

Environmental and Social Considerations Study in Detailed Planning Survey (Technical Cooperation for Development Planning)

1. Full title of the Project

Study on the Strategic Planning for Water Supply and Sewerage Sector in Ulaanbaatar City

2. Type of the study

Master Plan Study, and Feasibility Study for highly prioritized project(s)

3. Categorization and its reason

(1) Category

Category B

(2) Reason

The project is not likely to have significant adverse environmental and social impacts under the JICA Guidelines for Environmental and Social Consideration (April, 2010) in terms of its sectors, characteristics and areas.

4. Agency or institution responsible for the implementation of the project

- Ministry of Road, Transportation, Construction and Urban Development
- Ulaanbaatar City
- Water Supply and Sewerage Authority of Ulaanbaatar City (USUG) Co., Ltd.

5. Outline of the Project

5.1. Objectives

To reexamine the current situation and problems in the water supply and sewerage sector in Ulaanbaatar city based on the achievement of existing master plans, and make feasibility study on priority projects to be identified in the Study.

5.2 Location

Ulaanbaatar City

5.3 Scope of the Project

Phase I: Basic study

- 1) Review of the previously formulated master plans
- 2) Collection and analysis of the available data and information related to the Study

- 3) Field reconnaissance and survey on existing water supply facilities, water sources and sewerage facilities (apartment area and Ger area)
- 4) Water quality analysis of water sources, tap water and wastewater (treated and raw)
- 5) Survey on area development plan, land utilization and socio-economic condition
- 6) Survey on natural environmental condition
- 7) Survey on public perception
- 8) Survey on present situation of Public Private Partnership on water supply and sewerage sector
- 9) Survey on laws, policies, and administration system related to water supply and sewerage
- 10) Institutional and management capacity assessment of relevant organization
- 11) Review and analysis of the plans and projects related to the Study
- 12) Evaluation of present water supply, sewerage condition and identification of problems

Phase II: Re-examination of planning framework on existing master plan

- 1) Re-examination of the perspectives between future demand and water supply/ wastewater treatment capacity based on the existing development plan

For water supply

- 2) Plan for effective use of surface water
- 3) Plan for monitoring on groundwater
- 4) Plan for improvement of water supply in Ger area
- 5) Plan for water demand saving for apartment area
- 6) Plan for reduction of the non-revenue water and improvement of water distribution system including data management and development telemetry system
- 7) Plan for improvement of tariff collection system

For sewerage

- 8) Confirmation of boundary served by Central Wastewater Treatment Plant (CWWTP)
- 9) Schematic lay-out plan of the facilities
- 10) Plan for operation and maintenance of sewerage system
- 11) Plan for effective use of reclaimed water and sludge from wastewater treatment plant

For both water supply and sewerage

- 12) Analysis of alternatives through Strategic Environmental Assessment (SEA) and Initial Environmental Examination (IEE)-level environmental and social considerations studies
- 13) Selection of priority projects

Phase III: Feasibility Study on priority project(s)

- 1) Supplemental data collection and analysis
- 2) Preliminary design of the facilities on priority project(s)
- 3) Operation, maintenance, management and human resources development plan in priority projects
- 4) Construction and procurement plan
- 5) Cost estimation and financial and economic analysis
- 6) Formulation of financial plan
- 7) Support for Environmental Impact Assessment: survey on relevant laws and regulations, scoping on impacts of priority project(s), elaboration of mitigation measures, development of an environmental management plan including environmental monitoring plan and its

implementation structure, consultation(s) with stakeholders, and preparation of document for information disclosure

- 8) Project evaluation
- 9) Formulation of implementation schedule

6. Description of the project site

6.1 Location Map of Ulaanbaatar City

The map of Mongolia and Ulaanbaatar is shown in Figure 1.



(Source) Map of Mongolia Political Map of Mongolia Satellite View Mongolia/nationsonline.org

Figure 1. Map of Mongolia and Ulaanbaatar

6.2 Environmental and Social Conditions of Ulaanbaatar City

Ulaanbaatar is the capital of Mongolia located in the central part of the country. The average altitude is about 1,300 m. The city lies on the northern bank of the Tuul River flowing in the east-west direction.

The climate of Ulaanbaatar is a continental one. It is classified as a semi-arid climate or steppe climate according to the Köppen climate classification. The annual average temperature in 2010 is -0.3 degree Celsius. Table 1 shows the monthly mean temperature at the Ulaanbaatar Monitoring Station in the Ulaanbaatar city center, and at the Terelj Monitoring Station in the hilly area.

Table 1 Monthly Mean Temperature in Ulaanbaatar (Celsius degree)

Monitoring Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Ulaanbaatar	-21.4	-16.8	-7.3	2.7	10.5	17.5	20.2	17.2	11.5	1.4	-9.4	-18.4	0.64
Terelj	-25.0	-20.9	-11.3	-1.1	6.8	13.2	15.6	12.7	6.9	-2.2	-13.2	-21.6	-3.34

Source: Hydrological & Meteorological Institute (Data from 2006 to 2010)

The precipitation of Ulaanbaatar is from around 200 mm to 300 mm per year, and most of it is concentrated in the period between May and September. Monthly mean precipitation in Ulaanbaatar is shown in Table 2.

Table 2 Monthly Mean Precipitation (mm)

Monitoring Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Ulaanbaatar	3.0	3.2	5.7	2.9	33.2	34.2	77.7	50.6	11.2	8.7	3.1	3.7	237.2
Terelj	2.8	3.4	5.7	6.4	31.3	59.3	69.6	58.8	15.4	14.3	3.1	2.9	272.9

Source: Hydrological & Meteorological Institute (Data from 2006 to 2010)

7. Legal Framework of Environmental and Social Considerations

7.1 Laws and Regulations

(1) Overview of laws and regulations related to environmental and social considerations

Major Mongolian laws and regulations related to environmental and social considerations are listed in Table 3.

Table 3 Laws and Regulations Related to Environmental and Social Considerations

Area	Title (Year)
General	The Constitution of Mongolia (1992)
	Law on Environmental Protection (1995)
Environmental Impact Assessment	Law on Environmental Impact Assessment (1998)
Conservation and Utilization of Natural Resources	Law on Special Protected Areas (1994)
	Law on Forest (1995)
	Law on Natural Plants (1995)
	Law on Water (1995)
	Law on Buffer Zones (1997)
Pollution Control	Law on Hunting (2000)
	Law on Air (1995)
Water Supply and Sewerage Treatment	Law on Domestic and Industrial Waste (2004)
	Law on Sanitation (1998)
Environmental Standards	Law on Utilization of Water and Sewerage in Cities and Communities (2011)
	Environmental Quality Standards for Air and Noise (MNS4585-2007)
	Environmental Quality Standards for Water (MNS4586-1998)
Land	Effluent Standards (MNS4943-2011)
	Law on Land (1994)
Cultural Property	Law on Allocation of Land to Mongolian Citizens for Ownership (2002)
	Law on Protection of Cultural Heritage (2001)

Source: Adapted from JICA (2010) *The Preparatory Survey (Basic Design) on the Ulaanbaatar Water Supply Development Project in Gachuurt in Mongolia*, JOGMEC (2009) *Survey on Investment Environment of Mongolia*, and Asia Foundation of Mongolia (2009) *Compendium of Laws: a Mongolian Citizens Reference Book*.

A few important laws and regulations are outlined below.

(2) Law on Environmental Protection

The Law on Environmental Protection took effect in March 1995. It regulates relations between the state, citizens, economic entities and organizations in order to ensure the human right to live in a healthy and safe environment, ecologically balanced social and economic development, protection of the environment for present and future generations, proper use of natural resources, and restoration of available resources.

(3) Law on Environmental Impact Assessment

In Mongolia, new projects as well as the renovation and expansion of existing industrial services and construction activities and projects which use natural resources in different ways are subject to environmental screening based on the Law of Mongolia on Environmental Impact Assessment. The annex to the law lists project categories subject to the screening. In terms of water supply and sewerage treatment facilities, water supply, waste treatment and landfill development projects for residential centers with a population of more than 10,000 are subject to the screening.

Article 4.1 of the law requires the proponents of such projects to conduct environmental screening for detailed environmental impact assessment (DEIA). The screening shall be carried out by an environmental impact assessment expert appointed by the Ministry of Nature, Environment and Tourism (MNET) (Article 4.6). The expert shall reach one of the following conclusions within 12 work days: 1) the project may be implemented without DEIA; 2) the project may be implemented pursuant to specific conditions; 3) DEIA is required; and 4) the project is cancelled.

DEIA will be conducted for projects that are deemed to require it as a result of environmental screening (Article 5). DEIA shall be conducted by an assessment specialist licensed by the MNET based on Article 9 of the law. The DEIA report must include the following (Table 4).

Table 4 Contents of DEIA Report

- | |
|--|
| <ul style="list-style-type: none">• Environmental baseline data and indices• Project alternative• Recommendations for minimizing, mitigating, and eliminating potential and significant adverse impacts• Analysis and calculation of the extent and distribution of adverse impact and its consequences• Risk assessment• Environmental Protection Plan• Environmental Monitoring Program• Opinions of local residents of the area of project implementation• Other issues with regard to the special nature of the project• Rehabilitation project |
|--|

Source: Article 5.4 of the Law of Mongolia on Environmental Impact Assessment

DEIA reports will be submitted to an environmental impact assessment expert who conducted environmental screening, and the expert will evaluate the report within 18 work days (Article 7.1 and

7.2). Based on the evaluation by the expert, the MNET will make a decision on whether to permit the implementation of a project (Article 7.3).

If a project caused or has caused adverse impacts on the health of the local population or the environment, the DEIA report shall be reviewed (Article 8.1). The review will be conducted by a review group appointed by the MNET (Article 8.2). If the review identifies the inappropriateness of the DEIA, the project proponent shall conduct a reassessment (Article 8.6).

(4) Environmental standards

1) Water quality

The environmental standards for water quality of Mongolia are shown in Table 5.

Table 5 Water Quality Standards for Major Indicators of Mongolia

Item	Standard
pH	6.5 - 8.5
O ₂	6.4 mg/ℓ or above
BOD	3 mg/ℓ
COD	10 mg/ℓ
NH ₄ -N	0.5 mg/ℓ
NO ₂ -N	0.02 mg/ℓ
NO ₃ -N	9.0 mg/ℓ
PO ₄ -P	0.1 mg/ℓ
Cr	0.05 mg/ℓ
Hexavalent chromium	0.01 mg/ℓ

Source: MNS4586-1998

Table 6 shows the effluent standards of Mongolia.

Table 6 Effluent Standards for Major Indicators of Mongolia

Item	Standard
Temperature	20 °C
pH	6-9
SS	50 Mg/ℓ
BOD	20 Mg/ℓ
COD	50 mg/ℓ
T-P	0.3 mg/ℓ
T-N	4 mg/ℓ
Cr	0.3 mg/ℓ

Source: MNS4943-2011

2) Noise and vibration

Table 7 shows the standards for noise and vibration of Mongolia.

Table 7 Standards for Noise and Vibration

Hour	Averaging Time	Standard
Daytime from 7 a.m. to 11 p.m.	16 hours	60 dbA
Night from 11 p.m. to 7 a.m.	8 hours	45 dbA

Source: MNS4585-2007

(5) Legal framework for protected areas and protected areas in and around Ulaanbaatar

The Law on Special Protected Areas provides the four categories of state-level protected areas shown in Table 8.

Table 8 Categories of Protected Areas

Name	Objective	Outline
National Conservation Park	To ensure the ecological balance for peculiar features of the natural zone and belt, their state of originality, and outstanding scientific significance	Mining, forest clearing, road construction, building construction and other development activities are strictly regulated. The National Conservation Parks are further classified into three categories: Virginal; Protected; and Limited. The strictness of regulations varies depending on the category.
Natural Complex Area	To protect an area that has relatively conserved its natural original state and the area's importance for historical, cultural and scientific knowledge, or ecological education	Regulations similar to the National Conservation Parks are applied. The Natural Complex Areas are further divided into three categories: Special; Tourist; and Restricted. The strictness of regulations varies as per the categories.
Natural Reserve	To protect a certain type of nature, to protect and conserve any resource, and to facilitate reclamation	Traditional economic activities without adverse impacts on the nature may be conducted in the Nature Reserves. Construction of buildings, digging, and tree cutting and other development activities are regulated. The Nature Reserves are further divided into Natural Complex Reserve; Biological Reserve; Fossil Reserve; Geological Reserve; and Water Reserve.
National Monument Area	To preserve the unique natural formations, historical and cultural traces in their original conditions	Building facilities which may have negative impacts on the view of monuments are restricted. Any activities that may harm monuments shall be 0.1- 3.0 km away.

Source: Law on Special Protected Areas

In addition to the Law on Special Protected areas, the Law on Water of 2004 protects areas around water sources such as special protected zones, and strictly regulates construction of buildings, industrial digging, and mining, clearance of trees, and other development activities.

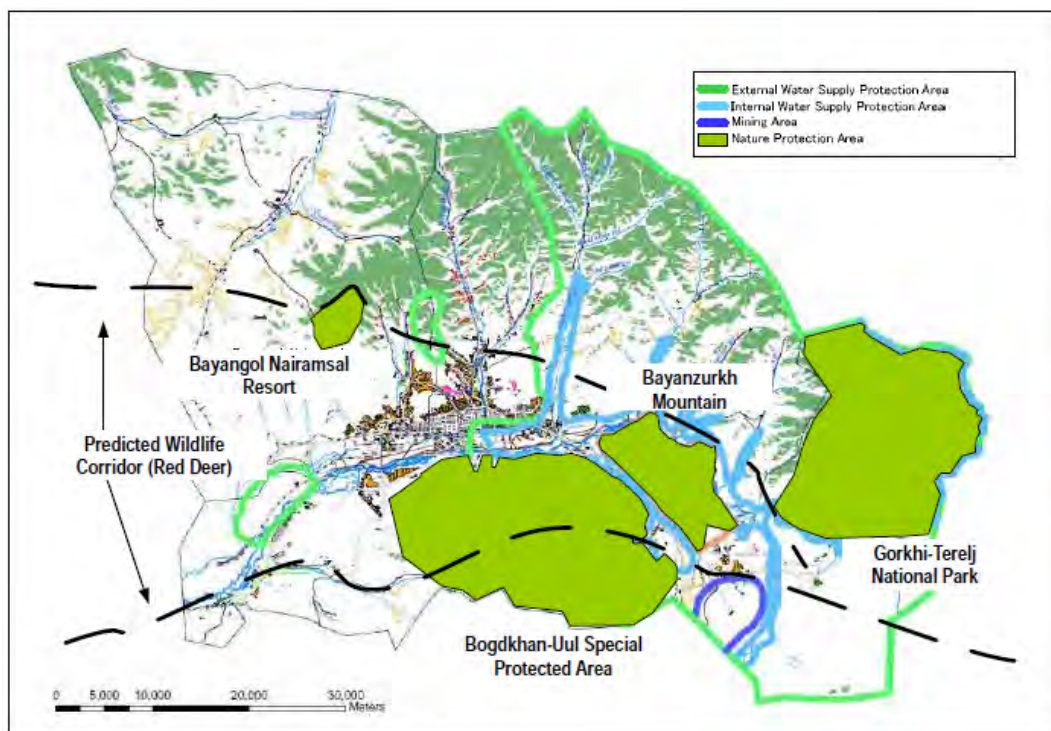
According to the Nature Protection Division of Ulaanbaatar City, there are eight (8) protected areas, including one (1) culturally protected area, in and around Ulaanbaatar City (Table 9).

Table 9 Protected Areas around Ulaanbaatar City

No.	Name	Area (ha)	Status
1	“Bogd Khan Mountain” National Park	41,600	Established
2	“Gorhi-Terelj” Nature Complex Area	293,200	Established
3	“Bayanzurkh Mountain” Nature Complex Area	9,330	Established
4	“Bayangol” Nature Complex Area	926	Established
5	Central water supply underground catchment area	135,080	Under consideration
6	“Chingelt Khairkhan Mountain” Nature Resource Area	1,600	Under consideration
7	“Songino Khairkhan Mountain” Nature Resource Area	2,150	Under consideration
8	“Gandantegchilen Monastery, Geser Temple” Memorial Place	58	Under consideration

Source: Nature Protection Division of Ulaanbaatar City

Figure 2 shows the locations of protected areas around Ulaanbaatar¹. A map indicating protected areas under consideration was not available in the MNET or the Nature Protection Division of Ulaanbaatar City.



Source: JICA (2009). *Study on City Master Plan and Urban Development Program of Ulaanbaatar*
Figure 2 Locations of Protected Areas in and around Ulaanbaatar City

(6) Legal framework for wildlife protection and wildlife in Mongolia

Mongolia has ratified the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Major endangered species registered with CITES are listed in Table 10.

Table 10: Major Endangered Species in Mongolia

Family	Scientific Name	Common Name
Bovidae	<i>Gazella subgutturosa</i>	Goitered Gazelle
Ursidae	<i>Ursus thibetanus</i>	Asian Black Bear
Feridae	<i>Uncia uncia</i>	Snow Leopard
Equidae	<i>Equus hemionus</i>	Asian Wild Ass
Equidae	<i>Equus przewalskii</i>	Mongolian Wild Horse
Bovidae	<i>Ovis ammon</i>	Asian Wild Sheep
Ciconiidae	<i>Ciconia boyciana</i>	Oriental White Stork
Gruidae	<i>Grus japonensis</i>	Red-crowned Crane
Gruidae	<i>Grus leucogeranus</i>	Siberian Crane
Laridae	<i>Larus relictus</i>	Relict Gull
Accipitridae	<i>Aquila heliaca</i>	Eastern Imperial Eagle
Falconidae	<i>Falco peregrinus</i>	Duck Hawk
Canidae	<i>Canis lupus</i>	Gray Wolf
Mustelidae	<i>Lutra lutra</i>	Common Otter
Moschidae	<i>Moschus moschiferus</i>	Siberian Musk Deer
Pelecanidae	<i>Pelecanus crispus</i>	Dalmatian Pelican

Source: Website of CITES, <http://www.cites.org/>

¹ The names of protected areas are slightly different between Table 9 and Figure 2. This is due to the difference of information sources. The study team was unable to determine which ones were more appropriate during the study.

(7) Legal framework for cultural heritage and cultural heritage around Ulaanbaatar

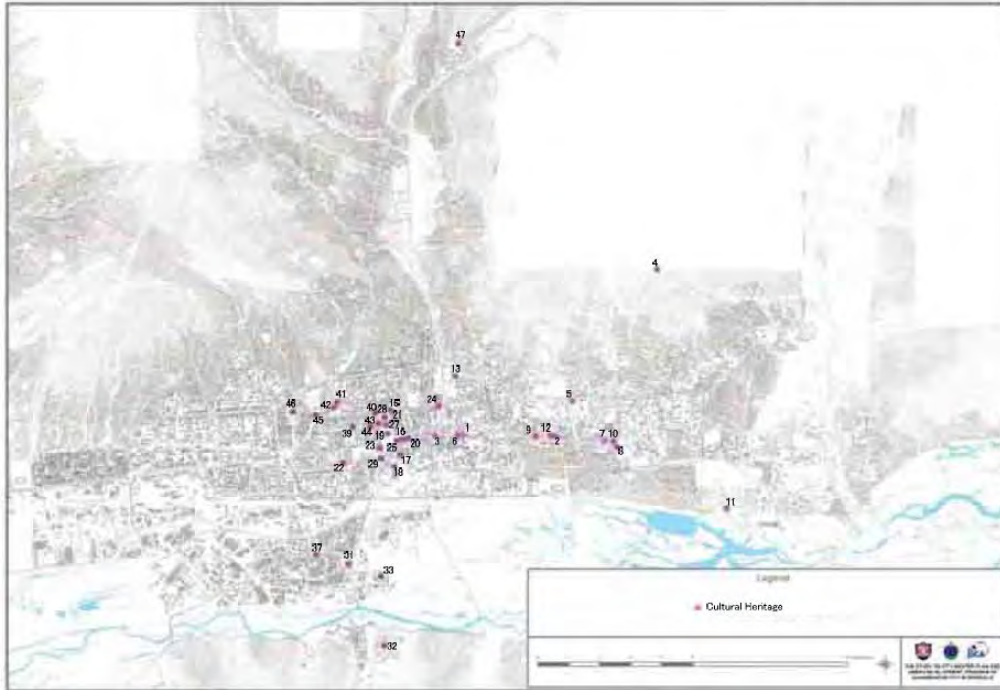
The Law on Protection of Cultural Heritage of 2001 stipulates that cultural properties with archeological values, ancient castles and temples shall be protected as historical cultural properties. According to the report of the “Study on City Master Plan and Urban Development Program of Ulaanbaatar” in 2009, many cultural properties have been identified in and around Ulaanbaatar City as shown in Table 11.

Table 11 Cultural Properties in and around Ulaanbaatar

No	Name	No	Name
City Level			
1	Tsogtdambajavyn house	21	Kh. Choibalsan monument
2	First European style 2 storey building	22	B. Tserendorj monument
3	2 stone lion sculptures in Arslantai bridge	23	S. Zorig monument
4	Memorial park in Altan olgii	24	Y. Lkhagvasuren monument
5	Mongolian revolutionists house in Konsulyn denj	25	“Horse breaking” sculpture
6	House where lived Mongolian Revolutionists	27	State ceremony palace
7	D. Sukhbaatar monument	28	State seal symbol monument
8	“Mongol Ard” monument	29	B. Renchin monument
9	D.K. Jukov monument	31	Some buildings of the Bogd Khan’s summer palace complex
10	Dandarbaatar monument	32	Monument for warriors
11	D. Sukhbaatar statue in his birth place	37	Monument for workers
12	House where lived N.K.Rerikh	39	First department store
13	Yu. Tsedenbal Monument	40	2 stone lion sculptures in front of the Natural Historical Museum
15	2 stone lion sculptures in front of the Mongolian National University	41	Mongolian and Russian revolutionists house
16	Capital city foundation monument	43	Monument for political repression
17	Place where lived former prime minister P. Genden	44	P.E. Shetinkin monument
18	D. Natsagdorj monument		Rock with memorial historical words
19	D. Sukhbaatar monument (with horse)		Khunnu time graves in Blkhiin am
20	V.I. Lenin monument		
National Level			
45	Geser Temple		2 stone columns of the Dari Ekh Temple
46	Gandantegchilen Monastery		Rock paintings in lkh tengeriin am
	Bogd Khaan’s Green Palace		Megjid Janraisig monastery
	Rock painting in Gachuurtyn am		Graves in Songinokhairkhan mountain
	Ger shaped wooden monasteries		Chin Van Khanddorj’s house
47	Dambadarjaa Monastery		Choijin Lama Temple

Source: JICA (2009). *Study on City Master Plan and Urban Development Program of Ulaanbaatar*

Figure 3 shows the locations of these cultural properties.



Source: JICA (2009). *Study on City Master Plan and Urban Development Program of Ulaanbaatar*

Figure 3 Locations of Cultural Heritages in and around Ulaanbaatar

(8) Legal framework for land acquisition and resettlement

Land privatization had not been authorized under the socialist regime in Mongolia. In 1992, however, the new Constitution allowed different forms of land tenure including private ownership. The Government of Mongolia is currently implementing land reform undertakings including land privatization by establishing the Law on Land (Land Law) of 1994, and the Law on Allocation of Land to Mongolian Citizens for Ownership (Land Allocation Law) of 2002. The Land Law is meant to regulate possession and use of land, whereas the Land Allocation Law is to govern the allocation of land for ownership. The outline of the Constitution, Land Law, and Land Allocation Law are described below.

1) Constitution of Mongolia

Article 6.4 of the Constitution stipulates that the state has the right to take over land for a special public need with compensation. Article 16.3 of the Constitution requires the state to pay due compensation if the state appropriates private properties. Land may be taken if the land is used in a way in which human health and the environment are not damaged.

2) Land Law

The Law on Land or the Land Law provides the definitions of different types of land title: 1) Ownership; 2) Possession; and 3) Use (Article 3.1). To own land means to be in legitimate control of land with the right to dispose of the land. To possess land means to be in legitimate control of land in accordance with the purpose of its use and terms and conditions specified in respective land contracts. To use land means to undertake a legitimate and concrete activity to utilize some of the land's specific qualities in accordance with contracts. Article 5.1 stipulates that any land other than that granted for ownership to Mongolian citizens is the state property. The state can take any land for special needs (Article 16.3). The state will negotiate with the right holders of land to be expropriated. Upon agreement between the parties, the decision of land acquisition is made and

necessary procedures commence.

3) Land Allocation Law

The Law on Allocation of Land to Mongolian Citizens for Ownership or Land Allocation Law provides the principles and procedures for land privatization. The law determines land to be allocated to private persons and the maximum size of land to be allocated. Article 32 of the law stipulates that land owned by citizens may be replaced or taken back with compensation when a special need of the state arises. If the state takes land owned by a private citizen, the state agency in charge of land matters shall reach a preliminary agreement with the land owner one year prior to the decision on land acquisition (Article 32.4 & 5). In addition, the state shall notify in writing the acquisition of land for special state needs not less than one year prior to the decision on land acquisition (Article 37.2).

The Ministry of Road, Transportation, Construction and Urban Development (MRTCUD) is in charge of land matters. The Administration of Land Affairs, Geodesy and Cartography (ALAGaC) and the Administration of State Registry of Titles (ASRT) have also been established as implementing agencies. The former is in charge of geodesy, cartography, land use plan and other matters, while the latter is responsible for the registration of land titles.

7.2 Relative agencies and institutions

(1) Ministry of Nature, Environment and Tourism

The Ministry of Nature, Environment and Tourism (MNET) is responsible for environmental conservation policies and the Law on Environmental Impact Assessment. The Department of Environment and Natural Resources is in charge of environmental impact assessment. Thus it is necessary to work closely with the department in conducting environmental screening and DEIA.

(2) Ulaanbaatar Water Supply and Sewerage Authority

The Ulaanbaatar Water Supply and Sewerage Authority, or USUG in its Mongolian acronym transliterated into English, was established in 1959. It is currently operated as an independent profit agency under the jurisdiction of Ulaanbaatar City. USUG has no permanent section to carry out an environmental and social considerations survey. Its staff members will be appointed as environmental and social considerations arise, and perform duties such as the preparation of environmental impact assessment laws by subcontracting external consultants. Thus staff members in charge of environmental and social considerations shall be clearly identified at the commencement of the master plan study.

8. Provisional Scoping

8.1 Types and magnitudes of possible adverse impacts

Table 12 shows the result of the provisional scoping on possible environmental and social impacts related to the formulation of the master plan of water supply and sewerage treatment.

Table 12 Provisional Scoping Table

Item	Expected impacts	
	Construction Phase	Operation Phase
Air Pollution	B	B
Water Pollution	C	B
Soil Contamination	-	B
Waste	B	B
Noise and Vibration	B	C
Offensive Odor	-	B
Hydrology and Groundwater	B	B
Ground Subsidence	-	-
Protected Areas and Biodiversity	C	B
Climate Change	-	-
Involuntary Resettlement	C	C
Land Acquisition	C	-
Local Economy and Impacts on Land Use	C	C
Local Conflict and Inequality	C	C
Sanitation and Infectious Disease (HIV/AIDS)	-	-
Local Water Use and Water Rights	C	C
Cultural Heritage	C	C
Landscape	-	-
Minority and Indigenous Peoples	-	-
Accidents and Safety	B	B

[Legend]

A : Significant impacts are expected

B : Certain impacts are expected

C : Impacts are unknown at present

- : No impacts are expected

Source: JICA Study Team

The following section describes expected environmental and social impacts.

(1) Air Pollution

[Construction Phase] A certain amount of air pollutants is expected to be emitted from the use of vehicles and heavy machines during construction and rehabilitation works. Those air pollutants will not have significant effects in remote areas such as water development ones. However, in densely populated areas such as *Ger* areas, air pollution may affect local residents.

[Operation Phase] There are no safety devices to detect and neutralize chlorine leakage in chlorination facilities of water intake wells, and thus localized air pollution may be caused. There is no possibility of air pollution associated with the operation of sewerage treatment facilities.

(2) Water Pollution

[Construction Phase] Temporary increase in suspended solids of rivers may be caused by turbid water to be discharged by construction and rehabilitation works of water supply and sewerage treatment facilities. Occurrence or non-occurrence of impacts and their degree cannot be identified at present since they depend on the components and locations of individual projects.

[Operation Phase] No water pollution is expected from the operation of water supply facilities. Water pollution indicators such as SS, BOD, COD, and pH may deteriorate due to discharge from

sewerage treatment facilities. It should be noted that the current discharge from the Central Waste Water Treatment Plant fails to fulfill the water discharge standards of Mongolia (MNS 4943-2011).

(3) Soil Contamination

[Construction Phase] No soil contamination is expected.

[Operation Phase] Water supply projects will not cause soil contamination. On the other hand, sewerage sludge may cause soil contamination depending on the way of the treatment. Sludge generated from the Central Sewerage Treatment Plant is currently stored in the premises of the plant after drying. However, soil contamination may occur because no measures have been taken to prevent leakages to the ground. In the Factory Sewerage Treatment Plant, polluted water containing chromium discharged from 30 leather factories is treated. There are several leather factories in Ulaanbaatar City, and discharged water from them is currently flowing into the Central Sewerage Treatment Plant. Sludge generated from the Central Sewerage Treatment Plan may contain chromium.

(4) Waste

[Construction Phase] Waste soils and construction wastes will be generated from construction works for water supply and sewerage treatment facilities.

[Operation Phase] Sludge will not be generated from the operation of water supply facilities, since the water source in Ulaanbaatar is groundwater and no water purification facilities are required at present. Gas cylinders of chlorine will be returned to the supplier and thus waste cylinders will not be generated. In terms of sewerage treatment, sludge will be discharged. Sludge may include organic compounds, nitrogen, phosphorus, and heavy metals including chromium.

(5) Noise and Vibration

[Construction Phase] Noise and vibration are anticipated from construction works for water supply and sewerage treatment facilities. In particular, pipe laying in *Ger* areas may cause temporary disturbance of local residents' livelihoods.

[Operation Phase] Although the operation of pumps and other facilities will cause some noise and vibration, USUG states that there will be no significant impacts since such facilities are usually located away from the boundary of the sites. There are no complaints from local residents about noise and vibration. However, it is necessary to confirm the occurrence or non-occurrence of impacts when planning the layout of facilities.

(6) Offensive Odor

[Construction Phase] No impacts related to offensive odor are expected during construction works for water supply and sewerage treatment facilities.

[Operation Phase] No offensive odor will be generated from the operation of water supply facilities. In terms of the operation of sewerage treatment facilities, offensive odor may affect the livelihoods of local residents. According to USUG, there are complaints about offensive odor, in particular during summer, from local residents living near the Central Sewerage Treatment Plant.

(7) Hydrology and Groundwater

[Construction Phase] Digging of wells for the development of new sources may affect the water level and quality of nearby groundwater. In terms of construction works of sewerage treatment facilities, no impacts on hydrological conditions and groundwater are expected.

[Operation Phase] If groundwater or underflow water of the Tuul River is to be taken, there is a possibility of adverse impacts on the hydrological conditions of the Tuul River. Although significant impacts are not expected at present since the potential of groundwater is considered sufficient to cover the future water demand, it is necessary to conduct a detailed study on hydrological conditions and groundwater if new water source development is included in the master plan to be formulated. In particular, if the construction of an underground dam for the cultivation of groundwater is included in the master plan, there may be certain impacts on the downstream part of the river, such as the reduction of the water volume.

(8) Ground Subsidence

[Construction Phase] No ground subsidence is expected from construction works for water supply and sewerage treatment facilities.

[Operation Phase] No ground subsidence is expected since the current water source of Ulaanbaatar City is the underflow water of the Tuul River, and a sufficient amount of water is continuously supplemented.

(9) Protected Areas and Biodiversity

[Construction Phase] Temporary impacts on an ecosystem such as tree cutting, clearance of vegetation may be caused during the construction works, depending on the locations of water supply and sewerage treatment facilities. Temporary impacts on water creatures are also anticipated if construction works are undertaken in surface water channels. According to the Nature Protection Division of Ulaanbaatar City, there are seven (7) nature protected areas around Ulaanbaatar (Table 9), thus there may be certain impacts on these areas depending on the locations of related facilities. Occurrence or non-occurrence of impacts and its degree cannot be identified at present since they depend on the detailed plans of individual projects.

(10) Climate Change

The amount of greenhouse gases emitted during construction works and the operation of water supply and sewerage treatment facilities is considered very low and thus negligible.

(11) Involuntary Resettlement

[Construction Phase] According to USUG, the development of new water sources under consideration, and the rehabilitation and expansion of the Central Sewerage Treatment Plant will not cause involuntary resettlement since project sites are already acquired for almost all the projects. On the other hand, pipe laying works and small-scale sewerage treatment plants in *Ger* areas may require temporary or permanent resettlement. The occurrence or non-occurrence of resettlement and its scale cannot be identified at present, since they depend on the components and locations of individual projects.

[Operation Phase] Impacts caused by permanent involuntary resettlement will continue after the

construction phase. Local residents to be relocated may face difficulties in maintaining or improving their livelihoods than those before resettlement.

(12) Land Acquisition

[Construction Phase] According to USUG, the development of new water sources under consideration, and the rehabilitation and expansion of the Central Sewerage Treatment Plant will not require land acquisition from private owners. On the other hand, pipe laying works and small-scale sewerage treatment plants may require temporary or permanent acquisition of land. The occurrence or non-occurrence of acquisition from private owners and its scale cannot be identified at present, since they depend on the components and locations of individual projects.

(13) Local Economy/ Impacts on Land Use

[Construction Phase] Certain impacts such as temporary closure of streets, increase in traffic due to the increase in construction vehicles, and temporary land use restriction are expected, especially in *Ger* areas, during construction works for water supply and sewerage treatment plants. The occurrence or non-occurrence of these impacts and their degrees cannot be identified at present, since they depend on the components and locations of individual projects.

[Operation Phase] Certain impacts are predicted since entry into water sources and nearby areas and land use in such areas are regulated.

(14) Local Conflict and Inequality

[Construction and Operation Phase] Projects to develop new sources and to rehabilitate and expand the Central Sewerage Treatment Plant will not cause local conflicts. In terms of projects in *Ger* areas, local residents may feel that particular groups and/or areas benefit or are disadvantaged in an unfair manner. The occurrence or non-occurrence of such impacts and their degrees cannot be identified at present, since they depend on the detailed planning of individual projects.

(15) Sanitation and Infectious Disease (HIV/AIDS)

[Construction Phase] According to the 2010 report of the Joint United Nations Programme on HIV and AIDS or UNAIDS, the estimated HIV prevalence is less than 0.1% of the adult population in Mongolia. Thus the risk of the spread of HIV/AIDS associated with the inflow of construction workers is considered low.

[Operation Phase] There is little risk of problems regarding sanitation and infectious diseases.

(16) Local Water Use and Water Rights

[Construction and Operation Phase] According to USUG, there are no water right owners with whom USUG needs to coordinate in relation to the utilization of water of the Tuul River. However, coordination with entities using groundwater of the Tuul River may be required if the amount of water intake is high. In addition, certain impacts are predicted if temporary closure of surface water channel is necessary. The occurrence or non-occurrence of such necessity cannot be identified at present, since they depend on the detailed planning of individual projects.

(17) Cultural Heritage

[Construction and Operation Phase] There are many cultural heritages in and around Ulaanbaatar as indicated in Table 11. Therefore construction works for water supply and sewerage treatment facilities may cause certain adverse impacts. The occurrence or non-occurrence of such impacts cannot be identified at present, since they depend on the locations of individual projects.

(18) Landscape

There is little risk of significant change of local landscape associated with the construction of water supply and sewerage treatment facilities. At the feasibility study phase of individual projects, it is necessary to identify the degree of impacts on local landscape based on local stakeholder meeting.

(19) Minority and Indigenous Peoples

According to USUG, there are no designated residences or zones where minorities and indigenous peoples live.

(20) Accidents and Safety

[Construction Phase] Accidents may occur during construction or rehabilitation works for water supply and sewerage treatment facilities, or development of new water sources. If some construction works are carried out in *Ger* areas, there is a possibility of traffic accidents involving local residents due to increase in the traffic of construction vehicles.

[Operation Phase] Workers may be involved in accidents during the operation of related facilities. There are no safety devices to detect and neutralize chlorine leakage in chlorination facilities of water intake wells. Entry into water supply and sewerage treatment facilities is prohibited, and thus the risk of accidents with local residents involved is low.

8.2 Mitigation Measures

Avoidance, minimization, and mitigation measures against anticipated impacts are described below.

(1) Air Pollution

Construction vehicles and heavy machineries shall be properly maintained to minimize air pollutants. Details of construction works including date, time, and duration shall be notified to local residents prior to the commencement of works. A contact address to receive complaints from local residents also needs to be released. Safety devices to detect and neutralize chlorine leakage should be installed in chlorination facilities of water intake wells, and operation manuals for related facilities should be properly formulated and distributed to workers.

(2) Water Pollution

Materials and construction methods that reduce muddy water shall be adopted, and measures to prevent muddy water from directly inflowing into rivers, such as the construction of simplified weirs, shall be undertaken. With respect to discharged water from sewerage treatment plants, facilities which have enough capacity to fulfill effluent standards need to be set up. In the medium and long run, measures to improve the quality of inflow water to the plants need to be considered.

(3) Soil Contamination

Sewerage sludge needs to be disposed of in a way to prevent leakage in sections surrounded by concrete and other impermeable materials.

(4) Waste

Waste soil generated by construction works should be used for back-filling. Construction companies and workers shall be guided not to leave waste soil and other wastes in construction sites. Articles requiring proper disposal of construction wastes shall be incorporated into the contract with construction companies to ensure proper waste disposal. Sewerage sludge shall be disposed of in compliance with the Law on Domestic and Industrial Waste Management.

(5) Noise and Vibration

Construction vehicles and heavy machineries shall be properly maintained to minimize noise and vibration. Construction works in the early morning and late night should be avoided. Impacts of noise and vibration on nearby households should be mitigated by prior notification of the date and time and duration of construction works. A contact address to receive complaints from local residents also needs to be released.

(6) Offensive Odor

When designing sewerage treatment facilities, it is necessary to arrange the design to prevent the leakage of offensive odor flowing outside the premises. Sewerage treatment facilities shall be properly maintained to minimize offensive odor.

(7) Hydrology and Groundwater

Prior to the development of water sources, wells should be sampled to monitor the groundwater level. Wells shall be sampled from nearby areas and downstream of the development site. If a significant drawdown is observed, water intake shall be reduced or halted until the water level recovers.

(8) Protected Areas and Biodiversity

It is necessary to consider transplanting of trees to be cut in order to minimize the number of trees to be cut. When cutting trees, additional ones should be planted to keep the number of trees the same. After construction works, construction sites shall be immediately restored to promote vegetation recovery. If some works are planned in surface water channels, mitigation measures such as shortening of work schedule; minimization of closure; and prevention of inflowing of muddy water into rivers. If certain impacts of effluents from the Central Sewerage Treatment Plant on water creatures are anticipated, ecological monitoring should be conducted for index species.

(9) Involuntary Resettlement

It is necessary to conduct on-site investigation to identify necessity of resettlement and its scale when planning individual projects. It is also necessary to coordinate with local residents affected, and obtain their consent. If large-scale resettlement is expected, a resettlement action plan (RAP) shall be formulated and released to the public based on the JICA Guidelines for Environmental and Social Considerations. The RAP needs to include due compensation for relocation and support for re-establishment of the relocated residents' livelihoods. At the stage of a master plan in which details

are not determined, a resettlement policy framework shall be formulated, and a survey on resettlement shall be conducted when details of individual projects are put together.

The amount of compensation shall be calculated at full replacement cost, including market price of the property, cost for ground leveling, registration fees, and other related expenses. Support for re-establishment of livelihoods shall be provided to improve the living standard or at least to restore it to the pre-project level.

(10) Land Acquisition

On-site investigation shall be conducted to identify lands to be acquired and their right holders when planning individual projects. It is also necessary to coordinate with local residents affected, and obtain their consent. The amount of compensation will be determined based on the market price. However, according to the Draft Resettlement Policy Framework for the Third Ulaanbaatar Urban Service Improvement Project (USIP3) supported by the World Bank, acquisition at market value is rare in practice. It is therefore necessary to conduct a survey on actual practices and compensation amount, and, if necessary, measures to ensure the acquisition of land at the market price should be considered.

(11) Local Economy and Impacts on Land Use

Details of construction works including date and time and duration shall be notified to local residents and other stakeholders prior to the commencement of works. Traffic control shall be done to avoid any accidents. A contact address to receive complaints from local residents also needs to be released.

(12) Local Conflict and Inequality

Local stakeholder meetings shall be held to coordinate with local residents, and the result of the meetings shall be properly reflected in a project plan.

(13) Local Water Use and Water Rights

Local stakeholder meetings shall be held to coordinate with local residents who live in the downstream areas of new water source development sites, and the result of the meetings shall be properly reflected in a project plan.

(14) Cultural Heritage

Impacts on cultural heritages shall be confirmed in local stakeholder meetings. Based on the result of the meetings, necessary measures shall be undertaken. If certain impacts on cultural heritages are expected, it is necessary, in consultation with District governments and local residents, to consider mitigation measures such as route change and relocation of the cultural properties.

(15) Landscape

Local stakeholder meetings shall be held to collect opinions of local residents on local landscape. The result of the meetings shall be properly reflected in a project plan.

(16) Accidents and Safety

Safety education shall be provided to construction workers to prevent accidents. Traffic safety education should also be provided to drivers of construction vehicles. Safety devices to prevent

chlorine leakage and neutralize chlorine need to be installed. Facilities shall be fenced to prevent the entry of local residents and livestock.

9. Alternatives to the project activities including ‘without project’ option

The Project is to reexamine the current situation and problems in the water supply and sewerage sector in Ulaanbaatar, and will contribute to proper planning of future investments in the sector. Without the master plan, development of water sources, water supply and waste water treatment would be implemented in an unplanned and uncoordinated manner. This will affect adversely both quantity and quality of the Tuul River, the main source of water in Ulaanbaatar, and other water bodies. “Without project” option will, therefore, deteriorate the situations regarding water supply and sewerage sector in Ulaanbaatar, and thus the “without project” option cannot be taken.

Alternatives related to subproject selection cannot be conducted at this stage, since subprojects to be included in the reexamined master plan are not yet selected. Such alternatives need to be considered at the later stage.

10. Result of the consultation with recipient government on environmental and social consideration including roles and responsibilities

JICA Detailed Planning Survey Team provided the JICA Guidelines for Environmental and Social Considerations (2010) (JICA Guidelines) and explained that it would be applied to the Study. The Mongolian side understood the policy of the JICA Guidelines and agreed in principle as follows:

- 1) The Mongolian side will follow EIA regulations in Mongolia for Study activities and take appropriate measures, if necessary. The JICA Study Team will provide the technical support to do it.
- 2) The information disclosure such as opening the study report shall be made in order to ensure the participation and dialogues with various stakeholders, in order to achieve appropriate environmental and social considerations.
- 3) In the course of implementation of the Study, public consultation with communities and stakeholders shall be included, if necessary.
- 4) In view of the Study objectives, both sides agreed that the Study follows laws and regulations in force in Mongolia and the JICA guidelines.

11. Terms of Reference for Environmental and Social Considerations

The Mongolian side agrees the terms of reference for the environmental and social considerations in the Study as described below.

(1) Environmental and social consideration study in reviewing the previously formulated Master Plan

- (a) Study on institutional framework of Mongolia regarding environmental and social considerations
- (b) Study on current environmental and social status of areas covered by the Master Plan
- (c) Analysis on alternatives, including zero-option scenario, through the implementation of

Strategic Environmental Assessment

- (d) Scoping on possible environmental and social impacts, focusing on water quality, waste, odor, groundwater, involuntary resettlement and land acquisition, impacts during construction phase, and other impacts
- (e) Elaboration of mitigation measures
- (f) Implementation of stakeholder consultation meeting
- (g) Elaboration on points to consider for the environmental and social considerations at the project implementation stage

(2) Environmental and social consideration study for selected project

If project(s) subject to EIA is selected as priority project(s), the following studies will be conducted to support the Mongolian side to implement EIA.

- (a) Study on current environmental and social status of project site(s)
- (b) Analysis on alternatives including zero-option scenario
- (c) Scoping of possible impacts according to the components of candidate project(s)
- (d) Elaboration of mitigation measures
- (e) Implementation of stakeholder consultation meeting
- (f) Elaboration of environmental management plan and environmental monitoring plan and their implementation structures

12. Other relevant information

None