Initial Environmental Examination

October 2013

Mongolia: Ulaanbaatar Urban Services and Ger Areas Development Investment Program (MFF, Project 1)

Prepared by the Municipality of Ulaanbaatar (MUB) for the Asian Development Bank (ADB)

CURRENCY EQUIVALENT

(as of 15 September 2013)

Currency unit	–	Mongolian Tughrik (MNT)
MNT1.00	=	$ 0.00058
$1.00	=	MNT 1,698

ABBREVIATIONS

ADB	Asian Development Bank
C-EMP	contractor's environmental management plan
CWWTP	Central Wastewater Treatment Plant
EIA	environmental impact assessment
EMP	environmental management plan
EMR	environmental monitoring report
GOM	Government of Mongolia
GRM	grievance redress mechanism
IEC	information, education and communication
IEE	initial environmental examination
MEGD	Ministry of Environment and Green Development
MFF	Multitranche Financing Facility
MNT	Mongolian Tughrik
MUB	Municipality of Ulaanbaatar
PMO	Project Management Office
PPTA	Project Preparatory Technical Assistance
SPS	Safeguard Policy Statement
SES-WTPS	Socio-Economic Survey and Willingness to Pay for Services
SRA	Subcenter Redevelopment Authority
P1-EMP	environmental management plan for Project 1
USD	United States Dollar
USIP	Ulaanbaatar Services Improvement Project
USUG	Ulaanbaatar Water and Sewerage Authority
WHO	World Health Organization

WEIGHTS AND MEASURES

^{O} C	-	degree Centigrade
g or gm	-	gram
GW	-	gigawatt

h	-	hour
ha	-	hectare
km	-	kilometer
km^2	-	square kilometer
KV	-	kilovolt
KW	-	kilowatt
KWh	-	kilo-watt hour
l	-	liter
L_{Aeq}	-	Equivalent continuous A-weighted sound pressure level
m	-	meter
mi	-	mile
mph	-	mile per hour
m/s	-	meter per second
m^3	-	cubic meter
m^3/d	-	cubic meter per day
m^3/s	-	cubic meter per second
mg	-	milligram
mg/l	-	milligram per liter
mg/m^3	-	milligram per cubic meter
mm	-	millimeter
MPa	-	Mega-pascal
MW	-	Mega-watt
pcu/h	-	passenger car unit per hour
t	-	metric ton
t/d	-	metric ton per day
t/a	-	metric ton per annum
µ	-	micron

NOTES

In the report, "$" refers to US dollars.

This initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff and may be preliminary in nature.

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Table of Contents

ANNEXES

I. EXECUTIVE SUMMARY

A. Project Introduction and Purpose

1. This initial environmental examination (IEE) has been prepared for tranche 1 of the Ulaanbaatar Urban Services and *Ger*[1] Areas Development Investment Program (hereinafter referred to as tranche 1 of the Program). The program will be financed by the Asian Development Bank (ADB) through its multitranche financing facility (MFF) in three tranches over a period of maximum 10 years. The MFF is estimated to be a total of $320 million. The program aims at improving the quality and coverage of urban infrastructure and basic services, and implementing a sustainable and inclusive process of urban development for middle *ger* areas of Ulaanbaatar, Mongolia. It is expected to directly benefit 400,000 people living in the middle *ger* areas and to indirectly benefit the entire population of Ulaanbaatar. Combining spatial and sector approaches, it will support the socio-economic development of existing urban subcenters and urban corridors to progressively transform the *ger* areas into livable, productive and well-functioning peri-urban areas.

2. The expected impact of the program will be improved living conditions in Ulaanbaatar. The expected outcome will be sustainable, inclusive and well-structured development of *ger* areas in Ulaanbaatar. The expected results of the program include (i) a well-developed network of subcenters, providing economic opportunities, housing and employment, with reduced impact on the environment, particularly regarding soil and air pollution; (ii) water supply, wastewater and district heating service providers that are financially self-sufficient and use modern technologies to provide high-quality services; and (iii) an efficient and growth-oriented urban planning system based on sound legislative foundation in a market environment, with an active public participation process.

3. The initial tranche of the program (**Tranche 1 or Project 1**) will focus on two priority subcenters: (i) Bayankhoshuu Subcenter in Songino Khairkhan District (Khoroos 7, 8, 9, 10, 28); and (ii) Selbe Subcenter in Sukhbaatar District (Khoroo 14) and Chingeltei District (Khoroos 14, 18). Both subcenters are in the mid-*ger* areas in the northwest and north of Ulaanbaatar City, respectively. Within the city's subcenter hierarchy, these two subcenters have been identified as second level subcenters aiming to deliver livelihood and socio-economic services to a combined area of over 200,000 people. The scope of tranche 1 is presented in **Table I-1**.

4. Tranche 1 has been classified as a Category B undertaking by ADB, requiring an IEE. The IEE has been prepared by the project preparation technical assistance (PPTA) team for, and in close collaboration with, the Municipality of Ulaanbaatar (MUB), following ADB Safeguard Policy Statement (SPS, 2009) of the ADB. The IEE (i) gives an overview of Mongolia's environmental policy and the EIA requirements of Mongolia and the ADB; (ii) describes the program and tranche 1; (iii) presents the baseline environmental conditions of physical, ecological, socio-economic and physical-cultural resources; (iv) assesses the anticipated environmental impacts of proposed physical activities; (v) recommends measures to mitigate anticipated impacts; (vi) describes the process, and presents the results, of the consultation and information disclosure that has been undertaken; (vii) defines a grievance redress mechanism; and (viii) provides an Environmental Management Plan.

[1] Named after *ger* tents.

5. In compliance with Mongolia's environmental safeguard policy, tranche 1 was subject to General Environmental Impact Assessment (GEIA)-or environmental screening-by the Ministry of Environment and Green development (MEGD) in March 2013. The GEIA conclusion has required the preparation of a Detailed EIA (DEIA) for each subcenter. The DEIAs were prepared by a MEGD-registered/licensed entity (ENVIRON LLC) following the Directive Schedule for DEIA in the GEIA conclusion.

Table 1: Tentative Investment Program ($ million)

Item			Investment Program	Project 1
A.	**Base Cost[a]**			
	1.	Expanded roads and urban services		
		1.1 Roads improvement	89.18	20.06
		1.2 Water supply system improvement	17.36	10.06
		1.3 Sewerage system improvement	21.07	12.19
		1.4 Heating service expansion	72.15	23.15
	Subtotal (1)		**199.76**	**65.46**
	2.	More efficient service providers	**13.75**	**3.75**
	3.	Increased economic and public services	**16.41**	**4.75**
	4.	Institutional strengthening and capacity development		
		4.1 Detailed engineering design and supervision	11.90	5.73
		4.2 Program management implementation support	2.18	1.05
		4.3 Subcenter development and urban planning	1.91	.92
		4.4 Community engagement	1.47	.71
		4.5 Safeguards monitoring	.50	.24
		4.6 Strengthening service providers	1.54	.74
	Subtotal (4)		**19.50**	**9.39**
	Subtotal (A)		**249.42**	**83.35**
B.	**Contingencies**			
	1.	Physical contingencies	24.37	7.86
	2.	Price contingencies	33.36	9.00
	Subtotal (B)		**57.73**	**16.86**
C.	**Financing Charges During Implementation[b]**		**12.85**	**4.31**
	Total (A+B+C)		**320.00**	**104.52**

Note: Numbers may not sum precisely because of rounding.
[a] Includes value-added tax and import duties. The taxes and duties are estimated at $16.7 million for the investment program and $6.08 million for project 1.
[b] Includes interest and commitment charges. Interest during construction on the Asian Development Bank (ADB) loans has been computed (i) at 2.0% per annum of the first tranche's loan from ADB's Special Funds resources (Asian Development Fund); and (ii) at the 5-year (corresponding to implementation period) USD fixed swap rate plus an effective contractual spread of 0.4%; and a commitment charge of 0.15% on the undisbursed portion of the first tranche's loan from ADB's ordinary capital resources.
Source: Asian Development Bank estimates.

B. Description of the Environment

6. Ulaanbaatar lies in the Tuul River valley at 1,350 m above mean sea level, surrounded by the foothills of the Khentii mountain range. Terrain is relatively flat at the city center and gently to steeply rolling in the peri-urban areas. The Bayankhoshuu and Selbe Subcenters are located to the north of the City center, in relatively flat to rolling terrain with some gullies serving as outfalls for surface drainage and are surrounded by steep hills dominantly occupied by ger settlements.

7. Mongolia has a severe continental climate, characterized by little precipitation and sharp daily and seasonal temperature ranges. It has long cold winters and short summers. Ulaanbaatar is the world's coldest capital, with temperatures ranging from about -30oC to

nearly +25oC. Some 95% of the precipitation falls spring to end of fall, with over 70% of it falling in the summer months. Air is driest in spring, with average monthly relative humidity of 40 to 65%.

8. The Tuul River runs from east to west through the southern part of the City. Its upstream is undisturbed, unpolluted and has very low mineralization. As it traverses the City, it suffers from pollution due to the steady influx of settlers close to it and its tributaries and largely due to discharges from the CWWTP. Selbe River forms the eastern boundary of the Selbe Subcenter. Even when flowing, the river does not cover the entire bed. Informal settlers have encroached on it and it has become a solid waste dumping ground in some parts. Selbe River is considered of low biological value and is not used as source for drinking water or for agricultural use.

9. Air pollution is among the pressing environmental issues in Ulaanbaatar. In winter, SO2, NO2 and particulate matters reach levels that are multiples of those in summer. Major sources of air pollution include emissions from vehicles, boilers and power plants, cooking/heating stoves. Ambient noise levels throughout the city center are consistent with little fluctuations. The average noise levels comply with the national standards, but exceeds WHO guidelines. Periodically, particularly during peak traffic hours at curbside, noise exceeds national standards.

10. The soil crust at the City center has severely degraded and completely lost its fertility. In ger areas, due to soil erosion, the nutrient soil crust has disappeared, exposing the lower level of soil including gravel and rocks. In recent years, soil erosion has reportedly increased. From 2003-2007, the heavy metal contamination level in soil remained below the permitted level.

11. Ulaanbaatar is exposed to seismic events. According to a seismic hazard assessment by the Research Center of Astronomy and Geophysics of the Mongolian Academy of Sciences (RCAG), earthquakes of magnitude 8.0 are possible around Ulaanbaatar. Localized flooding can be caused in the City through heavy rain events due to poor surface drainage. The flooding is ephemeral and the water subsides rapidly.

12. The tranche 1 subproject sites are in the subcenters of two middle ger areas (Bayankhoshuu and Selbe Subcenters). These are not within, adjacent or close to legally protected areas. Weeds and grasses grow on the banks of gullies and Selbe River; while fauna species are those common to a crowded urban environment, such as, sparrow, crows and dogs. There are four small khoroo religious buildings within the Bayankhoshuu Subcenter, but these have been constructed recently (less than 25 years old) and have no cultural heritage value. No other physical cultural resources are adjacent or close to the perimeters of the tranche 1 subproject sites.

C. Alternatives

13. Different project alternatives were considered during project feasibility study and initial environmental examination, including the with- and without-project alternatives. Specific projects considered the alternatives for the following: (i) sources of water, pipe-laying, off-takes, and trench profile, for water supply projects; (ii) heating systems, for heating projects; and (iii) road network patterns, for road projects.

14. The ‘without-project’ or ‘do-nothing’ alternative would be allowing the subcenters to grow further as “under-serviced” and its living environment, worsened. This would impede: (i) further social and economic development of Ulaanbaatar and in effect, of the entire country as Ulaanbaatar contributes more than 60% to the national economy; and (ii) Mongolia’s delivery of its commitment to MDG7, ensuring environmental sustainability.

15. The ‘with project’ alternative will provide the nearly 15,300 residents in Bayankhoshuu and Selbe Subcenters convenient access to safe/potable water supply, wastewater management services, heating; houses and properties; basic social services, and economic infrastructures for basic commodities, public transport services and income and employment opportunities. It will improve the living environment within the Subcenters and the local economy of middle ger areas. Overall, the City will benefit from the ‘with project’ alternative. It will contribute to the realization of the Ulaanbaatar City Master Plan 2030, wherein the development of the two Subcenters of Bayankhoshuu and Selbe for the middle ger areas is recommended. It will hasten further social and economic development in Ulaanbaatar and contribute to overall development of the country. It will contribute to the delivery of Mongolia’s commitment to: (i) MDG7, i.e. “reduced proportion of people without sustainable access to safe drinking water and basic sanitation”; and (ii) additionally, MDG1, i.e., “reduced proportion of urban population living in slums”, considering that ger areas are “under-serviced” areas.

D. Project Benefits

16. Tranche 1 will support the implementation of the city master plan by developing two priority subcenters located in the mid-ger areas in the north of Ulaanbaatar City, the Bayankhoshuu and Selbe Subcenters. It will initiate a redevelopment process of the targeted areas and improve living standards, environment, and efficiency for economic growth. It will bring benefits of convenient access to houses and properties, safe/potable water supply, wastewater management services, heating, and social and economic infrastructures to nearly 15,300 people in the Bayankhoshuu and Selbe Subcenters. This will, in turn, lead to positive impacts, such as reduced health risks and incidence of diseases, reduced dust suspension, reduced soil and groundwater contamination, reduced greenhouse gas emission, among others.

17. Through its multi-interventions to improve operations of the CWWTP and drinking water supply system, tranche 1 will provide USUG operations the benefits of energy savings, reduced non-revenue water and improved wastewater treatment, which will translate to positive environmental impacts namely: (i) reduced air emissions due to efficient use of energy; (ii) water conservation from reduced NRW and the promotion of water saving appliances in project facilities; (iii) surface water pollution prevention and abatement due to reduced pollution load to Tuul River; (iv) reduced odor in the CWWTP and its immediate vicinity due to better performing CWWTP. The improvements in water supply and wastewater management operations will allow the MUB and USUG to conserve resources and reduce operational costs while increasing the capacities for meeting Ulaanbaatar’s future demand for improved water and wastewater services.

E. Anticipated Environmental Impacts and Risks

18. Tranche 1 of the program was categorized “B” for environment, requiring an Initial Environmental Examination (IEE) in accordance to ADB’s Safeguard Policy Statement 2009.

19. The main environment, health and safety risks related to project include (i) weak capacity of implementing and sub-implementing agencies in environmental management, which poses risk for a weak EMP implementation; hence, a Capacity Development Program to upgrade the skills of the Subcenter Redevelopment Authority (SRA) and a Project Implementation Support for the institutional strengthening and capacity development of the PMO are proposed under tranche 1; (ii) the 24-hour daily work normally expected from contractors in Ulaanbaatar poses risk for noise at night time to exceed standard limits; (iii) higher dust and noise levels, which poses risk for increased health hazard; (iv) increased traffic congestion, which poses risks for longer travel time, longer delivery of people, goods and services; (v) health and safety hazards, which pose risks to the lives of communities and construction workers; and (vi) the generation and stockpile of aggregates, residual soil and wastes that could spill onto nearby water bodies, which poses risks for increased deterioration of surface water quality.

20. **Impacts during construction.** The more salient among the impacts during construction are presented herein. Dust/suspended particles and noise will arise from earthworks, transport/ loading/unloading of aggregate materials and wastes, movement/operation of construction vehicles/equipment, dry exposed areas, open stockpiles of aggregate materials and wastes, crushing/grinding/mixing/drilling/screening/potential blasting, among others. The levels will be salient during the peak construction period.

21. The opening/re-opening/dismantling of active and closed pit latrines within the construction alignments will cause foul odor to emanate. The workers handling the site clearing will be most at risk. Other potential sources of foul odor during construction would be poor sanitation practices of construction workers, poor management of solid wastes, the use of high VOC-emitting processes and specialty applications. Inner roads and lanes of main roads will be closed. The existing traffic congestion, particularly during peak hours, will be worsened. Travel time would become longer.

22. Accesses to construction sites and properties will be blocked or obstructed by excavations, installations and stockpiles of wastes, aggregates and pipes, and potentially indiscriminate parking of construction vehicles/equipment, will pose safety hazards and disruption and nuisance to daily lives and socio-economic activities. Accidental damage to water mains, power supply poles and telephone cables will cause disruption of services. Transfers of power supply poles and telephone cables are likely, resulting in disruption of services. Disruption of services will cause disruption of domestic and economic activities and social services. Given the current “under-serviced” state of the subcenters, residents and regular passers-by will be exposed to increased health and safety hazards during construction. There will be occupational exposure to health and safety hazards for construction workers as well.

23. A detailed set of mitigation measures is prescribed in the Environmental Mitigation Plan of the environmental management plan for tranche 1 (P1-EMP, see **Annex E**). The effective conduct of the following are crucial mitigation measures during construction as well: (i) construction management by the Contractor; (ii) preparation of detailed Contractor EMPs (C-EMP) based on P1-EMP, and supervision of C-EMP implementation by the Contractor’s Environmental Management Engineer; (iii) construction supervision and monitoring of C-EMP implementation by the PMO; (iv) observance of the grievance redress mechanism (GRM) by all concerned parties; and (v) the participation of concerned communities in the monitoring of C-EMP implementation.

24. **Impacts during Operation.** During operation, main potential environmental impacts relate to the operation of the heating systems, and other works to a lesser extent. Potential adverse impacts during operation of the Heat-Only Boilers (HOBs) include (i) pollutants emission from the HOBs, (ii) noise from the HOBs, (iii) wastewater, and (iv) solid waste of ash and slag. The operation of the HOBs in Selbe and Bayankhoshuu Subcenters will emit particulate matters (PM), SO2 and NOx, the concentrations of which will be influenced by the quality of coal burned, the flue gas volume and the type and performance of the flue gas treatment equipment.

25. The HOBs in Selbe and Bayankhoshuu Subcenters have been examined for point source emissions during the operation period. The predicted emissions will comply with MON standard MNS 5885:2008 (Acceptable concentration of air pollutant elements) and the new MNS 6298:2011, as well as the World Bank Group EHS recommended limits for Small Combustion Facilities Emissions[2] (of 50-150 mg/m3 for PM; 2,000 mg/m3 for SO_2; and 650 mg/m^3 for NOx). To achieve the predicted levels, fabric filter/baghouse, cyclone separators and denitrification equipment will be installed.

26. Noise frequency or vibration level at working environment shall comply with the requirements of Mongolian standard MNS 0012-013:1991: "Workplace Atmospheres, Hygienic Requirements."

27. Wastewater from plant operation is expected to come from wet scrubbing, equipment maintenance and dust suppression during coal crushing and ash handling. Design will aim to avoid generating wastewater that cannot be either: (i) directed to the new sewer system; or (ii) containerized and easily transported for proper treatment and disposal. One recommendation to reduce wastewater is to adopt dry or semi-dry, instead of wet, scrubbing. CCP recycling is more complex (and therefore less feasible) with wet scrubbing than dry. Coal and ash storage shall have to be fully enclosed and safe from contact with surface runoff. Therefore, it is critical that the plant is sited in a flood free site and its' perimeter well equipped with storm drain. The best scrubbing technology will be determined as part of the plants final process design.

28. Proper disposal of coal combustion products (CCPs) is an important environmental problem. HOBs generate a variety of CCPs, namely bottom ash, fly ash, slag and flue gas desulphurization (FGD) residue. Ash, slag and FGD residues will be stored in enclosed structures in the plant site. These will be supplied to interested projects, organizations and entities for applications or reuse. The remainder will be disposed of at the City landfill.

29. During the operation of all completed works, the effectiveness of their services would not be sustained without efficient operation, maintenance and repair. USUG has been operating at a loss since year 2000. The Institutional Strengthening and Capacity Development Component of Tranche 1 will work on reforms in these two sectors through strengthened laws and regulations.

[2] IFC/World Bank 2007, *Environmental, Health and Safety Guidelines General EHS Guidelines*, World Bank, Washington. p.7

F. Public Consultation and Grievance Redress Mechanism

30. During project preparation, two rounds of public consultations were held. The 1st round of public consultations was through the household and business surveys under the PPTA's Socio-Economic Survey and Willingness to Pay for Services (*SES-WTPS*), which was conducted in Q4 2012 to Q1 2013 and wherein environment related questions were incorporated into the survey questionnaire. The relevant survey queries are those concerning access to and satisfaction with the existing basic services, satisfaction level with current social and environmental conditions, and priority environmental and infrastructure issues. The surveyed revealed that poor access to water supply, sanitation and heating, poor roads without sidewalks and lighting, scarce public amenities are among the priority concerns. The second round of public consultation was conducted in the framework of the DEIA by ENVIRON. The results of the consultation, which are reported in detail in the two DEIAs, confirm the findings of the first round.

31. A GRM for tranche 1 has been formulated to receive and respond to public complaints on the environmental performance of tranche 1 projects. The GRM will be disclosed to affected communities prior to commencement of construction works.

G. Environmental Management and Monitoring Plan

32. The environmental management plan for tranche 1 (P1-EMP) will serve as the framework for the environmental management of tranche 1 projects, commencing from detailed design phase through to operation. The P1-EMP is featured herein as **Annex E**. This will be updated by the PMO based on the detailed design, with technical assistance from the Environmental Specialist of the Project Implementation Support (PIS) Team. The P1-EMP will be carried out by the detailed design Consultant, PMO, implementing agencies and contractors for civil works, USUG and others as Operators of project facilities.

33. The P1-EMP also features an Environmental Monitoring Plan that prescribes periodic monitoring of air, surface and ground water and noise by a licensed institute to verify the effectiveness of implemented mitigation measures and the overall environmental performance of tranche 1 projects during construction and during operation.

H. Conclusion

34. The IEE concludes that tranche 1 projects are not environmentally critical. The major impacts will mainly arise during construction. These impacts are assessed to be highly site-specific, temporary and will not be sufficient to threaten or weaken the surrounding resources.

35. The preparation and full implementation of a Contractor EMP (C-EMP) that addresses as minimum the requirements of the SPS-compliant P1-EMP will mitigate the impacts to acceptable levels. Standard mitigation measures, basically integral to socially and environmentally responsible construction practices, are commonly used these days in construction sites in urban setting of Mongolia and are known to Contractors. Hence measures to reduce impacts to acceptable levels would not be difficult to plan, design and institute.

36. Project 1 will transform the "under-serviced", into adequately serviced, subcenters, which will hasten the qualitative improvement of the living environment in Bayankhoshuu and Selbe Subcenters.

37. Based on the IEE, the classification of tranche 1 as Category ‘B’ is confirmed. No further special study or detailed EIA needs to be undertaken to comply with the Safeguard Policy Statement of the ADB. In compliance with GOM regulations, Project 1 has obtained approval for two DEIA reports on 17 October 2013 by MEGD. The DEIAs has been disclosed to the affected communities.

II. INTRODUCTION

A. Introduction and Purpose

38. This initial environmental examination (IEE) has been prepared for the initial tranche (Project 1) of the Ulaanbaatar Urban Services and Ger Areas Development Investment Program (hereinafter referred to as Program), a multitranche financing facility (MFF) in Mongolia. The program will support Ulaanbaatar city master plan in upgrading priority service and economic hubs (subcenters) in mid-*ger* areas. The program is geographically targeted with multisector interventions. It proposes an integrated solution to respond to the urgent demand for basic urban services and develop urban subcenters as catalysts for growth in the *ger* areas. The program is divided into three projects and has four outputs: (i) roads and urban services are expanded within priority subcenters, and connectivity between them is improved; (ii) economic and public services in targeted areas are increased; (iii) service providers become more efficient; and (iv) institutions and capacity are strengthened.

39. The first tranche of the MFF, subject of this Initial Environment Examination, will support the city master plan in developing the Selbe and Bayankhoshuu subcenters. The main components to be financed are (i) construction of sewerage network extension of 6.1 kilometers (km) collector main, sewerage pumping station along with 2.9 km of sewer pipe extension; (ii) within the subcenters, 15 km of priority roads; 17.6 km of water supply, 18 km of sewerage, and 9.7 km of district heating network pipes; and 5 HOBs for a total capacity of 42 megawatts; (iii) social and economic facilities: two kindergartens, and two business incubators associated with two vocational training centers; (iv) multi-interventions in the Ulaanbaatar Water Supply and Sewerage Authority (USUG) to improve the central wastewater treatment plant and drinking water supply network; and (v) institutional strengthening and capacity development to prepare detailed design and construction supervision; support community participation, awareness, and small and medium enterprise development; improve urban planning and subcenter development; strengthen the capacity of the program management office (PMO); and support service providers' reforms.

40. The IEE has been prepared by the Project Preparatory Technical Assistance (PPTA) consultant on behalf of, and in close collaboration with, the Municipal Government of Ulaanbaatar. The IEE includes (i) an overview of Mongolia's environmental policy and the EIA requirements of Mongolia and the ADB; (ii) description of the program and Project 1; (iii) description of the baseline environmental conditions of physical, ecological, socio-economic and physical-cultural resources; (iv) assessment of the anticipated environmental impacts of proposed physical activities; (v) measures to mitigate anticipated impacts; (vi) the analysis of alternatives; (vii) the process and results of the public consultation and information disclosure; (viii) a grievance redress mechanism; and (ix) an Environmental Management Plan for Project 1 (P1-EMP).

41. The objectives of this IEE are to

(i) Provide necessary baseline data about Project 1 of the program;
(ii) Provide understanding on potential impacts of Project 1 of the program;
(iii) Provide information on potential mitigation measures to minimize negative impacts including mitigation costs;
(iv) Provide information on the public consultation process undertaken, and the level Grievance Redress Mechanism (GRM) established; and

(v) Formulate Environmental Management and Monitoring Plans (including definition of institutional responsibilities, capacity building and training plans, and budgeting).

B. Environmental Categorization, ADB, and MON Safeguards Requirements

42. **ADB environmental categorization.** Project 1 has been classified as a Category B undertaking by the Asian Development Bank (ADB), requiring an IEE. The salient impacts identified during screening will arise prior to and during construction. Prior to construction, right-of-way/land acquisition will involve some displacement and involuntary resettlement. During construction, there will be: (i) increased dust and noise levels; (ii) generation of wastes and spoils; (iii) increased traffic congestion; (iii) obstructed accesses to properties and social and economic services/facilities; (iv) potential disruption of water supply, power supply and telephone services with accidental damages to or relocation of supply mains and poles; (v) community and workers' health and safety hazards. These impacts are considered reversible and site specific and can easily be mitigated to acceptable levels through sound environmental management planning, socially- and environmentally-responsible construction practices, and adequate communication with and involvement of the local authorities and communities. This IEE report is prepared in accordance with ADB's Safeguard Policy Statement (2009) and was approved by the East Asia Regional Department (EARD) of ADB and disclosed on ADB's project website.

43. **MEGD environmental categorization and safeguard documents**. In compliance with Mongolia's environmental safeguard policy, Project 1 was subject to General Environmental Impact Assessment (GEIA) - or environmental screening - by the Ministry of Environment and Green development (MEGD) in March 2013. The GEIA conclusion has required the preparation of a Detailed EIA (DEIA) for each subcenter. The DEIAs were prepared by a MEGD-registered/licensed entity (ENVIRON LLC) following the Directive Schedule for DEIA in the GEIA conclusion. The DEIA reports were approved by MEGD on 17 October 2013. These have been disclosed to the affected communities by the MUB.

C. Structure of this IEE Report

44. The IEE report is organized as follows:

1. ***Executive Summary*** (Chapter I) outlines important facts, major findings, and recommended actions of the IEE;
2. ***Introduction*** (Chapter II) describes the purpose of this IEE, environmental categorization by ADB and MEGD based on an environmental screening, and the structure of the IEE;
3. ***Policy, Legal, and Administrative Framework*** (Chapter III) describes ADB's and the Mongolian environmental impact assessment requirements and procedures, and applicable environmental regulations;
4. ***Description of Project under Project 1*** (Chapter IV) provides a justification of projects under Project 1;
5. ***Description of the Environment*** (Chapter V) defines the project's area of influence, and provides a description of the potentially affected environment. The description is based on reviews of available documentation, statistical data, and meetings with experts in the field and field surveys and investigations. The ADB definition of the environment requires environmental assessments to address four aspects of the environment: (i) physical resources, including

topography and soils, air and water quality, noise, among others; (ii) ecological resources; (iii) physical cultural resources; (iv) socio-economic situation, including economic development, public health and education, and poverty; and (v) land use;

6. ***Alternative Analysis*** (Chapter VI) provides information on the project's location and conceptual alternatives, as well as "No action" alternative;
7. ***Anticipated Impacts and Mitigation Measures*** (Chapter VII) provides an assessment of potential impacts of the proposed development in light of the existing conditions. Direct, indirect, induced and cumulative environmental impacts are assessed in this IEE. It assesses environmental impacts on soil, surface water, noise, flora, fauna, cultural heritage, health and safety, and social economy, during design, construction and operation. It also defines mitigation actions to prevent and/or otherwise mitigate unavoidable impacts expected to be incorporated as integral parts of the project;
8. ***Information Disclosure and Public Participation*** (Chapter VIII) provides information on public consultation activities undertaken during Project 1 preparation, and introduces the plan for future public consultation;
9. ***Grievance Redress Mechanism (GRM)*** (Chapter IX) presents the GRM established to handle grievances and complaints arising during project implementation. It defines GRM entry points, timeframe and institutional responsibilities of the GRM;
10. ***EMP Implementation Costs*** (Chapter X) provides information on environmental costs;
11. ***Environmental Management Plan*** (Chapter XI) presents the EMP defined for Project 1. The EMP defines the mitigation measures, performance indicators, environmental monitoring requirements, institutional responsibilities, training activities related to environmental management, reporting requirements, and a mechanism for feedback and adjustment.
12. ***Conclusions*** (Chapter XII) summarizes the major environmental impacts and mitigation measures, defines project risks and required project assurances, and concludes on the environmental soundness of the project;
13. ***Sources of Information*** provide the list of references used in the IEE.
14. ***Annexes*** provide supplemental information. The full EMP is **Annex E**.

D. Policy, Legal, and Administrative Framework

1. Mongolia's Environmental Policy

45. Mongolia has enacted a comprehensive policy and legal framework for environmental management. It has policies, legislation and strategies in place to manage the protected estate, to satisfy its international obligations and to protect the quality of the environment for the health and well-being of its citizens. The hierarchy of policies and legislative provisions for environmental management in Mongolia comprises five layers ranging from the Constitution to international treaties, and to environment and resources protection laws. [3]

46. The main policy documents include the National Environmental Action Plan of 1996, updated in 2000; the State Policy for Ecology of 1997; the National Plan of Action to Combat Desertification, updated in 2010; the Biodiversity Conservation Action Plan of 1996 (now the Rare Animals Protection Plan of 2012); and the National Plan of Action for Protected Areas, all developed under the Ministry of Environment and Green Development (MEGD) auspices, as well as the Mongolian Action Programme for the 21st Century, developed by the National Council for Sustainable Development in 1996. The National Action Plan for Climate Change was added in 2000 and updated in 2011. Several program documents, e.g., the National Water Program (updated in 2011), National Forestry Program, Program of Protection of Air, Sustainable Development Education Program (2009-2019), Special Protected Areas, and Protection of Ozone Layer, were also completed at the turn of the decade. In addition, other guidance documents with important environmental repercussions were developed under the auspices of other ministries and these include the Roads Master Plan, the Power Sector Master Plan, the Tourism Master Plan, and the Renewable Energy Master Plan. Other documents, such as the annual Human Development Reports, have increasingly incorporated environmental aspects.[1]

47. The overarching policy on environmental resources and their protection is set out in the 1992 Constitution of Mongolia. Proceeding from, and conformable to, the Constitution, the Government of Mongolia (GoM) has enacted a series of environmental laws, regulations and standards. Among these, the Law on Environmental Protection and Law on Environmental Impact Assessment provide the core framework and general procedure and guidelines on environmental assessment.

[3] Institutional Structures for Environmental Management in Mongolia. August 2008. UNDP.

Table 2: Relevant Environmental Laws in Mongolia

Law	Year	Purpose
Law on Subsoil	1988	Regulates relations concerning the use & protection of subsoil in the interests of present and future generations.
Law on Special Protected Areas	1994 (2004)	Regulates relations concerning the use & taking of areas under special protection (natural conservation parks, natural complex areas, natural reserves & national monument areas).
Law on Land	1994 (2012)	Regulates the possession & use of land by a citizen, entity & organization, & other related issues. Articles 42/43 provide guide on removing possessed land & granting of compensation relative to removing.
Law on Environmental Protection	1995 (2012)	Regulates "relations between the state, citizens, economic entities & organizations in order to guarantee the human right to live in a healthy and safe environment, have ecologically balanced social and economic development, & for the protection of the environment for present & future generations, the proper use of natural resources & restoration of available resources". Its Article 7 requires the conduct of natural resource assessment & environmental impact assessment to preserve the natural state of the environment, and Article 10, the conduct of environmental monitoring on the state and changes of the environment.
Law on Air	2012	Regulates the protection of the atmosphere to provide environmental balance & for the sake of present & future generations. Allows Government to set standard limits to emissions from all sources. Provides for the regular monitoring of air pollution, hazardous impacts & changes in small air components such as ozone and hydrogen.
Law on Forests	2012	Regulates relations for protection, possession, sustainable use & reproduction of the forest in Mongolia. Defines prohibited activities in protected forest zones & their regimes & conditions when undertaking allowed activities in the utilization zone forests & their regimes.
Law on Natural Plants	1995	Regulates the protection, proper use, & restoration of natural plants other than forest & cultivated plants.
Law on Water	2012	Regulates relations pertaining to the effective use, protection & restoration of water resources. Specifies regular monitoring of the levels of water resources, quality & pollution. Provides safeguards against water pollution.
Law on Plant Protection	1996 (2007)	Regulates the inhibition, protection, inspection of pasturelands & plants.
Law on Buffer Zones	1997	Regulates the determination of special protected area buffer zones & the activities. Article 9 requires the conduct of detailed environmental assessment for the establishment of water reservoirs or construction of floodwalls or dams in buffer zones for special protected areas.
Law on Environmental Impact Assessment	1998 (2012)	Regulates "relations concerning protection of the environment, prevention of ecological imbalance, the use of natural resources, assessment of the environmental impact and decision-making on the start of a project". It sets out the general requirements and procedures for project screening and conduct of environmental assessment and review.
Law on Sanitation	1998	Governs relationships concerning maintenance of sanitary conditions, defining the general requirements for sanitation in order to ensure the right of an individual to healthy & safe working & living conditions, ensuring normal sanitary conditions, & defining the rights & duties of individuals, economic entities & organizations with this respect.
Law on Protection of Cultural	2001	Regulates the collection, registration, research, classification,

Law	Year	Purpose
Heritage		evaluation, preservation, protection, promotion, restoration, possession and usage of cultural heritage including tangible and intangible heritage.
Civil Code of Mongolia	2002	Its Article 502 stipulates the liability for damage to environment.
Law on Wastes	2012	Governs the collection, transportation, storage, & depositing in landfills of household & industrial waste, & re-using waste as a source of raw materials to eliminate hazardous impacts of household and industrial waste on public health & the environment. Undertakings that generate significant amount of wastes must dispose of the wastes in designated landfills that meet prescribed standards.
Law on Disaster Protection	2003 (2012)	Regulates matters relating to the principles & full powers of disaster protection organizations & agencies, their organization & activities, as well as the rights & duties of the State, local authorities, enterprises, entities & individuals in relation to disaster protection.
Law on soil protection and prevention from desertification	2012	Regulates matters related protection of soil deterioration, reclamation, and prevention from desertification
Law on fauna	2012	Regulates matters related protection of animals, growth and development, breeding, rational use of its resources.

(year last amended)

48. Mongolia is a party to the international environmental conventions and protocols. It has passed state laws that implement the terms of these international conventions, with provision that: *"If an international treaty to which Mongolia is a party is inconsistent with this law then the provisions of the international treaty shall prevail*".

Table 3: Relevant International Environmental Conventions

International Convention / Protocol	Year of Party
World Heritage Convention	1990 (a)
United Nations Framework Convention on Climate Change	1993 (r)
Kyoto Protocol	1999 (a)
Convention on Biological Diversity	1993 (r)
United Nations Convention to Combat Desertification	1996 (r)
Vienna Convention for the Protection of the Ozone Layer	1996 (a)
Montreal Protocol on Substances That Deplete the Ozone Layer	1996 (a)
Washington Convention on International Trade in Endangered Species of Wild Fauna & Flora (CITES)	1996 (a)
Basel Convention on the Control of Transboundary Movements of the Hazardous Wastes and Their Disposal	1997 (a)
Ramsar Convention on Wetlands of International Importance	1998 (e)
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	2001 (r)
Stockholm Convention on Persistent Organic Pollutants	2004 (r)

(a) accession; (e) entry into force; (r) ratification.

E. Environmental Impact Assessment Requirements

49. The project is subject to the environmental safeguards requirements of both Mongolia and those of the ADB. These requirements are defined in the next two sections.

1. Environmental Assessment Requirements of the ADB

50. Environmental safeguards requirements, including environmental impact assessment requirements, are defined in ADB's Safeguard Policy Statement (2009). All projects funded by

ADB must comply with SPS 2009 to ensure that projects undertaken as part of programs funded under ADB loans are environmentally sound, are designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards. With respect to the environment, the SPS 2009 is underpinned by the ADB Operations Manual, Bank Policy (OM Section F1/OP, 2010). The policy promotes international good practice as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines.[4]

51. **ADB's Environmental Safeguards policy principle** are defined in SPS (2009), Safeguard Requirements 1, as follows:

1. Use a screening process for each proposed project, as early as possible, to determine the appropriate extent and type of environmental assessment so that appropriate studies are undertaken commensurate with the significance of potential impacts and risks.
2. Conduct an environmental assessment for each proposed tranche to identify potential direct, indirect, cumulative, and induced impacts and risks to physical, biological, socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues), and physical cultural resources in the context of the project's area of influence. Assess potential transboundary and global impacts, including climate change. Use strategic environmental assessment where appropriate.
3. Examine alternatives to the project's location, design, technology, and components and their potential environmental and social impacts and document the rationale for selecting the particular alternative proposed. Also consider the no project alternative.
4. Avoid, and where avoidance is not possible, minimize, mitigate, and/or offset adverse impacts and enhance positive impacts by means of environmental planning and management. Prepare an environmental management plan (EMP) that includes the proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators. Key considerations for EMP preparation include mitigation of potential adverse impacts to the level of no significant harm to third parties, and the polluter pays principle.
5. Carry out meaningful consultation with affected people and facilitate their informed participation. Ensure women's participation in consultation. Involve stakeholders, including affected people and concerned non-government organizations, early in the project preparation process and ensure that their views and concerns are made known to and understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation as necessary to address issues related to environmental assessment. Establish a grievance redress mechanism to receive and facilitate resolution of the affected people's concerns and grievances regarding the project's environmental performance.
6. Disclose a draft environmental assessment (including the EMP) in a timely manner, before project appraisal, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. Disclose

[4] New Version of the "World Bank Group Environmental, Health, and Safety Guidelines", April 30, 2007, Washington, USA. http://www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuiidelines

the final environmental assessment, and its updates if any, to affected people and other stakeholders.

7. Implement the EMP and monitor its effectiveness. Document monitoring results, including the development and implementation of corrective actions, and disclose monitoring reports.
8. Do not implement project activities in areas of critical habitats, unless (i) there are no measurable adverse impacts on the critical habitat that could impair its ability to function, (ii) there is no reduction in the population of any recognized endangered or critically endangered species, and (iii) any lesser impacts are mitigated. If a project is located within a legally protected area, implement additional programs to promote and enhance the conservation aims of the protected area. In an area of natural habitats, there must be no significant conversion or degradation, unless (i) alternatives are not available, (ii) the overall benefits from the project substantially outweigh the environmental costs, and (iii) any conversion or degradation is appropriately mitigated. Use a precautionary approach to the use, development, and management of renewable natural resources.
9. Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges, including direct and indirect greenhouse gases emissions, waste generation, and release of hazardous materials from their production, transportation, handling, and storage. Avoid the use of hazardous materials subject to international bans or phase-outs. Purchase, use, and manage pesticides based on integrated pest management approaches and reduce reliance on synthetic chemical pesticides.
10. Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities.
11. Conserve physical cultural resources and avoid destroying or damaging them by using field-based surveys that employ qualified and experienced experts during environmental assessment. Provide for the use of "chance find" procedures that include a pre-approved management and conservation approach for materials that may be discovered during project implementation.

52. This IEE is intended to meet these requirements.

2. Environmental Assessment Requirements of Mongolia

53. Under the Law on EIA, all projects or development initiatives, whether new or renovation/expansion, are subject to general environmental impact assessment (GEIA) or environmental screening prior to implementation. The project proponent is required to submit the following for screening by the appropriate authority:

(i) project description;
(ii) technical and economic feasibility study;
(iii) working drawings; and

(iv) other relevant documents.

54. Depending on the type of project, scale of a project, or population size of project location, GEIA is conducted by the Ministry of Environment and Green Development (MEGD) or the concerned local administrative body through the Department of Environment (DE) for *aimags* and the Environmental and Green Development Agency (EGDA) for the Municipality of Ulaanbaatar (MUB). However, if a subproject is comprised of two or more activities, as in the case of Project 1 under this Program, GEIA will be conducted by the MEGD. GEIA takes a minimum of 14 days (longer, when extension becomes necessary) and makes any of the following conclusions:

(i) the project may be implemented without conducting a detailed environmental impact assessment (DEIA);
(ii) the project may be implemented without conducting a detailed environmental impact assessment (DEIA), but pursuant to specific conditions;
(iii) the project would require a DEIA; or
(iv) the project is rejected on grounds of non-conformity with the relevant legislation, or adverse impact of the equipment and technology on the environment, or absence of the project in the land management.

55. If DEIA is required, the scope of work shall have been defined as part of the conclusion of the screening (GEIA) activity. The project proponent engages a MEGD-registered environmental consulting entity to conduct the DEIA according to the scope of work and develop the DEIA Report, which shall have the following contents: (i) environmental baseline data; (ii) project and technology alternatives; (iii) recommended measures to mitigate and eliminate potential; adverse impacts; (iv) analysis of the extent and distribution of adverse impacts and consequences; (v) risks assessment; (vi) environmental management plan to include environmental protection (mitigation) plan and environmental monitoring program; (vii) opinions and comments of affected households in the project area; (viii) if applicable, other issues regarding cultural heritage in the project area and special nature of the project; and (ix) if applicable, rehabilitation plan.

56. The DEIA is submitted to the MEGD for review, which is expected to come up with a conclusion within 18 working days (or may be extended, if necessary). The public is ensured of access to the DEIA Report for their opinion. The MEGD will approve or disapprove a DEIA based on the conclusion of the review and taking into account the public's opinion. Projects that are not approved to implement may redesign project to conform to the unmet environmental requirements, and submit a revised DEIA for a re-assessment, for public consultation and eventually for approval.

57. In compliance with Mongolia's environmental safeguard policy, Project 1 was subject to General Environmental Impact Assessment (GEIA) - or environmental screening - by the Ministry of Environment and Green development (MEGD) in March 2013. The GEIA conclusion has required the preparation of a Detailed EIA (DEIA) for each subcenter. The DEIAs were prepared by a MEGD-registered/licensed entity (ENVIRON) following the Directive Schedule for DEIA in the GEIA conclusion. Key standards applied in the DEIAs and the IEE include the following and are featured as **Annex A**:

(i) MNS 4585:2007, Air Quality General Technical Requirements, for ambient air quality and noise;
(ii) MNS 4586:1998, Indicator of Water Environmental Quality General Requirements, for surface water quality;

(iii) MNS 900:2005, Drinking Water Hygienic Requirement and Quality Control, and the WHO Guidelines for Drinking-water Quality, Fourth Edition, 2011, for the groundwater quality;
(iv) MNS 5850:2008, Soil Quality, Soil Pollutant Elements and Substances, for soil quality; and
(v) MNS 6298:2011, Maximum Acceptable Level and Measuring Method of Air Pollutants in the Exhaust Gases from Steam and Hot Water Boilers of Thermal Power Plants and Thermal Stations, and Environmental, Health and Safety (EHS) Guidelines, Maximum Small Combustion Facilities Emissions Guidelines (3MWth-50MWth) of the of the IFC, April 2007, for boiler emissions.

F. Description of project

1. Justification and Rationale

58. **Ulaanbaatar's urban fabric** has two distinct parts: (i) the city core, which largely consists of apartment blocks with complete utility services, including water, sanitation, and district heating; and (ii) the ger areas which are characterized by expanding unplanned settlements of low- and medium-income households with unserviced plots, unpaved roads, and few social facilities. Out of a total population of over 1.3 million people in Ulaanbaatar, 40% live in the city core and 60% in the ger areas. The expansion of ger areas has taken place outside the influence or guidance of urban planning. Ger areas have grown street-by-street, with citizens locating their khashaas and gers wherever they found habitable land. Sometimes they settled in disaster risk areas, such as those close to natural drainage channels or high-tension power lines[5]. Ger areas—in general—present a haphazard street pattern, with little respect for the natural slopes gradient or hazard. Consequently, ger areas are characterized by large, unserviced, or partially serviced plots—usually from 500 to 700 m2—which are accessible through dirt roads of varying widths.[6]

59. **Underdeveloped ger areas.** Ger areas house 60% of Ulaanbaatar city population, but lack adequate infrastructure and services, and suffer from intensifying environmental challenges. The process of ger areas' densification and sprawl is putting tremendous pressures on the urban environment and the residents' health, as inadequate sanitation and solid waste infrastructure has caused soil pollution. In addition, air pollution is considered among the most severe in the world, particularly during winter, because of inadequate heating systems and unpaved roads, increasing number of private vehicles and dust from unpaved roads. Although air pollution has improved in recent years, concentrations of SO_2, NO_2, CO and particulate matters exceed WHO and Mongolian standards in winter months. Underinvestment in urban infrastructure and services and inadequacies in their operation and maintenance raise the cost of doing business and restrict access to jobs and services. The absence of employment and basic urban services in the ger areas also puts extra pressure on the existing urban services located in the city center, which has reached an unprecedented level of traffic congestion.

[5] Tranche 1 subprojects will not cover settlers residing in these disaster risk areas unless affected by the ROW/land acquisition for the component activities.
[6] Named after ger tents, there are three types of ger areas: (i) central ger areas (located near the built-up core of the city), (ii) mid-ger areas, and (iii) fringe ger areas. The population in Ulaanbaatar's mid-ger areas is estimated at 400,000 people.

60. **The role of subcenters.** In the ger areas of Ulaanbaatar, a process of spatial polarization or clustering is taking place in form of economic nodes or subcenters. Subcenters are clusters of public facilities and businesses with an associated transport hub. Generally, they are characterized by urban settlement around public infrastructure built during the Soviet period and new public amenities built more recently by government and donor programs (for example khoroo offices, police stations, schools and kindergartens). Their sphere of influence is from 30,000 to more than 100,000 people. Outside the core of the subcenters are residential areas consisting mostly of individual houses on large plots, although in some areas a densification process of sorts has started by the division of the khashaas (fences) and construction of multifamily houses. These private businesses, shops, and markets are developing, and densification is occurring near areas where clusters of public facilities such as schools, kindergartens, khoroo offices, and bus terminals are located. In these subcenters, the potential for economic development and job creation is highest to spur sustainable growth in the *ger* areas. However, until the approval of the Ulaanbaatar city Master Plan 2030 in February 2013, there was no policy to support the systematic development of subcenters in *ger* areas.

61. **Urbanization of *ger* areas.** Inadequate urban planning and basic infrastructure has constrained the ability of subcenters to fully perform their urban functions in their sphere of influence in the *ger* areas. The long-term prospects of economic growth for Mongolia are positive. *Ger* areas will continue to expand, urbanization is already occurring in many locations and *ger* tents are being progressively replaced by solid houses. The identification of economic and public services in the subcenters represents an opportunity for *ger* areas development. Therefore, improvement of service providers and urban planning should be at the core of an integrated approach to developing a network to support the future urbanization of *ger* areas an improving the quality of life of people living in *ger* area.

62. This approach has been endorsed by the Municipality of Ulaanbaatar (MUB), district and subdistrict governments, the *ger* area communities, and other donors. It is incorporated in the revised city master plan and the government infrastructure programming as the main strategy to redevelop *ger* areas.

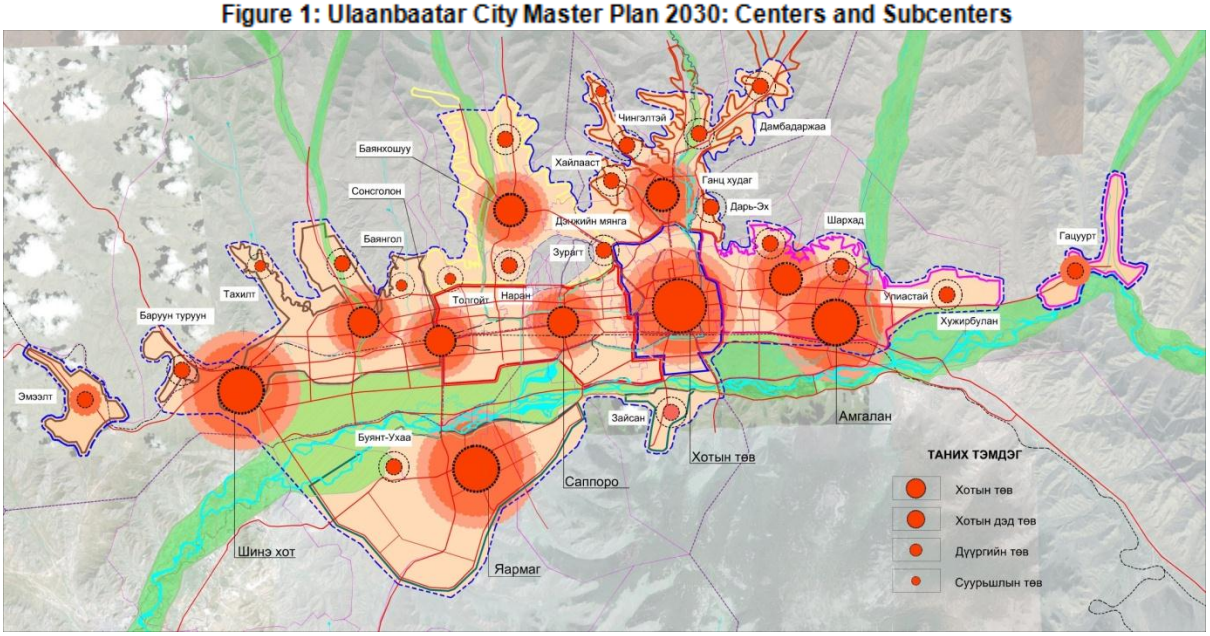
63. **The government and municipality of Ulaanbaatar's Initiatives in urban and *ger* areas development.** Under Ulaanbaatar's new leadership, development of the *ger* areas is a key priority. On 8 August 2012, the Prime Minister appointed Mr. E. Bat-Uul as the new Governor of Capital City and Mayor of Ulaanbaatar. The new Mayor has made a clear commitment to the redevelopment of the *ger* areas. In February 2013, the MUB established a 'Steering Committee on *Ger* Area Development' under the leadership of the Chairman of Ulaanbaatar City Council. This augurs well for the cause of *ger* area development in Ulaanbaatar.

64. The **Ulaanbaatar city master plan 2030** was approved by the Parliament of Mongolia in February 2013. The Master Plan recommends the development of 6 centers along the Peace Avenue in the built-up core, 2 subcenters (Bayankhoshuu and Selbe) in middle *ger* areas, and a number of microcenters. Thus, the Master Plan 2030 provides appropriate urban planning framework for the development of a network of subcenters. The MUB has issued the Mayor's 4-year Action Plan for the period 2012-2016, which outlines priority action areas on the following: (i) Ulaanbaatar with fresh air; (ii) Ulaanbaatar with private houses; (iii) Ulaanbaatar with employment and income; (iv) Safe and peaceful Ulaanbaatar, and (v) Ulaanbaatar without

bribery/corruption. Many of the activities under these five action areas support improvement of livability and livelihoods in *ger* areas.
The MUB has recently initiated a ***ger* area redevelopment program** in 12 subcenters. It aims to provide public sector investments in infrastructure, and to engage private sector for housing redevelopment. To implement the redevelopment program, the MUB has established a *Ger* Area Development Agency, which works under the overall executive guidance of the Mayor and advice of a steering committee.

65. The Government of Mongolia is in the process of formulating the **street project**, which envisages infrastructure investments along a set of streets to trigger development and economic activities. There are apparent potential linkages between the Street Project and the ADB investment program. Efforts are ongoing to strengthen coordination with the Street Project.

Figure 1: Ulaanbaatar City Master Plan 2030: Centers and Subcenters



66. **The investment program.** The proposed investment program addresses the development needs of Ulaanbaatar, specifically of *ger* areas and subcenters. The program, included in the ADB Country Partnership Strategy (CPS) 2011-2015, is in line with the impact, outcome and output supported by the CPS and will contribute to the achievement of the country's MDG7 targets in improved access to water supply and sanitation in urban areas.

67. The program will be a (maximum) ten-year investment aimed at improving the quality and coverage of urban infrastructure and basic services, and implementing a sustainable and inclusive process of urban development for middle *ger* areas of Ulaanbaatar. The impact of the program is improved living conditions in Ulaanbaatar. Its outcome is a network of livable, competitive, and inclusive subcenters in Ulaanbaatar's *ger* areas providing economic opportunities and urban services, leading to a healthier urban environment. The program is divided into three projects and has four outputs: (i) roads and urban services are expanded within priority subcenters, and connectivity between them is improved; (ii) economic and public services in targeted areas are increased; (iii) service providers become more efficient; and (iv) institutions and capacity are strengthened.

Overview of Project 1 Components and Subprojects

68. Project 1 will support the Ulaanbaatar City Master Plan 2030 in developing the two priority subcenters located in the middle ger areas in the north of the city, Bayankhoshuu and Selbe Subcenters[7]. The two areas are planned to become the main centers in the northern middle ger area, aiming to deliver urban and socio-economic services to a current combined population of over 200,000 people.

69. The objective of project 1 is to initiate a redevelopment process of the targeted areas to improve living standards, environment, and efficiency for economic growth by implementing: (i) a spatial restructuring of the subcenter and the extension of urban services along priority roads network;[8] (ii) improved centrality, attractiveness and socio-economic services based on community needs and priority urban functions; (iii) a set of clustered redevelopment and housing involving the private sector and based on options favored by the communities; (iv) operation and management improvement of service providers; and (v) key sector reforms, institutional strengthening and capacity building.

70. **Outline development plans (ODPs) of Bayankhoshuu and Selbe subcenters** have been prepared, taking into account current conditions including: (i) current population, and projected demographic growth of 2020 and 2030, (ii) current social and economic infrastructure, including kindergartens, schools, health clinics, hospitals, and bus-stations; (iii) physical infrastructure (mainly water supply by kiosks, heating services to public buildings, and bridges/culverts), (iv) topography, and natural drainage, (v) disaster risk factors, and (vi) the spatial and economic linkages between these two subcenters, and between the two subcenters and the built city-core of Ulaanbaatar. The preparation of subcenter ODPs is taking into account the community and business development needs identified through the 'Community Action Planning' process supported and guided by UN-HABITAT.

71. The two ODPs include the road network that will help develop enhanced mobility within the subcenters. The road network corresponds to the other planned physical infrastructure network of water supply, sewerage, and heating services. The ODPs also include priority social and economic infrastructure as well as other physical and environmental improvements related to local flood control, embankments, and bridges.

72. The main components to be financed under Project 1 are (i) construction of sewerage network extension of 6.1 kilometers (km) collector main, sewerage pumping station along with 2.9 km of sewer pipe extension; (ii) within the subcenters, 15 km of priority roads; 17.6 km of water supply, 18 km of sewerage, and 9.7 km of district heating network pipes; and 5 HOBs for a total capacity of 42 megawatts; (iii) social and economic facilities, including two kindergartens, green areas and small squares; and two business incubators associated with two vocational training centers; (iv) multi-interventions in the Ulaanbaatar Water Supply and Sewerage Authority (USUG) to improve the central wastewater treatment plant and drinking water supply network; and (v) institutional strengthening and capacity development to prepare detailed design and construction supervision; support community participation, awareness, and small and medium enterprise development; improve urban planning and subcenter

[7] Bayankhoshuu subcenter: Songino Khairkhan District – Khoroo 9; Selbe subcenter: Sukhbaatar District – Khoroo 14, and 17.

[8] That have minimum land acquisition impact, support a well-organized spatial development, have low level of engineering constraints and gather a strong community participation.

development; strengthen the capacity of the program management office (PMO); safeguard plan implementation and supervision, and support service providers' reforms. Scope of work under Project 1.

Figure 2: Bayankhoshuu Subcenter Development Vision

Figure 3: Selbe Subcenter Development Vision

Table 4: Scope of Civil Works and Equipment under Project 1

Subcomponents	Scope of Work	
	Bayankhoshuu Subcenter	**Selbe Subcenter**
Construction of sewage network extension (6.1km) from the nearest terminals of the existing city sewerage system	Collector main, DN 300 mm, 2.73 km	Collector main, DN 400/300mm, 2.55 km Extension of easternmost collector, DN 250mm, 1.18 km Pressure sewer pipe, DN 200mm, 0.907 km Sewage pumping station, 10 kW
Roads and Urban Services, including urban services network (water, wastewater, and district heating) along priority roads; decentralized district heating system based on heat-only-boilers to supply the development area within the subcenter; road construction including sideways, waste collection facilities, lighting and urban fixtures.	Internal sewerage pipe work - In single trench, DN 150mm, 1.713 km - In single trench, DN 200mm, 0.027 km - In common trench, DN 150mm, 3.483 km - In common trench, DN 200mm, 1.515 km	Internal sewerage pipe work - In single trench, DN 150mm, 2.924 km - In single trench, DN 250 mm, 1.187 km - In common trench, DN 150mm, 5.160 km - In common trench, DN 200mm, 1.364 km - In common trench, DN 250mm, 0.508 km
	Water supply pipe work In single trench, DN 100mm, 1.676 km In single trench, DN 75mm, 0.109 km In common trench, DN 100mm, 1.515 km In common trench, DN 75mm, 3.483 km	Water supply pipe work - In single trench, DN 100mm, 1.693 km - In single trench, DN 75mm, 2.512 km - In common trench, DN100mm, 7.033 km - In common trench, DN 75mm, 0.028 km
	Roads & drainage - Road, 5.5m carriageway, various widths, 6.15 km - Streetlight every 40 m - Rehabilitation of existing road after trenches, 2.07 km - Drainage culvert, 868 m - 4.5 ha of landscaping included in pedestrian ways	Roads & bridges - Road, 5.5m carriageway, 9.608 km - Streetlight every 40 m - Rehabilitation of existing road after trenches, 0.97 km - Bridges, 2 units over Chingeltei Creek, 1,000m2 - Improvement of river embankment, 2.0 km - 3.43 ha of landscaping included in pedestrian ways
	Local district heating, using HOB	Local district heating, using HOB
	- Heating plants, 2 – 8.4 MW (3 units of 2.4 MW boiler per plant)	- Heating plants, 3 – 8.4 MW (3 units of 2.4 MW boiler per plant)
	- Heat distribution network, 7.627 m	- Heat distribution network, 11,768 m
	2 x DN250 direct bury, 786 m	2 x DN200 direct bury, 801 m
	2 x DN200 direct bury, 1,179 m	2 x DN150 in channel, 4,788 m
	2 x DN150 in channel, 2,359 m	2 x DN100 in channel, 6,179 m
	2 x DN100 in channel, 3,303 m	
	- Heating service connections, 200 m	
	2 x DN50 direct bury, 150 m 2 x DN100 in channel, 50 m	

Subcomponents	Scope of Work						
	Bayankhoshuu Subcenter	**Selbe Subcenter**					
	- Heat meters for public & project buildings, 10 units						
	For DN50, 5 units						
	For DN100, 5 units						
Social and economic infrastructure	- Kindergarten (2,500 sq.m. of floor area of class rooms, administration and services + 2000 sq.m playground)	-Kindergarten (2,500 sq.m. of floor area of class rooms, administration and services + 3,050 sq.m playground)					
	- Business Incubator and Vocational Training Center (2,500 sq.m. floor area + 2,000 sq.m. of open/green area)	- Business Incubator and Vocational Training Center (2,500 sq.m. floor area + 2,000 sq.m. of open/green area)					
Multi-interventions in USUG to improve the central wastewater treatment plant (CWWTP) and drinking water supply network, introduce local control and central operational control systems (SCADA), implement a domestic and industrial water metering program, a program for Non-Revenue Water (NRW), and measures to improve water quality (in cooperation with WHO).	Improvements at WS pumping stations	Ind'l	Nisekh	Shrkhd	Tolgoit	Meat	U.S.
	Installation of SCADA	√	√	√	√	-	-
	Replacement of measuring equipment for flow, pressure and reservoir level in PS & the reservoir/s	√	√	√	√	-	-
	Replacement of four main pumps and electric motors	√	-	-	-	-	-
	A complete telemetry system	√	√	√	√	√	√
	Supply and installation of 16 new submersible pumps in the existing boreholes	√	-	-	-		-
	Supply and installation of control panel with PLC for borehole control (for each of 16 boreholes above)	√	√	-	-	√	-
	Installation of fiber optic cables between all boreholes & the PS building	√	√	-	-	√	-
	Replacement of an existing chloride dosing system	√	√	-	-	-	-
	Reconstruction of pipelines and control valves	√	-	-	-	-	-
	Supply/installation of a complete power MCC with main switch and fuses to be installed in a new cabinet	-	√	√	√	-	-
	Supply/installation of new soft starters for main pumps	-	√	-	-	-	-
	Supply/installation of three new drainage pumps	-	√	-	-	-	-
	Supply/installation of satellite communication.	-	-	-	-	-	√
	Extension of existing PLC for 2-way communication(Chingeltei, Selbe, Bayankhoshuu upper & lower booster stns						
	Improvements in UB's WS distribution network	20 new control valves			10 new measuring points		
	Construction of manholes	√					
	Installation of a PLC logic controller system	√			√		
	Complete programming of SCADA	√			-		
	Signal list for the parameters	√			-		
	SCADA to comply w/ existing USUG SCADA software	√			-		
	A complete telemetry system	√			√		
	Installation of pressure control valves in the manhole	√			-		

Subcomponents	Scope of Work		
	Bayankhoshuu Subcenter	**Selbe Subcenter**	
	Installation of two pressure sensors in the main pipe	√	-
	Operational Control Centre (OCC) at USUG's main office Equipment for dispatch centre control and monitoring Personal computers, Office network improvement and expansion Software for computer managed maintenance program Telemetry to network connection equipment for pumping station control Reprogramming of the existing SCADA software Equipment for engineering station		
	Improvements at the CWWTP Repair & reprogram of, new PC for, SCADA Replacement of 20 existing DO sensors aeration tanks Supply and installation of 5 ultrasonic sludge level sensors in the secondary settlers Supply and installation of analyzing equipment for several parameters of TP effluent stream Construction of a selector in the treatment plant Replacement of existing old air diffusers in the aeration tanks and replace them with 10,000 new diffusers		
	Measurement of industrial wastewater Supply of 10 portable waste water flow meters for measuring in industrial sewers		

Construction of Sewage Network Extension

73. Conveying the sewerage collected from the two subcenters to the City Wastewater Treatment Plant (CWWTP) is preferred to the alternative of having decentralized wastewater treatment units. Both sewerage systems will be connected to existing sewer collector mains. The following investments will be required under Component (1) of Project 1:

74. In **Bayankhoshuu**, a 300mm sewage collector main (2.73 km), will be installed from the intersection of Trade Union Street and Revolutionary Street to the terminal of the existing system at Khanii Material;
In **Selbe**, the following will be installed/built: (a) a 400/300mm collector main, (2.55 km), along the N-S Chingeltei Street, from Buudal 7 to the terminal of the existing system, at Khailast; (b) a 250mm external Eastern sewage collector to the proposed sewage pumping station; a 250mm pressure sewer pipe, (0.907 km), from the proposed sewage pumping station to the proposed 400/300 mm sewage collector main at Khailast; and (c) a 10-kW sewage pumping station, to be situated at the lower-most of the cluster included between Chingeltei Street in the west and Selbe River in the east and Dambadarjaa in the north and Khailast Creek in the south, that will be capable to lift an average 34 l/s of sewage by 2030 into the 500mm collector main in Chingeltei Street.

Roads and Urban Services

(1) Road Construction and Drainage

75. In **Bayankhoshuu Subcenter**, road construction and drainage will include (i) 6.15 km of priority roads with 5.5m carriageway (or various widths according to the maps of ROW); (ii) street lighting every 40 m; (iii) rehabilitation of 2.07 km of roads disturbed by the installation of water supply and sewerage pipes; and (iv) about 868 m of drainage culverts will be constructed to cover ravines (open drainage channels) on the western and southern part of the Subcenter.

76. In **Selbe Subcenter,** road construction and drainage will include (i) 9.6 km of priority roads with 5.5m carriageway (or various widths according to the maps of ROW); (ii) street lighting every 40 m; (iii) rehabilitation of 1.0 km of roads disturbed by the installation of water supply and sewerage pipes; (iv) two small bridges, 1,000 m2; (v) improvement of the existing river embankment (2 km); and (vi) landscaping works, 3.7 ha.

Figure 4: Proposed Priority Roads – Bayankhoshuu Subcenter

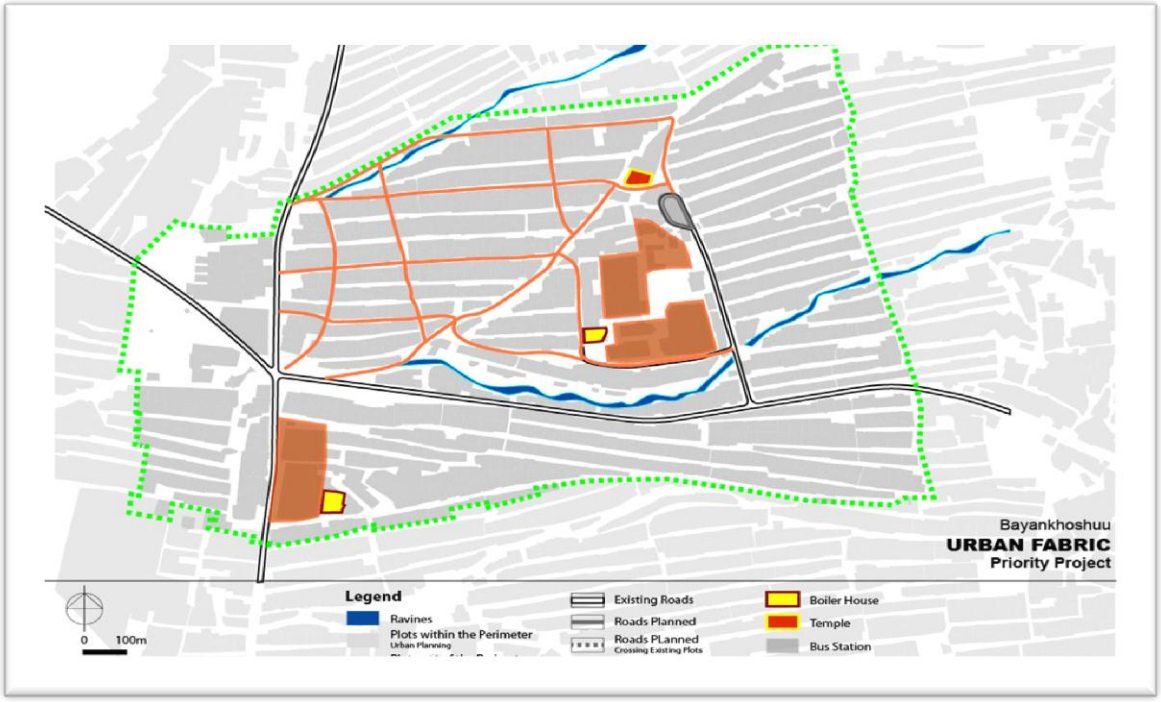


Figure 5: Proposed Priority Roads – Selbe Subcenter

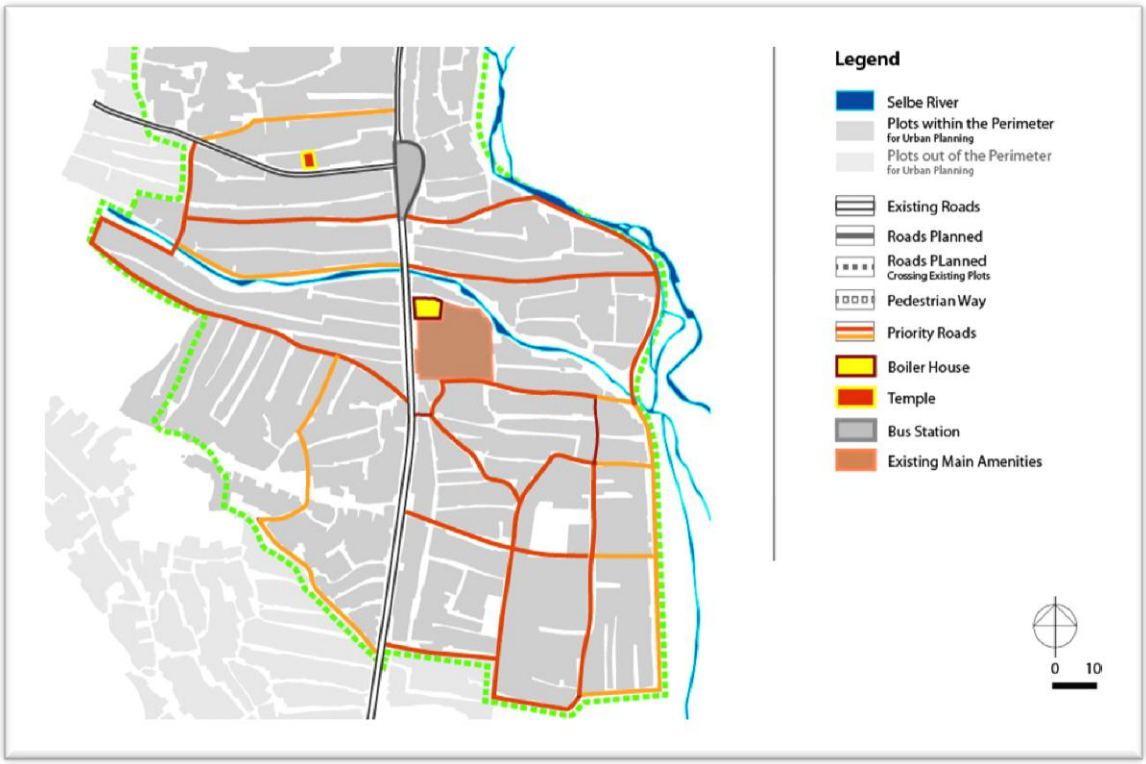
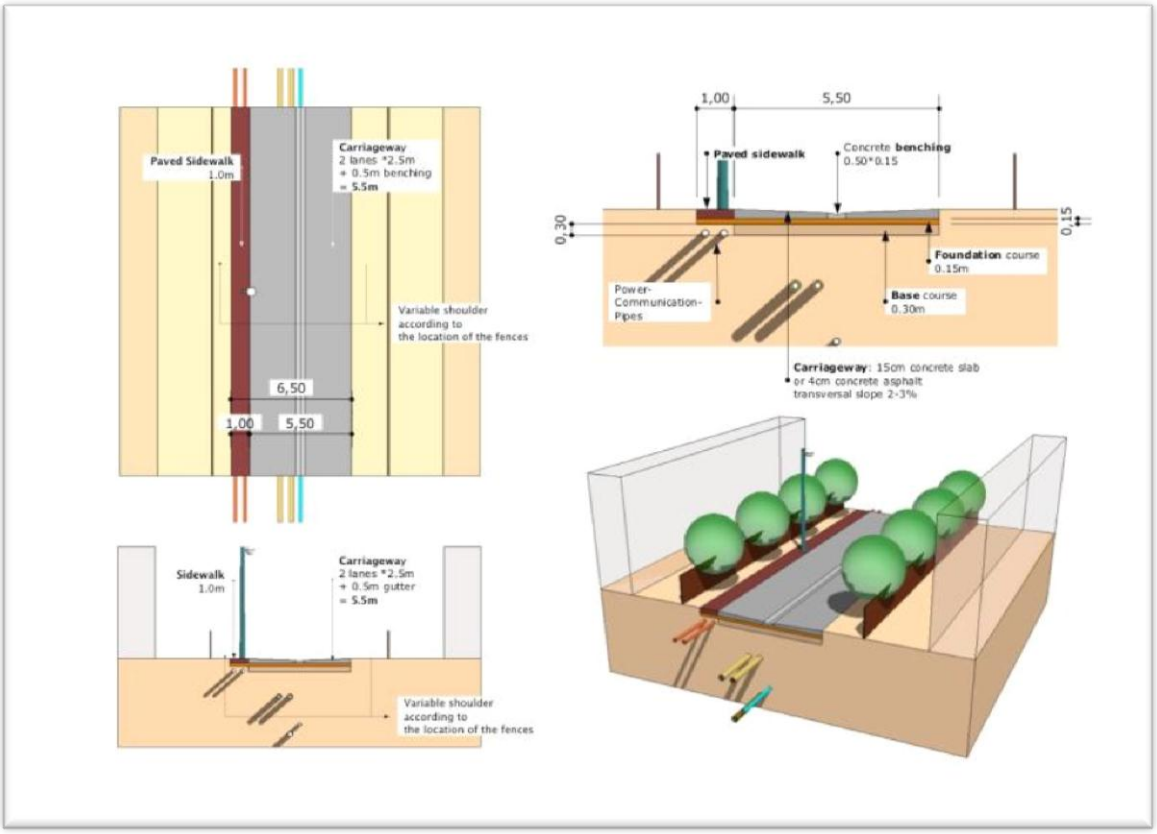


Figure 6: Typical Road Cross-Section with Auxiliary Utility Lines



(2) Water Supply and Sewer Systems

77. **Bayankhoshuu subcenter.** The water distribution system of Bayankhoshuu Subcenter will consist of a network of 6.78 km of 75 and 100mm pipes, laid in single and common trenches. The water supply system for the Bayankhoshuu Subcenter will be fully looped, thus providing service also to real estate subdivisions extending outside the external loop. The internal loops will be supplied water from the Upper Bayankhoshuu Reservoir (1,500 m3 capacity, as primary source) through the existing 225mm distribution main and the Lower Bayankhoshuu Reservoir (500 m3 capacity) through the existing 160mm distribution main.

78. The proposed separate sewerage system of Bayankhoshuu Subcenter will consist of 6.74 km of 150-200mm pipes, laid in single and common trenches. The system needs to be connected to the terminal of the existing City collector main at Khanii Material, south of the service area, in order to convey the sewage to the Central Wastewater Treatment Plant (CWWTP). This connection is described above (Component 1).

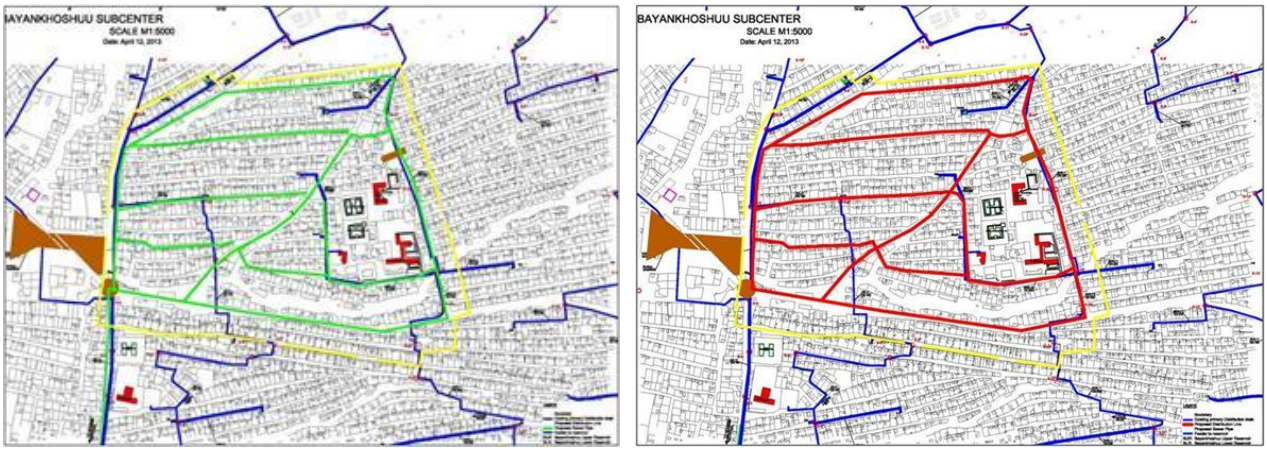
Table 5: Summary of Water Supply Pipework (m) – Bayankhoshuu Subcenter

DN (mm)	In single trench	In common trench	Subtotal
100	1,675.8	1,515.7	3,191.6
75	109.0	3,483.0	3,592.0
Subtotal	1,784.9	4,998.7	6,783.6

Table 6: Summary of Sewerage Pipework (m) – Bayankhoshuu Subcenter

DN (mm)	In single trench	In common trench	Subtotal
150	1,713.6	3,483.0	5,196.6
200	27.1	1,515.7	1,542.8
Subtotal	1,740.7	4,998.7	6,739.4

Figure 7: Layout of the Water Supply Network and Sewerage System in Bayankhoshuu Subcenter



79. **Selbe subcenter.** The water service is articulated around four main loops supplied from the Chingeltei Reservoir and from the Dari Ekh Pumping Station, as follows: (i) the southwestern sector, west of the Chingeltei Street, with off-takes in the existing 225mm distribution main from Chingeltei Reservoir; and (ii) the northernmost part and the eastern sectors extending east of the Chingeltei Street, with off-takes in the existing 225mm distribution main fed from the Dari Ekh Pumping Station, which maintains the pressure and circulation of the looped distribution main serving the area East of the Selbe Street up to Dambadarjaa. The proposed water distribution system of Selbe Subcenter will consist of a network of 11.27 km of 75 and 100mm pipes, laid in single and common trenches.

80. The proposed separate sewerage system of Selbe Subcenter will consist of 11.14 km of 150-250mm pipes, laid in single and common trenches. Due to the topographic configuration of Selbe Subcenter, the system will have to be connected to separate trunk mains to be able to convey to the existing wastewater treatment facilities. Since the territory of the Selbe Subcenter slopes toward the Selbe River, the area will be connected to a north-south trending external sewer pipe running along the right bank of the Selbe River. This external sewer pipe will lead sewage to the southeastern-most tip of the service area where a pump station will lift the collected sewage into a new collector main in Chingeltei Street. The sewerage network of the Subcenter area extending west of Chingeltei Street will be connected to a new sewer main planned along Chingeltei Street (included in Component 1 presented above)..

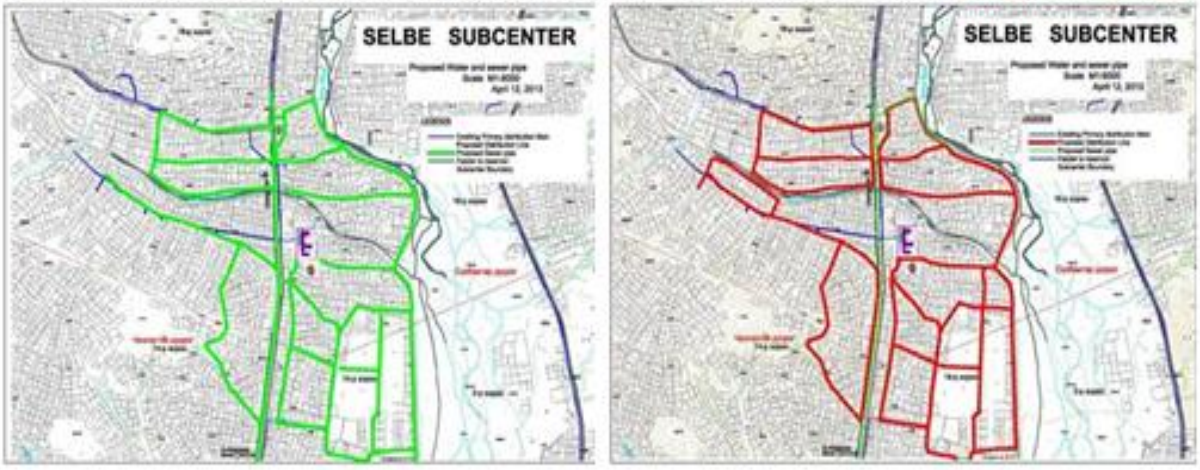
Table 7: Summary of Water Supply Pipework (m) – Selbe Subcenter

DN (mm)	In single trench	In common trench	Subtotal
100	1,693.5	7,033.3	8,726.8
75	2,512.5	28.3	2,540.7
Subtotal	4,206.0	7,061.6	11,267.6

Table 8: Summary of Sewerage Pipework (m) – Selbe Subcenter

DN (mm)	In single trench	In common trench	Subtotal
150	2,924.3	5,160.0	8,084.3
200		1,364.5	1,364.5
250	1,187.2	508.8	1,696.1
Subtotal	4,111.6	7,033.3	11,144.9

Figure 8: Layout of the Water Supply Network and Sewerage System in Selbe Subcenter



81. **Household connections.** Water supply and sewerage connections for private consumers will be at the charge of private consumers or by real estate developers. To provide

support to private households that wish to connect to the water and sewerage network, a supporting parallel microfinance program is proposed. It will be supported under an ADB-proposed private sector loan to a major banking group that includes a large commercial bank with extensive experience of microfinance. $6.0–10.0 million could be made available for *ger* areas. The proposed loan is likely to become effective in 2013. The commercial bank would be the implementing agency, assisted where necessary by the SRA.

(3) Heating Services

82. It is expected that for the 2030 planned population there will be approximately 1.7 million m^2 of heated space in Bayankhoshuu subcenter and 2.3 million m^2 in Selbe subcenter, which includes residential, commercial, and institutional buildings. Component 2 of Project 1 will support the installation of new boiler plants and distribution networks to meet load requirements as presented in Table 9.

Table -9: Projected Heating Loads (Peak Mega Watts)

Building Type	Bayankhoshuu	Selbe	Heating Solution
Single-Family	5.2	6.9	Individual coal boiler or electric
Apartment – Individual	8.3	13.2	Multi-unit coal boiler or electric
Apartment – Central	23.2	30.9	Local District Heating System
Townhouse - Individual	8.3	11.1	Multi-unit coal boiler or electric
Institutional	3.3*	4.8	Local District Heating System
Commercial – Individual	8.7	11.3	Individual coal boiler or electric
Commercial – Central	34.6	45.3	Local District Heating System
Totals - Central	88.0 MW	116.6 MW	
Individual	32.0 MW	42.5 MW	

*Assume existing HOB Plants will remain in use

83. The proposed heating services will involve the installation of five 8.4 MW heating plants and their distribution networks. Each heating plant will consist of 3 units of 2.8 MW coal-fired heat-only boilers (HOB). Coal from the Baganuur mine will be used. It is subbituminous or lignite, with a heating value of 3,360 kcal/kg and 17% ash content. Baganuur coal is not suitable for pulverized coal technology. The proposed boiler is the Chinese cyclone type, using crushed Baganuur coal. Boiler thermal efficiency is 80%.

84. Heating plants will be designed to comply with Mongolian Standard MNS 5457:2005 and MNS 6298:2011 for SO_2, NO_x, and particulate emissions (PM10). Proposed emission controls are fabric filter/baghouse and cyclone separators, which are preferred as dry output eases disposal. Physical layout and design of the plants will include provisions for coal and ash storage and handling that effectively eliminate neighborhood exposure to dust emissions and minimize exposure of plant workers to the extent possible.

85. The HOBs will be designed to be located near residential areas and will be designed to meet or not to exceed Mongolian Air Quality Standard MNS 4585:2007 including noise output to MNS 4585:2007 and MNS 0012-013:1991: "Workplace Atmospheres, Hygienic Requirements." The HOBs will be connected to the sewer system that will be installed under Project 1 to handle allowable wastewater.

86. HOBs generate a variety of Coal Combustion Products (CCPs), namely bottom ash, fly ash, slag and flue gas desulphurization (FGD) residue. The requirement for disposal of CCPs is expected to be at larger scale that the District can handle. CCPs will be stored in enclosed structures in the plant site. There is presently no formal recycling of CCPs in Ulaanbaatar, although some studies are underway. Where possible, these will be supplied to interested projects, organizations and entities for applications or reuse. CCPs can be used in a variety of engineering applications, and which will be considered in projects for subsequent tranches: (i) as fill materials for structural applications and embankments; (ii) as aggregates in road base and sub-base; and (iii) as aggregates in asphalt paving, among others. Although there is potential for CCP re-use in construction materials, it is beyond the scope of the USGADIP to create a recycling market, and the present assumption is that ash will be transported to a dedicated storage/disposal site that the City has established adjacent to the Central Wastewater Treatment Plant with adequate environmental protection measures.

87. All heat distribution network piping are double pipes (supply and return), which will be installed concurrently with the water distribution and sewage collection systems. Heating distribution pipes and service connection pipes are required to be steel in concrete "channels" under present Mongolian design codes. Pipes DN200 and larger will be directly buried and insulated with 50mm of urethane insulation and covered with a protective jacket. Distribution pipes of DN150, DN100, and DN80 and building connections of the same sizes will be installed in concrete channels. Building service connections of DN50 and smaller will be direct buried and insulated with 75mm of urethane insulation and covered with a protective jacket. Table 10 gives the scope of works; Figures IV-8 and IV-9 show the proposed locations.

Table 10: Scope of Works for Heating Services

Item	Unit	Bayankhoshuu	Selbe
Land	ha	0.497	0.745
Heating plant, 8.4 MW	ea	2	3
Piping network			
2 x DN250 direct bury	m	786	-
2 x DN200 direct bury	m	1,179	801
2 x DN150 in channel	m	2,359	4,788
2 x DN100 in channel	m	3.303	6,179
Heating service connection			
2 x DN50 direct bury	M	150	150
2 x DN100 in channel	M	50	50
Heat meters			
For DN50	ea	5	5
For DN100	ea	5	5

Social and Economic Infrastructures

88. Socioeconomic infrastructure to be provided in each subcenter considered the community and business development needs identified through the 'Community Action Planning' process facilitated by UN-HABITAT. The socioeconomic and willingness to pay survey conducted under the TA further confirmed the demand for these infrastructure. The socioeconomic infrastructure will address the current gap in services and will increase the centrality and urban function of the two subcenters.

89. **Bayankhoshuu subcenter.** In terms of social and economic infrastructures, the following are proposed for Bayankhoshuu Subcenter, taking into consideration the demands of the communities: (i) construction of a kindergarten for 130 pupils and with a playground; and (ii) business incubator/vocational training center, 5000 m^2.

90. **Selbe subcenter.** The following are proposed taking into consideration the demands of the communities: (i) construction of a kindergarten for 130 pupils and with a playground; and (ii) business incubator/vocational training center, 5000 m^2.
The kindergarten and business incubator center / vocational training center: are grouped together since each building may offer multipurpose areas. This option is justified (i) due to the lack of available plots of land and (ii) due to the interest of addressing in a symbolic way the

extremes of education and training. As conceived, this subproject does not raise any functional conflict, both entities operating in quite separate ways.

91. In addition to the investments proposed under Project 1, the MUB has committed to improve the Khoroo administration buildings in both subcenters. Linked to the rebuilding, would be the construction of about 40 apartment units in each subcenter for use by families resettled as a result of the works or would provide transitory accommodation for those participating in the land pooling schemes. Funds for the improvement and construction of these facilities have been committed by MUB through its *ger* area development budget for 2013. The estimated cost of these works is about $10 to $12 million.

Figure 9: Bayankhoshuu and Selbe – Kindergarten / Business incubator center

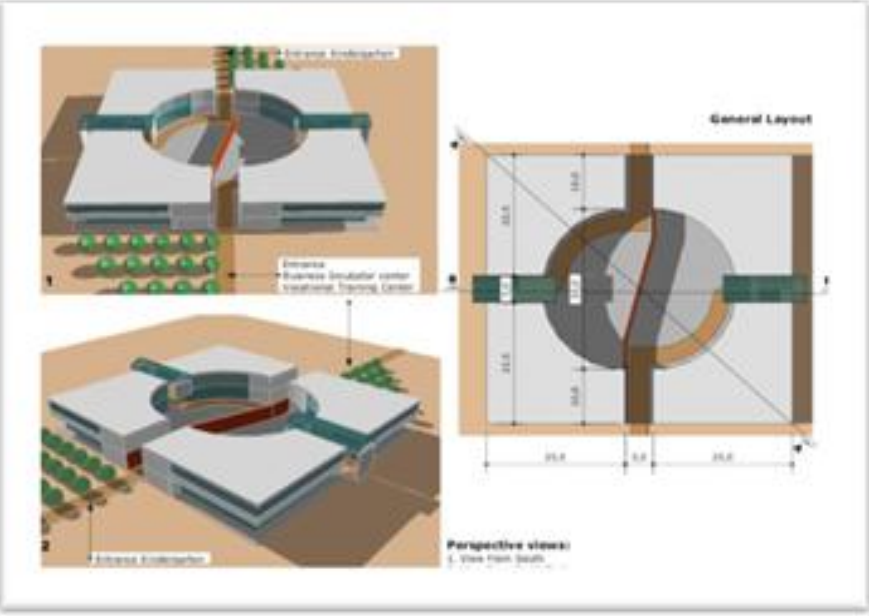


Figure 10: Bayankhoshuu and Selbe – Khoroo's Building / 40 Transit Apartments

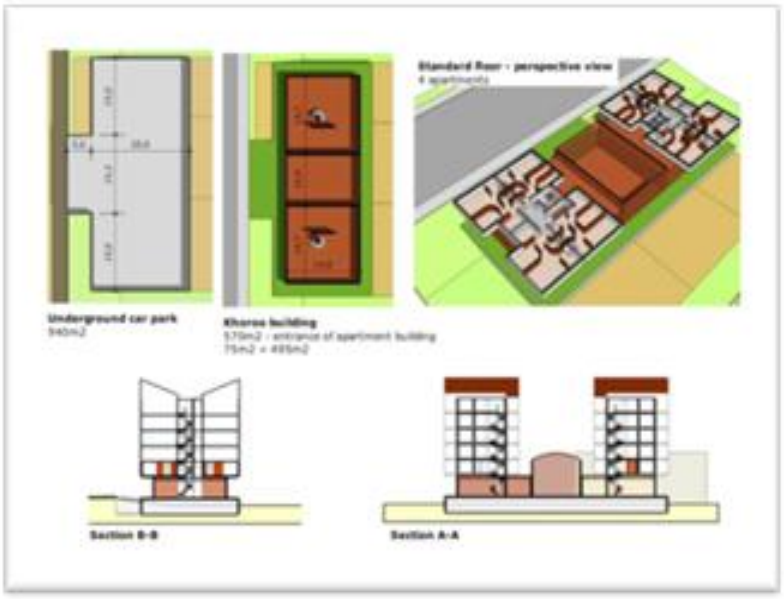


Figure 11: Locations of the Proposed Heating Plants and Social and Economic Infrastructures, Bayankhoshuu Subcenter

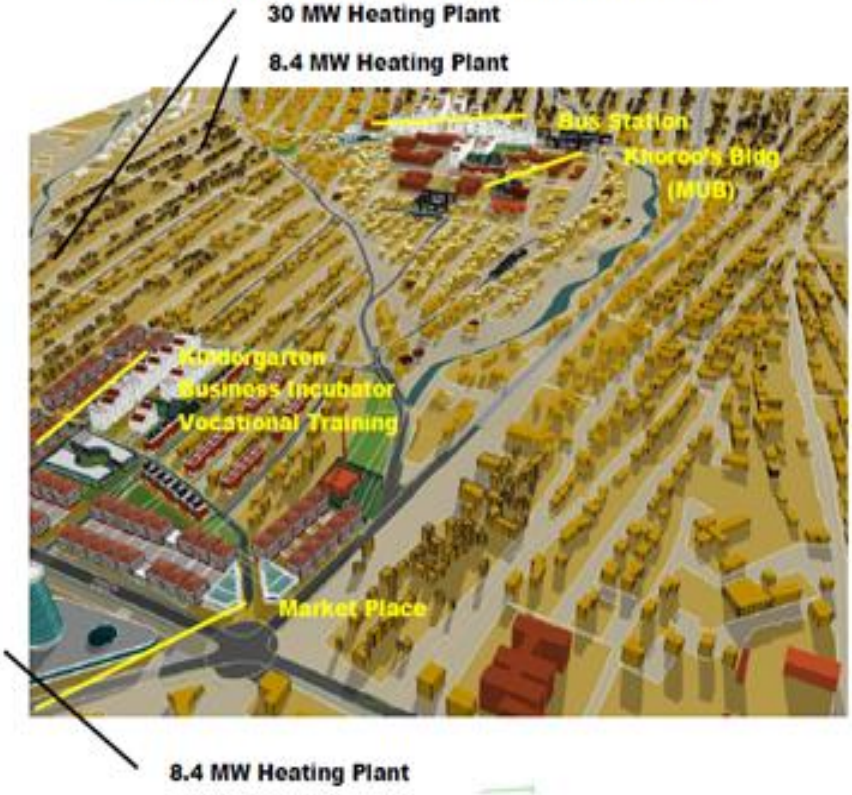
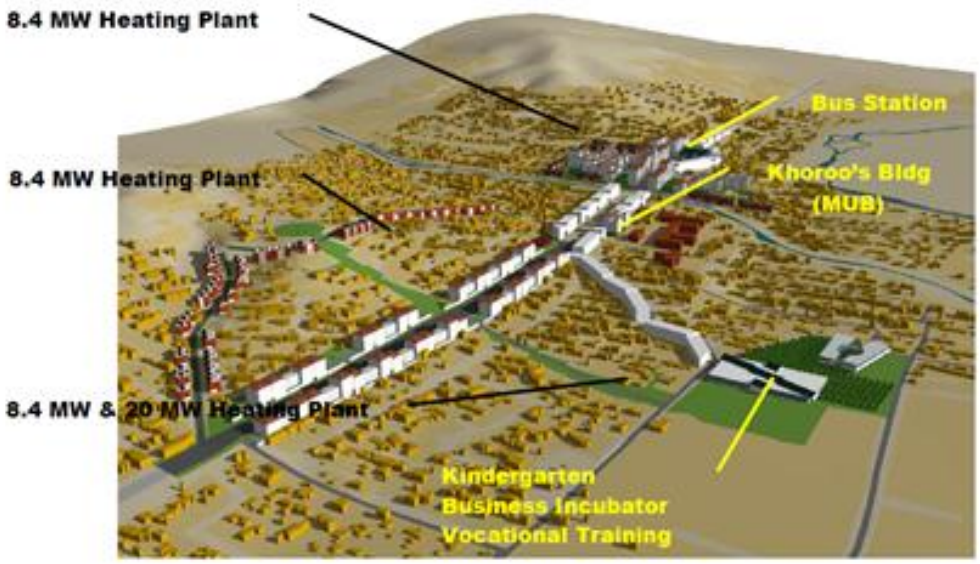


Figure 12: Locations of the Proposed Heating Plants and Social and Economic Infrastructures, Selbe Subcenter



Multi-interventions in USUG

92. The component aims at improving the central wastewater treatment plant (CWWTP) and drinking water supply network, will introduce local control and central operational control systems (SCADA), implement a domestic and industrial water metering program, a program for Non-Revenue Water (NRW), and measures to improve water quality (in cooperation with WHO). The component will be carried out through a grant from the Urban Environment Infrastructure Fund to the amount of 3.7 million $. The component includes three subcomponents.

93. USUG operational improvements: The project will upgrade and improve the operational control of the water distribution scheme, leading to a reduction of energy consumption and an improved service delivery to USUG's customers. The operational improvement involves two main activities, as follows: (i) Installation of Equipment for Operational Control; and (ii) Operational Control Centre.

94. The future, targeted situation is as follows: all assets are monitored and controlled by USUG from the Operational Control Centre (OCC) that is located in USUG's headquarters. This OCC maintains an accurate and up-to-date overview of the performance of the supply scheme, and is capable of adjusting the operations as required (e.g. in case of an emergency). The main task of this OCC is to control and optimize the water distribution processes (in terms of flow,

pressure and energy) and to ensure constant and reliable water services delivery to the customers.

95. Operational control and data acquisition systems (SCADA) for various assets will be installed, including pumping stations, reservoirs, booster stations. Furthermore, control valves and monitoring/measurement devices in the distribution network will be installed to regulate the flow and pressure. Finally, communication means for data exchange between the field and the Operational Control Centre will be established.

96. SCADA at Central WWTP: At the Central WWTP, the existing SCADA system will be repaired and reprogrammed. Some equipment will be replaced and the software checked and repaired, where necessary. A new PC for the SCADA system will be installed in the CWWTP control room and a second PC with SCADA connection in the head engineer's office in the CWWTP. The SCADA system at the CWWTP will be designed as a local system and will not be connected to the central Operational Control Centre (OCC).

97. The component will have significant environmental benefits (including energy savings, reduced organic loads to Tuul River, reduced water losses and water demand, reduced industrial pollution load to WWTP, etc.). These benefits are discussed in Chapter VII-A. The component will have minimal or no impacts during construction and operation, and are thus not further discussed in the Impact chapter (Chapter VII) and the environmental management plan (EMP).

Definition of the Project's Area of Influence

98. The program will be implemented in Ulaanbaatar City, particularly in the *ger* areas. Project 1 will focus on the (i) Bayankhoshuu Subcenter of Songino Khairkhan District; (ii) the Selbe Subcenter of Sukhbaatar and Chingeltei Districts; and (iii) the site of the Central Wastewater Treatment Plant (CWWTP) in Tolgoit area of Songino Khairkhan District. Project 1 projects will involve horizontal works (water supply, wastewater collection, heat distribution, roads, drainage/culvert, embankment) and construction of point objects (HOBs, sewage pumping stations, and social and economic infrastructures).

99. The potentially affected environment from Project 1 implementation can be classified into: (i) "main project areas of influence", covering component sites (footprints) and areas within 200 m from their edges;[9] considering the potential reach of noise, dust and socio-economic impacts; and (ii) "extended areas of influence" to include borrow areas/quarry sites, waste

9 200 m takes into account the potential reach of noise, dust and socio-economic impacts.

disposal sites, access routes to and from component sites and the resources in close proximity to them, sources of water for construction use, workers campsites and their immediate surroundings, and sources of labor.

Table 11: Potentially Affected Resource/s in Project's Area/s of Influence

Area of Influence	Potentially Affected Resources				
	Soil, ground & geology	Water resources	Air	Land Use & Socio-economic Resources	Other Ecological Resources *
1 Component sites & vicinities within at least 200 m from their edges **	√	√	√	√	-
2 Borrow areas/quarry sites & their areas of influence ***	√	-	√	-	√
3 Waste disposal sites ***	√	-	√	-	-
4 Access routes - To/from sources of chemicals for construction use & disposal sites	√	√^	√	√	-
- Used by other construction-associated vehicles	-	-	√	√	-
5 Sources of water for construction use & their downstream stretches	-	√	-	√	√
6 Workers' campsites & immediate surroundings (if outside 200 m from edges of component sites)	√ ^^	√ ^^	√ ^^	√	-
7 Sources of labor for construction	-	-	-	√	-

* Areas of influence of borrow areas/quarry sites could have migratory species at certain periods of the year.

** According to the IEE Report of the proposed Regional Logistics Development Project, Government of Mongolia, 2011, for the majority of equipment that may be used during construction, noise levels could exceed the background levels monitored by the MEGD.

*** Expects that the following have no water resource to affect: (i) legally permitted borrow areas/quarry sites & City's waste disposal sites; and (ii) potential Government project & other sites that would avail of the residual soil for filling.

^ Water resources that are crossed by, adjacent to, or close to access routes (including effective downstream stretches). “Close to”, say within 50 m without any form of physical barrier in between water resource and access route.

^^ From poor sanitation practices, additional demand for water within the community, use of stove for heating and cooking & if applicable, transport to and from component sites.

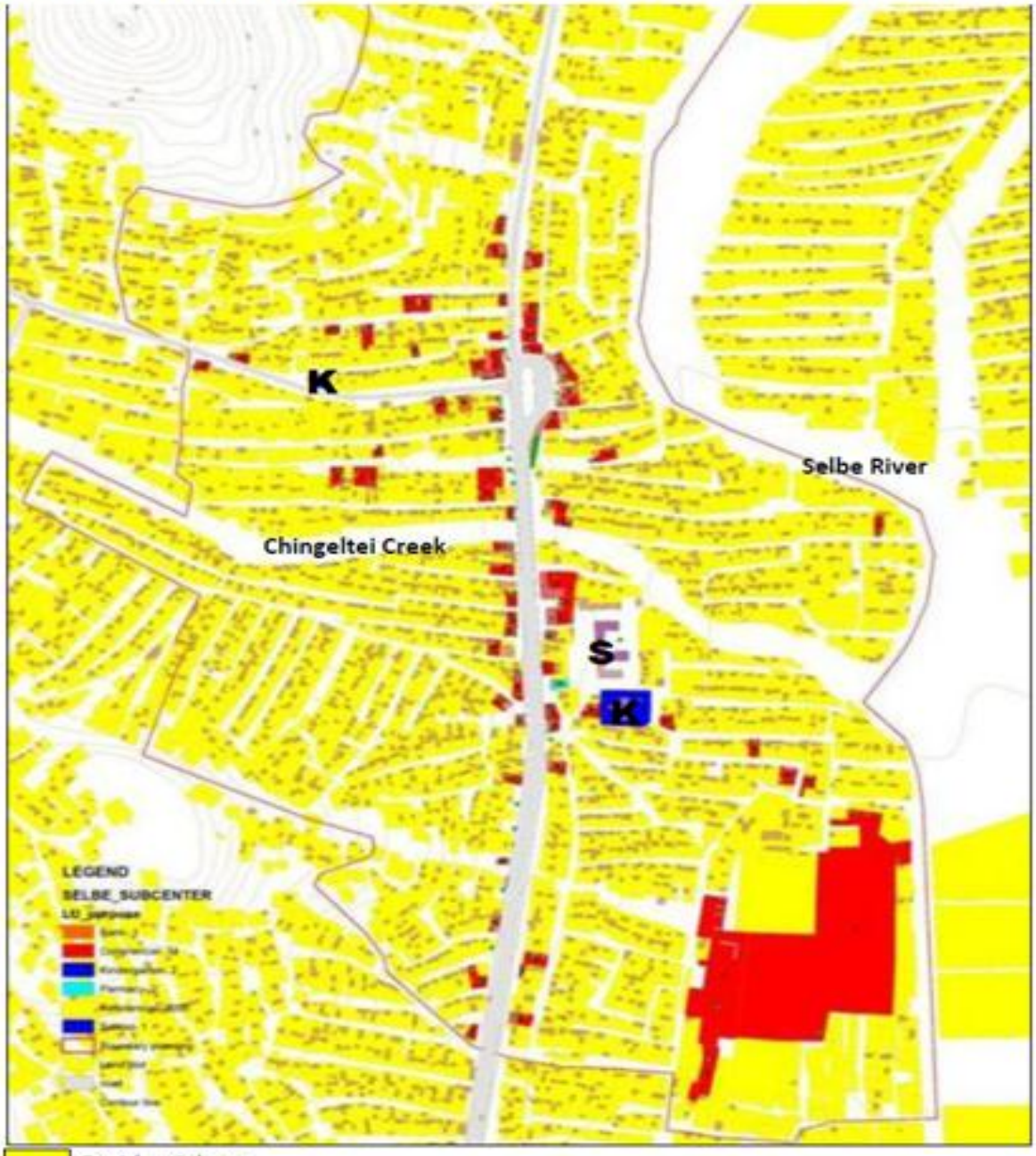
100. From sites reconnaissance and review of land use maps, potentially affected resources within the main areas of influence were identified and are presented. These include the natural and artificial resources within the main project areas of influence that will potentially be exposed to adverse impacts.

Table 12: Potentially Affected Resources in Component Sites

Component Site	Affected Resources
1 Bayankhoshuu Subcenter	Residents Bayankhoshuu Creek 4 religious buildings (2 Buddhist temples, 2 small oratories) 3 Kindergartens, 2 Schools 2 Hospitals, 2 Dormitories 3 Wells Existing basic services (water kiosks, bathhouses, public transportation services, heating network, power distribution poles and cables, water supply mains, etc.).
2 Selbe Subcenter	Residents Selbe River, Chingeltei Creek 1 School, 2 Kindergartens Existing basic services (water kiosks, bathhouses, public transportation services, heating network, power distribution poles and cables, water supply mains, etc.).
3 Sewerage Network Extension (a) For Bayankhoshuu	 Residents 2 Schools
(b) For Selbe	Residents Selbe River, Khailast Creek 1 School, 2 Kindergartens 2 Hospitals

Figure 13: Locations of Potentially Affected Resources, Bayankhoshuu Subcenter

Figure 14: Locations of Potentially Affected Resources, Selbe Subcenter



Residential area
K-Kindergarten
S-School

Description of the Environment (baseline)

General

101. The description of the pre-project environment (administrative, biophysical and socio-economic) establishes (i) the environmental setting within which Project 1 will be implemented, and therefore needs to be designed to suit, and (ii) the environmental values which will be changed (either negatively or positively) by the project activities. Both these roles are encompassed by the concept of the "baseline" environment.

Geography, Topography and Geology[10]

102. **Geography.** Ulaanbaatar is the capital city of Mongolia. It is not part of any province as it is an independent municipality. It has a total land area of 4,700 sq. km (0.3% of the size of the country) and is divided into 9 districts (*düüregs)*, which are further subdivided into 152 subdistricts (*khoroos)*[11]*,* comprising of micro-districts *(khesegs)*.

103. The Ulaanbaatar City Master Plan 2030 was approved by the Parliament of Mongolia in February 2013. The Master Plan recommends the development of 6 centers along the Peace Avenue in the built-up core, 2 subcenters (Bayankhoshuu and Selbe) in middle *ger* areas, and a number of microcenters. Thus, the Master Plan 2030 provides appropriate urban planning framework for the development of a network of subcenters under the program. Project 1 investment will cover the two Subcenters of Bayankhoshuu and Selbe, located in the districts of Songino Khairkhan in the northwest, and Sukhbaatar and Chingeltei in the north, respectively. Songino Khairkhan has a land area of about 1,200 sq. km (about a quarter of the total city area); Sukhbaatar, 208 sq. km (a little over 4% of the total city area) and Chingeltei, 89 sq. km (2% of the total city area). The Master Plan has zoned the two Subcenters as low density residential zones with neighborhood commercial nodes.

[10] Sources of information and base maps in the Section include (a) 2007 Environmental Outlook of the Ulaanbaatar City. Regional Resource Centre for Asia and the Pacific/ UNEP. b) Air Pollution in Ulaanbaatar. Initial Assessment of Current Situation and Effects of Abatement Measures. December 2009. The World Bank. c) IEE Report. Mongolia: Urban Transport Development Investment Program (MFF, tranche 1). February 2012. Prepared by the Municipal Government of Ulaanbaatar for the ADB. d) Base map of Mongolia obtained from www.nationsonline.org.

[11] Mongolian Statistical Yearbook 2011. National Statistical Office of Mongolia.

Figure 15: Ulaanbaatar City Master Plan 2030 – Centers & Subcenters

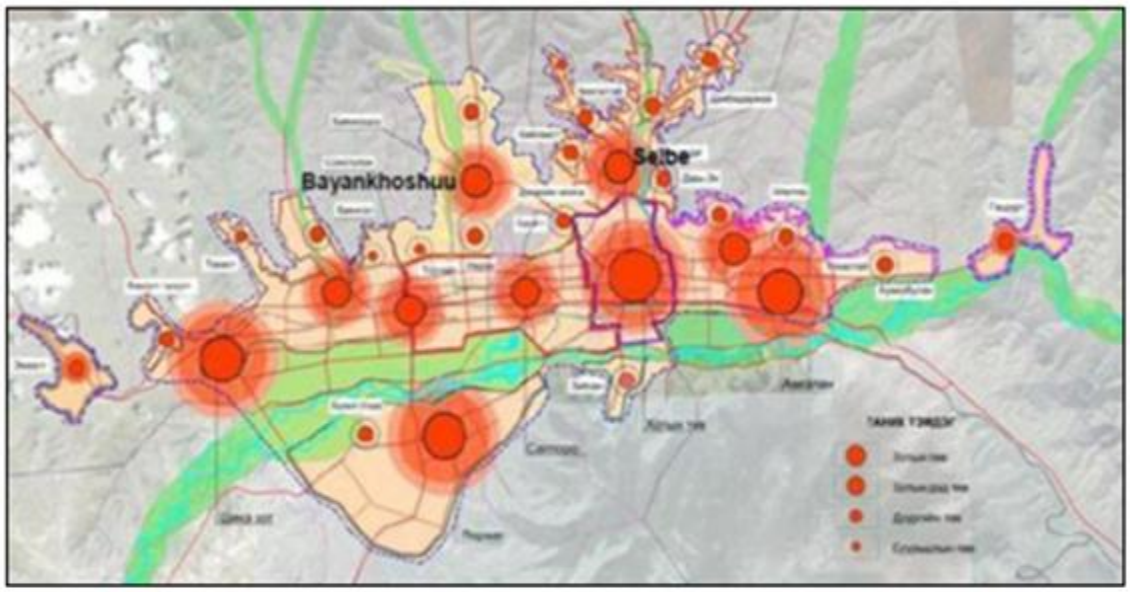
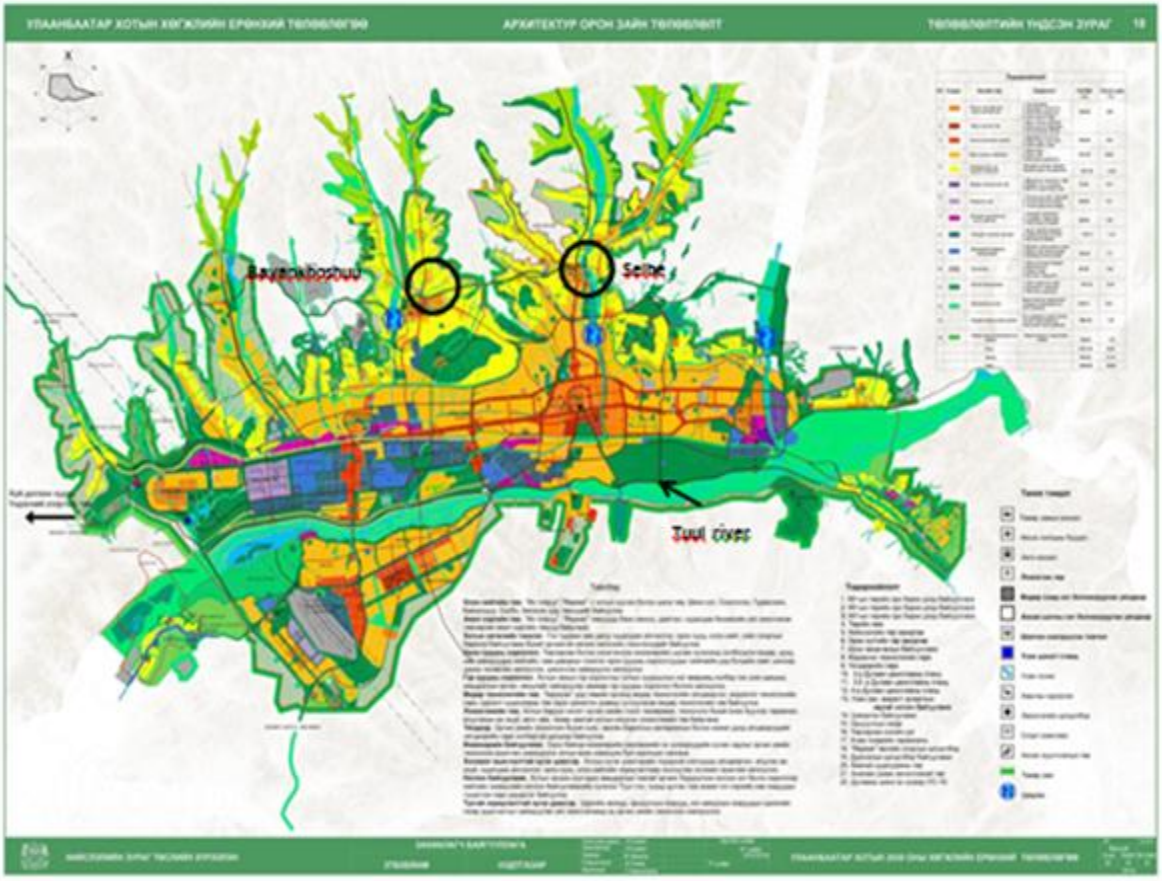


Figure 16: Ulaanbaatar City Master Plan 2030 – Zoning Map



104. **Current land use.** The existing land uses of the subproject sites are as follows:

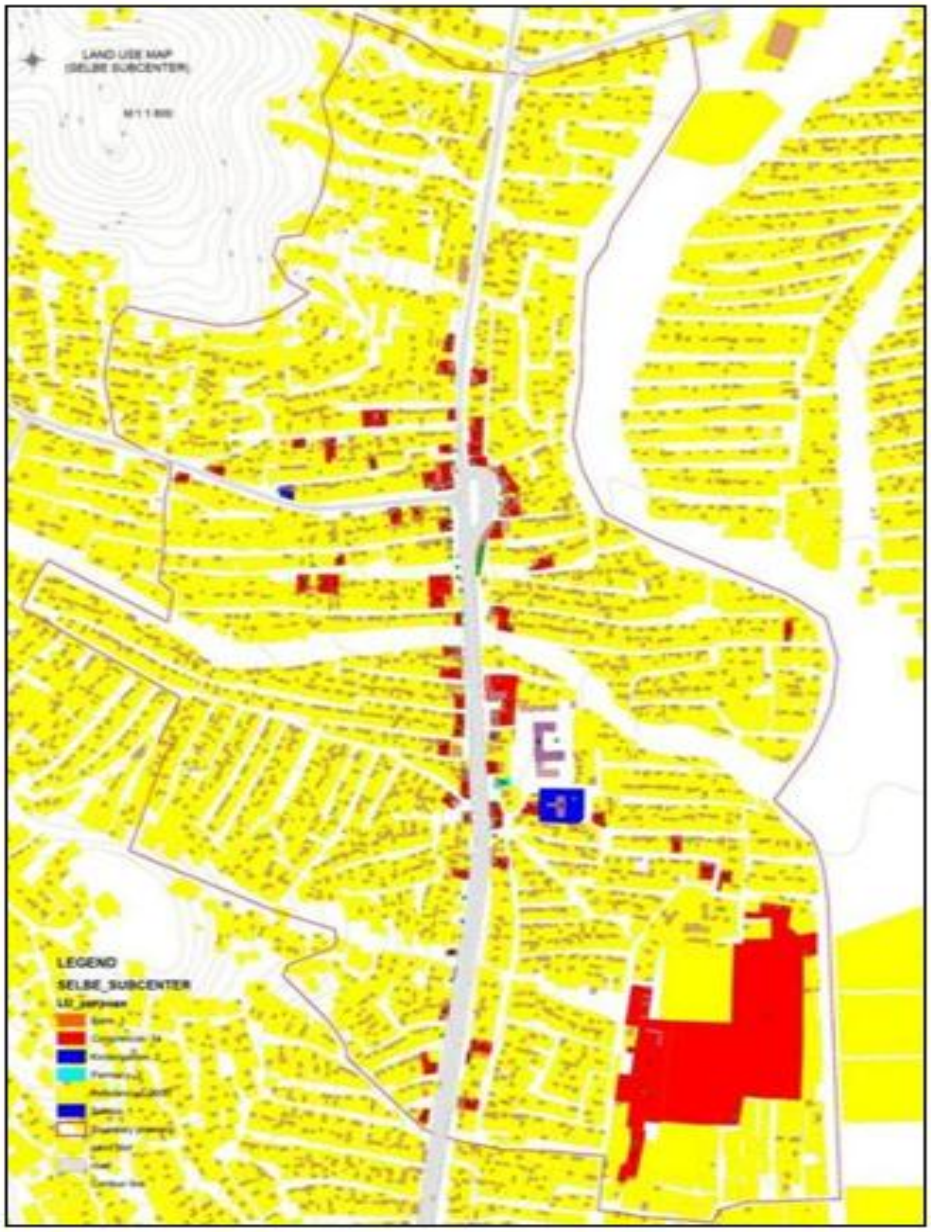
(i) Of 162-ha of land covered by the Bayankhoshuu Subcenter, about 154 ha (95%) is residential (including roads and open areas); 7.5 ha (5%) is devoted to public amenities; and 0.5 ha is occupied by the bus station.

(ii) Of the 156-ha of land covered by the Selbe Subcenter, about 153 (or 98%) is residential (including roads and open areas); 1.8 ha (1.2%) is devoted to public amenities; and 0.8 ha is occupied by the bus station.

105. Both of the subcenters have a spontaneous road network design resulting from uncontrolled allocation of plots of land, leading to discontinuous routes and variable width of unpaved road (often less than 6 m).

Figure 17: Current Land Use Map – Bayankhoshuu Subcenter

Figure 18: Current Land Use Map – Selbe Subcenter



106. **Topography.** Ulaanbaatar is situated in the Tuul River valley at 1,350 m (4,430 feet) above mean sea level. It is surrounded by the foothills of the Khentii mountain range that includes four mountains namely, the Bogd Khan Uul in the south, Chingeltei Uul in the north, Bayanzurkh Uul in the east and Songino Khairkhan Uul in the west and north west, rising up to 1,650 and 1,949 m altitude.

107. The valley floor with its Tuul River runs due east-west, with the extent of the City stretching out over a length of about 27 km from east to west (Figure V-2). The north-south width of the valley is about 4 km at Ulaanbaatar's central area. Additionally, the *ger* areas spread out almost at all sides of the central area, but predominantly to the north, east and west. Terrain is relatively flat at the city center and gently to steeply rolling in the peri-urban areas. To the east, elevation rises up to about 1,400 m; to the west, about 1,250 m; to the north, between 1,600 and 1,800; and to south, 1,800 m. The Project 1 subcenters are located in relatively flat to rolling terrain with some gullies serving as outfalls for surface drainage.

Figure 19: Topography in Selbe (Left) and Bayankhoshuu (right) Subcenter

108. **Geology.** Geologically, the Ulaanbaatar region belongs to the Khentii geosynclinals depression. Ulaanbaatar City is mainly underlain by Cambrian, Devonian and Carboniferous sandstone and mudstone. It is located on an alluvial plain. Top soil layer is very fine grained; it is easily picked up by wind action. MEGD confirmed that the soil in the City is low in permeability. Gullying and erosion is visible on steep slopes in the ger areas to the north, including in Bayankhoshuu and Selbe Subcenter.

109. The geomorphology of the Tuul river basin is included generally in a mountainous area and formed from mountain range, its mountainside and foot, streams, river mount, valley and narrow ravines. The mountains surrounding the river basin become a recharge region of groundwater; the valley of UB is an accumulation, transference foot region. The geological structure of the basin covers granite rock penetrated sedimentary, magic rocks of Cambrian,

Devon, Carbon periods frozen on depth at Jurassic and Triassic periods that distributed. Tertiary (Neocene, Paleocene) sediments are averagely 80 m thick, mainly have clayish structure of not penetrated water. Modern quaternary of Holocene aged alluvial, lake, and wind originated sediments distributed along Tuul river valley contains comparatively high content of groundwater resources (see below).

Climate[12]

110. Mongolia lies in the North Temperate Zone, and has a severe continental climate, characterized by little precipitation and sharp daily and seasonal temperature ranges. It has long cold winters and short summers when most precipitation falls. Winter comes in November/December through March/April; spring in April through May; summer in June through August; and fall in September through October/November.

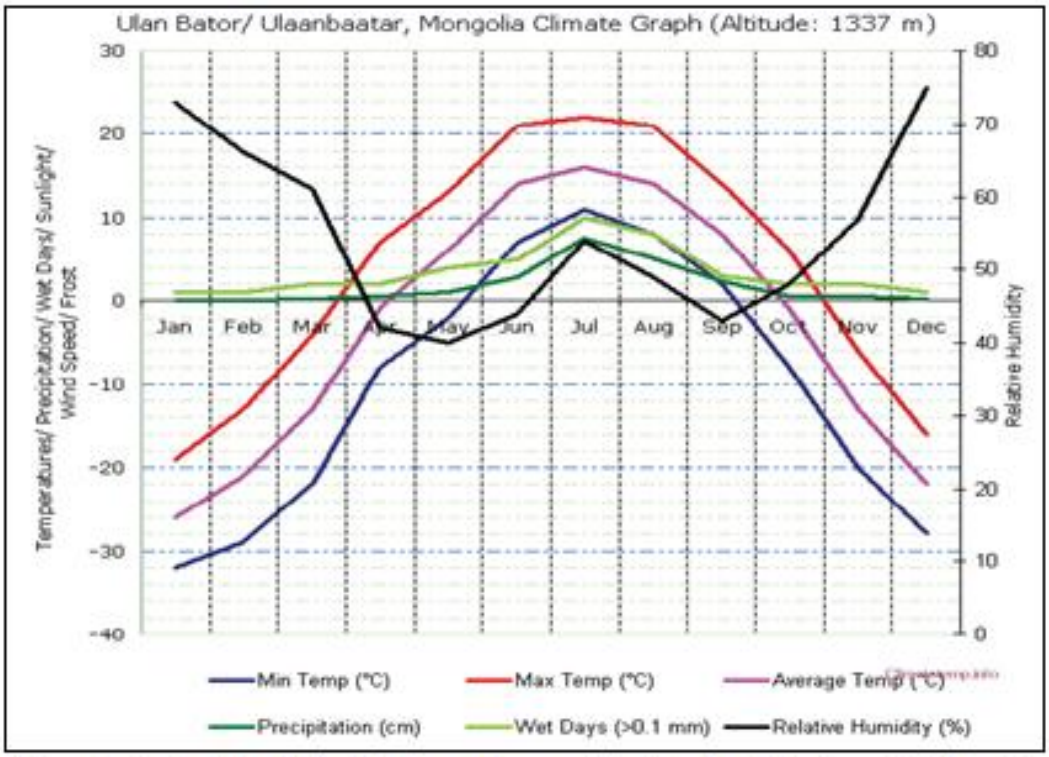
111. Ulaanbaatar City is the world's coldest capital, with temperatures ranging from approximately -30^{o}C to nearly +25^{o}C. In the 30-year period of 1978-2008, the Ulaanbaatar Station at the city center recorded monthly average air temperature ranging from -21.7^{o}C in January to +18.2^{o}C in July. Annual average air temperature was -0.36^{o}C. In Ulaanbaatar, it rains 40-70 days, and snows 25-30 days, a year. The city is covered with snow for 140-170 days in a year. Between 2000 and 2010, total annual precipitation in Ulaanbaatar ranged from 161.3 mm (in 2008) to 288 mm (in 2003); total number of days with rain ranged from 95 days (in 2008) to 152 days (in 2010). In general, about 95% of the precipitation falls from beginning of spring to end of fall, with over 70% of it falling in the summer months. Average monthly morning relative humidity ranges from 65-85%; that in the evening from 40-70%. Spring is driest, with average monthly relative humidity between 40 and 65%. The highest average monthly relative humidity level occurs in the winter months of December and January, sometimes reaching 83-85%. The dominant wind direction in Ulaanbaatar is northwest, observed to blow through the city in 30 to 40% of the cases in any month of the year. Average monthly wind speed is from 1.6 m/sec (in January and December) to 4.4 m/sec (in May). Based on 1961-1990 records, the annual average mean daily sunshine duration was 7.7 hours.

112. Due to its location, Ulaanbaatar experiences many temperature inversions, where warm air is trapped beneath colder denser air. At least 80% of these inversions occur from October to

[12] Iinformation in this Section obtained from: a) 2007-Environmental Outlook of the Ulaanbaatar City. Asia-Pacific Global Environmental Outlook, Data Portal Project. 2006-2010, UNEP. October 2009. b) Hong Kong Observatory, at www.hko.GOM.hk/wxinfo/climat/world/eng/asia/china/ulaanbaatar_e.htm#. c) Mongolian Statistical Yearbooks 2003, 2007 and 2010. National Statistics Office of Mongolia. iv) www.weatherbase.com.

April when air temperatures are from 7.5 to 11.7oC and land temperatures are from -21 to -39^{o}C (**Annex A**).

Figure 20: Climate Graph for Ulaanbaatar



Source: 5-Year Evaluation of the Central Emergency Response Fund. Country Study: Mongolia. Channel Research. 11 July 2011. Commissioned by the United Nations Office for the Coordination of Humanitarian Affairs.

113. **Wind** in UB blows mostly from the north and northwest in UB. In many months of the year the wind is observed to be blowing from northwest in 30-40% of the cases, however, it rarely blows from the east. The average wind velocities in UB are usually lower than in other parts of Mongolia. Monthly wind velocities average 1.6 – 4.4 m/s, with an average of 7 to 9 days per year where wind velocities exceed 10 m/s. The dry environment exacerbates the frequent dust storms occurring in Mongolia each year. Wind erosion of soil (Aeolian) - a dynamic process of soil degradation in which the shear stress applied on the ground surface by wind exceeds the ability of the soil particles to resist separation and transportation – is significant in the project areas.

Hydrology, Surface Water Quality[13]

114. The following surface waters are in the area of influence of Project 1 components: (i) Selbe River which forms the eastern boundary of the Selbe Subcenter; (ii) Tuul River, to which Selbe River flows and which receives effluent from the CWWTP; and (iii) the Bayankhoshuu, Chingeltei and Khailast Creeks.

115. **Tuul river.** UB is located in the Tuul River basin. Originating in the Khan-Khentein-Nuruu Nature Reserve in the Khentii Mountain, east of Ulaanbaatar, Tuul River runs from east to west through the southern part of the City. It has a catchment of 49,840 km^2, length of 704 km, width ranging from 35 to 75 m during normal conditions, depth of 0.8 to 3.5 m, and velocity of 0.50 to 1.50 m/s. Its long-term annual average discharge near Ulaanbaatar is about 26.6 m/s; during the low flow period of the warm season, 1.86 m/s. The annual runoff of Tuul River is about 69% rainfall water, 6% melted snow water, and 25% groundwater. Surface water level is not steady due to the surface flow formed by rainfall. The river water table rises starting July until September and declines in winter. Tuul River is typically frozen from November to March/April.

Table 12: Water Flows and Water Levels of Tuul River at Ulaanbaatar

Discharge, m^3/s

average	2006	2007	2008	2009	2010
1	-	-	-	0.006	0.050
2	-	-	-	-	no data
3	0.147	0.160	0.043	0.129	no data
4	3.657	2.255	1.967	8.681	1.926
5	20.335	16.412	3.617	11.219	22.294
6	48.453	11.136	38.338	23.240	14.036
7	48.097	28.192	78.855	44.577	11.257
8	18.713	25.390	20.099	33.665	24.540
9	11.101	18.000	38.137	21.363	12.384
10	8.651	9.838	15.532	10.451	6.528
11	1.653	0.944	4.441	1.583	1.500
12	0.085	0.026	0.333	0.310	0.020

Water level,cm

average	2006	2007	2008	2009	2010
1	0.0	0.0	0.0	23.3	86.6
2	0.0	0.0	0.0	0.0	no data
3	41.1	24.6	77.1	5.3	no data
4	88.6	91.3	108.5	113.7	96.3
5	120.8	112.2	93.0	111.4	123.3
6	145.0	103.5	118.2	122.9	114.7
7	145.9	125.4	158.9	149.7	109.3
8	117.8	123.5	115.5	140.2	126.1
9	106.9	115.2	131.8	127.2	114.5
10	101.5	102.3	111.5	111.2	103.3
11	99.0	90.5	100.1	106.3	95.7
12	98.6	26.6	113.6	115.7	101.5

116. The upstream part of Tuul River is undisturbed, unpolluted and has very low mineralization because of minimal human activities. In addition, many clear and fresh mountain rivers flow into it. As the river runs through the City (Figure V-2), it suffers from pollution due to, the steady influx of settlers close to it and its tributaries and largely due to discharges from

[13] Sources of information in this Section include (a) 2007-Environmental Outlook of the Ulaanbaatar City. Asia-Pacific Global Environmental Outlook, Data Portal Project. 2006-2010, UNEP. October 2009 ; (b) draft final report. RETA 7918 Ulaanbaatar – Mongolia. Water and Wastewater Operation Improvement Project. December 2012.

Central Wastewater Treatment Plant (CWWTP). **Annex B** provides the results of the 2011 and 2012 monthly monitoring of Tuul River water quality at Bayanzurkh Bridge (upstream) and Zaisan (mid-stream). BOD level exceeded standard limits intermittently.

117. **Selbe River**, a tributary of the Tuul River, flows from the south of the Khentii Mountain range. It has a catchment area of 303 sq. km; is fed by 10 tributaries on its east and west sides, and runs from north to south for about 30 km. As it turns west at the south side of the city, it is known as Dund Gol River, eventually joining Tuul River, after approximately another 10-km stretch downstream. The principal recharge mechanism of the Selbe River is rainwater in summer and autumn; therefore, water levels fluctuate considerably. The water remaining after the autumn rain is frozen during winter. Even when flowing, the river does not cover the entire bed, as such has become a solid waste dumping ground. **Annex B** provides the results of the 2011 and 2012 monthly monitoring of Selbe River water quality at Ulaanbaatar. BOD, COD, NO_2 and P levels exceeded standard limits in 5 to 8 monitoring activity. NH4, pH , F and Cr^{+6} exceeded standard limits in 3, 2 and 1 time/s The river is considered to be of low biological value and is not used as source for drinking water or for agricultural use.

118. In November 2012, the Capital City Citizens Representative Khural (City Council) issued a resolution declaring the headstream area of about 2,072 ha that flows to the Selbe River, a special protected area. Land reclamation and exploitation is prohibited, except for activities that do not violate the Law of Forestry and Water. Project 1 subproject sites are far from this headstream area. The headstream area is not the source of water for the project during operations.

119. The Selbe and Tuul rivers are experiencing a low flow and passing time that contributes to the hardening and drying out of river plains. The meadows and marsh soil around the spring source of Selbe River have dried out, as well as melting of the frozen crust allowing for the ground soil to subside and sink.[14]

120. The Bayankhoshuu Creek traverses Bayankhoshuu Subcenter near its southern perimeter. It flows from the NE, through the Subcenter and southward through the City core to the Tuul River. The Chingeltei Creek traverses the southern half of the Selbe Subcenter. It flows from the west to the east joining the Selbe River. Both Bayankhoshuu and Chingeltei Creeks are heavily laden with sediments; and its banks are showing signs of erosion. The Khailast Creek is outside the Selbe Subcenter but will be within the main area of influence of the sewerage network extension (Component 1). It flows from the Chingeltei District in the west to Sukhbaatar District in the east to join the Selbe River. All three creeks are dry in dry months.
Groundwater

[14] Tuul River Basin Integrated Water Resources Management Assessment. MEGD. 2012.

121. UB depends entirely on groundwater for its water supply and abstractions have increased steadily in recent years. Groundwater exists in unconfined aquifers (alluvial sediments of late quaternary to recent period) at depths between 4-30 m. The static water level in the Tuul River valley is from 2-6 m in winter and 0.5-5 m in summer. However, extraction of groundwater can cause the static water level to drop from 10-13 m in winter and from 15-19 m in summer. Studies by the Ministry of Environment and Green Development (2012), the Water Authority (2005 and 2010) and JICA estimated that a total installed capacity of 339,700 m3/d of groundwater is available, of which the installed capacity for USUG is 255,000 m3/d. [15] JICA carried out preliminary studies regarding the recharging of groundwater. Assuming a 9% rate of recharge and an annual precipitation of 342 mm/year, groundwater recharge is estimated at approximately 540,000 m3/day. This would show that groundwater is not overused, at present, but that with increasing abstractions this could soon be the case. The JICA study also conducted research on improving groundwater resources, among others by creating an underground dam to store water.

122. In a recent study (2012) of MEGD, the renewable groundwater resources are calculated to be over 1 million m3/day. ADB is currently developing a new project with MEGD which aims at strengthening institutional capacity of the Tuul River Basin Authority (TRBA), under the Ministry of Environment and Green Development (MEGD), to coordinate and monitor in the Tuul River Basin and thus ensuring long-term sustainability of ground- and surface water resources in the Tuul River Basin.[16] The project is intended, amongst others, to support the TRBA with implementing necessary environmental infrastructure for the protection of the water resources in Tuul River basin following international good practices, including but not limited to: (i) construction of small groundwater recharge infrastructure; (ii) embankment improvement, flood protection, and green urban development of the Selbe river; and (iii) assessment and remediation of polluted areas in Tuul River. All these activities will only involve smaller construction works, which will target specific environmental improvement and protection.

Air Quality

123. The National Environmental Action Plan (NEAP) 2000 refers to air pollution as among the pressing environmental and natural resource issues confronting Mongolia. Major sources of air pollution include (i) vehicle emissions; (ii) emissions from boilers and power plants; (iii)

[15] JICA. Study on the strategic planning for water supply and sewerage sector in Ulaanbaatar City in Mongolia (interim report October 2012). MEGD. 2012. Integrated water management national assessment report.

[16] MEGD and the Ministry of Economic Development (MOED) submitted official requests for technical assistance to ADB on 11 March 2013 and 25 April 2013, respectively.

emissions from burning coal, wood and/or garbage/plastics in household heating stoves; (iv) dry land, eroded soil and unpaved roads; (v) forest fires; and (vi) solid waste disposal sites.

Table 13: Major Sources of Air Pollution in Ulaanbaatar

Month	Air Pollutants (%)			
	PM	Black C	S	Pb
Vehicle emissions	12	13	0	68
Coal burning	35	70	86	32
Wood burning	3	11	5	0
Wind transport of dust	50	6	9	0

Source: Mongolian National University, Board of Nuclear Energy, Scientific Research Department, June 2007. (Lifted from 2007-Environmental Outlook of the Ulaanbaatar city, Asia-Pacific Global Environmental Outlook, Data Portal Project 2006-2010, UNEP, October 2009)

124. Air quality in Mongolia is strongly influenced by the seasons. In winter, SO_2, NO_2 and PM concentrations reach levels that are multiples of those in the summer, as indicated in the monitoring results for Songino Khairkhan and Sukhbaatar Districts and the City Center presented in **Annex C.** Air quality was also analyzed around the central WWTP in April 2012 by USUG (). Data obtained from the Statistical News of the National Statistics Office of Mongolia also revealed the number of times that the daily average concentrations of SO_2, NO_2, PM10 and PM2.5 at 7 monitoring stations around the City exceeded the national standard limits in the spring month of May 2011 and in the winter months of December 2012 and January 2013 (**Annex C).**

Table 14: Air quality around CWWTP (April 2012)

№	Sample point at CWWTP	mg/m³ (1)				
		SO2,3	NO2,3	PM10		
				average	max	min
1	Sludge area-left 100m	0.008	0.010	0.026	0.0239	0.017
2	Sludge area-left 500m	0.005	0.033	0.040	0.319	0.012
3	Inside sludge thickening	0.070	0.013	0.022	0.220	0.014
	Air quality standard*	0.450	0.085	0.100	x	x
	WHO Guidelines 01-09-2011 (2)	0.200 24-hour mean 0.500 10-minute mean	0.040 annual mean 0.200 1-hour mean	0.020 annual mean 0.050 24-hour mean		

Analyze standard: MNS 17.2.5.12.88, MNS 17.2.5.11.88, ISO 9001:2000

http://www.who.int/mediacentre/factsheets/fs313/en/index.html

Noise[17]

Ambient noise levels throughout the city center are consistent with little fluctuations. These data are further supported by monitoring for a domestic EIA report[18], which observed noise levels in the City at 62 dB at the kerbside in peak hour traffic, dropping slightly to 61 dB at the wall of the closest building at ground level. This figure reduces to 59 dB at 4 meters above ground. The average noise levels exceeded WHO guidelines. The noise level in the Subcenters is likely to be similar. This will be confirmed during baseline monitoring prior to construction.

Soil Quality[19]

125. The soil crust of Ulaanbaatar is of two zones namely, city central and green area. The city central soil crust has been severely degraded and has completely lost its fertility. The green area soil crust has not been degraded heavily and has kept its original nature. In the *ger* areas, due to soil erosion, the nutrient soil crust has disappeared, exposing the lower level of soil including gravel and rocks. In recent years, soil erosion has reportedly increased. According to a research done from 2003 through 2007: (i) the heavy metal contamination level in soil had remained below the permitted level; however, (ii) around the Tuul River plains contamination level had an increasing trend in the latter years.

[17] Sourced: IEE Report for Mongolia: Urban Transport development Investment Program (MFF, tranche 1). MUB. February 2012 (Revised in December 2012).

[18] Domestic EIA Report. Construction of a Leveled Interchanged, West of Main Intersection. Edem. 2009.

[19] 2007-Environmental Outlook of the Ulaanbaatar City. Asia-Pacific Global Environmental Outlook, Data Portal Project. 2006-2010, UNEP. October 2009.

Table 16: Levels of Heavy Metal Contaminants in Soil, 2003-2007 *

	Heavy Metal Contaminant									
	Mn	Zn	Sr	Pb	Cd	Cr	Co	Cu	Ni	Hg
Average	447.3	52.4	364.0	45.7	1.85	89.4	6.5	44.4	30.0	0.352
Minimum	68.5	9.6	18.3	5.0	0.10	4.8	0.0	1.5	1.6	0.024
Maximum	793.4	558.1	845.0	533.4	4.80	373.0	26.0	682.2	84.0	1.900
MNS 5850-2008	-	*300.0*	*800.0*	*100.0*	*3.00*	*150.0*	*50.0*	*100.0*	*150.0*	*2.000*
Basic content, Tuul River basin	*709*	*42.0*	*471.0*	*20.0*	*1.20*	*73.0*	*10.5*	*16.0*	*27.0*	*0.250*

* 2007-Environmental Outlook of the Ulaanbaatar City. Asia-Pacific Global Environmental Outlook. Data Portal Project. UNEP. October 2009.

Maximum levels exceeding MNS 5850-2008

Climate Change

126. Mongolia is subject to Climate Change. The annual average temperature in the 30-year period of 1961-1990 was -2.47^{o}C. In the next 18-year period, 1991-2008, it rose to -1.45^{o}C, registering an increase of 1.02^{o}C. In the past decade, total annual rainfall has decreased from over 300 mm in 2000 to 161-288 mm throughout the decade (or, a reduction of at least 35 mm and at most 162 mm). The number of hot/dry days has reportedly increased as well, raising the city's vulnerability to forest fires and other natural hazards.[20]

[20] From a mere 4 incidents of forest fire in 2005, there had been 47 forest fires in 2007 and 21 cases of the same in 2008.

Table 17: Mean Air Temperature, Monthly & Annual Averages, 1940-2008 (oC)

Period	Month												Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Byant Ukhaa Sta.													
1940-2008	-25.8	-21.2	-10.1	1.0	8.6	15.2	17.3	15.2	7.8	-1.3	-14.0	-23.2	-2.54
1961-1990	-24.7	-20.8	-9.9	0.3	8.9	14.6	16.6	14.7	7.4	-1.2	-13.4	-22.1	-2.47
1991-2008	-25.4	-19.1	-8.8	2.8	9.0	16.3	18.8	16.4	8.9	-0.7	-13.3	-22.3	-1.45
Average change	0.7	1.7	1.1	2.5	0.1	1.7	2.2	1.7	1.5	0.5	0.1	0.2	1.02
Ulaanbaatar Sta.													
1978-2008	-21.7	-16.7	-7.6	1.8	10.0	15.8	18.2	16.0	9.3	0.6	-11.0	-19.0	-0.36
1978-1990	-21.5	-17.6	-8.5	0.9	9.8	14.7	16.9	14.8	8.4	0.5	-11.3	-18.7	-0.97
1991-2008	-21.8	-16.0	-6.9	2.4	10.2	16.5	19.1	16.8	9.9	0.6	-10.8	-19.3	-0.06
Average change	0.3	1.6	1.6	1.5	0.5	1.8	2.3	2.0	1.5	0.1	0.5	0.6	0.91

Byant Ukhaa Sta. is located at the Chinggis Khan International Airport.

Ulaanbaatar Sta. is located at the center of the city.

Table 18: Total Annual Rainfall, Ulaanbaatar, 2000-2010

Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Rainfall, mm *	323.0	201.1	190.2	288.0	261.0	193.3	257.8	181.7	161.3	274.1	236.0

* National Statistical Yearbooks 2003, 2007, 2010. National Statistics Office of Mongolia.

127. According to the latest records, the annual mean air temperature of the country has increased by 2.2^{o}C since 1940. Precipitation has not changed significantly. Based on the HadCM3 model results by researcher Gomboluudevb. P[21] (Climate Change, Mitigation of Disaster Risks, 2009), the annual mean air temperature will increase by 0.5^{o}C in 2015, 1.0^{o}C in 2022, 1.5^{o}C in 2030 and 2.0^{o}C in 2040.

128. According to the Integrated Water Management National Assessment Report of MEGD, 2012, based on an estimation of A1B Model, GHG emission scenarios, in 100 years:

1. Winter air temperature value will be less than 6^{o}C in terms of change in trends and will increase by 2.6 ^{o}C in 100 years. Summer air temperature value will be less than 4.5 ^{o}C in terms of change in trends and will increase by 2.4 ^{o}C in 100 years. This indicates that winter will be more warmed compared to the summer season.
2. Intra-winter precipitation is changing by <50% and its value will increase by 23%. Intra-summer precipitation is changing by <20% and its value will increase by only 3%. Relatively, winter precipitation will increase faster than summer precipitation. When viewed at time series, it will gradually increase up to 2070, thereafter, it will stabilize.
3. Generally, winter in Mongolia is expected to become wild and summer drier. Dryness will be intensified due to high evaporation and small increase of summer precipitation compared to the normal climate as expressed by percent.

129. Among the climate change issues, the water scarcity issue relates to Project 1, as the main source of water is groundwater, mainly recharged by surface waters. According to the 2007 water inventory, 887 from 5,121 rivers, 2,096 from 9,340 springs, 1,166 from 3,732 ponds have dried out, representing an increase of 20% since 2003 water inventory. This indicates the decreasing trend of surface water in Mongolia.

[21] Climate Change, Mitigation of Disaster Risks. Gomboluudevb. P. 2009

Natural Disasters

130. Natural disasters in the area surrounding Ulaanbaatar are mainly caused by forest fires, floods, extreme cold, snow storms and disease outbreaks. Forest fires accounted for 49% of the disaster events during the period 1990-2000. During this period, floods, contagious disease outbreaks (human and animals combined), extreme cold and snow storms, and earthquakes accounted for 11%, 13%, 5% and 4%, respectively.[22]

131. **Seismic hazard.** The seismic activity in Mongolia is related to its location between the compressive structures associated with the collision of the Indian-Australian plate with the Eurasian plate on the one hand and the extensional structure associated with the Baykal rift system on the other. The historical records (1903 onward) of the seismicity in Mongolia show a high concentration of seismic activity along the Mongolian-Altay and Gobi-Altay ranges and the north western border with Russia and around Mogod east of Hangay Mountain.

132. The Research Center of Astronomy and Geophysics of the Mongolian Academy of Sciences (RCAG) has partnered with the French organization, '*Département analyse, surveillance, environnement*' (DASE) in order to assess the seismic hazard of Mongolia and Ulaanbaatar. The results of their assessment[23] were derived through a full review of Mongolia's seismic activity and attenuation laws were redefined. Following a natural seismic 'crisis' or 'sequence' in 2005, the rate of seismic activity started to increase after years of stability. The seismic crisis led to the RCAG and DASE research and a new fault system became apparent. Paleo-seismicity research along a fault-line scarp shows that earthquakes of around magnitude 8.0 are possible around Ulaanbaatar City. Active faults near Ulaanbaatar include (i) Emeelt fault, 30 km, possible magnitude 6.8, approximately 30 km from the City; (ii) Gunjiin Fault, 15-20 km, possible magnitude 7.0, approximately 30 km from the City; and (iii) Hustai Fault, 200 km (main fault 70-80 km), possible magnitude of 8.0, approximately 40 km from the City.

133. **Flooding and waterlogging.** Localized flooding can be caused in the City through heavy rain events due to poor surface drainage. The flooding is ephemeral and the water subsides rapidly. More than 75% of precipitation in the City occurs in July and August. Serious floods, mainly caused by the Tuul River occurred in 1915, 1939, 1959, 1966, 1967, 1971, 1973, 1982 and 2003. In 1966, the Tuul River water level reached 3.2 m with a flow of 1,500-1,800 m^3/s and the flood killed over 100 people.

134. shows the flood prone areas in Ulaanbaatar and the Project 1 Subcenters to have flood prone areas, appears to be the areas along the gullies.

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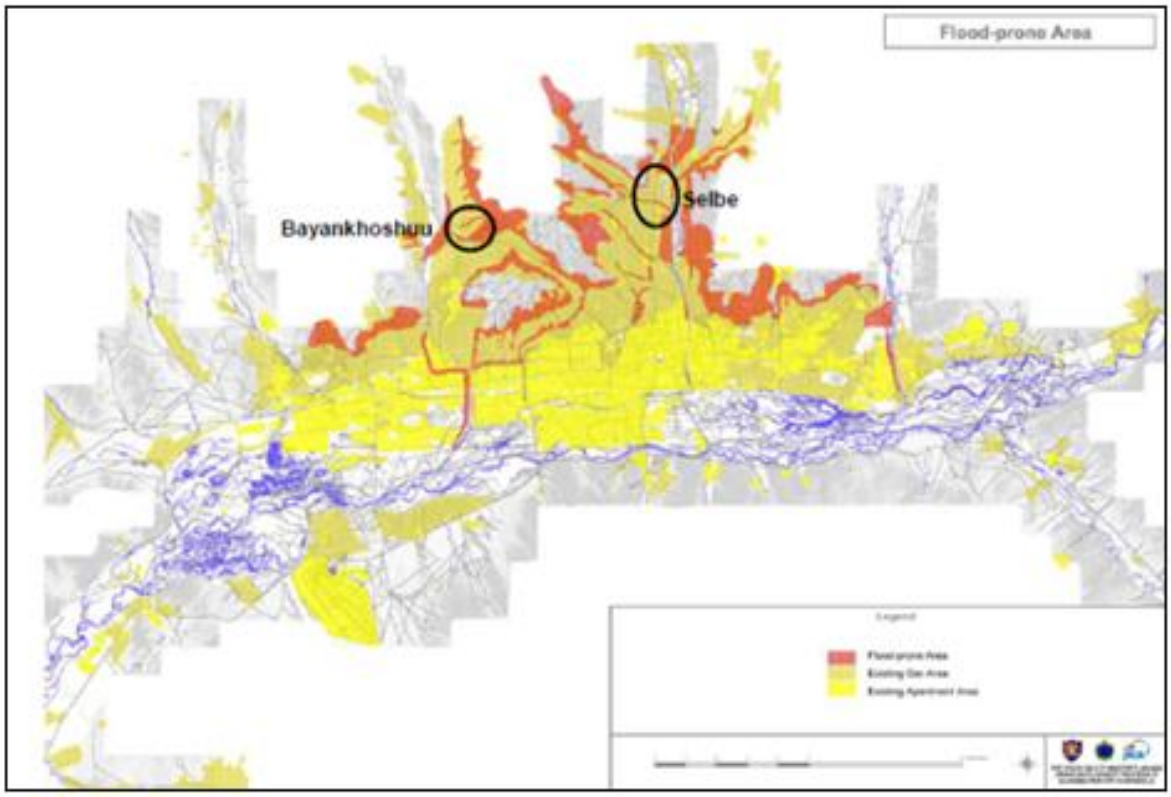
[22] Source: National Center for Emergency, 2002.

[23] http://www-dase.cea.fr/public/dossiers_thematiques/evaluation_de_l_alea_sismique/description_en.html

Figure 21: Flood- and Waterlogging-Prone Areas in UB



Source: The Study on City Master Plan and Urban Development of Ulaanbaatar City (UBMPS). JICA. March 2009.

Ecological Resources

135. **Protected areas.** In Ulaanbaatar, there is one special protected area (SPA), the Bogd Khan Uul SPA, located in the southern edge of the city; one nature park (NP), the Gorkhi-Terelj NP, located in the eastern edge of the city; and two registered natural resource conservation areas, the Bayanzurkh Mountain, located between the Bogd Khan Uul SPA and the Gorkhi-Terelj NP, and the Bayangol Naramsal Resort, located northwest of the city. In November 2012, the Capital City Citizens Representative Khural (City Council) issued a resolution declaring the headstream area of about 2,072 ha that flows to the Selbe River, a special protected area. The Project 1 subproject sites are not within, adjacent or close to these areas.

136. **Biodiversity.** The Tuul River is home to the critically endangered sturgeon, endangered taimen, nearly threatened ide and arctic grayling.[24] The catchment area of the Selbe River is habitat for 7 classifications of tree and bush, 183 plants of new families, such animals (in few

[24] Tuul River Basin Integrated Water Resources Management Assessment Report. Ministry of Nature, Environment and Green Development. 2012.

populations) as the hedgehog, rabbit, squirrel, steppe fox and grey wolf, and such migrating animals as wild pig, roe, deer, elk and lynx.

137. In the Project 1 subproject sites and vicinities, few weeds and grasses grow on the banks of gullies and Selbe River; while fauna species are those common to a crowded urban environment, e.g., sparrow, crows and dogs.

Physical Cultural Resources

138. There are 4 structures of religious importance in Bayankhoshuu, 2 small Buddhist temples (1 storey, wood and clay mixed small buildings, one was built in 1989 and another in 2008) and 2 small Christian oratories (1 storey ordinary brick houses, one was built in 2004). The structures have no cultural heritage value, but the Buddhist monks expressed their wish to keep the temples if there will be development. None of these structures will be affected by the Project (confirmed in the draft LARP). No other physical cultural resources are adjacent or close to Bayankhoshuu Subcenter; or within, adjacent or close to, Selbe Subcenter and the CWWTP.

Socioeconomic Indicators

139. **Gross domestic product.** Ulaanbaatar currently generates more than 60% of Mongolia's gross domestic product. Ulaanbaatar's economic structure consists of services (68.8%), industry and construction (30.7%) and agriculture (0.4%). Retail and wholesale, manufacturing, mining and quarrying, construction, transportation and storing services comprise the bulk of its economic activities. Job offered to migrants from the countryside mostly come from factories, hotels and restaurants.

Table 19: Ulaanbaatar's Contribution to Mongolia's GDP

Sector		Mongolia	Ulaanbaatar
2008	Total	6,555,569.4	3,594,904.3 (55%)
	Agriculture	19 %	0.7 %
	Industry and construction	34 %	32.3 %
	Services	47 %	67.0 %
2010	Total	8,414,504.6	5,225,921.7 (62%)
	Agriculture	14 %	0.5 %
	Industry and construction	36 %	32.1 %
	Services	50 %	67.4 %
2011 prelim	Total	10,829,679.6	6,991,314.8 (65%)
	Agriculture	13 %	0.4 %
	Industry and construction	35 %	30.7 %
	Services	52 %	68.8 %

Source: Mongolian Statistical Yearbook 2011. National Statistical Office of Mongolia.

140. The national census of business units in 2011 counted 66,491 business units all over the country, of which 85% were business entities; 9% were non-Governmental organizations; 6.0% were budget organizations. Of the business entities, 98% were legal institutions.

141. Close to 70% of the total business units in the country are in Ulaanbaatar. Of these, 46% are in the districts of Project 1 Subcenters, i.e., 22% in Sukhbaatar, 13% in Chingeltei and 11% in Songino Khairkhan Districts. Majority, about 65%, of the business operations in the Subcenters are in trading (wholesale/retail); 29% in services, 3% in manufacturing/production, and 3% in other forms.[25] These business activities drive the local economy in the Project 1 Subcenters and its influence areas.

142. **Population.** By the end of 2010, Mongolia had a resident population of 2.65 million, of which about 68%) lived in urban areas. Nearly 42% of the country's total resident population (or 1.16 million) were in Ulaanbaatar City, representing some 65% of the total urban population. By the end of 2011, national resident population grew to 2.7 million (or some 50,000 people more than the previous year's). Of this, urban population accounted for about 66%. Ulaanbaatar had

[25] Socioeconomic Survey and Willingness to Pay for Services. Final Report. UUSGDIP PPTA. 2013.

44% of the country's resident population (or 1.2 million people) and 67% of the total urban population.

143. In Ulaanbaatar, majority of its resident population live in the *ger* areas. According to the JICA Study on Improving the Living Conditions of *Ger* Areas in Ulaanbaatar, *ger* population in the 6 central districts of Bayangol, Bayanzurkh, Chingeltei, Khan-Uul, Songino Khairkhan and Sukhbaatar reached 645,100 in 2010 (or about 56% of Ulaanbaatar population). About 35% of this total *ger* population are in Songino Khairkhan, Sukhbaatar and Chingeltei Districts, in which the two Project 1 subcenters are located.

Table 20: Population in Ger Areas, 2010

District	Project 1 Subcenter	Population		Households	
		Total	% to Total	Total	% to Total
1 Bayangol	-	75,230	11.7	18,738	12.0
2 Bayanzurkh	-	167,404	25.9	42,636	27.4
3 Chingeltei	Selbe	44,866	6.90	11,620	7.5
4 Khan-Uul	-	178,433	27.6	40,192	25.8
5 Songino Khairkhan	Bayankhoshuu	112,734	17.5	24,600	15.8
6 Sukhbaatar	Selbe	66,442	10.3	17,947	11.5
Total		645,109	100.0	155,733	100.0

Source: Study on Improving Living Conditions of Ger Areas in Ulaanbaatar. JICA and Municipality of Ulaanbaatar. 2010.

144. **Population and density in Project Subcenters.** The total population within the two subcenters in 2011 has been estimated under the Project Preparation Technical Assistance (PPTA) to be about 15,274, of which about 49% (7,502 persons) are within the Bayankhoshuu Subcenter, and 51% (7,772 persons), within the Selbe Subcenter. With a land area of about 160 ha, Bayankhoshuu Subcenter has a gross population density of 47 ppha; Selbe SC with 142 ha of land area, 55 pph.

145. **Ethnic minorities.** The national census conducted in Mongolia in 2000 identified the Khalkha Mongols as the largest ethnic group constituting 81.5% of the total population of the country. There are 29 ethnic groups identified as citizens in Mongolia; with the majority belonging to the eight groups shown in Table 21. Based on the Socio-Economic Survey and Willingness to Pay for Services (SES-WTPS) conducted by the PPTA, no person belonging to the ethnic minority group resides within the Project 1 Subcenters.

Table 21: Ethnic Groups Population, 2000*

Ethnic Group	% National Population 2000	% Ulaanbaatar Population 2000
Khalkha	81.5	90.9
Dorvod	2.8	1.8
Buriad	1.7	1.5
Bayad	2.1	1.4
Kazakh	4.3	0.8
Zakhchin	1.3	0.6
Uriankhai	1.1	0.5
Dariganga	1.3	0.4
Others	3.5	1.5

* 2000 Population and Housing Census: The Main Results. National Statistical Office. Mongolia. July 2001.

146. **Income and employment**. In Ulaanbaatar, the average monthly income of a household is MNT 952,039 city[26]; or an average monthly income per person of MNT 244,112. According to the SES-WTPSS, a household in Project 1 subcenters earns on the average MNT 1,053,953 a month or MNT 250,941 per person per month. This average income is about MNT 170,000 higher than a household's average monthly expenses of MNT 885,746. It is also just about equivalent to the City's average monthly income per household and per person. 53% of the households in the two Project 1 Subcenters depend on wage and salary, 19% on pension, and 15% on household business, for income. The remaining 13% are supported by allowances or remittances from children, parents and/or other relatives.

147. In 2011, the country registered an unemployment rate of 7.7%; Ulaanbaatar had 5.7%.[27] According to SWS-WTPS results, 42.5% of household heads in the T1 Subcenters are employed; 24.6% are retirees; 18.5% are self-employed; while 14.4% are not employed due to being students, old aged or other reasons.

Housing and Access to Basic Services in *Ger* Areas

148. **Access to housing.** Of the total *ger* households in Ulaanbaatar, nearly 56% live in houses with floor areas ranging from 21-40 m^2; while 44% live in traditional *gers*. In the City's subcenters, 25% of the households live in traditional *gers*. According to the SES-WTPS, 23% of the households in Bayankhoshuu and 27% in Selbe live in traditional *gers*. The profile of

[26] Statistical data from Statistical Office of Capital City, 4th Quarter, 2012.

[27] Mongolian Statistical Yearbook 2011. National Statistical Office of Mongolia.

khashaa (plot) ownership indicate that 84% of the households are khashaa owners, 13 percent are residents without paying rent, and 3.5 percent are renting. The survey results further show that approximately 1.7 households live in one khashaa.

149. **Access to health services.** Each khoroo has a family clinic that renders primary health care services for free. There are 123 family clinics in Ulaanbaatar. By national standard, one doctor must serve 1,500-2,000 people in *ger* districts. However, in family clinics in suburban *ger* districts, one doctor is presently serving 2,300-2,500 people. This situation applies also to khoroos in the Project 1 subcenters. Some 82% of the residents in Bayankhoshuu and in Selbe Subcenters go to the nearest family clinic for primary health care; a few (1%) go to private hospitals for health services. The next level of health care is provided by district hospitals. There are three hospitals in Songino Khairkhan District and 1 hospital in Chingeltei District.

150. **Access to education.** There is at least one public school in each khoroo in Ulaanbaatar. Public schools Nos. 67 and 76 and public school No. 35 operate in Bayankhoshuu and in Selbe Subcenters, respectively, providing a 12-year high school education. About 44% of the students walk to school; 52% take the public transportation to get to school; while a mere 4% is brought to school by cars. According to the SES-WTPS, among the school-aged children in the Bayankhoshuu and in Selbe Subcenters, 26.7% are currently attending school; 71.8% have not graduated; 0.7% has not dropped out; and 0.7% has not studied. Those who are not attending school are working, taking care of other family members or have other reasons. Some 34% of the survey respondents have assessed the facilities of the nearest schools and kindergartens as good; 26% as fair; 12% as bad. The remaining 28% has not given an assessment. With respect to quality, 37% finds the schools reliable; 33%, overcrowded; and 26% provided no assessment. A few assessed the schools to be far and in poor physical condition and the tuition fees high.

151. **Transport facilities.** The main road network in Ulaanbaatar is mostly paved; while small roads, especially in the *ger* areas, are mostly unpaved. The main access roads to subcenters have no sidewalks and drainage provisions. The poor condition of unplanned and unstructured earthen roads in *ger* areas is one of the most serious concerns expressed by *ger* residents. Many parts of these roads are impassable for vehicles, have drainage problems, pose traffic safety hazards, and are the source of a substantial amount of dust. Also, the lack of street lights contributes to higher crime rates after dark.

152. **Water supply.** *Ger* areas mainly depend on water kiosks for their domestic water needs. The residents and businesses within the Bayankhoshuu and Selbe Subcenters essentially rely on water distribution kiosks for their water supply. The kiosks in Bayankhoshuu are fed from two 500 m^3 reservoirs, i.e., one lower and one upper, located south and northeast of the Subcenter, respectively. In Selbe, kiosks are supplied with water from a looped distribution main fed from

the Khailast pump station. Kiosks are sited in such a way that each unit can serve about 1,000 residents living at distances between 100 and 500 m from the kiosk. Water is normally fetched by foot using special carts or by car. Water service from kiosks is provided from 10 AM to 8 PM with a break between 1 and 2 PM. Table 22 gives the estimated density of accessible water kiosks from the perimeters of the Bayankhoshuu and Selbe Subcenters, indicating the levels of service and access by all residents within the Subcenters to be within the current norm.

Table 22: Level of Water Service per Kiosk in the Subcenters, 2011

Subcenter	Inhabitants	Accessible Kiosks	Inhabitants per Kiosk
Bayankhoshuu	7502	9	834
Selbe	7772	7	1,110

Source: SES-WTPS, 2013

153. Based on the results of the SES-WTPS: (i) about 86% of the respondent households in the two subcenters obtain water for their domestic and sanitary needs from water kiosks; (iii) 89% rate the quality of the water good to very good; (iii) 74% boil their water to make it safer for drinking; (iv) 91% think that water supply service should be improved through individual connections. Among the business units 94% are variably dependent on water supply. Of these, 66% obtain water from USUG operated kiosks, 11% from other kiosks and 14% from truck delivery. Another 5% of business units obtain water from own or neighbors' wells. About 73% of the businesses are 200 m from the nearest public water kiosks.

154. **Access to sanitation.** The majority of households and business units in *ger* areas are not connected to the sewerage system (see below). Pit latrine of the simplest design is the form of sanitation facility in the *ger* areas. Greywater is discharged into latrines or soaking pits. Commercial water users are generally connected to septic tanks. Odor, filled latrines and the low state of sanitation are the most serious concerns raised by the households in Bayankhoshuu and Selbe Subcenters.

155. **Solid waste.** Solid waste collection and transport in Ulaanbaatar is carried out by the districts. Solid wastes from the subcenters are collected once a month. According to the SES-WTPS, about 99.5% of the households in the subcenters give their solid wastes to collection trucks. However, openly dumped solid wastes are still observed around the subcenters. About 45-46% of the households in the Bayankhoshuu and Selbe Subcenters are highly satisfied with the current solid waste management; 42% in Bayankhoshuu and 30% in Selbe are moderately satisfied; while 13% in Bayankhoshuu and 24% in Selbe are not satisfied.

156. **Access to heating.** There are three major heating modes in Ulaanbaatar namely, district heating, heat-only boilers (HOBs), and domestic stoves. The district heating system serves most of the urban area and industries with a total heating load of 1,555 Gcal/hr. The three combined heat and power plants of CHP2, CHP3, and CHP4 provide the heat. A Thermal Power Plant 5 (TPP5) is currently being developed. Phase I is to be completed by 2015 and Phase II, by 2020. *Gers* are all heated by small, stoves fed mainly with lignite coal and also wood.[28] According to the SES-WTPS, 55% of households Bayankhoshuu and Selbe Subcenters are still using the traditional coal stoves for heating their dwellings. The remaining households use smokeless stoves and improved stoves (but still using coal as fuel) and electric stoves. Of the respondent business units, 98% have heating, of which 59% have HOBs as the main resource for heating; 15% use traditional fire wood/coal stoves; 14% use improved stoves; and 11% use electric heaters.

157. **Access to electricity.** Nearly 99% of the households in Ulaanbaatar are connected to the City power supply grid. The remaining few are connected to renewable energy facilities and small electric generators. In Bayankhoshuu and Selbe Subcenters, all households have access to power supply. Some 99% of the households are connected to the City power supply grid; while the rest source electricity from a neighbor's power line within a khashaa.

158. **UB's sewerage and wastewater treatment system.** Ulaanbaatar's sewerage system includes 147.7 km of sewerage pipelines, and a Central WWTP with treatment capacity of 180,000 m^3/day. An audit of the system was conducted by Vitens Evides International (VEI), Royal HaskoningDHV and individual consultants in the framework of the study "Water and Wastewater Operation Improvement Project" under the ADB administered RETA 7918: Support to Urban Infrastructure Development and Financing. The final study report is available from the project website http://www.adb.org/projects/45007-001/main).

[28] Air Pollution in Ulaanbaatar. Initial Assessment of Current Situation and Effects of Abatement Measures. December 2009. The World Bank.

Analysis of Alternatives

With- and Without-Project Alternatives

159. The subcenters are facing significant development challenges, characterized by the following attributes: (i) Majority of residents and businesses in the subcenters rely on kiosks for water. In wintertime time, fetching water would be most inconvenient and hazardous; (ii) Majority of the residents and businesses have individual pit latrines as sanitation facilities causing soil contamination, health hazards and odor especially during summer; (iii) Residents use cooking stoves for heating fuelled by coal and sometime dry waste, contributing to greenhouse gas emissions and health hazard; (iv) Main access road to the core of the subcenters is in fair to poor condition, without sidewalks; (v) Inner roads are unpaved, and without lighting; (vi) Residents have to go to the city center for relaxation and recreation or purchase of some basic commodities; (vii) The cores of the subcenters are congested due to bus station operations in a limited open area along the main road, in front of the commercial hub, and which is also used as parking area for private vehicles.

160. The **"without-project" or 'do-nothing' alternative** would be allowing the subcenters to grow further as "under-serviced" and its living environment, worsened. This would impede: (i) further social and economic development of Ulaanbaatar and in effect, of the entire country as Ulaanbaatar contributes more than 60% to the national economy; and (ii) Mongolia's delivery of its commitment to MDG7, ensuring environmental sustainability.

161. The "**with project" alternative** will provide the nearly 15,300 residents in Bayankhoshuu and Selbe subcenters convenient access to: (i) centralized safe/potable water supply, wastewater management services, heating; (ii) houses and properties; (iii) basic social services, e.g., kindergarten, schools, hospitals, family clinics, police station, khoroo government office gathered in the core of the subcenters; (iv) economic infrastructures for basic commodities, public transport services and income and employment opportunities. As a result, there will be reduced dust suspension, reduced soil contamination, reduced greenhouse gas emissions, improved and safe mobility, improved social and economic opportunities, among others. Overall, the 'with project' alternative will improve the living environment within the subcenters and the local economy of middle ger areas. There will also be indirect benefits to the communities within the sphere of influence of the subcenters (such as, closer proximity to more basic commodities and economic services and opportunities, more convenient public transport facilities). During construction, there will be opportunities for local employment and increased earnings of local enterprises. The opportunity for short-term employment will be citywide in scope, not necessarily limited to the labor force available in the Project 1 subcenters or nearby ger areas.

162. Overall, the City will benefit from the 'with project' alternative. It will contribute to the realization of the Ulaanbaatar City Master Plan 2030, wherein the development of the two subcenters of Bayankhoshuu and Selbe for the middle ger areas is recommended. It will hasten further social and economic development in Ulaanbaatar and contribute to the development of the country. It will contribute to the delivery of Mongolia's commitment to: (i) MDG7, i.e. "reduced proportion of people without sustainable access to safe drinking water and basic sanitation"; and additionally (ii) MDG1, i.e., "reduced proportion of urban population living in slums", considering that *ger* area are "under-serviced" areas.

Alternatives Related to Project Design

(1) Water Supply

163. The proposed distribution systems will be fed from the existing primary distribution networks, constructed under the World Bank supported *USIP 2* Project, which supply the center of Ulaanbaatar.

164. **Alternative sources of water** were considered for both subcenters. These include (i) Bayankhoshuu subcenters to be fed from either or both of the Upper (1,500 m3) and Lower (500 m3) Bayankhoshuu Reservoirs; and (ii) Selbe subcenters, from the Chingeltei Reservoir (500 m3) and from the Dari Ekh Pump Station. All mentioned reservoirs and pumping station are fed from the Gachuurt Upper Wellfied (8.03 million m3/yr).

165. **In** Bayankhoshuu, since a large housing complex of the National Border Police locate in the SW of the Bayankhoshuu subcenters is presently supplied from the Lower reservoir and the regulating capacity of this reservoir might be insufficient to sustain further demand, the supply of the Bayankhoshuu subcenters water distribution will, therefore, be commanded with priority from the Upper Reservoir.

166. In Selbe, the SW sector W of Chingeltei Street will source water from the Chingeltei Reservoir. The northernmost part and the E sectors extending E of Chingeltei Street will source from the Dari Ekh Pump Station.

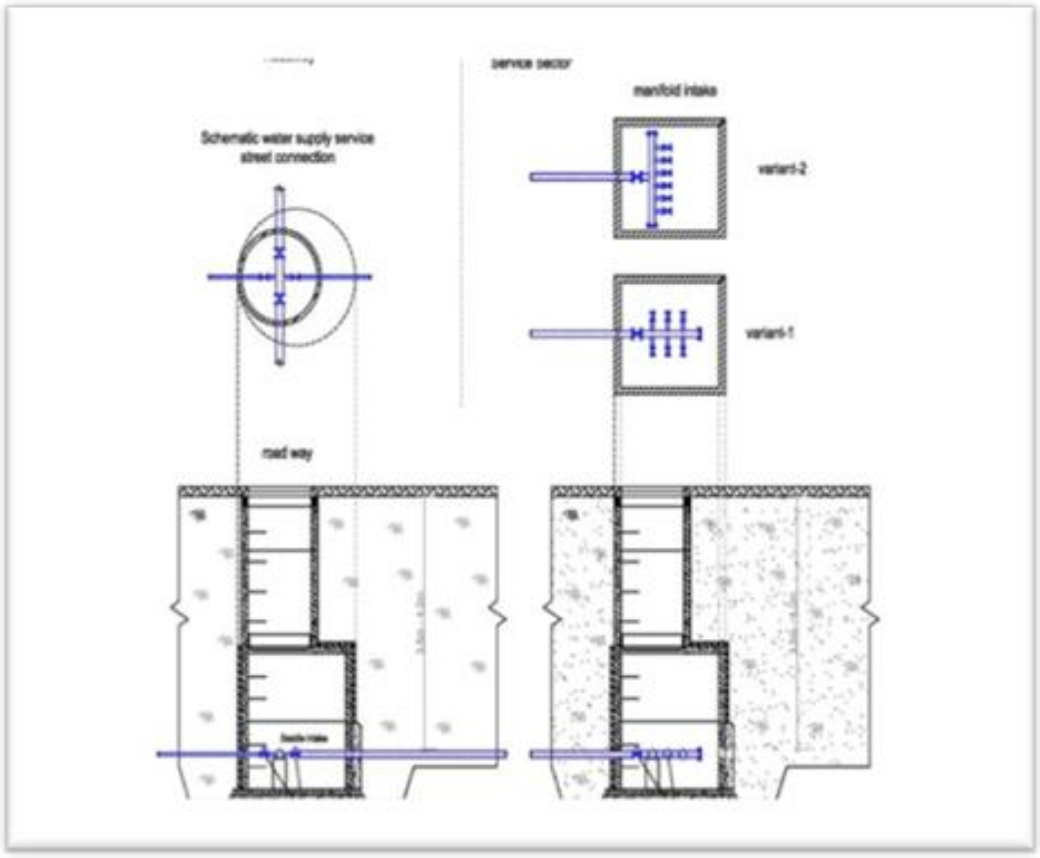
167. **Off-take alternatives** considered include (i) Off-takes to be located at the existing kiosks, which is ideal. This alternative will allow installing service area bulk flow meters and pressure gauges without risks of freezing during winter time. Flow meters should be installed also at the inlets of service zones, as much as possible; (ii) Off-takes could be directly from any convenient point of the existing distribution mains. This will require the construction of insulated manholes 1.5 m in diameter. With this off-take configuration, the installation of a flow meter is not contemplated.

168. For emergency purposes each service area will be connected to the distribution system via a second off-take. All service zones will be served by means of looped pipework, allowing service feeding from at least two points.

169. Profiles of trenches should be according to Norms BNbD3.05.04-90; BNbD3.02.01-90; BNbD3.01.01-89; BNbD3.01.03-88; BNbD3.01.05-90 and other. The invert for individual water and sewer pipes is set at -3.5 m from soil level. Local variations can be admitted as a function of local soil topography changes. Steeper slopes up to vertical shall be accepted if special construction procedures shall be applied, including wall sustainment with jacks.

170. Water and sewerage connections spaced between 100 to 50 m apart will be provided as a part of the water distribution and sewerage collection pipe works. Manholes on water intakes in distribution pipes and sewer manholes will be installed simultaneously with the construction of the pipe works. Typically, the water and sewer pipes will extend for a limited distance outside both sides of the roadway and housed inside manholes located just outside the roadway borders. Sector control valves and flow meters will be installed inside the water intake manholes. The external water sector connection manholes will be equipped with valve and manifold. Up to six consumers or groups of consumers will be able to connect via the manifold. Water supply and sewerage connections for private consumers will be at the charge of private consumers or by real estate developers. To provide support to private households that wish to connect to the water and sewerage network, a supporting parallel microfinance program is proposed. It will be supported under an ADB-proposed private sector loan to a major banking group that includes a large commercial bank with extensive experience of microfinance. $6.0–10.0 million could be made available for *ger* areas. The proposed loan is likely to become effective in 2013. The commercial bank would be the implementing agency, assisted where necessary by the SRA.

Figure 22: Schematic Cross Section of a Sector Water Connection



(2) Wastewater Management

171. Two alternatives for wastewater management were put forward: The first alternative was to connect to the City's existing central wastewater treatment plant. The second alternative was to have decentralized wastewater treatment units in the subcenters.

172. Experience has shown that a single, well operated wastewater treatment plant (WWTP) can easily treat the wastewater of a City of the size of Ulaanbaatar in 2030. Main difficulties in the process of treatment of wastewater arise with the onset of the severe winter conditions prevailing in Ulaanbaatar. Problems like risk of freezing can be more easily handled in large-sized WWTPs.

173. In comparison with a large WWTP unit, small sized ones require: (i) larger capital investments per cubic meter of treatment capacity; (ii) comparatively large number of operators; (iii) relatively higher energy consumption and costs per unit volume of treated water; (iv) very sensitive to sudden events such as flash floods, drastic temperature changes as well as sudden

increase of pollutant load (BOD, COD, nitrate, compounds, etc.); (v) during winter time, while the influent is still relatively warm, the rather small effluent flow tends to freeze during the severe winter months.

174. This latter issue concerning small WWTPs is particularly valid for the *Ger* areas, where due to the lack of open land, any site selected for the construction of a decentralized WWTP would be unavoidably in the immediate vicinity of densely populated dwellings. Therefore, the main option is to have the wastewater collected from the project subcenters conveyed to and treated at the CWWTP.

(3) Heating

175. **Heating service system.** Options include (i) connecting to the City's central heating system; (ii) developing local district heating systems; (iii) improved (efficient & environment-friendly) individual heating systems. Capacity limitations of the present central heating infrastructure and the inefficiency of constructing long pipelines to the remote subcenters make connections to the central heating system impractical at this time.

176. Between improved individual and local district heating systems, the selection of the latter over the former involved the consideration of the following:

1. Given that the predominant fuel will be coal for some time, improving the technology of coal combustion to reduce emissions is expensive, and more easily achievable with larger boiler plants than with individual building heating systems, although the difference must be large enough to support the cost of installing and maintaining the distribution network.
2. Local district heating systems will be more energy efficient. The present assumption is that most of the buildings that will be connected to the systems will be new buildings that are constructed to the recently adopted code "Thermal Performance of Buildings", which defines new performance standards for building heat loss. The buildings (public amenities) that will be constructed under Project 1 will be subject to specifications to comply with the requirements to meet thermal performance. The housing projects, which will be implemented under public-private partnerships and which are outside the scope of Project 1, are expected to be subject to the same requirements in the bidding specifications.
3. The strategy of the Ulaanbaatar Urban Services and *Ger* Areas Development Investment Program to increase building density in the subcenters increases the economy of shared heating systems compared to individual systems by reducing the length of the heat distribution system (and other infrastructure) per user.
4. District heating is accepted technology in Mongolia. There are opportunities to introduce technology to Mongolia that will improve the sustainability and

operational efficiency so that it can be more economical to construct and operate than present technology.

177. **Fuel selection**. Options include (i) coal; (ii) wood; (iii) petroleum-based fuel; and (iv) electricity. Coal is the predominant heating fuel in Mongolia because it is abundant and less expensive than any alternative. Wood, which is used along with coal in stoves and small boilers, is undesirable due to long-term overharvesting of scarce timber resources. Petroleum-based fuels are available but expensive, so the only existing market and distribution infrastructure is for bottled LPG (liquefied petroleum gas) that is imported from China and used primarily for cooking.

There have been many proposals for alternative heating fuels that would be cleaner than coal, but none are developed to the point where their availability can be predicted. There are a number of promising technologies involving as gas or liquids produced from coal, and there are possibilities for natural gas to be imported from Russia or shale gas to be produced within Mongolia. All of these will require significant time and investments in production capacity and distribution infrastructure to be viable. There have been innumerable proposals in the past to provide alternatives to raw coal for use in small stoves and boilers, most involving processed and compressed coal, which have all failed to achieve significant market penetration.

178. Electricity is a common energy source for residential heating for those households located outside the coverage area of central district heating system who can afford the operating cost. Development in Ulaanbaatar has increased demands on the existing electrical generation and distribution infrastructure so that widespread implementation of electric heating is not a viable alternative, even if it could be made cost competitive with coal. In the *ger* areas, the capacity of the electrical distribution infrastructure will not support electric heating loads.

179. The investigation of fuels presently available and potentially available in the future, their relative cost and capacity of supply infrastructure resulted in coal being the only feasible heating fuel.

180. **Heating plant.** Designs for heating plants with known, recent costs were used as a basis for budgets estimating with consideration and appropriate adjustments for added equipment needed to meet anticipated air quality emissions standards and features that will improve the suitability of the plants to be situated in or new densely settled areas. Existing designs for 5.2 MW (3 boilers of 1.4 MW each) and 8.4 MW (3 boilers of 2.8 MW each) plants and budget costs were examined and the 8.4 MW plant selected as the module to be applied in the initial development stage.

181. A design for a larger 42 MW (3 boilers of 14 MW) that is planned to be constructed near Ulaanbaatar under an international project was used as a model for the larger plants to be installed subsequent to the initial development stage, that are presently sized at 30 MW (3 boilers of 10.5 MW) for Bayankhoshuu and 20 MW (3 boilers of 7.5 MW) for Selbe. The 42 MW plant has all the features needed to comply with anticipated emissions and other features that should be implemented. The features, site plan and budget have been scaled for the plant sizes planned for the subcenter, and differences in procurement and construction methodology.
Site requirements and acquisition costs were also derived from the respective example projects with adjustments for the assumed differences in features and implementation conditions.

(4) Roads

182. The road planning process started with the design of a regular and structured road network in order to shape the basis of a consistent and viable urban fabric. The hierarchy of roads consisted of 22, 15, 11, 8 and/or 5 m roads, covering 162 ha in Bayankhoshuu Subcenter and 152 ha in Selbe Subcenter.

183. In Bayankhoshuu, the proposed road network had 22m primary roads, 11m secondary roads, 8m tertiary road, and less than 5 m pedestrian ways.

184. The proposed road network in Selbe had 28m primary road (the width of which is defined by the BRT project, other primary roads at 15 m, 11m secondary roads, 8m and 5m tertiary roads and less than 5 m pedestrian ways.

185. Aside from the huge costs, the specified cross sections would involve high ROW acquisition and displacement/involuntary resettlement.

186. Due to the need to cut-back the scale of the budget, (i) priority roads had to be identified; (ii) quantities decreased; and (ii) some specifications moderated. The re-shaped networks cover 91 ha in Bayankhoshuu and 114 ha in Selbe, representing 56 and 75% of the perimeter covered by the original road networks, respectively. The reduction of the cross sections of the roads to 6.5 m and 5.5 m highly minimized land acquisition and involuntary resettlement.

ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

Positive Impact and Environmental Benefits

187. **Components 1-3** of Project 1 of the investment program will support the implementation of the city master plan by developing two priority subcenters located in the mid-ger areas in the north of Ulaanbaatar city, the Bayankhoshuu and Selbe subcenters. The two areas will become the main centers in the northern mid-*ger* area. Project 1 will initiate a redevelopment process of the targeted areas and improve living standards, environment, and efficiency for economic growth. Components 1-3 will bring benefits of convenient access to houses and properties, safe/potable water supply, wastewater management services, heating, and social and economic infrastructures to nearly 15,300 people in the Bayankhoshuu and Selbe Subcenters. (Economic and social infrastructure considers the community and business development needs identified through the 'Community Action Planning' process facilitated by UN-HABITAT, and the results of the socioeconomic and willingness to pay survey conducted under the TA.) This will in turn result to positive impacts, such as reduced health risks and incidence of diseases, reduced dust suspension, reduced soil contamination, reduced greenhouse gas emissions, among others.
188.
189.

190. presents the environmental benefits, positive impacts and outcome of the proposed components 1-3 of Project 1.

Table 23: Environmental Benefits, Positive Impacts and Expected Outcome of Components 1-3

Benefit, Positive Impact, Outcome	Subsectors					
	WSS	Heating	Road	Drainage	Social Infra	Econ. Infra
Benefits						
Direct access to safe potable water supply	√					
Direct access to wastewater collection	√					
Direct connection to district heating		√				
Safe & convenient access			√			
Relief from flooding/water logging			√	√		
Additional kindergarten places/playground					√	
Convenient access to public amenities					√	√
Convenient access to basic commodities						√

Benefit, Positive Impact, Outcome	Subsectors					
	WSS	Heating	Road	Drainage	Social Infra	Econ. Infra
Positive Impact						
Improved hygiene & sanitation	√					
Reduced water-borne diseases	√		-	√		
Reduced incidence of respiratory diseases		√	√	-		
Reduced (other) health risks	√	√	√	√	√	
Reduced odor	√	√				
Reduced soil contaminstion	√					
Reduced GHG emissions		√	√			
Reduced dust suspension			√			
Reduced life risks from exposure to cold		√				
Increased comfort/ convenience	√	√	√	√	√	√
Improved mobility			√		√	√
Reduced road accidents & crimes			√			
Reduced occurrence of flooding				√		
Improved working environment	√					
Improved business operations	√		√	√		
Outcome						
Improved living environment	√	√	√	√	√	√
Improved health conditions	√	√	√			
Increased productivity	√	√	√	√	√	√
Improved air quality	√	√	√	-	-	-
Safe community	√	√	√	√	-	-

191. **Component 4 (Multi-interventions in USUG)** of Project 1 will have significant environmental benefits, especially in the fields of energy efficiency, non-revenue water and water conservation, and surface water pollution prevention and abatement. Improvements in those fields will allow the MUB and USUG to conserve resources and reduce operational costs while increasing the capacities for meeting Ulaanbaatar's future demand for improved water and wastewater services. The main benefits are summarized below.

192. **Energy savings.** UB depends entirely on groundwater that is mainly pumped from the four well fields Central, Upper, Industrial and Meat. Energy consumption per cubic meter of

water varies from one location to another, but is especially high at Upper Reservoir as water has to be pumped over a hill top. A reduction in supply area of the Upper reservoir will be implemented, made up by an increased supply from “Central” pumping station where large energy saving can be realized. At the “Meat” and “Industrial” pumping stations, additional energy savings will be realized by reducing pumping pressures. Total energy saving at the 4 stations will exceed 30% (37.2MWh), a saving of $370,000 per year.

Table 24: Energy Savings with Pressure and Supply Zone Adjustments At Four Main Pumping Stations

Station	Current			After Project			Saving
	kWh/day	₹ mio/yr	USD/yr	kWh/day	₹ mio/yr	USD/yr	%
Central Upper	43,762	1,406	1,018,578	28,863	927.1	671,791	34.0%
Industrial	4,594	147.6	106,937	4,118	132.3	95,844	10.4%
Meat PS	2,270	72.9	52,832	1,607	51.6	37,398	29.2%
Total	50,626	1,626.1	1,178,348	34,587	1,110.9	805,033	31.7%
Energy saving				**16,039**	**515.2**	**373,315**	**31.7%**

193. Energy savings from improvements made at the CWWTP will be minimal. Improvements concentrate on the aeration process of the CWWTP, where new and additional air diffusers will optimize the aeration process. However, the amount of air required and, thus, the energy required to produce this air will, in principle, not decrease as it should be based on the incoming BOD-load. At the moment, the required amount of air is indeed blown into the tanks, but oxygen transfer to the activated sludge flocks is not optimal. After installation of the new diffusers, the same amount of air will be blown into the tanks, with a better transfer of oxygen to the flocks. Thus, it will improve the process, but not reduce energy consumption. However, minimal improvements may be reached: Fine-tuning air blow capacity will be possible after the installation of the automatic DO-meters. Through the SCADA, they will (partly) close air pipes after reaching the required DO-levels, which in turn will trigger the reduction of aeration, and as a result, energy consumption.

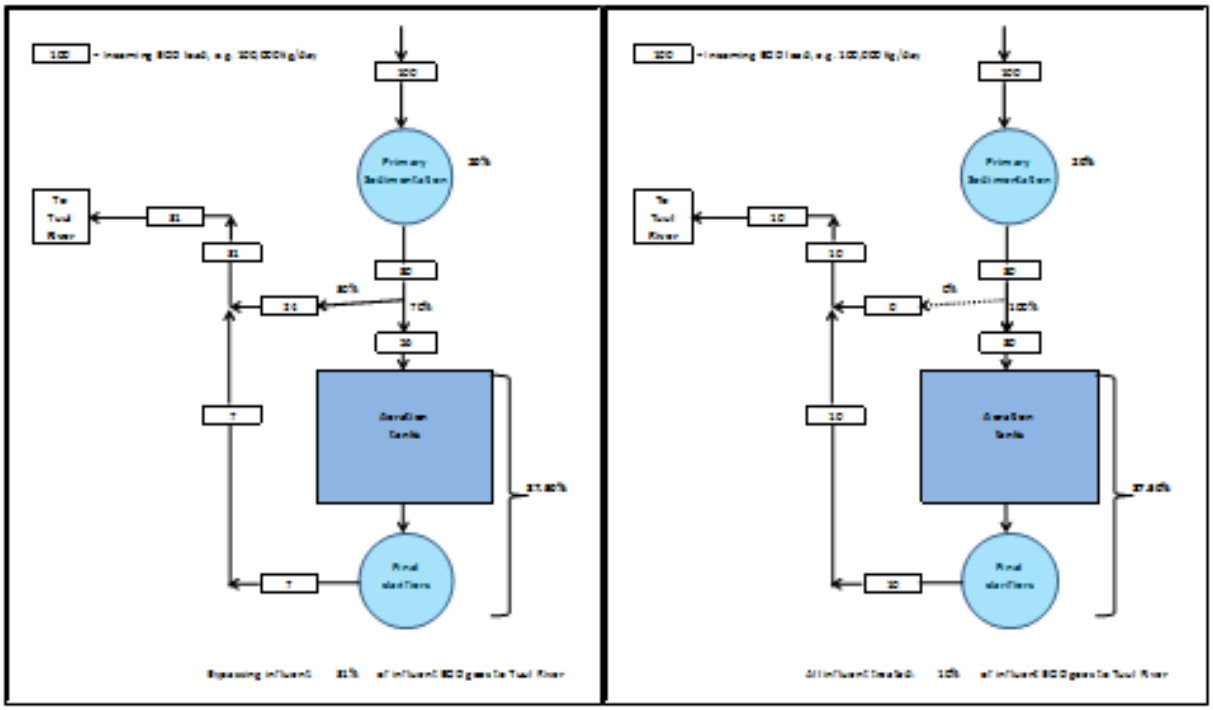
194. **Air emission reduction**. Reduced energy consumption of the water supply system (see above) will indirectly reduce CO_2, NO_x, SO_x and PM_{10} emissions produced by the coal power plants. By expert judgment, based on a state-of-the-art emission control systems, emissions per generated kilowatt-hour (kWh) can be estimated. The impact is low in relation to the total power plant emissions (capacity TPP 4: 1090 MW), but still remarkable.

Table 25: Air Emissions Reductions through Improved Drinking Water Operations

Item	Unit	CO2	NOx	SOx	PM10
Emissions	gram/kWh	672.5	0.359	0.358	0.012
Reduction	Ton/year	1,750	0.93	0,93	0.03

195. **Surface water pollution prevention and abatement.** Due to poor operation and limited capacities, some of the incoming wastewater flow at the CWWTP is presently discharged to the Tuul River without treatment. Component 4 will contribute to reduced pollution loads to the Tuul River by improving the aeration process in the CWWTP, by replacing old, and installing addition, air diffusers in the aeration tanks, as well as equipping each tank with a selector. As a result, the aeration process will be greatly enhanced, the quality of activated sludge flocks will improve, which in turn will increase the capacity of the final clarifiers. Bypassing the biological section will be much reduced and can, hopefully, be avoided altogether. As a result, the BOD load of the effluent discharged into the Tuul River will is expected to be reduced by 65%. Currently, 31% of influent BOD is discharged to the Tuul River. This figure will be reduced to 10% after the project, representing a very significant BOD pollution reduction of 3,500 tons per year.

Figure 23: Current and Proposed Situation after Project Implementation



Screening of Potential Impacts

196. The potential impacts of Project 1 components and subprojects – direct, indirect and induced, and cumulative –on natural and artificial resources were screened to identify the relative significance of potential impacts and to set context for formulation of the Environmental Management Plan. The results of the screening are presented in Table 26 to Table VII-6.

Table 26: Screening of Impacts Relative to Siting and Design

Direct Impacts						
	Impact					
Environment / Resource	Y	N	**Receptor Sensitivity**	**Magnitude of Impact**	**PIS**	**RIS**
Physical						
Air	√		(Air quality in area low. Noise comes from traffic & socio-eco activities in the day.) M	(Exposed to salient impact during construction, but temporary) H	H	L
Water	√		(Selbe River in UB high in BOD, COD, NH4, NO2, P. Informal settlers encroached on it) M	(Exposed to salient impact during construction, but temporary) H	M	L
			Bayankhoshuu, Chingeltei Creek high sediment loads, some SW dumped into it.) M	(Inadequate consideration during design of significance of sustaining hydrology of creeks) M	M	L
			(3-4 wells present in Bayankhoshuu) M	(Exposed to impact during construction but temporary) M	M	L
Ground/Soil	√		(Soil quality poor) L	(Exposed to potential accidental spill of hazardous materials during construction) M	L	L
Landscape	√		(Low quality landscape) L	(Exposed to temporary disturbance during construction) M	L	L
Climate	√		(Threats and impacts of extreme weather events) M	(Inadequate consideration during design) M	M	L
Seismicity	√		Earthquakes of about magnitude 8.0 are possible around UB) M	(Inadequate consideration) M	M	L

Direct Impacts						
Environment / Resource	**Impact** Y	N	**Receptor Sensitivity**	**Magnitude of Impact**	**PIS**	**RIS**
Aggregate material resource	√		(Potential unsustainable supply of aggregate materials to meet construction demand) M	(Inadequate consideration during design) M	M	L
Biological						
Flora		√				
Fauna		√				
Socio-economic						
Community	√		(Haphazard arrangement of properties & housing) H	Inadequate consideration in design, such that displacement, involuntary resettlement is not minimized, H	H	M
Kindergartens, schools, hospitals, dormitories	√		(Sensitive institutions) H	(During construction, temporary) H	H	M
Economic activities	√		(Center of economic activities. Public transport hub.) H	(During construction, temporary) H	H	M
Infrastructure & services	√		(Existing water mains, power supply poles /telephone cables in road ROW. People rely on kiosks for water and public bathhouses for sanitation.) H	(During construction, temporary) H	H	L
Physical Cultural						
PCRs – objects & sites	√		(2 temples and 2 oratories in Bayankhoshuu) M	(During construction, temporary) M	M	L
Indirect, Induced & Cumulative Impacts						
Environment / Resource	**Impact** Y	N	**Receptor Sensitivity**	**Magnitude of Impact**	**PIS**	**RIS**
No anticipated impacts						

Note: Y=Yes; N=No; L=Low; M=Medium; H=High; PIS=potential impact significance; RIS=residual impact significance (impact remaining after mitigation)

Table 27: Screening of Impacts during Construction

Direct Impacts						
	Impact					
Environment / Resource	Y	N	**Receptor Sensitivity**	**Magnitude of Impact**	**PIS**	**RIS**
Physical						
Air	√		(Air quality in area low. Noise comes from traffic & socio-eco activities in the day.) M	(Temporary) H	H	L
Water	√		(Selbe River in UB high in BOD, COD, NH4, NO2, P. Informal settlers encroached on it) M	(Spill of wastes & sediment, hazardous materials during construction, temporary) M	M	L
			Bayankhoshuu, Chingeltei Creek high sediment loads, some SW dumped into it.) M	(Spill of wastes & sediment, hazardous materials during construction, temporary) M	M	L
			(3-4 wells present in Bayankhoshuu) M	(Generation of wastes & sediment, use of hazardous materials during construction temporary) M	M	L
			(Residents rely on water kiosks. (Est. densities of accessible kiosks from perimeters of subcenters are just within the current norm.) M	(Potable water demand of construction workers if met using water from kiosk will render density higher & beyond norm) M	M	L
Ground/Soil	√		(Soil low quality) M	(Worst case is accidental spill of hazardous materials) L	L	L
	√		(Soil, terrain, geologic condition) M	(Temporary & intermittent) M	M	L
Landscape	√		(Low quality landscape) L	(Excavations, stockpiles, temporary) M	L	L

Direct Impacts						
Environment / Resource	Impact Y	Impact N	Receptor Sensitivity	Magnitude of Impact	PIS	RIS
Biological						
Flora		√				
Fauna		√				
Socio-economic						
Community	√		Underserviced community (access poor, access to services low, Dense community.) H	(Blocked roads & accesses, traffic, accidental damages to utility mains/poles, temporary) H	H	M
Workers (Construction)	√		(Constricted space, traffic congestion, odor in area from poor sanitation, existence of full waste pits and active pit latrines in the component sites) H	(Temporary) H	H	M
Economic activities	√		(Center of economic activities. Public transport hub. Will be disrupted/disturbed) H	(Blocked roads and accesses , temporary) H	H	M
Infrastructure & services	√		Existing water mains, power Supply poles /telephone cables in road ROW. People rely on kiosks for water and public bathhouses for sanitation. SW collection services only once a month.) H	(Accidental damage/s to utility lines. Blocked accesses to water kiosks and bathhouses, workers using water kiosks to meet potable water needs. SW generated collected by District that has inadequate trucks. temporary) H	H	M
Physical Cultural						
PCRs – objects & sites	√		(2 small temples and 2 small oratories in Bayankhoshuu) M	(Blocked accesses, noise & disturbances during rites, potential accidental damage/s Temporary) M	M	M
Indirect & Induced Impacts						
Environment / Resource	**Impact**		**Receptor Sensitivity**	**Magnitude of Impact**	**PIS**	**RIS**

Direct Impacts						
Environment / Resource	**Impact**		**Receptor Sensitivity**	**Magnitude of Impact**	**PIS**	**RIS**
	Y	N				
Physical						
Air		√				
Water		√				
Ground/Soil		√				
Landscape		√				
Biological						
Flora		√				
Fauna		√				
Socio-economic						
Commuting public, Public transport services	√		(Long travel time, especially during peak hours, traffic congestion) H	Traffic congestion will extend to affect longer length of main road, to affect other roads, & to increase travel time, temporary) H	H	M
Physical Cultural						
PCRs – objects & sites		√				
Cumulative impacts *						
Environment / Resource	**Impact**		**Receptor Sensitivity**	**Magnitude of Impact**	**PIS**	**RIS**
	Y	N				
Physical						
Air	√		(Air quality in area low. Noise comes from traffic & socio-eco activities in the day.) M	(Salient during peak construction period, temporary) H	H	M
Water	√		Bayankhoshuu, Chingeltei, Khailast Creeks high sediment loads, some SW dumped into it.) M	(Temporary) H	H	L
			(Densities of kiosks now at max. limit not be within norm) M	(If workers of all projects use kiosks as source for potable water, will bring density high, temporary) H	H	L
Biological						
Flora		√				

Direct Impacts						
Environment / Resource	Impact Y	Impact N	Receptor Sensitivity	Magnitude of Impact	PIS	RIS
Fauna		√				
Socio-economic						
Community	√		Underserviced community (access poor, access to services low, Dense community.) H	(More blocked roads/accesses, traffic, accidental damages to utility mains/poles, temporary) H	H	M
Workers (Construction)	√		(Constricted space, traffic congestion) H	(More workers, more works making space more constricted, temporary) H	H	M
Economic activities	√		(Center of economic activities. Public transport hub. Will be disrupted/disturbed) H	(More blocked roads/accesses , temporary) H	H	M
Infrastructure & services	√		Existing water mains, power Supply poles /telephone cables in road ROW. People rely on kiosks for water and public bathhouses for sanitation. SW collection services only once a month.) H	(Accidental damage/s to utility lines. Blocked accesses to water kiosks and bathhouses, workers using water kiosks to meet potable water needs. SW generated collected by District that has inadequate trucks. temporary) H	H	M
Physical Cultural						
PCRs – objects & sites		√				

Note: Y=Yes; N=No; L=Low; M=Medium; H=High; PIS= potential impact significance; RIS= residual impact significance (impact remaining after mitigation)

* Projects considered to possibly be implemented within T-1 construction timeframe include (i) ADB's BRT Project in Selbe; (ii) World Bank's drainage improvement under USIP 3 Project in Bayankhoshuu; and (iii) MUB's main road improvement projects in the Subcenters.

Table 28: Screening of Impacts during Operation

Direct Impacts						
Environment / Resource	**Impact** Y	N	**Receptor Sensitivity**	**Magnitude of Impact**	**PIS**	**RIS**
Physical						
Air	√		(Air quality low. Noise from traffic & socio-eco activities) M	(HOB will meet air & noise emission standard limits) L	L	
Water	√		Long-term positive impact anticipated			
Ground/Soil	√		Long-term positive impact anticipated			
Landscape	√		Long-term positive impact anticipated			
Biological						
Flora		√				
Fauna		√				
Socio-economic						
Community	√		(Traffic internal roads least) H	(Internal roads will be used by more vehicles) M	H	M
Completed works	√		(Institutional capacity to operate, maintain & repair, particularly USUG) H	Unsustained effectiveness of completed works (H)	H	L
Solid waste services	√		(Once a month collection, District has few trucks) H	(Volume hard for District to handle) H	H	L
Indirect, Induce, Cumulative Impacts						
Environment / Resource	**Impact** Y	N	**Receptor Sensitivity**	**Magnitude of Impact**	**PIS**	**RIS**
There will be no significant adverse indirect, induced and cumulative impact. Instead, there will be indirect benefits and positive impacts. Overall, the living environment will be improved.						

Note: Y=Yes; N=No; L=Low; M=Medium; H=High; PIS=potential impact significance; RIS= residual impact significance (impact remaining after mitigation)

Impacts and Mitigation Measures Associated with Project Location, Planning, and Design

197. Screening revealed the following salient concerns relative to siting: (i) displacement and involuntary resettlement due to land/ROW acquisition; (ii) existing poor air quality, moderately high noise level, low soil quality that should not be worsened during construction; (iii) roads and pipe works crossing the Bayankhoshuu and Chingeltei Creeks, close to the Khailast Creek, and adjacent to Selbe River; (iv) the sensitive institutions in the core of the Subcenters, e.g., kindergartens, schools, hospitals, dormitories and the 2 Buddhist temples and 2 Christian

oratories; (v) existing water mains, power supply poles and telephone cabled within the road ROW, and (vi) economic activities and public transport terminal services that will experience disruption and/or constraints during construction.

198. Relative to design, the concern is on inadequate consideration/incorporation/ assessment of, or coordination with: (i) the haphazard arrangements of settlements would result to significant displacement and involuntary resettlement; (ii) the Subcenter's vulnerability to the threats and impacts of seismic and extreme weather events, would render the completed works unable to sustain the effectiveness of their service throughout the period they were intended for; (iii)existing utility lines, would cause more incidents of accidental damage and disruption of services, and their planned alignment for extensions would hamper the sustainability of meeting demands; (iv) sustaining the existing width and hydrology of crossing creeks/adjacent Selbe River, resulting in designs that encroach into river/creeks, likely to exacerbate flooding problems and/or expose the built structures to damages during flooding or intensifying stream flows; and (iv) inadequate the demand for, & availability of fine and coarse aggregates could cause delay in construction progress, cause prolonged exposure of disturbed surfaces, & lead to indiscriminate extraction of said materials; (v) other projects in or close to the Subcenters and component sites.

199. In the **preparation of the feasibility studies**, resettlement plan and this IEE, the following mitigation measures have been undertaken to minimize the project's environmental and socioeconomic impacts.

200. Project 1 has been prepared within a highly consultative and participatory process. Socio-Economic Survey and Willingness-to-Pay (SES-WTP) and community consultation meetings and workshop have been held to inform the communities of the proposed investment program, obtain their priority needs and concerns and willingness to participate, and agree on projects.

201. The alignments of proposed roads and pipework have taken into careful consideration the haphazard arrangements of settlements and concerns expressed by local residents in the framework of the public consultation process, and have optimally avoided/minimized displacement and involuntary resettlement. The alignment of roads follows existing roads with very minor adjustments.

202. The selection of alignments of the pipe works within the roads have taken into consideration the following based on a sites reconnaissance: (i) alignments/locations of existing water supply networks and power supply poles; (ii) characteristics of roads and other access way including road traffic; and (iii) private properties, business establishments and social infrastructures adjacent to the roads. Consultations with utility authorities and site inspections

will be conducted at the detailed engineering stage in order to avoid or at least minimize dislocation of existing utilities and impacts on private properties, socio-economic activities and services and road traffic.

203. The proposed implementation schedule considered a chronology of the works including a gap of one year between the package of road and pipe works and the construction of the first buildings.

204. The IEE has incorporated the existing socio-economic and environmental conditions, issues and concerns raised in the SES-WTP.
Resettlement plans have been formulated in a highly consultative and participatory manner.
Joint social and environmental public meetings have been conducted to present/disclose the resettlement plans and IEE/EMP.

205. In compliance with Mongolia's environmental safeguard requirements, Project 1 has a MEGD-approved DEIA.

206. In project preparation, other planned and programmed projects have been taken into consideration, including the MON 39256: Urban Transport Development Investment Program; the World Bank's drainage improvement in Bayankhoshuu under the USIP 3 Project; and MUB's main road improvement projects in the Subcenters.

207. The potential issues, concerns and impacts that could arise during construction and operation can be avoided or, at least, mitigated with sufficient incorporation of environmental considerations **during the detailed design stage** including (but not limited to) the following:
The demand for, and availability of and sources for, fine and coarse aggregates to be assessed carefully during detailed design not only to mitigate delays in construction progress and avoid prolonged exposure of open or disturbed surfaces but also to avoid haphazard (and illegal) extraction of these materials. An Aggregates Management Plan (AMP) to be prepared during detailed design will serve as framework for the preparation of Contractor Aggregates Management Plan in the Contractor's EMP (C-EMP).

208. For completed works to cope with environmental and socio-economic impacts, sustain the effectiveness of its services, designs to incorporate the City's vulnerability to damages during earthquakes, extreme weather events as well as other natural hazards, existing utility infrastructures and relevant feedback/suggestions from stakeholder consultations.

209. During detailed design of bridges, culvert, road and pipe works crossing and adjacent to waterbodies, and embankment along Selbe River, consult the relevant government institution for the appropriate hydrological factors to take into account, i.e., factors that reflect influence of

climate change-induced events to ensure that no constrictions of existing and projected flows will result.

210. During detailed design, adequate consultations with other ongoing, proposed/concurrently designed projects for the Subcenters must be undertaken to synchronize construction schedules and designs, such as the World Bank's Third Urban Services Improvement Project (USIP3), ADB's Urban Transport Development Investment Program, and potential projects by the GOM, for overall environmental protection.

211. Appropriate environmental mitigation and monitoring measures are included in the P1-EMP. To attract more environmentally responsible bidders, the SPS-compliant P1-EMP will be part of the bidding document. Selected Contractor will be required to prepare a detailed Contractor EMP (C-EMP) that will address as minimum the requirements of the P1-EMP. The C-EMP will be quantitatively and qualitatively evaluated against the P1-EMP and cleared by the PMO prior to the commencement of any work on site. The Contract for civil works will explicitly stipulate the obligation of Contractor (and his/her subcontractors) to institute the mitigation measures properly and carry out environmental monitoring according to the PMO-cleared C-EMP. The Contract for civil works will stipulate some tie-up of progress payment and collection of performance bond with the performance in C-EMP implementation.

Environmental Impacts and Mitigation Measures during Construction

(1) Impacts on the Physical Environment

212. **Impacts on air quality.** Dust/suspended particles, noise, gas emissions and odor will arise from construction activities, processes, practices and materials. Dust and noise are considered to be the intermittent salient concerns during the peak construction period.

213. Dust/suspended particles will arise from: (i) inefficiently managed earthworks; (ii) the transport and loading/unloading of aggregate materials; (iii) the loading of construction wastes onto trucks at the subproject sites and transport and unloading of these at the City's disposal sites at Narangiin Enger, Ulaanchuluut and/or Iorin Davaa, whichever among them would be designated by MUB as the project's disposal site (will be clarified with MUB in the update of the EMP during the detailed design stage); (iv) movement/operation of construction vehicles/equipment; (v) crushing/grinding/ mixing/ drilling/screening/potential blasting activities; (vi) the creation of more dry exposed surfaces than can be worked at and backfilled promptly; (vii) having more stockpiles of aggregate materials on site than necessary; (viii) deferred disposal of construction spoils/wastes; and (ix) asphalt processing and/or paving operations. Wind, particularly in the dry months of April and May when average wind speed is observed to be higher, will contribute to the suspension of dust.

214. The sources of noise during construction includes: (i) movement and operation of vehicles/equipment; and (ii) construction processes and operations, such as crushing/grinding/ mixing/drilling/ blasting and loading/unloading of coarse aggregate & other materials. Noise levels from construction equipment will vary depending on the type of equipment used, model, type of operation being done, and the condition of the equipment used. A list of typical noise levels of representative construction equipment is presented, which indicates that: (i) noise levels generated by construction equipment decrease at a rate of approximately six decibels (dB) per doubling of distance away from the source; (ii) the maximum noise level for receptors less than 5 m could be 93-95 dB; and (iii) within 200 m from a noise source, noise level exceeds WHO guideline of 50 dB.

215. Moderate increase of sulphur oxides (SO_x) and nitrogen oxides (NO_x) levels in the ambient air quality will be expected intermittently from the: (i) unmanaged movement and operation of construction equipment; (ii) use of poorly maintained equipment; (iii) use of more high VOC-emitting asphalt processing and other special applications, e.g., adhesives, paints, etc.; and (iv) indirectly, from increased traffic congestion caused by the construction activities.

216. The opening/re-opening/dismantling of active and closed pit latrines within the construction alignments will cause foul odor to emanate. The workers handling the site clearing will be most at risk. Other potential sources of foul odor during construction would be poor sanitation practices of construction workers, poor management of solid wastes, the use of high VOC-emitting processes and specialty applications.

Table 29: Construction Equipment Noise

Equipment	Noise Emission Level (dBA) at Distances (m) from Equipment										
	5	10	15*	20	40	60	80	100	150	200	300
1 Bulldozer	86	80		74	68	64.5	62	60	56.5	54	50.5
2 Excavator	84	78		72	66	62.5	60	58	54.5	52	48.8
3 Loader	90	84		78	72	68.5	66	64	60.5	58	54.5
4 Land scraper	90	84		78	72	68.5	66	64	60.5	58	54.5
5 Mixing Equipment	87	81		75	69	65.5	63	61	57.5	55	51.5
6 Roller	87	81		75	69	65.5	63	61	57.5	55	51.5
7 Vibrator road roller	86	80		74	68	64.5	62	60	56.5	54	50.5
8 Backhoe			81								
9 Compactor			82								
10 Concrete mixer			85								
11 Crane (mobile)			83								
12 Generator			81								

Equipment	Noise Emission Level (dBA) at Distances (m) from Equipment										
	5	10	15*	20	40	60	80	100	150	200	300
13 Jack hammer			88								
14 Paver			89								
15 Pneumatic tool			85								
16 Pump			76								
17 Shovel			82								
18 Truck			88								

Source for Equipment 1-7: Initial Environmental Examination (IEE) of the Proposed Logistics development Project. Government of Mongolia. 2011.

Source for Equipment 8-18: Based on Figure 1 – Construction Equipment Noise Ranges. Noise From Construction Equipment and operations, Building Equipment and Home Appliances. US-EPA. 31 December 1971.

A blank field indicates no data available

217. **Impacts on water resources.** During construction, water resources will be exposed to potential depletion and deterioration.

218. Potential water resources depletion will be caused if potable and non-potable construction water demand will be met using water from kiosks and ground water resource in the Subcenters, respectively. Residents rely on water kiosks for their domestic water needs. The estimated densities of accessible kiosks from perimeters of the Subcenters are just within the current norm. If potable water demand of construction workers will be met using water from the kiosks, the densities will exceed the norm. Residents will be devoid of adequate water supply unless more frequent deliveries will be made to at least maintain the current densities.
Abstracting groundwater within the Subcenter for construction use could adversely affect the existing groundwater wells within, and/or in the peripheries of the Subcenters (at least 4 are reported in Bayankhoshuu Subcenter, including the well of the existing boiler).

219. Surface and groundwater resources in the vicinities will be prone to pollution from: (a) sedimentation or siltation caused by indiscriminate earthworks and irresponsible stockpiling of aggregates; (b) improper management of wastes and hazardous substances; (c) accidental spills of materials, particularly hazardous substances and wastes; and (d) poor sanitation practices of workers.

220. Potential surface water contamination/sedimentation from the construction of embankment, bridges and all works adjacent to or crossing water bodies. Polluted surface waters will degrade the quality of soil bed of the relevant water bodies .Polluted groundwater will pose health risks to the groundwater-reliant households within, and/or in the peripheries of, the Subcenter.

221. provides the relevant surface waters in the main areas of influence.

Table 30: Relevant Surface Waters

Surface Water		Relevance
1	Tuul River	Receives discharges from the CWWTP to which the collected sewage form the Subcenters will be directed for treatment. Selbe River is one of its tributaries.
2	Selbe River	Forms the eastern boundary of the Selbe Subcenter, along which the proposed works for an eastern sewer/collector and associated road rehabilitation after trench works and improvement of river embankment will be undertaken.
3	Bayankhoshuu Creek	Will be crossed by the proposed sewer/collector main along Trade Union Street. Will be crossed by internal pipe and road works along Zuun Bayan Uul 9 Street. Will be crossed by internal pipe and road works at Revolutionary Street. Its section near the junction of Trade Union and Revolutionary Streets will be within 15 m from internal pipe and road works along Revolutionary Street. Its tributary within the Subcenter will be crossed by, and will be adjacent to, internal pipe and road works.
4	Chingeltei Creek	Will be crossed by the proposed sewer/collector main along Chingeltei Street and eastern sewage collector. Will be crossed by, and will be adjacent to, internal pipe and road works.
5	Khailast Creek	Will be crossed by the proposed sewer/collector main along Chingeltei Street. Will be within 50 m away from the proposed pumping station at its confluence with Selbe River. Will be within 25 to 130 m away from the proposed pressure pipe and road works connecting the aforementioned pumping station and sewer/collector main along Chingeltei Street.

222. **Vibration.** Considering the quality of the general housing, terrain, soil and geologic conditions of the Subcenters altogether, vibration is considered a moderate impact. This will arise from movement and/or operation of vehicles and equipment, such activities as earthworks, drilling, excavation, blasting, crushing, grinding, among others. Unmitigated vibration could be a sensitive concern for some people and institutions as hospitals, adversely affect sensitive office/healthcare equipment, cause erosion, and could lead to damages of existing structures in the immediate vicinity of construction sites.

223. **Impacts on soil.** Potential impacts on soil are expected to be minimal. These include soil contamination and soil erosion. Soil contamination may be caused by: (i) improper

transport, storage, handling and disposal of solid wastes, septic wastes, hazardous wastes and hazardous substances, such as petroleum products from equipment operation and maintenance, lubricants, paints, chemicals, curing compounds, asphalt products, among others; and (ii) accidental spills or leaks of hazardous wastes and substances.

224. Soil erosion may be caused by construction works and/or vibration from movement and operation of construction vehicles/equipment near slopes, particularly at unprotected banks of gullies and creeks and moderately sloping terrain. Haphazard land disturbance will also lead to more lands exposed to soil erosion. Soil removed by erosion may become airborne, creating dust, and/or be transported away by water into water bodies and pollute them. With preventive and mitigation measures in place, such as guided land disturbance and coordinated work program (if more than one contractor will be working on a site from same or different projects), no significant soil erosion is expected.

225. The concern for possible indiscriminate borrow operations for aggregate materials is considered to be minimal. However, as preventive measure, the magnitude of this concern will be confirmed during detailed design and carefully addressed through the formulation of an Aggregates Management Plan as framework for the Contractor's EMP and requiring Contractor's to obtain aggregates only from sources with environmental clearance and license to operate and that still have high ratio of extraction capacity over loss of natural state.

(2) Impact on the Biological Environment

226. Project 1 subprojects will not impact on the biological environment. Few weeds and grasses grow on the banks of gullies and Selbe River; while fauna species are those common to a crowded urban environment, e.g., sparrow, crows and dogs. The proposed improvement of the existing embankment and pipeworks along the Selbe River will not encroached onto the Selbe River. Scattered informal settlers and latrines are found in half of the width of Selbe River (beyond the embankment). This indicates the distance of the existing embankment from the wet or frozen area of Selbe River. The aforementioned informal settlers are not covered by the Selbe Subproject, as no activity will be undertaken beyond the existing embankment. This proposed improvement and pipe works along Selbe River, as well as the proposed bridges over Chingeltei Creek and road and pipe works crossing or adjacent to other water bodies, will institute measures to mitigate impacts on the Selbe River, Chingeltei Creek, other water bodies and on nearby informal settlers. The subcenters are not within protected areas.

(3) Impacts on the Socio-Economic Environment

227. **Land acquisition and resettlement, deconstruction waste.** The ROW acquisition for the road and pipeworks is initially estimated to affect: (i) 86 households, 3,582 m2 of land and

11 structures with a total floor area of 319 m2 in Bayankhoshuu; and (ii) 178 households, 4,195 m2 of land and 59 structures with a total floor area of 639 m2 in Selbe. These estimates are based on the GIS. The results of the inventory of losses are currently being compiled. The issue on affected households will be addressed through a resettlement plan. The volume of wastes that will be generated from the demolition of affected structures needs to be managed properly. Initially, construction wastes are expected to be hauled to any one or all of the City's three landfill/disposal sites. Two are located in Narangiin Enger and Ulaanchuluut, both of which are approximately within 15 and 20 km to the west of Bayankhoshuu and Selbe, respectively. One is located in Iorin Davaa, approximately within 25 and 30 km to the southwest of Bayankhoshuu and Selbe, respectively. To reduce the volume of wastes to be brought to disposal site/s, reusable materials from the demolition waste stream would be offered free to interested individuals and/or junkshops.

228. **Traffic.** During construction, some inner roads and possibly 50% of main road widths will be closed. The identification of locations of pipe installations have collectively taken into account the: (i) existing traffic; (ii) properties to be affected; (iii) existing infrastructures that should be avoided or distanced from; and (iv) interference with existing socio-economic activities and properties. During construction, restricted road space, materials delivery and movements of construction-associated vehicles/equipment can worsen the existing traffic congestion, particularly during peak hours, in the Subcenters and main roads. Travel time would become longer. Delivery of goods, people and services will be affected. Road users will be exposed to more road safety hazards. With mitigation measures in place, including segmentation of works, prior consultation/coordination/collaboration with concerned local authorities, and adequate prior public information, traffic impacts would be moderated.

Table 31: Affected Portions of Main Roads

Subcenter/Main Road	Location	Significance of Road / Proposed Project	Affected Road Space
Bayankhoshuu Zuun Bayan Uul 9 St.	Eastern side	Connects Revolutionary St. with the commercial center of Bayankhoshuu. Plans to culvert-fill Bayankhoshuu Creek.	Works will occupy the eastern half.
Revolutionary St.	Southern side	E-W road that connects the Zuun Bayan Uul 9 St. in the east and the Trade-union St. in the west.	Works will occupy the southern half.
Trade Union St. (N of crossing with Revolutionary St.)	Eastern side	N-S road that connects Bayankhoshuu Subcenter with the City core.	Works will occupy the eastern half.
Trade Union St. (S of crossing with	Side opposite to existing water	N-S road that connects Bayankhoshuu Subcenter with the City core.	Works will alternatively occupy the eastern

Subcenter/Main Road	Location	Significance of Road / Proposed Project	Affected Road Space
Revolutionary St.)	mains, that are alternatively in E & W sides of the road		and western half.
Selbe Chingeltei St.	Eastern side	A critical mass transport axis that connects the settlements in the northern peri-urban areas to the City core. Proposed BRT alignment. One of the most heavily frequented roads in UB.	Works will occupy the eastern half.

229. **Blocked access to construction sites and properties.** Due to the restricted space in the Subcenters, blocking of access to houses, properties, businesses and social institutions, as well as to construction sites cannot be avoided. Excavations, installations, stockpiles of wastes and aggregates, storage of pipe materials waiting to be installed, and potentially indiscriminate parking of construction vehicles/equipment will create obstructions to accesses, gives inconvenience and nuisance, disrupt daily domestic and economic activities including public transportation operations, and pose safety hazards.

230. **Accidental damage to utility and service infrastructures and adjacent structures.** Water pipes supplying water to kiosks and bathhouses, power supply poles, street lights and telephone cables are found within the rights-of-way of main and internal roads. Accidental damages to them or their relocation will result in some service interruptions, which will disrupt domestic, social and economic activities. Accidental damage to adjacent buildings and houses, particularly during construction of the underground parking and other large building structures could occur.

231. **Community and workers' health and safety hazards.** The health and safety of the community and construction workers will be at risk during construction. They will be directly and indirectly exposed to crosscutting threats from construction's impacts on air quality (dust, gas emissions, harmful odors) and water resources (potential contamination of water from kiosks due to damaged supply pipes and from wells); noise and vibration, traffic congestion along main roads; huge volume of construction-associated vehicular movements; blocked accesses that constrict easy escape during emergency; open excavations; poorly managed construction wastes, wastewater and spoils; indiscriminate stockpiles of aggregates; hazardous substances transported to and stored on site; accidental spills of hazardous substances; local flooding or water impoundment caused by obstructions in surface drainage routes and which will become breeding grounds of mosquitoes and other disease vectors; reckless drivers of construction-

associated vehicles; potential fire and explosion; and lack of awareness on the hazards posed by Subproject implementation on health and safety.

232. Within the component sites, presence of full and active waste pits is expected. Prior to site clearing and excavation, adequate consultation with the Department of Health and USUG should be made for the hygienic management of these pits prior to site clearing and excavation to protect workers and community health. During detailed measurement survey for the finalization of the resettlement plan based on detailed design, the location and scale of these structures should be identified to aid in the proper planning of hygienic management.

233. Communicable and transmittable diseases may potentially be brought into the community by construction workers; and/or construction workers may also be potentially exposed to communicable and transmittable diseases in the community and in the workforce. The poor social behavior of some construction workers could cause social conflicts.

234. Inadequate supply of safe/potable water in construction sites; inadequate sanitation facilities; poor sanitation practices on site; poor housing conditions; the handling and operation of construction equipment; handling of hazardous substances; exposure to extreme weather and non-observance of health and safety measures, pose additional threats to the health and safety of construction workers.

235. **Local flooding**. Local flooding caused by blocked surface drainage routes, pumping out of water from excavations is assessed to be minimal. Water ponding is expected to subside shortly. Measures, however, need to be in place to ensure local flooding is avoided/mitigated, such as: (i) stockpile away from major drainage routes; (ii) create effective diversion routes for surface runoff; (iii) lead water pumped out from excavation pits (particularly the underground parking open excavation properly. In road and pipe works sites, pumped out water from excavations could be led to water drums for use in wetting exposed surfaces.

(4) Impacts on the Physical/Cultural Resources

236. **Impacts on religious structures.** There are four small religious structures in Bayankhoshuu, including 2 Buddhist temples and 2 Christian oratories. All structures are relatively new (less than 25 years old) and have no cultural heritage value. Two are along proposed pipe and road works. The other two, within 40 m distance. Potential impacts during construction include (i) obstructed access; (ii) safety hazards to visitors; and (iii) noise and disturbance during services, rites and ceremonies. The former two temples will be exposed to potential accidental damage.

(5) Assessment Summary

237. **Impacts** during construction will be temporary and are expected to be local, confined within the active work sites and their immediate vicinities. Except during windy days, heavy rainfall and/or extreme weather event, dust, odor, fine aggregates, sediments and wastes would not be the transported beyond these sites. With proper mitigation measures in place, special care taken at sensitive locations, e.g., hospitals, schools, temples/oratories, water bodies, among others, and ensuring that works are properly phased, segmented and organized so that the bulk of works are completed (or at least almost complete) prior to the commencement of another phase/segment, the potential adverse impacts during construction would be minimized and kept highly site-specific. These impacts will not be sufficient to threaten or weaken the surrounding resources.

238. Measures to keep construction impacts in Project 1 sites to the minimum or acceptable levels are mostly good engineering and construction practices.A detailed set of mitigation measures are featured in the EMP (Annex E). The effective conduct of the following are crucial mitigation measures as well: (i) construction management by the Contractor; (ii) supervision of C-EMP implementation by the Contractor's Environmental Management Engineer; (iii) construction supervision by the PMO; (iv) monitoring of C-EMP implementation by the PMO; (v) observance of the Grievance Redress Mechanism by all concerned parties; and (vi) the participation of concerned communities in the monitoring of C-EMP implementation.

Table 32: Some Mitigation Measures for Salient Issues/Concerns /Impacts during Construction

Issues/Concerns/ Impacts	Some Mitigation Measures
Dust	Segmentation of works. No more loose surfaces/stockpiles than necessary. Water dry exposed surfaces, stockpiles of san & excavated materials at least twice a day, or as necessary. Tarpaulin or similar cover on trucks carrying aggregates, cement, residual solid & wastes. Maintain min. 2 feet freeboard. Minimize drop heights & spray water when loading/unloading aggregates.
Noise	Set up noise barriers, e.g., temporary fence, enclosure around generator sets. Restrict noisy operations from 8AM-5PM. Overtime work should not go past 10PM, observe regulated noise level, not use noisy equipment. Use only equipment that emit least noise, e.g., electrically powered equipment, hydraulic tools those with efficient mufflers. Turn off equipment when not use. Spread out schedule of material deliveries and waste disposal.

Issues/Concerns/ Impacts	Some Mitigation Measures
Gas emissions	Reduced vehicular movements, through coordinated transport of materials, spoils, wastes; workers' accommodations at walking distance; bigger capacity trucks for hauling wastes/spoils, where access allow. Turn off equipment/ vehicle when not in use. Limit engine idling to a max. of 5 minutes. Use clean-fuelled generators. No burning of wastes.
Odor	Effective disinfection/deodorization/sanitizing affected latrines prior to clearing. Coordinate/consult with District DOH. Provide adequate sanitation facilities, adequate water supply. Strictly enforce observance of sanitation practices. Properly store, promptly dispose of, organic and hazardous wastes.
Depletion of water resources	Meet construction water demand with water from permitted sources outside the Subcenter, delivered to sites by water truck, stored on site in tanks. Ensure potable water is stored clean and safe.
Change in groundwater regime/local groundwater variations from underground parking construction	Apply method of construction that would cut off the basement from the local groundwater regime, e.g., shoring appropriate to geologic condition. Consult & coordinate with community & local authorities on the potential groundwater variations during construction and the interim measures, e.g. supply of water through water trucks to those adversely affected.
Deterioration of surface & groundwater resources	Provide adequate sanitation facilities, adequate water supply. Strictly enforce observance of sanitation practices. Implement an eco-friendly solid/hazardous waste management, among others: Practices waste minimization, reuse and segregation Has covered storage bins, color-coded, clearly marked to avoid mixing, especially with hazardous wastes Implements prompt disposal at the City landfill Implement measures to mitigate sedimentation/siltation, among others: Use any combination of silt fences, sandbags, barrier nets, diversion of offsite runoff around site appropriately Stockpile of flat grounds, & away from, not obstructing, main surface drainage routes, limit to max. height of 2 m, dispose of unsuitable & excess solids as soon as possible Program stockpiling on site Implement measures to mitigate potential adverse impact from use and storage of hazardous

Issues/Concerns/ Impacts	Some Mitigation Measures
	substances, among others: Have safe storage, with visible signage, secure from unauthorized entry or use and can contain spillage Have equipment clearly leaking oil repaired at once, but off site Use less hazardous substances Store no more hazardous substances on site than needed
Vibration	Restrict use of equipment emitting vibrations, 8AM-5PM Prior to start, identify vibration-sensitive areas & structures in the construction influence area to plan for appropriate technology, equipment/tools & procedure level to apply or use Limit speed to max. 40 kmph en route to sites, 30 kmph in access roads and sites
Traffic & road blocking	Prepare traffic management scheme, & coordinate implementation with local traffic authorities &affected communities. Post billboards on road./lane closure, traffic rerouting plan at strategic places, min. 1 week prior to effectivity Post traffic (flag) persons during entire working hours Spread out schedule for materials delivery in none-peak hours Manage arrivals/ departures of trucks efficiently.
Blocked access to construction sites and properties	During IEC, prior to mobilization, inform communities regarding work phasing & schedules, anticipated access blocking, provisions for safe access for blocked properties & temporary parking for blocked garages/driveways.. Provide safe accesses to blocked properties, e.g., steel planks of adequate grade, width and length, & if necessary, with guide rail
Accidental damage to utility & service infrastructures	Utility and service infrastructures: During mobilization coordinate with relevant utility companies for the exact locations & set contact arrangements in case of damage/s. In case of accidental damage, advise concerned utility company and/or the PMO, at once Give at least 1 week prior notice on planned service interruption due to relocation of existing utility lines and/or for interconnection/streamlining. Adjacent structures: Conduct site investigation to obtain information concerning the quality, conditions & sensitiveness of structures in the location and features of underground structures and public utilities. Particularly for underground/subsurface construction, a geological survey to understand the geological and hydrological conditions to guide planning and implementation of construction.

Issues/Concerns/ Impacts	Some Mitigation Measures
	For underground construction, apply appropriate shoring system (one that has better water and ground loss control)
Disruption of socio-economic activities	Provide safe alternative access for blocked properties. Issue prior notice on scheduled service interruptions 1 week before effectivity. Interruption should not go beyond 2 hours. In case of accidental damage, advise concerned utility company and/or the PMO, at once
Potential damage to temple/oratory sites/structures	Adequate prior consultations and coordination with temple/oratory authorities. Provision sufficient protection barriers, as applicable. Contractor to implement repairs for accidental damages immediately at his own expense.
Community and health & safety	Implement a C-EMP that addresses the measures in the P1-EMP as min. requirements to mitigate dust, noise, gas emissions,, odor, vibration, water depletion and deterioration, traffic, road and access blocking. In addition: Adequate/appropriate lighting, reflectorized barrier (or temporary fences) around active work sites. Safe access to pedestrians/residents Emergency response procedures Coordinate with authorities of nearby schools & hospitals for safety measures. Adequate social preparation regarding construction activities, & associated health & safety risks, grievance redress mechanism, to be conducted at least 1 month prior to award of Contract.
Workers' health & safety hazards	Orient workers prior to mobilization, on occupational health & safety hazard and strict observance of safety measures Strictly enforce use of protective wears, e.g., eye masks, nose masks, ear mufflers, helmets, gloves, appropriate footwear Implement recommended measures to mitigate dust, gas, odor, noise, vibration, traffic Provide safe accommodations with reliable water supply of potable water, adequate sanitation facilities Set up emergency response team equipped with adequate staff, equipment, tools, supplies, including for firefighting.
Damages on works during seismic or extreme weather event	After every event, conduct an engineering investigation of built structures & implement the necessary corrective measures without delay.

Environmental Impacts and Mitigation Measures during Operation

239. During operation, main potential environmental impacts relate to the operation of the heating systems, and other works to a lesser extent.

240. **Impacts during operation of heating system.** Potential adverse impacts during operation of the HOBs include (i) pollutants emission from the HOBs, (ii) noise from the HOBs, (iii) wastewater, and (iv) solid waste of ash and slag. These are discussed below.

241. **Gaseous emissions.** The operation of the HOBs in Selbe and Bayankhoshuu Subcenters will emit particulate matters (PM), SO2 and NOx, the concentrations of which will be influenced by the quality of coal burned, the flue gas volume and the type and performance of the flue gas treatment equipment.

242. **Coal.** Most coal deposits in Mongolia are low sulphur and low nitrogen coal with sulphur contents between 0.4-1.4% and nitrogen content around 0.5%. Ash content of the coal is 12-20%. The current recommendation is to use Baganuur coal, which emits the least SO_2, from among coals from five main coal mines in Mongolia, with 90% and 95% flue gas desulfurization (FGD) efficiency. The Baganuur mine is located at 130 km distance from Ulaanbaatar and is considered to be the most economical as it is used at larger CHPs and the delivery infrastructure is in place.

Table 33: Quality of Coal of Main Coal Mines in Mongolia

Source of coal	SO2 content [%]	Heating value [MJ/kg]	SO2 emissions (no FGD) [mg/m3]	SO2 emissions with 90% FGD efficiency [mg/m3]	SO2 emissions with 95% FGD efficiency [mg/m3]
Baganuur	0.36	14.4	1,280	128	64
Shivee-Ovoo	0.90	11.7	3,940	394	197
Shariin Gol	0.60	17.2	1,790	179	90
Aduumchuluum	1.40	12.3	584	584	292
Tavantolgo	0.69	21.3	166	166	83

Source: ADB, 2012. TA 6371-REG: Mitigation of Trans-Boundary Air Pollution from Coal-Fired Power Plants in Northeast Asia. Final Report.

243. **Stack emissions.** The HOBs in Selbe and Bayankhoshuu Subcenters have been examined for point source emissions during the operation period. The predicted emissions will

comply with MON standard MNS 5885:2008 (Acceptable concentration of air pollutant elements) and the new MNS 6298:2011, as well as the World Bank Group EHS recommended limits for Small Combustion Facilities Emissions[29] (of 50-150 mg/m3 for PM; 2,000 mg/m3 for SO_2; and 650 mg/m^3 for NOx). To achieve the predicted levels, fabric filter/baghouse, FGD and denitrification equipment operating at 99-99.7% efficiency for PM, 95% efficiency for SO2 and 60-90% efficiency for NOx, will be installed.

Table -34: Stack Emission Predictions for HOBs

Size	Pollutant Parameters	Concentration (mg/m^3)	MON Standard MNS 5885:2008	MON Standard MNS 6298:2011	World Bank EHS
8.4 MWth	SO_2	130-600 mg/m^3	615-1,931	400	2,000
	NO_x	<1,100 mg/m^3	320-1,270	1100	650
	Particulate Matter	30-80 mg/m^3	200-1,270	50	50-150

244. **Greenhouse gas emissions**. The total greenhouse gas emissions of all HOBs combined were estimated based on the US EPA Mandatory Reporting Rule (MRR) Method under the Greenhouse Gas Reporting Program. The methodology accounts for coal quality and total consumption, emission reduction technology and efficacy. The annual GHG emissions will amount 62,000 tons per year.

Table 35: Greenhouse Gas Emission Predictions (total for all HOBs)

	Metric tons per year	Metric tons CO2e per year
Carbon Dioxide (CO2)	61,521.35	61,521
Methane (CH4)	6.98	146
Nitrous Oxide (NO2)	1.01	315
TOTAL		**61,982**

245. Physical layout and design of the plants will include provisions for coal and ash storage and handling that will effectively eliminate neighborhood exposure to dust emissions and minimize exposure of plant workers to the extent possible.

[29] IFC/World Bank 2007, *Environmental, Health and Safety Guidelines General EHS Guidelines*, World Bank, Washington. p.7

246. **Noise.** Noise frequency or vibration level at working environment shall comply with the requirements of Mongolian standard MNS 0012-013:1991: “Workplace Atmospheres, Hygienic Requirements.”

247. **Ash, slag, and FGD residue.** Proper disposal of coal combustion products (CCPs) is an important environmental problem. HOBs generate a variety of CCPs, namely bottom ash, fly ash, slag and flue gas desulphurization (FGD) residue. Ash, slag and FGD residues will be stored in enclosed structures in the plant site. There is presently no formal recycling of CCPs in Ulaanbaatar, although some studies are underway. Where possible, these will be supplied to interested projects, organizations and entities for applications or reuse. CCPs can be used in a variety of engineering applications, and which will be considered in projects for subsequent tranches: (i) as fill materials for structural applications and embankments; (ii) as aggregates in road base and sub-base; and (iii) as aggregates in asphalt paving, among others. Although there is potential for CCP re-use in construction materials, it is beyond the scope of the USGADIP to create a recycling market, and the present assumption is that ash will be transported to a dedicated storage/disposal site that the City has established adjacent to the Central Wastewater Treatment Plant.

present estimated ash volume and costs.

Table 36: Ash Removal Bayankhoshuu

Description	Unit	Rate	2020	2025	2030
Generation rate	Tash/Tcoal	20%			
Heating season ash	T		2633	6394	10154
Truckloads	T/load	10	263	639	1015
Trucks /week			16.0	38.9	61.8
Summer ash	T		270	655	1040
Truckloads	T/load	10	27	65	104
Trucks /week			1.6	4.0	6.3
Truck Cost	$/trip	$35.21			
Annual Cost			**$10,220**	**$24,819**	**$39,417**

Table 37: Ash Removal Selbe

Description	Unit	Rate	2020	2025	2030
Generation rate	T_{ash}/T_{coal}	20%			
Heating season ash	T		4169	7734	11298
Truckloads	T/load	10	417	773	1130
Trucks /week			25.4	47.1	68.8
Summer ash	T		427	792	1157
Truckloads	T/load	10	43	79	116
Trucks /week			2.6	4.8	7.0
Truck Cost	$/trip	$35.21			
Annual Cost			**$16,185**	**$30,021**	**$43,857**

248. **Wastewater.** Potential wastewater during HOB operation include (i) wastewater from the spraying of water to coal stockpile and while crushing, conveying and handling, and spraying ash stockpile while handling for dust suppression; (ii) wastewater from wet scrubbing; and (iii) wastewater from equipment maintenance. Quantities of these from each local heat distribution system are expected to be small. Some measures to mitigate impacts of generated wastewater include (i) the provision of peripheral stormwater drains around the HOB site to lead as much storm water away from the coal stockpile, ash stockpile, and domestic solid waste storage facilities; (ii) ensure coal and ash stockpile area is not prone to water logging or flooding; (iii) if appropriate and more efficient, adopt dry scrubbing instead of wet scrubbing; and (iii) dispose of wastewater to the sewer system, as appropriate. Design will aim to avoid generating wastewater that cannot be either (i) directed to the new sewer system; or (ii) containerized and easily transported for proper treatment and disposal.

249. **Impacts during operation of all other completed works.** During the operation of all completed works, the effectiveness of their services would not be sustained without efficient operation, maintenance and repair. USUG has been operating at a loss since year 2000. The Institutional Strengthening and Capacity Development Component of Project 1 will work on reforms in these two sectors through strengthened laws and regulations.

250. With good internal roads, it is expected that more vehicles will be passing through the communities, either to bypass the traffic on the main road or as shorter route to their destinations, which will pose safety risk to the communities of Bayankhoshuu and Selbe Subcenters. Measures to mitigate traffic safety hazard during operation include (i) design to consider securing pedestrian ways with bollards to prevent vehicles from using pedestrian ways,

and having road humps to control speed; (ii) considering the small widths of carriageways (5.5 m), khoroos to be advised to institute some one-way traffic systems.

Indirect, Induced, and Cumulative Impacts

(1) During Construction

251. Significant indirect and induced impact during construction would be the spill effect of traffic congestion into areas further up and down the main roads leading to the Subcenters. Proper coordination with the local authorities of areas affected by the spilled traffic should further mitigate the impact.

252. Other planned projects in the Project 1 Subcenters that could or would be implemented in the same timeframe with Project 1 include, but may not be limited to: (i) the ADB financed BRT line in Selbe (under MON 39256: Urban Transport Development Investment Program); (ii) the World Bank's drainage improvement in Bayankhoshuu (under the USIP 3 Project); and (iii) MUB's main road improvement projects in the Subcenters. This situation will create moderate to significant cumulative impacts during construction, such as: (i) dust and noise; (ii) potential contamination of Chingeltei and Khailast Creeks; and (iii) traffic congestion. To ensure cumulative impacts are brought to acceptable levels, project proponents/implementers must agree on a collaborative effort to mitigate impacts through responsible implementation of their respective EMPs. To mitigate cumulative traffic impact, (i) there must be adequate consultations with stakeholders and local traffic authorities and coordination among project proponents/implementers for a unified traffic management scheme, harmonization of certain activities and schedules where possible, and public information/disclosure of the cumulative impacts and collaborated measures; and (ii) provision of temporary bypass routes as consulted and agreed on with affected stakeholders and local authorities. This route must first be prepared (e.g., conditioned to accept the traffic spill, installed with signage) and maintained regularly as agreed on by the concerned projects.

253. The grievance redress mechanism should be disclosed (through public meetings, display at strategic places and media) to the communities affected by the traffic spill and temporary bypass routes.

254. Significant indirect and induced impact during construction would be the spill effect of traffic congestion into areas further up and down the main roads leading to the Subcenters. Proper coordination with the local authorities of areas affected by the spilled traffic should further mitigate the impact.

(2) During Operation

255. There will be no significant adverse indirect, induced and cumulative impact during operation. Growth in the underserviced ger areas will continue even without the investment program, which will cause further environmental decay and further threatening the lives of the ger communities. With completed works under Project 1, there will instead be indirect benefits and positive impacts and outcome (detailed in
256.
257.

258. of Section VII-A). Overall, the living environment will be improved. Project 1 is expected to showcase to other ger communities and encourage them to participate in the next tranches of improvements, particularly in the land pooling to be able to obtain lands for improved services.

259. Water conservation methods will be promoted in the subcenters through systematic metering of water use, and promoting the application of water saving appliances. ADB is currently developing a new project with MEGD which aims at strengthening institutional capacity of the Tuul River Basin Authority (TRBA), under the Ministry of Environment and Green Development (MEGD), to coordinate and monitor in the Tuul River Basin and thus ensuring long-term sustainability of ground- and surface water resources in the Tuul River Basin.30 The project's key activities are likely to include the following: (i) construction of small groundwater recharge infrastructure; (ii) embankment improvement, flood protection, and green urban development of the Selbe river; and (iii) assessment and remediation of polluted areas in Tuul River.

Unanticipated Impacts during Construction and Operation

260. In the event, unanticipated impacts become apparent during project implementation, the borrower will (i) inform and seek ADB's advice; (ii) assess the significance of such unanticipated impacts; (iii) evaluate the options available to address them; and (iv) update the IEE including EMP. ADB will help the borrower mobilize the resources required to mitigate any adverse unanticipated impacts or damage.

[30] MEGD and the Ministry of Economic Development (MOED) submitted official requests for technical assistance to ADB on 11 March 2013 and 25 April 2013, respectively.

Information Disclosure, Consultation, and Participation

Public Consultation during Project Preparation

261. Stakeholder consultation and participation was a key principle of the preparation of Project 1, in line with the investment program's aim of promoting an inclusive and participatory peri-urban development in the *ger* areas of Ulaanbaatar City. The strategy of engaging key stakeholders and affected groups included the following activities:

(i) **Socio-economic and willingness to pay Survey for Services** (SES-WTPS) among target households, small and medium enterprises (SMEs).

(ii) **Community and SME needs assessment**, under the general rubric of "Community Action Planning".

(iii) **Safeguards-specific consultation** of potentially affected people and key stakeholders (in addition to SES-WTPS).

(iv) **Socioeconomic Survey and Willingness to Pay for Services (SES-WTPS).** The survey was conducted to collect and assess information on (a) basic household data, profile of small and medium enterprises, and public institutions present in the target subcenter areas; (b) access to and existing conditions of water and sanitation, heating and cooking, solid waste management, power supply, education, and health services, and (c) willingness and ability to pay for improved services on water supply, sanitation and district heating. A sample of households of khoroo 6, 7, 8, 9, 10 and 28 of Songino Khairkhan District; khoroo 14 and 18 of Chingeltei District, and khoroo 14 and 15 of Sukhbaatar District, and businesses in the Bayankhoshuu and Selbe subcenter areas were surveyed. These areas have a total population of about 3,500 households and 180 businesses and institutions. Environmental experts of the PPTA were involved in the design, implementation and evaluation of the socio-economic survey, which incorporated key environmental queries. The relevant survey queries are those concerning access to and satisfaction with the existing basic services, satisfaction level with current social and environmental conditions, and priority environmental and infrastructure issues.

(v) The Household Survey involved a total of 827 households, i.e., 431 households (representing 28% of the total population) from Bayankhoshuu Subcenter and 396 households (representing 34% of total population) from Selbe Subcenter. The Business Survey involved 182 selected business units, of which 92 (50.5%) are in Bayankhoshuu Subcenter and 49.5% are in Selbe Subcenter. Most relevant findings from the survey are presented in the description of socio-economic environment (Chapter V); others are presented in **Annex D.**

(vi) **Community and SME Needs Assessment.** Since late-October 2012, the PPTA and UN-HABITAT teams have been undertaking community mobilization

activities as part of the consultative and participatory approach of the program, through the conduct of the following: (i) a series of meetings with the MUB officials, khoroo officials, and khesegs leaders; and (ii) a series of needs assessment and community action planning (CAP) workshops with the representatives from the households and SMEs. UN-HABITAT mobilized and organized the ger area communities in the two subcenters in form of Community Development Councils (CDCs). In November-December 2012, the CDCs identified and validated the community and SME needs in both subcenters. Further workshops in Q1/Q2 2013 resulted in CDCs preparing draft Community Action Plans that summarize how ger area communities propose to address their needs (**Annex G**). Public consultation confirmed the support for the project, and highlighted basic dissatisfaction with current services, as the following summary illustrates:

a) With regard to water supply, less than 50% of the respondents are highly satisfied with the current water supply services. The reasons dissatisfaction include too much time is spent to take water (20%); inconvenient access (19%); unreliable service (14%); and health risks (14%). The majority wishes to improve the water supply services through direct connection to piped water supply.

b) With regard to sanitation and wastewater, the majority of respondents are moderately satisfied or dissatisfied with the existing sanitation facilities and services. The main reasons for include pits filling up too quickly (27%); bad smell (21%); and uncomfortable facilities and service (18%). The majority wishes to be connected to the central sewer.

c) With regard to solid waste, 78% of the respondents expressed their dissatisfaction with current solid waste management services. About 98% of the respondents deem it necessary to change solid waste management services, of which 31% proposes improvement through increased collection frequency and 30%, through prompt collection.

d) With regard to heating, 70% of the respondents expressed their dissatisfaction with the heating system. Reasons include excessive costs (30%); poor performance (27%); and difficulty to operate (25%). About 99% deem it necessary to change the current heating system, of which 96% proposes connection to the central heating network.

262. Clusters of households willing to consolidate their plots in exchange for private sector developed residential units—complete with water supply, sewage, and heating connections—have been identified with the support of UN-HABITAT. Households will be offered the choice to trade their plot of land—through direct trading or land pooling methods—for access to urban services and improved residential units—apartments or townhouses. This process will be driven

by the private sector and regulated by the Subcenter Redevelopment Authority (SRA). The SRA will assist in realizing Subcenter Development Plans (SDPs) and ensure the strict application of the development plan, principles, land use ratios, and construction standards; and supervise private sector participation in the construction of residential units/compounds, in accordance with community needs and expectations, and private sector interests. The approach will be applied according to strict zoning requirements, private sector interest, proximity to trunk infrastructure developments, and wishes of the community.

263. **Environment safeguards related consultations included** (i) consultation of local government institutions, and (ii) public meetings with affected households of potentially affected people and key stakeholders in the two subcenters, to discuss the draft IEE, anticipated impacts, and proposed mitigation measures.

264. The consulted local government institutions included (i) several members of MEGD for the updated Law on EIA, status of update of Order A2, and guidance in GEIA request; (ii) NAMHEM for environmental monitoring data and costs; (iii) the Citizen Service Center of MUB for the City's grievance redress mechanism; and (iv) USUG discuss and present findings of the WS and CWWTP technical and environmental audits.

265. With regard to the Law on EIA (2012), MEGD confirmed that (i) tranche 1 is under new law requirements, but (ii) follows Procedural Guidance for Environmental Impact Assessment from 2010 (Order No. A-2, of the Ministry of Environment and Green Development) This Order is currently undergoing update/modification to incorporate the recent amendments in the Law on Environmental Impact Assessment.

266. A **second round of public consultation** was conducted in June 2013 by the DEIA institute (ENVIRON). The objectives of the public meetings were:

(i) to inform the stakeholders of (a) anticipated impacts arising from the projects; (b) proposed measures to avoid and mitigate them; (c) existence & implementation of the environmental management plan (EMP) that includes environmental mitigation and monitoring; (d) existence of a grievance redress mechanism (GRM); and

(ii) to solicit stakeholders' concerns, opinions & comments for the proper consideration in the IEE and EMP. The notes of the public meetings are presented in **Annex H.**

Future Public Consultation and Participation

267. Public consultation will continue throughout implementation of Project 1 and its components to be able to deal with public concerns promptly. The PMO will maintain a good communication flow with stakeholders. All stakeholders must be invited and encouraged to participate in community discussions. The PMO, design consultant, contractor and/or operator will be open to contact by the public on matters concerning the progress of the subprojects, adverse impacts, mitigation measures, environmental monitoring and grievances. The implementing agencies, through the PMO and in collaboration with subproject khoroos, will be responsible for organizing public consultations. Specifically:

(i) **During Construction.** Prior to the mobilization by the Contractor, the PMO in collaboration with the subproject khoroos, will join with the social team in conducting an intensive information, education and communication (IEC) campaign to ensure that sufficient level of awareness among the affected communities on the upcoming project construction and its anticipated impacts are attained. Billboards about the subproject, implementation schedule and contact details of implementing agencies, PMO and khoroos will have been set at strategic locations within the Project 1 khoroos. Information on the GRM will be posted at the bulletin boards of khoroo offices. During construction, frequent informal interviews will be conducted by the PMO to monitor the environmental concerns of subproject communities and to be able to act on them promptly.

(ii) **During Operation.** During the first two years of operation, the Operators will continue to monitor environmental concerns regarding the completed works through periodic random interviews.

(iii) During project implementation, the final IEE and its EMP, as well as the GOM-approved DEIA Reports, will be made available in the PMO and the IAs for the perusal of interested parties. Copies may be made available upon formal request.

Information Disclosure

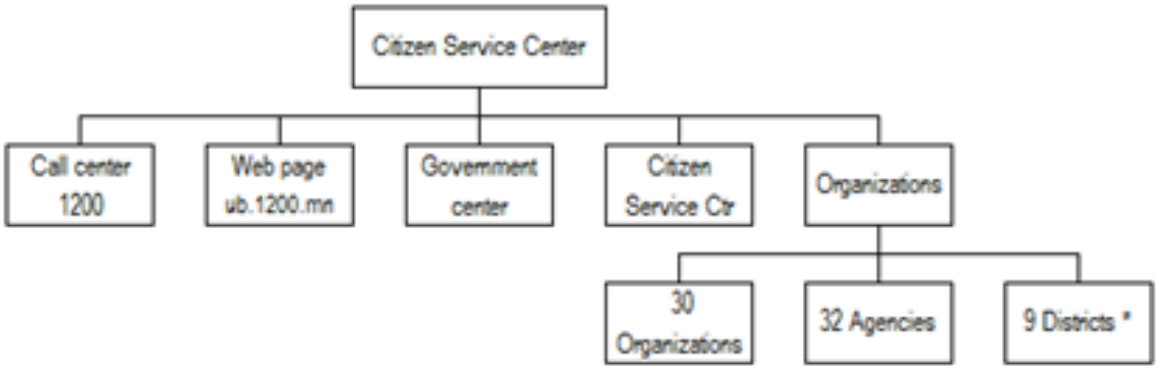
268. Environmental information related to Project 1 components was and will be disclosed as follows: (i) the IEE is available for review in the PMO's office; (ii) the IEE was disclosed on ADB's project website (www.adb.org) in July 2013; (iii) copies of the IEE are available upon request; and (iv) annual reports on project's compliance with the Environmental Management Plan (EMP) will be available at www.adb.org.

Grievance Redress Mechanism

Current Practice in Mongolia

269. The Citizen Service Center of the Office of the Mayor of Ulaanbaatar was established on 26 December 2012 by virtue of Mayor's Ordinance A/675 for a centralized system of receiving, referring, solving and responding to public grievances in the Capital City. Under the system, grievances may be filed: (i) through call center 1200; (ii) through web page www.ub1200.mn; (iii) at the 11-11 Government Center; (iv) with any of the affiliated organizations (i.e., the 9 Districts, 32 agencies, 30 organizations); or (v) at the Citizen Service Center. Waste disposal, land disputes, failure and faulty utility services, ethics of Government officials are only few of the types of complaints received by the unified network/system of grievance resolution.

Figure 24: Citizen Service Center (CSC)



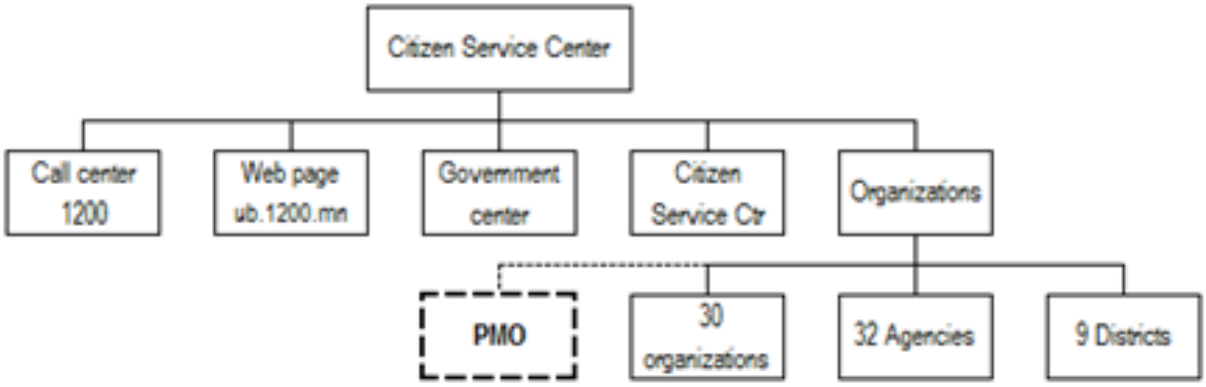
* Tranche 1 subprojects will be implemented in 4 of the 9 Districts.

Grievance Redress Mechanism for Project 1

Proposed Set Up

270. In consultation with the Citizen Service Center (CSC), the grievance redress mechanism (GRM) for Project 1 will be linked to the existing system. The PMO will network as one of the participating organizations in the system.

Figure -25: Proposed Integration of PMO into the Citizen Service Center



271. The PMO's environmental safeguard staff will oversee the implementation/ observance of the GRM. Local grievance staffs will be designated by subproject khoroos to: (i) serve as the counterparts of the PMO's environmental safeguard staff at the khoroo level; (ii) serve as a form of the khoroos' participation in the environmental management of the subproject affecting them; and (iii) bring the GRM closer, comfortably and conveniently accessible, to all segments of society in the affected khoroos. Contractors and operators will be required to designate their respective counterpart grievance staff.

272. The GRM will accommodate both formally and informally lodged, but eligible, grievances. Formally lodged grievances are those received at the PMO and at Khoroo Offices. Informally lodged grievances are those received by the Contractor during construction or Operator during operation. All grievances will have to be registered/recorded at the PMO and evaluated for eligibility by the PMO. The PMO will inform ADB, and will report on the observance/implementation of the GRM in the Project 1 monthly reports and in the periodic Environmental Monitoring Report submitted to ADB. The PMO will periodically provide the CSC with necessary information and records of valid grievances.

273. Sufficient support system, i.e., communication facilities, recording, and reporting system, funds, posters declaring contact details at strategic locations, among others, will be set up to sustain the effective implementation of the GRM.

Access to the Mechanism

274. Any person who has environmental concerns/issues pertaining to Project 1 subprojects during detailed design, construction and operation phases will have access to the GRM free of charge. The PMO will ensure that potentially affected people in the main areas of influence of

the subprojects[31], are aware of their rights to access, and will have access to, the GRM free of administrative and legal charges; and the GRM is fully disclosed prior to construction: (a) in public consultations and IECs or social/community preparations, (b) through posters placed in the offices of the subproject khoroos and USUG, in strategic places within the immediate area of influence of Project 1, on the web page, www.ub1200.mn (posters to include names and contact details of the head and environmental safeguard staff of the PMO and of counterparts in the subproject khoroos, and USUG).

Types of Grievance Expected and Eligibility Assessment

275. The expected grievances are those relating, but not limited, to the following:

(i) **During detailed design or prior to construction.** Environmental concerns of affected residents and environment-oriented groups.

(ii) **During construction.** Damages to properties, injuries caused by project activities/equipment/workers, access blocking, disruptions of utility services, constricted access to water kiosks and public bath houses, dust, odor, noise, vibration, health and safety hazards, and other inconveniences.

(iii) **During operation**. Local water logging/impeded surface drainage caused by road, unsustainable effectiveness of services due to poor maintenance and repair of completed works, and other inconveniences.

276. Once a grievance is received, its eligibility will be assessed:

(i) Does the grievance relate to a Project 1 subproject/component?

(ii) Is the grievance within the scope of the mechanism? (The mechanism will cover only environmental issues/concerns on and environmental impacts of Project 1 subprojects.)

277. Ineligible grievances are those that:

(i) do not relate to a Project 1 subproject/component; or

(ii) are outside the scope of the mechanism, such as land acquisition, involuntary resettlement, issues of fraud or abnormalities in the procurement process under Project 1.

278. To minimize a high incidence of non-valid grievances, it is critical that the scope of the mechanism is well-explained to, and is understood by, the public especially the residents of the immediate areas of influence of Project 1.

[31] Main areas of influence to include project sites and areas within 200 m from the edge of project sites.

GRM Steps and Timeframe

279. Grievances raised on environmental impacts are critical to the health, wellness and safety of affected persons (APs). Hence, the proposed mechanism attempts to be most easily accessible and most responsive to APs' complaints (Figure 1).

(i) **Stage 1 (informal):** First, APs can lodge complaints directly to the Contractor during construction or Operator during operation. Contractor/Operator shall assess the complaint immediately and act on the complaint within three days from receipt of complaint.

(ii) **Stage 2 (formal):** If assessment reveals the issue as not associated with the Subproject's environmental performance, the Contractor/Operator shall direct AP to the City's Citizen Service Center (CSC). If it is associated with the subproject's environmental performance but is not acted on within three days from receipt of complaint, or if AP is not satisfied with the resolution undertaken by the Contractor/Operator, he/she can access the stage 2, as follows:

Step 1 (Day 1)

280. AP lodges complaint at the access points of the PMO or Khoroo Office.

Step 2 (Day 1)

281. PMO/Khoroo Office documents/registers lodged complaint, makes sure these are duly referenced and provides AP with a copy of referenced complaint. If lodged at the khoroo level, local grievance staff contacts the PMO immediately to inform about the lodged complaint. AP shall immediately be informed if the grievance is within, or outside, the purview of the mechanism.

Step 3 (Day 3/Day 4)

282. If the grievance is outside the purview of the mechanism, AP shall be informed accordingly, and directed to the CSC, as relevant.

283. If complaint is covered by the mechanism, the AP shall be informed of the expected action timelines as set out in the established mechanism. If both of the AP and Contractor/Operator are available, the complaint shall be immediately reviewed, investigated and discussed. If not, both parties should agree to undertake the review, investigation and discussion within 5 days. The discussion will center on the cause and action/measure to implement based on the review and investigation. Agreement on actions and measures and

time involved shall be made with the AP. Agreement shall be properly documented and filed; PMO, concerned Khoroo Office and AP shall have copies.

Step 4 - Implement the agreed on action/resolution.

284. (Day 5/Day 6) If complaint is minor, i.e., not requiring further investigation and would be easy to resolve, the Contractor/Operator shall immediately implement agreed on action/resolution.

285. (Day 5/Day 6 to Day 9/Day 10) If further investigation and/or procurement of supplies/parts would be necessary, the Contractor/Operator shall: (i) immediately provide the most suitable interim measure to reduce the magnitude of the impact; and (ii) start work on the final measure not later than 6 days from the day discussion meeting is held.

Step 5 (2 weeks after completion of action/measure taken)

286. If, according to the AP, the impact has been resolved satisfactorily, PMO shall obtain a written confirmation of satisfaction from the AP. This confirmation will signify closure of grievance and will form part of the grievance documentation. Concerned Khoroo Office and AP shall retain their copies of the confirmation. The PMO will inform ADB about the complaint and its resolution.

Step 6 (after closure of grievance)

287. The PMO shall monitor the effectiveness of the resolution for at least a week after closure of grievance (that is, when action implemented has been satisfactorily confirmed in writing by the complainant). Monitoring and evaluation shall be properly documented and included in the Environmental Monitoring Report. The PMO will inform ADB about the complaint and its resolution.

Step 7 (Appeal level for dissatisfied AP)

288. When dissatisfied (or, in the event the issue/impact persists despite actions undertaken), AP can contact the Citizen Service Center. The PMO shall ensure that ADB is immediately informed.

289. Informally and formally lodged grievances, discussions and agreements made, associated actions or responses taken, satisfaction/dissatisfaction of APs, grievances directed/referred to the CSC, cases appealed and found eligible/ineligible, and important lessons learned shall be documented for record, monitoring and evaluation, and mechanism-

enhancement purposes. Records, findings and experiences shall be included in the progress and environmental monitoring reports of the Contractor, Operator and PMO. The PMO will periodically provide the CSC with necessary information and records of valid grievances. The GRM is presented in Figure 1**.**

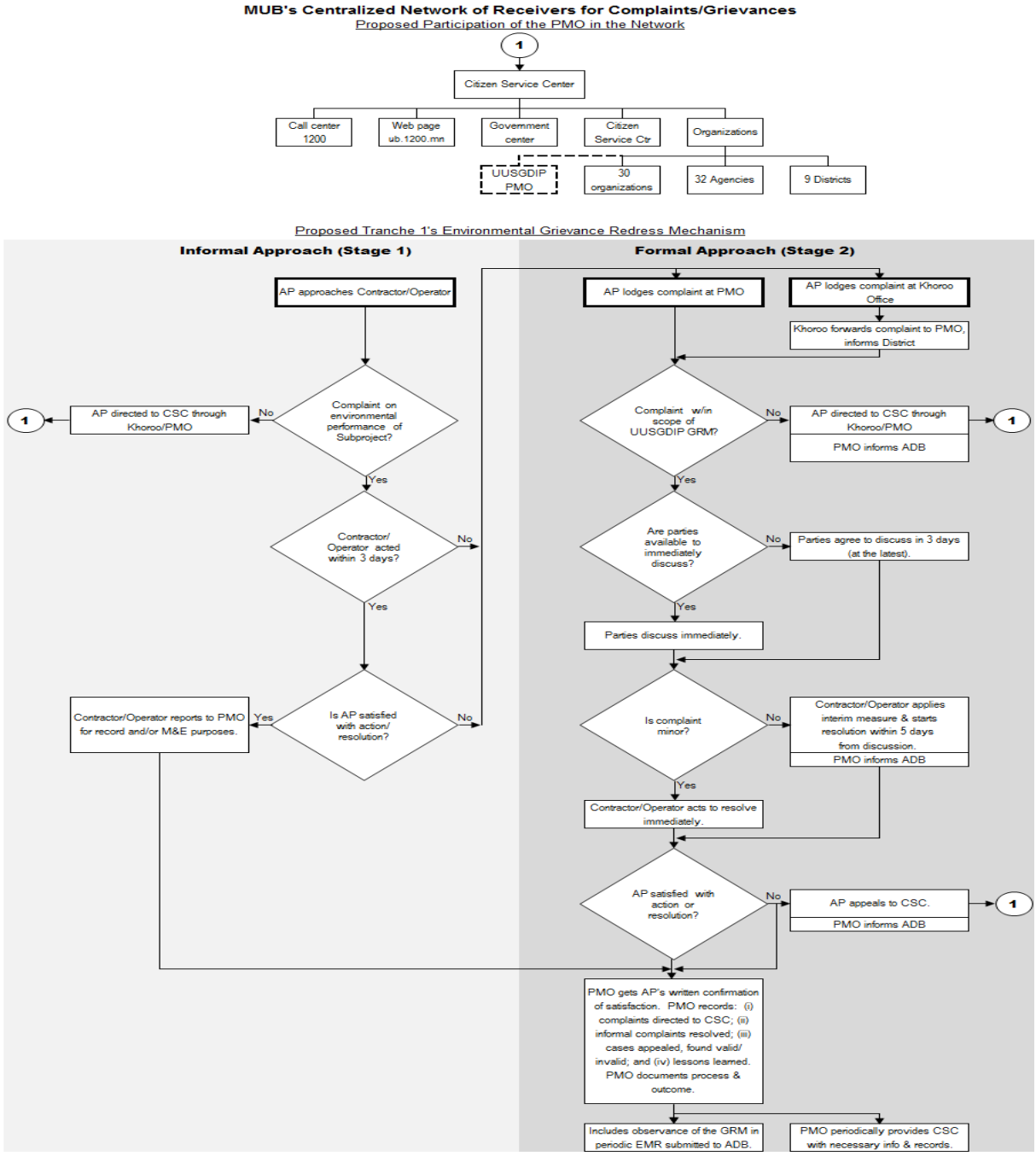
Figure 1: Grievance Redress Mechanism defined for Project 1

AP – Affected Person; CSC – Citizen Service Center; GRM – Grievance Redress Mechanism; M&E – Monitoring & Evaluation PMO – Program Management Office; UUSGDIP – Ulaanbaatar Urban Services and Ger Areas Development Investment Program

Economic Assessment

290. Project 1 is estimated to cost $130 million, i.e., ADB-$100 million, MUB-$30 million). The marginal cost for environmental management is initially estimated to be USD 112, 385 (MNT 157.6 million). This cost is 0.09% of the total Project 1 costs. The costs include USD 17,535 (MNT 24.58 million) of fixed costs to cover environmental impacts monitoring prior to, and during, construction; USD1,520 (MNT 2.13 million) annually for environmental impacts monitoring during operation; USD 55,700 for an Environmental Safeguard Staff in the PMO for 4 years; and USD 39,150 (MNT 54.9 million) for institutional strengthening.

Table 1: Preliminary Cost for EMP Implementation



Activity		Estimated Cost (USD) & Funding Source				
		Detailed Design Cost	Integrated in Construction Cost	PMO Budget (Counterpart Cost)	Operator's Annual Budget	ADB TA
Environmental Mitigation						
A. Pre-Construction Phase						
A.1 Finalizatin of IEE & EMP		c/o DED cost	-	-	-	-
A.2 Preparation and appraisal/approval of GOM EIAR		-	-	-	-	c/o PPTA
A.3 Intensive IEC community awareness campaign		-	-	c/o social cost	-	-
A.4 Resettlement, compensation		-	-	c/o resettlement cost	-	-
B. Construction Phase						
B.1 Implementation of environmental mitigation plan		c/o construction preliminaries & running costs	c/o construction preliminaries & running costs	-	-	-
C. Operation Phase						
C.1 Implementation of environmental mitigation plan		-	-	-	c/o operations running cost	-
Sub-Total	USD	-	-	-	-	-
	(thousand) MNT	-	-	-	-	-
Environmental Impacts Monitoring						
A. Pre-Construction Phase						
A.1 Establishment of baseline environmental data		-	-	2,055.00	-	-
B. Construction Phase						
B.1 Monitoring of air, noise, ground & surface water			15,480.00	-	-	-
B.2 Monitoring of community & workers' health and safety		-	1,000.00	-	-	-
B.3 Monitoring of C&D waste disposal		-	1,000.00	-	-	-
C. Operation Phase						
C.1 Monitoring of air, noise		-	-	-	1,520.00	-
C.2 Monitoring of community & workers' health and safety		-	-	-	500.00	-
Sub-Total	USD	-	17,480.00	2,055.00	1,520.00	-
	(thousand) MNT	-	24,506,960.00	2,881,110.00	31,616.00	-
Performance Monitoring						
A. PMO Environmental Safeguard Staff *		-	-	55,700.00	-	-
Sub-Total	USD	-	-	55,700.00	-	-
	MNT	-	-	78,091,400.00	-	-
Institutional Strengthening & Capacity Building						
A. Environmental Specialist ^	USD	-	-	-	-	38,850.00
B. Training	USD	-	-	-	-	300.00
Total	USD		17,480.00	57,755.00	1,520.00	39,150.00
					Grand Total USD	114,385.00
					(thousand) MNT	160,367,770.00

1 US$ = 1,402 MNT (as of March 2013)

* Salary for 4 years starting at USD 1,000 at 10% ncrease annually.

^ Assumed 3.25 months (spread in 2-3 years) of combined international & national consultant inputs, includes fees, per diem, visa, transport.

Note: Environmental impact monitoring during operation is estimated for 10 years of monitoring only.

ENVIRONMENTAL MANAGEMENT PLAN

291. An environmental management plan (EMP) has been developed, which will be the framework for the environmental management of the Project 1 components that will commence from detailed design phase through to operation. The EMP is featured herein as **Annex E**. The EMP will be updated based on the detailed design, with technical assistance from the Environmental Specialist of the Project Implementation Support (PIS) Team. The EMP will be carried out by the detailed design Consultant, the PMO, Contractors for civil works, and the USUG.

292. The institutions that will have major and minor roles in environmental management include the: (i) Municipality of Ulaanbaatar (MUB) as the executing agency and implementing agency of the program; (ii) subcenter redevelopment authority (SRA)**,** set up under the jurisdiction of the Vice Mayor for Urban Development and Investment within MUB as a city owned enterprise; (iii) Ulaanbaatar Water and Sewerage Authority (USUG) as a sub-implementing agency; (iv) project steering committee (PSC); (v) program management office (PMO); (vi) project implementation support (PIS) team and its environmental specialist; (vii) the Asian Development Bank (ADB); (viii) Design Consultant; (ix) Civil Works Contractors; (x) Ministry of Environment and Green Development (MEGD); and (xi) Concerned Khoroo Government Units. Main responsibilities for implementation and coordination of the EMP are defined in **Table E-1 of Annex E**.

293. **Institutional Strengthening and Training**. Capacity building will be implemented through the environmental specialists that will be engaged under the program Implementation Support (PIS); and the Capacity Development Program under the Institutional Strengthening and Capacity Development Component. While carrying out technical assistance, the PIS environmental specialists will conduct lectures/seminars on topics relevant to EMP implementation and will ensure that the EMP implementation will be a “hands-on” training for the PMO, particularly its environmental safeguard staff, as well as the MUB, SRA and USUG. The Capacity Development Program shall invite external experts to conduct lectures/seminars on other environmental management topics such as Climate Change Adaptation, Good Engineering Practices as Mitigation measures, and other relevant topics that would be requested by the MUB, PMO, SRA and USUG. The institutional strengthening and training component of the EMP is presented in **Table E-5** of the EMP (**Annex E**).

CONCLUSION & RECOMMENDATION

Project Benefits

294. The preparation and full implementation of a Contractor EMP (C-EMP) that addresses as minimum the requirements of the SPS-compliant P1-EMP will mitigate the impacts to acceptable levels. Standard mitigation measures, basically integral to socially and environmentally responsible construction practices, are commonly used these days in construction sites in urban setting of Mongolia and are known to Contractors. Hence measures to reduce impacts to acceptable levels would not be difficult to plan, design and institute.

295. The proposed Project 1 projects will transform the “under-serviced”, into adequately serviced, subcenters, which will hasten the qualitative improvement of the living environment in Bayankhoshuu and Selbe Subcenters.

296. Based on the IEE, the classification of Project 1 as Category ‘B’ is confirmed. No further special study or detailed EIA needs to be undertaken to comply with the Safeguard Policy Statement of the ADB. In compliance with GOM regulations, Project 1 has obtained approval for two DEIA reports on 17 October 2013. The DEIAs has been disclosed to the affected communities by the MUB.

Major Environmental Impacts and Mitigation Measures and Management Plan

297. The IEE concludes that Project 1 projects are not environmentally critical. The major impacts will mainly arise during construction. These impacts are assessed to be highly site-specific, temporary and will not be sufficient to threaten or weaken the surrounding resources.

298. The extent of **adverse impacts during construction** is expected to be largely local, confined within the project footprints and their immediate vicinities. During windy and dry weather, suspended particles in the entire Ulaanbaatar City is normally high due to the dry and loose top soil which is easily blown by wind action. With proper measures in place, there should be least magnitude of construction stockpiles of fine aggregates and residual soils and generated wastes that would be transported beyond the above mentioned project’s main and extended areas of influence during strong winds and heavy rainfall. Hence, it can be concluded that adverse impacts during construction would be highly site-specific.

299. The few significant adverse impacts during construction will be temporary and short-term (i.e., most to occur only during peak construction period, estimated to last 20-30% of the construction period). These will not be sufficient to threaten or weaken the surrounding resources. The preparation and implementation of a Contractor’s EMP (C-EMP) that would

address as minimum the requirements of the P1-EMP will mitigate the impacts. Standard mitigation measures, basically integral to socially and environmentally responsible construction practices, are commonly used at construction sites in urban setting and are known to Contractors. Hence, mitigation measures would not be difficult to design and institute.

300. **During operation**, main potential environmental impacts relate to the operation of the heating systems, and other works to a lesser extent. Potential adverse impacts during operation of the Heat-Only Boilers (HOBs) include (i) pollutants emission from the HOBs, (ii) noise from the HOBs, (iii) wastewater, and (iv) solid waste of ash and slag. The operation of the HOBs in Selbe and Bayankhoshuu Subcenters will emit particulate matters (PM), SO2 and NOx, the concentrations of which will be influenced by the quality of coal burned, the flue gas volume and the type and performance of the flue gas treatment equipment.

301. **Environmental management plan (EMP).** The P1-EMP contains an Environmental Mitigation Plan and Environmental Monitoring Plan. It fully addresses the potential impacts and risks arising from Project 1 implementation. It specifies the mitigation measures that: (i) are inherent to good engineering and construction practices and are therefore not be difficult to institute, and (ii) involve consultation, coordination and collaboration with local authorities and communities. The P1-EMP further specifies the roles and responsibilities of institutions in overall environmental management to ensure the reduction of adverse impacts to acceptable levels. It requires the formulation of Contractor EMPs (C-EMP) with complete management plans for adverse impacts, e.g., dust control, noise control, traffic management, addressing as minimum the requirements of the SPS-compliant P1-EMP, and the C-EMP to be cleared by the PMO. It requires a full time environmental safeguard staff in the PMO to oversee EMP implementation, including the observance of the GRM. Under the Institutional Strengthening and Capacity Development Component of Project 1, capacity development in environmental management will be carried out and policy and regulatory reforms in the WSS and Heating sectors to ensure sustainable operation, maintenance and repair of the completed water supply, sanitation and heating infrastructures.

Project Risks and Assurances

302. The main project risks related to environment include (i) weak capacity of implementing and sub-implementing agencies in environmental management, which poses risk for a failed EMP implementation; (ii) the financial difficulties of USUG (operator for water supply and sewerage), which poses risks for EMP implementation to fail during operation; (iii) the 24hour daily work normally expected from contractors in UB poses risk for noise at night time to exceed standard limits; (iv) higher dust and noise levels, which poses risk for increased health hazard; (v) increased traffic congestion, which poses risks for longer travel time, longer delivery of people, goods and services; (vi) health and safety hazards, which pose risks to the lives of

communities and construction workers; (vii) the significant demand for aggregate materials which poses risks for illegal quarries/extraction of aggregate materials; (viii) spill of sediments and wastes onto crossing and/or adjacent water bodies; which poses risks for increased deterioration of surface water quality.

303. Most of these risks have been addressed through sound environmental management planning. The P1-EMP was formulated to ensure that risks are reduced to acceptable levels. In order that the In addition, the various levels of participating government units have agreed on the following assurances.

304. MUB shall ensure the preparation, design, construction, implementation, operation and decommissioning of the Project 1 projects to comply with all applicable laws and regulations of the Government of Mongolia relating to environment, health and safety; ADB's Safeguard Policy Statement 2009; and all measures and requirements set forth in the IEE, the EMP, and any corrective or preventative actions set forth in the Annual Environmental Monitoring Report and ADB comments on it.

305. The MUB shall ensure that: (a) all bidding documents include the SPS-compliant P1-EMP; (b) selected Contractors will be required to prepare a detailed C-EMP that addresses as minimum the requirements of the P1-EMP; (c) C-EMP will be evaluated quantitatively and qualitatively against the P1-EMP and cleared by PMO and PIS prior to commencement of any work on site; (d) the Contracts for civil works explicitly stipulate the obligation of Contractors (and his/her subcontractors) to institute the mitigation measures properly according to the cleared C-EMP; and (e) the Contract for civil works stipulate some tie up of progress payment and collection of performance bind with the performance in C-EMP implementation.

306. MUB shall make available a budget for: (a) a full time qualified environmental safeguard staff in the PMO who shall oversee the EMP implementation; (b) the implementation of mitigation measures in the EMP that are under the responsibility of the PMO; (c) the implementation of corrective actions recommended in the Annual Environmental Monitoring Report; (d) environmental monitoring by a licensed institute in accordance with the SPS-compliant P1-EMP; (d) the preparation of the periodic environmental monitoring reports by the PMO; (e) necessary communication and reporting equipment and systems for effective EMP implementation and GRM observance; and (f) all other official costs to be carried out by the PMO in adherence to the requirements set out in the EMP.

307. MUB shall cause the PMO to: (a) implement all mitigation measures prescribed in the P1-EMP as under the responsibility of the PMO; and (b) provide the MUB with a written notice of any unanticipated environmental risks or impacts that arise during construction and/or operation and that were not considered in the IEE or the T-1EMP.

308. The MUB shall: (a) submit annual Environmental Monitoring Reports to ADB and disclose relevant information from such reports to affected persons upon submission; (b) review any changes to the project design that may potentially cause negative environmental impacts, and in consultation with ADB, revise environmental mitigation and monitoring measures as necessary to assure full environmental compliance. MUB will provide to ADB within 60 days, justification for any proposed changes to the mitigation measures required during design, construction, and operations, for safety or emergency reasons; and (c) report any actual or potential breach of compliance with the measures and requirements set forth in the P1-EMP after becoming aware of the breach.

309. MUB shall (a) select legally operated borrow pits and spoil disposal sites appropriate to the scale of the required borrow soil and the spoil generated prior to start of construction mobilization; (b) formally endorse such sites as being consistent with the P1-EMP requirements; (c) manage the sites in accordance with the P1-EMP prescriptions; (d) require waste contractors to submit manifest for every disposal at the MUB-selected disposal sites.

310. MUB shall cause the Design Consultants to ensure adequate incorporation of: (a) seismicity factors; and (b) climate change impact factors.
MUB shall ensure that the heat-only boilers comply with the most recent national standards MNS 6298:2011 and regular ambient air quality and staff emission monitoring is conducted and reported to ADB.

311. MUB shall ensure that the services of a licensed institute is procured to: (a) conduct periodic monitoring of air quality, surface and groundwater quality and noise level in accordance with the Environmental Monitoring Plan of the P1-EMP and (b) submit quarterly environmental monitoring reports to the MUB.

312. MUB shall cause the PMO to ensure that the contractors will: (a) implement an awareness and prevention training for all its workers on the risks, hazards, impacts and prevention of transmittable/communicable diseases, e.g., HIV/AIDS, SARS, AH1/N1; (b) provide necessary measures and facilities to ensure the safety and health of its workers; (c) require workers to submit to physical examination/tests and provide Contractors with results for the health baseline data of workers; (d) enforce upon workers to observe local customs concerning acceptable social behavior; and (e) enforce upon workers to observe sanitation practices and wearing of prescribed protective wears while in the construction premises.

313. MUB shall cause the PMO to ensure that the capacity-building program described in the P1-EMP is implemented as planned.

314. MUB shall ensure that no proceeds of the Loan are used to finance any activity included in the list of prohibited investment activities provided in Appendix 5 of the SPS 2009.

Overall Conclusion

315. The proposed components under Project 1 were defined through a highly consultative and participatory process. Considering the 'underserviced' state of the Project 1 Subcenters, the affected communities positively anticipate that the proposed interventions will improve their living environment.

316. The IEE and its P1-EMP have been disclosed during joint social-environmental public meetings with affected communities. Opinions and concerns have been taken into account, as relevant and appropriate. Adverse impacts arising from Project 1 implementation will be avoided, mitigated to acceptable levels following the SPS-compliant P1-EMP. Institutional strengthening and capacity development will be conducted for overall environmental sustainability of Project 1 projects.

317. Based on the IEE, the classification of Project 1 as Category B is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with the Safeguard Policy Statement of the ADB.

ANNEX A: KEY ENVIRONMENTAL QUALITY STANDARDS

Table A-1: Ambient Air Quality Standards

Parameter	MNS 4585:2007		EHS Guidelines. World Health Organization (WHO). Air Quality Guidelines Global Update, 2005)	
SO_2	24-hour	20	24-hour	125 (Interim target-1)
				50 (Interim target-2)
				20 (guideline)
	10 minute	500	10 minute	500 (guideline)
NO_2	1-year	30	1-year	40 (guideline)
	24-hour	40	24-hour	-
	20-min	85	1-hour	200 (guideline)
PM_{10}	1-year	50	1-year	70 (Interim target-1)
				50 (Interim target-2)
				30 (Interim target-3)
				20 (guideline)
	24-hour	100	24-hour	150 (Interim target-1)
				100 (Interim target-2)
				75 (Interim target-3)
				50 (guideline)
$PM_{2.5}$	1-year	25	1-year	35 (Interim target-1)
				25 (Interim target-2)
				15 (Interim target-3)
				10 (guideline)
	24-hour	50	24-hour	75 (Interim target-1)
				50 (Interim target-2)
				37.5 (Interim target-3)
				25 (guideline)
CO	Average in 1 hour	30g/m3	No standard	

Interim targets are provided in recognition of the need for a staged approach to achieving the recommended guidelines.

Table A-2: Noise Level Standards

Receptor	MNS 4585:2007		EHS Guidelines (Guidelines for Community Noise, World Health Organization (WHO), 1999)	
Residential, institutional, educational	07:00 - 23:00	60 dB(A)	07:00 - 22:00	55 dB(A)
	23:00 - 07:00	45 dB(A)	22:00 - 07:00	45 dB(A)

Table A-3: Surface Water Quality Standards

Parameter	MNS 4586-98	
pH		6.5-8.5
DO	mgO/l	not less than 6&4 *
BOD	mgO/l	3
NH_4-N	mgN/l	0.5
NO_2-N	mgN/l	0.002
NO_3-N	mgN/l	9
PO_4-P	mgP/l	0.1
Cl	mg/l	300
F	mg/l	1.5
SO_4	mg/l	100
Mn	mg/l	0.1
Ni	mg/l	0.01
Cu	mg/l	0.01
Mo	mg/l	0.25
Cd	mg/l	0.005
Co	mg/l	0.01
Pb	mg/l	0.01
As	mg/l	0.01
Cr	mg/l	0.05
Cr^{6+}	mg/l	0.01
Zn	mg/l	0.01
Hg	mg/l	0.1
Oil	mg/l	0.05
Phenol	mg/l	0.001
Active and washing substances	mg/l	0.1
Benzapyren	Mkg/l	0.005

* DO >6 mgO/l for summer time and DO >4 mgO/l for winter time

Table A-4: Groundwater Quality Standards

Parameter	MNS 900:2005		WHO Guidelines for Drinking Water Quality, Fourth Edition. 2011	
Na^+	mg/l	200		None established
K^+	mg/l	200		None established
Ca^{2+}	mg/l	100		-
Mg^{2+}	mg/l	30		-
$S0_4^{2}$	mg/l	500		None established
HCO_3	mg/l	-		-
CO_3^{2}	mg/l	-		-
Cl	mg/l	350	mg/l	5
P	mg/l	0.7-1.5		-
Br		-		None established
Test, by mark	mg/l	2		-
Color	degree	20°		None proposed
Odor	mark	2		-
pH		6.5-8.5		None established
Electric Conductivity Y S/st		-		-
General Minerals		1000		-
Hardness	mg-eqv/l	7		None established
Acidity potential	mB			-
Solid remains	g/l	1		-
NH_4	mg/l	1.5		None established
NO_3	mg/l	50	mg/l	50
NO_2	mg/l	1	mg/l	3
PO_4	mg/l	3.5		-
As	mg/l	0.01	mg/l	0.01
Fe	mg/l	0.3		None established
Pb	mg/l	0.03	mg/l	0.01
Ni	mg/l	0.02	mg/l	0.07
Cr	mg/l	0.05	mg/l	0.05
Cu	mg/l	0.1	mg/l	2
Zn	mg/l	5		None established
Mn	mg/l	0.1		None established
Cd	mg/l	0.003	mg/l	0.003
Hg	mg/l	0.0005	mg/l	0.006
B	mg/l	0.5	mg/l	2.4
Ba	mg/l	0.7	mg/l	0.7
Mo	mg/l	0.07		None estabished
Se	mg/l	0.01	mg/l	0.04
E.coli or thermotolerant coliform bacteria		-		Must not be detectable in any 100 ml sample.

MNS 900:2005, Drinking Water Hygienic Requirement and Qualtity Control is the stadard used for groundwater supply, which is the source for drinking water supply in Mongolia.

Table A-5: Soil Quality Standards

Parameter	MNS 5850 :2008			
	Soil Mechanical Composition			Maximum Acceptable Amount
	Clay	Loamy	Sandy	
Pb	100	70	50	100
Cd	3	1.5	1	3
Hg	2	1	0.5	2
As	6	4	2	6
Cr	150	100	60	150
Cr^{6+}	4	3	2	4
Sn	50	40	30	50
Sr	800	700	600	800
V	150	130	100	150
Cu	100	80	60	100
Ni	150	100	60	150
Co	50	40	30	50
Zn	300	150	100	300
Mo	5	3	2	5
Se	10	8	6	10
B	25	20	15	25
F	200	150	100	200
CN	25	15	10	25

Table A-6: Boiler Emission Guidelines

Guideline	Parameter (in mg/Nm3)			
	MNS 6298:2011		EHS Guidelines *	
SO_2	mg/m^3	400 urban 600 remote areas	mg/Nm^3	2000
NO_x	mg/m^3	450-1,100 based on volatile coal	mg/Nm^3	650
PM	mg/m^3	50-200	mg/Nm^3	50-150
Dry Gas Excess O_2 content	-	-	%	6

* Small Combustible facilities Emission Guidelines (3MWth-50MWth) - for Boilers using solid fuel

MWth - Megawatt thermal

Nm^3 is at one atmospheric pressure, 0°C.

ANNEX B: CLIMATE DATA

Table B-1: Selected Climate Data

Period	Month												Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Average Air Temperature, oC (Ulaanbaatar Sta.)													
1978-2008	-21.7	-16.7	-7.6	1.8	10.0	15.8	18.2	16.0	9.3	0.6	-11.0	-19.0	-0.36
1978-1990	-21.5	-17.6	-8.5	0.9	9.8	14.7	16.9	14.8	8.4	0.5	-11.3	-18.7	-0.97
1991-2008	-21.8	-16.0	-6.9	2.4	10.2	16.5	19.1	16.8	9.9	0.6	-10.8	-19.3	-0.06
Average change	0.3	1.6	1.6	1.5	0.5	1.8	2.3	2.0	1.5	0.1	0.5	0.6	0.91
Rainfall, mm * Mean rainfall, mm 1961-1990 **	1.1	1.7	2.7	8.3	13.4	41.7	57.6	51.6	26.2	6.4	3.2	2.5	216.4
Relative humidity % ^													
average morning	83	81	74	66	64	73	78	80	76	75	79	83	76
average evening	71	65	50	40	37	43	50	49	46	48	60	72	53
Sunshine hours, mean daily 1961-1990 **	5.7	7.3	8.6	8.8	9.7	9.0	8.0	8.3	8.2	7.3	5.9	5.0	7.7
Wind speed, 2005 m/sec ^^	1.6	21.	2.9	3.9	4.4	3.5	3.1	2.6	2.9	2.6	2.0	1.6	2.8

* National Statistical Yearbooks 2003, 2007, 2010. National Statistics Office of Mongolia.

** Hong Kong Observatory www.hko.GOM.hk/wxinfo/climat/world/eng/asia/china/ulaanbaatar_e.htm# (Location of weather station, 47.9 N, 106.9 E, altitude: 1306 m.

^ www.weatherbase.com

^^ 2007-Environmental Outlook of the Ulaanbaatar City. Asia-Pacific Global Environmental Outlook, Data Portal Project. 2006-2010, UNEP. October 2009.

Table B-2: Climate Data (2008-2012) - Ulaanbaatar Meteorological Station

Average air temperature (°C)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	-23.6	-17.7	-2.4	5.2	8.2	17.4	20.3	17.8	10.9	1.5	-7.1	-19.1
2009	-20.5	-17.3	-7.5	7.2	12.3	16.8	19.3	16.8	10.1	1.2	-13.5	-20.9
2010	-23.6	-20.8	-11.5	-2.2	12.1	19.4	21.7	15.6	12.2	1.6	-8.9	-19.2
2011	-23.8	-15.6	-9.6	4.2	8.2	17.3	17.4	18.4	8.0	3.7	-10.4	-22.1
2012	-25.5	-20.2	-8.0	2.7	11.5	15.2	18.0	15.9	11.6	0.2	-12.3	-22.4

Extreme maximum air temperature (°C)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	-11.8	1.9	11.0	26.7	28.6	34.0	34.8	33.6	24.7	15.8	7.4	-6.7
2009	-6.8	0.0	6.9	24.1	29.8	30.0	33.3	32.5	28.7	17.9	9.5	-5.0
2010	-6.6	-4.6	7.8	22.3	29.5	38.3	37.4	29.9	31.5	21.6	8.1	-3.0
2011	-10.5	0.8	12.6	23.5	27.2	32.1	29.7	31.8	23.9	22.0	9.3	-11.3
2012	-11.6	-6.4	14.0	21.7	29.5	32.7	29.4	30.9	27.4	17.8	8.1	-9.5

Extreme minimum air temperature (°C)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	-33.8	-31.6	-18.1	-10.2	-5.3	1.8	9.2	2.2	-3.6	-14.0	-20.0	-31.8
2009	-32.9	-33.3	-25.7	-8.1	-4.0	1.8	10.2	4.2	-4.4	-12.7	-25.5	-33.6
2010	-35.7	-33.1	-29.1	-17.0	-1.5	3.3	7.3	3.2	-5.3	-9.8	-23.9	-33.2
2011	-32.5	-27.5	-27.1	-10.2	-5.4	5.9	6.1	5.7	-6.9	-7.7	-24.6	-31.3
2012	-37.0	-34.4	-23.9	-9.7	-2.0	4.0	7.3	0.0	-1.9	-14.1	-28.4	-32.9

Total precipitation (mm)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	2.2	0.9	2.3	1.4	12.4	67.2	69.1	41.3	14	10.8	0.7	6.2
2009	0.9	2.8	3.8	2	39	31.1	118	47.3	13.8	8.1	1.8	5.5
2010	2.3	4.4	7.2	1.1	25.7	23.3	79.6	65.8	8.9	12.6	7.6	1.2
2011	1.4	8.2	0.4	11	27.4	77.3	58.3	43.9	7.6	10.5	11.7	2.1
2012	0.7	1.4	0.9	6.5	9	70.1	106.8	56.7	17.5	3.8	7.8	6.2

Maximum precipitation (mm/day)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	1.2	0.5	1.2	0.9	3.0	28.6	25.7	30.6	5.0	7.2	0.5	1.1
2009	0.9	1.9	2.9	2.0	33.1	14.7	44.8	13.8	5.9	6.0	1.4	2.0
2010	0.5	3.4	2.2	0.9	21.8	7.9	25.1	34.3	5.9	5.9	2.1	0.8
2011	0.6	2.4	0.4	9.4	8.0	30.9	21.3	11.5	5.9	5.5	5.8	1.1
2012	0.3	0.8	0.5	3.8	2.8	20.7	21.9	16.5	10.1	1.7	3.5	1.8

Average relative humidity (%)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	82	74	47	35	36	49	52	49	51	60	62	68
2009	68	60	51	34	36	44	57	59	50	59	69	69
2010	65	65	61	45	35	45	50	57	49	56	69	68
2011	69	70	59	37	48	49	61	55	49	57	65	77
2012	76	73	57	39	33	50	60	58	46	53	61	64

Minimum relative humidity (%)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	60	31	15	6	7	10	17	11	12	11	22	41
2009	40	31	12	6	8	7	14	16	11	17	23	47
2010	29	29	29	11	8	6	13	16	14	14	32	39
2011	42	43	11	7	9	8	18	12	12	13	18	59
2012	60	44	13	12	12	14	24	17	13	18	14	45

Maximum relative humidity (%)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008				94	98	94	92	97	95	99	90	92
2009	85	85	91	94	98	95	95	96	97	97	89	88
2010	79	85	94	86	95	96	97	98	93	97	96	92
2011	79	90	85	96	96	97	96	98	88	85	84	84
2012	82	81	84	87	83	84	84	87	80	88	82	78

Total sunshine duration (hours)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	160.4	231.1	240.5	268.4	285.3	209.0	307.4	304.1	254.3	216.9	214.5	164.3
2009	198.4	223.3	269.9	265.2	304.1	277.6	231.7	275.1	251.5	212.4	196.2	151.2
2010	171.0	200.6	229.4	280.7	316.0	253.5	265.1	266.6	281.6	214.8	168.0	152.4
2011	191.1	203.8	284.4	295.4	282.4	259.3	285.8	252.0	278.5	236.4	187.1	159.7
2012	183.4	241.4	285.7	270.1	311.8	257.7	223.2	244.6	245.0	200.8	153.8	94.4

Average wind speed (m/sec)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	0.9	1.1	2.0	3.2	3.3	3.1	2.9	2.8	2.8	2.5	1.9	1.6
2009	1.4	2.3	2.6	3.0	3.5	3.5	3.1	2.9	3.0	2.4	1.8	1.8
2010	1.9	2.1	2.8	2.9	3.6	3.3	3.1	2.8	2.7	2.1	1.9	1.7
2011	1.3	1.8	2.3	3.1	3.2	3.0	2.8	2.7	2.6	2.2	2.0	1.2
2012	1.2	1.8	2.4	3.2	3.4	2.7	2.3	2.8	2.5	2.2	2.1	1.7

Maximum wind speed (m/sec)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	7	8	14	21	20	30	21	24	16	16	14	17
2009	14	19	18	20	19	21	20	17	20	16	15	18
2010	13	22	19	19	22	25	17	22	14	14	20	13
2011	10	11	20	19	23	20	18	18	19	16	13	9
2012	10	13	17	20	19	20	17	20	20	14	13	13

Prevailing wind direction

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	E	E	N	N	N	E	E	N	WN	E	W	WN
2009	ES	ES	E	N	W	WN	E	E	WN	W	E	ES
2010	W	ES	E	N	WN	E	E	WN	E	WN	ES	WN
2011	W	ES	WN	WN	WN	E	WN	E	N	E	ES	ES
2012	W	W	W	W	WN	WN	EN	WN	E	WN	E	E

ANNEX C: ENVIRONMENTAL QUALITY DATA

Table C-1: Water Quality of Tuul River and Selbe River, 2011 & 2012

Tuul River - Bayanzurkh Bridge

Date	pH	EC	Weig	DO	BOD_5	COD	SO_4	NH_4	NO_2	NO_3	Pmineral	F	Fe	Cr /VI
5/4/2011	7.47	70.80	0.40	10.90	5.60	5.20		0.15	0.00	0.25	0.03	0.17	0.03	-
6/8/2011	6.53	56.90	-	8.22	1.90	4.40		0.09	0.01	0.08	0.05	0.24	0.03	
7/20/2011	7.13	72.70	26.40	7.11	1.30	5.00	1.00	0.15	0.00	0.39	0.01	0.46	0.02	
8/17/2011	6.54	70.50	1.80	7.47	1.11	2.50		0.10	0.00	0.08	0.01	0.17	0.01	
9/21/2011	7.64	78.00	2.00	9.26	3.90	2.00	3.20	0.08	0.00	0.10	0.01	0.18	0.01	
10/19/2011	7.22	84.70	0.80	9.11	2.80	1.40		0.04	0.00	0.25	0.00	0.58	0.03	
11/16/2011	7.33	88.70	-	8.64	2.60	1.20	16.00	0.49	0.01	0.01	0.02			
12/6/2011	7.27	87.30	2.60	8.01	0.80	0.80	6.90	0.02	0.00	0.40	0.00	0.26	0.04	
4/4/2012	7.51	139.10	3.60	4.71	1.26	3.80	19.80	0.37	0.02	0.64	0.01	0.04	0.07	
5/2/2012	8.04	76.40	21.80	9.95	2.70	4.30	6.60	0.10	0.00	0.20	-	0.14	0.04	0.01
6/6/2012	7.18	106.00	4.20	8.24	1.25	4.80	4.30	0.12	0.01	0.07	0.00	0.04	0.03	0.00
7/4/2012	6.17	62.00	5.80	6.88	2.90	3.30	1.60	0.14	0.00	0.32	0.03	0.03	-	
8/22/2012	7.25	61.90	5.20	9.20	3.44	5.40	2.40	0.20	0.01	0.33	0.00	0.05	0.09	
9/19/2012	7.48	77.90	2.40	7.90	1.11	4.30	2.70	0.11	-	0.17	0.00	0.10	-	
10/17/2012	7.11	106.60	-	8.53	5.84	2.50	2.40	0.12	0.00	0.34	0.00	0.05	-	-
11/14/2012	7.65	88.80	-	9.24	2.92	2.70	8.20	0.06	0.00	0.36	0.01	0.14	-	-
MNS 4586:1998	6.5-8.5	-	-	Not less than 6&4	3	10	100	0.5	0.02	9	0.1	1.5	-	0.01

Bayanzurkh Bridge is located upper part from Zaisan post. It is east of confluence of Selbe River with Dund Gol River.

Tuul River - Zaisan

Date	pH	EC	WB	DO	BOD_5	COD	Hardness	SO_4	NH_4	NO_2	NO_3	Pmineral	F	Fe
5/4/2011	7.84	60.70	-	11.22	5.90	5.20	0.53	2.50	0.13	0.00	0.16	0.01	0.14	0.04
6/8/2011	6.67	55.40	3.40	7.90	1.10	4.00		2.80	0.09	0.01	0.13	0.01	0.07	0.02
7/20/2011	8.09	68.30	8.00	8.06	2.60	3.80	0.70	1.60	0.14	0.00	0.55	0.00	0.37	0.02
8/17/2011	7.07	71.40	2.40	7.63	0.60	2.20		1.40	0.04	0.00	0.07	0.00	0.18	0.01
9/21/2011	8.27	77.30	4.00	8.64	1.90	2.00	0.78	2.60	0.04	0.00	0.04	0.01	0.18	0.03
10/19/2011	7.50	75.80	4.00	8.64	2.30	2.00			0.04	0.00	0.43	0.03		0.04
11/16/2011	7.26	85.10	0.40	11.15	2.60	1.20		15.40	0.02	0.00	-	0.04		
5/2/2012	8.70	81.40	26.60	7.58	0.60	3.50		5.90	0.11	0.01	0.32	0.01	0.16	0.02
6/6/2012	7.46	59.80	10.60	6.28	1.34	2.80	0.51	17.10	0.11	0.00	0.08	0.00	0.11	0.07
7/4/2012	8.15	64.00	1.60	7.66	3.53	4.40	0.57	7.50	0.28	0.00	0.44	0.01	0.03	-
8/22/2012	7.15	63.60	6.20	7.20	0.72	4.80	0.53	1.00	0.24	0.01	0.39	0.00	0.10	-
9/19/2012	8.13	78.90	0.20	7.27	0.79	4.30	0.55	3.20	0.09	0.01	0.20	0.00	0.08	-
10/17/2012	7.30	94.70	4.80	12.01	5.69	8.70		1.20	0.09	0.00	0.79	0.00	0.14	-
11/14/2012	7.50	100.40	-	6.32	2.84	2.40	0.87	5.60	0.05	0.00	0.59	0.01	0.21	-
MNS 4586:1998	6.5-8.5	-	-	Not less than 6&4	3	10	-	100	0.5	0.02	9	0.1	1.5	-

Zaisan is inthe area of confluence of Selbe River with Dund Gol River.

Selbe River at Ulaanbaatar

Date	pH	EC	WB	DO	BOD_5	COD	Hardness	SO_4	NH_4	NO_2	NO_3	Pmineral	F	Fe	Cr /VI
4/6/2011	7.58	284.00	10.60	10.27	6.00	10.40	2.21	7.00	1.30	0.06	0.97	0.07	0.10	0.12	0.02
5/4/2011	7.65	286.00	257.00	8.06	6.80	11.60	2.54	33.60	0.54	0.03	1.02	0.03	-	0.74	0.01
6/8/2011	8.12	297.00	4.40	5.21	0.63	4.70	0.78	12.40	0.21	0.02	1.21	0.01	0.18	0.05	
7/20/2011	8.01	374.00	32.40	7.27	3.00	6.50	2.95	68.30	0.18	0.03	1.76	0.00	0.65	0.04	
8/17/2011	6.86	250.00	12.00	8.35	1.59	3.60	2.17	49.30	0.05	0.13	1.80	0.03	0.31	-	
9/21/2011	8.65	708.00	1.00	8.79	2.50	3.00	5.00	11.30	0.04	0.02	0.32	0.01	0.22	-	
10/19/2011	7.35	412.00	7.40	8.32	2.20	2.50	3.81	42.90	0.17	0.02	7.05	0.01	1.56	0.07	
5/2/2012	8.98	331.00	21.80	9.32	5.70	2.90	2.77	2.70	0.10	0.01	0.32	-	0.11	0.05	0.01
6/6/2012	7.29	191.50	15.60	5.65	1.33	4.60	1.70	7.00	0.52	0.04	0.40	0.01	0.12	0.15	0.01
7/4/2012	8.09	140.00	1,010.80	5.51	4.90	26.00	1.31	40.60	0.25	0.26	5.45	0.17	0.30		
8/22/2012	7.61	239.00	77.40	7.52	2.72	12.40	1.68	7.70	0.39	0.09	0.65	0.02	0.28	0.02	
9/19/2012	8.46	428.00	11.00	8.06	2.37	5.80	3.15	33.10	0.10	0.00	0.12	0.00	0.31	-	
10/17/2012	7.60	600.00	3.20	12.48	6.79	11.80	4.06	86.80	0.14	0.03	9.00	0.01	0.32	0.01	0.01
MNS 4586:1998	6.5-8.5	-	-	Not less than 6&4	3	10	-	100	0.5	0.02	9	0.1	1.5	-	0.01

Source: NAMHEM

Exceeded national standards

Table C-2: Air Quality in Songino Khairkhan, Sukhbaatar and at the City Center, 2011 & 2012

Songino Khairkhan District, 16 khoroo

2011	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MNS 4585:2007	WHO
SO_2	90	77	46	25	5	4	2	2	4	12	37	-	20	20
NO_2	No data												40	40

2012	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MNS 4585:2007	WHO
SO_2	111	79	33	13	12	5	1	2	3	17	44	99	20	20
NO_2	68	60	39	20	19	20	24	20	22	26	29	38	40	40

Sukhbaatar District, 10 khoroo

2011	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MNS 4585:2007	WHO
SO_2	133	110	66	41	25	18	9	7	11	29	96	245	20	20
NO_2	72	71	49	32	26	23	18	22	28	40	59	87	40	40
PM10	1,020	623	255	247	175	114	missing	215	215	254	679	1,549	100	50
CO	4,787	4,368	2,476	1,211	617	397	310	408	711	752	3,205	5,876	10,000	10,000
O_3	7	19	23	30	36	39	43	51	37	23	14	8	100	100

2012	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MNS 4585:2007	WHO
SO_2	208	140	56	26	11	8	5	3	4	16	50	100	20	20
NO_2	73	44	32	26	21	32	37	30	27	41	53	73	40	40
PM10	1,435	756	364	425	573	125	107	147	132	67	519	1,286	100	50
CO	5,501	3,851	2,062	1,319	593	397	331	144	578	771	missing	missing	10,000	10,000
O_3	2	5	18	33	38	38	21	21	23	41	8	5	100	100

Sukhbaatar District, 16 khoroo

2012	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MNS 4585:2007	WHO
SO_2	87	61	29	8	3	1	1	-	1	9	27	106	20	20
NO_2	52	47	23	17	18	16	13	13	15	21	26	44	40	40

West Crossroad, Bayangol District (UB Center)

2011	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MNS 4585:2007	WHO
SO_2	57	51	44	26	16	11	-	10	13	22	39	60	20	20
NO_2	127	148	126	115		55	50	58	58	65	94	139	40	40
CO	3,259	2,832	2,148	1,087	955	907	no data	981	960	1,853	2,271	3,266	10,000	10,000
PM10	430	235	190	190	150	92	109	117	128	158	158	374	100	50
PM2.5	459	273	120	53	43	43	51	30	33	109	122	271	50	25

2012	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MNS 4585:2007	WHO
SO_2	70	60	43	14	9	12	6	4	5	13	22	36	20	20
NO_2	no data	no data	no data	49	50	120	133	137	127	153	197	229	40	40
CO	2,894	2,514	1,832	1,245	1,105	1,083	1,038	396	509	575	1,229	1,656	10,000	10,000
PM10	307	334	162	177	153	104	115	143	144	209	174	312	100	50
PM2.5	no data	no data	no data	no data	no data	33	36	39	42	178	131	227	50	25

Exceeded international standard
Exceeded both national and international standards

Table C-3: Frequency of Daily Average Concentration Exceeding the National Standard Limits

Period	Monitoring Station	Parameter			
		SO2	NO2	PM10	PM2.5
05/2011	Around Misheel Expo Centre, Khan-Uul District	-	-	-	-
	Around the west crossroad, Bayangol District	6 times	13 times	22 times	6 times
	Around 1st khorooloi, Songino Khairkhan District	-	-	-	-
	Around the 13th khorooloi, Bayanzurkh District	1 time	3 times	2 times	2 times
	32nd Toirog	17 times	-	26 times	-
	Kharkhorin Market	9 times	1 time	21 times	-
	Offitseruudiin ordon	-	1 time	-	-
12/2012 (prelim)	Around Misheel Expo Centre, Khan-Uul District	-	-	-	-
	Around the west crossroad, Bayangol District	23 times	28 times	26 times	27 times
	Around 1st khorooloi, Songino Khairkhan District	28 times	12 times	-	-
	Around the 13th khorooloi, Bayanzurkh District	30 times	26 times	27 times	-
	32nd Toirog	31 times	29 times	28 times	-
	Kharkhorin Market	25 times	29 times	28 times	-
	Offitseruudiin ordon	31 times	12 times	-	-
01/2013	Around Misheel Expo Centre, Khan-Uul District	-	-	-	-
	Around the west crossroad, Bayangol District	30 times	31 times	30 times	25 times
	Around 1st khorooloi, Songino Khairkhan District	20 times	15 times	-	-
	Around the 13th khorooloi, Bayanzurkh District	30 times	30 times	-	-
	32nd Toirog	31 times	26 times	30 times	-
	Kharkhorin Market	29 times	28 times	29 times	-
	Offitseruudiin ordon	25 times	22 times	-	-

Source: Economic Sector Indicators. Social and Economic Situation of Mongolia. Statistical News. National Statistics Office of Mongolia. www.nso.mn

Table C-4: Air quality monitoring results in Khoroos (winter - Nov 2011 and January 2012)

District / Khoroo No.	November 2011				January 2012			
	CO	NO2	SO2	PM10	CO	NO2	SO2	PM10
Songino-Khairkhan 9	29.9	125	300	885	50.5	57.5	225	890
	11/16/2011. 18:40-19:10				1/20/2012. 20:20-20:50			
Chingeltei 18	25.69	140	275	494	30.7	207.5	475	1040
	11/21/2011. 21:20-21:50				1/23/2012. 19:55-20:25			
Sukhbaatar 14	63.36	225	860	1770	101.4	240	780	2780
	11/23/2011. 20:15-20:45				1/25/2012. 19:00-19:30			

Air Quality Index

Index estimation	Level of air quality	Color	Impact on health
0-50	Good, no impact.	**green**	Within standard
51-100	Minor	**yellow**	Within standard, might impact some persons (mainly with ozone-sensitivity).
101-150	Negative impact on vulnerable people	**orange**	Negative impact on health of vulnerable persons as (with lung or heart diseases)
151-200	Negative impact	**red**	Health is changed, vulnerable persons more impacted than others.
201-300	Highly negative impact	**pink**	All are affected from negative impact
301-500	Hazardous impact	**brown**	Harmful conditions and all are at risks.

Source: UB Air Quality Agency. Winter Measurement Results by Moving Station, AQMS-9000.

ANNEX D: NOTES OF 1ST ROUND OF CONSULTATION

318. The 1st round of consultation was through the household and business surveys under the PPTA's Socio-Economic Survey and Willingness to Pay for Services (SES-WTPS), which was conducted in 2012-2013 and wherein environmental questions were incorporated into the survey questionnaire. The relevant survey inquiries are those about access to and satisfaction with the existing basic services, satisfaction level with current social and environmental conditions, and priority environmental and infrastructure issues.

Household Survey

319. The Household Survey involved a total of 827 households, i.e., 431 households (representing 28% of the total population) from Bayankhoshuu Subcenter and 396 households (representing 34% of total population) from Selbe Subcenter.

Table D-1: Household Survey Respondents

Indicators	Total	Subcenter	
		Bayankhoshuu	Selbe
Households surveyed			
Total	827	431	396
Proportion (%)	100.0	52.1	47.9
Household heads' average age	46.4	46.6	46.0
Household heads' gender, %			
Male	82.1	84.3	80.5
Female	17.9	15.7	19.5

320. Some relevant findings from the household survey are presented in the description of socio-economic environment (Chapter V).

Business Survey

321. The Business Survey involved 182 selected business units, of which 92 (50.5%) are in Bayankhoshuu Subcenter and 49.5% are in Selbe Subcenter.

Table D-2: Profile of Business Survey Respondents

Indicators	Total	Subcenter	
		Bayankhoshuu	Selbe

Indicators	Total	Subcenter	
		Bayankhoshuu	Selbe
Business units surveyed			
Total	182	92	90
Proportion (%)	100.0	50.5	49.5
Respondents' average age	42	42	42
Respondents gender, %			
Male	42.9	42.4	43.3
Female	57.1	57.6	56.7
Respondents' designation, %			
Owner	76.9	65.2	88.9
Executive Director	19.8	32.6	6.7
Employee	3.3	2.2	4.4
Respondents' educational level, %			
Primary school	1.1	2.2	-
Basic	6.6	6.5	6.7
Secondary	41.2	30.4	52.2
Vocational/ technical education	8.8	10.9	6.7
Tertiary/Bachelor's degree	39.0	44.6	33.3
Postgraduate degree	3.3	5.4	1.1

Environmental Issues Raised By Surveyed Business Units

322. Twenty-eight percent (28%) of the surveyed business units are highly satisfied with the current social and environmental conditions in the area where they run their businesses; 52% are moderately satisfied; and 20% are not satisfied. Nearly 75% of the respondents raised air pollution; at least 45% raised electricity problems, soil pollution and inadequate street lighting; and 34% raised poor access to safe potable water and absence of sidewalk, as reasons for the moderate and non-satisfaction. Heating services came out to be the priority need, followed by sanitation and water.

Table D-3: Environmental Issues raised by Surveyed Business Units

Environmental Issues	Total	Subcenter	
		Bayankhoshuu	Selbe
What is your satisfaction level with the current social and environmental conditions in this area?			
Moderately Satisfied	52.2	62.0	42.2
Highly satisfied	28.0	16.3	40.0
Not satisfied	19.8	21.7	17.8
If not highly satisfied what is the problem?			

Environmental Issues	Total	Subcenter	
		Bayankhoshuu	Selbe
Poor air quality	74.0	75.3	72.2
Electricity problem	47.3	51.9	40.7
Soil pollution	46.6	45.5	48.1
Not enough lighting	45.0	50.6	37.0
Poor access to safe potable water	34.4	33.8	35.2
No sidewalk	34.4	41.6	24.1
Poor environment around bus stop	28.2	19.5	40.7
Poor road network within community	21.4	23.4	18.5
Soil erosion	19.1	16.9	22.2
Flood	19.1	18.2	20.4
Inadequate police service	14.5	19.5	7.4
Poor transportation service	6.9	6.5	7.4
What do you consider as priority environmental and Infrastructure issues?			
Heating system	78.6	77.9	79.6
Sanitation system	67.9	64.9	72.2
Water service	58.0	61.0	53.7
Power connection	26.7	28.6	24.1
Construction of road network	16.8	14.3	20.4
Drainage	14.5	15.6	13.0
Solid waste management	14.5	16.9	11.1
Construction of sidewalks	13.0	11.7	14.8

Willingness to Participate

323. Majority of the target business units are willing to participate in land re-development project and they have expressed their willingness to participate in development council meetings and decision making activities. But the minority or 13.5% expressed their willingness to participate in the activities to give up space and relocating to designated commercial areas in the subcenter area.

Access to Water Supply

324. The main source of water for a majority (66%) of the respondent businesses is the public water kiosk. Nearly 14% depend on water truck delivery; 11% source water from private kiosks; while the remaining either have own well or fetch water from neighbor's well or other sources.

325. About 73% of the businesses are 200 m from the nearest public water kiosks. The rest at closer distances.

326. Less than 50% of the respondent businesses are highly satisfied with the current water supply services. The reasons for the somewhat satisfaction and dissatisfaction include too much time is spent to take water, 20%; inconvenient access, 19%; unreliable service, 14%; and 14% considered some health risks. The SES-WTP Report is not clear if health risks are due to quality of water and/or the fetching of water in the cold winter. A huge majority is for improvement of the supply services through direct connection to piped water supply.

Table D-4: Satisfaction with Existing Water Supply Services (%)

Subcenter	Satisfaction with current services			Current situation should be changed	How situation can be improved
	Highly satisfied	Somewhat satisfied	Not satisfied	Yes	Direct connection to water supply system
Bayankhoshuu	44.3	44.3	11.4	98.0	93.8
Selbe	50.6	27.7	21.7	95.1	94.9
Total	47.4	36.2	16.4	96.7	94.3

Access to Sanitation Facilities

327. 50% of respondent businesses have toilets, basically pit latrines. Majority of those without toilets use home or neighbor's toilets. Of the service-oriented entities, 61% have toilets. Some business units, which do not have own toilets, use the nearest public toilet, which is connected to the central system and is more comfortable, at a service fee of 200 MNT per use.

328. 44% of the respondent businesses discard wastewater to a separate pit, maintained or sucked by machine; 33% to toilet pits, 20% to a separate absorbable pit; the remaining few to any open area or drainage outside the khashaa. Some throw their wastewater outside during winter because they have not prepared wastewater pits beforehand. They know that the thrown wastewater will melt in spring and spread bad nasty odor; however, they do not want to discard to their toilets whole winter to avoid filling up the toilet quickly and besides the neighboring businesses are doing likewise.

329. 58% of the respondent businesses have their pits or septic tanks emptied by private contractors either monthly (for some 40% of them) or annually (some 30% of them), at an average service fee of 78,275 MNT each time.

330. Majority of the respondent businesses are somewhat satisfied with the existing sanitation facilities/ services. The main reasons for somewhat satisfaction and dissatisfaction include pits filling up too quickly, 27%; bad smell, 21%; and uncomfortable facilities/services, 18%. A huge majority proposes to connection to wastewater system for improvement.

Table D-5: Satisfaction with Existing Sanitation Facilities/Services (%)

Subcenter	Satisfaction with current services			Current situation should be changed	How situation can be improved
	Highly satisfied	Somewhat satisfied	Not satisfied	Yes	Direct connection to sewerage system
Bayankhoshuu	18.4	53.1	28.6	97.5	92.3
Selbe	26.2	31.0	42.9	100.0	93.5
Total	22.0	42.9	35.2	98.6	92.9

Solid Waste Management

331. Some 87% of the respondent businesses avail of the monthly truck collection services at an average monthly service fee of 13,927 MNT. Some 9% dispose of their solid wastes at a designated dumping area.

332. 78% of the respondents expressed their somewhat satisfaction and dissatisfaction to current solid waste management services. Reasons for somewhat satisfaction and dissatisfaction include trucks not collecting waste on time, 63%; the current level of service is creating environmental pollution, 31%; and no space to keep the wastes, 28%. About 98% of the respondents deem it necessary to change solid waste management services, of which 31% proposes improvement through increased collection frequency and 30%, through prompt collection.

Table D-6: Satisfaction with Existing Solid Waste Management Services (%)

Subcenter	Satisfaction with current services			Current situation should be changed	How situation can be improved*
	Highly satisfied	Somewhat satisfied	Not satisfied	Yes	Increasing collection frequency / prompt collection
Bayankhoshuu	22.0	50.5	27.5	98.6	35.7 / 30.0
Selbe	24.4	30.2	45.3	96.9	25.4 / 30.2
Total	23.2	40.7	36.2	97.8	30.8 / 30.1

* The recommendations with the highest percentage.

Heating

333. Nearly 98% of respondent businesses have heating. 59% of them are supplied heat by low pressure boiler, 15% use traditional fire wood/coal stove; 14% use improved stove, and 11% use electric heaters.

334. In the current heating system 66.3% of total business units use coal, 20.8% use wood and 11.8% use electricity respectively.

335. Some 70.2% of the respondents expressed their somewhat satisfaction or dissatisfaction to the heating system. Reasons include heating systems too expensive, 30%; systems not heating well, 27%; and current system uncomfortable, 25%. About 99% deem it necessary to change the current heating system, of which 96% proposes connection to central heating network.

Tale D-7: Satisfaction with Existing Heating Situation/Services (%)

Subcenter	Satisfaction with current services			Current situation should be changed	How situation can be improved
	Highly satisfied	Somewhat satisfied	Not satisfied	Yes	Connection to central/district heating system
Bayankhoshuu	20.0%	46.7%	33.3%	98.6%	97.2%
Selbe	39.8%	29.5%	30.7%	100.0%	94.3%
Total	29.8%	38.2%	32.0%	99.2%	96.0%

Electricity

336. About 95% of the respondent businesses are connected to the central power supply. Electricity supply is unreliable, power outage is frequent.

337. Over a third of the respondents are highly satisfied with the current power supply. The remaining majority expressed somewhat satisfaction and dissatisfaction for reasons that include unreliable service, 70%; and too expensive, 25%. A vast majority proposes improvements for reliable service and night meters with discounted rates.

Table D-8: Satisfaction with Existing Electricity Supply Services (%)

Subcenter	Satisfaction with current services			Current situation should be changed	How situation can be improved
	Highly satisfied	Somewhat satisfied	Not satisfied	Yes	Reliable service
Bayankhoshuu	23.9%	56.5%	19.6%	98.6%	-
Selbe	34.6%	47.3%	18.1%	93.9%	-
Total	34.6%	47.3%	18.1%	96.6%	69.6

ANNEX E: ENVIRONMENTAL MANAGEMENT PLAN FOR PROJECT 1 (P1-EMP)

Objective and Structure

338. This Project 1 Environmental Management Plan (P1-EMP) is part of the Initial Environmental Examination (IEE) Report for the Project 1 of the proposed Ulaanbaatar Urban Services and Ger Areas Development Investment Program, a multitranche financing facility (MFF). It will serve as the framework for the environmental management of Project 1, commencing from detailed design phase through to operation.

339. The P1-EMP identifies all potential impacts of the Project 1 components and recommends the mitigation and protection measures with the objective of avoiding or reducing these impacts to acceptable levels, meeting international and Mongolian standards. It defines the institutional arrangements and mechanisms, the roles and responsibilities of relevant institutions, procedures and budgets for its implementation. It seeks to ensure continuously improving environmental protection activities prior to construction, during construction and during operation in order to prevent, reduce or mitigate adverse impacts and risks. It draws on the findings of the IEE, PPTA and ADB review mission discussions and agreements with the relevant government agencies.

340. The EMP (i) defines the environmental management objectives; (ii) outlines the responsibilities of relevant institutions in EMP implementation; (iii) summarizes the potential impacts and recommends measures to mitigate them; (iv) sets out the environmental monitoring and inspection plan; (v) presents the institutional strengthening and training plan; (vi) specifies the reporting requirements; and (vii) presents the mechanism for feedback and adjustment.

341. The P1-EMP will be updated based on the detailed design, as necessary, and disclosed on the project website.

Implementing Organizations and Their Responsibilities

342. The institutions that will have major and minor roles in environmental management include the (i) Municipality of Ulaanbaatar (MUB) as the executing agency and implementing agency of the program; (ii) Subcenter Redevelopment Authority (SRA)**,** set up under the jurisdiction of the Vice Mayor for Urban Development and Investment within MUB as a city owned enterprise; (iii) Ulaanbaatar Water and Sewerage Authority (USUG) as a sub-implementing agency; (iv) Project Steering Committee (PSC); (v) Program Management Office (PMO); (vi) Project Implementation Support (PIS) Team and its Environmental Specialist; (vii) the Asian Development Bank (ADB); (viii) Design Consultant; (ix) Civil Works Contractors; (x) Ministry of Environment and Green Development (MEGD); and (xi) Concerned Khoroo Government Units. Main responsibilities are defined below, and in **Table E-1**.

1. **Implementing organizations and their responsibilities.** The institutions that will have major and minor roles in environmental management are defined below.
2. **Municipality of Ulaanbaatar (MUB)** as the executing agency and implementing agency of the Program, responsible for firming up the necessary collaboration with MEGD for environmental impact monitoring.
3. **Project steering committee (PSC)**, responsible for; (i) deciding on environmental management matters that will require action from the senior-management level; and (ii) ensuring the allocation and timely disbursement of adequate resources for the monitoring of EMP implementation and conduct of environmental monitoring activities required from the implementing agency in the Environmental Monitoring Plan.
4. **Subcenter redevelopment authority (SRA).** The SRA will be set up under the jurisdiction of the Vice Mayor for Urban Development and Investment within MUB as a city owned enterprise. This special purpose delivery vehicle will facilitate, coordinate and manage the redevelopment and densification process. More specifically, it will assist in realizing Subcenter Development Plans (SDPs) and ensure the strict application of the development plan, principles, land use ratios, and construction standards; and supervise private sector participation in the construction of residential units/compounds, in accordance with community needs and expectations, and private sector interests. SRA will also (i) facilitate obtaining the necessary inputs and/or assistance from the subproject khoroos, communities and concerned private sector to meet environmental safeguard obligations; and (iii) firm up collaboration with subproject khoroos in consultations and information disclosure, environmental monitoring, and implementation/observance of the grievance redress mechanism.
5. **Ulaanbaatar water and sewerage authority (USUG)** as a sub-implementing agency, responsible for: (i) providing technical assistance and support to the PMO in EMP implementation; (ii) as operator for the completed water and sewerage structures, observing the program's GRM and implementing environmental mitigation and monitoring measures that will address as minimum the requirements of the project EMP.
6. **Program management office (PMO)**, which will be established by the Mayor and be under the Vice Mayor for Urban Planning and Investment , will be responsible for undertaking and managing the day-to-day activities of Project 1. Its Environmental Safeguard Staff (ESS) shall coordinate and supervise the EMP implementation, including but not limited to: (a) update the P1-EMP after detail project design; (b) oversee incorporation of EMP recommendations into the design/bid documents; (c) ensure the procurement of environmentally responsible contractors; (d) ensure that an DEIA approval has been secured prior to the awarding of civil works contract; (e) set up baseline ambient air quality, noise & vibration levels, ground- & surface water quality & baseline statistics on incidence of diseases, road accidents and crimes occurring at night in the unlit roads in concerned khoroos; (f) set up and coordinate grievance

redress mechanism (GRM); (g) review and clear C-EMPs of the selected Contractors; (h) monitor contractors to ensure adherence to the EMP; (i) prepare monthly reports on EMP implementation to the PMO; (j) conduct consultation meetings with local stakeholders as required, informing them of imminent construction works, updating them on the latest project development activities, GRM, etc.; and (k) support the PIS-ES in conducting training, EMP compliance reviews, annual reporting, etc.

7. **Project units under the SRA**, responsible for providing assistance to the SRA and PMO in environmental management at the Subcenter level, particularly in consultations and information disclosure, IEC campaign, environmental monitoring and implementation/observance of the grievance redress mechanism (GRM).
8. **Contractors** will develop, implement and (internally) monitor Contractor EMPs, fully responding to the P1-EMP. To ensure that the contractors comply with the P1-EMP provisions, the PMO with the help and technical support of PIS-ES, will prepare and provide the following specification clauses for incorporation into the bidding procedures: (a) a list of environmental management requirements to be budgeted by the bidders in their proposals; (b) environmental clauses for contractual terms and conditions; and (c) the full P1-EMP in Mongolian.
9. **Concerned khoroos** (through their designated counterpart for the PMO's ESS) will actively participate in (a) public disclosure of Project 1 IEE, EMP & EMRs, and in the community awareness program on health and safety impacts of Project 1 implementation; (b) the establishment of health and safety baseline data prior to construction; (c) review EMRs & results of environmental monitoring by Contractors, and ensure that necessary corrective actions are taken for reported exceedance that will be confirmed as caused by Contractor's negligence;
10. **Licensed institute.** A licensed institute will be engaged to conduct baseline monitoring prior to construction, and quarterly environmental monitoring during project construction and operation, following the monitoring plan presented in **Table E-3**. The licensed institute will comply with Mongolian Quality Assurance/Control procedures and regulations for sampling and monitoring of environmental media, and assess compliance with Mongolian environmental quality standards for ambient air, water and noise quality. The laboratory, to be contracted by the PMO, will submit quarterly environmental impact monitoring reports to the PMO.
11. **Project implementation support team**, its Environmental Specialist (PIS-ES), responsible for imparting technical advice, guidance support and "hands-on training" to the PMO and SRA, particularly its ESS, in EMP implementation of Project 1 implementation. The PIS-ES will provide support to the PMO, the PMO-ESS, and the SRA and USUG with (a) project preparation; (b) training, (c) yearly environmental progress and EMP compliance monitoring; (d) annual EMP monitoring and progress reporting; (e) identifying environment-related implementation issues and necessary corrective actions; and (f) undertaking site visits as required.

12. **Asian Development Bank (ADB)**, responsible for undertaking reviews of relevant documents for clearance purposes and carry out periodic review missions to review (amongst others) the environmental aspects of Project 1.

Table E-1: Environmental Responsibilities

Phase	Responsible Agencies	Environmental Responsibilities
Project Preparation	MEGD	Conduct General EIA following MON procedures Review and approved DEIAs
	EA, PMO	Request MEGD to conduct General EIA, comply with MEGD instructions Conduct IEE in accordance with ADB SPS 2009, and DEIAs in accordance with MON Law on EIA 2012
	PPTA Consultants	Support EA in preparing request to MEGD and IEE
	ADB	Review and approve IEE, including EMP, disclose on ADB website
Detailed Design	Design institutes	Incorporation of environmental mitigation measures in detailed designs, and bidding documents.
	PMO, SRA, PIS-ES	Update EMP based on detailed design, as necessary Provide updated EMP to Design Institutes
	ADB	Approve updated EMP, if necessary
Tendering	PMO, SRA, tendering company, DI	Incorporate mitigation measures and the EMP clauses in tendering documents, civil contracts and contractors' construction management plans.
	PIS, ADB	Review tendering documents; confirm project's readiness
Construction	EA, IA	Advise on implementation of mitigation measures
	Contractors	Prepare and submit Contractor EMP, fully responsive to P1-EMP; Implement mitigation measures and conduct internal monitoring/supervision
	PMO-ESS	Coordinate GRM; supervise EMP implementation; conduct regular site inspections; prepare monthly EMP progress reports; conduct training; support PIS in preparing annual EMP monitoring and progress report
	Licensed institute	Conduct quarterly environmental monitoring, prepare monitoring report
	PIS (PIS-ES)	Advise on the mitigation measures; provide comprehensive technical support to PMO, IAs and IUs for environmental management; conduct training; conduct annual EMP compliance review; prepare annual EMP monitoring and progress reports.
	ADB	Conduct review missions; review and approve annual EMP monitoring and progress reports, including disclosure
Operation	PMO	Conduct EMP compliance review, instruct IAs on environmental management requirements; prepare EMP monitoring and progress reports until PCR is issued
	SRA	Implementation of mitigation measures as defined in EMP

Licensed institute	Conduct environmental monitoring following approved monitoring plan
ADB	Review and approve EMP monitoring and progress reports, disclose on ADB project website

ADB = Asia Development Bank; DI = Design Institute(s); PIS = Project Implementation Support, PMO = Project Management Office; PMO-ESS = Project Management Office Environmental Safeguard Staff, EA = Executive Agency; IA = Implementing Agency; MEGD = Ministry of Environment and Green Development; DEIA = Detailed Environmental Impact Assessment; IEE = Initial Environmental Examination; EMP = Environmental Management Plan.

Summary of Potential Impacts and Mitigation Measures

343. This section describes the potential environmental issues and impacts during the detailed design, pre-construction, construction and operation phases of Project 1, as identified during the Initial Environmental Examination (IEE), as well as corresponding mitigation measures designed to minimize the impacts. The recommended mitigation measures consist of actions, activities, plans and documents (including resettlement/compensation plan, environmental approval documents, Contractor's EMP) that need to be undertaken, observed, obtained, prepared to prevent, mitigate, or compensate for, the salient adverse impacts enumerated in Chapter VII. The broad measures are outlined below; while the specific measures are presented in the Environmental Mitigation Plan (**Table E-2**):

(i) incorporating in detailed design adequate considerations and conditions relative climate change and seismicity to sustain the structural integrity and effective operations of completed works;

(ii) prompt compensation for losses associated with ROW acquisition according to the approved Resettlement/Compensation Plan;

(iii) ensuring the engagement of an environment-responsible Contractor by incorporating the SPS-compliant P1-EMP into the bidding documents, for use as basis in the preparation of the Contractor's C-EMP by the selected Contractors, addressing as minimum the requirements of the T1- EMP. C-EMP to be quantitatively and qualitatively evaluated against the P1-EMP and cleared by PMO-ESS and PIS-ES prior to the commencement of any work on site. The contract for civil works to explicitly stipulate the obligation to institute the mitigation measures properly and carry out environmental monitoring according to the P1-EMP. The Contract to stipulate some tie-up of progress payment and collection of performance bond with the performance in the implementation of the CEMP/P1-EMP;

(iv) a C-EMP that ensures good and environment-friendly engineering practices that avoid first, and (if unavoidable) mitigate, adverse impacts; and commitment from Contractor to fully implement the C-EMP/P1-EMP;

(v) quality construction supervision and environmental monitoring by the SRA and its Pus, and the PMO (environmental monitoring to be outsourced to licensed institute);

(vi) conduct of engineering investigations of built structures after every seismic and extreme weather events during construction and during operation and full disclosure of investigation reports;
(vii) sufficient funds for sustained quality of operation and maintenance; and
(viii) observance of the grievance redress mechanism and prompt action/ resolution of lodged grievances.

344. The Environmental Mitigation Plan points out that most measures are the usual good engineering practices. The effectiveness of the measures will be evaluated based on the results of the environmental monitoring and inspection to determine whether they should be continued or improvements should be made. Improvements need to be confirmed through stipulated environmental management procedures.

Environmental Monitoring and Inspection

345. Environmental monitoring and inspection will consist of: (i) environmental impact monitoring; and (ii) EMP performance verification. Environmental impact monitoring will cover ambient air quality, noise, groundwater quality, surface water quality and community health and safety prior to construction and during construction; and workers health and safety during construction. EMP performance verification will monitor and verify the performance of the Design Consultant, Contractor, Operator, SRA and PMO in complying with, or adhering to, the C-EMP/P1-EMP. The Environmental Monitoring and Inspection Plan is presented as **Table E-3** and **Table E-4**

Table E-2: Environmental Mitigation Plan

A. Prior to Construction Phase

A.1 Detailed Engineering Design

	Potential Environmental Concerns/Impacts		Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
						Implement	Supervise & monitor
1	Unsustainable supply of gravel, sand, soil or unsustainable extraction of these materials to meet construction demand	1.1	Prepare a Sub-project Aggregates Mgnt Plan (AMP), confirming location of sources, estimating supply of, & demand for, aggregates during construction. This will serve as framework for Contractor's Aggregates Management Plan.	Not applicable	c/o Design Cost	Design Consultant	PMO PIS Envi Sp/ ADB*
		1.2	Specify in bidding documents Contractor's obligation to obtain aggregates only from quarries & crushing plants still operating within allowed extraction threshold per permit to operate.				
2	Non-sustainability of completed works due to inadequate consideration in design the following: --- seismicity, water scarcity stress associated with climate change	2.1	Design to incorporate the following, as appropriate: - seismicity in UB & vulnerability to damages during earthquakes - climate change induced dry spell/drought, rise in temperature & resulting water scarcity stress, rapid thawing of permafrost, decreasing depth of frozen soil.	Not applicable	-		
3	Inadequate consideration of the significance of sustaining hydrology of crossing & adjacent creeks/river.	3.1	Consult relevant government institution for the appropriate hydrological & hydraulic factors to take into account (factors that reflect influence of climate change-induced impacts.	Not applicable	-		
4	Lack of coordination with other projects in/or close to the Subcenters & component sites	4.1	Undertake adequate consultations with other ongoing, proposed, currently prepared projects to synchronize implementation time frame & appropriate details to avoid adverse cumulative impacts.	Not applicable	c/o Design Cost		

A.2 ROW Acquisition, Obtaining Approvals, and Community Preparation

	Potential Environmental Concerns/Impacts		Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
						Implement	Monitor
5	Displacement of HH. loss of land, & parts of structures, crops/trees, income	5.1	Finalize Resettlement/Compensation Plan, after Detailed Detailed Measurement Surveys, through highly consultative & participatory process.	All affected villages	-	Design Consultant	PMO & PIS Envi Sp/ ADB*
		5.2	At least 30 days before awarding of contract for civil works, losses shall have been fully compensated for.	All affected villages	c/o resettlement cost	PMO	PIS Envi Sp/ ADB*
6	DEIA requirements & approvals	6.1	Conduct/Prepare EIA report and obtain approval from MEGD.	Not applicable	c/o PMO's counter-part obligations		
7	Potential communicable/transmittable diseases brought with entry of workers & overall health/safety hazards during construction & potential grievances	7.1	Intensive IEC campaign on communicable/transmittable diseases, e.g., SARS, H1N1, STD, HIV/AIDS, tuberculosis, that may be brought with entry of workers, on health/safety hazards during construction, & on the grievance redress mechanism.	All affected villages	c/o PMO's counter-part obligations	PMO with DPH, khoroos	

* ADB will monitor compliance with EMP in the framework of review missions and review of annual EMP monitoring and progress reports.

A.3 Procurement & Prior to Mobilization

Potential Environmental Concerns/Impacts		Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
					Implement	Review & Evaluate
8	Engagement of environmentally irresponsible contractor for civil works	8.1 An ADB-cleared Project 1 EMP (P1-EMP), as part of bidding documents.	Not applicable	-	PMO	PIS Envi Sp/ ADB*
		8.2 P1-EMP to be appended to the Contract for basis of preparation of Contractor's EMP (C-EMP) that will address as minimum the requirements of the ADB-cleared P1-EMP & for compliance.				
		8.3 Contract to require Contractor's submission of monthly envi'l monitoring report, outline appended in Contract.				
		8.4 Contract to also stipulate some tie up of progress payment & collection of performance bond with the performance in C-EMP/ P1-EMP implementation.				
		8.5 C-EMP to be quantitatively & qualitatively evaluated against P1-EMP.				
		8.6 PMO to clear C-EMP before start of any work on site or establishment of project construction-related facilities.				

B. Construction Phase

Potential Environmental Concerns/Impacts		Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
					Implement	Monitor
PHYSICAL / CHEMICAL ENVIRONMENT						
9	Dust/suspended particles from: - earthworks - dry exposed areas - stockpile of dry soil, sand, cement - transport of aggregates, cement, residual soil for disposal, & wastes - loading/unloading of fine aggregates, cement and other materials - movements of construction vehicles	9.1 Segmentation of works, as appropriate, to minimize having more loose surfaces/stockpiles than necessary.	All sites	-	Contractor	PMO & PIS Envi Sp/ ADB*
		9.2 Appropriately watering dry exposed surfaces, stockpiles of sand &, if applicable, excavated materials, at least twice daily.	All applicable sites	c/o Construction running cost		
		9.3 Tarpaulin or similar cover on trucks carrying aggregates, cement residual soils, & wastes. Maintain min. 2 feet freeboard.	Entire hauling route	c/o Supplier's cost	Supplier & Contractor	
		9.4 Minimize drop heights when loading/unloading soil onto trucks/ground. Spray water on soil being loaded/unloaded.	All sites	-		
		9.5 Clean up work surfaces at the end of each day's work.	All sites	-	Contractor	
		9.6 Speed limit for construction vehicles to max. of 30 kph in sites.				
		9.7 For works within 30 m from houses set up a temporary wall between receptor & work area. Wall to be at least 2.5 m high & at least 10 m beyond each end of the work area.	All sites	c/o Construction safety cost (preliminaries)		

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost[a] (USD)	Institutional Responsibilities	
				Implement	Monitor
10 Gas emissions from; - exhaust of operating construction equipment/vehicles, including generator sets - burning of solid/hazardous wastes - overall power/energy use in construction - use of high VOC emitting specialty applications	10.1 Reduced vehicular movements through: - coordinated transport of materials, spoils & waste - worker's accommodations at walking distances, or providing mass transport for workers - bigger capacity trucks for hauling of wastes/spoils, where access roads allow	All sites	-	Contractor	PMO & PIS Envi Sp/ ADB*
	10.2 Turn off equipment/vehicle when not in use. Limit engine idling to a max. of 5 minutes.				
	10.3 Use clean-fuelled generators.				
	10.4 No burning of wastes. No indiscriminate dumping of waste, especially organic wastes, left to decompose.				
	10.5 Use low VOC-emitting asphalt processing & other materials, e.g., adhesives, sealants, paints, etc.				
	10.6 Use only well maintained construction vehicles/equipment, with emission test certificate.				
11 Odor from: - gas emission sources - use of high VOC emitting specialty applications - poorly managed solid & hazardous wastes - poor sanitation practices of workers	11.1 Application of gas emission mitigation measures. (No. 10 above)	All sites	-		
	11.2 Properly store, promptly dispose of, organic & hazardous wastes.				
	11.3 Require enclosed trucks for, or effective cover when, hauling wastes to the landfill & chemicals to construction sites.				
	11.4 Schedule as much activities that generate odor as possible to specific times of the day (non-peak hours of public presence) and consider weather conditions (wind & temperature).				
	11.5 When there is high odor release from activities, slow down/adjust, or suspend, some odor releasing activities.				
	11.6 Where applicable, install barriers around potential odor generators, located against prevailing wind directions.	All sites	c/o Construction mobiliz'n cost (preliminaries)		
	11.7 Provide adequate sanitation facilities, adequate water supply. Strictly enforce observance of sanitation practices.				
12 Noise from: - operating equipment/vehicles (especially those diesel-fed & without efficient mufflers), - processes such as drilling/pavement breaking, excavation, concrete mixing, earthmoving, demolition of existing structures - unloading of aggregates	12.1 Set up noise barriers, for example: - temporary fence around active work area, 2.5 m high - sound-absorbing enclosure around generator sets	Applicable sites	c/o Construction mobiliz'n cost (preliminaries)		
	12.2 Restrict use of noisy equipment from 8 AM-5 PM. Overtime work should not go past 10 PM, observe reduced noise level, not use noisy equipment, be coordinated with W/CPC. Inform affected communities at least 3 days in advance.	All sites	-		
	12.3 Use only equipment that emit least noise, e.g. electrically powered equipment, hydraulic tools, those with efficient mufflers. Allow only well-maintained equipment/vehicles, with certificates of compliance to noise standards, to be used in construction.				
	12.4 Locate noise generators at max. distance from nearest receptors.				
	12.5 Turn off equipment/vehicles when not in use.				
	12.6 Spread out schedule of material, spoil & waste transport, in the day (off-peak traffic hours), or early evening.				

Potential Environmental Concerns/Impacts		Recommended Mitigation Measures		Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
						Implement	Monitor
13	Vibration generated from: - operation of equipment/vehicles & movement of trucks to & from sites - construction activities, e.g., drilling, excavation	13.1	Restrict use of equipment emitting vibrations, 8 AM-5 PM.	All sites	-		
		13.2	Prior to start, identify vibration-sensitive areas & structures in the construction influence area to plan for the appropriate technology, equipment/ tools & procedure level to apply or use.				
		13.3	Schedule separately ground-impacting activities as necessary to reduce the intensity of impact.				
		13.4	Limit engine idling to a max. of 5 minutes.				
		13.5	Limit speed to max. 40 kph en route to sites, 30 kph in access road and sites.	En route to and in, Subproject sites			
		13.6	Use available equipment & tools that emit least vibrations per manufacturer's specifications, or equipped with shock absorber, & has a handbook for user's safety & specifies requirements on vibration. Maintain equipment/tools to specifications.	All sites	c/o Construction mobiliz'n cost (preliminaries)		
14	Impacts from extracting (quarrying/ borrowing) materials to meet construction needs - dust, noise, vibration during quarrying/ borrowing, during transport, during loading/unloading, from wind-blown stockpiles in quarry - siltation/sedimentation of water body in surface drainage path, in quarry/borrow areas & while stored in sites - visual impact on the landscape in quarry/borrow areas - traffic & smoke generated during transport - potential accidents, especially during transport of aggregates, cement, construction and deconstruction waste, etc	14.1	Implement Contractor's Aggregates Management Plan (CAMP)	All sites	-		
		14.2	Source aggregate only from quarry/borrow areas with environmental clearance & license to operate, & that still have high ratio of extraction capacity over loss of natural state.				
		14.3	If Contractor/Sub-contractor shall operate its own quarry/borrow operations: - Contractor to obtain environmental certificate & license to operate prior to extraction & implement site restoration after. - Verify Contractor's license to, environmental clearance for, quarry.	Contractor's quarry/borrow area	c/o Contractor's Project Cost		
			- Ensure site restoration plan is implemented by Contractor after completion of borrowing for Project 1 subproject.	Contractor's quarry/borrow area	-	PMO	PIS Envi Sp/ ADB*
		14.4	Aggregate trucks to: - observe max. speed limit of 40 kph en route to sub-component sites; 30 kph in access roads to, & in, sub-component sites - maintain min. of 2 feet freeboard & provide tight cover - visibly display in their bodies the required speed limit, Subproject info & contact details - minimize drop heights during loading/unloading; spray water on aggregates being loaded/unloaded - be well-maintained, with up-to-date emission test certificate	Contractor's quarry/borrow area to sites	-	Contractor	PMO & PIS Envi Sp/ ADB*
		14.5	Manage aggregate stockpiles in quarry sites, e.g. stockpiling only enough, providing wind barrier, regularly wetting stockpiles.				
		14.6	Sub-contract for aggregates supply to stipulate the obligation to comply to all of the above and all applicable mitigation measures stipulated in C-EMP/P1-EMP.				

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
				Implement	Monitor
15 Depletion of water resources in Subcenter due to workers getting water from kiosks for their potable water supply.	15.1 Meet construction water demand using water from permitted sources outside Subcenter, delivered to sites by water trucks & stored on site in tanks. Ensure potable water is stored clean & safe.	All sites	c/o Construction running cost (preliminaries)	Contractor	PMO & PIS Envi Sp/ ADB*
16 Deterioration of surface & ground water resources (crossing & adjacent water bodies & existing wells) from inadequate management of the following in workers camp & subproject sites: - sewage/wastewater - solid & hazardous wastes - sediments, silts - hazardous construction materials - Construction and demolition waste	16.1 Provide adequate sanitation facilities, adequate water supply. Strictly enforce observance of sanitation practices.	All construction sites &/or field offices & workers accommodations	c/o Construction mobiliz'n & running costs (preliminaries)		
	16.2 Implement an eco-friendly waste management that: - practices waste minimization, reuse and segregation - has adequate covered storage bins/containers, color-coded clearly marked to avoid mixing, especially hazardous wastes - has separate enclosed storage areas for solid & hazardous wastes, that can contain spills, clearly marked/labelled - networks with private individuals/entities that are into waste recovery & recycling to reduce wastes brought to landfills - implements prompt disposal at the City landfill - coordinate with authority for the disposal of hazardous wastes - workers & hazardous waste contractors to observe safety measures/system when handling hazardous wastes - requires waste contractors to promptly submit a manifest from City landfill for every disposal, from recyclers/junkshops for every delivery of re-usable construction spoils/refuse.				
	16.3 Implement measures to mitigate sedimentation/siltation. - Use any combination of silt fences, sandbags barrier nets, speed stilling humps, diversion of offsite runoff around site appropriately. - Stockpile on flat grounds & away from, not obstructing, main surface drainage routes, limit to max height of 2 m, dispose of unsuitable & excess soils as soon as possible program stockpiling on site.	All sites			
	16.4 Implement measures to mitigate potential adverse impact from use and storage of hazardous substances - have safe storage, with visible caution signage, secure from unauthorized entry or use & can contain spillage. - safe storage - if using stationary ground storage, it should be at least 30 m from water bodies or nearest groundwater resource, at least 1 foot above highest flood level; or - use mobile storage for easy transfer during potential flooding, as appropriate - should always be in good condition, color-coded, with clear labels - have equipment clearly leaking oil repaired at once, but off site. - no vehicle maintenance & refuelling in Component sites. - use less hazardous substances - store no more hazardous substances on site than needed - spill clean up materials for all types of hazardous substances present in the sites to be readily available in the sites.				

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
				Implement	Monitor
	16.4 Limit engine idling to a max. of 5 minutes.	All sites	-	Contractor	PMO & PIS Envi Sp/ ADB*
	16.5 Limit speed to max. 40 kph en route to sites, 30 kph in access road and sites.	En route to and in, Subproject sites			
	16.6 Use available equipment & tools that emit least vibrations per manufacturer's specifications, or equipped with shock absorber, & has a handbook for user's safety & specifies requirements on vibration. Maintain equipment/tools to specifications.	All sites	c/o Construction mobiliz'n cost (preliminaries)		
SOCIO-ECONOMIC & CULTURAL ENVIRONMENT					
17 Traffic and road blocking due to: - movements of construction vehicles/ equipment in narrow access roads - roadside parking of construction vehicles and equipment - stockpiling of aggregates, excavated soils, spoils within access road ROW	17.1 Prepare traffic management scheme, & coordinate implementation with the local traffic authorities & affected communities.	Concerned local traffic authorities, khoroos	-	PMO with local traffic authorities & khoroos	PIS Envi Sp/ ADB*
	17.2 Post billboards on road/lane closure, traffic rerouting plan at strategic places, min. 1 week prior to effectivity.	All affected sites	c/o Construction safety cost (preliminaries)		
	17.3 Post traffic (flag) persons during entire working hours.	Access roads			
	17.4 Provide safe pedestrian access.				
	17.5 Spread out schedule for materials delivery in non-peak hours.	All sites	-		
	17.6 Coordinate with khoroos for parking of construction trucks.\				
	17.7 Manage arrivals/departures of trucks.				
	17.8 Store excavated materials without obstructing traffic flow & safe safe access by affected communities.				
18 Blocking of access to properties	18.1 During IEC, prior to mobilization, inform communities regarding work phasing & schedules, anticipated access blocking, provisions for safe access for blocked properties & temporary parking for blocked garages/driveways.	Affected khoroos	c/o PMO's counter-part obligations	PMO with khoroos	PIS Envi Sp/ ADB*
	18.2 At least one week prior to access blocking, notify the affected properties. Work together and agree with property owners and khoroo authorities for the alternative access and parking areas.	Affected properties	-	Contractor	PMO & PIS Envi Sp/ ADB*
	18.3 Provide safe access to blocked properties, e.g., steel planks of adequate grade, width and length, &, if needed, with guide rail.	Affected properties	c/o Construction safety cost (preliminaries)		
19 Accidental damage to utility & service infrastructures, & adjacent structures	19.1 During mobilization, coordinate with relevant utility companies Verify exact locations of underground utility lines, & set contact arrangements in case of damage.	Not applicable	-		
	19.2 Prepare a schedule of crossing of all existing utility lines and ensure that a copy is available on site for reference by workers.	All sites			
	19.3 In case of accidental damage, advise concerned utility company and/ or PMO at once				

Potential Environmental Concerns/Impacts		Recommended Mitigation Measures		Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
						Implement	Monitor
SOCIO-ECONOMIC & CULTURAL ENVIRONMENT							
17	Traffic and road blocking due to: - movements of construction vehicles/ equipment in narrow access roads - roadside parking of construction vehicles and equipment - stockpiling of aggregates, excavated soils, spoils within access road ROW	17.1	Prepare traffic management scheme, & coordinate implementation with the local traffic authorities & affected communities.	Concerned local traffic authorities, khoroos	-	PMO with local traffic authorities & khoroos	PIS Envi Sp/ ADB*
		17.2	Post billboards on road/lane closure, traffic rerouting plan at strategic places, min. 1 week prior to effectivity.	All affected sites	c/o Construction safety cost (preliminaries)		
		17.3	Post traffic (flag) persons during entire working hours.	Access roads			
		17.4	Provide safe pedestrian access.				
		17.5	Spread out schedule for materials delivery in non-peak hours.	All sites	-		
		17.6	Coordinate with khoroos for parking of construction trucks.				
		17.7	Manage arrivals/departures of trucks.				
		17.8	Store excavated materials without obstructing traffic flow & safe safe access by affected communities.				
18	Blocking of access to properties	18.1	During IEC, prior to mobilization, inform communities regarding work phasing & schedules, anticipated access blocking, provisions for safe access for blocked properties & temporary parking for blocked garages/driveways.	Affected khoroos	c/o PMO's counter-part obligations	PMO with khoroos	PIS Envi Sp/ ADB*
		18.2	At least one week prior to access blocking, notify the affected properties. Work together and agree with property owners and khoroo authorities for the alternative access and parking areas.	Affected properties	-	Contractor	PMO & PIS Envi Sp/ ADB*
		18.3	Provide safe access to blocked properties, e.g., steel planks of adequate grade, width and length, &, if needed, with guide rail.	Affected properties	c/o Construction safety cost (preliminaries)		
19	Accidental damage to utility & service infrastructures, resulting in service interruptions, e.g., water pipes, power poles, telephone lines	19.1	During mobilization, coordinate with relevant utility companies Verify exact locations of underground utility lines, & set contact arrangements in case of damage.	Not applicable	-		
		19.2	Prepare a schedule of crossing of all existing utility lines and ensure that a copy is available on site for reference by workers.	All sites			
		19.3	In case of accidental damage, advise concerned utility company at once. Facilitate quick restoration by clearing obstructions & lending assistance (workers, equipment, tools) in the repair.				
		19.4	Give at least 1 week prior notice on planned service interruption due to relocation of existing utilities, power supply poles, water lines, &/or for interconnection/streamlining.	All khoroos concerned			
20	Disruption of socio-economic activities due to interruption of infrastructure services, access and road blocking	20.1	Provide safe alternative access for blocked properties.	All sites	c/o Construction safety cost		
		20.2	Issue prior notice on scheduled service interruption, 1 week before effectivity. interruption should not go beyond 2 hours.	All sites	-		
		20.3	Immediately advise utility companies on any accidental damages to existing utility for quick restoration of service.				

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
				Implement	Monitor
21 Community health/safety hazard from, among others: - dust, noise, gas emissions, odor, vibration - water resource depletion & deterioration - inadequate waste/wastewater mgnt - spillage of hazardous substances - haphazard movement & parking of construction vehicles/equipment - increased traffic - open excavations - unsafe alternative access provided - rise of communicable/transmittable diseases with entry of workers - Deconstruction and demolition waste	21.1 Implement a C-EMP that addresses the measures in the P1-EMP as minimum requirements to mitigate dust, gas emissions, noise, odor, vibration, water depletion and deterioration, traffic, road & access blocking. In addition, to ensure that such safety measures as the following are implemented/in place: - Adequate/appropriate lighting, reflectorized barrier (or temporary fences, where applicable) around active work sites - Safe access for pedestrians/residents - Emergency response preparedness (procedures, trained staff, equipment, tools & supplies), including for fire-fighting. - Posting of billboards about the Subcomponents, informing on the dates of start & finish, names & contact details of contractor, supervising person on site, PMO, route of trucks, layout of subproject, etc.	All sites	c/o Construction mobiliz'n & running costs (preliminaries) &/or Project cost	Contractor	SRA, PMO & PIS Envi Sp/ ADB*
	- Coordination with authorities of nearby schools & hospitals for safety measures.	All sites	-		
	- Adequate social preparation regarding construction activities, & associated health & safety risks, grievance redress mechanism, to be conducted at least one month prior to award of Contract.	All khoroos within construction area of influence	c/o PMO counterpart fund	PMO	PIS Envi Sp/ ADB*
22 Workers' health/safety hazard from, among others: - dust, noise, gas emissions, odor, vibration - inadequate waste/wastewater management - poor sanitation practices - exposure to hazardous substances - operating equipment/handling of tools - haphazard movement of construction vehicles/equipment - increased traffic open excavations - rise of communicable/transmittable diseases in Subproject communities - exposure to extreme weather	22.1 Orient workers, prior to mobilization, on occupational health & safety hazard and strict observance of safety measures.	All sites	c/o Construction mobiliz'n & running costs (preliminaries)	Contractor	SRA, PMO & PIS Envi Sp/ ADB*
	22.2 Strictly enforce use of protective wears, e.g., eye masks, nose masks, ear mufflers, helmets gloves, appropriate footwear.	Not applicable			
	22.3 Implement recommended measures to mitigate dust, gas emission, odor, noise, vibration, traffic.	All sites			
	22.4 Install adequate lighting, safe accesses to & from work areas.				
	22.5 Provide safe accommodations with reliable supply of potable water, adequate sanitation facilities.				
	22.6 Provide adequate water for washing & safe drinking, and adequate sanitation facilities, in construction sites. - Ensuring that workers' daily exposure limit value (ELV) is kept within standard limit, as specified by manufacturer: Break up of continuous use of equipment by individual worker, introduce 3 shifts/day in use of the equipment - Pre-construction orientation & training on safe operation/ handling of hazardous equipment/tools - Strict enforcement of wearing protective clothing/gear prescribed when using vibrating equipment.				
	22.7 Require workers to submit health certificates for employment & for worker's health baseline data.	Not applicable	-		
	22.8 Arrange with nearest primary & tertiary health institutions for health & emergency care of workers.				
	22.9 Set up emergency response team equipped with adequate staff, equipment, tools & supplies, including for fire-fighting.	All sites	c/o Construction safety cost		
23 Damage to temples (or parts of), during religious rites & ceremonies	23.1 Prior consultations & adequate coordination with temple authorities.	Bayankhoshuu Subcenter	c/o Construction		
	23.2 Apply protection measures as agreed.				
	23.2 Contractor to compensate damage (actual value) if damage is due to lack of/inadequate protection measures.		safety cost		
SUSTAINABILITY CONTRIBUTION 24 Damages during seismic or extreme weather event	24.1 After every seismic or extreme weather event, conduct engineering investigation of built structures & implement corrective measures without delay.	All sites	c/o Construction insurance cost	Contractor	PMO & PIS Envi Sp/ ADB*

C. Operation Phase

Potential Environmental Impacts		Recommended Mitigation Measures		Location	Estimated Cost [a] (USD)	Institutional Responsibilities Per Phase				
						Pre-Operation Phases			Operation Phase	
						Det. Design Consultant	PMO	PIS Envi Sp / ADB*	Operator	PMO & ADB*
25	Air emissions (PM, SO2, NOx)	25.1	Use the least emitting, high efficiency technology	Not applicable	-	Implement	Monitor	Monitor	-	-
		25.2	Install the approprioate efficient emission controls such as, as appropriate (to mention some) - wet, semi-dry or dry scrubber (desulfurization) - selective catalytic reduction (denitrification) - fabric filter, cyclone separator (PM)							
		25.3	Physical layout plan of plant site to include provision for coal, ash, slag. Storage and handling that will effectively eliminate neighborhood exposure to dust emissions & minimize exposure of plant workers to the extent possible.							
		25.4	Enforce strict use of protective wear by plamt workers/staff.	HOB plant site	-	-	-	-	Implement	Monitor
		25.5	Prompt maintenance and repair							
		25.6	Perform air quality monitoring according to the ADB-cleared T1-EMP	HOB site	c/o Operations envi'l mgt cost					
26	Noise	26.1	Prompt maintenance and repair	HOB site	c/o Operations running & envi'l mgt cost	-	-	-		
		26.2	Perform environmental monitoring according to the ADB-cleared T1-EMP							
27	Ash, slag, FGD residue	27.1	Apply dust suppression when handling coal and ash							
		27.2	Prompt disposal of ash to interested re-users. But Operator must ensure ash is safe before disposing to re-users. Consult experts or conduct a lab analaysis.							
28	Unsustained effectiveness of operation/services due inefficient O&M/R	25.1	Sufficient budget and technical capacity for operation, maintenance and repair.	Not applicable	c/o Operations running cost	-	-	-		
		25.2	Fast track implementation of the Institutional Strengthening & Capacity Development - Reforms in WSS and Heating Sectors to strengthen USUG and heating agency.	Not applicable	c/o UUSGDIP Tranche 1	-	-	-		Implement
29	Traffic safety	29.1	Design structural measures to protect the community, e.g., - bollards to prevent vehicles in pedesatrian ways - road humps to control speed - Since carriageways are only 5.5 m wide, institute one-way traffic system							
30	Damages during seismic or extreme weather events	30.1	After every seismic or extreme weather event, conduct engineering investigation of built structures & implement corrective measures without delay.	All sites	c/o Operations emergency or contingency cost	-	-	-	Implement	Monitor

Table E-3: Environmental Impact Monitoring (Pre-Construction Phase)

I. ENVIRONMENTAL IMPACT MONITORING

	Aspects/Parameters to be Monitored	Location	Means of Monitoring	Frequency	Estimated Cost (USD)	Responsibility	
						Implement	Compliance Monitoring
A.	**Prior to Construction Phase** During procurement prior to awarding of contract for civil works						
1	**Ambient air quality** SO_2, NO_2, CO, PM_{10}, $PM_{2.5}$ *Review results against GOM standard MNS 4585:2007* *Results as baseline data before mobilization*	7 in Bayankhoshuu 8 in Selbe	Analytical methods outlined in MNS 0017-2-3-16:1998	Once	595.00 680.00	Licensed Laboratory for PMO	PIS Envi Sp/ADB*
2	**Ambient noise levels** *Review results against GOM standard MNS 4585:2007* *Results as baseline data before mobilization*	7 in Bayankhoshuu 8 in Selbe	Analytical methods outlined in MNS OIML R 102:2001	Once	70.00 80.00		
3	**Groundwater quality** pH, DO, EC, BOD, Hardness, NH_4, NO_2, NO_3, Pmineral, Fe, SO_4, F, Cr^{6+}, E-coli, coliform *Review results against MNS 900:2005 & WHO Guidelines for Drinking-water Quality* *Results as baseline data before mobilization.*	3 in Bayankhoshuu 3 in Selbe	Analytical methods outlined in MNS (ISO) 5667-11:2000	Once	135.00 135.00		
4	**Surface water quality** pH, DO, EC, BOD, COD, Hardness, NH_4, NO_2, NO_3, Pmineral, Fe, SO_4, F, Cr^{6+}, E-coli, coliform *Review results against MNS 4586-98* *Results as baseline data before mobilization.*	2 Bayankhoshuu Creek 2 Chingeltei Creek 2 Selbe River 2 Khailast Creek (f appropriate, if they have waters)	Analytical methods outlined in MNS 4047:1988	Once	90.00 90.00 90.00 90.00		
5	**Community health & safety conditions** - Incidence of diseases associated with respiratory, nervous circulatory & digestive systems, skin, cancer, communicable/transmittable diseases - incidence of accidents (vehicular, fire, etc) & crime *Information as baseline data before mobilization.*	Concerned khoroos	Information from & close coordination with khoroo health centers & Department of Health (district level), with khoroo government	Once	-		
	Sub-Total (Prior to Construction for baseline data)				2,055.00		

1) Applied unit costs of NAMHEM and Central Laboratory of MEGD

2) The minimum set of parameters to be monitored after establishing the baseline will be that observed quarterly by the NAMHEM

Table E-3: Environmental Impact Monitoring (Construction and Operation Phase)

	Aspects/Parameters to be Monitored	Location	Means of Monitoring	Frequency	Estimated Cost (USD)	Responsibility	
						Implement	Compliance Monitoring
B.	**Construction Phase**						
6	**Ambient air quality** SO_2, NO_2, CO, PM_{10}, $PM_{2.5}$ *Review results against GOM standard MNS 4585:2007*	7 in Bayankhoshuu 8 in Selbe	Analytical methods outlined in MNS 0017-2-3-16:1998	Once quarterly	4,760.00 5,440.00	Licensed Laboratory for Contractor	PMO / PIS Envi Sp/ADB* GASI
7	**Ambient noise level** *Review noise levels against GOM standard MNS 4585:2007*	6 in Bayankhoshuu 6 in Selbe	Analytical methods outlined in MNS OIML R 102:2001	Once quarterly	480.00 480.00		
8	**Groundwater quality** pH, DO, EC, BOD, COD, Hardness, NH_4, NO_2, NO_3, Pmineral, Fe, SO_4, F, Cr^{6+}, E-coli, coliform *Review results against MNS 900:2005 & WHO Guidelines for Drinking-water Quality*	2 in Bayankhoshuu 2 in Selbe	Analytical methods outlined in MNS (ISO) 5667-11:2000	Once quarterly	720.00 720.00		
9	**Surface water quality** pH, DO, EC, BOD, COD, Hardness, NH_4, NO_2, NO_3, Pmineral, Fe, SO_4, F, Cr^{6+}, E-coli, coliform *Review results against MNS 4586-98*	2 Bayankhoshuu Creek 2 Chingeltei Creek 2 Selbe River 2 Khailast Creek (f appropriate, if they have waters)	Analytical methods outlined in MNS 4047:1988	Once quarterly	720.00 720.00 720.00 720.00		
10	**Community health & safety conditions** - Incidence of diseases associated with respiratory, nervous circulatory & digestive systems, skin, cancer, communicable/transmittable diseases - incidence of accident, fire & crime	Concerned khoroos	Information from & close coordination with khoroo health centers & Department of Health (district level), with khoroo government	Once quarterly	-		
11	**Workers' health & safety** - Incidences of illness due to work - Incidences of work-related accident, injuries/deaths to emergencies, crime involving workers	Construction sites	Records of Safety Engineer	Once quarterly	-		
12	**Construction and demolition waste** - Presence/absence of illegal dumping - Environment safeguards at dumping site(s)	Construction sites, waste disposal site	Visual inspections	Once quarterly	-		
	Sub-Total (Construction)			USD	15,480.00		
	TOTAL (Prior to Construction and During Construction)			USD	17,535.00		
C.	**Operation Phase**						
13	**Ambient air quality** SO_2, NO_2, CO, PM_{10}, $PM_{2.5}$ *Review results against GOM standard MNS 4585:2007*	4 in Bayankhoshuu 4 in Selbe	Analytical methods outlined in MNs MNS 0017-2-3-16:1998	Once quarterly	1,360.00 1,360.00	Licensed Laboratory for Operator	PMO / PIS Envi Sp/ADB*
14	**Ambient noise levels** *Review results against GOM standard MNS 4585:2007*	4 in Bayankhoshuu 4 in Selbe	Analytical methods outlined in MNS OIML R 102:2001	Once quarterly	160.00 160.00		
15	**HOB stack emissions** SO2, NO2, CO, PM10, PM2.5 *Review results against GOM standard MNS 6298:2011 and EHS Guidelines*	2 in Bayankhoshuu 3 in Selbe	Analytical methods outlined in MNS OIML R 102:2001	Monthly during heating season (6 times per year)	120.00 180.00		
	TOTAL Annually (During Operation)			USD	3,340.00		

Table E-4: EMP Performance Monitoring

II. EMP PERFORMANCE MONITORING

	Aspects/Parameters to be Monitored	Location	Means of Monitoring	Frequency	Responsibility	
					Implement	Compliance Monitoring
A.	**Prior to Construction Phase**					
	A.1 Detailed Design Preparation					
1	Climate Change and seismicity factors considered in detailed designs.	Not applicable	Review of detailed design documents.	Once, prior to finalization Once, prior to approval	Design Consultants	PMO & PIS Envi Sp/ADB*
	A.2 Obtaining Clearance					
2	DEIA Report approval obtained	For Project 1	Presence of approved DEIA document.	Once, at least 30 days prior to contract award	PMO	PIS Envi Sp/ADB*
3	Intensive awareness program on health and safety hazards, communicable/transmittable diseases, on the grievance redress mechanism	Bayankhoshuu Subcenter Selbe Subcenter	Review of relevant report of the PMO's Social, Environmental & Communication Teams.	Once, at least 30 days prior to contract award		
	A.3 Procurement					
4	Procurement process complied with EMP requirements: ADB-cleared EMP part of bidding documents.	Not applicable	Verifying EMP in bidding document.	Once, prior to procurement		
	C-EMP/EMP compliance stipulated in Contract	Not applicable	Review of Draft & Final Contract.	Once, during draft Once, prior to signing		
	Contract stipulates some tie up of progress payment & collection of performance bond with performance in C-EMP/EMP implementation.					
5	Affected HHs resettled and compensated according to the ADB cleared RP.	Bayankhoshuu Subcenter Selbe Subcenter Sewerage network extension areas	Records of Resettlement Safeguard staff of of PMO	Once a week until all done.	PMO	PIS Envi Sp/ADB*
	A.4 Post-Procurement Prior to Mobilization					
6	Preparation by selected Contractor its C-EMP, addressing P1-EMP requirements as minimum, & includes (but not limited to) plans for: aggregates mgnt; excavation mgnt (linked to removed soil mgnt); dust, noise & vibration controls; gas emission mitigation; solid & hazardous waste mgnt; traffic mgnt (to be coordinated with authorities); occupational health & safety; grievance redress; emergency response; environmental monitoring & reporting.	Not applicable	Verifying existence of C-EMP. Evaluating C-EMP against P1-EMP.	Once prior to mobilization	Contractor	PMO/ PIS Envi Sp/ADB*
7	C-EMP cleared by PMO	Not applicable	Verifying existence of PMO clearance.	Once prior to mobilization	PIS Envi Sp	ADB
8	Environmental impact monitoring for baseline data	As prescribed in the P1-EMP.	As prescribed in the P1-EMP.	Once prior to mobilization		
B.	**Construction Phase**					
9	Environmental mitigation implemented according to the C-EMP/P1-EMP.	All sites	Field observations. Consulting affected residents. Review of lodged grievances. Review of records of workers accidents & sick leave.	Regular bi-weekly & random Random At least once a week. Once a month	Contractor GASI, IUs	PMO/ PIS Envi Sp/ADB*
10	Environmental impact monitoring	As prescribed in the P1- EMP.	Monthly EMR of Contractor & Annual EMR.	Monthly & annually	Contractor	PMO/ PIS Envi Sp/ADB*
					PMO	PIS Envi Sp/ADB*
11	Monthly EMR submitted promptly following prescribed content as minimum.	All sites	Review of Contractor's monthly EMR.	Once a month	Contractor	PMO/ PIS Envi Sp/ADB*
12	Informally & formally lodged grievances acted on promptly, successfully &/or Grievance Redress Mechanism observed.	All sites	Review of lodged grievances. Consult Khoroos.	Regular bi-weekly & random At least once a week	Contractor & PMO	PIS Envi Sp/ADB*
13	Engineering investigation after each seismic &/or extreme weather event, and, if applicable, remediation works taken.	All sites	Review of investigation & remediation works report.	At the latest 1 week after each event		
14	Monthly Progress Report on Environmental Monitoring following prescribed content as minimum.	Project 1	Review of the MPREM.	Monthly	PMO	
15	Annual EMR submitted promptly following prescribed outline.	All sites	Review of the annual EMR.	Annually		
C.	**Operation Phase**					
16	Monthly EMR submitted promptly following prescribed content as minimum.	All sites	Review of Contractor's monthly EMR.	Once a month	Operator	PMO/ PIS Envi Sp/ADB*
17	Informally & formally lodged grievances acted on promptly successfully &/or Grievance Redress Mechanism observed.	Subproject	Review of lodged grievances. Consulting village authorities.	Regular and random At least once a week		
18	Engineering investigation after each seismic &/or extreme weather event, and, if applicable, remediation works taken.	All sites	Review of investigation & remediation works report.	At least 1 week after each event		
19	Monthly Progress Report on Environmental Monitoring following prescribed content as minimum.	Project 1	Review of the MPREM.	Monthly	PMO	
20	Annual EMR submitted promptly following prescribed outline.	For the Subproject	Review of the annual EMR.	Annually		

Institutional Strengthening and Training

346. Considering the limited skills and experience of the program's key players, technical assistance from environmental specialists and capacity development during initial project implementation will be needed for institutional strengthening. Capacity development will put emphasis on hands-on training in implementing their responsibilities in environmental management of Project 1, particularly in EMP implementation.

347. Capacity building related to environment safeguards will be implemented through: (i) the environmental specialists that will be engaged under the program Implementation Support (PIS); and (ii) Capacity Development Program under the Institutional Strengthening and Capacity Development Component. While carrying out technical assistance, the PIS environmental specialists will conduct lectures/seminars on topics relevant to EMP implementation and will ensure that the EMP implementation will be a "hands-on" training for the PMO, particularly its environmental safeguard staff, as well as the MUB, SRA, USUG, and the concerned Khoroos. The Capacity Development Program shall invite external experts to conduct lectures/seminars on other environmental management topics such as those suggested in **Table E-5** and/or other topics that would be requested later on by the PMO, MUB, SRA, and/or USUG.

348. The cost requirement for the conduct of the courses and seminars by external experts is included in the overall budget for Capacity Development Program.

Table E-5: Proposed Topics for Capacity Building/Training

Topic	Target Participants	Timing	Duration / Cost
1. By PIS Environmental Specialists			
1.1 Legal Framework a Relevant GoM laws, regulations & standards on environmental assessment & management b ADB SPS 2009 c EA procedure under the Program - Harmonizing the GoM & ADB safeguard Requirements	MUB-DEP, USUG PMO, SRA, Concerned khoroos	Early stage of PIS	½ day c/o PIS-TA
1.2 Some Aspects of EA Process & Environmental Management a Meaningful consultation & information Disclosure b Grievance redress mechanism c Environmentally responsible procurement d Occupational & community health and safety	MUB-DEP, USUG PMO, SRA, Concerned khoroos	Early stage of PIS	3 x ½ day c/o PIS-TA
1.3 EMP Implementation a Implementation arrangements -Institutional responsibilities -Environmental monitoring and reporting b Emergency response c Performance indicators	MUB-DEP, USUG PMO, SRA, Concerned khoroos	Early stage of PIS	½ day c/o PIS-TA
2. By External Experts			
2.1 Other relevant topics a Climate change and adaptation (applicable to eligible projects under the program) b Good engineering and construction practices as mitigation measures c Other relevant topics that may be requested by MUB &/or PMO	MUB-DEP, USUG PMO, SRA, Concerned khoroos	During Program's Capacity Building	2-3 days 3,000

Note: Best practices relevant to each topic to be presented, where applicable.

Environmental Reporting

349. Environmental monitoring and inspection activities and findings shall be documented for purposes of reporting, recording, verifying, referring on and evaluating the environmental performance of Project 1. The documentation shall also be used as basis in correcting and enhancing further environmental mitigation and monitoring. Environmental monitoring reports (EMRs) shall be prepared as follows:

(i) Monthly internal progress reports by the Contractors during construction and by the Operator during operation, submitted to the PMO. These monthly reports will include; (i) physical progress of the component; (ii) mitigation measures implemented; (iii) grievances received, resolved, closed and/or directed to other mechanisms; (iv) emergencies responded to; and (v) corrective actions taken.

(ii) The monthly EMP progress report by the PMO's ESS will incorporate the monthly reports of Contractors or Operators. The report will include (i) physical progress of T1 components; (ii) mitigation measures implemented; (iii) non-compliance with EMP; (iv) progress of capacity development; (v) unforeseen issues and concerns and status of corrective actions; (vi) findings of informal public consultations; (v) grievances received, resolved, closed and/or directed to other mechanisms; and (vi) performance evaluations of Contractors/Operators.

(iii) Quarterly environmental impact monitoring report by the licensed institute to report on the results of environmental quality monitoring as specified in the EMP. Report will include the analysis results and assessment of compliance/non-compliance with Mongolian and international standards. The 3rd, 6th, 9th, 12th Monthly Progress Report on EMP Implementation will incorporate the quarterly report of the licensed institute.

(iv) Annual EMP monitoring and progress reports, by the PMO's ESS to be submitted to the ADB to comply with environmental agreement in the loan. The Annual EMP monitoring and progress report will not only report on the progress and results of environmental monitoring and compliance of C-EMP/P1-EMPimplementation but will also briefly: (i) assess the effectiveness, of instituted measures; (ii) point out violation/s, if any; (iii) assess/recommend corrective actions; and (iv) cite any coordination made for corrective actions and, if applicable, certifications for having instituted them effectively. It shall also feature possible innovative mitigation measures applied by the Contractor, Operator or affected residents themselves, and other lessons learned in C-EMP/P1-EMP implementation. These will be useful in adjusting the C-EMP/P1-EMP to adapt to real ground situations. (Proposed adjustments/enhancement of the C-EMP/P1-EMP must have prior ADB.)

Mechanisms for Feedback and Adjustment

350. Based on environmental monitoring and reporting systems in place, the PMO shall assess whether further mitigation measures are required as corrective actions, or improvement in environmental management practices are required. The effectiveness of mitigation measures and monitoring plans will be evaluated by a feedback reporting system. The PMO will play a critical role in the feedback and adjustment mechanism. If the PMO identifies a substantial deviation from the EMP, or if any changes are made to the scope of Project 1 that may cause significant adverse environmental impacts or increase the number of affected people, then the PMO shall immediately consult MEGD and ADB to get their approval and identify EMP adjustment requirements.

Performance Indicators

351. This Section presents the preliminary set of environmental performance indicators to evaluate the effect of Project 1 implementation on the environment, i.e., whether or not Project 1 is enhancing, sustaining or deteriorating the state of the environment. The indicators are directed on two environmental areas that will be impacted by Component implementation: (i) health and safety of the concerned people and (ii) Selbe River. The selected indicators are limited to only those that can be measured or gauged from activities during subproject implementation and that can be tracked over a defined period (**Table E-6**). These will be finalized during the update of the EMP based on detailed designs.

Table E-6: Environmental Performance Indicators (1/3)

Indicator			Data Source
Parameter	Performance	Target	
During Construction 1 Emission of dust/particulates 1.1 Ambient concentrations PM10, PM2.5, CO, SO_2, NO_2	- % excess of level over GOM standard MNS 4585:2007	- Level should comply with MNS 4585:2007	- Result of air quality monitoring by Contractor - Result of pre-construction air quality monitoring by PMO
	- % excess of level over the pre-construction ambient level (if latter has exceeded MNS 4585:2007)	- If pre-construction ambient level has exceeded the MNS 4585:2007, level during construction should not exceed pre-construction level.	
	- % of the total HHs in construction influence area that lodged complaint on health impact &/or nuisance due to severe dust, gas emissions	- No community complaint lodged regarding health impact or nuisance from severe dust	- Grievance Redress Mechanism Record & Report
2 Emission of noise 2.1 Ambient noise level	- % excess of level over GOM standard MNS 4585:2007	- Level should comply with MNS 4585:2007	- Result of noise monitoring by Contractor - Result of pre-construction noise monitoring by PMO
	- % excess of level over the pre-construction ambient level (if latter has exceeded MNS 4585:2007)	- If pre-construction ambient noise level has exceeded MNS 4585:2007, increase in ambient noise level should not be more than 3 dB at the nearest reception location off-site.	
	- % of the total HHs in construction influence area that lodged complaint on health impacts &/or nuisance due to severe noise	- No community complaint lodged on health impact or nuisance from severe noise.	- Grievance Redress Mechanism Record & Report

Table E-6: Environmental Performance Indicators (2/3)

Indicator			Data Source
Parameter	Performance	Target	
3 Generation of solid waste, wastewater, hazardous waste, sediments			
3.1 Concentrations of pollutants in groundwater resources	- % excess of levels over the pre-construction ambient levels	- For parameters with pre-construction levels equal to or exceeding MON standard & WHO guidelines for drinking water quality, their levels during construction should not be higher than pre-construction levels.	- Results of ground water quality monitoring by Contractor - Results of pre-construction ground water quality monitoring by PMO
		- For parameters with pre-construction levels below the MON standard & WHO guidelines for drinking water quality, their levels during construction should not be more than 3% higher than pre-construction levels AND should be below the more stringent guideline limits.	
	- % of the total HHs in construction influence area that lodged complaint on health impacts due to deteriorating ground water quality	- No community complaint lodged regarding health impacts due to deteriorating ground water quality	- Grievance Redress Mechanism Record & Report
3.2 Concentrations of pollutants in Selbe River	- % excess of levels over the pre-construction levels	- For parameters with pre-construction levels equal to or exceeding MNS 4586-98, their levels during construction should not be higher than pre-construction levels.	- Results of surface water quality monitoring by Contractor - Results of pre-construction surface water quality monitoring by PMO
		- For parameters with pre-construction levels below MNS 4586-98, their levels during construction should not be more than 3% higher than pre-construction levels AND should be below MNS 4586-98.	
4 Generation of safety hazards			
4.1 Accidents, injuries, fire, explosion, landslide caused by earthworks, social conflicts involving workers, crimes involving workers	- % of total construction days when construction-associated trucks encountered road accidents	- None or 0%.	- Progress & monitoring reports of PMO & Contractor's Safety Team - Grievance Redress Mechanism Record or Report - Record & report of the Contractor's Safety Team - Record & report of khoroo & district police &/or traffic authorities - Hospital records
	- % of total construction days with accident or emergency (fire, explosion, landslide caused by earthworks)	- None or 0%.	
	- % of total construction days with accident or emergency that caused injuries &/or fatalities.	- None or 0%.	
	- % of total construction days with worker/s involved in social conflicts or crime	- None or 0%.	

Table E-6: Environmental Performance Indicators (3/3)

Indicator			Data Source
Parameter	Performance	Target	
During Operation			
5 Direct access to safe potable water & direct access to wastewater collection services			
5.1 Reduced incidence of water-borne diseases	- Number of incidence proven caused by water	- No such incidence from among those connected	- Khoroo family clinic/health center records prior to operation and during operation
6 Direct access to district heating	- Number of incidence of illnesses from exposure to cold - Number of incidence of respiratory illnesses	- No such incidence from among those connected - Decreased incidence from among those connected	- Khoroo family clinic/health center records prior to operation and during operation
7 Emissions from HOBs			
7.1 Ambient concentrations PM10, PM2.5, SO_2, Nox	- % excess of level over GOM standard MNS 4585:2007	- Level should comply with MNS 4585:2007	- Result of air quality monitoring by Operator - Result of pre-construction air quality monitoring by PMO
	- % excess of level over the pre-project ambient level (if latter has exceeded MNS 4585:2007)	- If pre-construction ambient level has exceeded the	
7.2 HOB stack emissions of PM10, PM2.5, SO_2, Nox	- % excess of level over GOM standard	- Level should comply with MNS 6298:2011	- Result of air quality monitoring by Operator and monitoring agency

ANNEX F: MAIN REFERENCES

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ANNEX G: COMMUNITY ACTION PLAN (SUMMARY) (PREPARED BY UN-HABITAT, MONGOLIA)

A. Background

352. The ADB TA 7970-MON: Ulaanbaatar Urban Services And Ger Areas Development Investment Program aims to promote an inclusive *peri*-urban development in the ger areas in Ulaanbaatar City. It will combine spatial and sector approaches and introduce sustainable urban services and support the socio-economic development of urban subcenters in *ger* areas. To fulfill the principle of an inclusive *peri*-urban development, the ADB has entered into a contract with the UN-Habitat for the community-led and participatory approach to *ger* area development for the project preparatory phase. In 2012-2013, the community and business groups (Community Development Council or CDC and SME Development Council or SDC, respectively) have been mobilized, organized, and are continually engaged in the development of the over-all strategy of urban functions development – i.e. land readjustment/land pooling; preparation of the land use plan for residential, economic, livelihood, and logistics use; support to resettlement planning and implementation; and, identify projects to be implemented based on land available.

353. The community engagement is envisaged to be relevant through the detailed design and implementation phases of the project. This will ensure that the plans and projects developed out of the needs surfaced during the community consultations are respected throughout the project period. This will be achieved through the mobilization, organization, and capacity building of the CDCs and SDCs in identifying and analyzing their needs, developing their action plans, and continuously engaging with the MUB and the TA Team to build consensus on the

B. The Community-led and Participatory Process

354. The community-led and participatory approach applied in the ADB is patterned after the UN-Habitat's People's Process which puts people at the center of development. This has been proven to have worked in many countries where UN-Habitat operates including Mongolia through the ongoing *Community-led Ger area Upgrading Project in Ulaanbaatar City in Mongolia* funded by the Government of Japan. The community mobilization process in the 2 subcenters basically followed the UN-Habitat People's Process with some modifications to suit the nature and timeline of the ADB project. There are 7 major phases employed in the ADB project, as follows: (a) Community Mobilization; (b) Organizing the communities and formation into Primary Groups; (c) Formation of Community Development Councils (CDC); (d) Formation of the SME Development Council or SDC; (e) Formation of CDC at the subcenter level (in progress); (f) Community Action Planning (CAP) process for the CDCs and SDCs; and, (g) Planning Consultation with the CDC. Continuing discussions and consultations on the different issues are done during these different phases to surface the real community needs which could be responded to by the investment project.

C. The Community Action Plan: Bayankhoshuu and Selbe Subcenters- Project 1, Tranche 1

355. The community engagement in the 2 subcenters will run parallel and will go through the same set of activities. This will be implemented by UN-Habitat during the entire duration of the project 1, tranche 1 which is projected to be completed by 2017. The critical activities per phase are as follows:

(i) **Project Preparation, social mobilization, and detailed design stage.** This will involve the following: (a) conduct series of consultative meetings and information campaign on the project objectives and investments, technical engineering designs of the investment projects, land pooling options and preferences, land valuation/pricing, and those affected by the construction/ road right-of way; (b) continuing organizational formation and strengthening of Primary Groups and Community/SME Development Council on how to meaningfully engage in the project especially in the SRA and how to set up feedback mechanism or grievance system; (c) comprehensive IEC on land pooling, land valuation, etc. ; and d) preparation and finalization of the proposed SME Development Plan.

(ii) **Implementation/construction stage.** Critical activities include (a) consultative meetings for resettlement/relocation; (b) implement resettlement compensation/relocation plan; (c) conduct community-led monitoring of construction works for quality control; (d) continuous capacity building for the Community Development Council (CDC) and Primary Groups especially in contracts negotiation/contracting and dealing with the SMEs; and (d) documentation of good practices, lessons learned, feedback, complaints or grievances.

(iii) **Operations and maintenance (O&M) stage.** Critical activities will involve (a) IEC program for basic hygiene practices, water conservation, community involvement on the ger redevelopment, SME Development Program, etc.; (b) capacity development activities for CDCs/SDCs on redeveloped lots on O&M of new facilities, estate management, etc.; (c) continuing consultations on the scope and technical/engineering design and implementation arrangements for proposed socio-economic projects (i.e., kindergarten, clinics, bus station, market, khoroo building, vocational training centers, public spaces/open parks); and, (d) documentation of good practices, feedback, complaints or grievance issues and lessons learned.

(iv) **Monitoring and evaluation stage.** Critical activities will include (a) documentation of schemes/approaches that worked (good practices), feedback, lessons learned, complaints or grievance issues; and (b) conduct community-based monitoring and evaluation of new basic infrastructure and services and impacts on beneficiaries based on agreed log frame of the project.

D. Implementation Arrangements

356. UN-Habitat will be the direct implementation agency of this community engagement and SME development component of the project. It will coordinate directly with the project PMO for direction, coordination of activities, administrative and reporting functions, and link with other MUB departments. Links with the GADA will likewise be done through the PMO for the sharing of the project component's progress and innovations and possible replication of the project in other areas, as well as policy support.

E. Timeframe – 3-4 years from 2014-2017

F. Budget - US$ 1,005,000

G. Monitoring and Evaluation

357. The Project TA Team and UN-Habitat will develop the participatory M&E Framework for this component with inputs from MUB and CDCs. A Monitoring Committee will be organized to be headed by the MUB-PMO and develop systems and tools based on ADB guidelines as well as experiences from other countries where similar projects have been undertaken. The committee will determine the frequency of the monitoring of the project. A midterm evaluation is being recommended given the project duration and a final evaluation will be necessary to be done by an external evaluator.

ANNEX H: SYNTHESIS OF CONSULTATION MEETING, JUNE 2013

358. Environ LLC –a government authorized EIA company - has been awarded a contract in conducting detailed EIA for Bayankhoshuu and Selbe subcenters within the Ulaanbaatar Urban Services and Ger Areas Development Investment Program in compliance with the MON Law on Environmental Impact Assessment (2012).

359. As planned, public consultation for dissemination and sharing info on EIA study takes place two times during the EIA study period. One is at the commencing of EIA study and the other is at the end of study for each of these subcenters. This section summarizes the first round of consultation conducted by Environ LLC in June 2013.

Bayankhoshuu Subcenter

360. Environ LLC conducted the first public consultation in Bayankhoshuu subcenter on 8th of June 2013 in Public Hall of the 7th Khoroo of Songino Khairkhan District within the project area.

Agenda of Meeting

13.00-13.10 Opening by Ms. Ouynchimeg, 7th Khoroo Governor, Songinokhairkhan District
13.10-13.20 Purpose of the meeting and overview of proposed Ger area re-development project- Mr. Erdenesaikhan
13.20-13.40 Introduction of DEIA work: purpose and activities and outputs of DEIA activities.
13.40-14.00- Q&A session.

Audience

361. Despite pre-election period, where it is difficult to conduct any public meeting outside of political parties, 38 citizens gathered in the citizen's hall of the 7th Khoroo.

Meeting Minutes

362. The meeting was opened by Ms. Ouynchimeg, 7th Khoroo Governor, Songinokhairkhan District. Mr. Erdenesaikhan introduced: (1) the purpose of the meeting "to inform citizens and inhabitants in the project area about the start of EIA study in relation to proposed Ger area development project in accordance with the Law on EIA of Mongolia (2012) and ADB Environmental Safeguard Policy (2009)"; and (2) main purpose, planned activities and expected outputs and outcomes of the proposed Ger Area Development Program in Bayankhoshuu Subcenter. The Project supplied "briefing paper" was used in introducing the project.

363. Then he specifically focused on (3) what DEIA is going to cover: baseline status on ground and surface water, soil pollution and air quality (current status vs. requirements by legislation), why current status of these elements are necessary and why we are informing about DEIA to be conducted, why these info would be necessary for inhabitants etc.

364. Mr. Erdenesaikhan provided contact info of Environ's EIA study team for question/clarification and getting comments and feedbacks from inhabitants on ongoing study. He also announced about planning of the second public consultation meeting to introduce the EIA study results in the beginning of coming July.

Question and Answers

(i) Question by Mr. Tsedenbaatar: Do you have a detailed map of project planned infrastructure?

Answer: Currently infrastructure experts together with mapping experts have been working on establishing tracks for planned infrastructure on sewerage, water supply, heating and paved roads.

(ii) Question by Ms. Baigalmaa: What will happen if my plot will be affected by the planned infrastructure?

Answer: I was informed that a separate resettlement study is ongoing regarding project affected people and this study started in early spring 2013 The study team has been visiting those households whose property is overlapping with the planned trace of infrastructure.

(iii) Question by Ms. Tsolmon: If affected would it be compensated properly?

Answer: As mentioned earlier there is a separate study team working on this issue and our study team's purpose is different and we do not possess relevant info. As far as I know, there are certain policies of the Government of Mongolia and ADB on resettlement issues and these national and international legislations are emphasized on full coverage of various compensation measures for affected households.

(iv) Question by Ms. Narantugs: I fully support the project because planned infrastructure will provide suitable and healthy environment for our living space through clean water supply, relevant heating and sewage disposal as well as good road network.

Table H-1 : List of participants, Bayankhoshuu public consultation, June 2013

No.	Names of participants	Cell phones	Home address
1	Æ. Öîëìîí	98283271	7-ð õîðîî êîëîíê 2-16

No.	Names of participants	Cell phones	Home address
2	Áààñàíõ¿¿	88475547	7-ð õîðîî êîëîíè 9
3	Ö. Îþí÷èìýã	88843083	ÑÕÄ 7-ð õîðîî 3-5
4	×. Ãàíõóÿã	88843083	ÑÕÄ 21-10
5	×óëóóíõ¿¿	93147404	ÑÕÄ 40-01
6	Öýäýíáààòàð	96310949	ÑÕÄ 7-ð õîðîî êîëîíè 1-7
7	Ñàðàíòóÿà	86866712	ÑÕÄ 7-ð õîðîî êîëîíè 3-7
8	ØÍÎâäîð	88691279	ÑÕÄ 7-ð õîðîî êîëîíè 2-17à
9	×îéæèí	99221687	ÑÕÄ 7-ð õîðîî êîëîíè 1-6
10	Öýðýíäîðæ	88853189	ÑÕÄ 7-ð õîðîî 39-8
11	Ãàíáîëä	88695900	ÑÕÄ 7-ð õîðîî 36-29
12	Íàíñàëìàà	89449252	ÑÕÄ 7-ð õîðîî 39-11
13	Ñ. Áàéãàëüìàà	88624805	ÑÕÄ 7-ð õîðîî Ìîíãàà 5-2
14	Á. Ýðäýíýñ¿ðýí	96599067	ÑÕÄ 7-ð õîðîî Ìîíãàà 5-5à
15	Ãàëòîãòîõ	88694140	ÑÕÄ 7-ð õîðîî Ìîíãàà 5-5
16	Áàòýíãýë	96205215	ÑÕÄ 7-ð õîðîî Ìîíãàà 4-7
17	Â. Îþí	96604270	ÑÕÄ 7-ð õîðîî Ìîíãàà 5-6
18	Àðèóíàà	88891444	ÑÕÄ 7-ð õîðîî Ìîíãàà 3-5
19	Áàäàì	95774242	ÑÕÄ 7-ð õîðîî Ìîíãàà 4-9á
20	ªëçèéø¿ð	88092774	ÑÕÄ 7-ð õîðîî 38-14
21	Öýðýíáàäàì	91197255	ÑÕÄ 7-ð õîðîî Ìîíãàà 4-9à
22	Àðèóíàà	50041009	ÑÕÄ 7-ð õîðîî Ìîíãàà 2-8
23	Ý. Ïóíöàãäóëàì	96730098	ÑÕÄ 7-ð õîðîî êîëîíè 1-9
24	Òóÿà	99939194	ÑÕÄ 7-ð õîðîî êîëîíè 3-1
25	Ñ. Ñ¿õçàÿà	91188991	ÑÕÄ 7-ð õîðîî êîëîíè 3-2
26	Ýíõòàéâàí	89800076	ÑÕÄ 7-ð õîðîî êîëîíè 2-17
27	Öîëìîí	98283271	ÑÕÄ 7-ð õîðîî êîëîíè 2-16
28	Ë. Áàòæàðãàë	96632306	ÑÕÄ 7-ð õîðîî 40-21
29	Ç. Ñóãàðñ¿ðýí	96012371	ÑÕÄ 7-ð õîðîî Ìîíãàà 4-3
30	Íàðàíòºãñ	96604143	ÑÕÄ 7-ð õîðîî 40-9
31	Öàãààíäîðæ	91682236	ÑÕÄ 7-ð õîðîî 39-4
32	Àëòàíöýöýã	89999619	ÑÕÄ 7-ð õîðîî 4-6
33	Ì. Áàòöàãààí	95840004	ÑÕÄ 7-ð õîðîî 40-4
34	Í. Ýíõòóóë	99164154	ÑÕÄ 7-ð õîðîî 39-23
35	Ä. Áàäàìäàðü	88708004	ÑÕÄ 7-ð õîðîî Ìîíãàà 4-2
36	Ã. Ãàíöýöýã	99251850	ÑÕÄ 7-ð õîðîî Ìîíãàà 4-10
37	Ýðäýíýáàÿð	99274861	ÑÕÄ 7-ð õîðîî Ìîíãàà 2-11

Selbe Subcenter

365. The first public consultation in Selbe subcenter took place on 11th of June 2013 in Public Hall of the 14th Khoroo of Sukhbaatar District within the project area.

Agenda of Meeting

10.00-10.10 Opening by Ms. Enkhzaya, 14th Khoroo Governor, Sukhbaatar District.
10.10-10.20 Purpose of the meeting and overview of proposed Ger area re-development project- Mr. Erdenesaikhan
10.20-10.40 Introduction of DEIA work: purpose and activities and outputs of DEIA activities.
10.40-11.00- Q&A session.

Audience

366. Despite pre-election period, where it is difficult to conduct any public meeting outside of political parties, 28 citizens have been gathered in the citizen's hall of the 14th khoroo of Selbe Subcenter.

Meeting Minutes

367. The meeting was opened by Ms. Enkhzaya, 14th Khoroo Governor, Sukhbaatar District.

368. Mr. Erdenesaikhan made a powerpoint presentation which introduced (1) the purpose of the meeting "to inform citizens and inhabitants in the project area about the start of EIA study in relation to proposed Ger area development project in accordance with the Law on EIA of Mongolia (2012) and ADB Environmental Safeguard Policy (2009)".

369. He has briefly introduced (2) main purpose, planned activities and expected outputs and outcomes of the proposed Ger Area Development Program in Selbe Subcenter. Project supplied "Briefing paper" was used in introducing the project.

370. Then he focused on (3) what DEIA going to cover: baseline status on ground and surface water, soil pollution and air quality (current status vis requirements by legislation), why current status of these elements are necessary and why we are informing about DEIA to be conducted, why these info would be necessary for inhabitants etc.).

371. Mr. Erdenesaikhan has provided contact info of Environ's EIA study team for question/clarification and getting comments and feedbacks from inhabitants on ongoing study. He also announced about planning of the second public consultation meeting to introduce the EIA study results in the beginning of coming July.

Question and Answers

(i) Question by Mr. Nyamdorj: Do you have a detailed map of project planned infrastructure because the map on your slide is too coarse to see in detail where these pipelines go?

Answer: This map is provided by the project to provide overall view, and current infrastructure experts together with mapping experts have been working on establishing tracks for planned infrastructure on sewerage, water supply, heating and paved roads.

(ii) Question by Ms. Tuya: I understood in discussion with project staff in meeting organized last month that pipelines will go for 3 km where the starting and end points of these pipeline? My second question when the infrastructure will be constructed?

Answer: The feasibility study is currently ongoing to detail the proposed pipelines. When the feasibility study results will be available, I will be able to respond properly on your question. The program has 3 steps to be fully implemented for ten years and Project 1 will be implemented in 2-3 years.

(iii) Question by Ms. Tsolmon: Are there many affected households and will those affected households be resettled? Is there alternative way to avoid involuntary resettlements?

Answer: There is a separate study team working on this issue and our study team's purpose is different and we do not possess relevant info. As far as I know, there are certain policies of the Government of Mongolia and ADB on resettlement issues and these national and international legislations are emphasized on full coverage of various compensation measures for affected households.

Table H-2: List of participants, Selbe public consultation, June 2013

No.	Names of participants	Cell phones	Home address
1	Äîëæèí	95527313	СБД Хàíäãàéò 42-518
2	Ã. Òîãîî	91199701	СБД Хàíäãàéò 42-528
3	Ë. Äàâèéãîìáî	96203005	×Ä 14-ð õîðîî
4	Æ. Á¿ðýíòóÿà	93136720	×Ä 14-ð õîðîî
5	Á. Öýäýí	88151464	×Ä 14-ð õîðîî
6	Ñ. Íýìäîðæ	91208252	×Ä 14-ð õîðîî
7	Ñ. ×èìãýý	88893555	×Ä 14-ð õîðîî
8	Ä. Òóÿà	91172529	×Ä 14-ð õîðîî
9	Ñ. Øèíæýýðàâäàí	96052718	ÑÁÄ 14-ð õîðîî
10	Ã. Ñóìúÿà	96442122	ÑÁÄ 14-ð õîðîî
11	Ö. Àðèóíàà	95122895	ÑÁÄ 14-ð õîðîî
12	Ä. Áóÿíõèøèã	96667576	ÑÁÄ 14-ð õîðîî 40-473
13	Ñ. Òýðýñìàà	96635270	ÑÁÄ 14-ð õîðîî 17-103
14	Ä. Ò¿ìýíæàðãàë	94949439	ÑÁÄ 14-ð õîðîî 18-116
15	Á. Ãàí÷èìýã	96015048	×Ä 14-ð õîðîî 8-88
16	Í. ×èìýä	96640283	×Ä 14-ð õîðîî 18-417
17	Ö. È÷èíõîðëîî	99845088	×Ä 14-ð õîðîî 20-455
18	ß. Ðèíà	97081586	×Ä 14-ð õîðîî 14-308
19	Ë. Äýìáýðýëñàéõàí	89714242	×Ä 14-ð õîðîî 5-43
20	Ö. Æàâçàíäóëàì	95000483	×Ä 14-ð õîðîî 1-5
21	Ñ. Íàðàíöýöýã	96698981	ÑÁÄ 14-ð õîðîî 35-410

22	Ñ. Øèðýíöýöýã	99860360	ÑÁÄ 14-ð õîðîî 40-480
23	Ã. Íýìäîðæ	99812791	ÑÁÄ 14-ð õîðîî 19-46
24	Ö. Îòãîíáàÿð	99154496	ÑÁÄ 14-ð õîðîî 15-99
25	Æ. Ýíõçàÿà	89687997	ÑÁÄ 14-ð õîðîî 32-329
26	Ã. Ñóìúÿà	96442122	ÑÁÄ 14-ð õîðîî 25-135
27	Ä. Ñ¿õáààòàð	99243078	ÑÁÄ 14-ð õîðîî 18-38
28	Ë. Àëòàí÷èìýã	95284419	ÑÁÄ 14-ð õîðîî 40-478