

PART II: Ulaanbaatar City

Master Planning 2030

5 GENERAL FRAMEWORK TO REVISE EXISTING MASTER PLAN

5.1 Long-term Socio-economic Development Prospects for Mongolia

1) Middle- and Long-term Economic Development Prospects and Targets for Mongolia

Currently, there are two (2) economic development prospects for Mongolia. The one is indicated in the “Millennium Development Goal Based National Development Strategy” (MDG-based NDS) approved by Parliament, which sets very ambitious economic growth targets up to 2021. The other, presented in the IMF Staff Report for 2006 Article IV Consultation, is a more moderate economic growth scenario. Changes in average growth rates are indicated in Table 5.1.1.

Table 5.1.1 Changes in Annual Average Growth Rates in MDG-based NDS and IMF Staff Report 2006

(Unit: %)

Source	2007 - 2015	2015-2021
MDG-based NDS	14	12
	2007 - 2011	2012-2026
IMF Staff Report for the 2006 Article IV Consultation	7.5	5.1

Sources: Millennium Development Goal Based National Development Strategy and Staff Report for the 2006 Article IV Consultation

Economic and social development targets are described in Section 8 of the MDG-based NDS. It is stated there that by 2015 the average GDP growth rate would be no less than 14% and GDP per capita would reach USD 5,000. By 2021, average growth rate would be no less than 12%, GDP per capita would be no less than USD 12,000, and Mongolia would become a middle income country.

The IMF Staff Report, on the other hand, said the economic performance of Mongolia has been very strong since 2002, forecasting similarly strong economic performance until 2009 (7% growth) and by 2010, a record 11% growth rate due to new mining site development (Oyu Tologoi Mine). After 2010, the GDP growth rate would stay at 6 to 5.5% between 2011 and 2014, further decreasing to 5% by 2015. As a result, the average GDP growth rate would be 7.5% from 2007 to 2011. After 2015, service industries would play a major role in the national economy. That is why the average GDP growth rate after 2015 would be 5.1% per annum.

2) Population Forecasts for Mongolia

National population forecasts were prepared by the National Statistical Office and the United Nations Population Fund (NSO-UNFPA), based on the 2000 Census. The forecasts consist of three (3) scenarios from three (3) different fertility rates; five-year population forecasts are shown in Table 5.1.2. In the high-growth scenario, annual population growth rate would be 1.3%, or 3.33 million by 2025. In the medium-growth scenario, annual population growth rate would be 1.2%, or 3.23 million. In the low-growth scenario, annual population growth rate would be 1.1%, or 3.17 million.

Table 5.1.2 National Population Scenarios Prepared by NSO-UNFPA

(000 persons)

	2000	2005	2010	2015	2020	2025	Average Growth Rate
High	2,390	2,573	2,764	2,966	3,160	3,330	1.3%
Medium	2,390	2,562	2,742	2,919	3,087	3,230	1.2%
Low	2,390	2,552	2,720	2,884	3,039	3,168	1.1%

Source: Population Forecast until 2025, NSO-UNFPA

As of 2005, the population of Mongolia was 2,562 thousand, which follows the medium-growth scenario well until 2008. Since changes in fertility rates and death rates are nearly constant and foreseeable, national population forecasts seem to follow the medium-growth scenario.

5.2 Conceptual Setting of Regional Development Framework

1) Existing Regional Framework

The existing Urban Master Plan, UBMP 2020, was planned in the development context at the national and regional levels. Also, Ulaanbaatar City and its surrounding areas were considered as an independent development zone. Since the city needs to alleviate population concentration in its area by developing satellite cities, the following concepts are proposed:

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

Communications and utilities are planned to be developed in satellite cities together with the promotion of small and medium enterprises, thereby leading the development of satellite cities into integrated settlement clusters.

Meanwhile, the ***National Development Strategy*** addresses the priority outcomes of regional development in the Phase I period of 2007 - 2015, as follows:

- Establish industrial and technological parks in regional centers and focal economic and trade zones in the regions and make them operational, and
- Create the basis for a knowledge-based economy.¹

To this end, the implementation strategy for the Ulaanbaatar region includes the industrial development of the three remote districts.

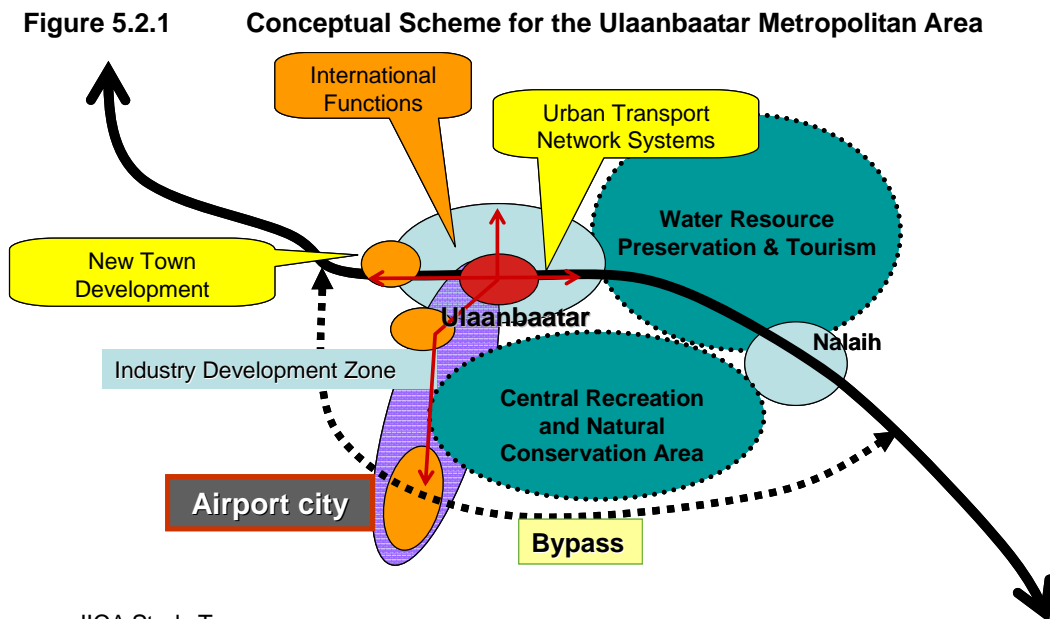
Ulaanbaatar Region Development Program (2005–2015)² provides the basic principle in developing satellite cities and villages around Ulaanbaatar City to reduce population concentration in and migration to Ulaanbaatar City. To this end, the development of satellite cities is expected to be achieved through the relocation of industries from Ulaanbaatar region.

2) Proposed Concept for Ulaanbaatar Metropolitan Area

The Ulaanbaatar Metropolitan Area will encompass the area within a **50km** radius from the city center to include Nalaikh, Zuunmod, and the planned new international airport. The following concepts are proposed to develop the area (see Figure 5.2.1):

¹ The Government of Mongolia, "Millennium Development Goals Based Comprehensive National Development Strategy of Mongolia (Draft)," Ulaanbaatar City, 2007, p. 95.

² This program was approved under the Resolution of the Government of Mongolia, No. 197, dated 16 August, 2006.



Source: JICA Study Team

Major urban activity centers will be linked to trunk roads such as the airport access, railway, and Asian Highway (AH)-3.

New Ulaanbaatar International Airport: This airport is planned to be located in the Khushigt valley and will be developed with JICA assistance. It will be located south of Bogd Khan Mountain and 45km from the city center, aiming at encouraging tourism and rare metals export. This airport will be four (4) times bigger than the existing one and will have a 3,100-meter runway as well as terminal facilities with a capacity of 1.7 million passengers. It is targeted to open by 2015.

New Airport Access Highway: This highway will open to coincide with that of the New International Airport. While the Mongolian Government has given its commitment to construct it with financial assistance from Japanese ODA, Public Private Partnership (PPP) schemes need to be explored to develop and operate this highway. Combining its construction with the development of the Airport City, the scheme can be attractive to the private sector.

Airport City: Planning for this project should be made with a long-term perspective and should accommodate new economic and business activities that will benefit from being located near an international gateway. Three types of business opportunities are promising in the airport city. These are:

- Tourism and tourism-related businesses;
- Aviation-related businesses such as maintenance workshops for aircraft, air cargo logistics centers, aircraft parts distribution centers, catering businesses, etc.; and
- ICT and knowledge-based businesses.

Railway Bypass: This 65-kilometer-long road has long been planned to pass through the new international airport in the south of Bogd Khan Mountain and to function as an international freight line connecting with China and Russia. The establishment of regional logistics centers is therefore proposed near the diverging points of the railway bypass, or in Nalaikh in the east and Tolgoit in the west.

Ulaanbaatar City will be served with a hierarchical urban transportation network which will be connected to regional and international transportation facilities.

Asian Highway: The national road from Altanbulag (Russian border) to Zamin-uud (Chinese border) is designated as Asian Highway No. 3 (AH-3) with AH Design Standard Class III. Since 1995, the Government of Mongolia has implemented AH-3 development projects with ADB assistance, namely Road Development Phase-1 (1995-2000): Ulaanbaatar-Altanbulag (312km)³; Road Development Phase-2 (2000-2005): Nalaikh-Choir (200km), and Road Development Phase-3 (2006-2009): Sainshand-Zamin-uud (282km). To further meet potential demand due to extensive mineral development, a number of plans and projects on air, rail, and road transportation are being promoted as briefly explained below.

3) Economic Function of Remote Districts

As mentioned in Section 5.2.1, three remote districts were proposed to be part of Ulaanbaatar region. However, only Nalaikh can be regarded as part of the Ulaanbaatar Metropolitan Area, because the other two districts are distant; Bagakhangai and Baganuur are 90 and 140km from the city center. What should be done is for the two districts to enhance their roles as engines of socio-economic development by leveraging on their unique characteristics, as shown in Table 5.2.1.

Table 5.2.1 Development Directions for Three Remote Districts

Remote Districts	Direction of Development	Km from UB Central	Population		
			2007	2020	2030
Nalaikh	<i>New Industrial Promotion Park & Logistic Center</i>	30 Km	28,152	55,000	78,500
Baganuur	<i>UB Metropolitan Industrial and Energy Center</i>	140 Km	25,969	39,000	45,800
Bagakhangai	<i>Agro-industrial Center</i>	90 Km	3,864	6,000	6,500
Total			57,985	100,000	130,900

Source: JICA Study Team

As part of the Ulaanbaatar Metropolitan Area, Nalaikh can function as an “industrial incubator” that will promote new industrial and technological breakthroughs. To facilitate the economic development of this satellite city, domestic and foreign direct investments (FDIs) need to be attracted. Becoming a “logistics center” is another important function that this town can assume. The population of Nalaikh District by 2030 is expected to increase by 2.8 times from the 2007 level of about 28,000, or 78,500.

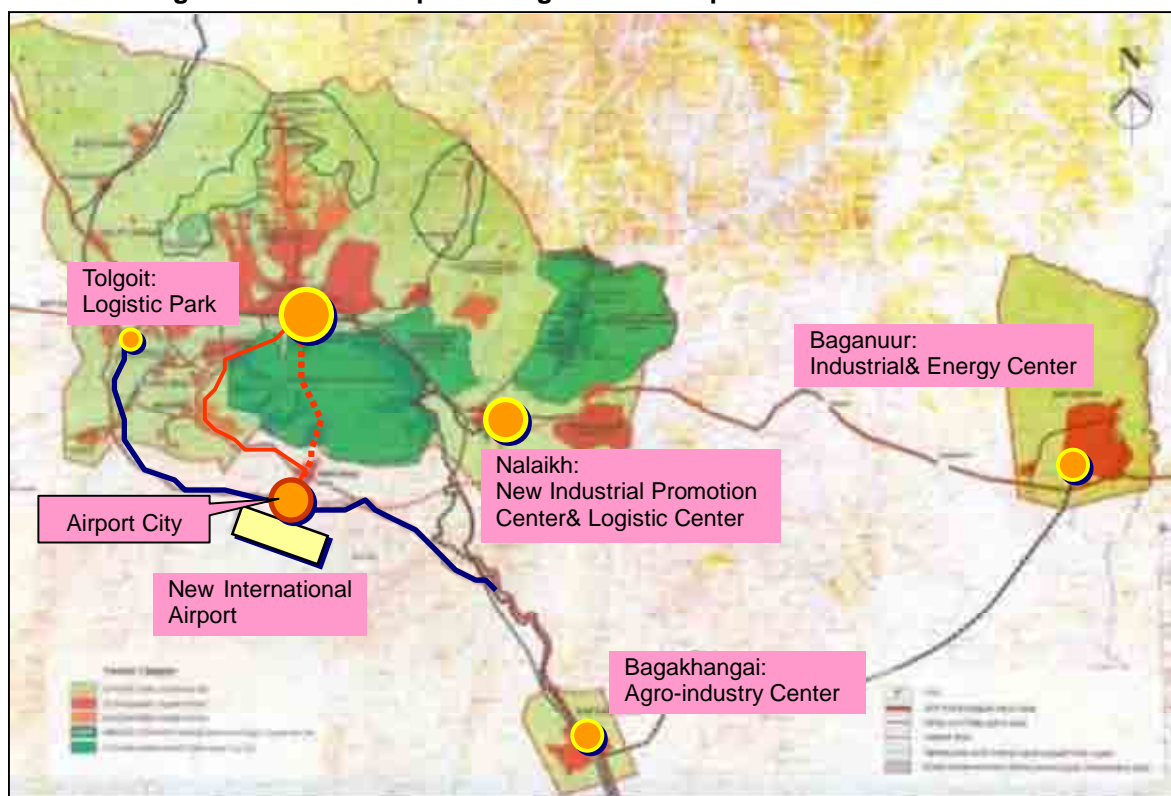
Baganuur is rich in mineral resources, such as coal, and is close to Herlen River, a rich source of water. With these characteristics, Baganuur has a great potential of becoming an “energy production center” and a resource-based industrial center. Its population by 2020 is

³ The section between Ulaanbaatar and Nalaikh is deemed the last section of AH-3 in Mongolia, for which a feasibility study was conducted in 2007 by the Korea International Cooperation Agency (KOICA). The KOICA study prepared two alternative routes for the Ulaanbaatar Bypass between Nalaikh and the Western Checkpoint at the 22nd Km-post; one will pass the foot of Bogd Khan Mountain in the north (Alternative 1: L=52.9 km) and the other in the south (Alternative 2: L=64.8 km). Regardless of which alternative will be chosen, a new highway will be required to connect Ulaanbaatar City to the new airport and Zuunmod, because the study gives priority to the bypass.

expected to reach 45,800 from 26,000 at present. However, should industries located in this area, the population will easily surpass this projection.

Bagakhangai is located at a railway junction and can be regarded as the southern gateway to the Ulaanbaatar Metropolitan Area. Because of this locational advantage, it has the potential to attract agro-processing industries, targeting the Ulaanbaatar market. Therefore, the government should provide special incentives to such investments. Otherwise this small township would deteriorate.

Figure 5.2.2 Proposed Regional Development Structure



Source: JICA Study Team

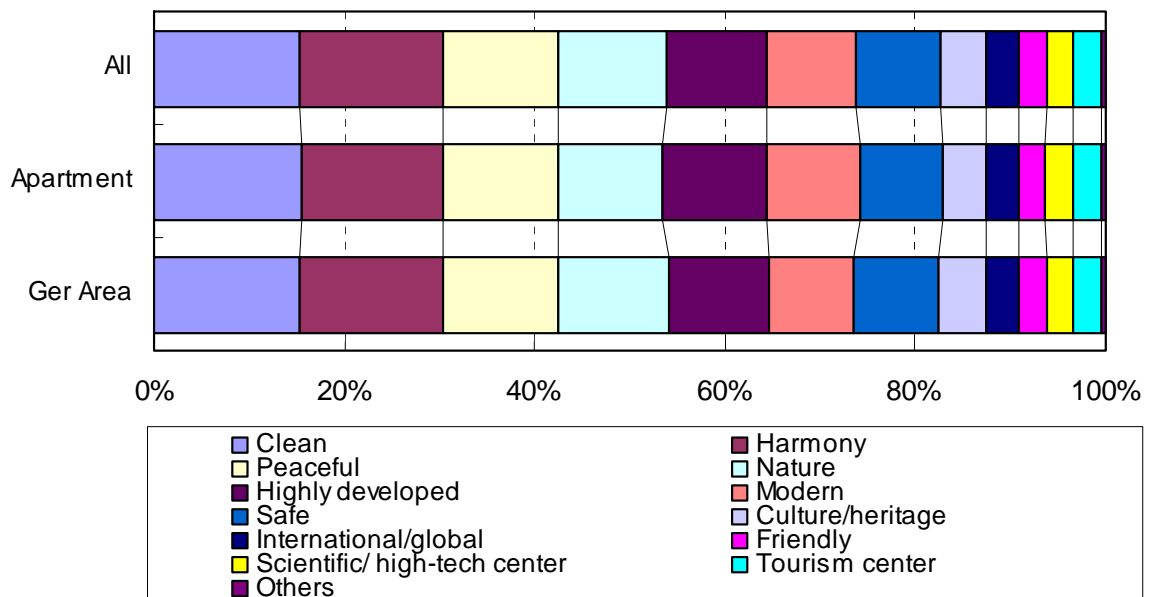
5.3 Urban Development Vision and Objectives for Ulaanbaatar City

1) Public Perception on Future Ulaanbaatar City

The HIS results provided a number of significant implications for urban planning. To the question of what images should be pursued for Ulaanbaatar City in the future, the four (4) most preferred images in order of importance are: 1) clean, 2) harmony, 3) peaceful, and 4) nature, as shown in Figure 5.3.1.

This implies that security and environment are the most important aspects of their life. The security of a healthy life was the most frequent choice as the most important aspect for a good living environment. The most important urban services that were most frequently chosen were “urban air quality” and “health/welfare service.” “Health service facilities” was also the most commonly requested important facility needed to be located near residences.

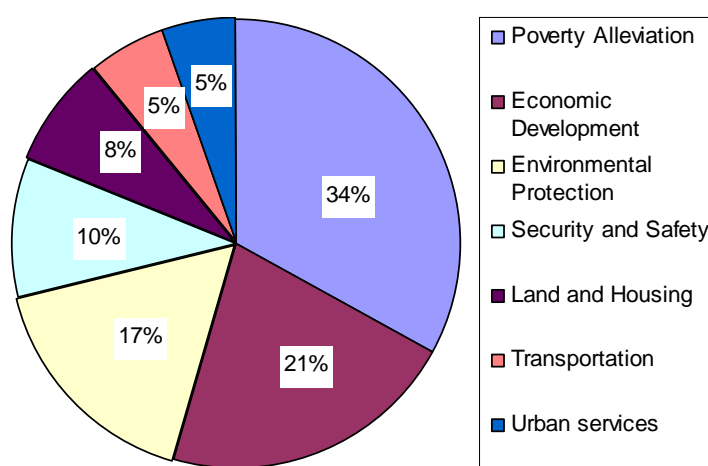
Figure 5.3.1 People’s Choices on Urban Images for Ulaanbaatar City



Source: Household Interview Survey, 2007, JICA Study Team

Meanwhile, to the question on what the most important planning aspects should be tackled with best effort, the people selected: 1) poverty alleviation (34%), 2) economic development (21%), and 3) environmental protection (17%), as shown in Figure 5.3.2. The people’s perception of the current situation seems to be very balanced; it shows they are most concerned with economic development, but with planning emphasis on environmental conservation.

Figure 5.3.2 People's Choices as Most Important Aspects for Ulaanbaatar City

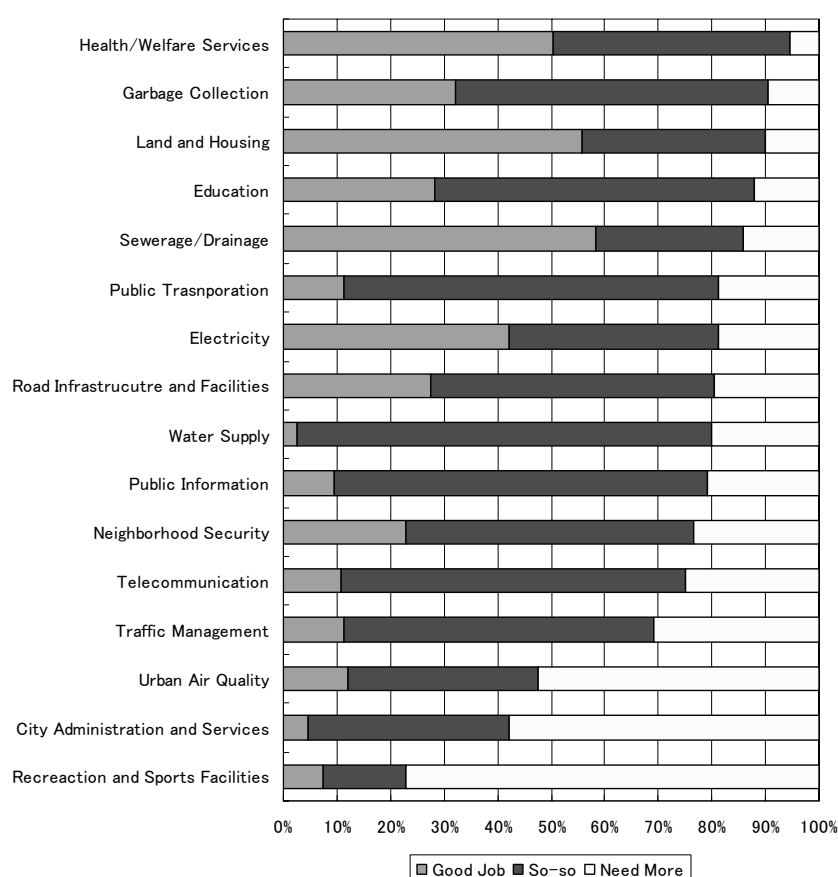


Source: Household Interview Survey, 2007, JICA Study Team

With regard to the “public services” that should be enhanced, as shown in Figure 5.3.3, HIS results show the following findings:

- (a) Enhancement of Traffic including Public Transportation:** The assessment of the traffic situation was quite bad in all aspects.
- (b) Development of Parks and Green Spaces:** Most households indicated that it was “important” or “very important” to have access to parks and green spaces, which however, is very limited at present. Squares, big parks, playgrounds for children, and street trees were highly desired.
- (c) Enhancement of Garbage Collection and Cleanliness of Neighborhood:** Among Ger resident-respondents, the frequency of garbage collection and the cleanliness of dumpsites, particularly in apartment areas, garnered the highest scores.
- (d) Reduction of Air Pollution and Dust:** About 80% and 70% of the respondents assessed the air quality and dust levels, respectively, as “bad” or “very bad.”
- (e) Enhancement of Economic Conditions particularly for Ger Dwellers:** Respondents in both apartment and Ger areas indicated “poverty alleviation” and “economic development” as the most important urban issues. The economic conditions of those living in Ger areas seem more serious than those in apartments. Half of the households felt economically threatened in terms of managing their future. Such feeling was much stronger for those living in Gers (60%). Dissatisfaction with their living environment was more common among those living in Gers than in apartments in the aspects of “security of good housing” and “access of employment opportunity.” Meanwhile, apartment dwellers were dissatisfied with the “amenity in the natural environment.”

Figure 5.3.3 People's Assessment of Basic Urban Services in Ulaanbaatar City



Source: Household Interview Survey, 2007, JICA Study Team

2) Urban Development Visions

The UBMP 2020 was prepared based on analytical research and insights into the reality back in 2000. Since then, many social and economic changes have taken place, revealing the deficiencies of the plan in serving as a guidepost for urban growth management.

The plan addresses five visions for the Ulaanbaatar City by 2020, as follows:

1. **First Vision:** For the city to become a well-developed capital city at par with international standards, to have a vibrant economy, to become a world-class business center with a competitive edge in education, information, science, and technology;
2. **Second Vision:** For the city to have appropriate policies on land management and urban development, including the development of areas with appropriate infrastructure and improved housing conditions for all;
3. **Third Vision:** For the city to provide healthy existence, safe environment, a strong social fabric, and a progressive legal framework;
4. **Fourth Vision:** For the city to have a responsive and efficient public administration, and involves the community and the private sector in civic services; and
5. **Fifth Vision:** For the city to be an attractive tourist destination in Asia.

These visions expressed in UBMP 2020 are all considered appropriate and are appreciated by the people as shown in HIS results. Therefore, this JICA Study is adopting the same visions over the same planning horizon, and is pursuing very similar goals.

However, two (2) points do not appeared in the planning visions of the UBMP 2020: the one is financing capability, wherein the private sector has to be encouraged to help provide public services and infrastructure through PPP schemes. The other point missing in the plan is the development of a legal framework to materialize these visions.

3) Planning Objectives

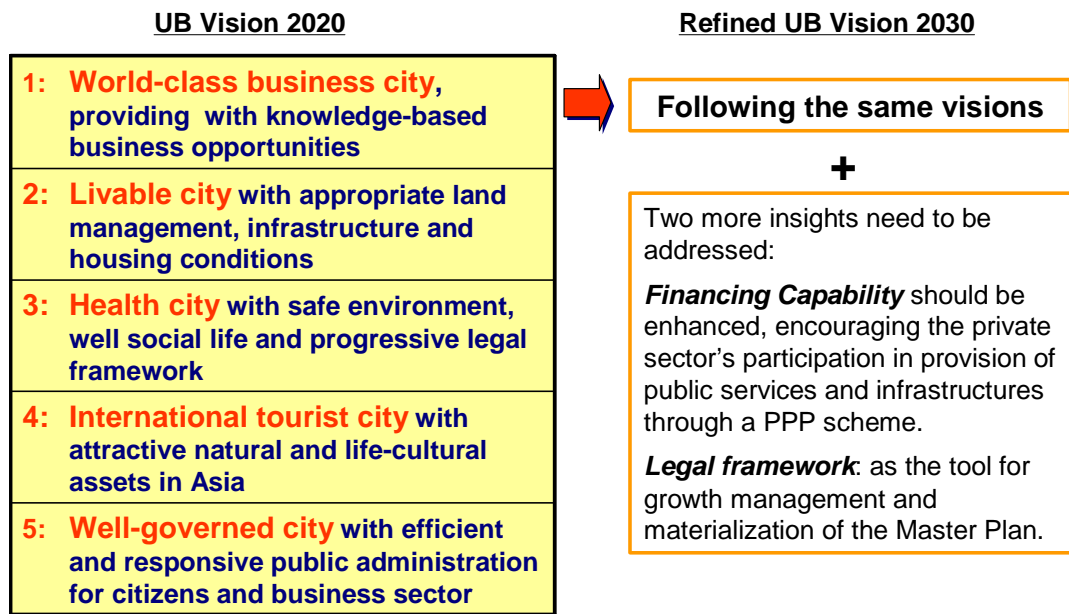
The UBMP 2020 stipulates several planning objectives, as follows:

1. To determine the basic approach to establishing comfortable living conditions for the present and future residents and to support a sustainable city development under new socio-economic situations;
2. To maintain the equilibrium between the needs of national parks and the environmental impact of daily activities;
3. 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;
4. To keep equilibrium of national conservation parks and ecological safety of the environment of living activities;
5. To create an environment in conformity with territorial requirements, space, and concept of beauty by using traditional methods of urban planning;
6. To meet the safety requirements of transportation and engineering infrastructure;
7. To re-develop Ger and other residential areas, and increase housing supply;
8. To improve the industrial zoning system and land uses; and
9. To establish community centers and improve social infrastructure.

While the above objectives are relevant and appropriate and have been adopted in the JICA Study, the following additional objectives are being examined:

10. To develop new urban agglomerations, or new towns, in a planned manner to accommodate increasing housing demand and economic requirements, including those of the industrial and service sectors, well beyond 2020;
11. To ensure year-round commercial activities, as well as recreation/tourism and other services in the CBD, which will become the center of a World City;
12. To improve people's mobility through more energy-efficient and time-saving public transportation system along major corridors;
13. To develop an urban planning legal framework in conformity with the Civil Law, Land Law, and the other relevant acts/regulations; and
14. To develop a comprehensive housing finance system to help improve the housing conditions of low- and middle-income households.

Figure 5.3.4 Vision for Ulaanbaatar, 2020 and 2030



Source: UBMP-2020 and JICA Study Team

5.4 Socio-economic Framework for 2020 and 2030

1) GRDP Development in Ulaanbaatar City

Table 5.4.1 indicates the changes in GDP and GDP per capita growth rates for Mongolia and Ulaanbaatar. Since 2002, Mongolia has entered a new economic phase after the economic slump in the 1990s. In recent years, the country's average GDP growth rate accelerated from 6.9% in 2002–2004 to 8.6% in 2005–2007. GDP per capita also increased from 5.6% to 7.2% in the same period.

However, the growth rates of Ulaanbaatar were not as good as Mongolia's. The city's GDP growth rate recorded 5.1% in 2002 - 2004 and 5.8% in 2005 - 2008. The gap between Mongolia's and Ulaanbaatar's GDP per capita widened because the population growth rate of Ulaanbaatar is higher than the country's.

Table 5.4.1 Changes in GDP and GDP per Capita Growth Rates
(%)

	Ulaanbaatar		Mongolia	
	GDP Growth Rate	GDP per capita Growth Rate	GDP Growth Rate	GDP per capita Growth Rate
2002	6.1	1.8	4.0	2.6
2003	6.7	1.1	6.0	4.8
2004	2.5	-1.3	10.6	9.3
2005	9.1	5.0	7.3	6.0
2006	-1.2	-4.1	8.6	7.2
2007	9.6	5.6	9.9	8.2
Average 2002-2004	5.1	0.5	6.9	5.6
Average 2005-2007	5.8	2.2	8.6	7.2

Source: Mongolian Statistical Yearbook 2007

UBMP 2020 and the Regional Development Program 2015 stated the economic development targets for Ulaanbaatar. Table 5.4.2 shows the annual average growth rates used by both master plans. In these plans, the rates will increase gradually up to their respective target years. Global experiences in economic development imply that rapid economic growth starts suddenly and dramatically, then diminishes as the economy matures. The JICA Study Team recognizes Mongolia's economy as already having entered the high growth phase since 2002.

Table 5.4.2 Annual Average Growth Rates in UBMP 2020 and MP 2015
(Unit: %)

	Until 2010	Until 2020
UBMP-2020	9.0%	10.5%
	Until 2010	Until 2015
Regional Development Program 2015	7.5%	7.7%

Source: UBMP-2020, Regional Development Program 2015

The JICA Study Team projected the annual average GDP growth rates for Mongolia and Ulaanbaatar until 2030, as indicated Table 5.4.3. Since the prices of copper and gold are higher and more stable than the IMF report has estimated, the JICA Study Team projected a 7% GDP growth for Mongolia for a longer period. The development of new mining sites was also not considered due to the high uncertainty surrounding such projects. The JICA Study Team expects that the benefits from the mining industry will be used to diversify the Mongolian economy, and that other industries which this report describes in Section 6.2 will also contribute to national economic growth after 2011. In the short term, the GDP growth rate of Ulaanbaatar City would be lower than the country's due to recent developments in mining and agriculture. However, after 2011, Ulaanbaatar's will exceed that of Mongolia because urban industries and the urban economy will lead the national economic development.

Table 5.4.3 Changes in Growth Rates of Mongolia and Ulaanbaatar

	Mongolia	Ulaanbaatar	Remark
2008–2010	8.3	7.0	Economic development scenario indicated in the IMF Staff Report 2006 is applied to this period. GDP growth rates will record 7% in 2008 and 2009, increasing to 11% due to the operation of a new mining site (Oyu Tolgoi) by 2010. However, the impact of national economic development on the GRDP of Ulaanbaatar will be limited, and it will follow recent growth rates (7%).
2011–2015	7.0	7.5	Mining industry will continue contributing to GDP growth. On the other hand, the GRDP growth rate of Ulaanbaatar will accelerate due to the development of urban industries and urban economy. The growth rate of Ulaanbaatar City will surpass that of Mongolia.
2015–2020	7.0	7.5	GDP/GRDP growth rates will follow the same trend during 2011-2015.
2027–2030	6.4	6.8	Growth rates of Mongolia and Ulaanbaatar will slow down due to decreases in population growth and maturation of the economy. The growth rate of Ulaanbaatar City will still be higher than that of Mongolia because of the concentration of population and industries in the city.

Source: JICA Study Team

The calculation of GDP and GRDP in real prices from 2008 to 2030 indicates that the importance of Ulaanbaatar's economy to the national economy will be unchanged. The share of Ulaanbaatar's GRDP to the national GDP will decrease from 49.7% in 2007 to 47.9% by 2010, but it will start to increase again and record a 49.7% share by 2030.

2) Population Growth in Ulaanbaatar City

Mongolia experienced some heavy zud damages from the end of the 1990s till early 2000s. Together with free movement of population, in-migration to Ulaanbaatar City had accelerated, and the population growth of the city recorded 6.4% in 1999. After 1999, the growth rate remained at more than 3%. It recorded 5.5% in 2003, 4.2% in 2002, and 4.0% in 2005. In 2006, it dropped to 3.0%, but increased again to 3.7% in 2007 due to subsidies given to children born that year, which was considered a lucky year in the Oriental Zodiac. On the other hand, the country's population growth rate has been stable at around 1.2% to 1.3% since 2002. In 2007, the rate rose to 1.6% due to the same factors explaining Ulaanbaatar's case. The proportion of Ulaanbaatar's population to that of Mongolia increased 8.6 points in 10 years, from 30.5% in 1998 to 39.1% in 2007.

Table 5.4.4 Population of Mongolia and Ulaanbaatar since 1998

	Population (000)		Growth Rate (%)		Percentage of UB (%)	Event
	Mongolia	Ulaanbaatar	Mongolia	Ulaanbaatar		
1998	2,340	715	1.4	4.2	30.5	Free migration of people
1999	2,374	760	1.4	6.4	32.0	Zud
2000	2,408	787	1.4	3.5	32.7	Zud
2001	2,443	813	1.5	3.3	33.3	
2002	2,475	847	1.3	4.2	34.2	Land privatization (Ger area)
2003	2,504	893	1.2	5.5	35.7	Zud
2004	2,533	929	1.2	3.9	36.7	
2005	2,562	965	1.2	4.0	37.7	
2006	2,595	994	1.3	3.0	38.3	
2007	2,635	1,031	1.6	3.7	39.1	Land privatization (Summer house)

Source: Mongolia Statistical Yearbook

Three (3) population forecasts for Ulaanbaatar City were prepared to date: NSO–UNFPA, UBMP 2020, and MP 2015, as shown in Table 5.4.4. The NSO–UNFPA forecast is part of the national population forecast until 2025. It estimated that the city's population by 2025 would be 1.35 million at an annual average growth rate of 2.1%. In the UBMP 2020, the 2020 population would be 1.65 million at an annual average growth rate of 4.2%. In the MP 2015, 2015 population would reach 1.16 million at annual average growth rate of 2.0%.

All forecasts were prepared before 2005 when the population growth rate of Ulaanbaatar City had fluctuated heavily; that is why the population estimates for 2005 and the annual average growth rate forecast did not match with reality. The JICA Study Team recognizes the effect of push (incidence of зуд and the difficult economic situation in remote areas) and pull (economic development and job opportunities in Ulaanbaatar City) factors at work.

Annual average growth rates of the NSO–UNFPA and MP 2015 (around 2%) seems to be lower than the current population growth rate (nearly 4%). On the other hand, the annual growth rate of the UBMP 2020 is too big, because the figure was based on the population growth rate in 2000.

Table 5.4.5 Existing Population Forecasts for Ulaanbaatar City

(Unit: thousand persons)

	2005	2010	2015	2020	2025	Annual Average Growth Rate (%)
NSO – UNFPA	894.3	1019.3	1,141.1	1,253.5	1,350.6	2.1
UBMP-2020	890.0	1,135.0	-	1,650.0	-	4.2
MP 2015	942.2	1093.4	1,164.7	-	-	2.0

Source: Population Forecast 2025, UBMP–2020, MP 2015

Based on average growth rates since the 1990s, those in recent years, and the proportion to national population forecasts (medium estimates of the NSO-UNFPA population forecast), the JICA Study Team set the average annual growth rate from 2008 to 2030, as shown in the second row in Table 5.4.6. Annual average population rates will decrease gradually from 4.2% in 2001-2005 to 2.0% in 2020-2025, continuing until 2026-2030. In the

forecast, the population of Ulaanbaatar City will account for 1.57 million and 1.87 million by 2020 and 2030, respectively. The proportion of the city's population to Mongolia will continue to increase from 37.7% in 2005 to 55.5% by 2030.

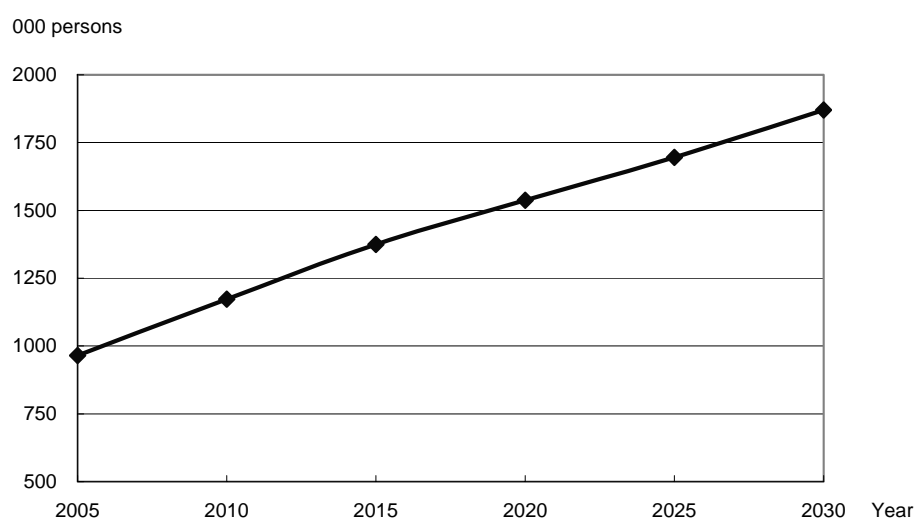
Table 5.4.6 Population of Ulaanbaatar City up to 2030

Year	2005	2010	2015	2020	2025	2030
Population (000 persons)	953.2	1,173.2	1,325.1	1,537.8	1,695.8	1,870.0
Average Growth Rate (%)	4.2*	4.0	3.2	2.3	2.0	2.0
Proportion to National Population (%)	37.7	42.8	47.1	49.8	52.5	55.5

Note: * Average growth rate from 2000 to 2005.

Source: JICA Study Team

Figure 5.4.1 Population Growth of Ulaanbaatar City



Source: JICA Study Team

3) Number of Households

The size of households in Ulaanbaatar City dropped by 1.0 point, from 5.4 persons per household in 1989 to 4.6 persons in 2006. It will continue to decrease up to 2030, due to progressive family nuclearization. As a result, the number of households will increase by more than twice from 224,000 in 2007 to 480,000 by 2030.

Table 5.4.7 Number of Households in Ulaanbaatar City (2005–2030)

(000 households)						
Year	2007	2010	2015	2020	2025	2030
Number of Households	224.2	260.3	315.8	365.6	417.2	479.5
Size of Household	4.6	4.5	4.3	4.2	4.0	3.9

Source: JICA Study Team

5.5 Strengthening of Competitiveness and Robust Economic Development

It is necessary to promote future urban industries to secure sustainable economic development of Ulaanbaatar and provide job opportunity for residents in Ulaanbaatar. These urban industries will be engines of growth for the national economic development in future because the GRDP of Ulaanbaatar occupies almost 50% of the national GDP.

1) Characteristics of Market

Based on an assessment of the economy of Mongolia and Ulaanbaatar, JICA Study Team identified the following characteristics about market in Mongolia and the surrounding countries.

- **Limited scale of domestic market:** Since current national population is only 2.6 million, it is difficult to introduce import-substitution industry. Future industries of Mongolia and Ulaanbaatar must overcome such limited scale of the domestic market.
- **Great Neighboring International Market:** Fortunately Mongolia is surrounded by the big and rapidly developing countries of China and Russia. These countries would provide with large markets to Mongolia in future. However, at the same time, these big markets are likely to easily penetrate or exploit the Mongolian market for their interests.
- **High Cost Structure:** Economy of Mongolia and Ulaanbaatar always has to pay comparatively high costs for consumers' products and transportation, due to being a landlocked state. Before 2005, the garment industry was booming in Ulaanbaatar due to "Agreement on Textiles and Clothing between China and other countries", however, after 2005 when the export quota of China was removed, the industry suffered from a heavy damage because transportation costs are very high and transportation time long. This fact implies that the leading industries of Mongolia and the urban industries of Ulaanbaatar have to optimize the use of Mongolian resources in order to cover such costs.
- **Use of benefits from mining industry:** The mining industry will greatly benefit the Mongolia people. A proper use of such benefits is very important to develop leading industries which can bring the sustainable development of Ulaanbaatar City.
- **Rapidly growing domestic demands for consumable goods:** Along with the economic growth and income increase, domestic demands particularly for consumers' goods are rapidly growing, but most of those are being imported mainly from China. Although manufacturing of consumer durables and appliances may be difficult to be fostered due to the economy of scale, an import substitution policy needs to be explored for agricultural and food products which are domestically consumed in daily lives.

2) Leading Industries for Ulaanbaatar

Based on the above understanding of the economy, JICA Study Team identified the following five (5) industries as leading industries which are endowed with great potentials in the global market in the future. We recognize it is required both to reestablish traditional industries which fully use Mongolian domestic resources and to develop new industries which

overcome the smaller scale market in Mongolia. These industries are:

- Mining-supporting and mining-related industries,
- Tourism and tourism-related service industry,
- Processing industry of cashmere,
- Information Communication Technology (ICT) and Business Process Outsourcing (BPO) business, and
- Agricultural products and food processing.

The mining industry is important in Mongolia's economy now and will be in the future. Currently it occupies 30% of GDP, 60% of exports and employs 4% of the total labor force. Although copper and gold mines are located outside of Ulaanbaatar City (Erdenet and South Gobi), supporting services of mining activities such as logistics, administration, insurance, spare parts procurement are to be performed in Ulaanbaatar City. It is said in the mining industry that a direct investment of one (1) US dollar generates an indirect investment of 1.5 to 2 US dollars, and employment of one (1) person in the mining industry generates employment of four (4) persons in the related industries.

In 2007, the Mining Association had 80 mining and mining related companies. Due to the new Mining Law and introduction of tax reform in 2007, international investors started hesitating to invest to the mining industry. As a result, the contribution of the mining industry to GDP growth was 0.4% in 2007. The other difficulty of the mining industry is lack of infrastructure in the remote area. In particular road network is very poor in rural areas.

The business situation of the mining industry depends on that of international economy. Although the mining industry enjoys booming in recent years, it is not sure whether the booming will come to an end. That is why the government should try to maximize benefit from the mining industry during its current boom. The government should make an effort to conclude an agreement with the private investors about allocation of benefit and taxation. If the mining boom finishes without new investments, Mongolian people cannot receive benefit for their future investment.

Tourism is already an important industry for Mongolia. During summer season, a large number of foreign tourists visit Mongolia. Tourist arrivals to Mongolia have nearly tripled in six (6) years (from 158,000 in 2000 to 452,000 in 2007)⁴. Average length of stay is 12 nights, and average spending is **US\$ 106 per day per person**. This contributes significantly to foreign currency earnings. Currently foreign tourists stay in Ulaanbaatar City for three (3) days.

It is necessary for Ulaanbaatar to enhance its gateway function through improvement of tourist sites and tourist services, and development of tour routes. Currently it is not so easy for independent foreign tourists to go around Ulaanbaatar City. It is necessary to improve provision of tourist information for visitors, and to formulate tourist circuit routes in Ulaanbaatar.

⁴ Out of 452,000 international arrivals, the number of Chinese visitors for business purpose was 211,000 in 2007. Even with Chinese visitors excluded, the number of visitors has increased by 1.5 times in four (4) years from 161,000 in 2004 to 241,000 in 2007.

Ministry of Road, Transportation and Tourism owns three (3) Tourist Information Centers at the Central Post Office, Railway Station and Chinggis Khaan Airport. It is true that locations of these centers are gateways of Ulaanbaatar City, but these centers cannot meet needs of visitors fully. That is why it is necessary to cooperate with private tourism companies and agents to enhance information provision. Private tourism companies and agents are located all over the city and provide tourism information to visitors independently. If Tourism Information Centers develop a network with these tourism companies and agents, they can update tourism information service frequently, and information provision function will be upgraded from *point* to *area*. Together with networking among the Tourism Information Centers, tourism companies and pubs, installation of signage and beautification around tourist sites are also needed.

The other important action by the public sector (both of the Central Government and Ulaanbaatar City Government) is to support human resource development. It is necessary to develop educational facilities for hotel & restaurant business in cooperation with the hotel & restaurant industry. There is an educational facility for middle-class management in Ulaanbaatar, according to Tourism Department of then MRTT and Tourism Department of Ulaanbaatar City, but most curricula are classroom lectures. It is necessary to invite hotel and restaurant managers as lecturers and to develop curriculum which has training programs at hotels and restaurants.

Value-added processing of cashmere was a major industry for Ulaanbaatar City until the beginning of 1990s but it ran down during the economic transition. From the point of the effective use of resources in Mongolia, these industries are still important. According to interviews to Cashmere and Wool Association and Leather Processing Association, the number of the member companies is 30 to 40, and the number of employees is 4,000 to 5,000 persons in each industry. Currently large percentages of raw material for these industries are exported to China with a limited processing; however, this industry will absorb more employment and generate more value added if these companies can procure more materials. According to the associations, they have potential markets to provide their products. The most serious problem is lack of raw materials.

There are other issues to be solved such as lack of working and investment capitals and treatment of industrial wastewater. Due to an environmentally bad image, relocations of these businesses are currently being discussed. Under such circumstances, the Central Government and City Government can support the industries from the following points.

The first one is to prohibit these industries from exporting unprocessed raw materials. Experience of metallurgy is a good example for these industries. Until 2005 scrapped steel was exported to China, and an operational rate of Darkhan Metal Plant was around 20 – 30%. However, after the enactment of a law which prohibits the export of scrapped steel to overseas countries, the rate has increased to 70 - 80%. A possible policy measure to keep raw materials inside Mongolia is to impose an export tax.

The second action to be taken by the government is to support efficient land use of these industries. The current industrial area was developed more than 30 years ago, and designed for heavy industries. It is necessary to use land for more efficiently in the market economy. The government will provide support in terms of technical, financial and institutional aspects to use industrial land more efficiently. In order to consolidate the land

for an industrial purpose, it is necessary to obtain consensus from the companies in these industries, and to cooperate with the associations. At the same time, improvement of infrastructure such as a wastewater treatment plant is needed. Improvement of infrastructure will contribute to an efficient energy use of the industries and to dispose of wastewater. Consolidation of land for industrial use will generate new land for residence, and improvement of infrastructure will assuage peoples' concern about environmentally negative effluent.

ICT and Business Process Outsourcing (BPO) business are newly developing businesses. Thirty (30) companies belong to the Mongolia Software Industry Association (MOSA), and five (5) to six (6) companies are working as BPO companies for Japan and other countries now. Many Mongolian people have been well-educated with good foreign languages commands. Their predominant capacity in accepting and adapting different foreign culture is also an advantage for BPO. These businesses will provide a big potential for younger generations.

According to MOSA, the number of programmers in Ulaanbaatar is 1,000, and MOSA has a future vision that the number of software companies should reach 200, the number of software engineers 1,000 persons, and the annual revenue of the industry USD100 billion. MOSA started to contact Japanese ICT companies and receive technical supports from Association for Overseas Technical Scholarship (AOTS), a technical training organization of the Japanese Government. Since the industry is emerging and has the potential of future development, government supports are also important.

One of the concerns of the software companies is lack of skilled programmers. That is why some software companies established training facilities by themselves. The ICT Authority also started financial support to such private training schools and universities. Possible support to the ICT industries other than support to human resource development is providing ICT service projects. For example, the investment to an ICT system within the government offices is a good starting project, and development of ICT systems for remote education and other public services is a necessary project in Mongolia. By use of open source software, the government can supply needs for ICT services to software companies in Ulaanbaatar. Local governments in Japan, such as Nagasaki Prefectural Government and Shimane Prefectural Government show useful examples in terms of overall ICT system design and relationship between the public sector and private sector in the system design.

Agricultural products and food processing industries should be strongly supported by the government under an import substitution policy. Fresh and safe perishable foods are highly demanded by people who are getting more consciousness on health. Agricultural activities should be encouraged in suburban areas in Ulaanbaatar City, providing farmers with tax incentives and subsidies for seeds procurement. Processing industries of agricultural products such as meats and dairy products may be located in designated industrial zones in Ulaanbaatar City.

3) Support for Human Resource Development

Two (2) kinds of supports by the Central Government and the City Government are necessary for promotion of the industries in Ulaanbaatar City: that is, support in "human resource development" and "technical and financial support" to start-up companies. In

2006-2007, the number of graduates of universities, higher educational institutes and collages was 26,000 persons, accounted for around 50% of the population at the age of 22 years old⁵. However, the curriculum of universities doesn't meet demands for human resources needed in industries. As described above, the ICT industries themselves have to train graduates of universities. Some interviewees from the tourism industry pointed out that the curriculum of universities for tourism business is almost lecture-based and students do not have practical training. It is necessary to support development of new and practical curriculum and collaboration between the academic and business society.

The other issue for "human resource development" is an existence of mismatch between majors in universities and needs in business society. Table 5.5.1 indicates university students' majors in 2007–2008. The proportion of business administration is 23% of university students (and 12% of the population at the same age). In order to promote the future urban economy, as described in the previous sections, the percentage of engineering and service industries including tourism services should be further increased. The government also has to tackle this problem.

Table 5.5.1 Number of University Students and their Major in 2007 - 2008

(Unit: %)

Total	No. of Students
University Students (persons)	150,326
Major	Share (%)
Business administration	23
Engineering	14
Education and teacher training	12
Social science	9
Medical science	9
Humanities	7
Service	6
Law	5
Mathematics and computer science	4

Source: Mongolian Statistical Yearbook 2007

4) Importance of Commercial Activity and Government Support to Start-up Firms

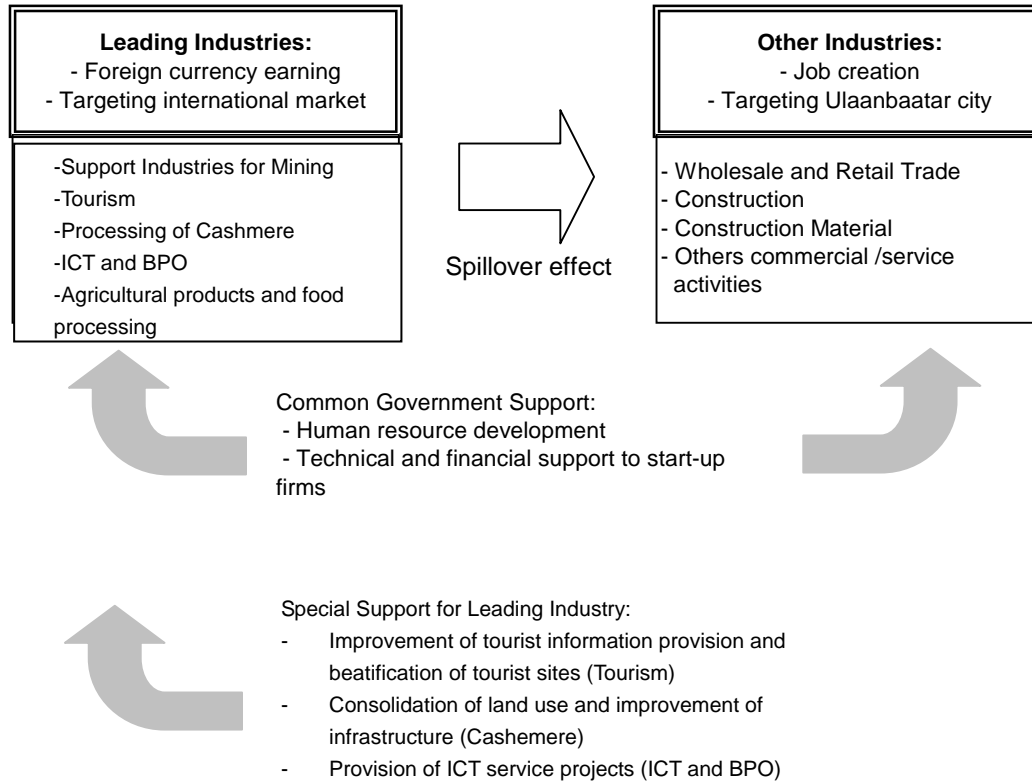
Urban economic activities which are induced by the leading industries and people's daily life are also important to sustain healthy economic development. Commercial activities and service industries will play an important role in the economy of Ulaanbaatar from now on. The contribution of these industries to GDP growth is limited but job creation effect is not negligible. Relation between the leading industries and other commercial/service industries are illustrated as Figure 5.5.1.

In the preceding section, special support measures for the leading industries, which are targeted at the international market and expected to earn foreign currency, are described. On the other hand, support to human resource development is common to both of the

⁵ According to Mongolia Statistical Yearbook, number of population between 20 and 24 was 267,000 persons. That is why average population of 22 years old was 53,400.

leading industries and the other industries. The other support needed for both the industries is technical and financial support to start-up firms. Establishment of start-up firms and growth of the firms are keys to growing both the industries.

Figure 5.5.1 Relations of Leading Industries and Integration with Other Industries



Source: JICA Study Team

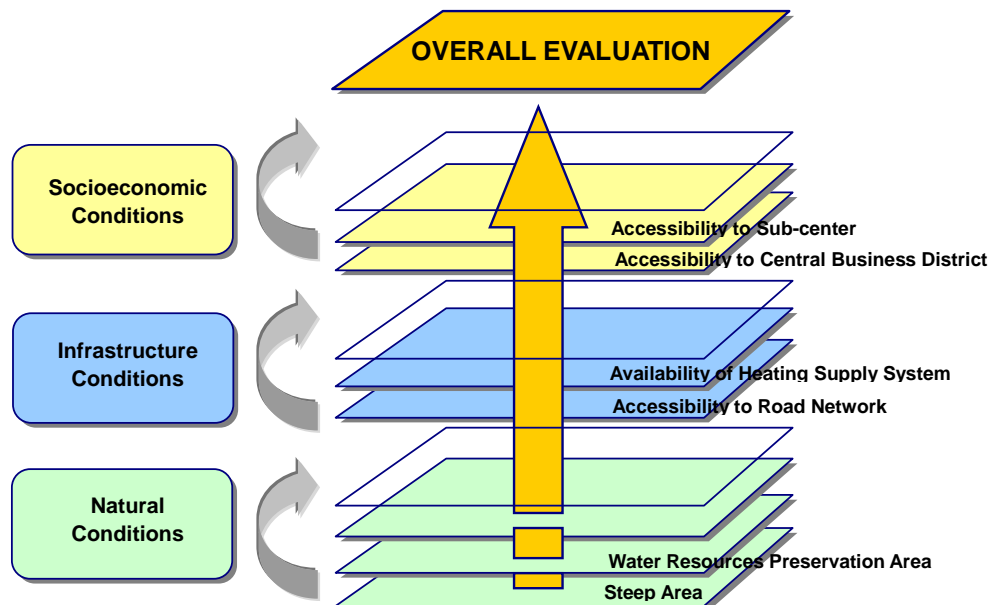
6 URBAN GROWTH MANAGEMENTMENT BASED ON A COMPACT CITY CONCEPT

6.1 Land Evaluation for Land Use Planning

1) Land Evaluation Methodology

Prior to detailed land use planning, land resources are evaluated in a rational and systematic way with use of GIS (Geographic Information System). The land use potential was evaluated from three (3) dimensions: (a) natural conditions, (b) infrastructure conditions and (c) socio-economic conditions. Each of the three dimensions consists of several indicators, which are explained later. Each condition is ranked in consideration of the degree of strength and weakness for land utilization. An overall evaluation is represented by superimposed scores using GIS, as shown in Figure 6.1.1.

Figure 6.1.1 Superimposed Ranking System for Land Evaluation (Using GIS)



Source: JICA Study Team

Each of the three (3) dimensions: (a) natural conditions, (b) infrastructure conditions and (c) socio-economic conditions consist of several indicators as shown below. As natural conditions constrain land utilization, their scores are to be negative. Meanwhile, as infrastructure conditions will contribute to land development, these conditions are scored as positive. Socioeconomic conditions will also contribute to increase in development potential because of accessibility to urban services and social welfare, so these conditions are also evaluated as positive scores.

(a) Natural Conditions

- (i) Steep Area
- (ii) Water Resources Preservation Area
- (iii) Water Cultivation Area
- (iv) Groundwater Contamination-prone Area
- (v) Natural Preservation Area (Legally Designated)

- (vi) Fertile Land Suitable for Agriculture
- (vii) Forest Land
- (viii) Flood-prone Area

(b) Infrastructure Conditions

- (i) Accessibility to Road Network
- (ii) Availability of Heating Supply System
- (iii) Availability of Water Supply System
- (iv) Availability of Sewerage System
- (v) Availability of Electricity Network
- (vi) Availability of Telecommunication Network
- (vii) Availability of Kiosk Distribution

(c) Socio-economic Conditions

- (i) Accessibility to Central Business District
- (ii) Accessibility to Sub-centers
- (iii) Accessibility to Railway Stations
- (iv) Accessibility to Bus Routes
- (v) Accessibility to Schools
- (vi) Accessibility to Parks
- (vii) Accessibility to Religious Facilities

2) Development Suitability Analysis and Development Potentiality Analysis

The following four (4) analyses are conducted for further land use planning.

- (a) **Analysis I:** Development Suitability Analysis based on Natural Conditions
- (b) **Analysis II:** Development Potential Analysis based on Trend Urbanization
- (c) **Analysis III:** Development Potential Analysis based on Existing Infrastructure Conditions
- (d) **Analysis IV:** Development Potential Analysis based on Adequate Land Utilization

Firstly, “Development Suitability Analysis based on Natural Conditions” identifies “Suitability” or “Unsuitability” for land development. Secondly, “Development Potential Analysis based on Trend Urbanization” simulates future trend urbanization and identifies problems without appropriate control measures for future urbanization. Thirdly, “Development Potential Analysis based on Existing Infrastructure Conditions” identifies development potential and urbanization suitable areas with most use of the existing infrastructures. Finally, “Development Potential Analysis based on Adequate Land Utilization” identifies future urbanization suitable areas by balancing urban development and protection of environmental resources. It also effectively takes advantage of the existing infrastructures and urban services, which will be taken into consideration for determination of future Urbanization Promotion Area (UPA).

(1) Analysis I: Development Suitability Analysis based on Natural Conditions

“Suitability” or “Unsuitability” for land development can be identified from the aspect of natural conditions, based on the scoring system as explained in Table 6.1.1. Based on the methodology above, “Suitability” or “Unsuitability” for land development was evaluated by

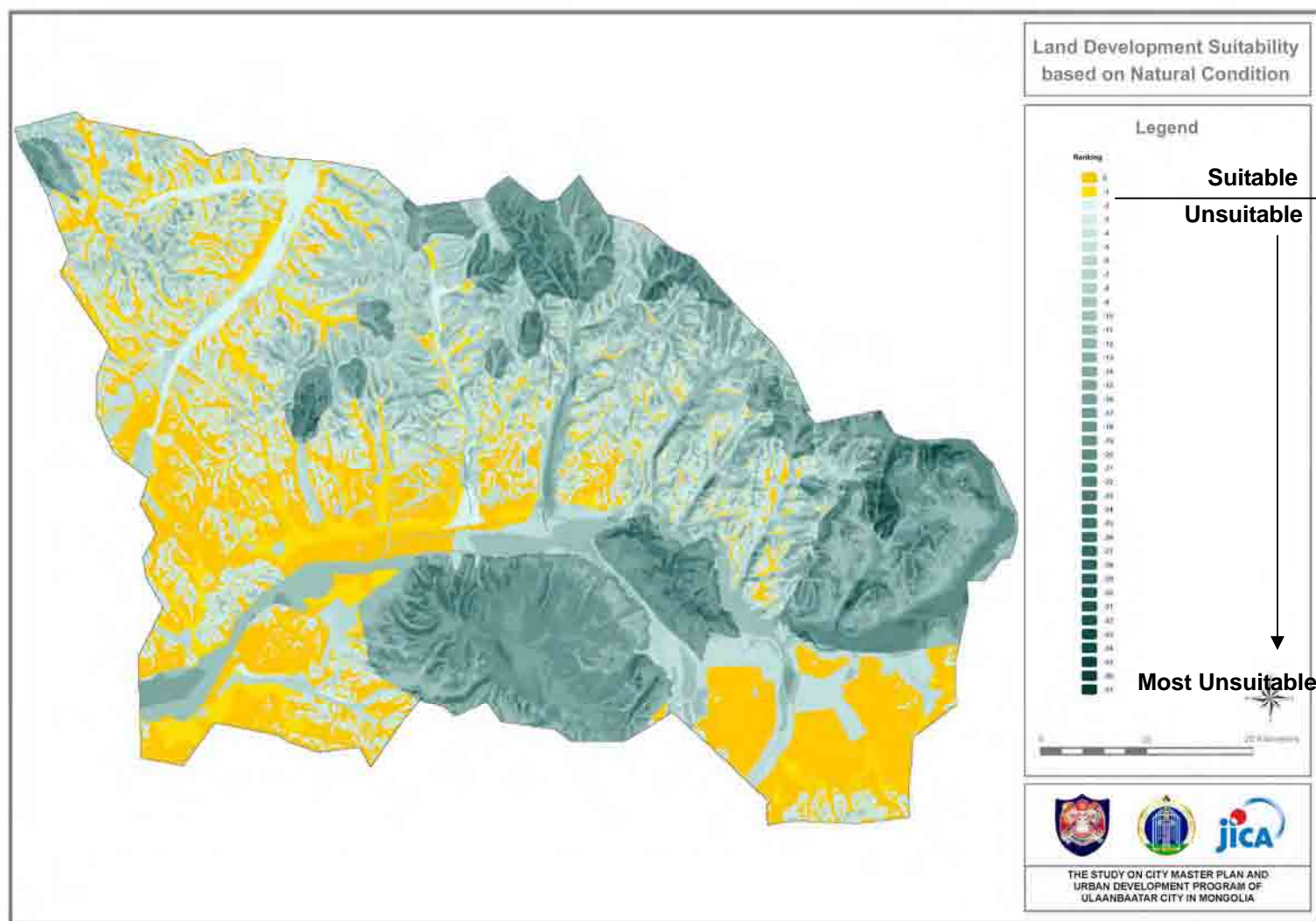
totaling scores of the subject natural conditions by GIS. The result is shown in Figures 6.1.2 and 6.1.3, indicating the distribution of land unsuitable for urban development. The analytical result obviously indicates that area suitable for development exists scarcely in the east area of UB City, and by contrast widespread in the west area. Based on this analytical result, area to be designated for urbanization promotion was determined.

Table 6.1.1 Ranking System for Land Evaluation based on Natural Conditions

Subjects		Ranking Scores						
		-10	-5	-4	-3	-2	-1	0
Natural Conditions	Steep Area	More than 16°	13 - 16°	10 - 13°	7 - 10°			
	Water Resources Preservation Area	Inside Riverbed	Buffer of Riverbed					Other Areas
	Water Cultivation Area	Inside						Other Areas
	Groundwater Contamination-prone Area				Above Groundwater Stream		Buffer of Groundwater Stream	
	Natural Preservation Area (Legally Designated)	Inside						Other Areas
	Fertile Land Suitable for Agriculture		Inside					Other Areas
	Forest Land		Inside					Other Areas
	Flood-prone Area		Inside					Other Areas

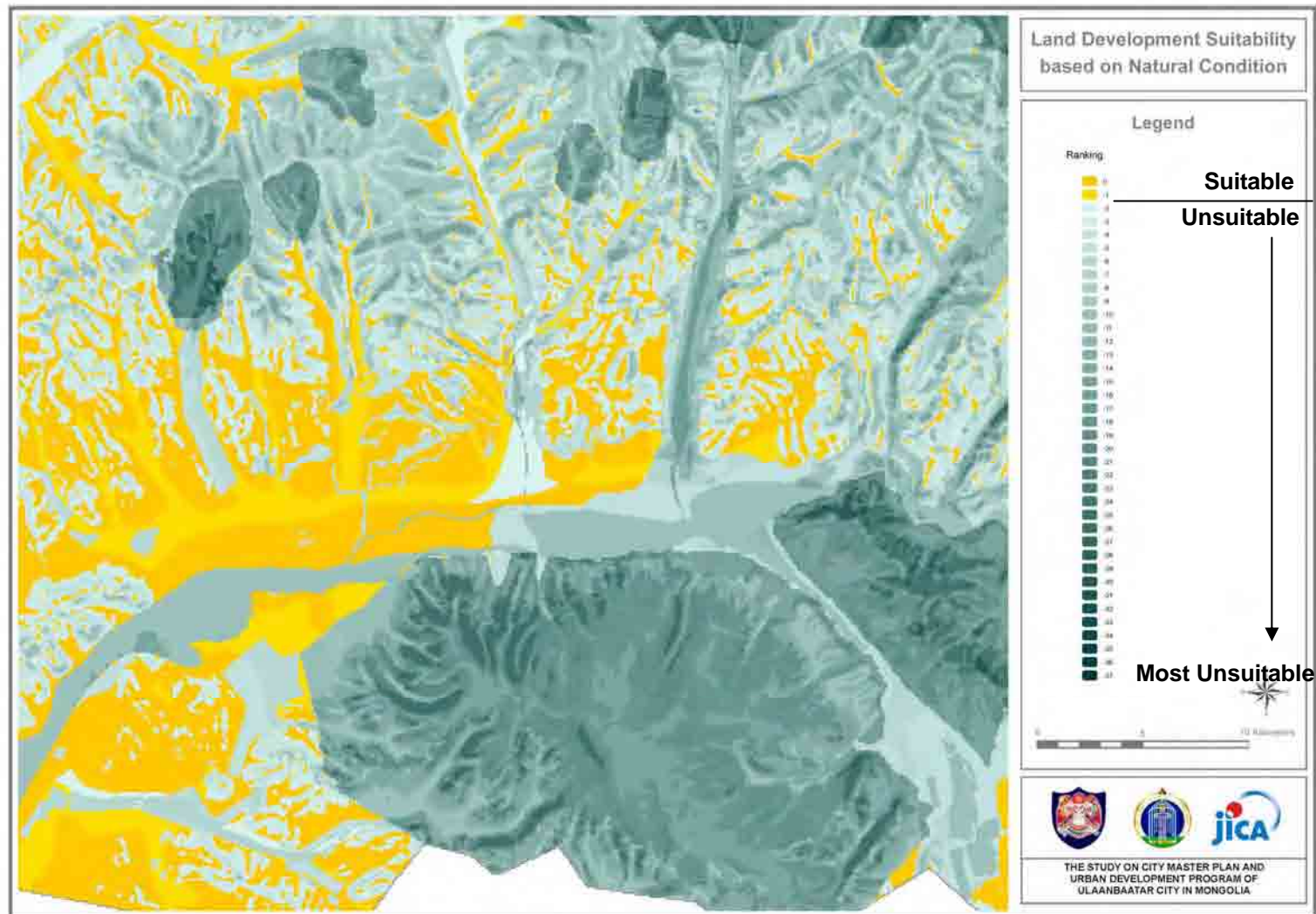
Source: JICA Study Team

Figure 6.1.2 Land Development Suitability based on Natural Conditions (UB Metropolitan Area)



Source: JICA Study Team

Figure 6.1.3 Land Development Suitability based on Natural Conditions (Ulaanbaatar City)



Source: JICA Study Team

(2) Analysis II: Development Potentiality Analysis based on Trend Urbanization

Future trend urbanization is simulated based on the current urbanization trend in order to identify future urbanization problems. Urbanization process is found even in the following areas whose natural conditions are expected to constrain urbanization, but actually do not. Such conditions are rescored to reflect the actual trend of urbanization.

- (i) Urbanization in water resources preservation area
- (ii) Urbanization in flood-prone area
- (iii) Urbanization in fertile land suitable for agricultural and forest land

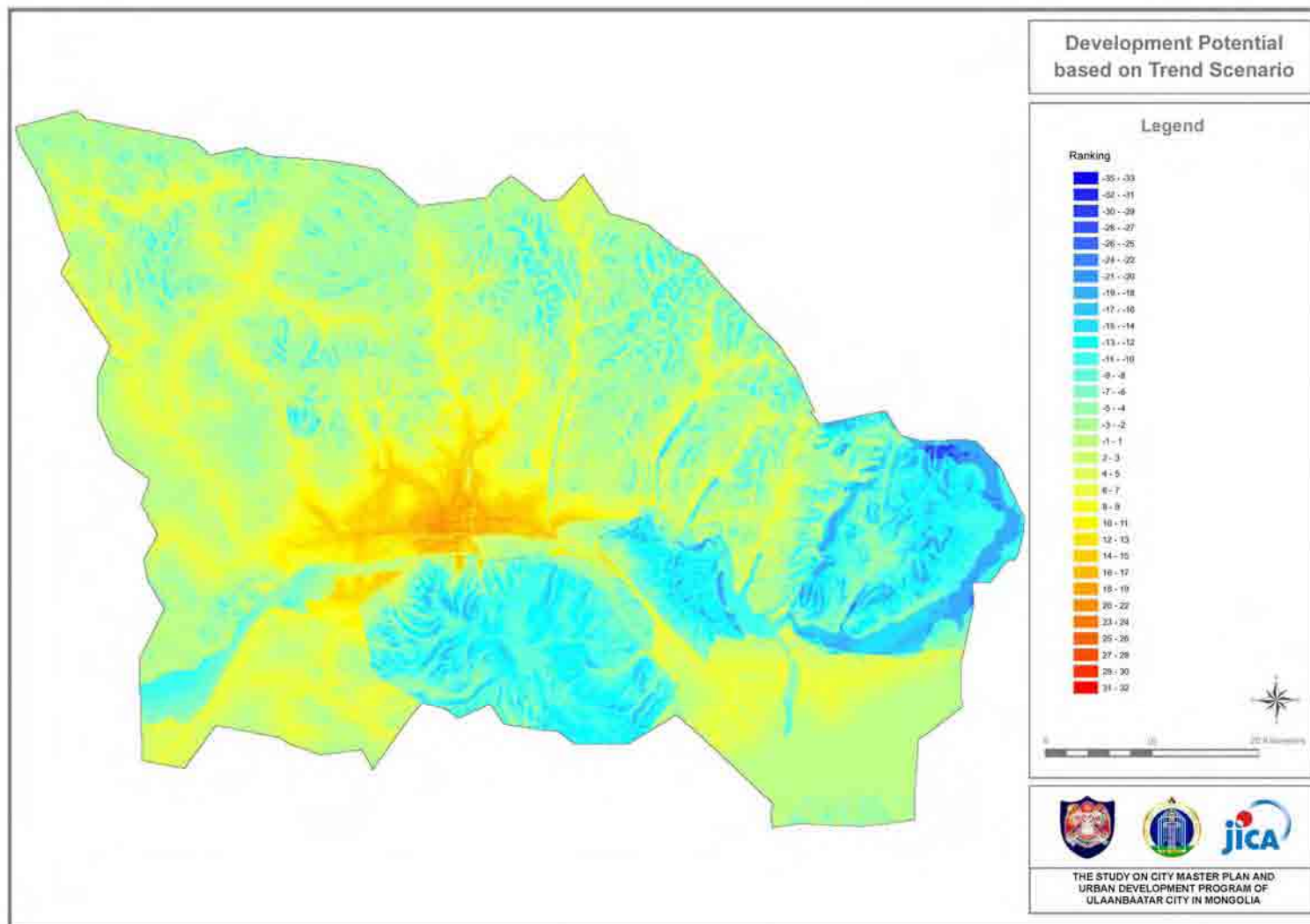
For the purpose of simulation of future trend urbanization, natural conditions and their effects are rescored as shown in Table 6.1.2. Specifically, natural conditions other than “Steep Area” and “Inside Riverbed” in water preservation areas are not assigned as constraints. The result of future trend urbanization simulation is shown on Figures 6.1.4 and 6.1.5.

The following are clarified by comparing the development suitability maps (Figures 6.1.2 and 6.1.3) and the future trend urbanization simulation maps (Figures 6.1.4 and 6.1.5).

- Extensive northward urbanization in the water preservation and underground contamination-prone areas and toward water cultivation area
- Extensive eastward urbanization in the water preservation area and upstream area of Tuul River

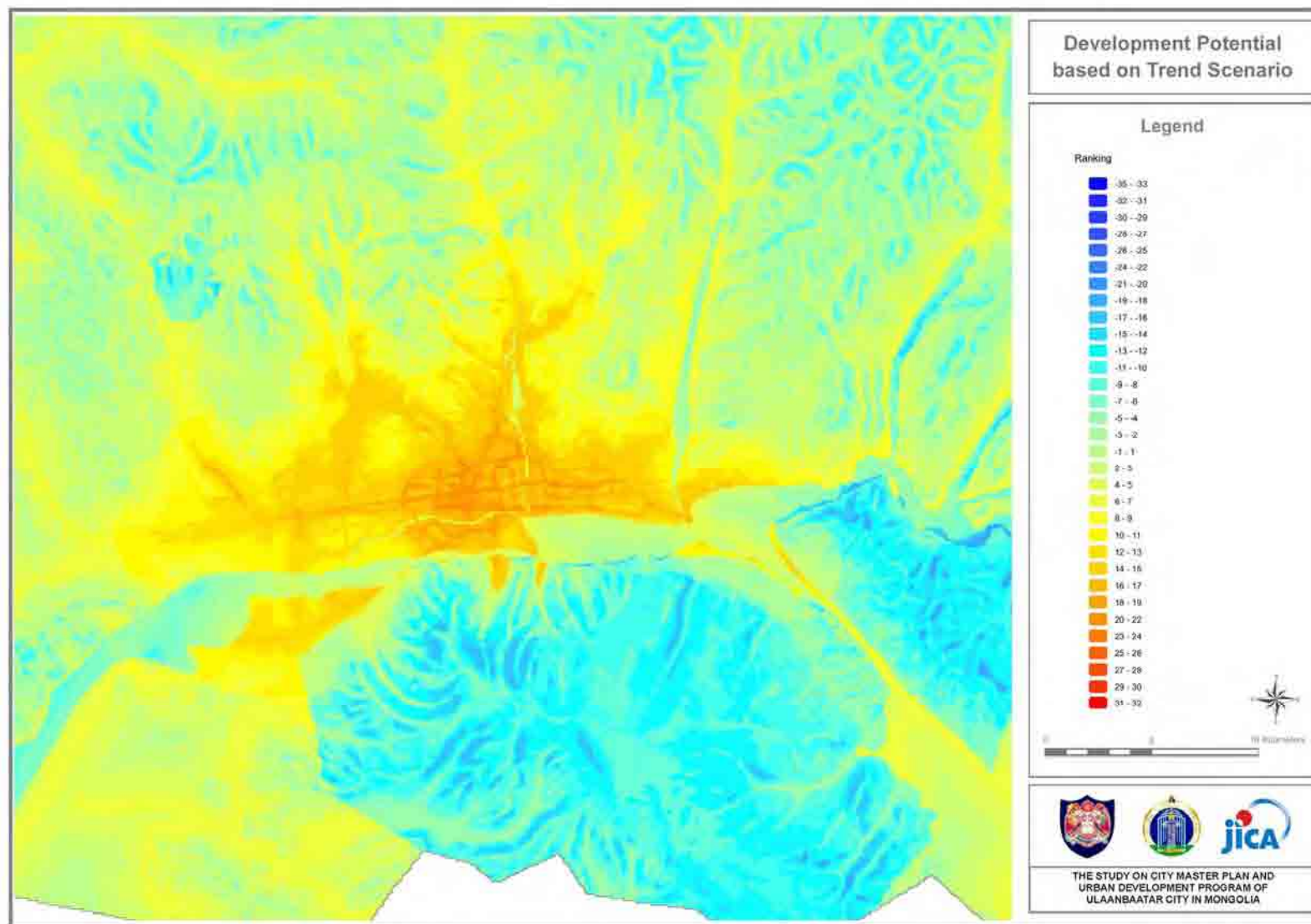
It is predicted that the continuity of the current urbanization would cause a huge environmental loss, especially severe damage to water resources which may endanger the urban sustainability of Ulaanbaatar City. It is, therefore, imperative to establish urbanization control measures including determination of the Urbanization Promotion Area (UPA) and development of institutional framework.

Figure 6.1.4 Development Potential Analysis based on Trend Urbanization (UB Metropolitan Area)



Source: JICA Study Team

Figure 6.1.5 Development Potential Analysis based on Trend Urbanization (Ulaanbaatar City)



Source: JICA Study Team

Table 6.1.2 Ranking System for Trend Urbanization Simulation

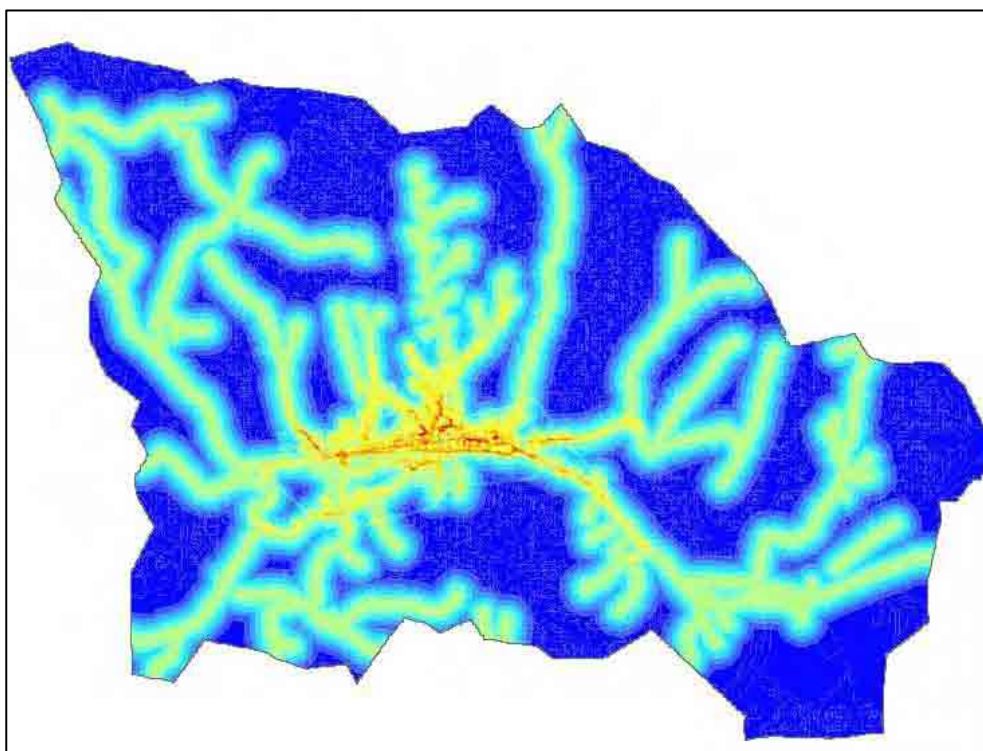
Subjects		Ranking Scores											
		-10	-5	-4	-3	-2	-1	0	1	2	3	4	5
Natural Conditions	Steep Area	More than 16°	13 - 16°	10 - 13°	7 - 10°								
	Water Resources Preservation Area	Inside Riverbed						Other Areas					
	Water Cultivation Area							Other Areas					
	Groundwater Contamination-prone Area							All Areas					
	Natural Preservation Area (Legally Designated)							All Areas					
	Fertile Land Suitable for Agriculture							All Areas					
	Forest Land							All Areas					
	Flood-prone Area							All Areas					
Infrastructure Conditions	Accessibility to Road Network							Other Areas	2000~2500m	1500~2000m	1000~1500m	500~1000m	0~500m
	Availability of Heating Supply System							Not Available	Available (100m)				
	Availability of Water Supply System							Not Available	Available (100m)				
	Availability of Sewage System							Not Available	Available (100m)				
	Availability of Electricity Network							Not Available	Available (100m)				
	Availability of Telecommunication Network							Not Available	Available (100m)				
	Availability of Kiosk Distribution							Not Available	Available (500m)				
Socioeconomic Conditions	Accessibility to Central Business District							Other Areas	10000~15000m	5000~10000m	2500~5000m	1000~2500m	0~1000m
	Accessibility to Sub-centers								1000~2500m	0~1000m			
	Accessibility to Railway Stations							Other Areas			1000~2500m	500~1000m	0~500m
	Accessibility to Bus Routes							Other Areas			1000~2500m	500~1000m	0~500m
	Accessibility to Schools								500~1000m	0~500m			
	Accessibility to Parks								500~1000m	0~500m			
	Accessibility to Religious Facilities								500~1000m	0~500m			

Source: JICA Study Team

(3) Analysis III: Development Potential Analysis based on Existing Infrastructure Conditions

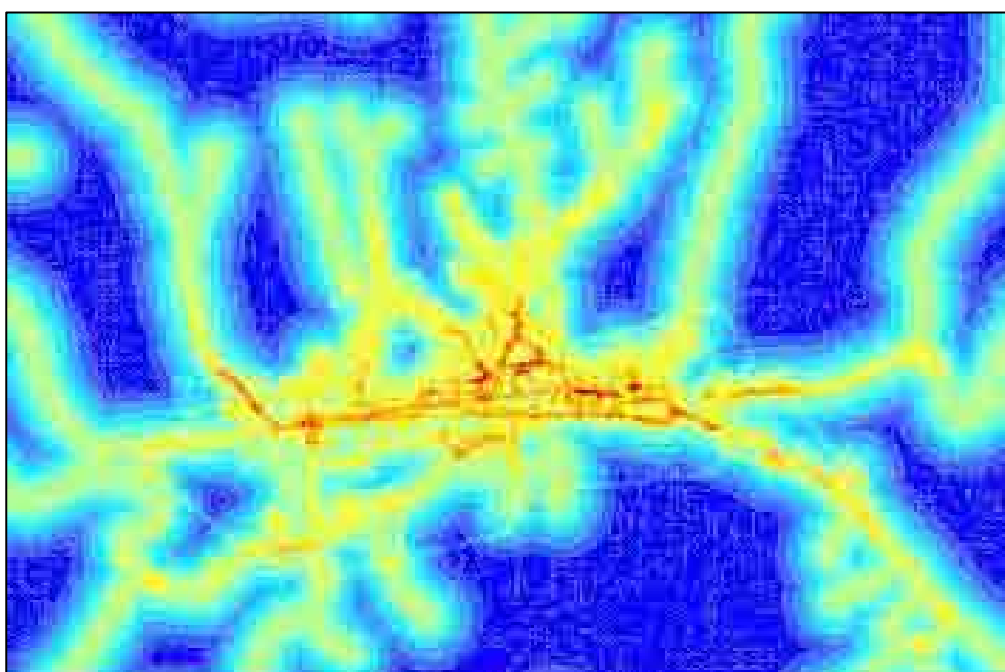
Development potential and urbanization suitable areas are identified only from a viewpoint of availability of the existing infrastructure. The result of the GIS analysis is shown in Figures 6.1.6 and 6.1.7. Scores are given based on the existing infrastructure conditions as shown in Table 6.1.3. High potentiality indicates the availability of various existing infrastructures with lower development cost to access newly developed/planned infrastructures.

**Figure 6.1.6 Development Potential based on Existing Infrastructure Conditions
(UB Metropolitan Area)**



Source: JICA Study Team

**Figure 6.1.7 Development Potential based on Existing Infrastructure Conditions
(Ulaanbaatar City)**

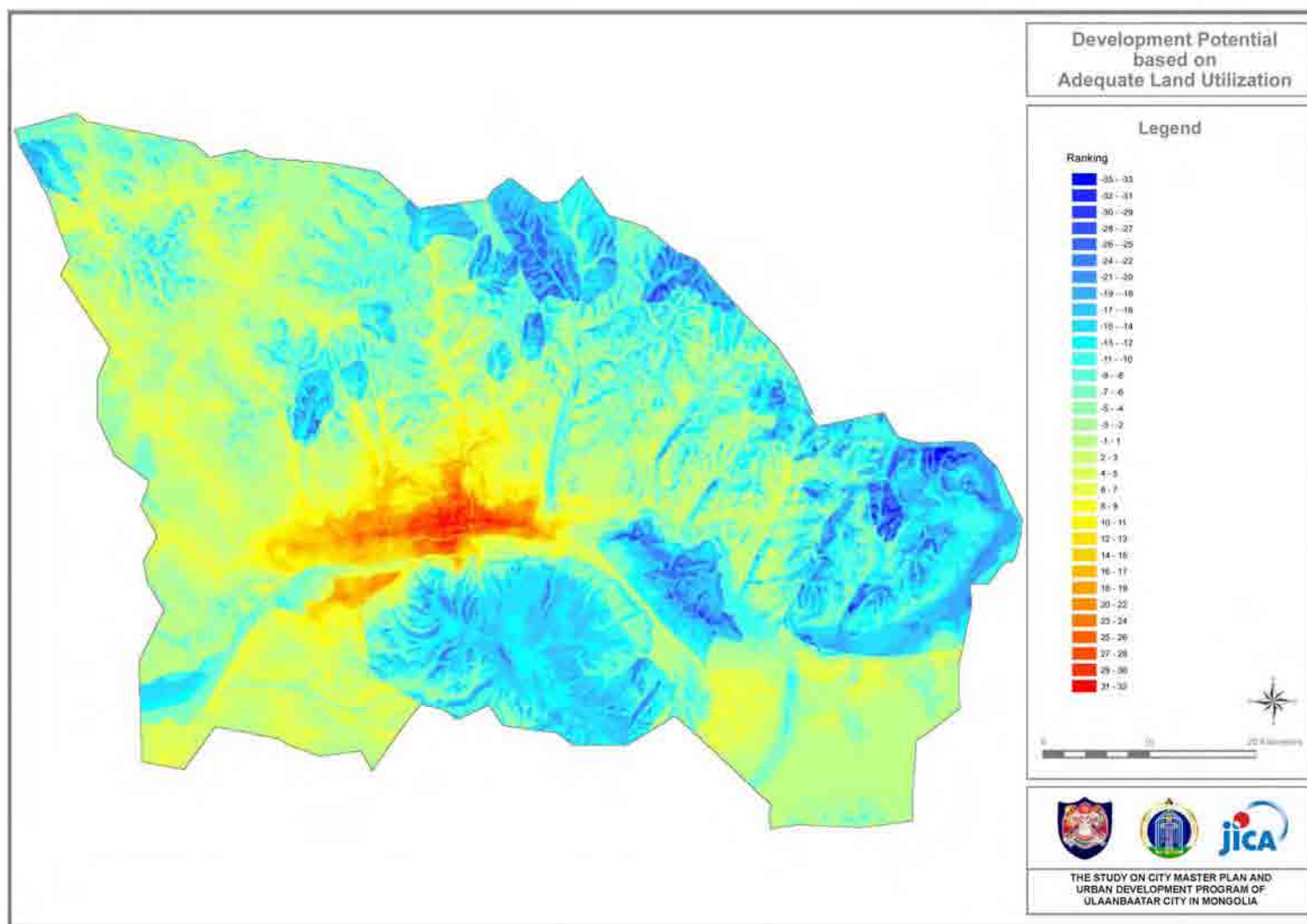


Source: JICA Study Team

(4) Analysis IV: Development Potential based on Adequate Land Utilization

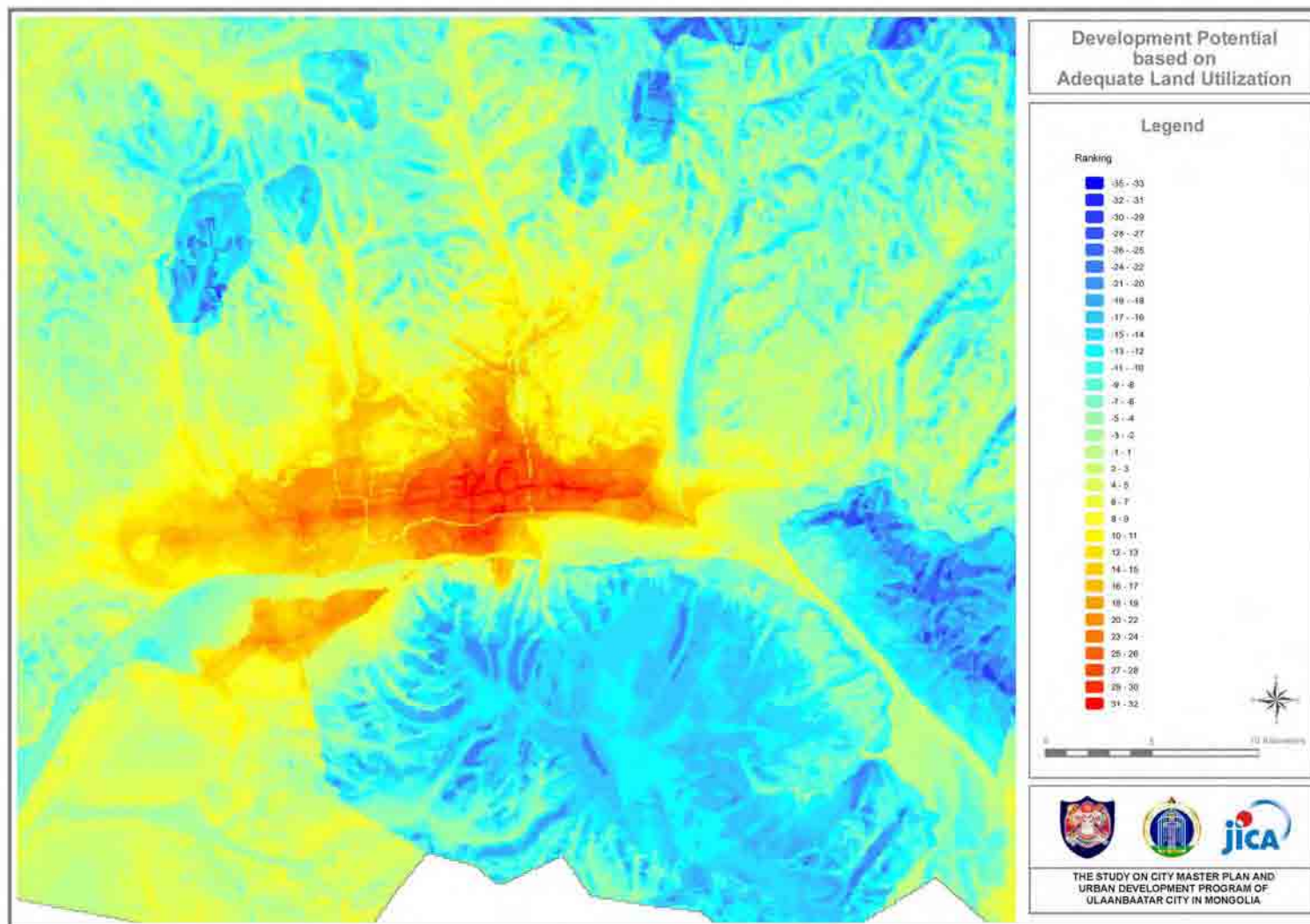
Development potentiality is evaluated based on the score of adequacy of land utilization. Adequate land utilization is considered to be achieved by utilizing areas based on natural conditions, fully taking advantage of the existing urban services and infrastructures. This contributes to minimizing environmental loss and development cost for infrastructures and public services. The analytical result is shown in Figures 6.1.8 and 6.1.9, and scores to be given are tabulated in Table 6.1.3. This result will be employed to determine Urbanization Promotion Area (UPA) by comparing Trend Urbanization Case (Figures 6.1.4 and 6.1.5) and Adequate Land Utilization (Figures 6.1.8 and 6.1.9).

Figure 6.1.8 Development Potential based on Adequate Land Utilization (UB Metropolitan Area)



Source: JICA Study Team

Figure 6.1.9 Development Potential based on Adequate Land Utilization (Ulaanbaatar City)



Source: JICA Study Team

Table 6.1.3 Ranking System for Development Potentiality based on Adequate Land Utilization

Subjects		Ranking Scores											
		-10	-5	-4	-3	-2	-1	0	1	2	3	4	5
Natural Conditions	Steep Area	More than 16°	13 - 16°	10 - 13°	7 - 10°								
	Water Resources Preservation Area	Riverbed	Buffer Area of Riverbed					Other Areas					
	Water Cultivation Area	Inside						Other Areas					
	Groundwater Contamination-prone Area				Above Ground-water Stream		Buffer Area of Ground-water Stream						
	Natural Preservation Area (Legally Designated)	Inside						Other Areas					
	Fertile Land Suitable for Agriculture		Inside					Other Areas					
	Forest Land		Inside					Other Areas					
	Flood-prone Area		Inside					Other Areas					
Infrastructure Conditions	Accessibility to Road Network							Other Areas	2000~2500m	1500~2000m	1000~1500m	500~1000m	0~500m
	Availability of Heating Supply System							Not Available	Available (100m)				
	Availability of Water Supply System							Not Available	Available (100m)				
	Availability of Sewage System							Not Available	Available (100m)				
	Availability of Electricity Network							Not Available	Available (100m)				
	Availability of Telecommunication Network							Not Available	Available (100m)				
	Availability of Kiosk Distribution							Not Available	Available (500m)				
Socioeconomic Conditions	Accessibility to Central Business District							Other Areas	10000~15000m	5000~10000m	2500~5000m	1000~2500m	0~1000m
	Accessibility to Sub-centers								1000~2500m	0~1000m			
	Accessibility to Railway Stations							Other Areas			1000~2500m	500~1000m	0~500m
	Accessibility to Bus Routes							Other Areas			1000~2500m	500~1000m	0~500m
	Accessibility to Schools								500~1000m	0~500m			
	Accessibility to Parks								500~1000m	0~500m			
	Accessibility to Religious Facilities								500~1000m	0~500m			

Source: JICA Study Team

3) Proposed Land Use Concepts

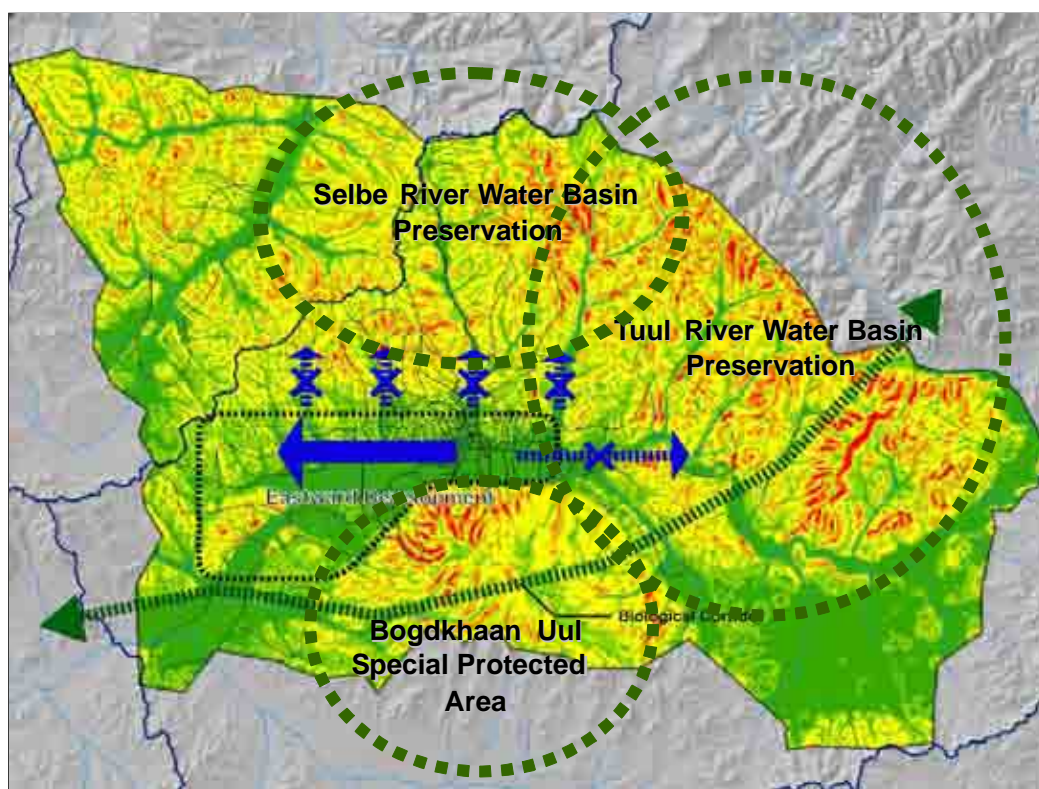
The current urbanization trend toward the upper stream of the Tuul River tends to increase damage of environmental resources, and such a trend should be carefully controlled. The land use of Ulaanbaatar City should be determined based on the following basic strategies.

- (i) Strictly conserve the watershed forest areas and special protection areas, which are assessed as environmentally sensitive, such as:
 - Eastward areas alongside the upper stream of Tuul River;

- Northward hilly areas toward the upper stream of Selbe River and Tolgoi River;
and
 - Bogdkhaan Uul Special Protected Area.
- (ii) Control the development in areas unsuitable for urbanization, including steep lands and flood prone areas
- (iii) Conserve fertile lands suitable for agriculture
- (iv) Conserve “Ecological Network” by
- Maintaining and improving the existing biological network of natural environment, consisting of forest, water and green areas, and
 - Maintaining migration routes of animals as “Biological Corridors”

Taking into account all conditions above, the urbanization process should be restricted in the east, north and south. The only direction suitable for urban expansion is the west, as shown in Figure 6.1.10. Massive land development activities for housing and commercial purposes in the east, north and south should be prevented or strictly controlled by legal instruments (as discussed in the following section), with large-scale development being allowed only towards the west.

Figure 6.1.10 Strategy of Land Use and Urban Expansion



Source: JICA Study Team

6.2 Institutional Framework for Strategic Urban Growth Management

The task of urban planning is to guide the administrative territory toward the most suitable land use. This requires a legally mandated administrative tool for urban growth management or urban development control. To this end, the first planning action is to evaluate the entire land potentials and suitability and divide it into two categories: (1) the areas to be positively developed or urbanized; and (2) the areas not to be urbanized, or to be subject to major urban activities only with strict controls.

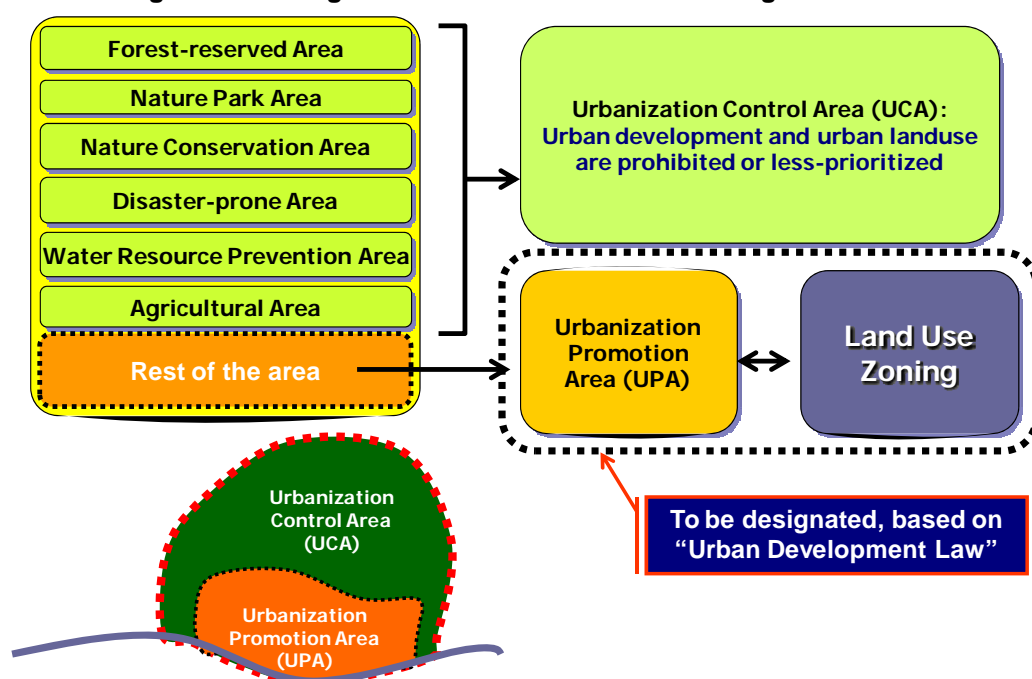
Figure 6.2.1 shows a conceptual procedure for a legal framework to determine the Urbanization Control Area (UCA) and at the same time, the Urbanization Promotion Area (UPA) for appropriate land use management.

To identify UCAs, the forest and green areas useful for “watershed protection” should be given the top priority in Ulaanbaatar City in particular, followed by forest-reserved areas, natural park areas, natural conservation areas, flood-prone areas. Areas suitable for agriculture also may be protected from urban development.

The residual area, subtracting all the conservation areas from the entire territory, is recognized as being suitable for urban development. Therefore, part of the residual area is designated as UPA, where urban development activities should be encouraged under land use rules and regulations. For instance, a “Zoning System” can be applied within the designated UPA.

In this process, the most important step is that the boundary dichotomizing the territorial area into UCA and UPA should be legally approved under the Urban Development Law or a related sub-law, otherwise the boundary would not make any sense for the enforcement of land use. Because there is normally a great difference in land value between the areas inside and outside the boundary, its designation will be politically sensitive and therefore requires a transparent procedure under the legal regulation.

Figure 6.2.1 Legal Framework for Land Use Management



Source: JICA Study Team

6.3 Urban Structure for the Compact City

1) Alternative Scenarios on Growth Management

Given a scenario of “Do-Nothing” on land use management for the urbanization process, urban sprawl will continue over any available areas in Ulaanbaatar City. The land will be occupied in a disorderly fashion, thereby blighting the city and eroding the potential for urban economic growth. Therefore, the management of urban growth will surely become crucial along with growing an urban economy.

Based on the same recognition as above, UBMP-2020 proposed a controlled-expanded urbanization pattern in association with the development of several new urban settlement areas. This approach would be appropriate, given a well-functioning management system for land development and construction activities by the private sector.

Another scenario, which deserves to be pursued to revise the Master Plan, is so-called “Guided-growth approach” to form a Compact City, instead of allowing urban sprawl. Based on past experiences in other cities in the world, the public mass-transit system will be an effective tool to guide urban development activities, so the compact city is regarded as a mass-transit-led urbanization pattern based on integration with transport systems and land use management.

2) Formation of Guided Compact City

The “Compact City” can be defined in several ways, depending on the characteristics of the city and planning objectives. Nowadays, the compact city concept is often used as a planning approach to form an environmentally sustainable urban system¹, or an energy-efficient urban structure under rapid increase in urban populations.

According to this, a Compact City should have conditions and/or elements as follows:

- (i) High-density settlement
- (ii) Less dependency on automobiles
- (iii) Clear delineation from surrounding area
- (iv) Mixed land use
- (v) Social fairness
- (vi) Self-sufficiency of daily life
- (vii) Independent governance

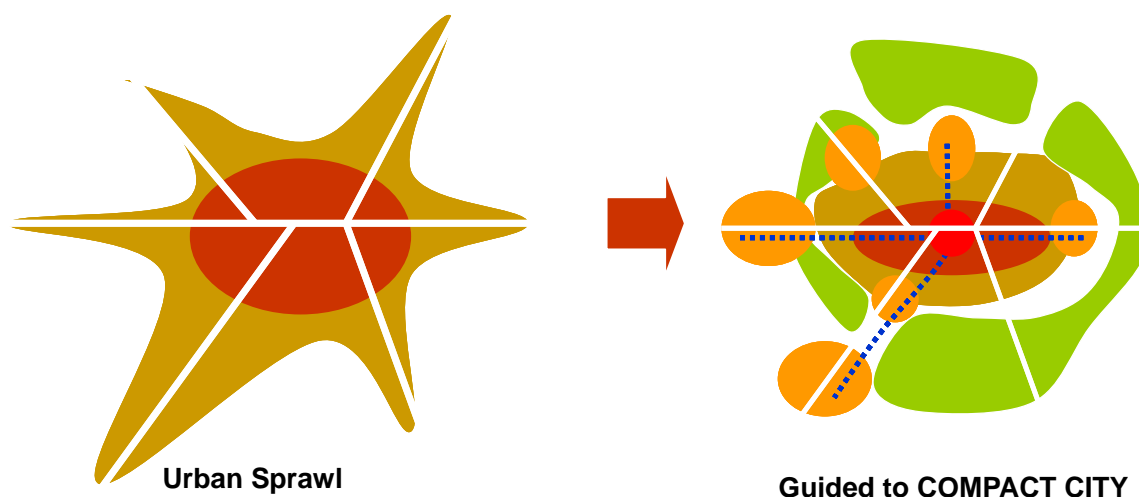
In addition, the following planning issues are envisaged for materialization of a Compact City.

- (a) **Quality Mass-transit Corridors:** An efficient public transportation system, comprised of mass-transit as a backbone and effective feeder systems is to be established.
- (b) **Integrated Urban and/or Land-use Development and Revitalization of Inner City:** high-density habitation and intensive land use for commercial and business activities need to be promoted.
- (c) **Efficient Supply of Social Infrastructures and Public Services:** Energy-saving/efficient and resource recycling-oriented urban systems are pursued.

¹ The first definition was made by Danzwik and Saaty (1978).

- (d) **Adequate Institutional Framework for Private Sector Investment:** Properly-managed active private sector participation in development of a Compact City is essential.

Figure 6.3.1 Urban Sprawl and Guided Move to Compact City



Source: JICA Study Team

3) Urbanization Pattern under the “Compact City Scenario”

The Compact City Scenario shall require a smaller Urbanization Promotion Area than that of the “Do-Nothing” Scenario because higher densification of existing urbanization areas will obviate disorderly urban sprawl.

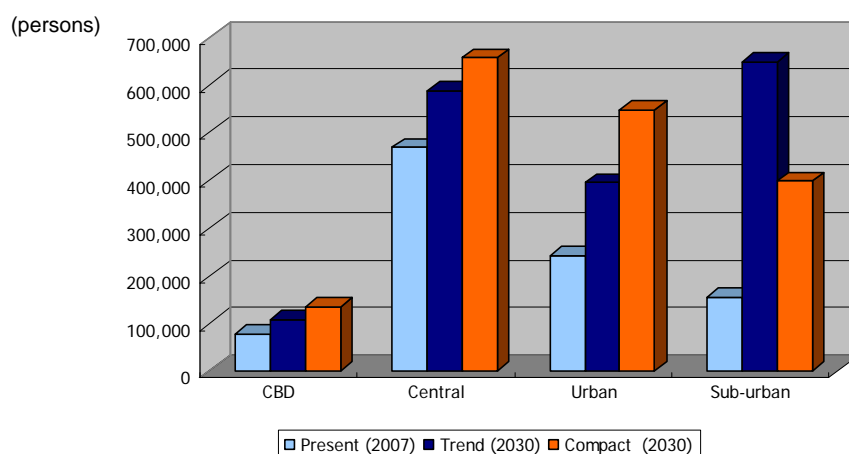
The current density of the existing urbanized area is about 60 persons/ha on average. The underlying issue for “Compact City” is how intensively the existing built-up area can accommodate new comers, or how high the population density could practically become. Facilitation of urban redevelopment and/or renewal will be a prerequisite to address the concept of Compact City.

An examination of future urbanization patterns in 2030 was made and the result is summarized in Table 6.3.1, presenting a comparison between “Trend (Do-nothing) Scenario” and “Compact City Scenario” in population, Urbanized Areas and Population Density in four (4) categories of area that represent the geographical proximity to the CBD, as shown in Figure 6.4.5. It is obvious that the urbanized area of the Compact City will be smaller than that of the Trend Scenario, totaling about 19,300 ha for the Compact City and about 25,000 ha for the trend scenario in 2030. Approximately 9,000 ha shall be additionally expanded from the present 2007 in the Trend Scenario, compared with about 5,700 ha in the Compact City.

The population density will be 90.0 persons/ha for the Compact City, compared with 69.4 persons/ha for the Trend Scenario on average.

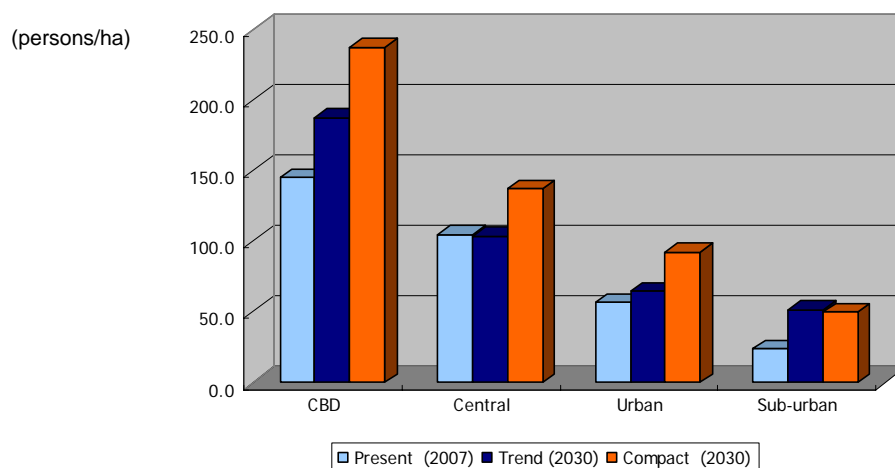
The comparison in area distributions is understandable from Figures 6.3.2 and 6.3.4. As seen in these figures, the Compact City tends to facilitate more densification in the central area by controlling urban sprawl to sub-urban areas. Thereby, benefits from the Compact City will lead to more efficient transportation, higher people’s mobility, a more efficient infrastructure network, better cost-performance and less environmental load on the entire city.

Figure 6.3.2 Comparison of Population Distribution between “Trend” and “Compact City”



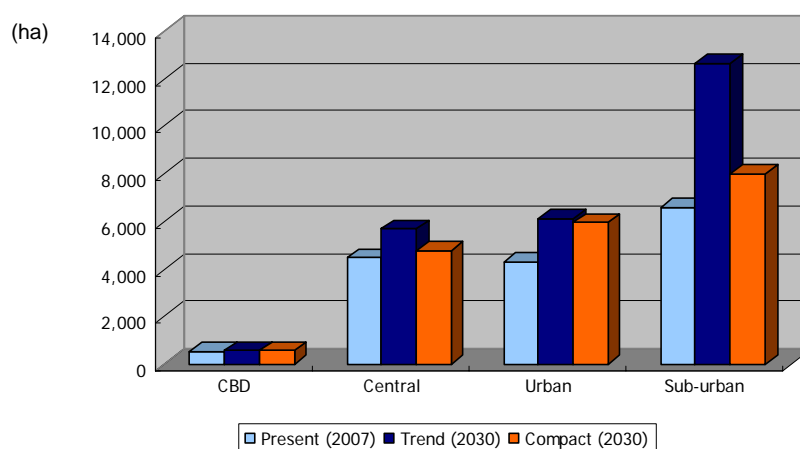
Source: JICA Study Team

Figure 6.3.3 Comparison of Population Density between “Trend” and “Compact City”



Source: JICA Study Team

Figure 6.3.4 Comparison of Urbanized Area between “Trend” and “Compact City”



Source: JICA Study Team

**Table 6.3.1 Comparison of Urbanization Patterns of Year 2030
between “Trend” and “Compact City”**

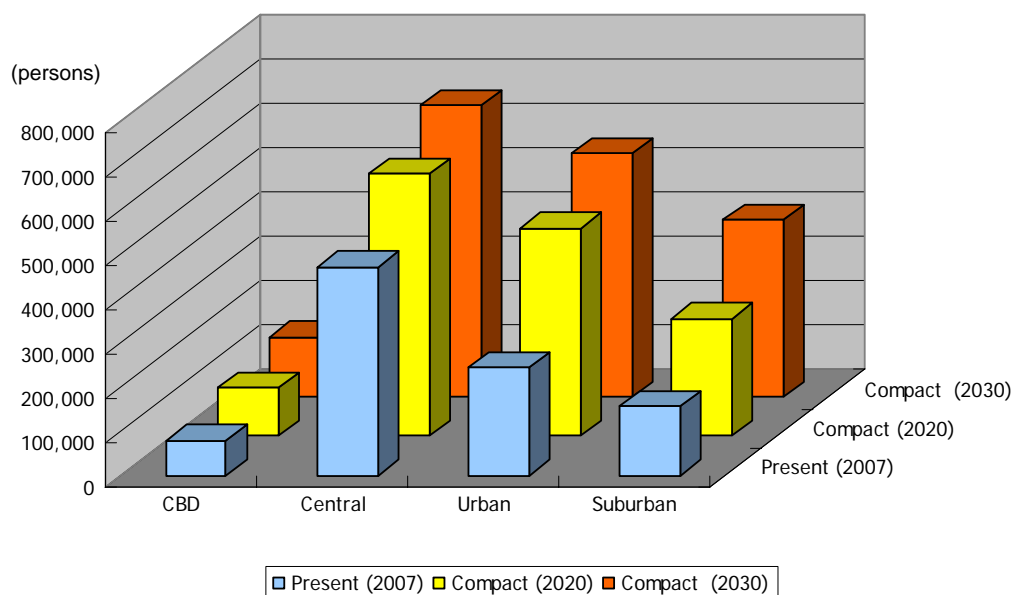
	(A) Population			(B) Urbanized Area (ha)			(C) Population Density (A/B) (prs/ha)		
	Present	Trend	Compact	Present	Trend	Compact	Present	Trend	Compact
	2007	2030	2030	2007	2030	2030	2007	2030	2030
CBD	77,800	107,200	134,900	540	570	570	144.1	188.1	236.7
Central	469,100	588,100	657,400	4,490	5,690	4,800	104.5	103.4	137.0
Urban	243,200	394,800	547,800	4,300	6,130	5,950	56.6	64.4	92.1
Sub-urban	155,600	648,900	398,900	6,590	12,670	8,010	23.6	51.2	49.8
Total	945,700	1,739,000	1,739,000	15,920	25,060	19,330	59.4	69.4	90.0

Note: Urbanized Area for “Compact City Scenario” includes urbanized area in the outside of Urbanization Promotion Area (UPA). Total area of UPA of Zoning Map is about 18,500 ha.

Source: JICA Study Team

Growth patterns from the present through Year 2020, to 2030 are examined as shown in Table 6.3.2. The growth pattern of the population for the Compact City Scenario is shown in Figure 6.3.5. At the present, rapid population increase is observed especially in urban and sub-urban areas. In the future, urbanization in sub-urban areas outside of the Urbanization Promotion Area (UPA) should be strictly controlled based on urban growth management. Taking into account future desirable urbanization as well as the present situation, population increase will be higher in urban areas, compared with other areas, up to Year 2020. Redevelopment and new development will then promote population increase in the CBD and sub-urban areas between Year 2020 and 2030.

Figure 6.3.5 Assumed Population Growth Pattern in Year 2020 and 2030 for “Compact City”



Source: JICA Study Team

**Table 6.3.2 Comparison of Growth Patterns between “Trend” and “Compact City”
in Year 2020 and 2030**

Projected Population Distribution

Unit: persons

Area	Present	Trend		Compact City	
	Year 2007	Year 2020	Year 2030	Year 2020	Year 2030
CBD	77,800	98,400	107,200	108,200	134,900
Central	469,100	567,400	588,100	592,300	657,400
Urban	243,200	371,800	394,800	469,400	547,800
Suburban	155,600	397,400	648,900	265,100	398,900
Total	945,700	1,435,000	1,739,000	1,435,000	1,739,000

Projected Employment Distribution

Unit: persons

Area	Present	Trend		Compact City	
	Year 2007	Year 2020	Year 2030	Year 2020	Year 2030
CBD	76,500	109,700	146,400	115,500	174,500
Central	200,800	312,100	390,800	320,200	415,400
Urban	63,800	191,600	245,900	218,300	297,400
Sub-urban	25,700	168,600	356,900	128,000	252,700
Total	366,800	782,000	1,140,000	782,000	1,140,000

Projected Urbanized Area

Unit: ha

Area	Present	Trend		Compact City	
	Year 2007	Year 2020	Year 2030	Year 2020	Year 2030
CBD	540	570	570	550	570
Central	4,490	5,480	5,690	4,690	4,800
Urban	4,300	5,850	6,130	5,530	5,950
Sub-urban	6,590	9,600	12,670	6,990	8,010
Total	15,920	21,500	25,060	17,760	19,330

Projected Population Density

Unit: persons/ha

Area	Present	Trend		Compact City	
	Year 2007	Year 2020	Year 2030	Year 2020	Year 2030
CBD	144.1	172.6	188.1	196.7	236.7
Central	104.5	103.5	103.4	126.3	137.0
Urban	56.6	63.6	64.4	84.9	92.1
Sub-urban	23.6	41.4	51.2	37.9	49.8
Total	59.4	66.7	69.4	80.8	90.0

Projected Employment Density

Unit: persons/ha

Area	Present	Trend		Compact City	
	Year 2007	Year 2020	Year 2030	Year 2020	Year 2030
CBD	141.7	192.5	256.8	210.0	306.1
Central	44.7	57.0	68.7	68.3	86.5
Urban	14.8	32.8	40.1	39.5	50.0
Sub-urban	3.9	17.6	28.2	18.3	31.5
Total	23.0	36.4	45.5	44.0	59.0

Source: JICA Study Team

4) Future Urban Structure of Ulaanbaatar City

(1) Land Requirement for New Urbanization in 2030

The Compact City Scenario shall require a smaller Urbanization Promotion Area because of higher densification of the existing urbanized areas and thereby avoiding disorderly urban sprawl. It is assumed that the existing urbanized areas will accommodate 1,510,000 people, while the new urbanization area will absorb more or less 230,000 people.

Based on the examination of future urbanization, it is provisionally calculated that the Urbanization Promotion Area, excluding flood-sensitive areas in the northern hilly area, shall be designated at about 19,210 ha including the existing built-up and newly urbanized areas; in addition, the Water Resource Prevention Area and Environmentally Protected Area is 9,200 ha. A total area of 28,410 ha is designated as summarized in Table 6.3.3. This provisionally calculated area will be slightly changed and adjusted for preparation of a draft zoning map, which will be explained below.

Table 6.3.3 Land Requirement for Urbanization (Compact City Scenario)

Land Use	Area (ha)	Share (%)	Population ('000)	Density (prs/ha)
Existing Urbanized Area	15,920	52%	1,510	95
Newly Urbanized Area	3,290	15%	230	70
Urbanization Promotion Area	19,210	68%	1,740	90
Water Resource Prevention Area and Environmentally Protected Area	9,200	32%	0	0
Total Area	28,410	100%	1,740	60

Source: JICA Study Team

(2) Future Urban Structure under the Compact City Scenario

A model of urban structure under the Compact City Scenario is depicted as shown in Figure 6.3.7 and 6.3.8 which was considered with several development strategies and concepts as follows:

- (a) **Development of Unique New Towns:** Two different types of new towns will be developed, namely "Science and Technology Town" and "Knowledge City" to accommodate about 100,000 people in new urbanization areas. (The Residual 130,000 people in new urbanization areas will be accommodated in other planned new towns.) Both new towns will be located along two (2) urbanization corridors within a 20 km radius of the existing CBD.
- (b) **Relocation of Higher Educational Facilities Currently Located in the CBD and Redevelopment of the CBD:** Development of "Science and Technology Town" and "Knowledge City" will offer better places and opportunities to facilitate innovative education and academic Research & Development (R&D) activities. Many universities and higher educational institutions located mainly in the existing CBD will be relocated to such unique new towns in suburban areas. Densification of the central area will be promoted by redevelopment of vacant land after relocation. In addition, traffic conditions in the central area will be improved by decreasing commuter traffic to schools in the CBD.
- (c) **Restructuring of Existing Industrial Area:** The existing industrial areas are extensively but inefficiently used, and environmental problems have been generated due to their close proximity to the central area as well as the Tuul River. It can be observed

that a number of factories are not in operation or are neglected with poor management of facilities. These factories and warehouses should be encouraged to relocate to the planned industrial parks or designated industrial zones. The area after relocation of those industries shall be converted into more efficient land use for housing and/or commercial uses.

- (d) **Development of Rail-based Public Transportation Systems:** Two (2) lines of rail-based public transportation system will be developed along the two (2) urbanization corridors, that is, the western and southwestern corridors. The first line will run on Peace Avenue from the present east tram terminal, passing through the CBD, to a new town of “Knowledge City.” The second line will run from the CBD, through Peace Bridge, to “Science and Technology Town”. Sections of both lines running through the CBD will be underground (approx. 5 km). These new public transport systems may be named “Ulaanbaatar Metro-Transit System (UMTS)”.
- (e) **Redevelopment of Sub-centers Centered on Railway Stations:** Redevelopment for intensive land use should be promoted in the surrounding areas of selected stations of the UMTS. A number of sub-centers whose developments are facilitated as commercial, service and business centers shall be designated in the revised Master Plan. In addition, underground malls will be developed at railway stations at Sukhbaatar Square and the State Department Store to create gathering spaces even in the severe climate of winter in Mongolia (See Figure 6.3.6). This redevelopment will contribute to increasing railway users.
- (f) **Restructuring and Improvement of Ger Areas/Ger Settlements:** Affordable social housing should be developed with vacant land created by restructuring the existing industrial areas. Residents in Ger areas will be resettled in such social housing units or the residential areas to be specially designated in the revised Master Plan. The north-side hills, which are currently Ger areas, have superior environments, including provision of sunshine by facing to the south and panoramic views of Ulaanbaatar City and Bogd Khan Mountain. These areas may be converted into quality and prestigious residential areas with good environments.
- (g) **Protection for Flood Disaster and Land Sliding:** Roads on the north-side hills serve as boundaries of the Urbanization Promotion Area. The road section will be designed for prevention of flood disasters and landslides.
- (h) **Development of Green Belt:** Green belt will be developed between the existing urbanized areas and new towns. It will be integrated into a network of natural environments at regional levels.

Figure 6.3.6 Redevelopment Centered on Railway Stations with Underground Malls (Image Perspective)



Source: JICA Study Team (Nikken Sekkei)

Figure 6.3.7 Urban Structure Model of the Compact City, Ulaanbaatar

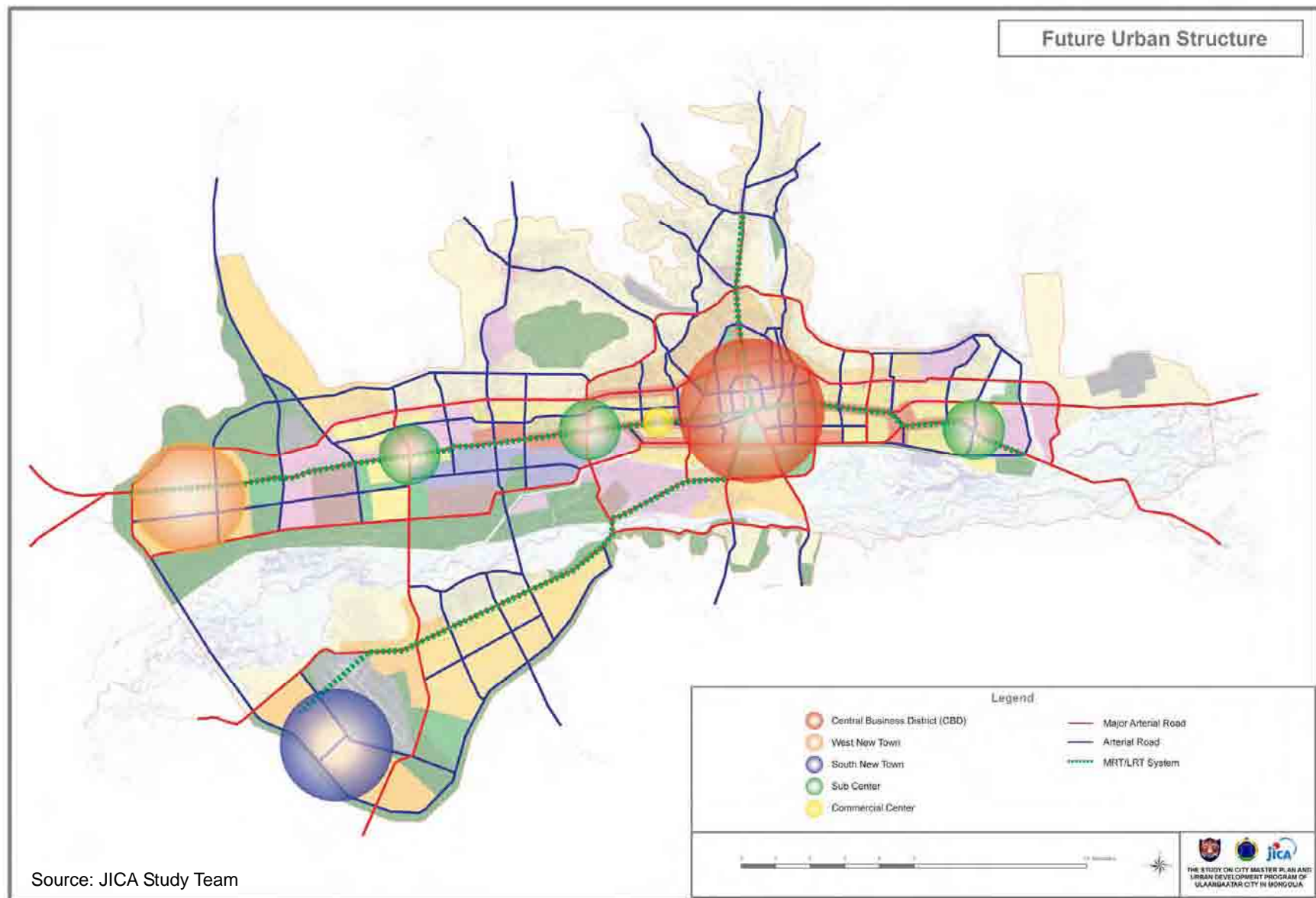
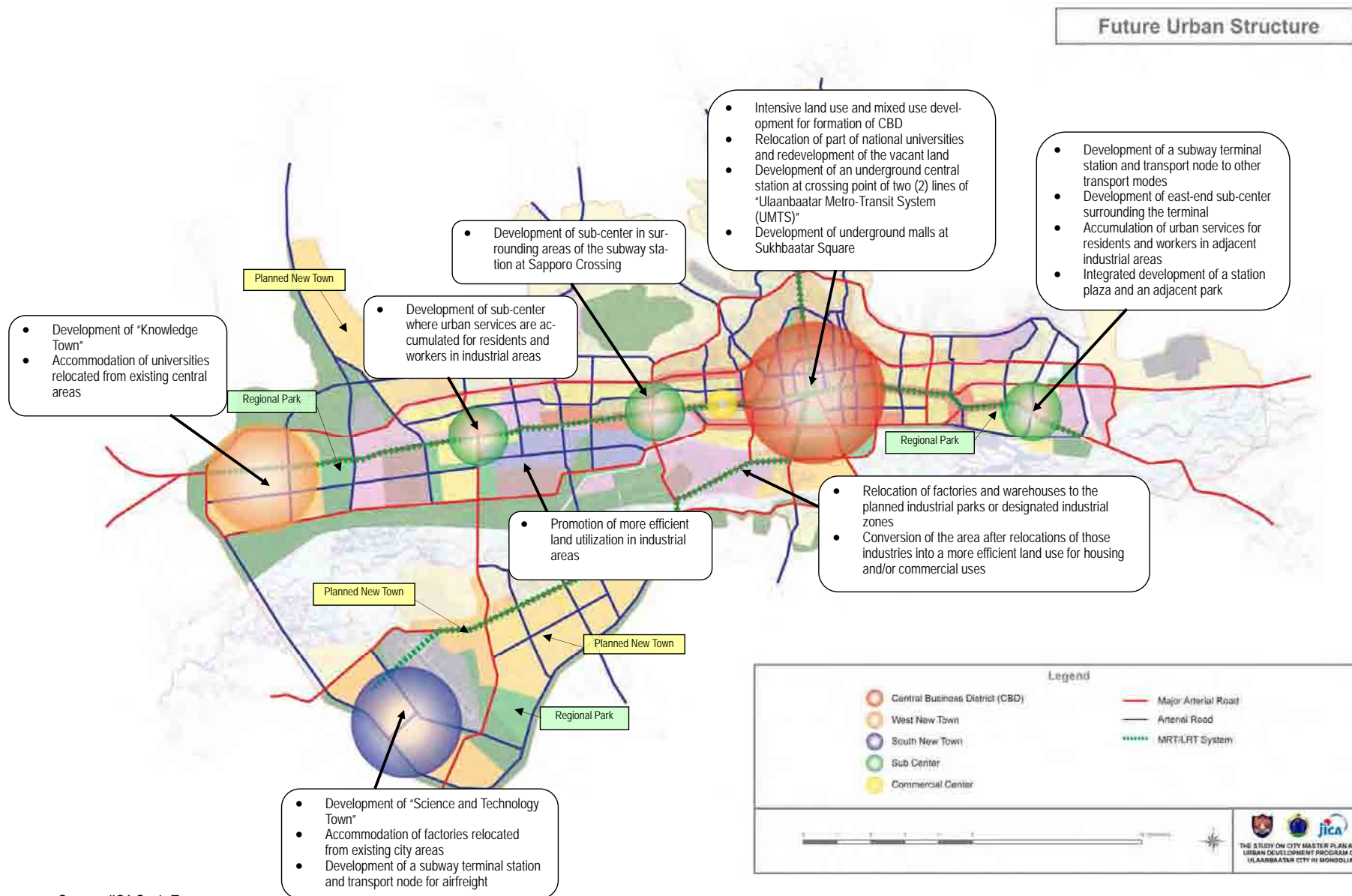


Figure 6.3.8 Development Strategies for Urban Structure Model of the Compact City, Ulaanbaatar



Source: JICA Study Team

6.4 Zoning System for Appropriate Land Use Management

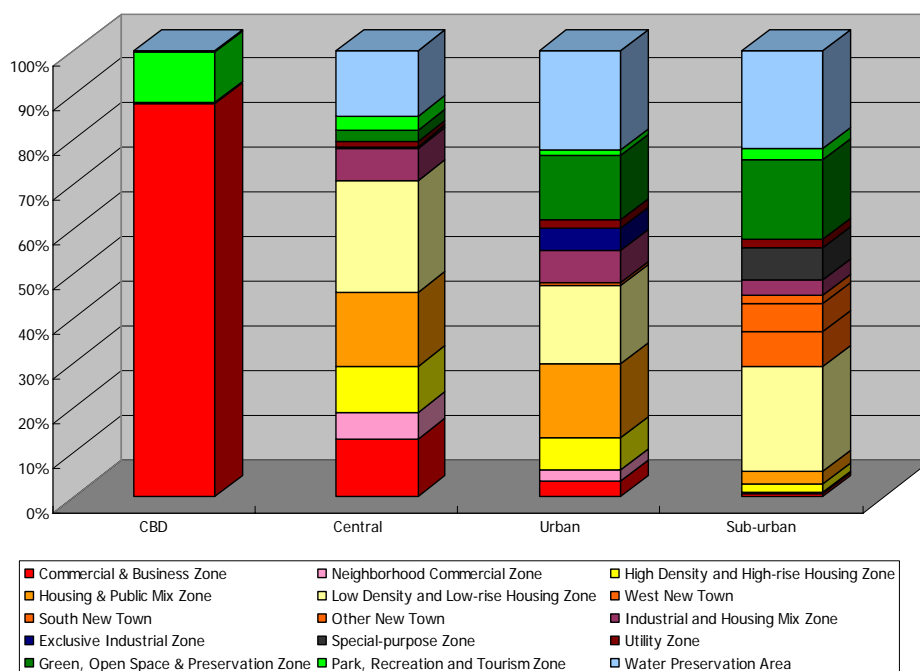
1) Proposed Zoning System

The JICA Study Team proposes a zoning system for Ulaanbaatar City based on the legal framework of urban planning as discussed in Section 6.2. The draft is depicted in Figure 6.4.2 and the zoning categories are explained in Table 6.4.1.

As summarized in Table 6.4.1, the area covered by this zoning system is approximately 27,680 ha in which the Urbanization Promotion Area (UPA) is 18,470 ha, and the preserved area for “Water Resource Prevention and Environmental Protection” accounts for 9,200 ha. Three (3) major zones, Residential Housing Zone, Commercial and Business Zone, and Industrial Zone, are allocated with areas of 10,250 ha (37.0%) , 2,300 ha (8.3%), and 1,990 ha (7.2%) respectively. It is noted that the zone for the Greenery Area, Recreation and Tourism totals 3,760 ha, meaning that the per capita green area is more or less 25 m² in 2030, whose level satisfies a standard area of 20 m² for urban development (UBMP-2020).

The area by land use for the thirty-two (32) planning areas depicted in Figure 6.4.5 is shown in Table 6.4.3. The share of land use by the above-mentioned four (4) categories is shown in Figure 6.4.1 below. Commercial and High Density and High-rise Housing Zone have a higher share in the CBD and central areas than in urban and sub-urban areas.

Figure 6.4.1 Land Use Distribution by Four (4) Categorized Areas



Source: JICA Study Team

In addition, the JICA Study Team proposes a legal designation system of “Special Policy-based Districts” which is incorporated into the Zoning System, as shown in Table 6.4.2. Proposed “Special Policy-based Districts” are depicted in Figure 6.4.2. This system aims to promote appropriate land use with special consideration of environmental conservation and historical and cultural assets protection.

This draft proposal for a zoning map should be further clarified among the authorities con-

cerned as well as professionals specialized in urban planning.

Some numerical indicators to regulate the physical and spatial forms of buildings and facilities are popular in many countries in association with the zoning system. These are, for instance, Floor Area Ratio (FAR % = total floor area/the land area), Building Coverage Ratio (BCR % = Ground floor area of the building/the land area), and Maximum Height of Building, Set-back, and so on. The appropriateness of these numerical regulations on building construction should be further elaborated. For this purpose, it is recommended to organize a “professional committee” at both national and local government levels to deliberate on these planning issues.

Table 6.4.2 Special Policy-based Districts Applicable for Ulaanbaatar City

Special Policy-based District	Objectives and/or Targets
High-rise and Highly Intensive Landuse Promotion District	To develop and/or redevelop the CBD with intensive accumulation of business, commercial and service functions
Beautification Promotion District	To improve and revitalize historical buildings and urban amenities.
Historical and Cultural Area Conservation District	To conserve the assets and heritages for tourism development as well as citizens.
Parking Space Capacity Enhancement District	To develop parking lots/space with a special emphasis, involving private sector's participation and traffic management measures.
Airport City Development District	To designate the project area for development of the Airport City adjacent to the NUIA.

Source: JICA Study Team

Table 6.4.1 Proposed Model of Zoning System

Major Land Use	Zoning System in the Mongolian Urban Development Law (Amended in 2008)	Proposed System		Designated Area in Zoning Map		
		Zoning Categories	Visions and Objectives	Area (ha)	Share (%)	
Residential	Residential Housing and Public Zone	Residential Housing Zone		10,255	37.1%	
		Low Density and Low-rise Housing Zone	To develop housing areas with good environment and open space at low density.	5,902	21.3%	
		Housing & Public Mix Zone	To improve housing environment in association with a wide variety of urban services and commercial activities.	2,879	10.4%	
		High Density and High-rise Housing Zone	To develop intensive housing areas with middle- and high-rise housing buildings and spacious open space.	1,473	5.3%	
Commercial and Public		Public Zone		2,303	8.3%	
		Neighborhood Commercial Zone	To activate a variety of commercial, business and service activities for neighborhood communities	648	2.3%	
		Commercial & Business Zone	To be intensively developed as pivotal commercial and business centers / sub-centers with a variety of high-level urban service functions.	1,655	6.0%	
Industrial		Industrial Zone	Industrial Zone		1,990	7.2%
	Industrial and Housing Mix Zone		To accommodate a variety of small and medium-scale industrial and service activities, including manufacturing, warehouses, goods distribution facilities, workshops, so on. Land use changes to housing areas may be allowed, given environmental improvement measures.	1,529	5.5%	
	Exclusive Industrial Zone		To accommodate exclusively large-scale industries and utility plants with well-functioning infrastructures to support such production activities.	461	1.7%	
Green	Greenery Area, Recreation and Tourism Zone	Zone for Greenery Area, Recreation and Tourism		4,316	15.6%	
		Green, Open Space & Preservation Zone	To be protected from any kind of land development for housing, commercial & industrial activities. No buildings with other than public purposes are allowed.	3,645	13.2%	
		Park, Recreation and Tourism Zone	To be developed as parks and landscape areas for citizens' recreation and tourism. No buildings with other than public purposes are allowed.	671	2.4%	
Others	Agricultural Zone	Agricultural Zone	To promote agricultural activities to supply fresh vegetables to city markets.	-	-	
	Special-purpose Zone	Special-purpose Zone	To be conserved as Public Graves, Military-purpose Facilities and others	867	3.1%	
	Engineering Network, Road and Transportation Zone	Utility Zone	Factories/plants for utilities and engineering facilities are involved in "Exclusive Industrial Zone"	443	1.6%	
	Summer Housing zone	Environmental Conservation Zone		-	-	
	-	Water Preservation Area		5,559	20.1%	
	-	New Town Development Zone	To be developed as "new towns" driven by Public-Private Partnership (PPP) integrated with special urban functions such high education, Knowledge-based industries, R & D, commercial and business and recreational functions, given full considerations of energy-saving utility systems.	1,943	7.0%	
		Total Area		27,676	100.0%	
		of which	Urbanization Promotion Area		18,472	66.7%
			Water Preservation Area and Environmentally Protected Area		9,204	33.3%

1) West New Town Area: 900 ha (3.3%), South Town Area 750 ha (2.7%), and Other New Town Area 300 ha (1.1%).

Source: JICA Study Team

Figure 6.4.2 Draft Zoning Map for UB City Master Plan 2030

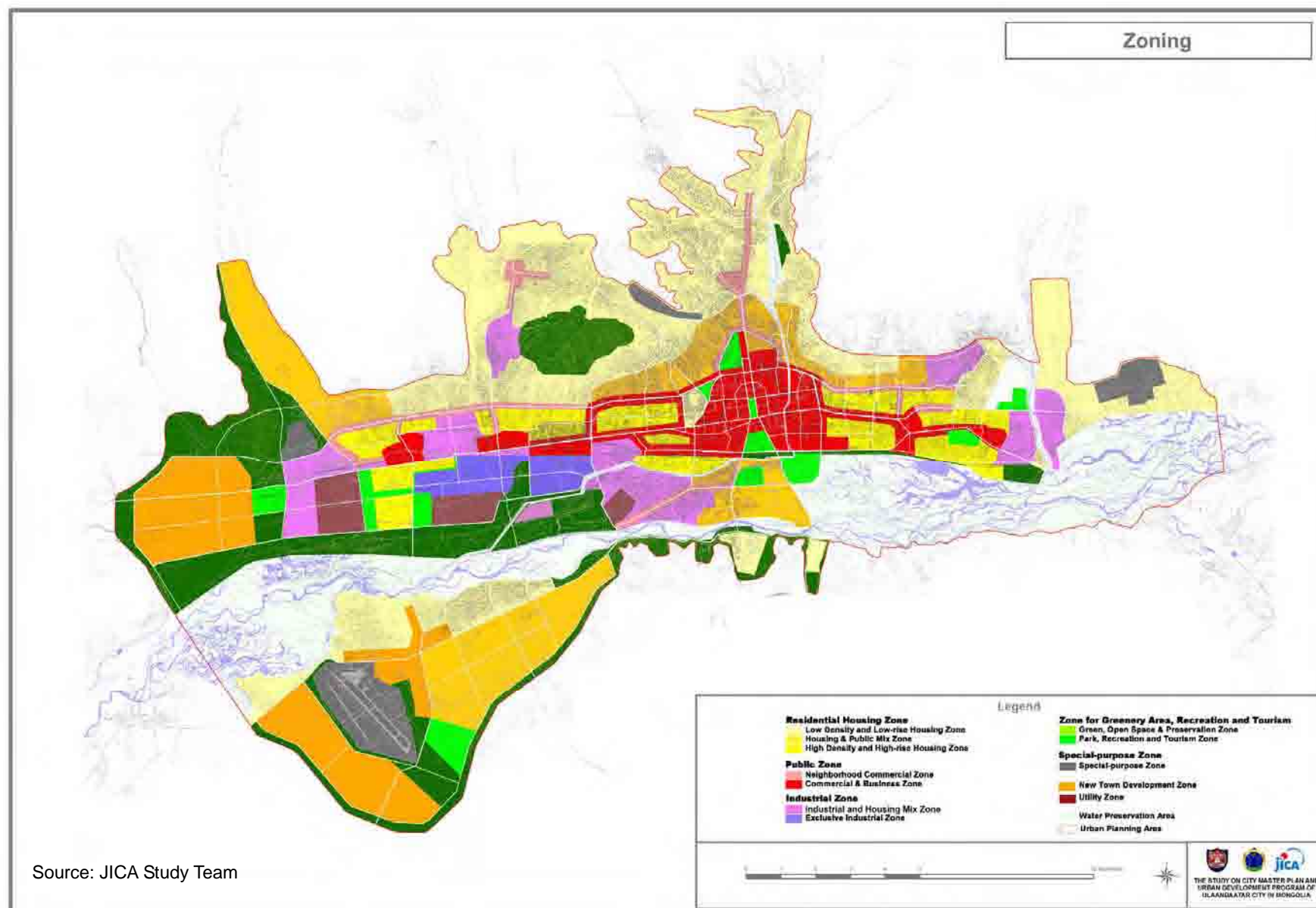


Figure 6.4.3 Draft Policy Zoning Map for UB City Master Plan 2030

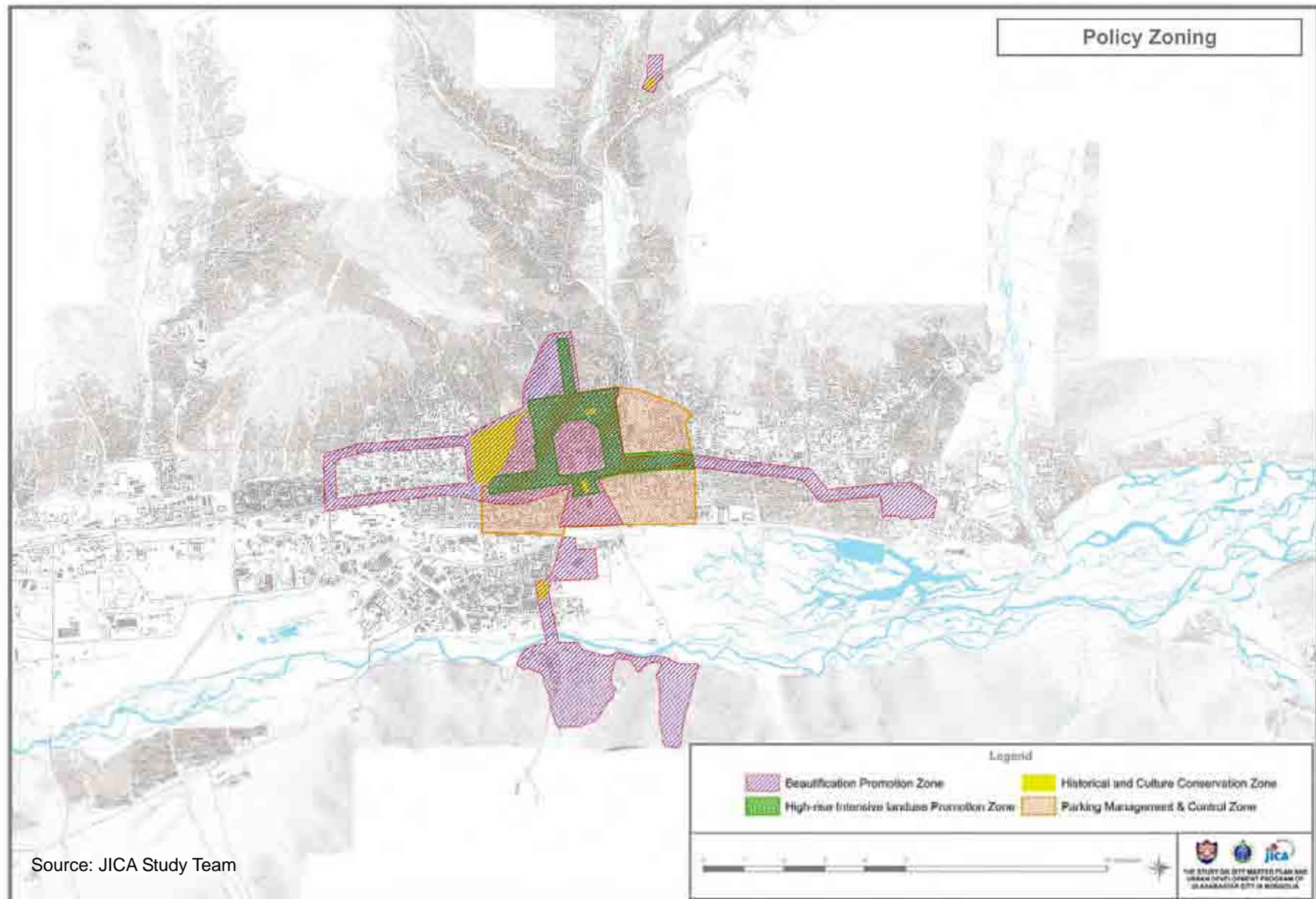


Figure 6.4.4 Ulaanbaatar City Master Plan 2030

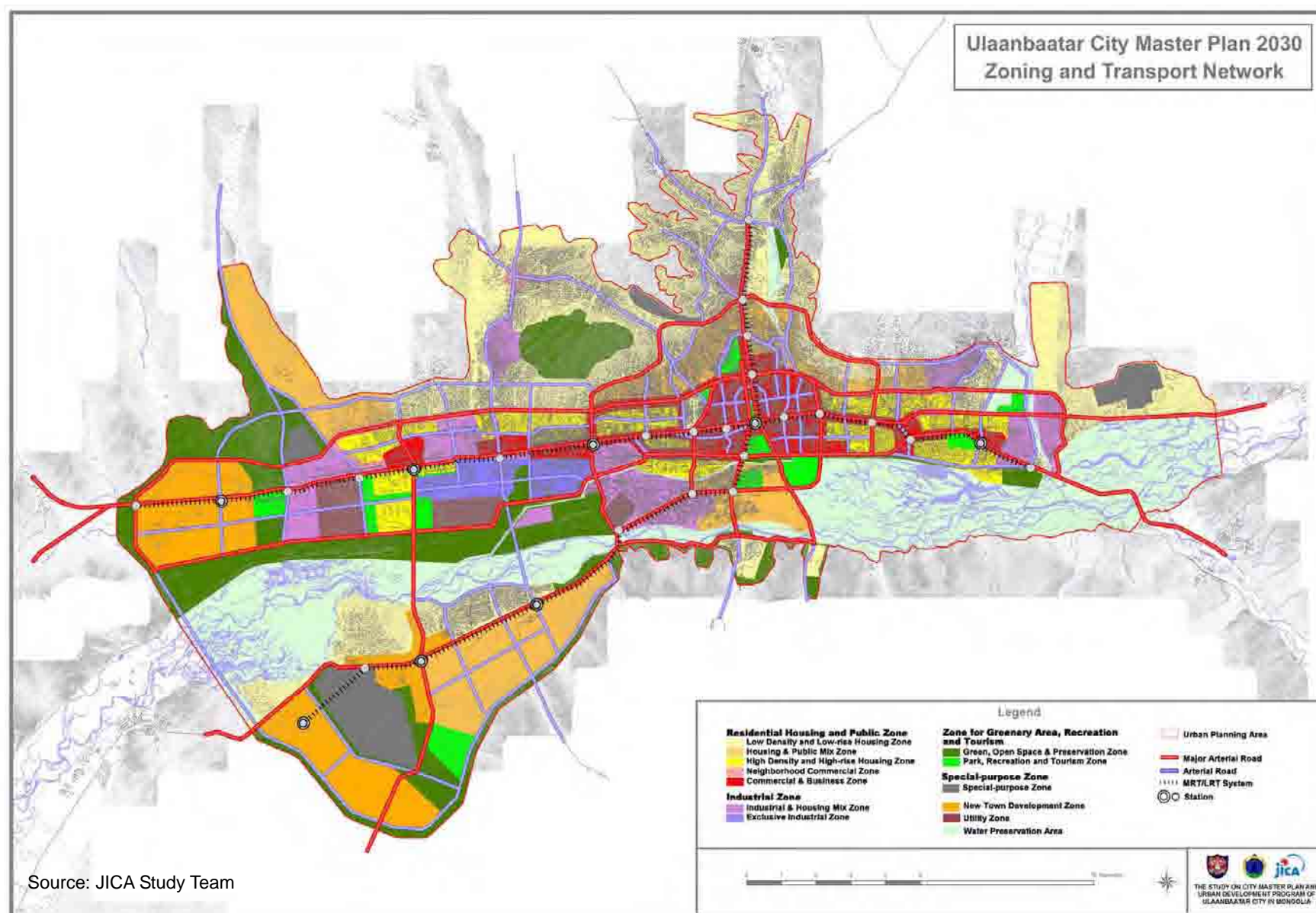
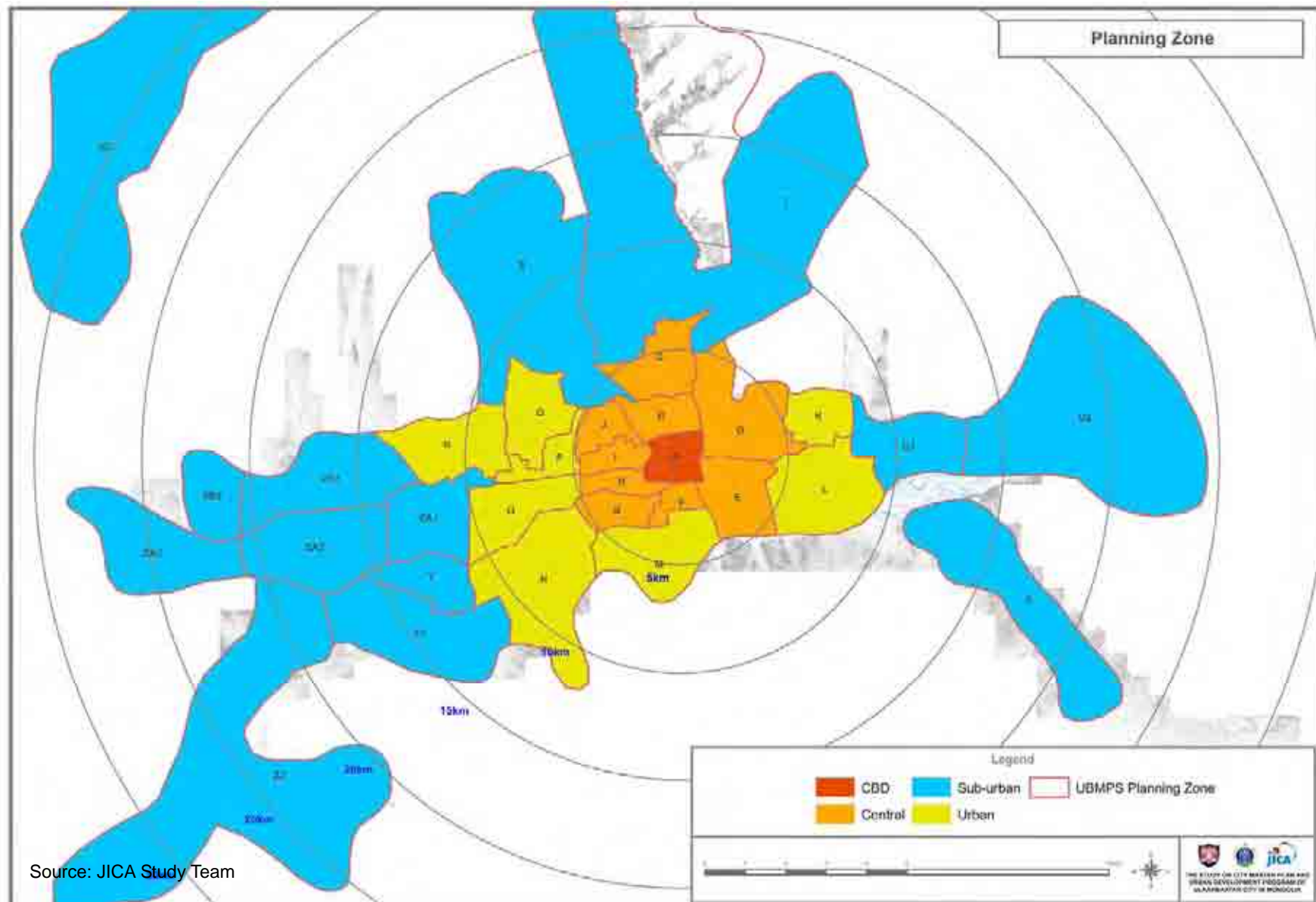


Figure 6.4.5 Planning Zone



Source: JICA Study Team

Table 6.4.3 Land Use Details of Zoning Map by Planning Zones

Upper-level Planning Zone	Planning Zone	Area	Future Urbanized Area													Water Preservation Area and Environmentally Protected Area		Urbanization Promotion Area	Future Urbanized Area	Water Preservation Area and Environmentally Protected Area
			Commercial & Business Zone	Neighborhood Commercial Zone	High Density and High-rise Housing Zone	Housing & Public Mix Zone	Low Density and Low-rise Housing Zone	New Town Development Zone			Industrial and Housing Mix Zone	Exclusive Industrial Zone	Special-purpose Zone	Utility Zone	Park, Recreation and Tourism Zone	Green, Open Space & Preservation Zone	Water Preservation Area			
								West New Town	South New Town	Other New Town										
CBD	A	572.1	504.2	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.4	0.7	1.4	572.0	569.9	2.1
Central	B	601.0	97.7	57.9	0.0	287.3	106.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	47.2	0.0	3.6	601.1	597.5	3.6
	C	1,035.7	0.0	106.6	0.0	32.1	679.3	0.0	0.0	0.0	0.0	0.0	15.7	0.0	0.0	0.0	63.6	897.3	833.7	63.6
	D	1,746.7	148.0	100.5	164.8	240.7	376.9	0.0	0.0	0.0	6.0	0.0	1.6	0.0	0.0	16.2	34.9	1,089.6	1038.5	51.1
	E	1,113.7	211.9	0.0	141.3	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.7	30.5	710.1	1,181.4	440.8	740.6
	F	297.8	0.2	20.3	0.0	198.0	0.0	0.0	0.0	0.0	9.9	0.0	0.0	0.0	43.2	17.2	9.0	297.8	271.6	26.2
	G	529.2	0.0	66.3	0.5	24.9	0.0	0.0	0.0	0.0	318.9	0.0	0.0	57.1	0.0	24.0	37.5	529.2	467.7	61.5
	H	366.5	112.7	0.0	147.9	0.0	0.0	0.0	0.0	0.0	100.3	0.2	0.0	0.0	0.0	0.0	5.5	366.6	361.1	5.5
	I	389.5	150.6	0.0	147.0	37.6	54.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	389.5	389.5	0.0
Urban	J	463.3	28.3	1.0	0.3	131.6	236.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.6	0.0	463.3	397.7	65.6
	K	721.7	0.0	0.0	0.0	5.3	128.8	0.0	0.0	0.0	128.2	0.0	0.0	0.0	0.0	0.0	52.8	315.1	262.3	52.8
	L	1,842.5	140.1	17.2	289.6	0.0	66.9	0.0	0.0	0.0	227.5	0.0	0.0	0.0	74.2	65.0	1232.7	2,113.2	815.5	1297.7
	M	1,565.7	0.0	0.0	0.0	148.9	144.6	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	253.7	200.3	747.8	293.8	454.0
	N	2,767.8	0.0	0.8	0.0	706.9	362.8	0.0	0.0	41.8	46.5	0.1	0.0	0.1	0.0	399.7	533.9	2,092.6	1159.0	933.6
	O	1,206.2	69.2	0.0	34.9	0.0	0.0	0.0	0.0	0.0	29.1	460.5	0.0	164.5	62.6	319.1	66.2	1,206.1	820.8	385.3
	P	514.0	103.7	42.3	160.9	0.0	115.7	0.0	0.0	0.0	37.9	0.0	0.0	0.0	0.0	53.4	0.0	513.9	460.5	53.4
	Q	1,117.2	0.2	72.6	53.7	0.0	598.3	0.0	0.0	0.0	132.0	0.0	0.0	0.0	0.0	260.5	0.0	1,117.3	856.8	260.5
Suburban	R	1,470.6	5.7	114.9	127.9	709.1	232.9	0.0	0.0	0.0	89.8	0.0	0.0	0.0	0.0	1.0	0.0	1,281.3	1280.3	1.0
	S	5,991.8	0.0	25.6	0.0	0.0	772.3	0.0	0.0	0.0	0.0	0.0	52.2	0.0	0.0	65.5	0.0	915.6	850.1	65.5
	T	13,429.6	0.0	0.3	0.0	0.0	823.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.4	21.9	858.1	823.8	34.3
	U1	1,437.1	0.0	0.0	0.0	0.0	696.1	0.0	0.0	0.0	49.9	0.0	178.5	0.0	0.0	0.0	809.7	1,734.2	924.5	809.7
	U2	7,261.9	0.0	0.0	0.0	0.0	10.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.0	64.4	10.4	54.0
	X	3,265.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	150.0	150.0	0.0	150.0
	Y	844.4	0.0	0.0	0.0	0.0	309.7	0.0	0.0	94.6	0.0	0.0	0.0	0.0	0.0	0.0	440.0	844.3	404.3	440.0
	Z1	2,649.6	0.0	0.0	0.0	350.4	187.3	0.0	748.2	159.9	0.0	0.0	533.8	0.0	131.5	512.1	676.0	3,299.2	2111.1	1188.1
	Z2	9,497.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	ZA1	1,394.0	82.8	21.1	204.3	0.0	0.0	0.0	0.0	0.0	323.5	0.0	0.0	220.9	95.4	246.2	199.7	1,393.9	948.0	445.9
	ZA2	2,120.9	0.0	0.0	0.0	0.0	0.0	589.0	0.0	0.0	0.1	0.0	0.0	0.0	65.2	486.3	256.0	1,396.6	654.3	742.3
	ZA3	2,226.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	ZB1	2,229.9	0.0	0.2	0.0	4.5	0.0	309.8	0.0	0.0	29.2	0.0	84.1	0.0	0.4	816.2	0.0	1,244.4	428.2	816.2
	ZB2	995.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	ZC	9,845.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total		81,510.2	1,655.3	647.6	1,473.1	2,879.2	5,902.4	898.8	748.2	296.3	1,529.3	460.8	867.3	442.6	670.8	3,645.3	5,558.8	27,675.8	18,471.7	9,204.1

Source: JICA Study Team

2) Proposed Planning Framework

The planning framework for the Year 2030, which is a guide to the future desirable urban structure of the Compact City, is proposed in Table 6.4.3 and Figures 6.4.6 to 6.4.8. The planning framework is determined in consistency with the proposed zoning system above.

Table 6.4.4 Planning Framework of Population, Employment, and Students in Year 2030 for Zoning Map

Categorized Area	Planning Zone	Year 2030		
		Population	Employment	Students
CBD	A	134,900	174,500	57,400
	B	90,100	57,300	17,100
Central	C	66,400	28,800	13,800
	D	145,300	83,100	35,900
	E	85,200	71,600	19,300
	F	31,600	10,700	5,600
	G	24,500	35,100	10,800
	H	66,100	49,900	12,800
	I	108,100	62,300	31,600
	J	40,100	16,600	6,600
	K	9,500	11,000	1,800
	L	117,600	73,500	21,200
Urban	M	25,400	6,100	8,700
	N	107,100	26,800	18,000
	O	21,300	53,200	3,500
	P	77,500	46,300	16,400
	Q	50,400	28,400	11,000
	R	139,000	52,100	32,500
	S	49,300	23,900	8,200
	T	54,300	27,900	9,000
Suburban	U1	35,500	11,900	6,600
	U2	4,600	5,600	800
	X	2,400	3,200	900
	Y	21,200	7,400	4,300
	Z1	84,800	47,100	22,700
	Z2	6,600	9,000	1,100
	ZA1	67,700	57,000	11,200
	ZA2	36,000	23,200	28,700
	ZA3	2,100	2,800	300
	ZB1	20,100	14,500	15,300
	ZB2	1,300	1,700	200
	ZC	13,000	17,500	2,700
Total		1,739,000	1,140,000	436,000

Source: JICA Study Team

Figure 6.4.6 Planning Framework of Population in Year 2030

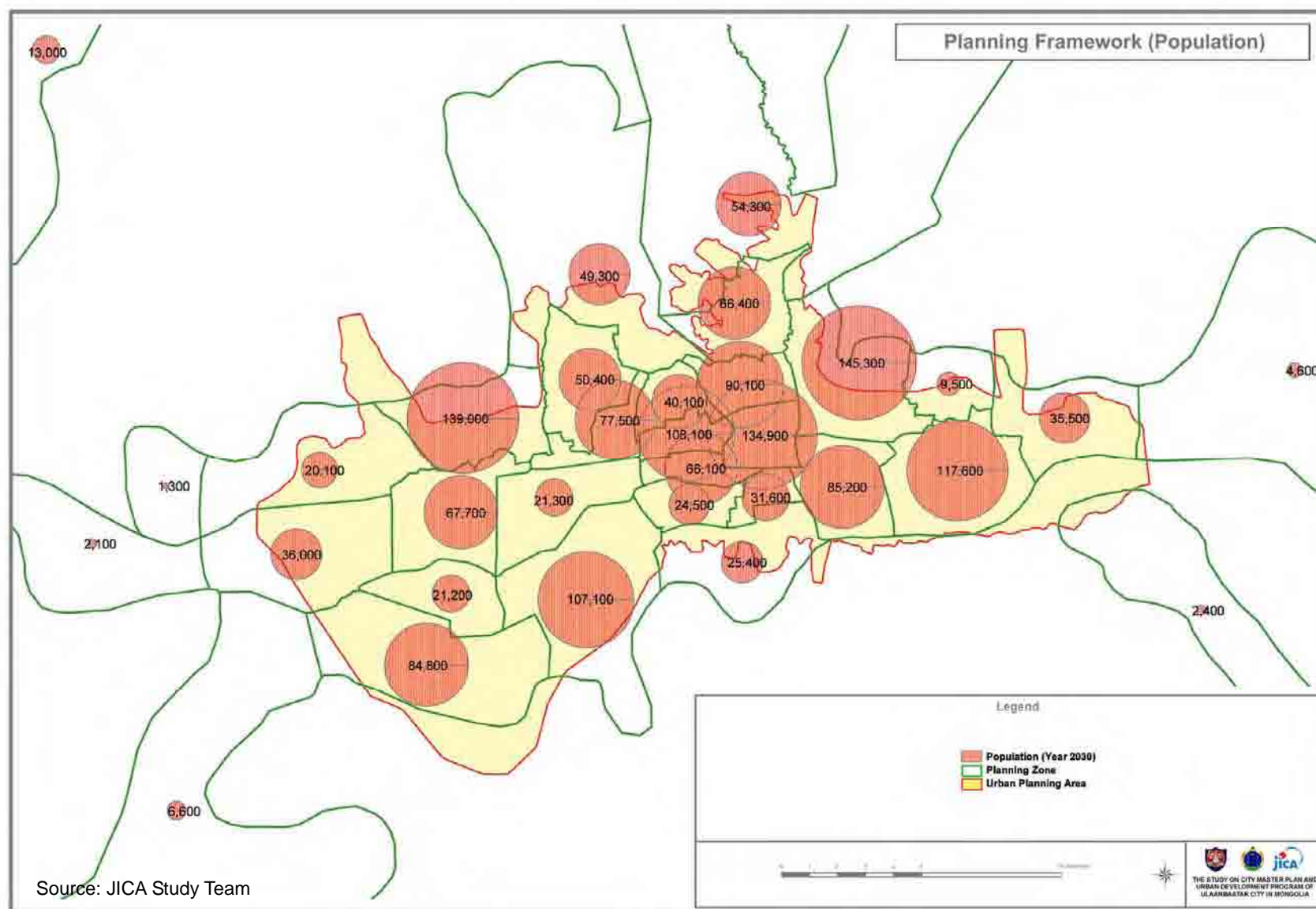


Figure 6.4.7 Planning Framework of Employment in Year 2030

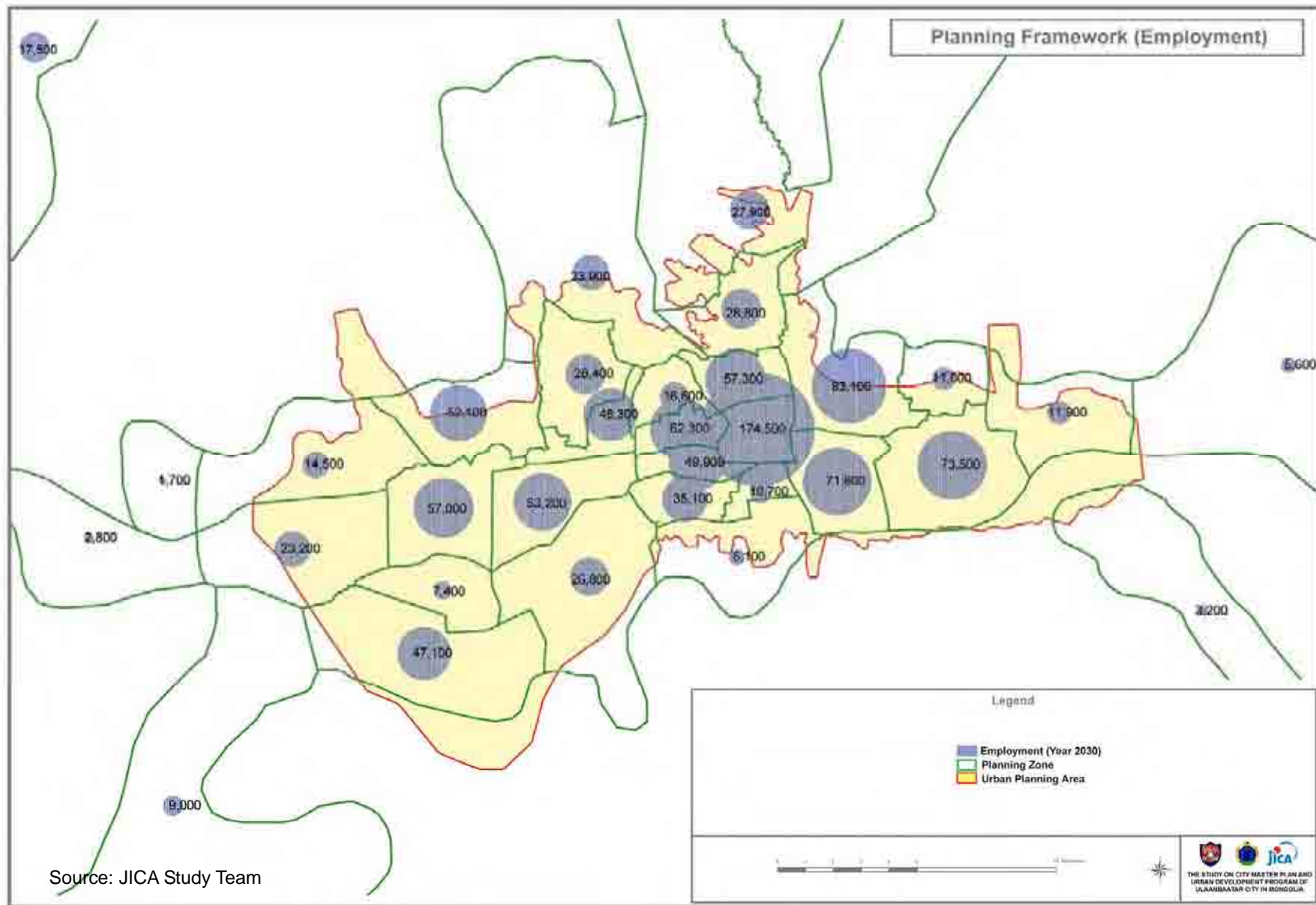
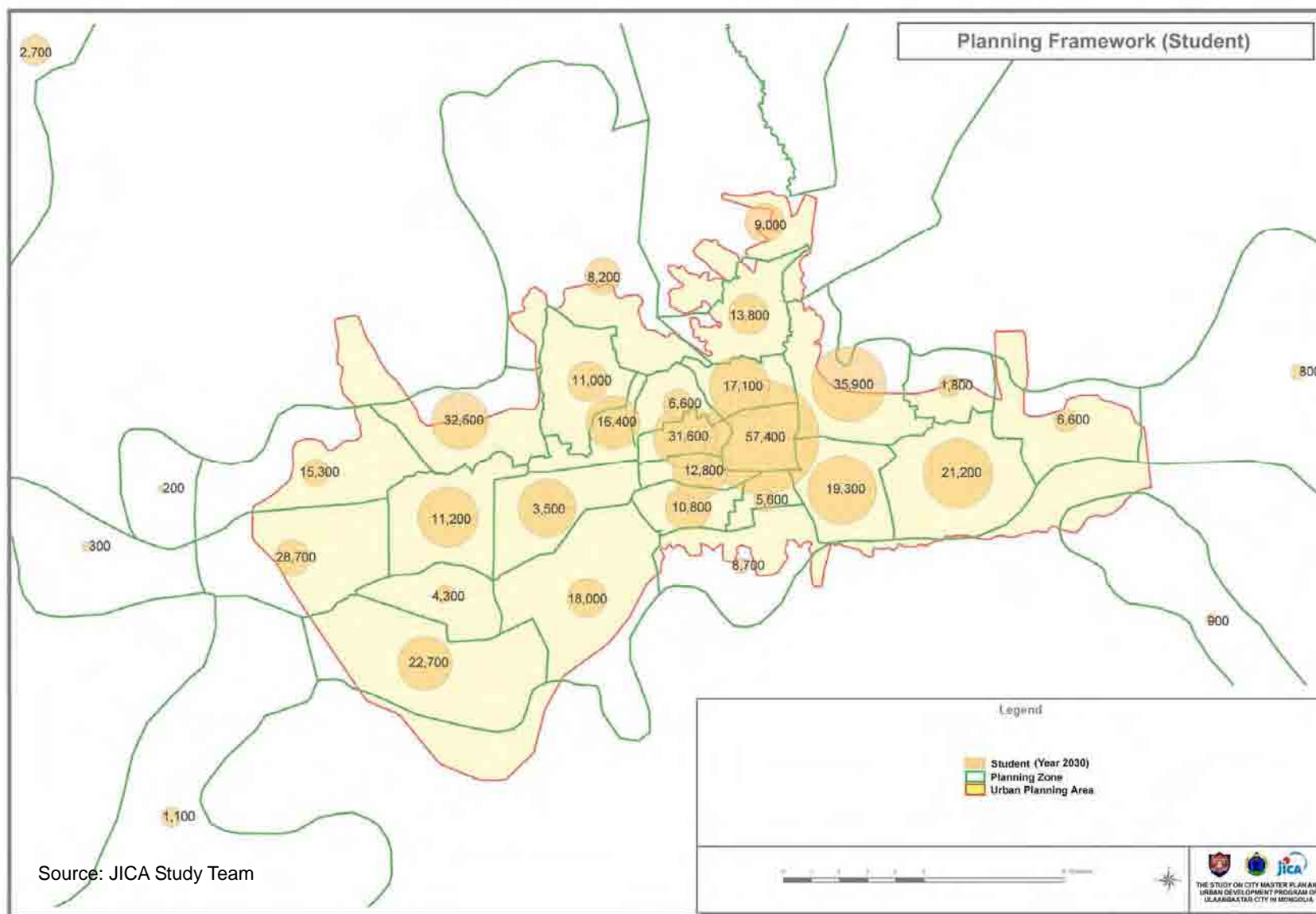


Figure 6.4.8 Planning Framework of Students in Year 2030



3) Proposed Spatial Distribution of Residential Units

Based on the estimated total number of housing units stock, spatial distribution by housing unit type in Year 2020 and 2030 is examined. Figure 6.4.9 shows spatial distribution of apartment-type housing units (high-rise and mid-rise apartment) by four (4) categorized areas, and Figure 6.4.10 shows spatial distribution of low-rise housing units (detached house, simple house w/o infrastructure, Ger and others).

Intensive land use in the CBD and central areas, especially alongside rail-based public transportation corridors, will be promoted by construction of apartment-type buildings. The share of apartment-type housing units decreases and that of low-rise housing units increases with distance from the CBD as shown in Table 6.4.5 and Table 6.4.6: for instance, 100% in the CBD, 66% in central areas, 58% in urban areas and 37% in sub-urban areas in Year 2030.

The share of apartment-type housing units will increase in central, urban and sub-urban areas from Year 2020 to 2030 by rebuilding as shown in Figure 6.4.11. By contrast, in these areas, the number of Ger will decrease by rebuilding from Year 2020 to 2030. The increase in apartment-type housing units in sub-urban areas will be provided by new town development with a mixture of apartment and low-rise residential buildings.

Table 6.4.5 Spatial Distribution of Housing Units Stock in Year 2020

Housing Unit Type	Apartment (High-rise)	Apartment (Mid-rise)	Detached	Simple House w/o Infra	Ger	Others	Total	Share of Apartment (%)	Share of Low-rise (%)
CBD	16,625	9,652	0	0	0	0	26,277	100.0	0.0
Central	31,788	55,854	29,705	16,352	10,060	103	143,861	60.9	39.1
Urban	6,804	50,325	30,051	16,548	10,189	104	114,020	50.1	49.9
Sub-urban	2,034	11,360	26,969	14,834	9,085	93	64,376	20.8	79.2
Total	57,250	127,191	86,725	47,734	29,334	300	348,534	52.9	47.1

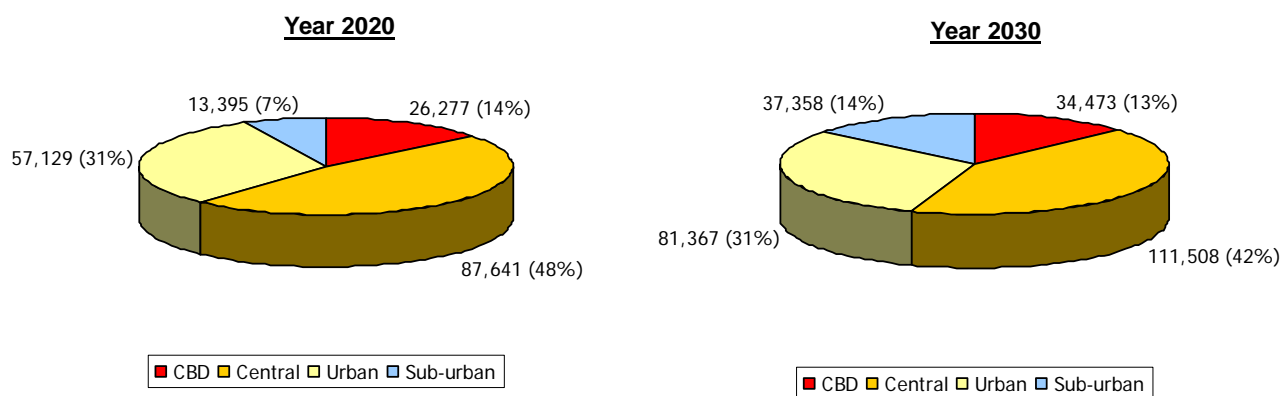
Source: JICA Study Team

Table 6.4.6 Spatial Distribution of Housing Units Stock in Year 2030

Housing Unit Type	Apartment (High-rise)	Apartment (Mid-rise)	Detached	Simple House w/o Infra	Ger	Others	Total	Share of Apartment (%)	Share of Low-rise (%)
CBD	23,974	10,499	0	0	0	0	34,473	100.0	0.0
Central	42,331	69,178	46,444	8,543	1,428	31	167,954	66.4	33.6
Urban	12,394	68,973	48,239	8,873	1,483	33	139,995	58.1	41.9
Sub-urban	7,343	30,015	53,119	9,771	1,633	36	101,917	36.7	63.3
Total	86,041	178,665	147,803	27,187	4,543	100	444,339	59.6	40.4

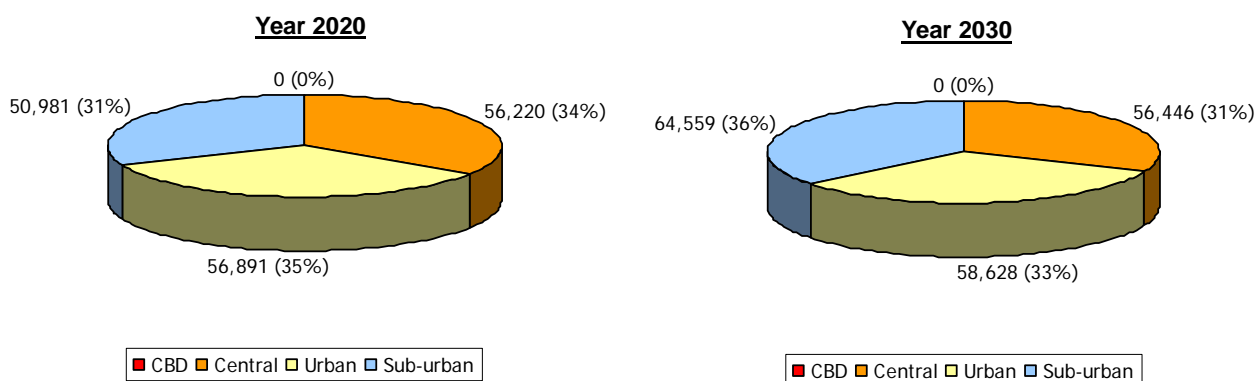
Source: JICA Study Team

Figure 6.4.9 Spatial Distribution of Apartment-type Housing Units in 2020 and 2030



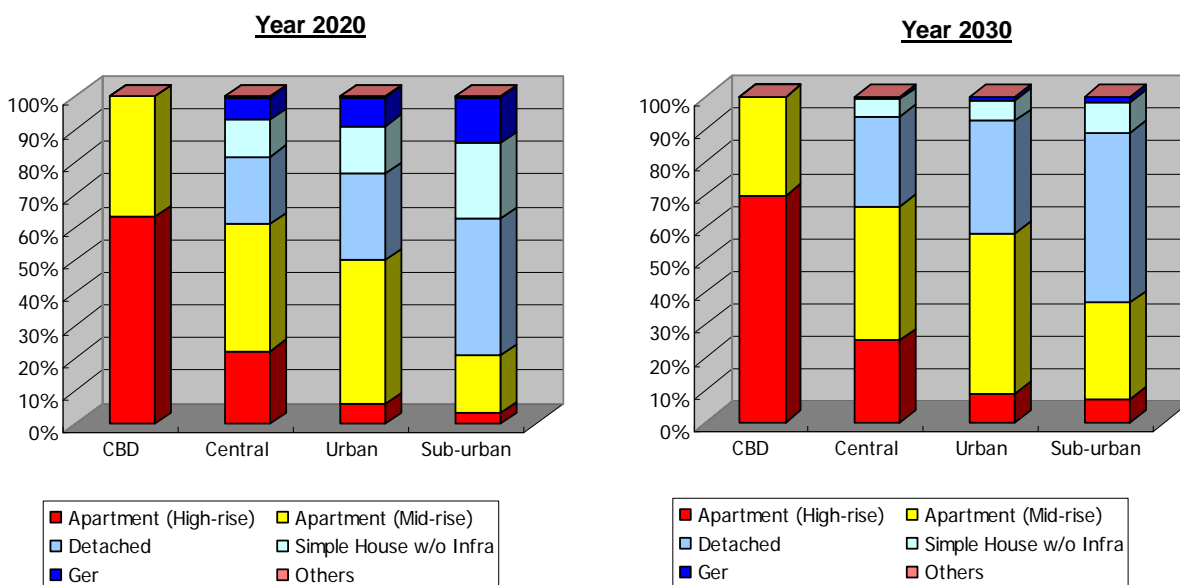
Source: JICA Study Team

Figure 6.4.10 Spatial Distribution of Low-rise Housing Units in 2020 and 2030



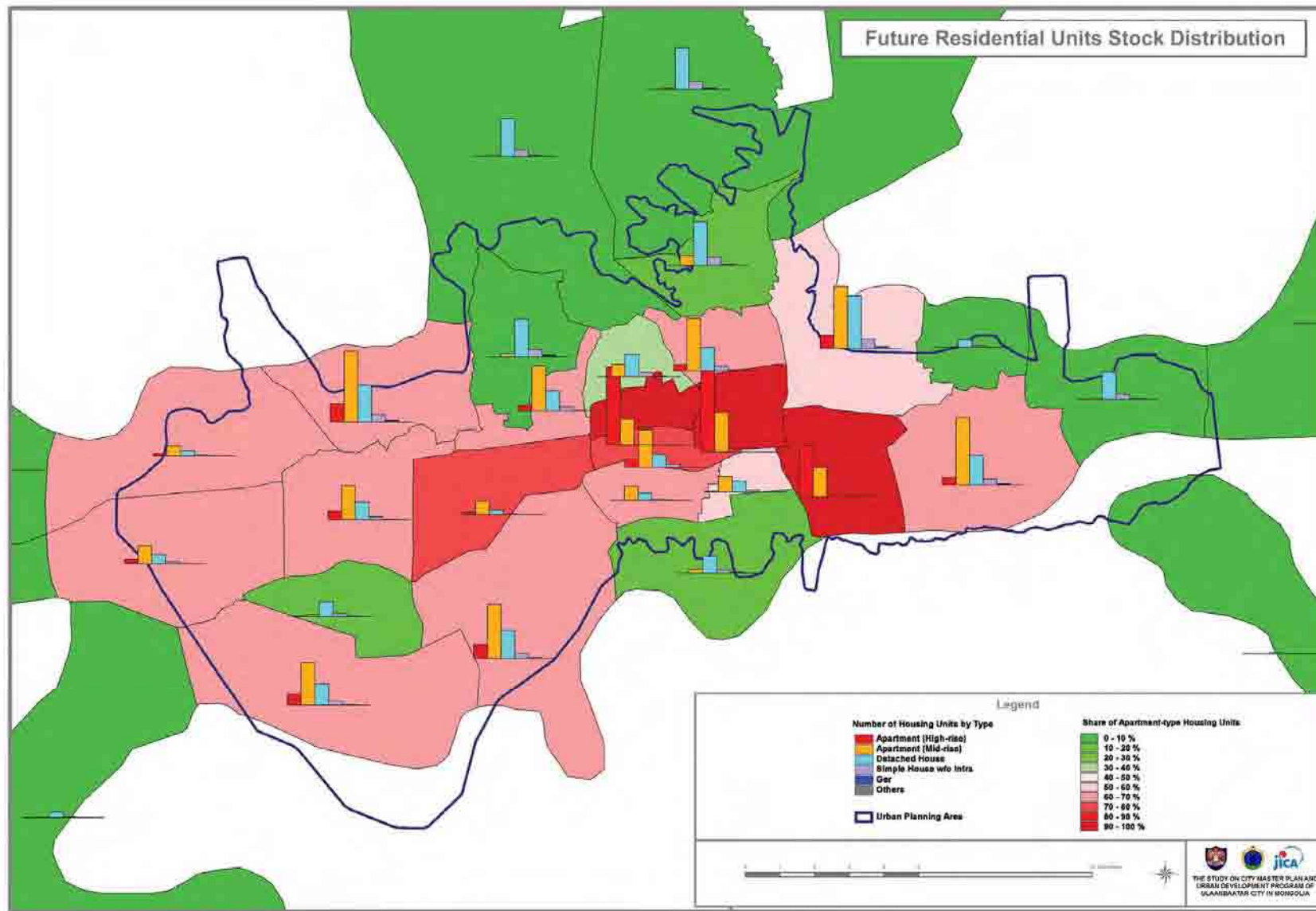
Source: JICA Study Team

Figure 6.4.11 Share of Housing Units Stock by Type in 2020 and 2030



Source: JICA Study Team

Figure 6.4.12 Projected Spatial Distribution of Housing Units Stock in 2030



6.5 Urban Green Network System

The JICA Study Team proposes the Urban Green Network System as depicted in Figure 6.5.2. The Urban Green Network System will play an essential role in balancing the natural and built environments, preserving environmental resources, maintaining and improving ecological networks, creating urban amenities, etc. For these purposes, it needs to be structured as a networked system of water preservation areas, green and open space, parks and street planting, etc.

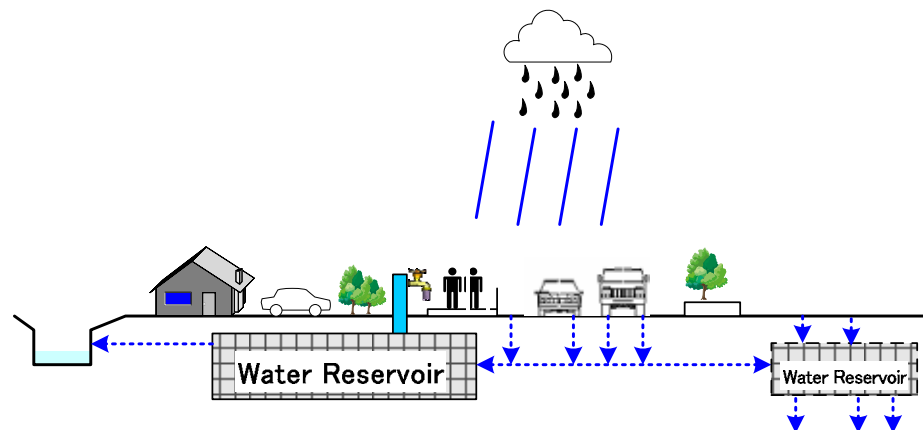
The proposed Urban Green Network System shown in Figure 6.5.3 is planned based on the following concepts:

- (a) **Utilization of Trans-City Rivers as the Main Framework of Urban Green Network System:** The Tuul River and its four tributaries, the Selbe River, Ulatai River, Tolgoit River and Bayang River, should be utilized as the main framework for the urban green network system. Especially, the Tuul River provides an invaluable habitat for flora and fauna, and also creates open space accessible to an enriched natural environment. These spaces should be more strictly protected by taking countermeasures against recent environmental degradation caused by industrial wastewater and uncontrolled development activities.
- (b) **Development of Green Network System Integrated with Disaster Management:** It is essential to develop a green network system from the viewpoint of disaster management. For instance, greening of river-side spaces should be strategically promoted for both purposes of flooding protection and development of recreational spaces.
- (c) **Balancing Environmental Preservation and Tourism Promotion in Bogdkhan Uul Special Protected Area:** Bogdkhan Uul Special Protected Area holds invaluable environmental resources, including forest areas, and provides tourism and recreation opportunities easily accessible from the central area of UB City. It is also a symbolic feature for UB City as a sacred place, which creates spectacular landscapes. Bogdkhan Uul Special Protected Area, as an integrated part of the Urban Green Network System, needs to be preserved and utilized for tourism promotion in a balanced manner.
- (d) **Allocation of Large-scale Green and Open Space as Buffer Areas:** Green and open spaces should be allocated as buffer areas between built and natural environments. Greenbelt is planned between new towns and existing urbanized areas to avoid continuously expanded built-up areas. In addition, large-scale green and open spaces alongside the Tuul River are planned to protect water preservation areas and enhance accessibility to river-side recreational spaces.
- (e) **Greening in Industrial Areas and Surrounding Areas of Industrial Facilities:** Greening in industrial areas and surrounding areas of power plants, WWTPs, etc. should be promoted to mitigate environmental degradation including noise and air pollution. It also contributes to creating favorable environment in industrial areas.
- (f) **Promotion of Greening on North-side Hilly Areas:** Greening should be promoted on the north-side hilly areas of disaster prevention roads for prevention of land sliding due to floods. It also contributes to connecting an inner-city green network with north-side forest areas outside of the urbanization promotion area.
- (g) **Development of Continuous Street Greening:** Street greening should be promoted in the form of connecting the above-mentioned environmental and cultural spaces. In

addition, pocket parks or small-size parks should be allocated alongside planted streets to create a pedestrian-friendly environment. For this purpose, design standards for greening roads/streets need to be formulated.

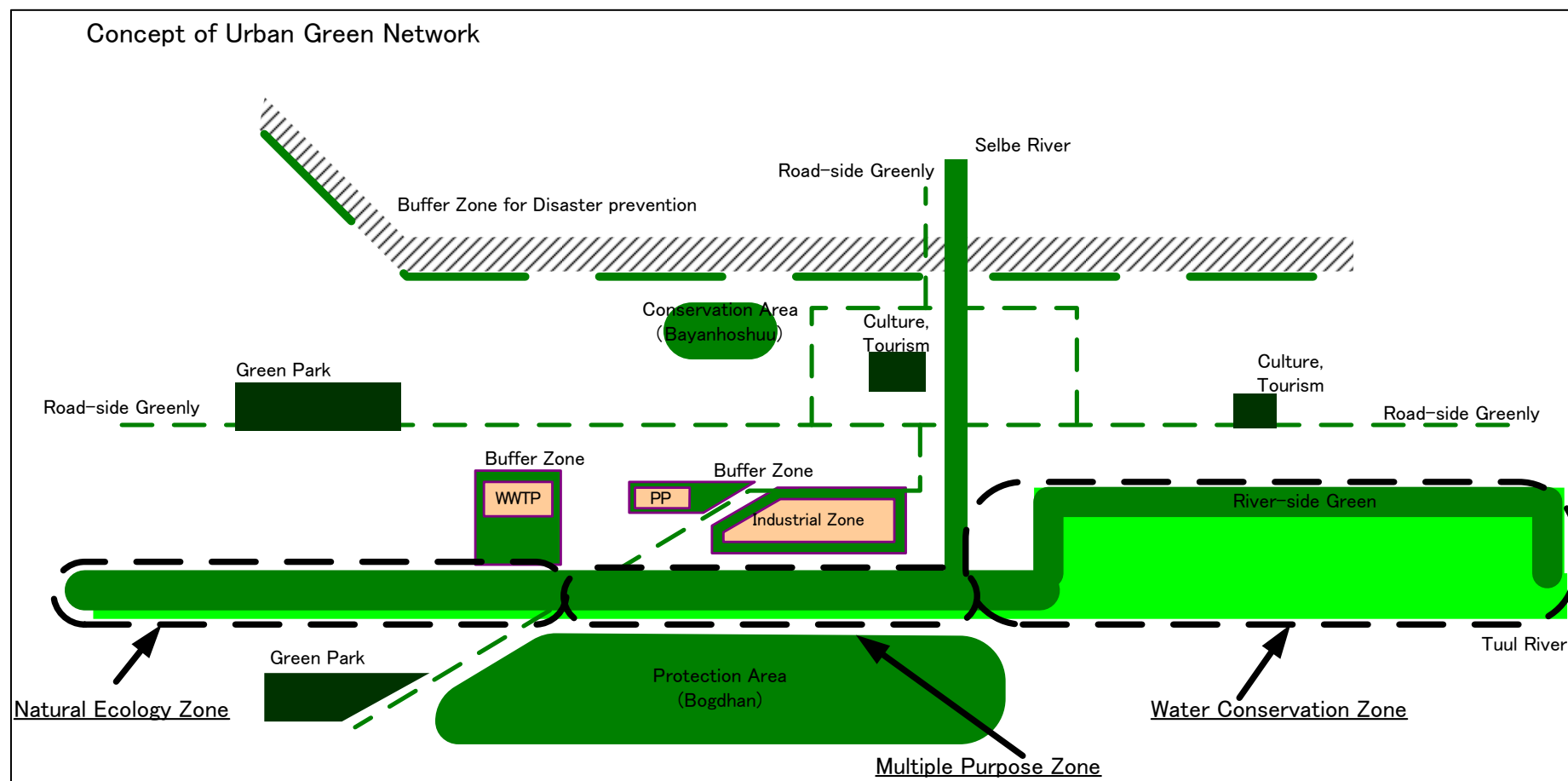
- (h) **Development of Tourism Places with Utilization of Cultural Heritages Integrated with a Green Network System:** Cultural heritages should be preserved and rehabilitated with greening in their surrounding areas. These areas can be integrated into the Urban Green Network System to create tourism and recreation places.
- (i) **Creation of Beautiful Cityscape by Designation of the Beautification Promotion Area:** Beautification Promotion Area, one of policy zonings, should be designated in the context of an Urban Green Network System to create urban amenities and beautiful cityscapes.
- (j) **Effective Use of Rain Water to Irrigate Green Network:** Road side (street) green space and pocket parks are proposed to form a green network linking environmental and cultural spaces and creating pedestrian-friendly environment. In addition, green spaces in residential areas are important as recreation and relaxation spaces. However it is critical how to irrigate the green network. Actually, plants along road side do not grow well due to lack of water. Therefore rain water recycling is recommendable in order to improve the irrigation to the green network. Due to the limited built-up area, an underground reservoir is reasonable (see Figure 6.5.1). In addition, an underground reservoir can strengthen drainage network to mitigate flood damage by connecting canals or penetration into underground.

Figure 6.5.1 Concept of Rain Water Recycling



Based upon the above-mentioned concepts, a thematic diagram for the Urban Green Network System is depicted in Figure 6.5.2.

Figure 6.5.2 Thematic Diagram for Urban Green Network System



Source: JICA Study Team

Figure 6.5.3 Park and Green Network

