEF	"Convergent Basic Social Service in Ger Area". The Programme promotes effective convergence and delivery of basic services through the use of Family Empowerment Strategy – especially among the disadvantaged and vulnerable children and families. (Ongoing)
	JICA	"Improving Access of Health System Among Migrants Excluded from Social System". The number of unregistered citizens migrating from rural area has increased and in parallel the number of people who have no insurance has increased. The pilot project has promoted and educated citizens the importance to be involved into social system especially health insurance. (Jan.2008 – Jan 2009)
	JICA	"Improving Water Hygiene Condition in Ger District". The number of water bone diseases such as hepatitis and diarrhea has increased among migrants from country side in UB. JICA and UNICEF constructed/rehabilitated water kiosks and school water related facilities and providing training of proper use of water among community people. (Completed)
Land management	GTZ	"Cadastral Survey and Land Registration Project" (Loan, 2004-2008, Tg.12.8million): Cadastral mapping for integration into a National Land Information System
	MCC	From 2008 to 2012, (1) Railroad project, (2) Property right project, (3) Vocational education project, (4) Health project will be implemented. Property right Project includes a) land registration system, cadastral data development, digitized map system, and b) establishment of rental system of pasture in peri-urban area)

Source: JICA Study Team

For contributing and coordinating with the Mongolian special committee on air pollution control, the World Bank and other donors have conducted continuing round-table meetings since 2007, with the last one held in April 10, 2008 to:

- Learn the new policy on air quality control by the central and Ulaanbaatar City governments;
- Discuss options and issues to ensure sustainable policy outcomes;
- Share views and international experiences; and
- Update each other on donor support programs and share findings.

The latest meeting identified several issues, as listed in Table 3.4.3. The areas to be tackled are: i) housing improvement, 2) fuel switch, 3) effective insulation, 4) adequate heating appliances, 5) road pavement, 6) greening, and 7) adequate sector performance (e.g. solid waste management, district heating, etc.).

Considered issues are as follows: 1) balance between economic cost and benefit, 2) affordability, 3) scheduling and priority, and 4) technical and financial feasibility.

#### 4) Ger Area Improvement Projects/Programs Supported by Donors

In the UBMP-2020 by UPRDI, potential development projects were short-listed to 20 highly prioritized programs, some of which are already under implementation with international assistance, such as the “Efficient utilization of water resources” by the World Bank and the “Providing affordable housing for Ulaanbaatar city” and “Creating New Land Assessment System in Ulaanbaatar” both by the ADB (see Table 3.4.4 and 3.4.5).

**Table 3.4.4 Ger Area Improvement Projects/Programs Supported by Multilateral Donors**

Donor	Project/Program	Content
World Bank	Ulaanbaatar Services Improvement Projects (USIP-1, 2) (see Figure 3.4.1)	<ul style="list-style-type: none"> <li>• Water supply (kiosk provision) in Ger areas and commercialization of the water supply company</li> <li>• Low-cost sanitation to promote health awareness and test improved pit latrines</li> <li>• “Community Led Infrastructure Plans” granted by the Japan Social Development Fund</li> </ul>
World Bank	Heating Stove Improvement Project (2001 – 2006)	<ul style="list-style-type: none"> <li>• Development and promotion of improved and cost-effective stoves which reduce CO<sub>2</sub> emissions and air pollution</li> <li>• Capacity building for manufacturing of improved stoves</li> </ul>
UN-Habitat	Ger-Area Upgrading Strategy and Investment Plan (GUSIP) (Mar 2006 – Mar 2008)	<ul style="list-style-type: none"> <li>• Objectives: (1) “Ger Upgrading Strategy”, (2) “Urban Development Guidelines”, (3) “Ger-area Improvement Action Plans”, (4) “Ger-area Investment Program”, (5) Institutional Strengthening Strategy, (6) Knowledge Sharing and Policy Learning Mechanisms</li> <li>• Target areas: (a) central Ger area to connect to central water network, roads and solid waste collection for new apartment blocks (b) middle Ger areas to improve the distribution of basic urban services, (c) peri-urban Ger areas to provide district officials with the skills and methods to reserve land with simple services.</li> </ul>
UNDP	Urban Poverty Profile for Ulaanbaatar through Urban Poverty and Immigration Study	• Under preparation
	Urban Poverty Reduction Project	• Under preparation

Source: JICA Study Team, “Ger-area Upgrading Strategy and Investment Plan”, UN-HABITAT

**Table 3.4.5 Ger Area Improvement Projects/Programs Supported by Bilateral Donors and NGOs**

Donor	Project/Program	Contents
JICA	Rehabilitation of the City's Groundwater Extraction and Distribution System (1996–2006)	<ul style="list-style-type: none"> <li>• Water resources will serve a city of app 1mil. People</li> </ul>
	Solid Waste Management Master Plan	<ul style="list-style-type: none"> <li>• Preparation of master plan for solid waste management</li> <li>• Conducted a pilot project in Ger area</li> </ul>
Netherlands	Ulaanbaatar Regional Environmental Management Plan	<ul style="list-style-type: none"> <li>• Urban environmental management for Ulaanbaatar provincial area</li> </ul>
USAID	Growing Entrepreneurship Rapidly Initiative	<ul style="list-style-type: none"> <li>• Micro enterprise development in Ger-areas with training and job matching services</li> </ul>
French Government	Water and Sewerage Master Plan	<ul style="list-style-type: none"> <li>• US\$1mil grant by French government</li> </ul>
Canada's Sustainable Cities Initiative (SCI)	Road-Map	<ul style="list-style-type: none"> <li>• Link Canadian investors to the City to share technical expertise and investment opportunities in solid waste management, urban planning, tourism development</li> </ul>
CHD International/ USAID	Ger Initiative (Aug 2002–Sep 2008)	<ul style="list-style-type: none"> <li>• Objectives: (1) Strengthen business, (2) Create new business, (3) Increase employment</li> <li>• Land price survey in 2005 for land value assessment by banks</li> </ul>
GTZ	Integrated Urban Development Programme (June 2006–2010)	<ul style="list-style-type: none"> <li>• Components: (1) Low-cost housing construction (cost and energy efficient housing), (2) Rehabilitation of apartments (energy efficient rehabilitation), (3) Integrated development strategies (participatory community development in Ger area, with ADB, MCC, UN-HABITAT), (4) Vocational training</li> <li>• Assisted "40,000 Units Housing Programme Master Plan 2006–2009"</li> </ul>
World Vision	Area Development Program	<ul style="list-style-type: none"> <li>• Projects: health, education, economic development, children</li> <li>• Community development with Community Based Organization (7 CBOs in Ulaanbaatar city)</li> <li>• To empower community, to strengthen local authority and government organization from 2006</li> </ul>
Urban Development Resource Center (UDRC)	Community based Ger Area Development	<ul style="list-style-type: none"> <li>• Living condition improvement of Ger areas by involvement of communities</li> <li>• Technical support to saving groups in Ger areas</li> <li>• Partnership arrangement with governments, donors, academe, NGOs</li> </ul>

Source: JICA Study Team, "Ger-area Upgrading Strategy and Investment Plan", UN-HABITAT

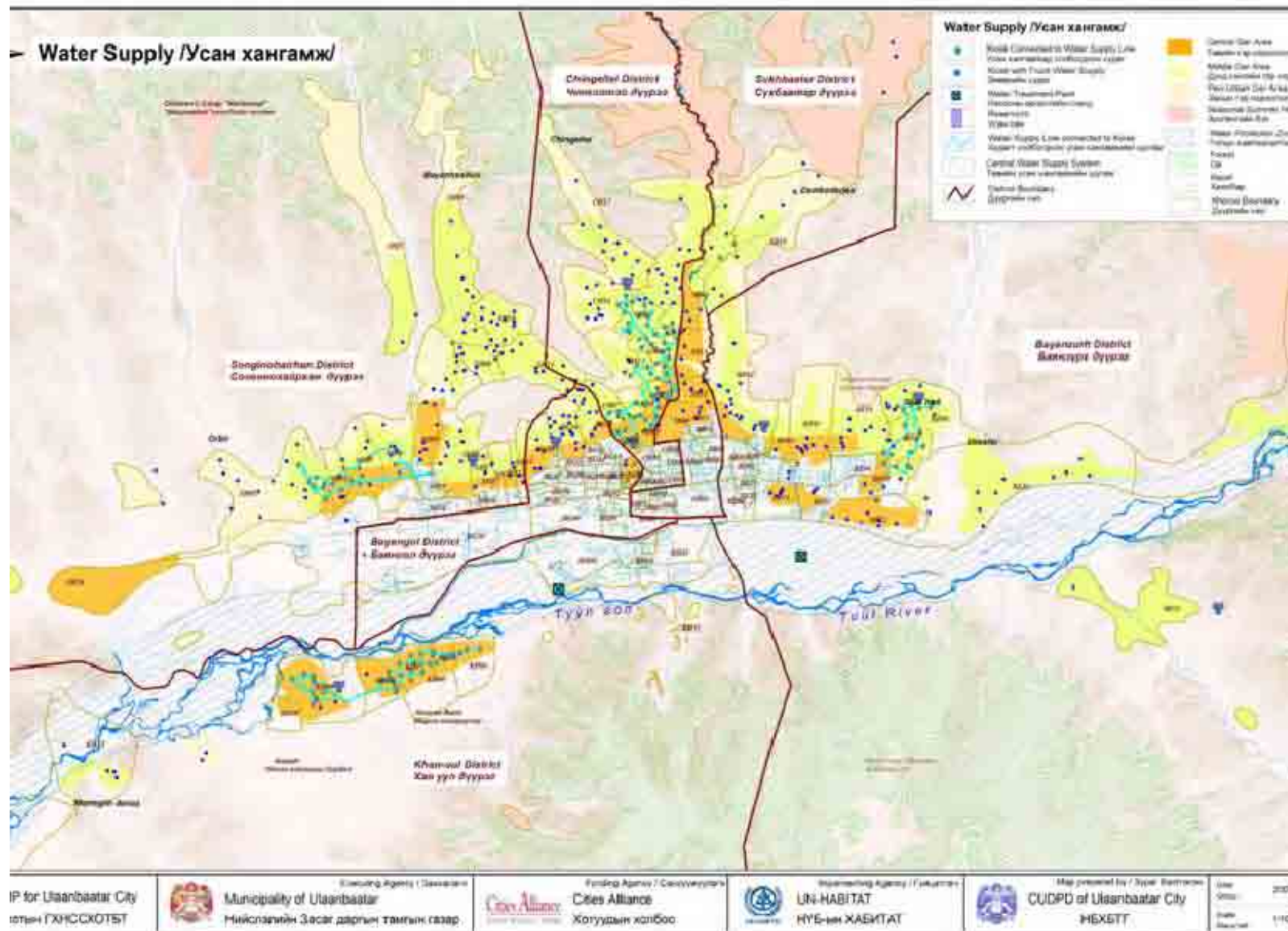
The main constraint in Ger area improvement is the local community's lack of awareness and initiative to improve their living conditions. Though most Ger area residents are expected to settle in apartments, there are limited access to finance and information. So far, there are few projects and studies that cover various aspects of Ger areas in a comprehensive manner. For example, the ADB conducted "**Urban redevelopment project in Dari-Ekh Ger area**" to introduce a land readjustment plan and improve roads and street furniture, and the GTZ has conducted "**Low-cost housing construction**" to install eco-friendly toilets. In addition, some NGOs conduct community development projects including vocational training and housing loan provision, which aim to raise the awareness of low- to mid-income households about a better way of life.

Since 2007, the UN-Habitat has implemented the “**Ger-area Upgrading Strategy and Investment Plan**” (GUSIP) with the support of the Cities Alliance and Ulaanbaatar City government. Its components are: 1) Ger area upgrading strategy, 2) urban development guidelines, 3) Ger area improvement action plans, 4) Ger area investment program, 5) institutional strengthening strategy, and 6) knowledge sharing and policy learning mechanism.

The Ger area upgrading strategy is composed of: 1) urban growth, environment sustainability, 2) Ger area upgrading (land management, infrastructure, social service, greening), and 3) urban governance (municipality, community-based organizations, PPP, etc.). GUSIP is expected to be a comprehensive master plan on Ger area improvement.

World Bank has implemented the “**Ulaanbaatar Service Improvement Project**” (USIP) for improvement of living condition of Ger area (especially remote area) by installing water reservoirs, water kiosks, expanding central water pipelines, etc. Though this project contribute to supply water to Ger residents, it lacks of viewpoints of development plan in a long-term.

**Figure 3.4.17 Map of Water Supply Network and Water Kiosk Distribution in Ger Area**



Source: "Ger-area Upgrading Strategy and Investment Plan", UN-HABITAT

## 4. CURRENT URBAN PROBLEMS AND COUNTERMEASURES

### 4.1 Rapid Urbanization

#### 1) In-migration and Rapid Population Growth in Ulaanbaatar

Ulaanbaatar City has been developing as the center of politics and economy in Mongolia. In 1935, the city hosted a population of only 10,000, accounting for 1.4% of the then national total.

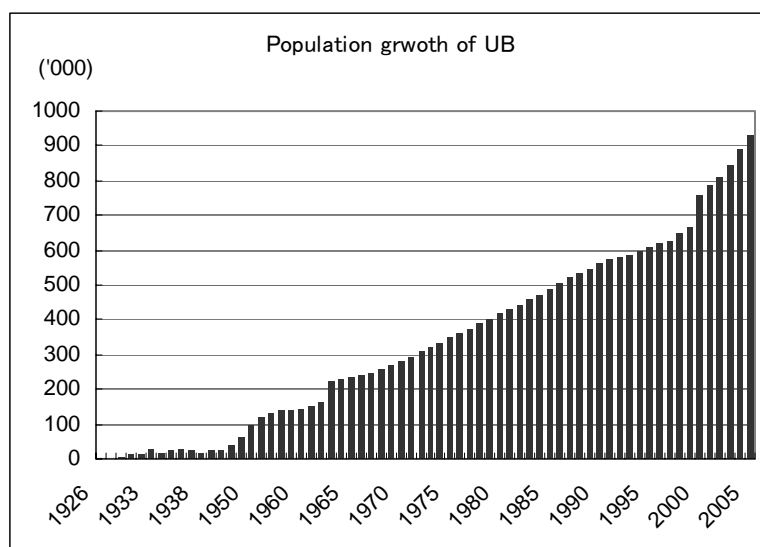
In 2005, or after 70 years, the population grew 100 times. As seen in Table 4.1.1, Ulaanbaatar City shows a much higher population growth rate than the national average, which means that the city has attracted people from the rural areas. As a result, in 2005, Ulaanbaatar City had a population of 965,300, accounting for 37.7% of the national total, and 62.5% of the national urban population.

**Table 4.1.1 Population Growth of Ulaanbaatar**

Year	Mongolia				Ulaanbaatar			
	Urban (Thousand)	Rural (Thousand)	Total (Thousand)	Growth annual rate	UB Total (Thousand)	UB share to National total	UB share to National urban total	UB annual growth rate
1918			647.5					
1935			738.2	0.8%	10.4	1.4%		
1944			759.1	0.3%	30.4	4.0%		12.7%
1956	183.0	662.5	845.5	0.9%	118.4	14.0%	64.7%	13.2%
1963	408.8	608.3	1,071.1	3.4%	223.7	20.9%	54.7%	9.5%
1969	527.4	670.2	1,197.6	1.9%	267.4	22.3%	50.7%	3.0%
1979	817.0	778.0	1,595.0	2.2%	402.3	25.2%	49.2%	3.2%
1989	1,166.1	877.9	2,044.0	2.5%	548.4	26.8%	47.0%	3.1%
2000	1,344.5	1,029.0	2,373.5	1.4%	760.1	32.0%	56.5%	3.0%
2002	1,421.0	1,054.4	2,475.4	2.1%	846.5	34.2%	59.6%	5.5%
2003	1,464.2	1,039.8	2,504.0	1.2%	893.4	35.7%	61.0%	5.5%
2004	1,498.2	1,034.9	2,533.1	1.2%	928.5	36.7%	62.0%	3.9%
2005	1,543.3	1,019.1	2,562.4	1.2%	965.3	37.7%	62.5%	4.0%

Source: JICA Study Team based on Mongolian Statistical Year Book 2006, Mongolian Population in XX Century, Statistical Handbook Ulaanbaatar 2006

**Figure 4.1.1 Population Growth of Ulaanbaatar City**



Source: JICA Study Team

The city's rapid population growth was mainly caused by in-migrants from other aimags, as shown in Table 4.1.2. Recently, the number of in-migrants has surpassed that of births, while social increase accounts for a large portion of the net increase in population, at around 80% of the total population increase. In 2004, 68,808 people in-migrated to Ulaanbaatar, the most number in recent years. This was because Zud happened in 2000 and 2001 that forced the Zud victims to come to Ulaanbaatar for better access to social services and employment.

**Table 4.1.2 Population Increases and Decreases in Ulaanbaatar City**

	Increase			Decrease			Net increase	Natural increase	Social increase	Social increase /Net increase (%)
	Birth	In-migration	Total	Death	Out-migration	Total				
1996	11,263	7,446	18,709	5,023	1,296	6,319	12,390	6,240	6,150	49.6%
1997	10,459	8,493	18,952	5,016	1,171	6,187	12,765	5,443	7,322	57.4%
1998	10,531	15,994	26,525	4,559	1,195	5,754	20,771	5,972	14,799	71.2%
1999	12,211	15,199	27,410	4,659	822	5,481	21,929	7,552	14,377	65.6%
2000	11,771	19,918	31,689	5,037	592	5,629	26,060	6,734	19,326	74.2%
2001	12,339	11,608	23,947	5,069	782	5,851	18,096	7,270	10,826	59.8%
2002	12,652	23,677	36,329	4,996	578	5,574	30,755	7,656	23,099	75.1%
2003	13,571	40,760	54,331	5,522	693	6,215	48,116	8,049	40,067	83.3%
2004	14,795	68,808	83,603	6,017	1,346	7,363	76,240	8,778	67,462	88.5%
2005	15,465	30,207	45,672	5,972	2,821	8,793	36,879	9,493	27,386	74.3%

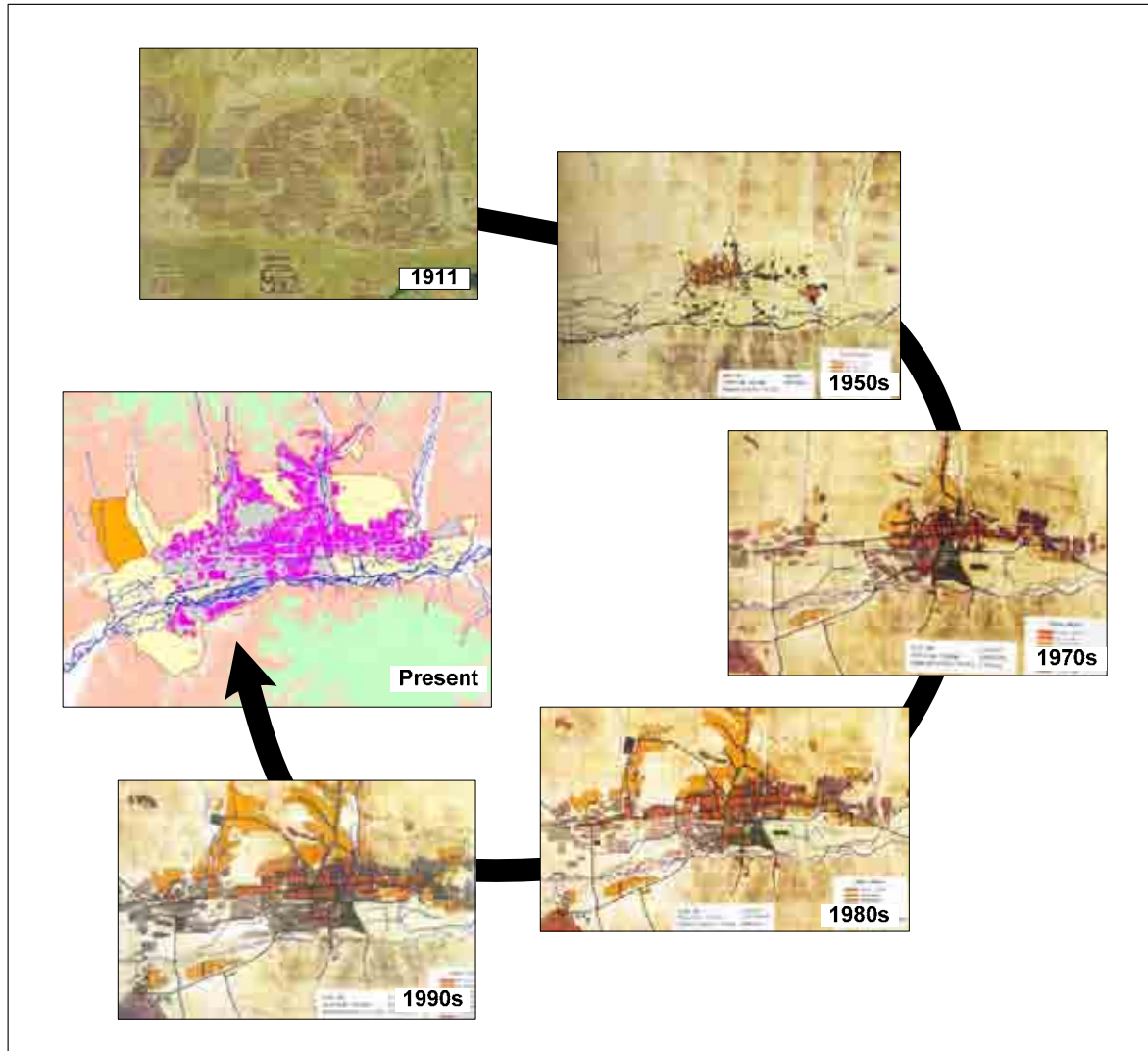
Source: Statistical hand book of Ulaanbaatar, 2006, Ulaanbaatar, Tables 2-34, 2-41, and 2-48



## 2) Expansion of Urbanized Areas and Ger Settlements

Figure 4.1.2 shows the expansion of urbanized areas in Ulaanbaatar from 1911 to the present. From this data, it is easy to recognize the rapid expansion of Ger settlements on the peripheries of Ulaanbaatar. These settlements have dismal living conditions due to poor infrastructure, soil contamination, and air pollution, among others.

**Figure 4.1.2 Urbanization of Ulaanbaatar City**



Source: JICA Study Team based on "Ulaanbaatar, The 800th Anniversary of Grate Mongolian State", 2006, and UBMP-2020

## 4.2 Aggravation of Housing Issues

### 1) Current Housing Conditions

According to the housing statistics in 2007, about three-quarters of the total households in Ulaanbaatar City live in permanent housing. The rest live in Gers or have no houses. However, only 60% of those living in permanent housing are connected to basic urban services, such as water supply and heating systems, although this connection rate is only slightly higher than that of the national average.

As for the types of living area, about 40% of total households in Ulaanbaatar City (90,948 households in 2007) live in apartments developed before the 1990s. Ninety-one percent (91%) of these apartments are self-owned. The living environment in such areas has deteriorated because most of the facilities and equipment have not been properly maintained, and open spaces have been encroached on by new buildings.

The remaining 60% of households live in Ger areas, and 93% of such houses are self-owned. Such areas have many environmental issues because of the lack of basic infrastructure. For example, untreated sewage from households penetrates into the ground which has a negative effect to the surroundings, and roads without drainage facilities cause frequent flooding. The most crucial environmental issue for the city emanating from Ger areas is the smoke from burning coal in winter time (see 4.9 in detail).

**Table 4.2.1 No. of Households in UB by Housing Type, 2006**

District	No. of Households	Apartment Area			Ger Area			
		Apartment	Detached	No house	Detached	Simple House	Ger	No house
Khan Uul	21,386	7,171	84	21	111	8,879	4,859	261
Baganuur	6,598	2,922	0	0	8	1,106	2,478	84
Bayanzurkh	50,828	18,678	128	47	317	16,111	15,207	340
Nalaikh	6,989	2,201	0	1	4	3,014	1,730	39
Bayangol	35,426	26,117	142	29	50	4,061	4,809	218
Sukhbaatar	28,435	13,144	7	45	247	7,196	7,424	372
Chingeltei	28,397	6,707	24	17	119	14,440	6,892	198
Bagakhangai	835	408	0	0	1	181	242	3
Songinokhairkhan	48,020	13,600	41	144	486	17,443	15,863	443
Total	226,914	90,948	426	304	1343	73,431	59,504	1,958

Source: Statistical Data of Ulaanbaatar City, 2007

After the MCUD has launched the “40,000 Housing Units Program”, the people suffered from steep rises in the purchase prices of apartments. In May 2007, the price of an apartment was US\$ 550/m<sup>2</sup>, but it rose to US\$ 950/m<sup>2</sup> in March 2008. This was mainly caused by supply shortages in cement and iron reinforcing rod, as well as housing speculations. GTZ is providing technical assistance for the MCUD to provide cheap construction materials, but the latter failed to predict the increases in the demand for these construction materials. As a result, housing supply could not keep up with demand, and it in turn led to a steep rise in purchase prices.

The high prices of apartments are not only beyond the capacity of low-income households; even lower middle-income households cannot afford them. Only high-income and upper middle-income households can acquire apartments. As a result, the social disparity between rich and poor is widening. It is predicted that unless the disparity is narrowed, it will be one of the biggest social ills of the city.

## 2) Housing Issues and 40,000 Housing Units Program

Since 1993, when the country's transition to market economy started, almost no public housing in Ulaanbaatar City has been provided. Instead, the private sector has developed many apartments. However, since these apartments are not affordable for majority of the people in the city, most of those moving to the city live in Ger areas. In addition, many poor households sell their apartments and move to Ger areas. Therefore, Ger areas are where poor households and newcomers to the city live.

Ulaanbaatar City is currently facing many serious issues concerning housing and living environment, including housing shortage caused by the rapid increase in population, dilapidated housing, degraded living environment, and limited water resources. As the country shifts to a new socio-economic system, those issues have not been properly dealt with by the relevant authorities of the national and city government. That is, after transferring apartments and land to individuals, housing issues seem to have become private matters. Most apartments and other housing facilities have not been adequately maintained, resulting in dilapidated conditions. Therefore, measures to maintain them properly have to be established.

**Table 4.2.2 House Ownership**

(%)

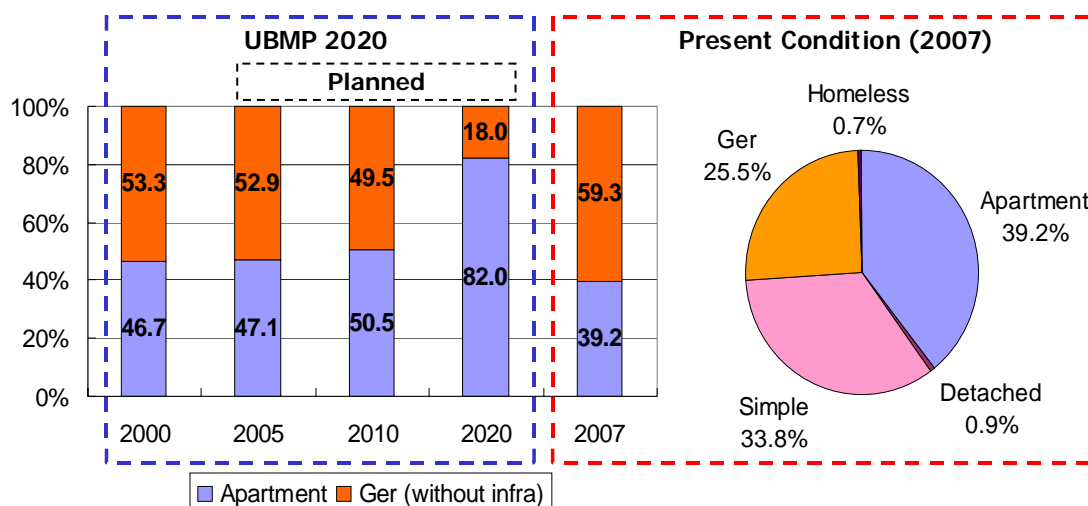
	Ger area	Apartment area	Total
Self-owned	93	91	92
Privately owned house for rent	0	3	1
Relative's house / no rent	2	4	3
State-owned house for rent	3	2	3
Uncertain Ownership	1	0	1

Source: Household Interview Survey, 2007, JICA Study Team

## 3) Housing Types

In the UBMP 2020, the target is for 82% of households to connect to the central network. But in reality, about 60% of the total population in Ulaanbaatar City live in Gers, while 40% live in apartments (see Figure 4.2.1). Among Ger residents, more than 50% live in so-called "simple houses" which are self-built wooden houses without connection to infrastructure and urban utilities. Both Gers and simple houses are not appropriate as urban houses because they create negative impacts on the environment and sanitation (air pollution, soil pollution, etc.), housing conditions (indoor air pollution, fragile structure, narrow space, lack of privacy, etc.). In addition, simple houses have been settled as immovable properties. While land management issues are complicated and as land privatization accelerates uncontrolled expansion of settlements, these deteriorated and non-performing assets need to be properly controlled to improve the urban environment and living conditions in Ger areas.

**Figure 4.2.1 Past, Planned and Present Housing Types**



Source: UBMP-2020, Statistical data of UB City 2007

#### 4) Household Profile

There is not much difference in family composition, but the income gap between households living in apartments and those in Ger areas is big (see Table 4.2.3). Though incomes of Ger households are lower than those of households in apartment areas, the former pays more for utilities due to limited public services. For example, the expenditure on coal in winter is a burden to household finance in Ger areas. Then too water consumption is quite limited in Ger areas since the people need to buy water at kiosks on foot. But water in Ger areas is more expensive than in apartment areas, where consumption is quite huge. According to USUG, the price of bottled water is 1Tg/L while delivery cost of water to kiosks by truck is 3.8Tg/L. Water price in apartments is only 0.3Tg/L.

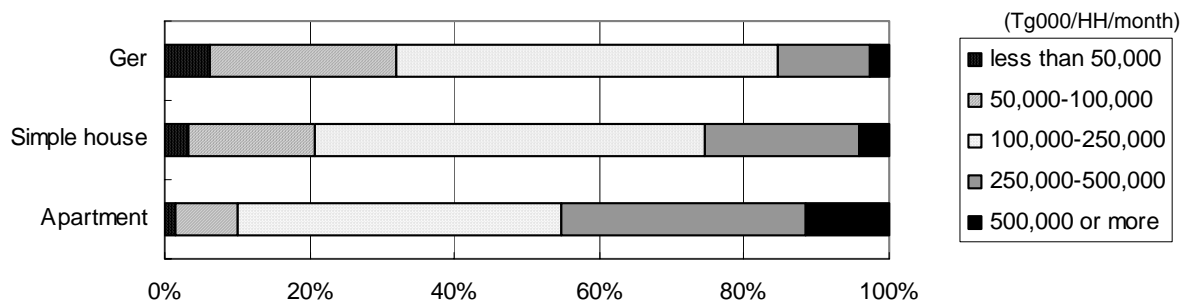
Income distribution varies according to housing types (see Figure 4.2.2). According to HIS results, the “average” household monthly income in UB City is 217,000Tg./HH/month. The average in apartment areas is 276,000Tg./HH/month, while that in Ger areas is only 180,000Tg./HH/month. The incomes of more than 30% of Ger residents and more than 20% of simple house residents are less than 100,000Tg./HH/month.

**Table 4.2.3 Household Profile by Housing Type**

		Mid-rise	High-rise	Detached with infra	Detached without infra	Ger	Average
Average No. of HH		3.7	3.7	4.5	4.2	4.1	4.0
Monthly income (Tg000/month)	Summer	254,751	291,980	194,055	187,711	156,906	212,184
	Winter	255,643	291,709	196,508	187,660	149,543	210,678
Monthly expenditure (Tg000/month)	Summer	231,566	238,775	186,762	172,559	138,358	188,744
	Winter	238,161	253,014	194,723	185,979	150,018	200,134
Heating in winter	Monthly cost (Tg000/month)	12,484	13,488	39,315	68,571	53,818	
	% of expenditure	5.2	5.3	20.2	36.9	35.9	
Water	Monthly cost (Tg000/month)	11,625	13,509	4,060	1,783	1,776	
	Consumption (L/per/day)	274	324	29	15.2	16.0	

Source: Household Interview Survey, 2007, JICA Study Team

**Figure 4.2.2 Income Distribution by Housing Type**



Source: Household Interview Survey, JICA Study Team, 2007

## 5) Settlement Conditions

The highest population density of about 669persons/ha is in the 6th Khoroolol, where high-rise apartments (9 - 12 floors) of the 80s Russian style are clustered. The central business district (CBD) along Peace Avenue has about 337persons/ha with mid-rise apartments (4 - 6 floors). These Russian-style residential areas have high densities where public facilities, such as kindergarten schools, are properly planned based on the Norm and Planning Standards.

On the other hand, population densities in Ger areas vary by location and period of settlement, since there are no planning standards. Also, settlements are not properly controlled (see Figure 4.2.3). For example, in Gandan and the 7th Khoroolol located in the central Ger area, settlements are 10 to 20 years old already, population densities are 144persons/ha in Gandan and 188persons/ha in 7th Khoroolol. In these areas, the size of one khassha is smaller than 700m<sup>2</sup>, which is the maximum size of privatized land. And 2-3 households (mostly relatives) share one khassha. Peripheral Ger areas, such as Dambadarjaa, has low density with approximately 76persons/ha. Ger areas are expanding to hilly and steep areas such as Chingeltei and Unur.

**Figure 4.2.3 Comparison of Typical Housing Patterns**

High-rise apartment in CBD	Central Ger Area	Central Ger Area	Middle Ger Area
6th Khoroolol 669 pax/ha BCR 23.5%	7th Khoroolol 188 pax/ha BCR 15.6%	Gandan 140 pax/ha BCR 24.7%	Dambadarjaa 76 pax/ha BCR 13.0%

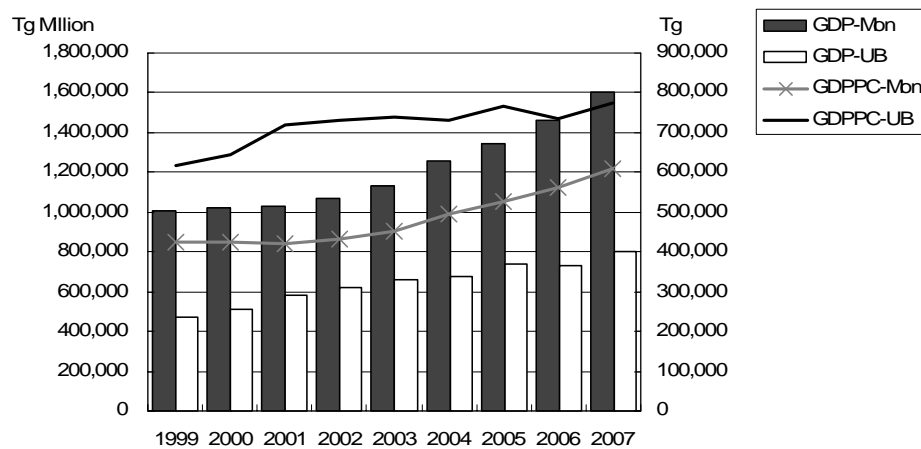
Source: JICA Study Team

Lands in Ger areas consist of a) “formal” Ger areas where land-use rights are certificated, and b) “informal” Ger areas where settlements are prohibited or without any rights. According to the MCC, while 90% of Ger lands are subject to privatization, only 25% of them have been completely privatized due to bureaucratic procedure, lack of knowledge of citizens, and uncertainties in tax payments. The types of land rights are categorized into: i) use, ii) possession, and iii) land ownership. Informal Ger areas, where settlements are prohibited, consist of water reservation area, riverbeds, flood-prone areas, vicinity of high-voltage towers, etc. Since there are no enforcement laws and mechanisms, eviction and forced settlements by government is a vicious circle. At present, both land ownership and resettlement conditions are not yet clear and need further study.

### 4.3 Sharp Growth of Commerce-driven Urban Economy

The Mongolian economy experienced stagnation in the 1990s during the initial phase of shifting to a market economy, but it recovered by 2002. Figure 4.3.1 shows the GDP of Mongolia and the GRDP of Ulaanbaatar City since 1999.<sup>1</sup> While the GDP growth rate of Ulaanbaatar City was higher than the annual average growth rate of Mongolia in the beginning of 2000s, it slowed down since 2003. The average GDP growth rate of Mongolia from 2004 to 2007 was 9.0%; in the same period, the average GRDP growth rate of Ulaanbaatar was only 5.1%. This implies that the current economic boom being experienced by Mongolia is driven by the copper and gold mining industry in the rural areas. The share of Ulaanbaatar's GRDP to Mongolia increased from 47% in 1999 to 58% in 2003, but it dropped to 50% in 2006.

**Figure 4.3.1 Changes in GDP/GRDP and GDP/GRDP per Capita**



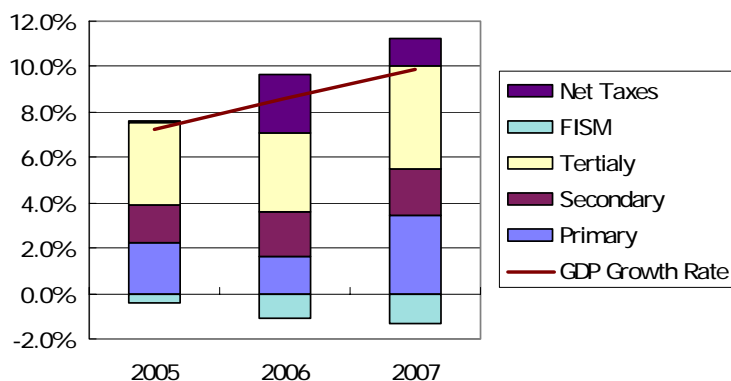
Source: Mongolian Statistical Yearbook 2006 and 2005, "Mongolia in a Market System" Statistical Yearbook 1989 - 2002

In 2001, the GRDP per capita of Ulaanbaatar was 1.70 times larger than the GDP per capita of Mongolia. However, this gap decreased to 1.27 times in 2007, with the latter, as shown in Figure 4.3.1, increasing faster than the former since 2003, narrowing the gap. The growth rate of Ulaanbaatar has been limited in recent years; while the annual average growth rate of Mongolia's GDP per capita was 7.7% in the last four (4) years, that of Ulaanbaatar City was only 1.3%.

The contribution of the tertiary sector to the recent growth of the national GDP is considered the most crucial and constant, ranging from 3.6% to 4.6%, as indicated in Figure 4.3.2. Meanwhile, the secondary and primary sectors account for 1.6 - 2.1% and 3.4% contribution to the GDP, respectively. Figure 4.3.3 shows the composition of industries in Mongolia. Agriculture, mining, as well as transport and communication have accounted for more than half of the national GDP.

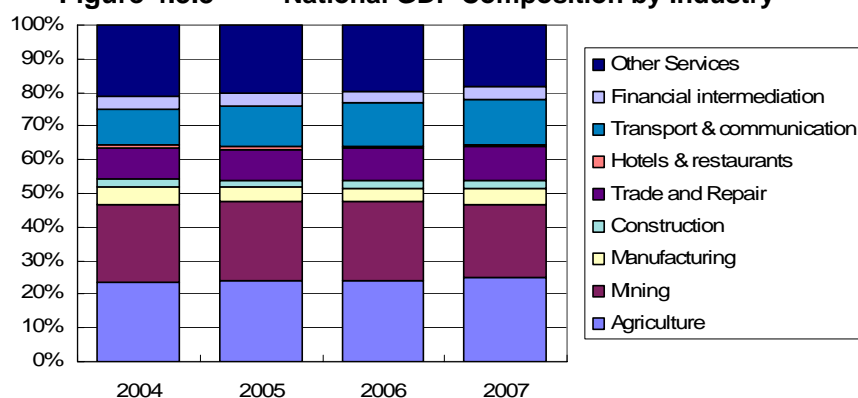
<sup>1</sup> Nominal GDP of Mongolia in Mongolian Statistical Yearbook has been revised in 2006 Edition and 2007 Edition, and each edition handles GDP in recent four years. That is why it is difficult to get medium and long term time-series GDP data now.

**Figure 4.3.2 Contribution of Industries to National GDP Growth**



Source: Mongolian Statistical Yearbook 2007

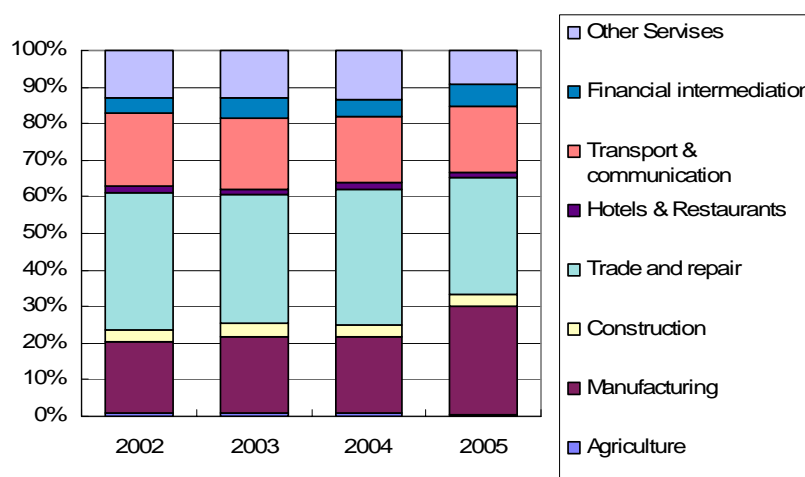
**Figure 4.3.3 National GDP Composition by Industry**



Source: Mongolian Statistical Yearbook 2007

In Ulaanbaatar, manufacturing, wholesale and retail trade, repair, and transport and communication are major industries. The contribution of agriculture is marginal. Figure 4.3.4 shows the shares of industries to the GRDP of Ulaanbaatar City since 2002 to 2005.

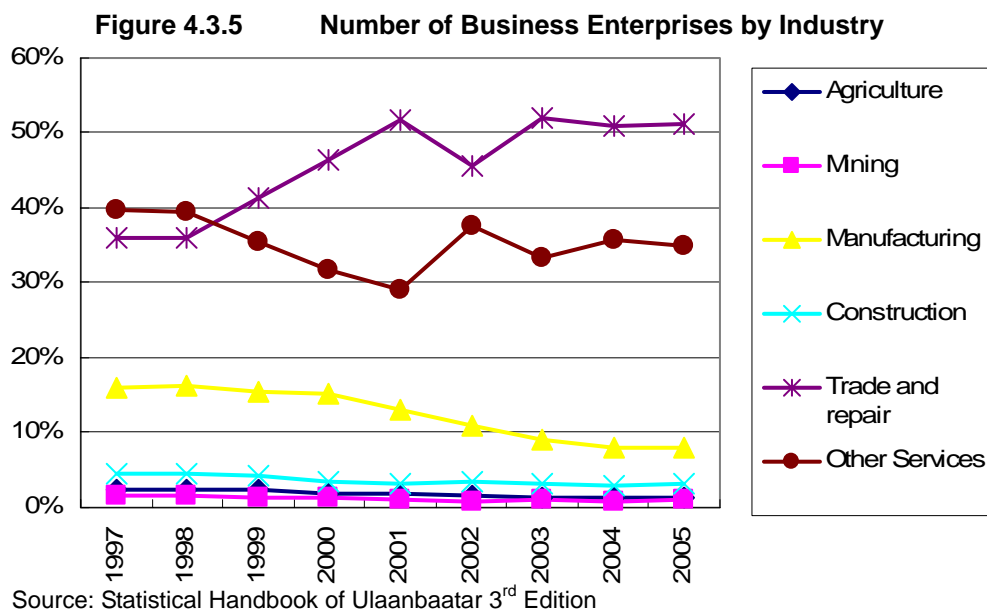
**Figure 4.3.4 GRDP Composition by Industry**



Source: Statistical Handbook of Ulaanbaatar 3<sup>rd</sup> Edition



Figure 4.3.5 shows the changes in the number of business enterprises in Ulaanbaatar City. It also shows the development of the trade and repair industry, where the number of enterprises increased by 4.8 times, i.e. from 2,697 in 1997 to 13,025 in 2005 or from 36% to 51%. On the other hand, the share of manufacturing decreased by 8 points, from 16% to 8%.



The development of the wholesale and retail trade, as well as the repair industry, is driven by private consumption. The rapid inflow of foreign direct investment (FDI) to the mining industry and the remittances from overseas workers<sup>2</sup> seem to promote household spending on automobiles and houses. In fact, industries, such as wholesale and retail trade and construction, are currently pushing the economy of Ulaanbaatar City, but these industries will not be the engines of economy for Ulaanbaatar in the long term.

The commercial activities mentioned above will continue to dominate the economy of Ulaanbaatar, and are important in creating jobs and enriching urban life. However, what is necessary is to promote industries that will lead the national economy and earn foreign currency. What industries have these potentials will be discussed in Section 6.3.

<sup>2</sup> Based on the Mongolian Statistical Yearbook 2007, the net amount of overseas workers' remittances was USD 83.9 million (credit: USD174.3 million and debit: USD90.3 million) in 2007. However, since every urban family has on average one member working abroad, the real impact on spending on automobiles and housing would thus seem to be bigger.

## 4.4 Urban Sprawl due to Poor Land Management

### 1) Current Trends

Urbanization rapidly progressed in Ulaanbaatar capital area as population rapidly increased from 652,200 (1998) to 952,400 (2005). The population in Ger areas also increased from 133,800 (1998) to 256,200 (2005) because of population influx from rural areas to the Ulaanbaatar capital area in search of employment and education opportunities, among other reasons. Illegal settlements have developed in Ger areas even without adequate infrastructure. After the enactment of the law on private land ownership in 2002, the government started land privatization predominantly in Ger areas, which also promoted population inflow to Ulaanbaatar City.

Table 4.4.1 shows land-use changes in the built-up areas of Ulaanbaatar City, comprising the six districts of Bayangol, Bayanzurkh, Chingeltei, Sukhbaatar, Songinokhairkhan, and Khan-Uul, between 1998 -- during the preparation period for the UBMP 2020 -- and 2006. Land for "cities, villages, and other settlements" increased in area, i.e. from 16,074ha to 19,917ha at a growth rate of 24% (1.24 times).

At the district level, especially in Bayanzurkh in the east and Songinokhairkhan in the west, urbanized areas rapidly increased in the period 1998 - 2006. Those in Bayanzurkh grew by 1.38 times or 1,588ha, and those in Songinokhairkhan by 1.57 times or 1,061ha. Population increase in the period 1998 - 2005 in these districts was 85,600 and 73,900, respectively. In addition, the growth rate of urbanized areas in Sukhbaatar in the north was 1.58 times, which is relatively high. These trends obviously show rapid urban sprawl eastward toward the upstream of Tuul River as well as northward and eastward toward the upstream of the Tolgoit and Selbe rivers. Simultaneously, agricultural land and forested land rapidly decreased as urbanization in these districts rose.

Table 4.4.3 shows the current conditions of land ownership, possession, and use according to the Unified Land Territory Report of Ulaanbaatar City (2006). As of 2006, the number of households who owned land was 60,740, which is 28.2% of the total number of households in 2005 (215,727). These households owned 2,932ha, which is 9.9% of the share of "cities, villages and other settlements land" (29,529.87ha) in Ulaanbaatar City's built-up areas (6 districts), which in turn comprise 0.6% of the total area of Ulaanbaatar City (9 districts) (470,444.00ha). Figure 4.4.1 shows trends in land ownership after land privatization started, that is from 2002 to 2006.

**Table 4.4.1 Recent Changes in Land Use in Ulaanbaatar City**

(Unit: ha)

		Bayangol	Bayanzurkh	Chingeltei	Sukhbaatar	Songino-khairkhan	Khan-Uul	Total of UB City
Agricultural Land	1998	803	72,989	2,964	8,287	92,442	35,443	312,918
	2006	640	54,320	2,118	5,583	92,453	23,996	179,110
	Increase	-163	-18,669	-846	-2,704	11	-11,447	-133,808
	Growth rate	-20%	-26%	-29%	-33%	0%	-32%	-43%
Cities, Villages and Other Settlements Land	1998	1,346	2,963	2,488	1,049	2,807	5,421	16,074
	2006	1,506	4,024	2,631	1,661	4,395	5,701	19,917
	Increase	160	1,061	143	612	1,588	280	3,843
	Growth rate	12%	36%	6%	58%	57%	5%	24%
Transportation and Network Land	1998	160	1,075	112	115	1,444	481	3,388
	2006	160	1,021	114	118	1,444	1,075	3,932
	Increase	0	-54	2	3	0	594	544
	Growth rate	0%	-5%	2%	3%	0%	123%	16%
Forest Resources Land	1998	0	45,060	3,360	11,354	23,299	6,156	89,229
	2006	0	34,624	4,056	13,419	20,629	1,941	74,668
	Increase	0	-10,436	696	2,065	-2,671	-4,215	-14,561
	Growth rate	0%	-23%	21%	18%	-11%	-68%	-16%
Water Resources Land	1998	640	2,324	6	35	71	975	4,051
	2006	640	2,317	6	35	71	975	4,044
	Increase	0	-7	0	0	0	0	-7
	Growth rate	0%	0%	0%	0%	0%	0%	0%
Reserve Land for Special Use of the State	1998	NA	NA	NA	NA	NA	NA	NA
	2006	3	28,106	6	25	1,071	14,779	43,990
	Increase	NA	NA	NA	NA	NA	NA	NA
	Growth rate	NA	NA	NA	NA	NA	NA	NA
Total of Each District	1998	2,949	124,412	8,930	20,840	120,063	48,466	325,660
	2006	2,949	124,412	8,930	20,840	120,063	48,466	325,660
	Increase	0	0	0	0	0	0	0
	Growth rate	0%	0%	0%	0%	0%	0%	0%

Source: JICA Study Team (prepared from UBMP-2020 and Unified Land Territory Report (2006))

**Table 4.4.2 Recent Population Changes in Ulaanbaatar City & Ulaanbaatar Capital Area**

No.		1	2	3	4	5	6	UB City	UB Capital area	
Name of Districts		Bayangol	Bayanzurkh	Chingeltei	Sukhbaatar	Songino-khairkhan	Khan-Uul	Total	Total	Ger Area
Total Population	1998	119,600	110,500	96,500	89,400	130,700	58,500	605,200	652,200	133,800
	2005	160,500	196,100	130,500	117,200	204,600	87,900	896,800	952,400	256,200
Population Increase		40,900	85,600	34,000	27,800	73,900	29,400	291,600	300,200	122,400
Annual Growth Rate (1998-2005)		4.3 %	8.5 %	4.4 %	3.9 %	6.6 %	6.0 %	5.8 %	5.6 %	9.7 %

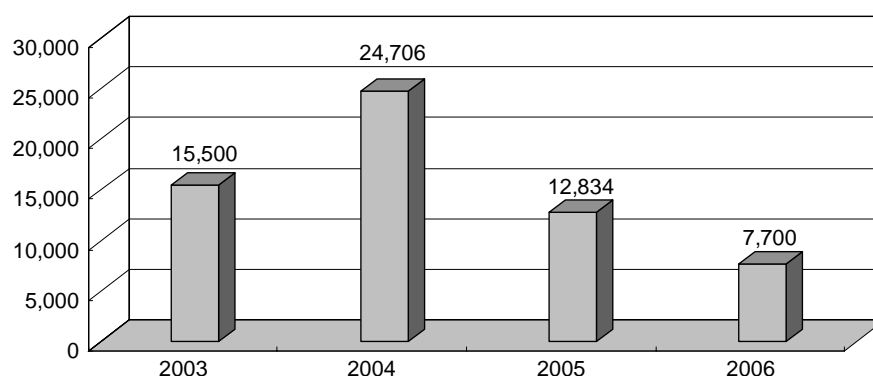
Source: Mongolian National Census

**Table 4.4.3 Allocation of Land for Citizens Who Owned, Possessed, Used the Land and Their Changes**

	Allocated Land	Indicator	2005	2006	Change
UB City Capital Area	Citizens Who Owned the Land	Number	53,050	60,740	7,690
		Size (ha)	2685.45	2932	246.55
	Citizens Who Possessed the Land	Number	43,135	38,277	-4,858
		Size (ha)	11,647.88	11,034.94	-612.94
	Citizens Who Used the Land	Number	363	322	-41
		Size (ha)	3,427.5	3,609.43	181.93

Source: Unified Land Territory Report (2006), Ulaanbaatar City

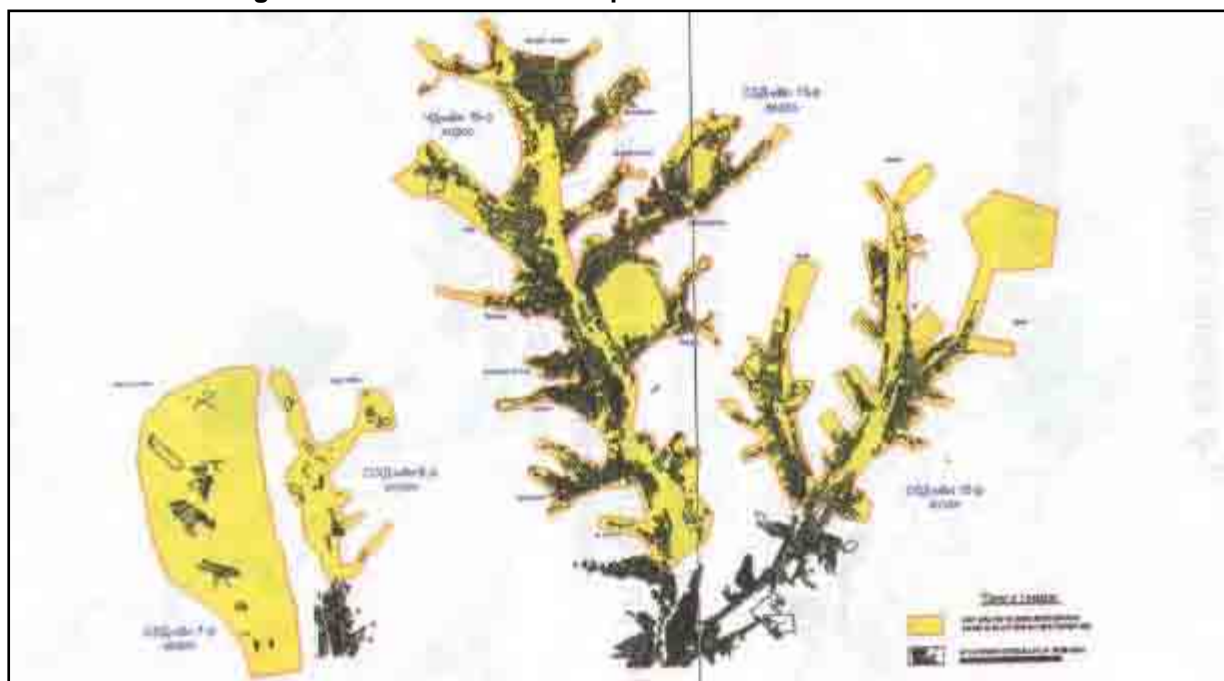
**Figure 4.4.1 Survey of Owned Land in Ulaanbaatar Capital Area, 2003 - 2006**



	2003	2004	2005	2006
Number of Households Who Owned the Land	15,500	24,706	12,834	7,700

Source: Unified Land Territory Report (2006), Ulaanbaatar City

**Figure 4.4.2 Location Map of Ger Land to be Privatized in 2007**



Source: Ulaanbaatar City Land Use Plan of 2007

## 2) Problems and Available Countermeasures

### (1) Rapid Urban Sprawl toward Water Resource Areas

Urban sprawl with expansion of Ger areas has been most rapid eastward toward the upstream of Tuul River. Urban sprawl has also picked up speed eastward and northward toward the upstream of the Selbe and Tolgoit rivers. This uncontrolled urbanization will adversely affect the natural resources in these areas including the contamination of water sources. It is thus essential to establish an urbanization control system such as the designation of urbanization promotion areas (UPAs) and urbanization control areas (UCAs) which have been established in Japan.

## **(2) Expanding Settlements in Flood-prone Areas**

Expanding Ger settlements in flood-prone areas, especially in riverbeds, has become very problematic. Currently, the Disaster Authority of Ulaanbaatar City continues to negotiate with residents in flood-prone areas to resettle based on the Disaster Management Plan. However, resettlement has not been smooth because residents have already obtained settlement permits from the Land Management Department of Ulaanbaatar City. This lack of coordination and sharing on policies, plans, and other information between the two departments should thus be addressed.

## **(3) Deficient Approach to Land Privatization**

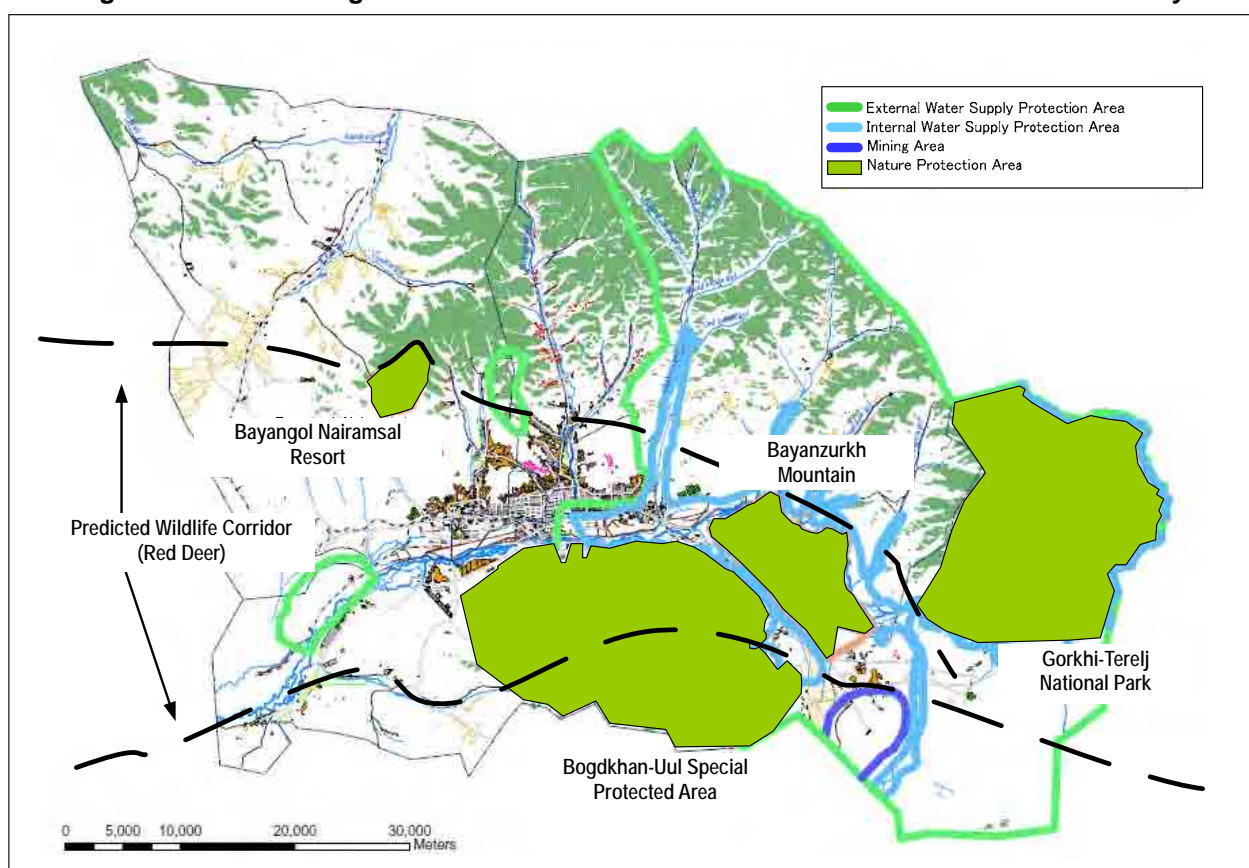
The government has actively promoted land privatization since 2002 even without the guidance of any plan. This has resulted in difficulties in acquiring land for development. It is, therefore, essential to prepare plans on land privatization that are consistent with the city's master plan and to establish a well-developed institutional system for land acquisition.

## 4.5 Inadequate Management of Natural Environment

### 1) Current Conditions and Problems

Conservation and protection areas for forests and wildlife are managed by the Ministry of Environment and Tourism (MET) of Ulaanbaatar City. There are two (2) national protected areas and natural parks, and two (2) provincial/city conservation areas in Ulaanbaatar City (see Figure 4.5.1).

**Figure 4.5.1 Registered Natural Resource Conservation Areas in Ulaanbaatar City**



Source: JICA Study Team based on MET, Ulaanbaatar City and World Bank

Protected areas are categorized into three (3) based on allowed utilization. The “primary zone” is strictly protected; therefore, it is not allowed to enter the area without prior permission. The “protection zone” functions as a buffer zone for the primary zone. In this area, academic and scientific activities for the purpose of conservation and rehabilitation are allowed. The “limited zone” delineates the boundary of protected areas and also functions as a buffer zone, where sustainable development such as ecotourism development and traditional/religious activities are allowed.

Even as Mongolia and Ulaanbaatar City both exert effort in improving their natural environment, there are many problems that limit them, with the following as major ones:

**Illegal Tree Cutting:** Under a policy in Ulaanbaatar City, it is strictly prohibited to cut trees in the forests. However, residents illegally cut trees to use for heating. In special protected areas and nature parks, administrative offices have been established, and rangers patrol the areas to prevent illegal activities. However, due to the lack of budget and human resources, the government could not totally eliminate illegal activities.

**Vested Interests Undermining National Interest:** Two (2) natural resource conservation areas have been registered by the government, and there are regulations/laws covering their management. In addition, various surveys on natural resource have been taken. However, one serious problem is the level of development going on inside, particularly in the Bogd Khan-Uul Special Protected Area. Large complexes of private housing, hotels, and apartment buildings have been constructed in direct conflict with the law. In a recent case, a new-town project near Yarmag was planned even though the proposed project would be located inside a protected area. The area's administrative office and MNE were seemingly powerless to stop the project, and the Cabinet decided to change the protected area's boundary to accommodate the development.

**Inappropriate Reforestation Programs:** Various reforestation programs have been conducted, including those from Japanese volunteer groups. However, most have not been successful because of insufficient technical procedures such as inappropriate choices of plant species, planting systems, and aftercare.

**Disturbance of Wildlife Corridors:** The current law on special protected areas does not have any provision pertaining to wildlife corridors or movement by wildlife between protected areas. It is thus necessary to come up with legislations on establishing such corridors to prevent developments and activities in the planned corridors.

## **2) Concepts on Natural Environmental Protection**

It is important to scientifically analyze natural environmental conditions, methodology of natural resource recovery, ecosystems and animal habitat/migration, and water protection. Likewise, it is important to take physical countermeasures, such as reforestation and construction of disaster prevention structures, while strengthening the legal framework and enforcement, raising public awareness on natural environmental conservation, and establishing appropriate organizations with capability for monitoring and inspection.

In addition to the above, the JICA Study Team is proposing concepts on urban development master planning which can also contribute to natural environmental protection.

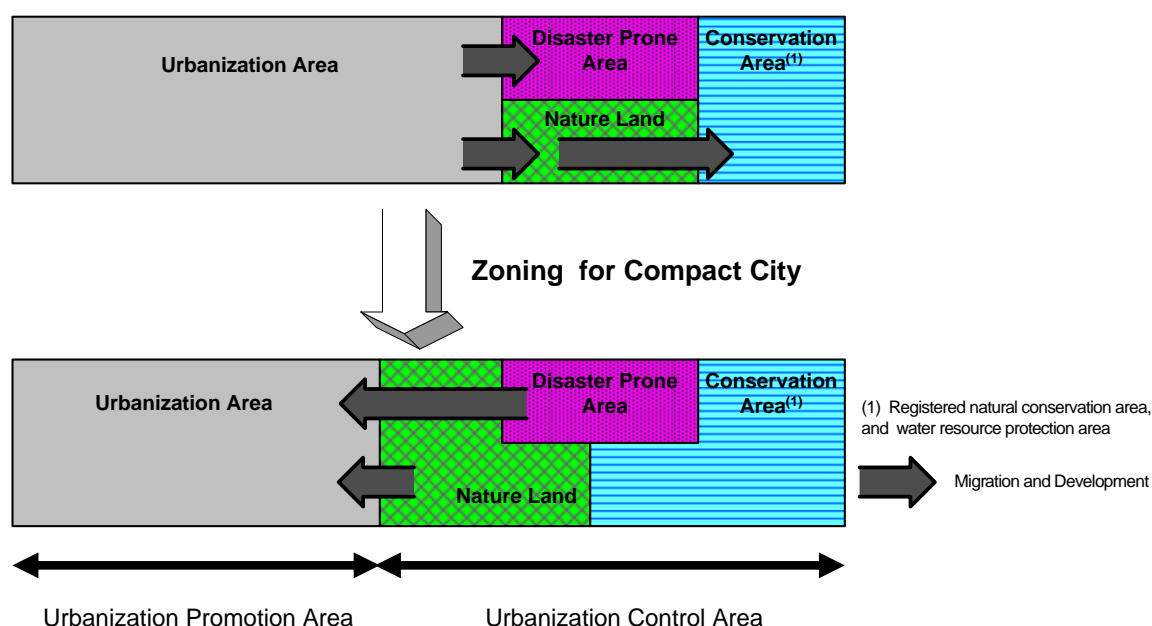
### **(1) Zoning**

The point of zoning an area is to divide it into two, that is one area where urbanization will be prohibited and/or controlled (UCA), and another area where urbanization will be allowed (UPA). Urbanization control areas include disaster-prone areas, agricultural/livestock land, forests/grasslands, and water resource areas. Registered conservation areas, of which there are four in Ulaanbaatar City, will also be controlled in the urban development process.

### **(2) Compact City**

The basic concept of a compact city is to provide the people with better services and benefits at lower costs by making the urbanization promotion area as compact as possible. It is expected that nature conservation land in urbanization control areas will increase by reducing urbanization promotion areas.

**Figure 4.5.2 Concept of Zoning for Natural Environmental Protection**



Zoning Ulaanbaatar City into urbanization promotion and control areas would require assigning each area with different functions and levels of natural environmental protection.

#### **(a) Urbanization Promotion Area**

Nature conservation land in this area will be harmonized with the development of green spaces as recreation areas such as parks and sports complexes. Green spaces will also be developed on roadsides and in children's parks, schools, hospitals, and other public spaces. Basically nature land should be regarded as a part of urban structure.

Since major water supply facilities are expected to exist in urbanization promotion areas, especially along Tuul River, such areas will be protected from any development. However, in reality, there are already many buildings in these areas and many more are planned. The building permission system is not clear as to why these buildings were approved in the first place. Legal enforcement to prohibit such kind of development will be strengthened. Also, the development of green spaces to function as people's recreation areas will be proposed in order to:

- avoid illegal/inappropriate construction, and
- enhance consensus on the protection of water supply areas.

#### **(b) Urbanization Control Area**

Nature conservation land in urbanization control area can function as a buffer zone for natural environmental protection and disaster prevention. This area will be kept in its natural state with no interventions from man.

In urbanization control areas, as well as in protected areas, one crucial issue is low enforcement and poor monitoring and inspection system. Hence there is a need to strengthen the legal framework and raise the capacities of relevant organizations.

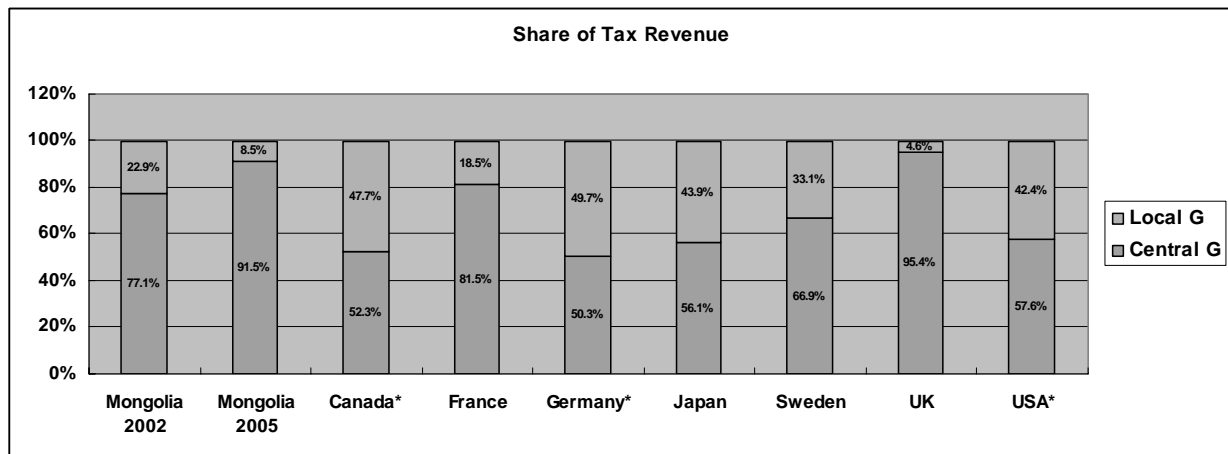


## 4.6 Inadequate Development Funds and Municipal Financing

### 1) Funding from National and Local Governments

The share of the central government in the total revenue of Mongolia 91.5%, leaving a paltry 8.5% for all local governments to share among themselves. Mongolia's system of tax revenue allocation, as shown in Figure 4.6.1, reveals a very centralized allocation system similar with UK's. Since Ulaanbaatar City accounts for more than half of the economic activities in Mongolia, the system could restrict the city's capacity to fund public service provision.

**Figure 4.6.1 International Comparison of Tax Revenue Sharing between Central and Local Governments**



Source: Mongolian Statistical Year Book 2005 and OECD Statistics 2002

Note: Countries with \* mark adopt federal government system.

The total expenditure of the Government of Mongolia for 2006 was Tg. 1,177 billion, whereas that of the local governments combined was Tg. 96 billion. About 79% of the total expenditure of the Mongolian General Budget (national government budget + local government budget) was current expenditure, compared to only 14% for capital expenditure. In the central government budget, the share of capital expenditure was the same as that in the General Budget, while it was about 17% in the local government budget. The total capital expenditure of local governments was about Tg. 16 billion, which is only 10% of the Mongolian government's capital expenditure.

**Table 4.6.1 Revenue and Expenditure of Central and Local Governments**

<b>CENTRAL GOVERNMENT</b>	2002	2003	2004	2005	2006	Tg million
<b>TOTAL REVENUE AND GRANTS</b>	<b>387,685.7</b>	<b>523,344.0</b>	<b>671,908.4</b>	<b>792,509.8</b>	<b>1,299,432.7</b>	
CURRENT REVENUE	380,843.9	500,054.6	649,079.7	764,362.2	1,270,273.5	
TAX REVENUE	288,737.0	388,081.3	537,490.7	635,564.4	1,056,570.5	
NON-TAX REVENUE	92,106.9	111,973.3	111,589.0	128,797.8	213,703.0	
CAPITAL REVENUE	-	-	-	-	-	
GRANTS AND TRANSFERS	6,841.7	23,289.4	22,828.7	28,147.6	29,159.3	
<b>TOTAL EXPENDITURE AND NET LENDING</b>	<b>450,681.0</b>	<b>585,374.5</b>	<b>711,245.5</b>	<b>717,805.2</b>	<b>1,176,658.9</b>	
CURRENT EXPENDITURE	326,079.7	411,787.6	511,400.7	566,169.9	938,053.3	
Goods and services	145,377.3	267,038.7	323,867.3	350,310.1	646,160.6	
Interest payments	19,581.9	17,649.4	22,069.6	20,682.8	18,081.7	
Subsidies and transfers	161,120.5	127,099.6	165,463.8	195,176.9	273,811.1	
CAPITAL EXPENDITURE	57,529.4	83,112.4	90,944.5	77,145.0	159,618.7	
From domestic sources	41,693.3	59,839.5	68,768.1	66,726.7	150,934.6	
Domestic investment	27,987.6	44,929.8	49,953.7	48,756.7	122,826.4	
Capital Repairs	3,349.3	4,961.8	6,102.0	4,872.0	12,421.4	
Road Fund	4,850.3	5,279.6	6,292.4	5,927.2	6,965.6	
Foreign financed	15,836.1	23,272.9	22,176.4	10,418.3	8,684.1	
NET LENDING	67,071.9	90,474.5	108,900.4	74,490.3	78,986.9	
On-lent foreign project loans	64,983.6	83,440.7	104,553.6	88,642.3	88,956.4	
On-lent foreign Cash loans	1,424.6	910.4	1,558.3	0.0	0.0	
Other lending minus repayments	663.7	6,123.4	2,788.5	-14,152.0	-9,969.6	
<b>LOCAL GOVERNMENT</b>	2002	2003	2004	2005	2006	Tg million
<b>TOTAL REVENUE AND GRANTS</b>	<b>104 818.1</b>	<b>52 312.8</b>	<b>68 766.6</b>	<b>78 308.9</b>	<b>96 202.1</b>	
CURRENT REVENUE	104 438.6	47 169.9	59 595.7	70 968.9	87 389.8	
TAX REVENUE	85 897.1	34 885.3	48 010.9	59 388.5	75 135.3	
NON-TAX REVENUE	18 541.5	12 284.6	11 584.8	11 580.4	12 254.4	
CAPITAL REVENUE	379.6	2 052.1	769.0	982.9	1 626.6	
GRANTS AND TRANSFERS	-	3 090.8	8 401.9	6 357.1	7 185.7	
<b>TOTAL EXPENDITURE</b>	<b>168 904.4</b>	<b>50 112.1</b>	<b>68 802.3</b>	<b>79 343.2</b>	<b>95 574.1</b>	
CURRENT EXPENDITURE	158 333.5	42 759.4	54 859.9	66 670.2	79 521.3	
Goods and services	155 575.4	26 775.4	34 716.3	39 156.0	49 892.9	
Interest payments	-	-	-	-	-	
Subsidies and transfers	2 758.1	15 984.0	20 143.6	27 514.2	29 628.4	
CAPITAL EXPENDITURE	10 570.9	7 352.7	13 942.4	12 673.1	16 052.8	
From domestic sources	10 570.9	7 352.7	12 775.6	12 673.1	16 052.8	
Domestic investment	6 948.0	6 466.7	8 012.9	7 475.6	11 318.9	
Capital Repairs	3 519.6	672.2	1 166.8	410.8	-	
Road Fund	90.0	213.9	4 762.6	4 786.7	4 665.0	

Source: Compiled by JICA Study Team based on Various Date Sources

During the period 2003–2005, 88% to 93% of the total capital expenditure was allocated to the central government budget, as illustrated in Table 4.6.2. The Mongolian government budget allocated to the local governments has been mainly for current expenses. And a very small portion of capital expenditure (0.2% to 3.0%) was allocated to the local governments. This shift has taken place due to the Consolidated Budget Law and the Public Sector Management and Finance (PSMF) Law enacted in June 2002.

Since the budget allocation for capital expenditure by the Government of Mongolia to the local governments in recent years has been minimal under the new PSMF regime, local governments had to fund their capital expenditure through own-fund sources, which have been very limited. About 26% of the capital expenditure of the central government budget in 2005 was funded by foreign loans.

**Table 4.6.2 Allocation of Capital Expenditure between National and Local Governments**

	(millions of tog)						State Budget						State Budget for Local Expenses						Local Budget					
	General Budget			State Budget			State Budget			State Budget for Local Expenses			Local Budget											
	2002	2003	2004	2005	2002	2003	2004	2005	2002	2003	2004	2005	2002	2003	2004	2005	2002	2003	2004	2005				
	Perform.	Perform.	Expect.	Draft Budget	Perform.	Perform.	Expect.	Draft Budget	Perform.	Perform.	Expect.	Draft Budget	Perform.	Perform.	Expect.	Draft Budget	Perform.	Perform.	Expect.	Draft Budget				
CAPITAL EXPENDITURE																								
1. Domestic Investment																								
Investment financed by budget	68,100.3	90,467.4	101,651.2	98,033.0	57,529.4	80,179.2	92,283.2	91,592.6	0.0	2,935.4	233.0	233.0	10,570.9	7,352.7	9,122.6	6,107.4								
Investment financed by road fund	39,875.9	56,890.0	60,587.0	62,060.0	32,837.9	49,182.1	52,896.3	55,952.6	0.0	1,027.3	0.0	0.0	7,038.0	6,680.6	7,690.7	6,107.4								
Investment financed by own resource	26,630.4	37,384.3	43,122.2	45,252.6	22,574.9	36,426.3	43,073.2	45,292.6	0.0	873.5	0.0	0.0	4,255.4	84.5	49.0	0.0								
Equipment financed by budget	4,377.3	3,200.4	2,699.8	2,360.0	1,684.7	2,803.8	2,627.1	2,360.0	0.0	126.4	0.0	0.0	2,692.5	250.3	72.7	0.0								
Investment financed by road fund	4,540.3	5,493.5	7,196.0	8,300.0	4,850.3	5,279.6	7,196.0	8,300.0	0.0	0.0	0.0	0.0	90.0	213.9	0.0	0.0								
Investment financed by own resource	3,728.0	5,001.9	0.0	0.0	3,728.0	4,652.4	0.0	0.0	0.0	27.4	0.0	0.0	0.0	322.1	0.0	0.0								
Local investment, rehabilitation	0.0	2,443.3	2,928.9	1,010.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,443.3	2,928.9	1,010.6								
Investment financed by local road fund	0.0	3,566.6	4,640.0	5,096.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3,566.6	4,640.0	5,096.8								
2. To Increase state reserve fund																								
Food, goods reserve	2,966.0	2,374.0	3,840.0	5,139.9	2,960.0	2,374.0	3,840.0	5,139.9	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0								
Seed reserve	180.0	588.2	600.0	640.3	180.0	588.2	600.0	640.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0								
Herb reserve	536.0	544.7	700.0	747.0	530.0	544.7	700.0	747.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0								
Fuel reserve	1,600.0	1,091.0	2,200.0	3,395.7	1,600.0	1,091.0	2,200.0	3,395.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0								
Cereal reserve	650.0	0.0	0.0	0.0	650.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0								
3. Land and non material items expenses																								
Mineral exploration expenses	2,553.5	2,296.6	2,943.6	3,103.6	2,546.1	2,203.9	2,710.6	2,870.6	0.0	92.7	233.0	233.0	7.4	0.0	0.0	0.0								
Forest expenses	1,299.6	1,438.8	1,590.0	1,900.0	1,299.6	1,438.8	1,590.0	1,900.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0								
Environment expenses	567.4	627.0	903.6	903.6	560.0	571.9	670.6	670.6	0.0	55.0	233.0	233.0	7.4	0.0	0.0	0.0								
	666.5	230.8	450.0	300.0	666.5	193.1	450.0	300.0	0.0	37.7	0.0	0.0	0.0	0.0	0.0	0.0								
4. Capital transfer																								
Rehabilitation of budget organization	6,868.9	5,633.9	8,295.0	4,007.4	3,349.3	3,146.4	6,850.8	4,007.4	0.0	1,815.4	0.0	0.0	3,519.6	672.2	1,431.9	0.0								
Rehabilitation financed by own resource	6,851.8	5,631.1	8,295.0	3,847.4	3,332.2	3,146.4	6,850.8	3,847.4	0.0	1,812.6	0.0	0.0	3,519.6	672.2	1,431.9	0.0								
	17.1	2.8	0.0	160.0	17.1	0.0	0.0	160.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0								
5. Investment financed by foreign loan																								
Autobroad construction	15,836.1	23,272.9	25,965.5	23,722.1	15,836.1	23,272.9	25,965.5	23,722.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0								
	15,836.1	23,272.9	25,965.5	23,722.1	15,836.1	23,272.9	25,965.5	23,722.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0								

Source: Mongolia Urban Development and Housing Sector Strategy, Appendices, ADB, May 2, 2005

## 2) Municipal Finance Structure of Ulaanbaatar City

Table 4.6.3 shows the revenue and expenditure trends of Ulaanbaatar City. The New Consolidated Budget Law and the PSMF Law enacted in 2002 have decreased both the revenue and expenditure budgets for Ulaanbaatar City since 2003. The main shift has occurred in the personal income tax revenue, value-added tax (VAT) revenue, and the Mongolian government transfer. The last which used to be allocated directly to the city has shifted to the local budgets of the line ministries. The revenue size of Ulaanbaatar City was Tg. 25 billion to 26 billion for 2003–2005, increasing to Tg. 40 billion for 2006–2007. The city's budget for capital expenditure in 2003–2005 was Tg. 3 billion to 5 billion, which is about 30% of the total expenditure.

The national government budget, as a direct transfer from the Government of Mongolia, and the local budget of the line ministries together cover 50% to 60% of the total expenditure required in the territory of Ulaanbaatar City.

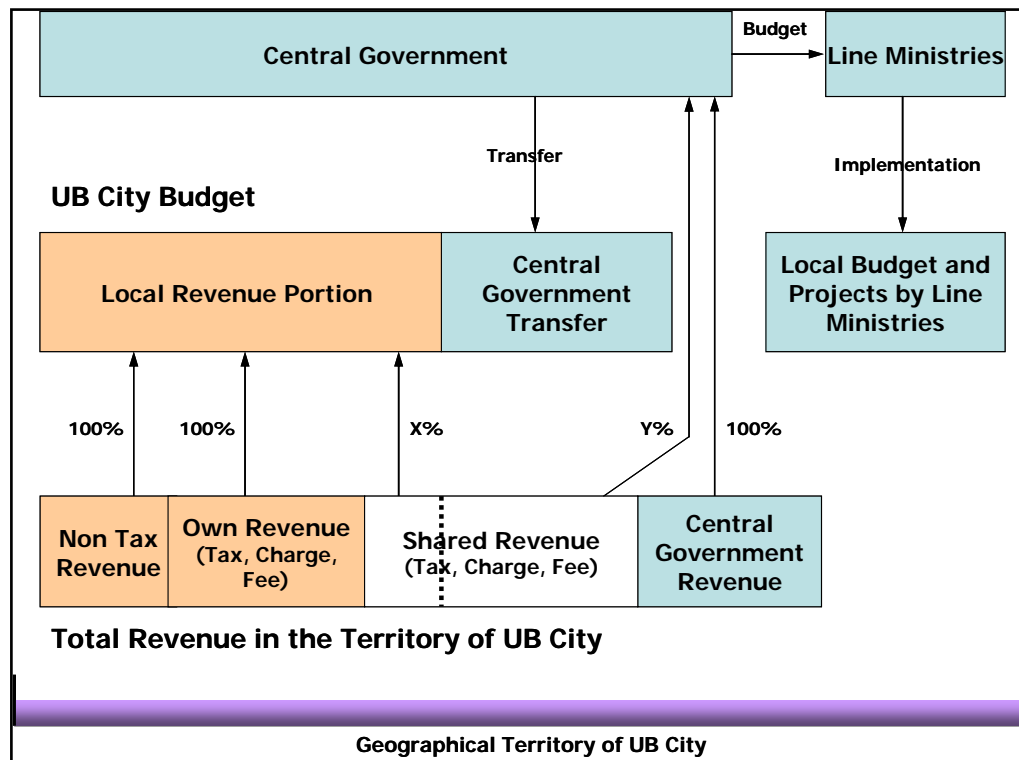
**Table 4.6.3 Revenue and Expenditure of Ulaanbaatar City (2002 - 2007)**

		(Million MNT)					
No	Revenue type	2002	2003	2004	2005	2006	2007
		Actual	Actual	Expected	Budget	Expected	Budget
<b>I.</b>	<b>Total Revenue</b>	<b>51,144.2</b>	<b>26,385.0</b>	<b>24,904.8</b>	<b>26,522.8</b>	<b>40,518.6</b>	<b>41,321.5</b>
1	Personal income tax	17,327.4	1,642.0	1,851.7	1,851.7	6,653.7	2,954.1
2	Property taxes	2,271.1	2,834.6	2,904.6	2,904.6	3,983.8	5,000.6
3	Taxes on goods and services	14,997.4	5,880.3	5,500.0	6,126.1	3,032.0	3,212.0
4	Other taxes	4,544.6	5,216.0	6,802.5	6,802.5	11,746.6	16,137.5
5	Non-tax revenue	10,583.9	9,217.5	5,550.0	6,541.9	6,685.2	6,868.5
6	Capital revenue	1,419.8	1,594.6	2,296.0	2,296.0	2,421.0	2,734.0
<b>II.</b>	<b>Total Expenditure</b>	<b>53,683.8</b>	<b>12,476.9</b>	<b>16,593.2</b>	<b>14,214.3</b>	<b>0.0</b>	<b>0.0</b>
1	Current Expenses	48,300.1	8,700.8	11,846.2	10,014.3		
2	Capital Expenditure	5,383.7	3,776.1	4,747.0	4,200.0		
	Funds to Finance Expenditure:	53,683.8	12,438.4	16,593.3	14,214.4	0.0	0.0
	Road Fund	0.0	0.0	2,760.0	3,200.0		
	Health Insurance Fund	2,058.0	0.0	0.0	0.0		
	Operating Revenue	3,660.6	1,317.3	794.7	699.3		
	Revenue from other activities	1,424.9	59.1	44.8	89.1		
	Local Budget and GOM Transfer	46,540.3	11,062.0	12,993.8	10,226.0		
<b>III.</b>	<b>GOM Line Ministries for Local</b>	<b>0.0</b>	<b>40,503.4</b>	<b>48,259.2</b>	<b>52,106.9</b>	<b>0.0</b>	<b>0.0</b>
1	Current Expenses	0.0	39,971.2	48,244.2	52,091.9	0.0	0.0
2	Capital Expenses	0.0	532.2	15.0	15.0	0.0	0.0
	Funds to Finance Expenditure:	0.0	41,110.5	48,259.3	52,107.0	0.0	0.0
	Health Insurance	0.0	2,353.9	3,311.9	3,948.8	0.0	0.0
	Operating Revenue	0.0	2,860.7	2,284.0	2,358.2	0.0	0.0
	Revenue from other activities	0.0	390.4	433.3	429.1	0.0	0.0
	Public Education Fund	0.0	0.0	0.0	0.0	0.0	0.0
	Budget	0.0	35,505.5	42,230.1	45,370.9	0.0	0.0
<b>IV.</b>	<b>Total GOM+Local Expenditure (II+III)</b>	<b>53,683.8</b>	<b>52,980.3</b>	<b>64,852.4</b>	<b>66,321.2</b>	<b>0.0</b>	<b>0.0</b>
<b>V.</b>	<b>Total Expenditure Financed by GOM (IV-I)</b>	<b>2,539.6</b>	<b>26,595.3</b>	<b>39,947.6</b>	<b>39,798.4</b>	<b>-40,518.6</b>	<b>-41,321.5</b>
	Percentage of Expenses financed by GOM (V/IV)	4.7%	50.2%	61.6%	60.0%	#DIV/0!	#DIV/0!

Source: Ulaanbaatar City

Figure 4.6.2 illustrates the municipal finance structure of Ulaanbaatar City. The total expenditure required by the city for 2005 was about Tg. 66 billion, 60%, of which or about Tg. 40 billion was financed by the Mongolian government.

**Figure 4.6.2 Municipal Finance Structure of Ulaanbaatar City**



Source: JICA Study Team

Table 4.6.4 illustrates the funding breakdown for project investments implemented within Ulaanbaatar City in 2006. Total investment was about Tg. 20 billion, about 58% (Tg. 11.6 billion) of which came from the Government of Mongolia and 42% (Tg. 8.4 billion) from local funds. However, of the latter, only 10% came from the local budget, and the rest was sourced from various reserve funds earmarked for specific purposes.

**Table 4.6.4 Funding Breakdown for Projects within Ulaanbaatar City (2006)**

	( Million MNT)	
<b>I. GOM Budget</b>		<b>%</b>
1. Line Ministries	4,651.2	23.3%
2. City Governor	5,000.0	25.0%
3. Deputy Premier	1,942.8	9.7%
Sub total	11,594.0	58.0%
<b>II. Local Budget</b>		
1. Capital from immovable assets	1,900.0	9.5%
2. Investment by Local budget	2,000.0	10.0%
3. Investment by Water Reserve Fund	200.0	1.0%
4. Investment by UB Fund	250.0	1.3%
5. Investment by UB Road Fund	4,032.0	20.2%
Sub total	8,382.0	42.0%
<b>Total</b>	<b>19,976.0</b>	<b>100.0%</b>

Source: Ulaanbaatar City

### 3) Municipal Finance Capacity of Ulaanbaatar City

The revenue size of the Government of Mongolia in 2005 was about 35% of the GDP, whereas that of the local governments combined was about 3.5% of the GDP. The total revenue of the local governments was about Tg. 78 billion in 2005 and that of Ulaanbaatar City was Tg. 38 billion which accounts for about 50% of the total revenue of the local governments. Table 4.6.5 shows the breakdown of revenues and expenditures of Ulaanbaatar City by district. The city's revenue accounts for 85% of the total revenue. There are about Tg. 1.4 billion grants given to various districts from the city, whereas it collects some revenue from other districts. The revenue to be collected for the state budget was set at about Tg. 1 billion for 2007, while it has been Tg. 14 - 15 billion in the past years, which however has become a heavy burden on the municipal finance of the city. Ulaanbaatar was successful in earmarking about Tg. 10 billion for 2007 from the revenue to be collected for the state budget which will be used to improve the city's roads.

**Table 4.6.5 Revenues and Expenditures of Ulaanbaatar City by District (2007)**

/thousand tugrugs/

No	District name	Budget revenue	Budget expenditure	Revenue to be collected from the district budget	Grants to the districts	Revenue to be collected to the state budget
1	City direct	35,082,902.2	33,501,794.1	0.0	0.0	
	a. Revenue	30,668,098.1	0.0	0.0	0.0	
	b. Transfer	4,414,804.1	0.0	0.0	0.0	
2	Bayangol	1,117,624.0	896,044.7	221,579.3	0.0	
3	Bayanzurkh	1,082,402.0	942,244.8	140,157.2	0.0	
4	Khan-Uul	850,393.3	850,393.3	0.0	0.0	
5	Sukhbaatar	1,085,745.4	848,940.5	236,804.9	0.0	
6	Chingeltei	1,056,482.0	826,781.9	229,700.1	0.0	
7	Songinokhairkhan	701,954.0	872,333.6	0.0	170,379.6	
8	Baganuur	214,139.9	534,641.7	0.0	320,501.8	
9	Nalaikh	115,786.0	568,435.8	0.0	452,649.8	
10	Bagakhangai	14,024.0	444,343.1	0.0	430,319.1	
	<b>Total</b>	<b>41,321,452.8</b>	<b>40,285,953.5</b>	<b>828,241.5</b>	<b>1,373,850.3</b>	<b>1,035,499.3</b>

Source: Ulaanbaatar City

The revenue size (the tax and the non-tax revenues) of Ulaanbaatar City in 2005 was 1.9% of its GRDP, which is far smaller than those of similar-size cities like Fukuoka and Sendai in Japan, which stood at 3.6% and 3.5%, respectively, in 2005. Meanwhile, the total property tax (12%) and personal income tax (19%) of Ulaanbaatar City for 2007 was 31% of its total revenue, as illustrated in Table 4.6.6.

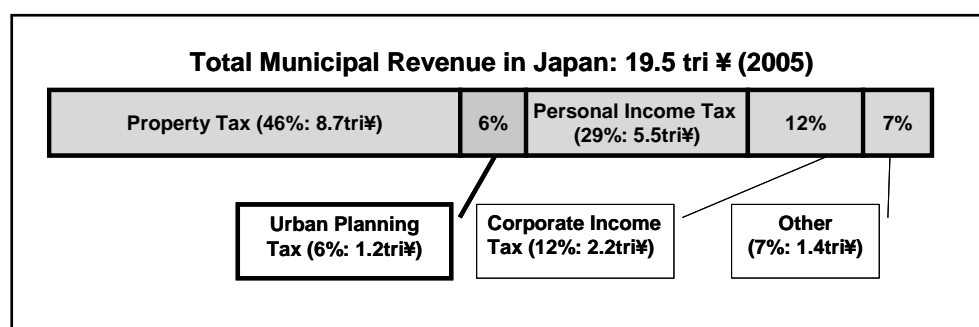
**Table 4.6.6 Municipal Revenue Sources of Ulaanbaatar City (2006 and 2007)**  
/thousand tugrugs/

No	Revenue type	2006		%	2007 draft
		Plan	Actual (expected)		
	<b>Total revenue and grants</b>	<b>39,858,178.5</b>	<b>40,518,599.4</b>		<b>41,321,452.8</b>
	<b>Total without transfer</b>	<b>33,861,947.8</b>	<b>34,522,368.7</b>	<b>100%</b>	<b>36,906,648.7</b>
1	Personal income tax	6,036,108.4	6,653,686.9	<b>19%</b>	2,954,101.7
2	Property taxes	3,983,618.9	3,983,820.3	<b>12%</b>	5,000,613.5
3	Taxes on goods and services	3,032,000.0	3,032,000.0	<b>9%</b>	3,212,000.0
4	Other taxes	11,744,522.4	11,746,610.1	<b>34%</b>	16,137,515.4
5	Non-tax revenue	6,424,204.1	6,685,234.5	<b>19%</b>	6,868,468.1
6	Revenue from transfers	5,996,230.7	5,996,230.7	<b>NA</b>	4,414,804.1
7	Capital revenue	2,641,494.0	2,421,016.9	<b>7%</b>	2,733,950.0

Source: Ulaanbaatar City

On the other hand, the breakdown of the municipal revenue in Figure 4.6.3 shows that the same revenue accounts for 75% of the municipal revenue of local governments in Japan, which hints at the potential of increasing the city's tax revenue base by increasing per-capita income levels and improving property-related tax mechanisms.

**Figure 4.6.3 Breakdown of Municipal Revenue in Japan**



Source: JICA Study Team

## 4.7 Worsening Traffic Congestion

### 1) Overview

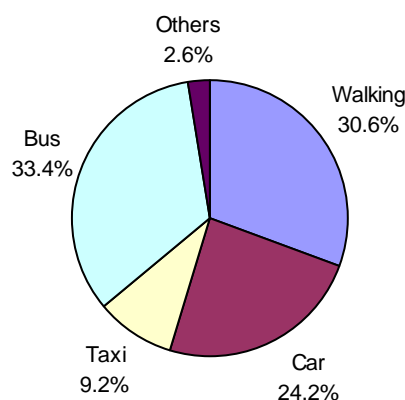
Current transportation demand in Ulaanbaatar City is estimated to be 3.4 million trips/day including walking or 2.3 million trips/day excluding walking. The demand is composed of walking (30.6%), car (24.2%), taxi (9.2%), bus (33.4%), and others (2.6%). When walking is excluded, the total demand is composed of car (34.5%), taxi (13.3%), bus (48.1%), and other vehicles (3.8%). The main purposes of transportation are “private,” “to work,” “to school,” and “business” (see Table 4.7.1, Figures 4.7.1 and 4.7.2).

**Table 4.7.1 Transportation Demand by Mode and Purpose**

Mode	No. of Trips by Purpose (000/day)							
	To Work	To School	Business	Private	To Home	Total	%	
Walking	85	127	16	357	446	1,031	30.6	-
Car	172	29	46	263	306	816	24.2	(34.8)
Taxi	55	15	12	89	140	311	9.2	(18.3)
Bus	211	130	25	260	501	1,127	33.4	(48.1)
Others	20	2	13	23	30	88	2.6	(3.8)
Total	543	303	112	992	1,423	3,373	100.0	-
%	16.1	9.0	3.3	29.4	42.2	100.0	-	-

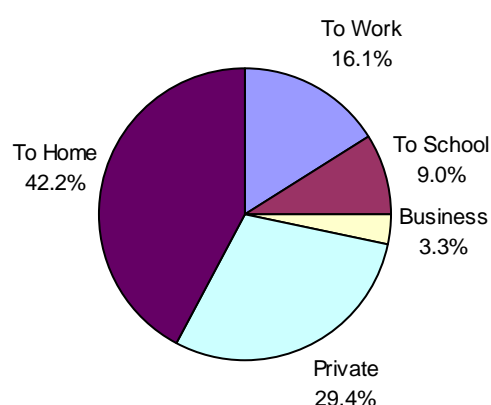
Source: Household Interview Survey, 2007, JICA Study Team

**Figure 4.7.1 Travel Demand by Transportation Mode**



Source: JICA Study Team

**Figure 4.7.2 Travel Demand by Purpose**



Source: JICA Study Team

The choices of transportation modes in the city are characterized as follows:

- Modal choice varies significantly among those not owning any vehicle, not owning a car, and owning one.
- The share of walking is high among households that do not own a vehicle or a car (36% and 34%, respectively) and those with car (20%).
- Dependence on cars is high among households with a car (49%), while low among those without a vehicle (11%). However, those without a car still use it to travel (32%).
- The use of public transportation is high among all households. Those without a



vehicle show the highest (52%), while even those with a car have a relatively high share (27%).

(v) The use of bicycles, motorcycles, and private buses, such as company or school buses, is not popular.

(vi) Taxis are commonly used by all households.

Road traffic has constantly increased due to the population growth and increase in vehicle numbers. During the period 1998 to 2007, traffic volume in the city center doubled, and in fringe areas, it sharply increased (see Figure 4.7.1). This also indicates a significant expansion of urban areas to the east, west, north, and south. Travel speeds of cars decrease d from about 40km/h to 25 - 30km/h on main roads, while those of buses declined from 25 - 30km/h to 20km/h and lower. In 2007, the number of registered vehicles in the city was only about 92,700 which is still low, although it increased by 11.6% between 2001 and 2007.

The results of the Household Interview Survey show that average travel time of “to work” trips of city residents is 32 minutes for a 4.5-kilometer distance. Compared to other cities in Asia, this is relatively long for Ulaanbaatar’s<sup>3</sup> size and therefore indicates inefficient connectivity between origin (residence) and destination (office) due in turn to fast-spreading urban areas and the lack of efficient transportation services.

The transportation sector in Ulaanbaatar City has been confronted with various problems and concerns. Although overall mobility and accessibility are tolerable to most people in the city, the situation will quickly worsen if urban population further increases, urban areas expand, and transportation demand intensifies without a corresponding provision of infrastructure and services. The city’s main problems and concerns on the current traffic/ transportation situation are as follows:

- (a) Increasing traffic congestion;
- (b) Decreasing level of safety and amenity of road transportation;
- (c) Unsatisfactory level of public transportation;
- (d) Low awareness of road users;
- (e) Lack of traffic management capacity; and
- (f) Deficient road transportation infrastructure/ facilities.

The causes of these problems are complex and interrelated, requiring both short-term and long-term attention, as well as an integrated approach covering infrastructure management and user awareness; transportation and land use; economic, social, and environmental aspects; and so on.

## **2) Analysis of Existing Traffic Congestion**

While traffic congestion is a common problem in most of the world’s medium to large cities -- although the situation and causes often differ -- there are still no universal indicators to aid a common understanding by all of what constitutes traffic congestion. However, the

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<sup>3</sup> For example, in Hanoi, Vietnam, which has a 3 million population, the average travel time of “to work” trips is about 20 minutes for 3.8 kilometers.

Study Team's analysis of traffic congestion in Ulaanbaatar has resulted in the following observations:

- (a) In general, the level of traffic congestion in the city is not so serious based on a number of indicators such as average travel speeds of vehicles on major roads (20 - 30 km/h), average travel time of "to work" trips (about 30 minutes) as well as the observation of the study team in comparison with other cities in Asia;
- (b) Traffic congestions are limited to certain sections during peak hours (morning, lunch time, and evening) and do not last long.
- (c) Traffic congestions are largely due to three (3) main factors, namely: (i) poor behavior of road users, including drivers and pedestrians, who often do not observe traffic rules, (ii) poor traffic control and management by enforcers, (iii) inefficient use of available engineering measures at intersections, to manage traffic lanes, etc.

While travel speed on roads, queue length at intersections, and volume-capacity ratio at road links are common indicators in urban transportation planning, the study also analyzed "average travel time of a trip" as an indicator of accessibility in the city regardless of the quantity and quality of infrastructure services. Results show that average distance of and time spent on a trip from an origin to a destination in the city are 29 minutes and 3.9km, respectively (see Table 4.7.2).

**Table 4.7.2 Accessibility of Urban Transportation in Ulaanbaatar City**

Trip purpose	Time (min)	Distance (km)	Mode	Time (min)	Distance (km)
To work	32	4.5	Walking	14	1.3
To school	27	3.3	Car	28	4.9
Business	32	4.3	Minibus	39	5.4
Private	26	3.6	Standard bus	43	5.4
To home	30	4.0	Taxi	27	3.4
Total	29	3.9	Total	29	3.9

Source: Household Interview Survey, 2007, JICA Study Team

As causes of traffic congestion in Ulaanbaatar City are relatively identical and not so serious (the city has only 70,000 vehicles), it is not so difficult to improve the situation through combinations of the following:

- (a) **Behavior Improvement of road users:** Traffic behavior of all road users, i.e. drivers, passengers, and pedestrians, is poor. Particularly cars and other vehicles are to be blamed for congestion in the city center and at main intersections which result in decreased traffic capacity. Low pedestrian awareness of traffic rules is the main cause of traffic accidents in which they are often the victims.
- (b) **Traffic Enforcement and Management:** Traffic is not properly controlled by enforcers due to a lack of personnel, operation techniques, and equipment /facilities. Simple traffic rules and measures are not observed and practiced. Control of roadside parking in the city center by designating alternative parking areas more clearly and/or charging adequate parking fees can be effective measures to achieve immediate improvement.
- (c) **Minor Infrastructure Improvement:** While the primary road network in the city is relatively adequate, it lacks articulation due to the lack of secondary roads as well as some missing links. Poor surface condition of roads as a result of inadequate maintenance also hampers traffic flow and the safety of vehicles and pedestrians. Poor

maintenance also contributes to economic and environmental costs of road traffic.

An analysis based on STRADA was conducted in the study indicates that the capacity of existing roads is underutilized and that it could be increased by as much as 20% by implementing the traffic management measures mentioned above and without putting in substantial funding. Therefore, if the city can formulate an effective mechanism based on this, costly infrastructure investments in the future can be avoided and higher economic returns can be generated (see Figures 4.7.3 and 4.7.4).

### **3) Future Prospects on Traffic Congestions**

The real threat of traffic congestion in the city will occur in the future and this may require fundamental policy interventions rather than short-term measures and symptomatic treatment. The combined impact of population growth, urban area expansion, and increased car ownership rates in the city is anticipated to be enormous. By 2030, the population is expected to have doubled, urban areas have expanded, and car ownership rates have increased from 20% of households to about 60%. The latter alone indicates that the number of cars will have increased six times the current level. An analysis of a “do nothing” scenario based on the “STRADA”<sup>4</sup> model also clearly indicates that traffic conditions by 2030 will be a nightmare unless strategic measures are implemented before then.

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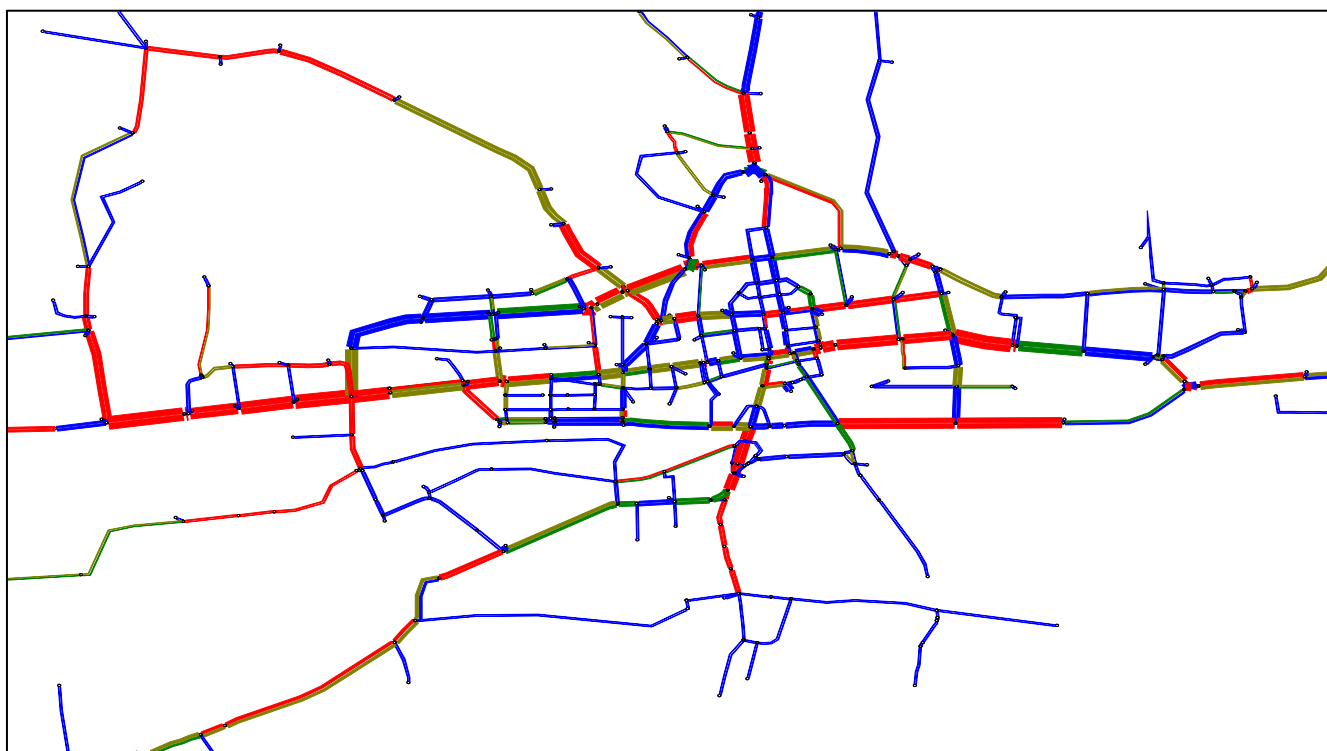
<sup>4</sup> The Study Team simulated the future traffic situation on roads under different scenarios using the STRADA model. The “Do nothing” scenario, meaning no projects are implemented, shows the traffic situation when future demand is assigned onto the existing road network.

**Figure 4.7.3 Assumed Traffic (2007) on Existing Road Network (Full Link Capacity)**



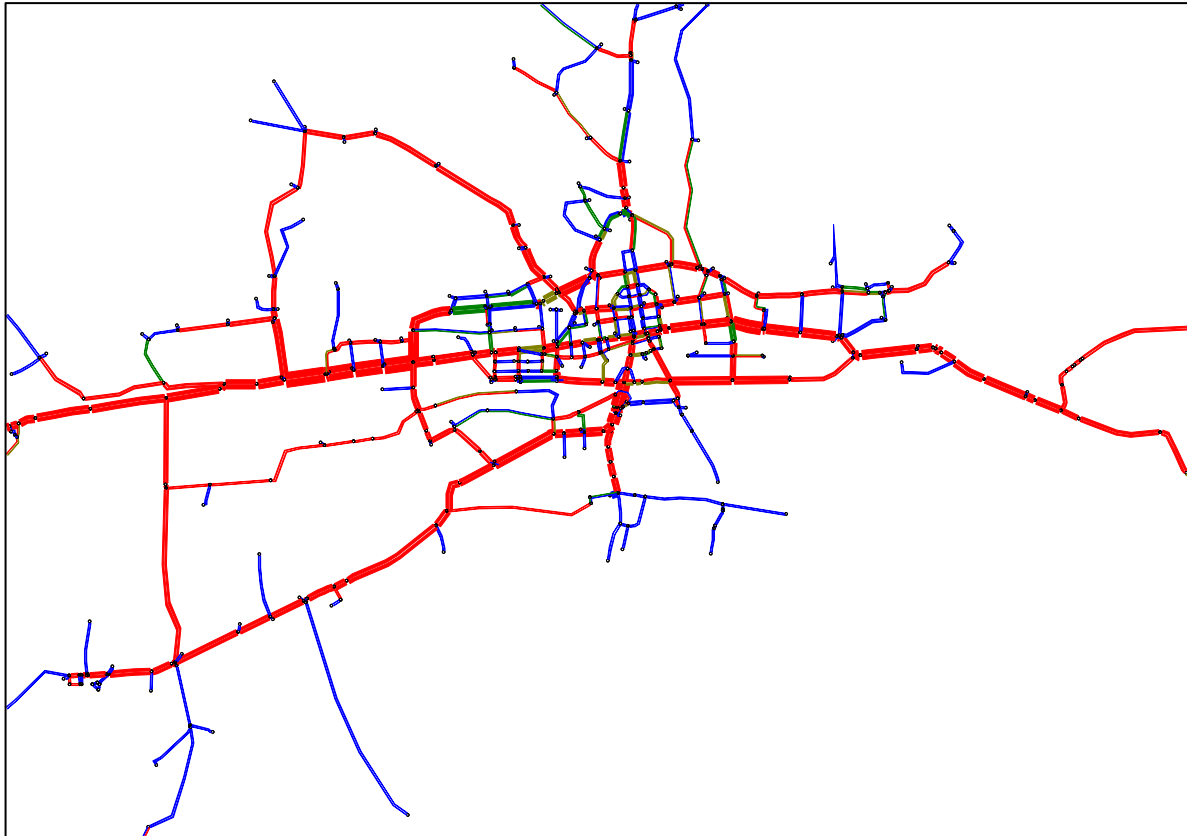
Source: JICA Study Team

**Figure 4.7.4 Assumed Traffic (2007) on Existing Road Network (80% of Link Capacity)**



Source: JICA Study Team

**Figure 4.7.5 Estimated Level of Traffic Congestion by 2030  
under a “Do Nothing” Scenario**



Source: JICA Study Team

Mitigating, if not removing, future traffic congestion in the city will be a big challenge and will require much more comprehensive and strategic interventions than relatively simple measures which are only effective in improving the current situation. The basic factors which affect traffic and congestion include the following:

- (i) Urban structure and land-use pattern, specifically the size of the urban area as well as the density of population and activities;
- (ii) Modal policy on public and private transportation, specifically the provision of mass transit system and management of car use; and
- (iii) Provision and management of transportation infrastructure, specifically road network development, traffic management measures, provision of parking and other transportation facilities.

Toward 2030, a critical planning issue will crop up and that is how to manage the city's growth vis-à-vis the role and impact of transportation. As explained in Section 6.4, the following two scenarios of growth pattern were tested:

- (i) Trend scenario assumes that the future urban area will grow more or less in accordance with the current trend; and
- (ii) Compact scenario assumes that the future expansion of urban areas will be controlled while the density of population and socio-economic activities will be guided.

The results of the analysis are the following (see Table 4.7.3):

- (i) Although the total number of trips/day will only double between 2007 and 2030, passenger-kilometers will increase by 3.3 times under the “trend scenario” and 2.7 times under the “compact scenario;”
- (ii) The average trip length of private transportation will increase between 2007 and 2030 from 5km to 7.2km under the “trend scenario” and 5.9km under the “compact scenario” due to prolonged trips as a result of urban area expansion.
- (iii) The reason the average trip length of public transportation will not increase is attributed to the assumption that mass transit routes have been developed thereby improving connectivity in the urban areas, especially under the “compact scenario” wherein future urban development is closely integrated with the development of mass transit lines.

An explicit conclusion from this simple analysis is that the development of compact urban areas with effective mass transit systems can contribute to the reduction in traffic congestion and savings in infrastructure provision.

**Table 4.7.3 Impact Analysis of Urban Growth on Transportation by Scenario**

		2007	2030 Scenario	
			Trend	Compact
No. of trips		1.0	2.0	2.0
Passenger-km		1.0	3.3	2.7
Average trip length (km)	Private transportation	5.0	7.2	5.9
	Public transportation	4.9	6.0	5.0

Source: JICA Study Team

## 4.8 Decrepit Urban Utilities

### 1) Water supply

#### (1) Water supply capacity

Water for Ulaanbaatar is supplied by the four (4) water sources of a) upper Source, b) central Source, c) industrial source and 4) meat factory, with a capacity of 145,500m<sup>3</sup>/day, according to Water Supply and Sewage Authority (USUG). Water is delivered by the network system of the city from the four (4) sources in a single zone system Table 4.8.5 shows water extraction capacity of USUG.

**Table 4.8.1 Water Supply Capacity of USUG**

Water source	Design capacity	Number of wells (Total number)	Number of wells (Daily working)	Working capacity per day: (1,000m <sup>3</sup> /day)	Supply zone
Upper	72,000	56	19	47,306	Upper part
Central	114,000	97	55	64,150	Central part
Industrial	40,000	16	11	22,200	Central part
Meat Factory	15,000	11	5	11,160	Central part
Total	241,000	180		144,816	

Source: USUG 2007, and National Committee for IHP, Mongolian National Case Study – Reference to Tuul River Basin, 2006, Ulaanbaatar, Table 16, p. 60.

In Ger Areas are not all connected to the central system, and supplied with water through water kiosks (pipe-connected or truck) or water trucks. There are 445 kiosks in Ger areas as of Nov. 2007, and 164 of which are connected to the central network and 60 trucks area used for water delivery to kiosks.<sup>1</sup>

#### (2) Water Consumption

According to USUG data, average water consumption of apartment dwellers was 285 liters per capita per day (lcpd) in 2007. The water consumption per capita is on the decreasing trend as shown in Table 4.8 from 450 liter/day in 1998. If the amount of 87,000 m<sup>3</sup>/day of water is divided by the total apartment dwellers in 2007, the average water consumption would be around 226 liters/day.

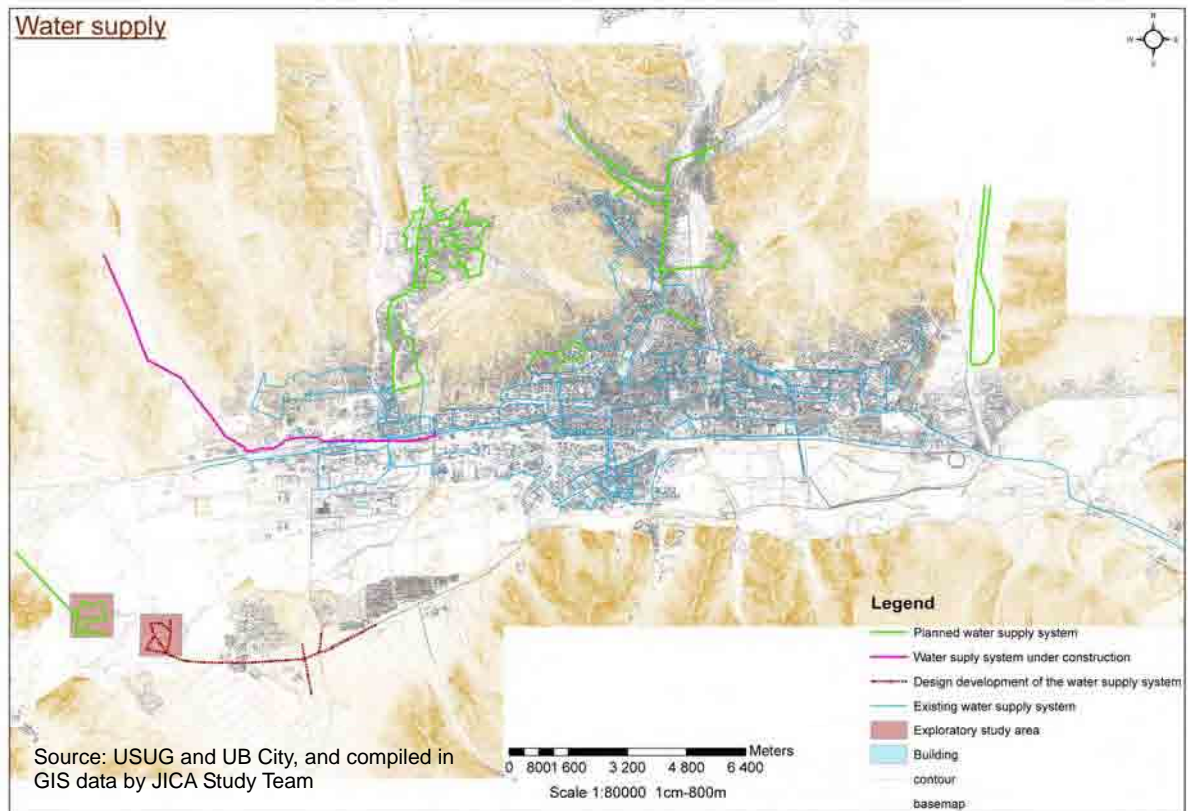
On the other hand, Ger area dwellers consume on average only 7.2 liters (7.8 lcpd for pipe connected kiosks, 6.9 lcpd for trucked kiosk) in 2007 according to USUG data.

As for the difference of water consumption between metered and un-metered consumers, water consumption of households with meter is around 290 lcpd while that of households without meter is assumed to consume 230 lcpd.<sup>2</sup> Individually-metered households consumes only 124.9 lcpd. In 2007 according to Housing and Communal Service Authority in Mongolia (OSNAUG).

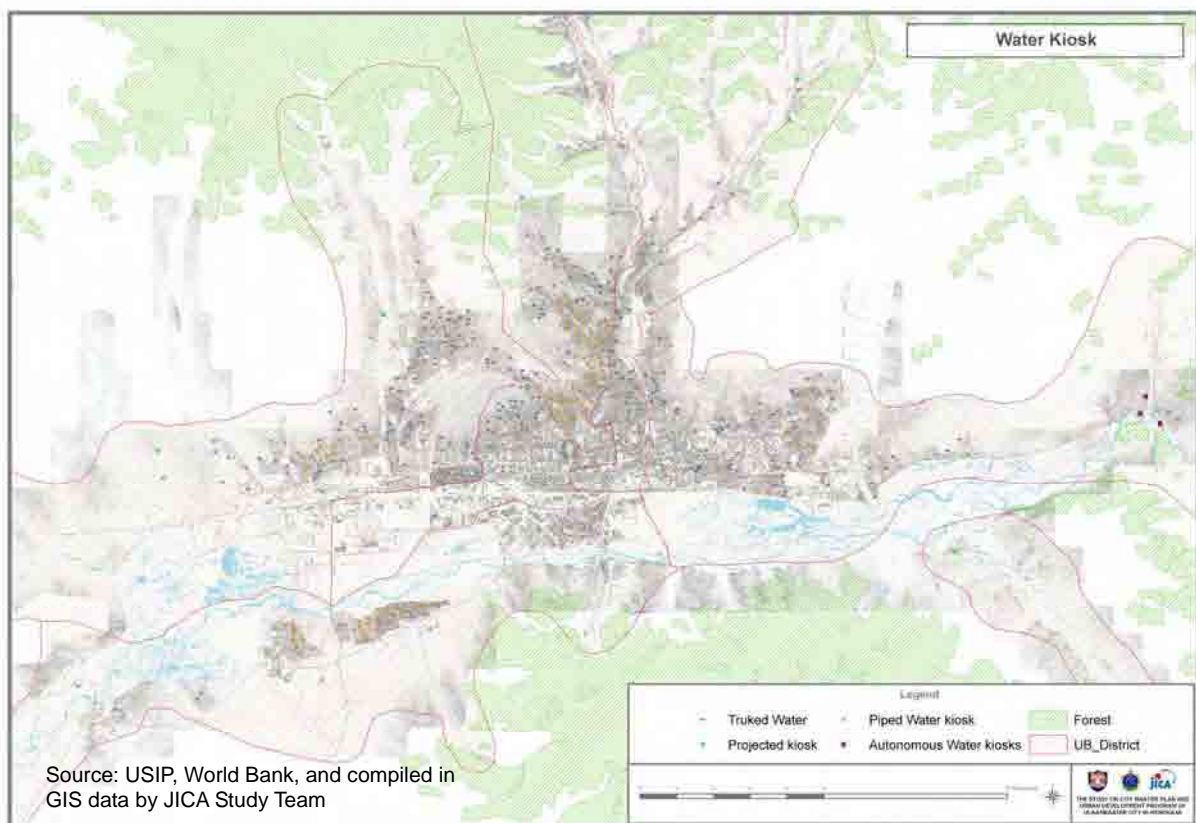
<sup>1</sup> USUG

<sup>2</sup> Water consumption per capita, according to USNAAG, is a little different from USUG's data with 309.7 lcpd in 2007 and 303.3 lcpd in 2006.

**Figure 4.8.1 Water Supply Network**



**Figure 4.8.2 Distribution of Water Kiosks**





**Table 4.8.2 Water Consumption**

	Unit	2003	2004	2005	2006	2007
<b>Water Consumption</b>						
Total water supplied	m <sup>3</sup> /d	159,993	156,729	157,424	156,406	154,461
Total water consumed	m <sup>3</sup> /d	110,259	115,632	117,309	110,442	115,524
(1) Apartment	m <sup>3</sup> /d	79,647	84,400.4	87,758	79,380	87,374
(2) Ger area	m <sup>3</sup> /d	2,539	2,567	3,156	3,256	3,220
(3) Private enterprises	m <sup>3</sup> /d	9,440	10,486	10,569	10,928	11,178
(4) Public institutions	m <sup>3</sup> /d	11,867	11,344	8,826	7,470	7,388
(5) Industrial factories	m <sup>3</sup> /d	6,766	6,834.6	7,000	9,408	6,364
(6) Leakage	m <sup>3</sup> /d	49,734	41,097	40,115	45,964	38,937
<b>Per capita consumption</b>						
Ger area (piped kiosk)	liter/d	6.40	6.80	7.00	7.40	7.80
Ger Area (trucked kiosk)	liter/d	5.80	5.40	6.30	7.30	6.90
Ger area average	liter/d	5.67	5.73	6.21	7.27	7.20
Apartment	liter/d	320.9	309.4	286	291.3	285

Source: USUG

**Table 4.8.3 Per Capita Water Consumption**

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Litter/day	450	431	358	318	287	319.9	309.4	286	291.3	285

Source: USUG

### (3) Water Metering

According to OSNAAUG, in 2007, 4,098 meters were installed to apartment buildings, some of which are to individual households, which accounts for around 18% of the households.

Households of recently built apartments are installed water meter individually. According to USUG, more 54,600 households need to be installed meters. This is expected to reduce water consumption.

**Table 4.8.4 Water Meter Installation Situation**

	2003	2004	2005	2006	2007
Total number of metering	2,570	2,960	3,129	3,734	4,098
Apartment buildings	1,273	1,528	1,691	1,952	3,802
Apartment households	81,428	77,200	74,585	77,604	77,020

Source: OSNAAUG

#### **(4) Water Leakage**

The pipeline network of the central water supply system was built around 1958. Since then, the system has been improved and expanded. Accordingly, the water supply system is old and water leakage is a big problem for the water supply system. Unaccounted water accounts for 29% for USUG and 27% for OSNAAUG and 37% for Ulaanbaatar as a whole<sup>3</sup>, and leakage of water is around 16~17%<sup>4</sup>. UBMP-2020 pointed out that 30% of water distributed to residential apartments leaked due to incomplete plumbing equipment.<sup>5</sup> Water leakage was found on water distribution pipes of a diameter from 150 to 800mm of steel pipes which were constructed more than 48 years ago.<sup>6</sup>

#### **(5) Water Tariff**

Water tariff (sales price) of drinking water for apartment is 0.3 Tg/l, and 1.0 Tg/l for water kiosk, according to USUG. It costs about 3.8 Tg/l to deliver water to kiosk by trucks. According to Water Authority, USUG's water tariff covers only delivery cost but not water production cost. The tariff structure means that the consumers are subsidized.

#### **(6) Problems and Countermeasures**

In water supply, major problems were identified as follows:

- The facilities and equipments for water supply are partly old so efficiency of water distribution is low. Repair and improvement of these old facilities including network pipes are necessary.
- The existing supply water capacity is not sufficient enough to meet the future demand. Another new supply source should be developed, for which a study should be done.
- In respect with the demand side management of water, to conserve water consumption, more metering should be installed and the water tariff structure should be reviewed to improve the financial management of the water supply related organizations at a sustainable level.
- Most of Ger areas are not connected to the central water supply system. Water is supplied by water kiosks or water trucks. To improve the situation, it is required to expand the connection with "communal water dispensary stations" or "water kiosks". This should be developed on a community-basis. For Ger areas away from the central network, development of more water kiosks needs to be developed.

### **2) Waste water treatment**

#### **(1) Central Waste Water Treatment Plant**

In Ulaanbaatar City, there is Central Wastewater Treatment Plant (CWWTP), located 17km from downtown Ulaanbaatar. CWWTP was built in 1964 and upgraded with a primary stage in 1968. A biological treatment unit was added in 1978 and extended in 1987.

CWWTP's design capacity is around 230,000m<sup>3</sup>/day. According to the Water and Wastewater Plan, the plant is operated over its maximum hydraulic capacity during peak hours and due to the bad design of the secondary clarification, its performance level is below average, with the estimated capacity at 177,500m<sup>3</sup>/day.<sup>7</sup>

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<sup>3</sup> World Bank report Infra, p.238

<sup>4</sup> According to USUG officer

<sup>5</sup> UBMP-2020, Vol. 4.

<sup>6</sup> JICA Grant report, p.29

<sup>7</sup> Water and Wastewater Master Plan, Section 6, p. 12.

## (2) Treated Waste Water

Actual amount of treated by the CWWTP is as shown in the table below. Averagely, Averagely 152,000~155,000 m<sup>3</sup>/day is treated out of which about 125,000 m<sup>3</sup>/day from apartment.

**Table 4.8.5 Waster Water Treated**

	Unit	2003	2004	2005	2006	2007
Daily average amount	m <sup>3</sup> /d	156,914.7	154,450.8	152,700.9	152,082.7	152,563.4

Source: USUG

## (3) Decrepit Network

The network is a 158km discharge sewer system<sup>8</sup>, and 110km of pipelines has been used since 1959.<sup>9</sup> Piping materials are various like ceramic, iron and concrete, cast iron, and asbestos cement; and because of long time of usage, pipes suffer from clogging, damage and breakage, which decrease flow capacity of sewers. Therefore the sewer network needs to improve the flow capacity of pipes.

## (4) Industrial Wastewater Treatment

Industrial waste water is also treated by the CWWTP. In 2007, 302 industrial factories are treated their waste water by the CWWTP with a total of 6,300 m<sup>3</sup>/day.

**Table 4.8.6 Treatment of Industrial Waste Water**

	Unit	2003	2004	2005	2006	2007
Industrial factories	No.	270	277	317	271	302
Amount of waste Water	m <sup>3</sup> /d	6,350	6,767	6,931	9,315	6,301

Source: USUG

Khargia Industrial Waste Water Treatment Plant (WWTP) is privately run by the Khargia Company in the Leather Association Industrial Park in Ulaanbaatar's central industrial zone. The plant was established in 1975, with a capacity of 13,800m<sup>3</sup>/day, and later was privatized. With the outdated facilities and poor maintenance over more than 30 years of use, this system does not function well. The wastewater from the plant has high contents of chromium and other heavy metals; chemical oxygen demand and ammoniums are treated at the CWWTP. In addition, some recent studies have illustrated that the CWWTP is only about 40 to 50% effective in cleaning the sewage.<sup>10</sup>

Tanneries at Tolgoit do not have any pre-treatment facility, and they discharge directly to the CWWTP system or dumped as sludge illegally, which causes serious soil and groundwater pollution.

## (5) Sanitation in Ger Area

According to a study by State Professional Inspection Agency in Ulaanbaatar in 2003, there were 67,000 Ger area plots on which 84,000 households lived. Out of them, 14% of plots did not have any latrine; 59% of latrines did not meet required sanitary standards; and 34% of the plots were without soak pits. Open soak pits, some one-meter deep are frequently used for disposing grey water.

There are estimated to be about 72,000 latrines in Ulaanbaatar City. These pits are

<sup>8</sup> The World Bank, p. 241

<sup>9</sup> Vol. 1, UBMP-2020.

<sup>10</sup> ADB, Mongolia Urban Development and Housing Sector Strategy, Vol. 1, May 2005, p. 49. And untreated industrial wastewater which contains Cr6 (Sulphit) flows into the CWWTP and destroy the bacteria resulting in declining the treatment level.

constructed by the residents themselves, and are closed once they are filled, usually, after three (3) to five (5) years of use. As a result, in longer-established Ger areas, spaces for latrines have been exhausted.

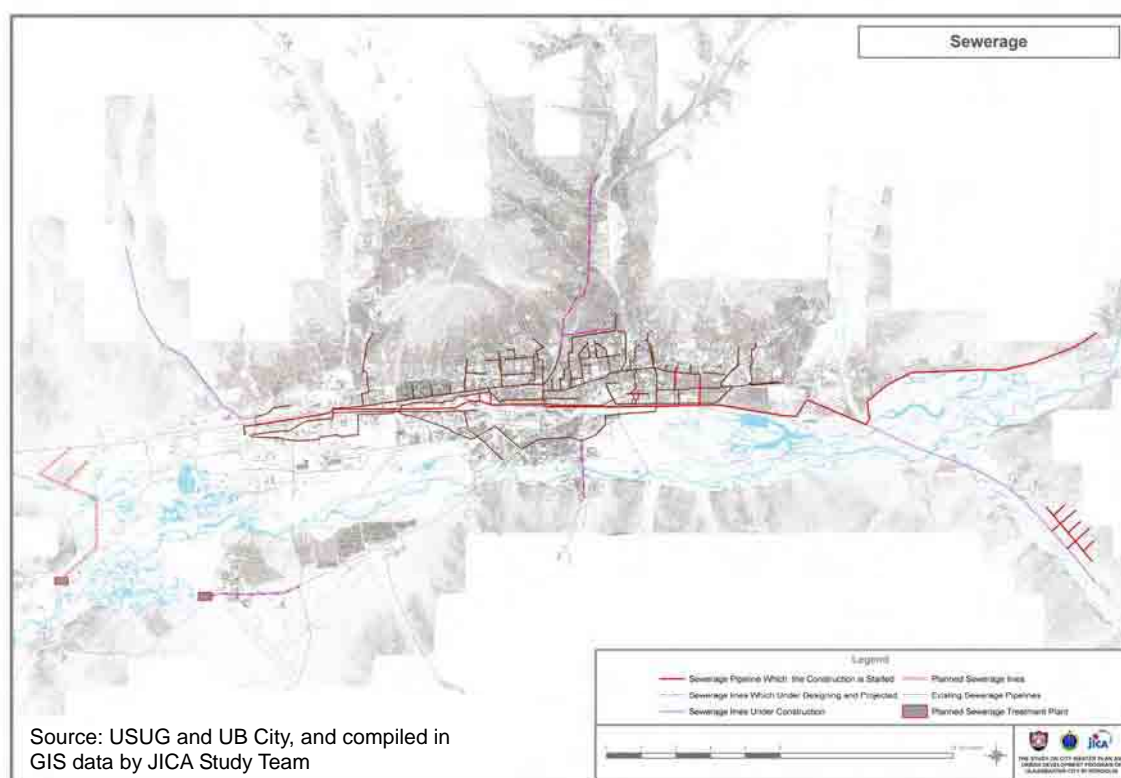
Such latrine condition in Ger area causes bad sanitary conditions, odor and the proliferation of flies and groundwater contamination.

## (6) Major Problems and Countermeasures

Major problems and conceivable countermeasures are described as follows:

- (i) The Central Wastewater Treatment Plants does not work effectively, less than the designed capacity, and to cope with the future demand, capacity should be expanded by construction of new treatment plants and/or expansion of the existing plants.
- (ii) The sewage network pipes have been used for years; accordingly they are to some extent clogged and damaged, resulting in a reducing capacity. Therefore, such less effective pipes should be repaired or replaced.
- (iii) Industrial wastewater is not treated properly. Khargia Industrial Wastewater Treatment Plant does not function well, through which un-treated industrial wastewater from tanneries flow into the CWWTP. Some industries without their treatment facilities discharge their untreated wastewater directly into the Tuul River or directly flow into the central sewer system. The central sewer plant does not have enough capacity to treat industrial wastewater, so that untreated water from the sewer plant aggravates river water quality.
- (iv) Most of Ger areas are not connected to the central sewage system; many of them use pit latrines which cause soil and water contamination. In Ger areas, it is necessary to introduce a sanitation system which treats wastewater of either individual households or groups of households.

**Figure 4.8.3 Sewage Network**



### 3) Power supply

#### (1) Power Supply Capacity and Load

Ulaanbaatar City is included in the power supply grid of the Central Electricity System. Thermal Power Stations No.2 (TPS-2), No.3 (TPS-3), and No.4 (TPS-4) are the main power source for Ulaanbaatar city. Table 4.8.1 shows the list of power supply capacity in each power station.

**Table 4.8.7 Power Supply Capacity**

Name	Design capacity (MWt)	Working capacity (MWt)	Construction Year	Name of Company
Ulaanbaatar Thermal Power Station -2	21.5*	17.6	1961 – 1969	“Thermal Power Station -2”
Ulaanbaatar Thermal Power Station -3	148.0	105.1	1968 – 1982	“Thermal Power Station -3”
Ulaanbaatar Thermal Power Station -4	540.0	432.0	1983 – 1991	“Thermal Power Station -4”
<b>Sub-total</b>	<b>709.5</b>	<b>554.7</b>		
Darkhan Thermal Power Station	48.0	38.6	1966, 1986	“Darkhan Thermal Power Station ”
Erdenet Thermal Power Station	28.8*	21.0	1987 - 1989	“Erdenet Thermal Power Station ”
<b>Total</b>	<b>786.3</b>	<b>614.3</b>		

Source: Ministry of Fuel and Energy

**Table 4.8.8 Power Consumption**

Items	Unit	2003	2004	2005	2006	2007
<b>Yearly Total Distributed</b>	Mil. kWh	1,022	1,079	1,154	1,215	1,321
<b>1. Yearly Total consumption</b>	Mil. kWh	686	748	823	906	1,016
-Entities	Mil. kWh	469	513	561	616	683
-Ger area	Mil. kWh	93	104	124	148	181
-Apartment area	Mil. kWh	124	131	139	143	153
<b>2. Loss</b>	Mil. kWh	336	331	331	308	305
<b>Yearly Electricity loss</b>	%	32.9%	30.6%	28.7%	25.4%	23.1%
<b>3. Domestic consumption</b>	Mil. kWh	1.40	1.40	1.10	1.00	1.00
<b>Yearly consumption per household</b>						
Ger area per household	kWh	1,447	1,440	1,628	1,804	1,860
Apartment area	kWh	2,042	2,026	2,061	2,086	2,102
Ratio (Apartment - Ger)		0.71	0.71	0.79	0.86	0.89
<b>Average Load</b>	mW		195.5	216.8	226.7	248

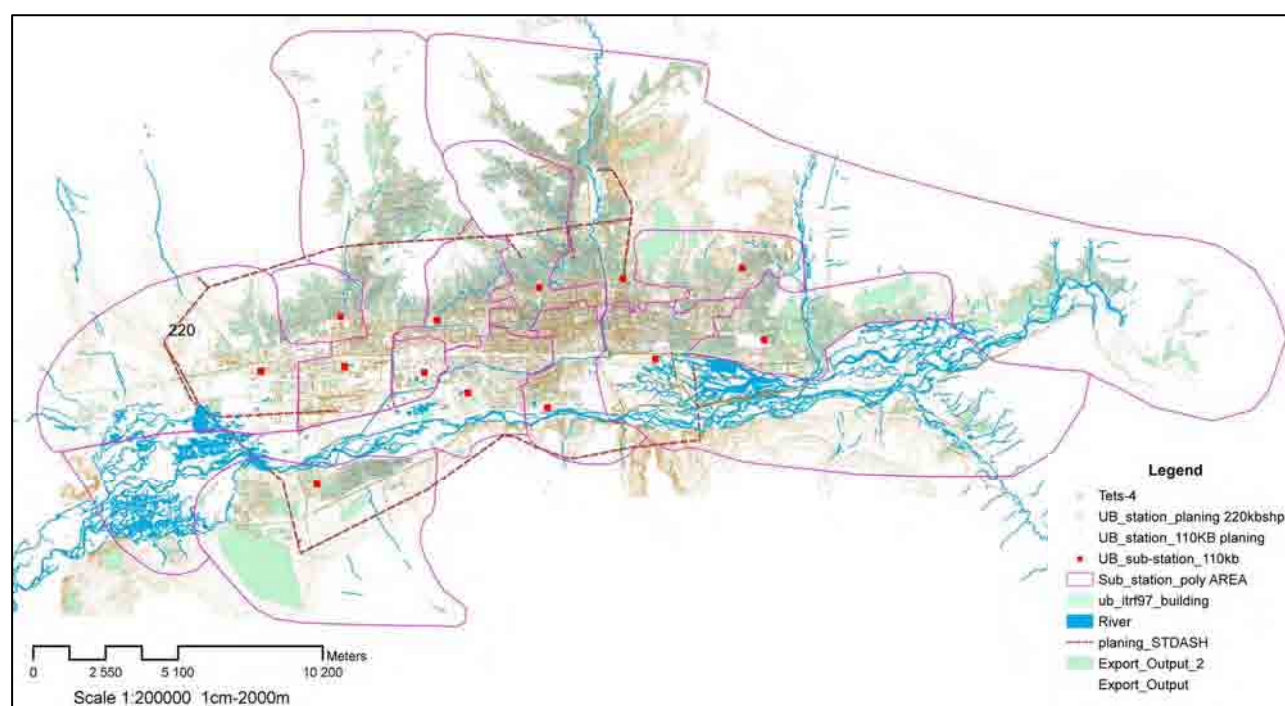
Source: UB Electricity Distribution Company

**Table 4.8.9 Sub-stations in Ulaanbaatar City**

Number of the region	Name of the sub stations	Voltage level (kV)	Start-up date
I	Naliakh	110/35/10	1990
II	Amgalan	110/10	1989
III	Tuul	110/35/10	1979
IV	Southern	110/10/6	1980
V	Thermo Power Plant-3	110/35/6	1967-1973
VI	Yarmag	110/35/10	1987
VII	Ulaanhuaran	110/10	1991
VIII	Dornod-2	110/35/10	1988
IX	Northern	110/10/6	1985
X	Western	110/10	1982
XI	Geo	110/10/10	1988
XII	Treatment	110/35/10	1993
XIII	Industry	110/10/6	1986
XIV	Thermo Power Plant-2	35/6	1964
XV	Central	110/6	1983
XVI	City	110/6	1986

Source: UB Power Distribution Co.

**Figure 4.8.4 Location of Sub-stations**



Source: UB Power Distribution Company and UB City, and compiled in GIS data by JICA Study Team

## (2) Power Consumption and Energy Loss

These power stations are coal-based and operate at efficiency levels below international standards.<sup>11</sup> As shown in the Table 4.8.10, the Central Electricity System suffers from huge electricity losses including transmission and distribution losses accounting for more than 23.1% of the power in 2007.

**Table 4.8.10 Electricity Consumption of Ulaanbaatar**

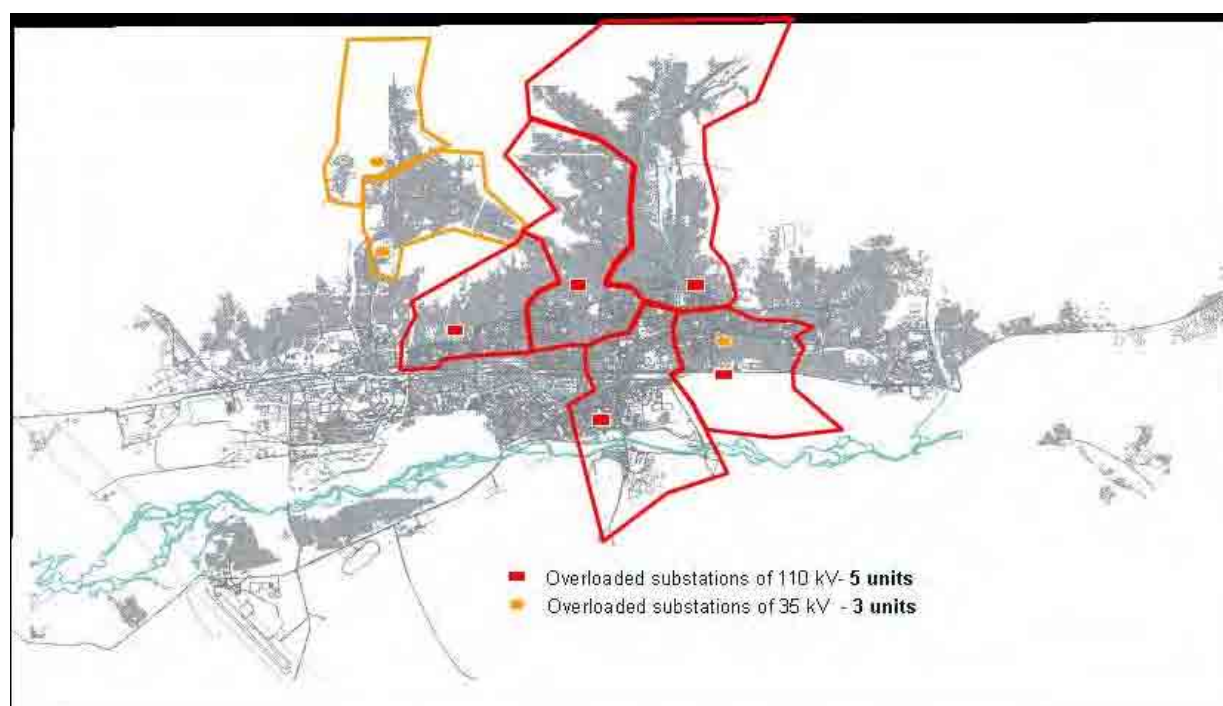
Indicator	Unit	2003	2004	2005	2006	2007
1.Total distribution electricity	GWh	1,022.1	1,079.0	1,154.2	1,214.7	1,320.8
2.Total consumption	GWh	686.0	748.4	823.1	906.3	1,016.2
	%					
3. Electricity loss	GWh	336.1	330.6	331.1	308.4	333.5
	%	32.9	30.6	28.7	25.4	23.1
Of which	GWh	156.4	180.2	152.3	139.7	
Distribution loss	%	15.3	16.7	13.2	11.5	
4. Domestic consumption	GWh	1.40	1.40	1.10	1.00	1.00

Source: Electric Transmission Network of Central Region Co. Ltd.

## (3) Overloaded Substations

Although power supply is sufficient as a whole, recently many in-migrants have pushed up consumption and it causes overload of sub-stations in some areas of Ulaanbaatar City<sup>12</sup>. In Ulaanbaatar City, as shown in Figure 4.8.1, eight (8) sub-stations, which are five (5) units of 11kV sub-stations and three (3) units of 35kV sub-stations, are overloaded in the five (5) service zones.

**Figure 4.8.5 Overloaded Substations in Ulaanbaatar**



Source: Electricity Transmission Network of Central Region Co. Ltd.

<sup>11</sup> The coal-fired power plants consume an estimated about 400 grams of coal equivalent (gce)/kWh of electricity compared with the international standards of 316 gce per kWh, referred from The World Bank, Infrastructure in Mongolia, p. 103.

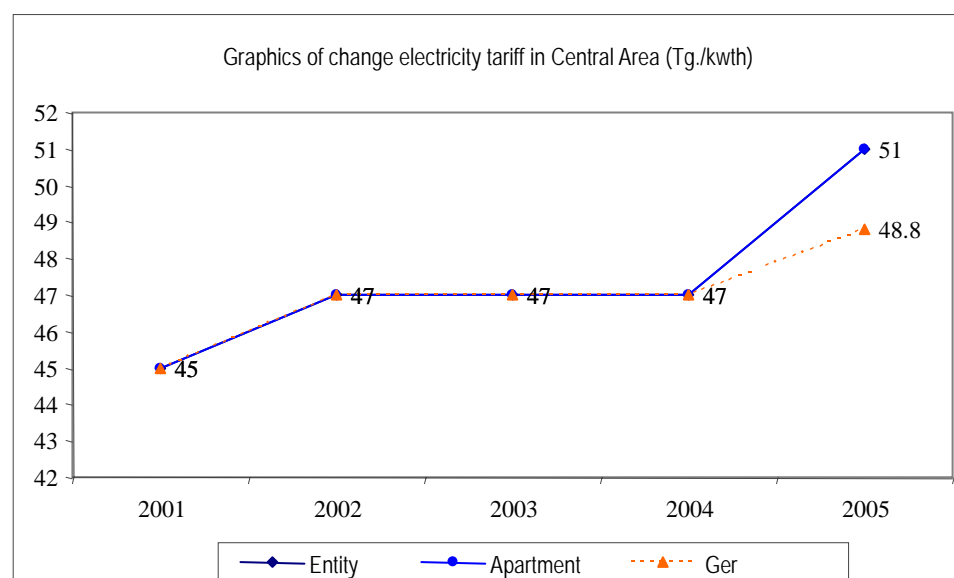
<sup>12</sup> Council of Ulaanbaatar Region, "Ulaanbaatar Region Development Program 2006-2015," 2006, UB City, p.26.

#### (4) Financial Viability

As a whole, the Central Electricity System (CES) has net losses for the past five (5) years according to the World Bank estimates. One of the preventive factors is a low level tariff, which is around Tg. 50 per kWh in 2005.

Average unit revenues (in Tg./kWh) for typical costumers in Ulaanbaatar City suggest that 60% tariff raise for residential customers 10-30% for industrial and commercial customers is necessary to reflect the cost in tariff levels.<sup>13</sup>

**Figure 4.8.6 Electricity Tariff in Central Area**



Source: Ministry of Fuel and Energy

#### (5) Problems and Countermeasures

As shown above, in terms of supply and demand balance in the power supply sector, problems and measures are summarized as follows:

- (i) The coal-based power stations are relatively inefficient, thereby requiring renovation.
- (ii) Technical losses such as transmission and distribution losses are large accounting for about 25% of the distributed electricity.
- (iii) There are overloaded sub-stations because of the recent rapid immigration which overloads the power system in some areas. This is caused by the power demand of the many in-migrants settling on the outward expanding Ger areas. Therefore, the land management of settlement of those in-migrants should be well conducted in accordance with the power supply capacity.
- (iv) The existing power supply capacity is not enough to meet future demand, and it is necessary to establish a new power source.
- (v) In order to maintain the balance of supply and demand, not only the expansion of supply side, but also the demand side management is important. To this end, metering and improvement of tariff structure is needed.

<sup>13</sup> The World Bank, p. 108, originally referred from ECA 2005.



#### 4) District Heating

##### (1) Heating Service

As of today, 83% of all buildings and structures of Ulaanbaatar City is supplied by thermal power by central heating supply system and the rest is supplied by water-heating boilers.

Heating supply system of Ulaanbaatar City has main duty to supply industrial, housing, social and public buildings by heating and also provides needed hot water and heating demand of air ventilation. The system supplies: heating (50.7%), hot water (29.1%), and hot steam (air vent) (20.2%).

##### (2) Heating Capacity

The central heating supply system of Ulaanbaatar City supplies approximately 4,500 buildings and structures with 1,448.7Gcal/h of heating capacity through 282.4km heating central pipeline with diameter of 150-1200mm, nearly 420km distribution pipelines, eight (8) pump stations by thermal power produced at three (3) Thermal Power Stations, i.e. TPS-2, TPS-3 and TPS-4.

TPS-2, TPS-3 and TPS-4 supply 3.5%, 32.5% and 64% of the total heating, respectively. Table 4.8.4 shows heating supply capacity in TPS-2, 3 and 4 and Figure 4.8.4 shows heating service network.

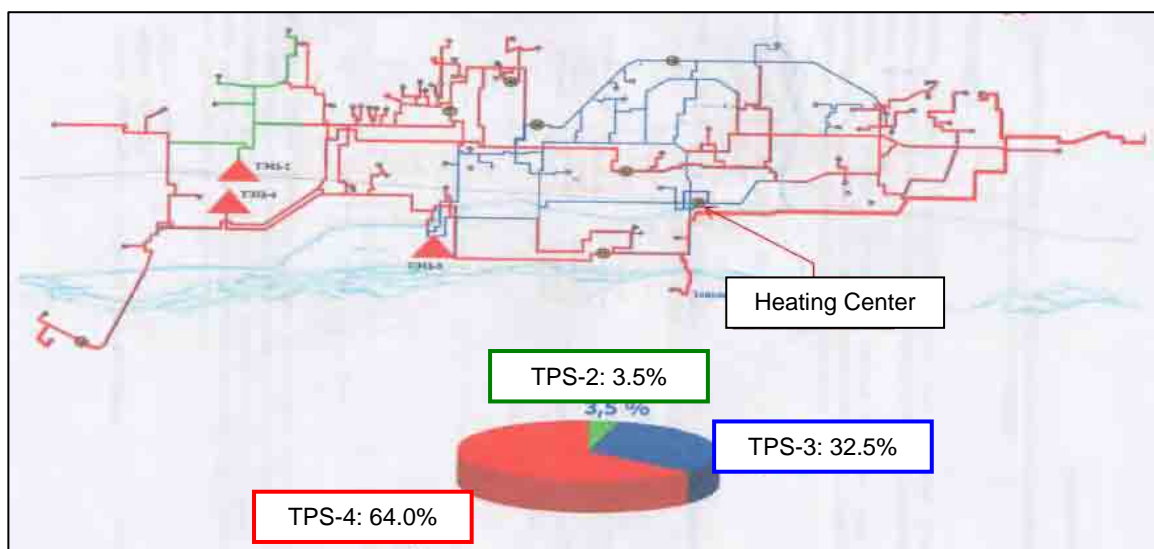
**Table 4.8.11 Heating Supply Capacity of TPS-2, 3 and 4**

(Unit: Gcal/h)

Name	Capacity		Amount Connected to the Central Heating System			
	Installed Capacity	Operational Capacity	Heating of Apartment Housing	Water Heating	Air Vent Heating	Total
UB TPS-2	36.1	31	-	-	-	27
UB TPS-3	552	518	-	-	-	496
UB TPS-4	1107	1045	-	-	-	925.7
Total	1,695.1	1,594	734.5	421.5	292.7	1,448.7

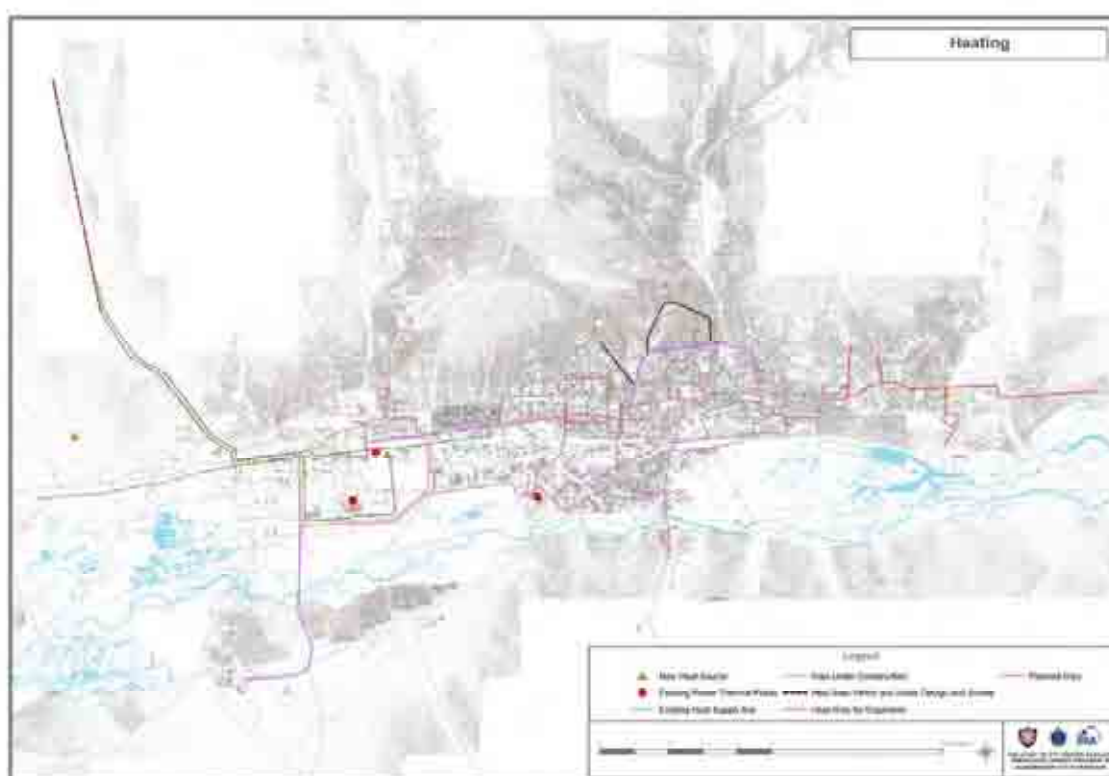
Source: Ulaanbaatar Heating Network co. Ltd. (UBHN)

**Figure 4.8.7 Thermal Power Stations and Heating Service Network**



Source: UBHN Co. Ltd.

**Figure 4.8.8 Heating Service Network**



Source: UB City, and compiled in GIS data by JICA Study Team

### **(3) Heating Network**

Heating network facility of Ulaanbaatar City has the equipment such as 286km heating central pipeline. 74km of all pipelines or 26% has been put into exploitation before 1977 and has been used for more than 30 years. 16.2% or 46.6km pipeline has been used for more than 40 years and their operating life has finished. Also, some pipelines are damaged many times and have corruptions from the external and internal sides although their operating life has not finished yet. Because distribution of thermal water aggravates corruptions. The pipelines that cannot be used anymore account for 21% of the total pipelines.

### **(4) Heating Loss**

Heating pipelines are old and this causes inefficient distribution of heating to end users. According to UBMP-2020, leakage of hot water during distribution accounted for 231,000Gcal (7.2%) of a total of 3.211 million Gcal in 1998.<sup>14</sup> UBHN Co. Ltd. conducts a test of heat-distribution losses every five (5) years, and the test result reveals that heat-distribution losses are 5 to 8 % on average, although results vary from main pipeline to another.

Looking at the national balance of heating supply, about 3% is lost during distribution. Also, compared with the standard norm of heating loss of pipelines of 5%, about 15-18% of heat was lost when distributed because of deteriorated insulation materials of pipelines.<sup>15</sup>

Ulaanbaatar City suffers from heat transmission losses and network losses accounting for

<sup>14</sup> Table 4.2.8, Vol.1, UBMP-2020

<sup>15</sup> Vol.1, UBMP-2020, p.119.

a 19.3% of the total heat produced, with 747Tcal losses out of 3,872Tcal. Furthermore, apartment dwellers as end users lose their heat by 36%.<sup>16</sup> Therefore, not only improvement of heat transmission and network, but housing should be improved to hold heating more efficiently.

**Table 4.8.12 Heating Network Pipes**

No.	Heating pipeline type	Year of utilization	Length (m)	Diameter (mm)
1	1-a, b, c, d,e,2-a, b,c, 4-b	1959	10,918	2 Ø 200-500
2	4-a	1960	1,226	2 Ø 200-500
3	2-d, e	1961	1,398	2 Ø 200
4	3-c	1964	900	2 Ø 400
5	6-f	1966	1,910	2 Ø 250-400
6	3-b,c,d 6-k 5-a,b 9-a,e, f	1968	11,359	2 Ø 400-700
7	5-d,e	1969	3,110	2 Ø 500
8	5-h	1974	2,139	2 Ø 250-800
9	6-a, b,c,d,e,f,g,h	1977	6,878	2 Ø 300-600
10	13-a,b	1972	6,900	2 Ø 250-400
11	7-h	1979	4,506	2 Ø 800
12	9-b, c,d, 6-k	1978	3,622	2 Ø 400
13	7-c,d,e	1980	5,931	2 Ø 400-500
14	10-c,d,e	1981	3,750	2 Ø 800
15	10-a,b	1982	5,198	2 Ø 800-1000
16	11-a,b	1983	7,116	2 Ø 1200
17	9-a, 11-c,d	1985	8,092	2 Ø 700-1000
18	11-d,h	1986	1,710	2 Ø 400-1000
19	Treatment plant	1987	2,000	2 Ø 300
20	9-h, 12-a, b, 11-HTC-8, 11 <sup>th</sup> and 21 <sup>st</sup> Khoroos, junction 3-a	1988	11,019	2 Ø 500-700
21	11-f	1989	1,823	2 Ø 500 / 300
22	Zaisan	1990	1,569	Ø 300
23	13-a,b	1993	5,500	2 Ø 350
24	8-d,e	1997	3,560	Ø 350-400
25	Pipeline of 7A, 10B /1000	2004	6,150	1 Ø 1000

Source: UBHN Co. Ltd.

**Figure 4.8.9 District Heating Balance in Ulaanbaatar**

Heat Purchase 3,872 Tcal (100%)	UB DHC 3,679 (95%)	Public & Commercial Customers 1,471Tcal (40%)	Public & Commercial End users 1,236 Tcal (84%)	
			Network losses 235 Tcal (16%)	
		Group substations (DHW + SH) 2,207(60%)	Apartment Entrance 1,889 Tcal (70%)	Apartment End users 1,200 Tcal (64%)
			Network losses 318 Tcal (30%)	Open Window Losses & DHW Energy Losses 689 Tcal (36%)
	Heat transmission losses 194Tcal (5%)			

Source: World Bank, "Foundation for Sustainable Development: Rethinking the Delivery of Infrastructure Services in Mongolia, June 2007, Figure 14, p. 105, original source is Kalkum 2006.

<sup>16</sup> World Bank, 2006, p. 105, original source is Kaljum 2006.

There two (2) main reasons for the losses of heat during distribution. Firstly, many of the pipes in the distribution network are old and corroded; secondly, the lack of metering for the consumption of hot water has lessened incentives for energy and water conservation, which leads to commercial losses.<sup>17</sup>

#### **(5) Financial Viability**

Heat is produced for 8,000 Tg /Gcal at Power stations, and sold to District Heating Center for 4,000 Tg, and further to Customers for 2,500 Tg while it is sold to industries for 13,112 Tg. This means the ordinary customers are highly subsidized.

#### **(6) Problems and Countermeasures**

Problems and measures are summarized as follows:

- Because of the dilapidated facilities including distribution pipelines to apartment buildings, a considerable amount of heat is lost technically during distribution. To improve the supply capacity of heating, these facilities should be well maintained and renovated.
- The existing heating supply capacity is not sufficient enough to meet the future and it is necessary to establish a new heating source.
- In order to maintain the balance of supply and demand, not only the expansion of the supply side but also the demand side management is important. Apartment buildings lose a huge amount of heat. To conserve energy consumption, introduction of heat-efficient buildings shall be studied.

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<sup>17</sup> Op. Cit, p. 104

## 4.9 Worsening Urban Environment and Living Conditions in Ger Areas

As already mentioned in Section 4.2, environmental and living conditions issues in Ger areas, where 60% of city households live, have seriously affected not only Ger residents but also those in apartment areas in the city center. In this section, issues on urban environment and living conditions in Ger areas are analyzed in terms of i) housing, ii) infrastructure and urban utilities, iii) sanitary conditions, and iv) awareness of residents and community.

### 1) Housing

Gers and simple houses are not appropriate urban dwellings, because of their i) fragile housing structure, ii) low heating efficiency and ventilation, iii) untreated wastewater and solid waste, iv) limited space and lack of privacy, v) poor design and landscape, etc. To secure a safer and cleaner environment, the improvement of housing should be urgently tackled.

Based on the result of HIS, most Ger households are not satisfied with their living spaces. About 75% of Ger residents wish to move, rebuild, or improve their dwellings (see Table 4.9.1). Residents who want to move or rebuild are less than 20% of the respondents. Most Ger residents prefer that their housing conditions at present locations to improve. Ger residents did not express dissatisfaction with utility connections or convenience even though there are few public services and facilities. It is possible that they do not pay much attention to their neighborhood because they prefer to improve their housing conditions first.

**Table 4.9.1 Housing Preference by Housing Type**

	Total	Move	Rebuild	Improve	Do nothing
1 Mid-rise	1,075	7.5%	3.1%	40.8%	47.8%
2 High-rise	698	7.0%	3.0%	43.1%	45.7%
3 Detached with infra	130	8.5%	5.4%	48.5%	36.9%
4 Detached without infra	1,546	6.8%	11.8%	42.9%	37.8%
5 Ger	1,066	12.5%	25.1%	35.7%	25.7%
6 Homeless	11	18.2%	9.1%	54.5%	9.1%
Total	4,542	8.4%	11.3%	41.0%	38.5%

Source: Household Interview Survey, 2007, JICA Study Team

### 2) Infrastructure and Urban Utilities

One of the serious issues in Ger areas is the lack of urban utilities, such as water, heating, sewage and solid waste collection. Although the development of urban utilities is the responsibility of the public sector, public services cannot cover the expanding Ger areas. Because of the lack of urban services, the urban environment and sanitary conditions in these areas have deteriorated, and residents do not enjoy a healthy and safe existence. It is necessary to consider the following: i) the extent the central network of urban utilities can be extended, and ii) how to design and develop independent utility networks or local infrastructure clusters.

Based on HIS results, the desired improvements in basic utility services differ between apartment and Ger areas (see Table 4.9.2). There are many inequalities related to water supply, as follows: i) residents in Ger areas, especially children, need to walk for an average of 11 minutes to reach water kiosks; ii) the price of water is 1.0Tg/liter, which is triple the price of water in apartment areas (0.3Tg/liter); and iii) average water consumption is 7.2 liters/day/person in Ger areas while it is 230 liters/day/person in apartment areas. In addition, Ger households cannot store water in tanks if they cannot treat it, because then

the quality suffers. This and the distance of water sources and the high water price are serious issues in Ger areas whose residents are mostly poor households.

Regarding heating, a third of Ger residents wish to be connected to the city's central heating system. In addition, more than a third of residents in simple houses are interested in private central heating systems (by smoke/ hot water heated by stove), which are pechka type or cluster heating system. Since using stoves and buying coal are costly, while the price of electric stoves is expensive, and air pollution from stoves affect their health, residents are forced to connect to any type of central heating system.

**Table 4.9.2 Desired Improvements in the Provision of Basic Utilities**

Utilities	Desired Improvement	Mid-rise	High-rise	Detached without infra	Ger
Water	Distance to water	4.0	1.0	<b>13.4</b>	<b>21.6</b>
	Water pressure	<b>40.9</b>	<b>37.5</b>	10.8	8.8
	Water quality	<b>39.2</b>	<b>41.7</b>	<b>29.9</b>	<b>31.6</b>
	Price	11.9	15.6	<b>25.5</b>	<b>22.8</b>
	Hours of supply	4.0	4.2	20.3	15.2
Heating	Central heating system	<b>58.8</b>	<b>51.1</b>	29.8	<b>39.6</b>
	Electricity stove	4.4	11.1	19.1	13.9
	Stove	0.9	4.4	9.2	13.9
	Private central heating system	26.3	26.7	<b>35.1</b>	21.8
	Gas	9.6	6.7	6.9	10.9
Solid waste collection	Frequency of collection	<b>51.3</b>	<b>55.2</b>	<b>57.9</b>	<b>61.1</b>
	Method of collection	12.5	12.5	12.2	9.0
	Fee	14.4	7.3	12.2	4.2
	Cleanliness of dump site	15.6	19.8	15.1	23.6
	Distance to collection site	6.3	5.2	2.6	2.1

Source: Household Interview Survey, 2007, JICA Study Team

### 3) Sanitary Conditions

Both urban environment and health of residents have been badly affected by the worsening sanitary conditions, especially air pollution from smoke, untreated sewage, and solid waste, as well as unpaved roads.

The smoke produced from burning coal for heating in winter has serious impact on the urban environment and the health of almost all citizens of Ulaanbaatar. The ADB report in 2006 of a survey of Ulaanbaatar City said that smoke from Ger areas from burning coal has caused 90% of air pollution.

Since untreated sewage is just buried in holes dug within individual lots, it penetrates into the ground and contaminates groundwater. During flooding, sewage spills over to the surrounding living quarters. These negative environmental effects are bolstered by data showing high concentrations of pollution of ground and surface water in the western part of Ulaanbaatar City where Ger areas are concentrated.

Solid waste management service cannot satisfy the demand in Ger areas due to rapid population increase and sprawl. The gap in collection service between apartment and Ger areas is wide. The service is provided everyday or several days a week in apartment areas, compared to only once a month in Ger areas. Despite this, the collection fee imposed on Ger residents is higher than that on apartment dwellers. Only 20% of residents in Ger areas pay the fee; the rest has resorted to in-house treatment and illegal dumping.

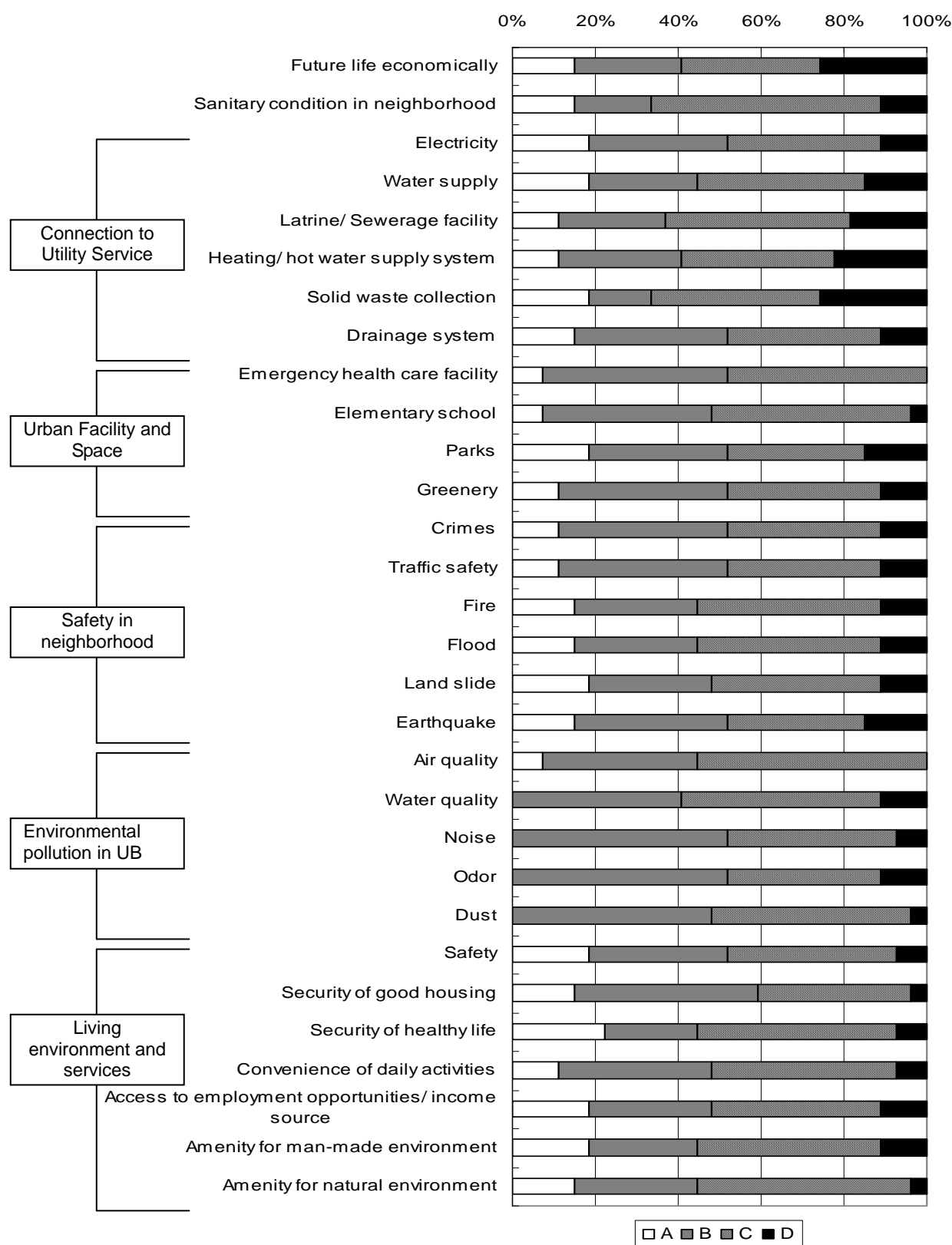
Also, unpaved roads without drainage facilities and drain routes in Ger areas in valleys have caused frequent flooding. Such areas are always dusty, especially in dry and windy seasons, because of sand and dust from unpaved roads. This condition is damaging to the eyes and throats of residents walking.

#### **4) Awareness of Residents and Community**

Traditionally, the local governments of Khoroo and Kheseg perform as local community organizations. Leaders of Khoroo and Kheseg have regular meetings, and residents consult with them whenever they encounter difficulties. In some Ger areas, community-based activities, such as cleaning and saving funds, are active. Although local community organizations and NGOs have not been established formally, there is a potential to motivate communities and residents to improve their living conditions. A sustainable mechanism to do this in collaboration with governments should be established.

Figure 4.9.1 shows the satisfaction levels of residents in Ulaanbaatar City. Residents see sanitary conditions as a problem. Since sanitary issues are closely related to improved living conditions and urban environment, an integrated improvement approach for the short and long terms would be essential. It is necessary to hear the opinion of residents on how to share the tasks can be shared among the public sector, private sector, and the community.

**Figure 4.9.1 Satisfaction Levels of Residents with Living Conditions in Ulaanbaatar City**



Note: Score (A: Best, D: Worst) is calculated by normal distribution.  
Source: Household Interview Survey, 2007, JICA Study Team