TA-6293 REG: Managing the Cities in Asia – Mongolia National Urban Assessment

Additional Component: Urban Development Assessment of the CHP 5 Neighboring Area in Ulaanbaatar

Final Report, 14 April 2016

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# Table of Contents

Glossary ........................................................................................................................................... 3

Executive Summary .......................................................................................................................... 5

1 Introduction .................................................................................................................................... 10

2 Study background .......................................................................................................................... 12

3 Study area ...................................................................................................................................... 14

3.1 Location of CHP 5 ...................................................................................................................... 14

3.2 Development of CHP 5 ............................................................................................................ 14

3.3 Agreed Proposed Heat Supply Distribution Transmission routing ........................................... 15

3.4 Boundaries of study area ......................................................................................................... 16

3.5 Typology of the study area and its projected growth ................................................................. 17

4 Study area development .............................................................................................................. 21

4.1 Visioning and strategic orientation for the study area ............................................................... 21

4.2 Harmonisation with major on-going development projects in the study area ......................... 21

4.3 Additional infrastructure requirements identified ..................................................................... 29

4.4 Institutional, legal, and regulatory constraints ........................................................................ 31

4.5 Suggested modifications in development orientation of on-going development schemes ..... 34

4.6 Additional development directions suggested based on experience elsewhere ................... 36

4.7 Summary proposed development strategy for the study area ................................................. 37

5 Recommended infrastructure investment proposals ..................................................................... 38

5.1 Re-design of On-going Investment Projects ............................................................................ 38

5.1.1 Ger Area Redevelopment Projects ..................................................................................... 38

5.1.2 Ger Area Land Readjustment Projects .............................................................................. 40

5.1.3 Da Khuree Car Market Site Redevelopment .................................................................... 41

5.1.4 Uliastai Light Industrial Area Redevelopment .................................................................. 42

5.2 New investment projects ......................................................................................................... 44

5.2.1 Thermo-technical Rehabilitation of Pre-cast Panel Apartment Buildings ............................ 44

5.2.2 Extension of envisaged East-West BRT line .................................................................... 45

5.2.3 North-eastern by-pass road ............................................................................................... 45

5.2.4 Ecopark East (Tsagaan Davaa solid waste site upgrading and expansion) ....................... 46

5.2.5 Completion of Tuul waste water collector ......................................................................... 47

5.2.6 Integrated Micro Centers .................................................................................................... 48

5.2.7 Protection and development of Uliastai river bank ............................................................ 48

5.3 Institutional coordination, capacity development and technical assistance ............................. 50
Summary of Recommendations and Follow-up Action Plan .................................................. 52
Annexes ................................................................................................................................. 54
Annex 1 Study Terms of Reference ...................................................................................... 54
Annex 2 Documents consulted and individuals met ............................................................... 59
Annex 4 Investment Proposals Workshop (29 January 2016) Notes .................................. 64
Annex 5 Proposed Supporting Investment Project Briefs ..................................................... 67
Glossary

ADB - Asian Development Bank
ALAGaC - Administration of Land Affairs, Geodesy and Cartography
BOOT - Build-Own-Operate and Transfer
BRT - Bus Rapid Transit
CDIA - Cities Development Initiative for Asia
CDM - Clean Development Mechanism
CHC - City Housing Company
CHP - Combined Heat and Power plant
CIIPP - City Infrastructure Investment Planning and Programming
CMT - Core Management Team
DDP - District Development Plan
EIA - Environmental Impact Assessment
3E - Economy, Equity and Environment approach
GADA - Ger Area Re-development Agency
GAHP - Ger Area Housing Project
Ger areas - Informal settlements
GIZ - German Agency for International Development
HoB - Heat only Boiler
JCM - Japanese-Mongolian Joint Crediting Mechanism
JICA - Japan International Cooperation Agency
Khoroo - Sub-district
MCUD - Ministry of Construction and Urban Development
MoE - Ministry of Energy
MUB - City Government of Ulaanbaatar
MUB Master Plan - MUB 2020 Development Master Plan and Development Concepts Plan 2030
NOSK - Capital City Housing Corporation
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>NUA</td>
<td>National Urban Assessment</td>
</tr>
<tr>
<td>PFS</td>
<td>Pre-Feasibility Study</td>
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<tr>
<td>PMU</td>
<td>Project Management Unit</td>
</tr>
<tr>
<td>SME</td>
<td>Small and Medium-size Enterprises</td>
</tr>
<tr>
<td>Sukh</td>
<td>Condominium Owners Association</td>
</tr>
<tr>
<td>ToR</td>
<td>Terms of Reference</td>
</tr>
<tr>
<td>UB</td>
<td>Ulaanbaatar</td>
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<tr>
<td>UBDHC</td>
<td>Ulaanbaatar City District Heating Company</td>
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<tr>
<td>USUG</td>
<td>Water Supply and Sewerage Authority</td>
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</tbody>
</table>
Executive Summary

This Ulaanbaatar (UB) urban expansion area assessment study comprises a separate component within the ADB/CDIA-supported Mongolia National Urban Assessment (NUA). It originated from the City Government of Ulaanbaatar (MUB)’s request to CDIA for support to carry out a Pre-Feasibility Study (PFS) for the urban infrastructure required for the 5th Combined Heat and Power Plant (CHP 5) This request included a request for an assessment of sustainable urban expansion of the city in the CHP 5 neighboring area (the study area).

Ulaanbaatar has experienced rapid urbanization since the 1950s, the pace of which has dramatically accelerated since the early 2000s. Its average annual urban population growth rate stood at 4% between 2000 and 2009, before rising to 5,2% p.a. since 2010. About 1.3 million inhabitants presently (2015) live in Ulaanbaatar, a city that was planned for half a million. Its expansion continues to be fuelled by important in-migration flows, attracting approximately 30,000 new settlers every year since 2005.

The city has two distinct parts: a formal urban core area consisting mainly of blocks of apartment buildings, and three tiers of unplanned Ger areas (informal settlements): inner- middle- and fringe-locations. While the formal urban area is connected to central infrastructure and has access to urban services and utilities, the Ger areas lack access to the infrastructure network like central city heating, water supply, sanitation, and, in some cases, electrical supply as well as paved roads, in addition to receiving inferior urban service provision. An estimated 60% of the city’s population lives in these Ger areas.

The Parliament of Mongolia approved the MUB 2020 Development Master Plan and Development Concepts Plan 2030 in February 2013. The Master Plan envisages UB to grow as a poly-centric expansion with two main centers and 6 sub-centers, as well as several satellite centres.

The plan to build a fifth power plant in the eastern part of the city is in response to the fact that the current power plants - 2, 3 and 4th (located in the western part of the city) are unable to meet the growing needs of heat and electricity in Ulaanbaatar. The CHPS will be located on a 45.4 ha site in eastern Bayanzurkh District’s 11th Khoroo, on the opposite side of Urgakh Naran sub-district. The site is accessible via the road heading to Nalaikh at the east of Ulaanbaatar and is adjacent to the railroad track that runs from Ulaanbaatar to China.

The study area has been defined as the spatial area impacted by the heat production, - transmission and - distribution resulting from the development of the CHP 5 plant. The electricity generated by the CHP 5 feeds into a national power grid, which is already well established in Ulaanbaatar, so no specific localized spatial impact of that is envisaged. In the delineation of the study area the consultants therefore considered the likely impact of the additional heat distribution system (as well as also considering the additional water supply) from the plant as the dominant criteria in defining the study area boundaries.

CHP 5 transmission routing proposals have been agreed in September 2015. With these, most of the Master Plan planning units in Bayanzurkh District are envisaged to receive heat from the CHP 5 plant, with the exception of two planning units (units 12 and 13 on the west side, which in the context of the envisaged divided East-West dual city heating system are to be provided with heat by the existing CHP.
and 4. These two planning units are considered fully developed and no major urban expansion is envisaged in them. Several planning units (most probably units 16 and 18) are expected to be served with heat supplied by the CHP 5 in combination with the Heat only Boiler (HoB) in Amgalan area, which started operating in September 2015. Such planning units have conservatively been considered as part of the study area. Within Bayanzurkh district seven residential planning units, three Ger districts (Dari-Ekh, Sharkhad and Khujirbulan areas), and the industrial area nr. 4 near Uliastai will thus receive heat from the new CHP 5 in combination with the Amgalan HoB.

Bayanzurkh district is essentially a mixed land-use district: 37% of the population are living in apartments that are connected to city infrastructure services. Apartment complexes are located in the center of the district, but are expanding to the Ger districts in the last 2-3 years. Most universities, administration buildings, hotels and other service centers are located in the Khoroo close to the center of the city. 63% of Bayanzurkh’s population live in Gers or houses within the Ger areas and are not connected to central infrastructure. The Ger areas within Bayanzurkh are located in the north, northeast and south east area. There is significant commercial and manufacturing land use. Also located in the district are some of the largest markets of the capital such as Daa Khuree, Narantuul and Dunjingarav as well as several drink and beverage factories.

The Master Plan envisages a poly-centric urban development for UB, with “Ikhtoiruu”, an old city center, to be complemented by the new city center “Shine-Yarmag” and 6 sub centers, namely Shine khot, Songol, Gurvaljin, Bayankholshuu, Selbe, and Amgalan. Bayanzurkh district as the eastern region of the total of 8 geographic planning regions will be further developed as a mixed region with a new city sub center, high technology industry, intellectual center, residential buildings, and micro districts with socio and eco-friendly industries.

The areas planned to receive heating from CHP-5 are mostly Ger districts, business areas and residential areas having buildings with social services entities. Heat is currently not supplied from the existing central heating supply systems to these areas, which are mostly heated from independent heat only boilers (HoBs). Households living in Ger districts heat their residences with coal or wood which is one of the main causes of air pollution in the city due to their location, which is generally on hill slopes and mostly upstream from prevailing wind.

To develop a overall strategic orientation for the study area the visions from the UB Master Plan , the Bayanzurkh District Development Plan and the National Urban Assessment have been matched with the projected CHP 5 heat distribution transmission lines, and based on that the study concludes that the development of the study area with its focus on the best utilisation from the limited central source heat supply should respond to the following three broad strategic orientations:
1) Compact city growth, i.e. densification in order to efficiently and equitably deliver urban services;
2) Poly-centric development with Sub-centers (in line with the Master Plan priorities for UB city as a whole);
3) Integration of heat supply distribution with other urban services, particularly transport.
These strategic orientations and concerns form the framework for the development directions and – proposals in the study, as outlined below.

The new heating supply from CHP 5 to the study area will serve a significant proportion of the study area’s population, but it will not be sufficient to cover all demand. This makes it all the more important to ensure that major on-going development projects and heat supply proposals in the study area will
be harmonised, so that mutually beneficial solutions can be identified to improve overall efficiency and equity of heat delivery. The hallmarks of the development strategy for the study area are consolidation and densification throughout the study area, making better use of existing and programmed infrastructure and through modified Ger area re-development schemes.

The following on-going development activities are pertinent in that regard:

a) Development of partial detail master plan in 12 planning units in Bayanzurkh district within the framework of the 2020 master plan.

b) Ger Areas Redevelopment Projects: Ger area re-development projects have started in 2012 and are on-going in four of the study area’s planning units. The development formula is that the Ger residents contribute their land, the city government contributes the cost of infrastructure, and the re-housing development process is managed by a private developer. After rehousing the original Ger residents, the developer builds and sells additional apartments in the market. The program aims to increase residential densities about 4-5-fold.

c) The Ger Area Housing Project (GAHP) has been established in 2013 to mobilize residents around the opportunities to collectively improve their living environment and develop land re-adjustment projects based on their interest and feedback. At the time of the study there are 8 planning units in Ulaanbaatar in which residents of possible land re-adjustment sites have established their temporary representative council for this purpose (two in Bayanzurkh district). Preliminary development studies have been completed and detailed project designs will be elaborated with participation and contributions by the residents. Under the land re-adjustment framework, the households prefer to keep their land and to build detached and town houses, and low rise apartments with business spaces. Densities are envisaged to increase from 70-80 persons per ha. to about 320 persons per ha.

d) District Development Plan of Bayanzurkh district: The district development plan identified challenges and then prioritized challenges to define solutions, proposed as projects. The plan identified four sets of projects to be implemented by 2030.

e) Retrofitting of old apartment buildings to save energy: About 20% of the housing stock in Ulaanbaatar comprises of social housing apartment buildings constructed during the socialist era (some 47,000 housing units in over 1,000 apartment buildings, of which about 8,150 units in the study area), mostly through using the pre-cast panel building technique. These buildings are generally structurally sound, but poorly insulated. A pilot project supported by German Development Cooperation and MUB in 2007 demonstrated that substantial energy savings gains could technically be achieved with relatively simple insulation measures.

Balanced urban development to ensure affordability of housing options to all and improving mobility to ensure access to employment and housing will be important strategic considerations in the harmonisation context. Sub-center development in Amgalan/Uliastai will be promoted, and the re-development of the redevelopment of the Da Khuree car market site provides an ideal opportunity to test new approaches. Simultaneously, the development strategy will continue to protect nature reserves along the Tuul, Selbe and Uliastai rivers.

Specific suggestions to re-design on-going area redevelopment projects in support of this and to utilise the new CHP 5 distributed heat more efficiently and equitably have been developed by the study team, while suggestions for additional supporting (infrastructure) investment projects to help achieve that,
as well as suggestions for institutional strengthening have been provided. These are summarized in the concluding chapter of the study and reproduced in the below tables along with an initial action plan for follow up.

Recommended design modifications

<table>
<thead>
<tr>
<th>Program</th>
<th>Actions</th>
<th>Actors</th>
<th>Timing</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ger Redevelopment Projects</td>
<td>Design parameters review with the objective to achieve a more demand-responsive and energy-efficient housing options mix</td>
<td>GADA/NOSK/developers</td>
<td>1st-2nd quarter 2016</td>
<td>Design guidelines for developers</td>
</tr>
<tr>
<td>Ger Land Readjustment Projects</td>
<td>Matching community designs with detailed master planning to ensure that such planning adequately considers community design proposals</td>
<td>GAHP/NOSK/MPA/JICA/GIZ/planning consultants</td>
<td>1st-2nd quarter 2016</td>
<td>Revised area development plans</td>
</tr>
<tr>
<td>Da Khuree redevelopment</td>
<td>Resolution of proposed land use dispute, so that the site can be redeveloped timely in the interest of sustainable growth</td>
<td>MPA/area lessee/planning consultants</td>
<td>1st-2nd quarter 2016</td>
<td>Agreed land use plan for the area</td>
</tr>
<tr>
<td>Ulaistai light industrial area infrastructure</td>
<td>Include in the next tranche of Ger Area Redevelopment investment, and protect water resources zone; develop Feasibility Study for sustainable urban development of the area</td>
<td>MUB/GADA</td>
<td>By 2017</td>
<td>Feasibility Study</td>
</tr>
</tbody>
</table>

Recommended investment project preparation

<table>
<thead>
<tr>
<th>Project</th>
<th>Estimated investment cost</th>
<th>Follow-up required</th>
<th>Actors</th>
<th>Timing</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Thermo-technical retrofitting of apartments</td>
<td>MNT 76 billion</td>
<td>Preparation of detailed feasibility study of thermo-technical retrofitting of apartments in the study area for external support</td>
<td>Mayor’s Office/NOSK/GIZ/Projects and Cooperation Department/MCUD/MOF</td>
<td>1st-3rd quarter 2016</td>
<td>Proposal for discussion with external support agencies (Russia, ADB, KfW?)</td>
</tr>
<tr>
<td>2. BRT extension</td>
<td>MNT 32 billion</td>
<td>Inclusion of proposed extension in revised BRT plan currently under consideration by MUB and ADB</td>
<td>MUB Transport Office/MPA/BRT consultants/Projects and Cooperation Department/ADB/MCUD/MOF</td>
<td>1st-3rd quarter 2016</td>
<td>Revised BRT Plan for ADB UTDIP Tranche 2</td>
</tr>
<tr>
<td>3. North eastern by-pass road</td>
<td>MNT 14 billion</td>
<td>Inclusion of by-pass in road development plans under ADB-supported UTDIP</td>
<td>MUB Transport Office/MPA/Transport consultants/Projects and Cooperation Department/ADB/MCUD/MOF</td>
<td>1st-3rd quarter 2016</td>
<td>Revised Road Development Plan for ADB UTDIP Tranche 2</td>
</tr>
<tr>
<td>4. Ecopark East</td>
<td>MNT 1 billion (FS)</td>
<td>Preparation of expanded Feasibility Study building on earlier efforts by MRA</td>
<td>Mongolian Recyclers Association/Mayor’s Office/Projects and Cooperation Department/EBRD/MCUD/MOF</td>
<td>1st-3rd quarter 2016</td>
<td>Feasibility Study for implementation</td>
</tr>
<tr>
<td>5. Tuul Waste Water collectors</td>
<td>MNT 12 billion</td>
<td>Resolution of resettlement issue along Tuul 3 and 4 to enable implementation of design</td>
<td>MUB Investment Department/USUG</td>
<td>2016</td>
<td>Projects ready for implementation in 2017 and 2018</td>
</tr>
<tr>
<td>6. Integrated Micro Centers</td>
<td>MNT 34 billion</td>
<td>Preparation of detailed design for each micro-center</td>
<td>MPA Infrastructure Department/Bayanzurkh District</td>
<td>2016</td>
<td>Projects ready for implementation in 2017 and 2018</td>
</tr>
<tr>
<td>7. Ulaistai river bank development</td>
<td>MNT 2 billion</td>
<td>Feasibility Study of embankment protection and leisure park</td>
<td>MPA/Planning Consultants</td>
<td>2016</td>
<td>FS completed, detailed designs to be tendered</td>
</tr>
</tbody>
</table>

8
### Suggested institutional strengthening measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Actions</th>
<th>Lead actors</th>
<th>timing</th>
<th>Output</th>
</tr>
</thead>
</table>
| Capacity enhancement of Sukhs          | 1) Strengthening and enforcement of regulations governing the operation of Sukhs  
                                          2) Training of Sukh management                                        | Supreme council of Sukhs/MCUD        | 1st-3rd quarter 2016       | Improved regulatory framework, enhanced management of Sukhs            |
| Preparation of operational regulations for urban re-development law | Detail out operational procedures for all five types of area redevelopment identified in the urban re-development law | JICA/MCUD                          | 2016               | Enacted regulations                                                    |
| Institute consumption-based billing for energy | Formulate and enforce consumption-based billing regulations under energy efficiency law | MoE/GIZ                              | 2016               | Enacted regulations                                                    |
| Consolidate MUB housing institutions   | Consider options for institutional integration of GADA, GAHF and NOSK    | Office of the Mayor, NOSK, GADA, GAHP, MCUD | 1st-3rd quarter 2016 | Institutional plan for consolidation of housing institutions           |
1 Introduction

This Ulaanbaatar (UB) urban expansion area assessment study comprises a separate component within the ADB/CDIA-supported Mongolia National Urban Assessment (NUA) as specified in the Terms of Reference at Annex 1. It originated from the City Government of Ulaanbaatar (MUB)’s request to CDIA for support to carry out a Pre-Feasibility Study (PFS) for the urban infrastructure required for the 5th Combined Heat and Power Plant (CHP 5) of 19 March 2015. This request, which was approved by the CDIA Core Management Team (CMT) on 26 March 2015 for support through the utilization of ADB TA-6293 REG resources at the disposal of CDIA, included a request for an assessment of sustainable urban expansion of the city in the CHP 5 neighboring area. A TA Agreement to implement the approved scope of work was signed by the Mayor of UB and the ADB CDIA Program Manager on 26 March 2015, and by the GIZ CDIA Program Coordinator on 8 June 2015.

In parallel, the Government of Mongolia (through the Ministry of Construction) had requested ADB and CDIA to support a National Urban Assessment to be conducted during August 2015 – January 2016. For reasons of coherence of operations and possibilities of greater synergies it was agreed between ADB and CDIA in June 2015 to separate the present UB urban expansion area assessment assignment from the CHP 5 infrastructure support work and to incorporate it as a free-standing separate component in the NUA.

The assignment started from 31 August 2015 for a duration of 5 months up to January 2016\(^1\) inclusive. Three missions have been conducted for the assignment by Senior Urban Development Specialist Emiel Wegelin, an inception mission during 14-27 September 2015, an interim mission during 15 November – 2 December 2015, and the final phase mission during 17-30 January 2016, supported by the National Urban Infrastructure Specialist Ms. Myagmar Dovchin, who provides the continuity of effort for the study’s duration intermittently in conjunction with her assignment in the NUA team.

The study team has benefited from meetings with the City Government (MUB), the National Government (Ministry of Construction), CDIA representatives, ADB staff, and members of the ADB/CDIA NUA consultants team, the CDIA/ADB CHP 5 infrastructure development consultants team, the ADB/CDIA Affordable Housing consultants team, the MUB/ADB Ulaanbaatar Urban Services and Ger Areas Development Investment Program- Improved Urban Planning and Sub-center Development and Community Engagement and SME Development consultants teams, and the Japan Social Development Fund/World Bank-supported Bayanzurkh District Development Plan team. A listing of documents consulted and individuals met is attached as Annex 2.

Site visits in Bayanzurkh District were conducted by the study team, for familiarization with the CHP 5 plant site location and its likely heat supply distribution areas, as well as to Ger area re-development sites and land readjustment sites, and locations of major infrastructure interface, and development projects. A visioning and strategic direction workshop with stakeholders was conducted on 25 November 2015 (summary workshop notes are attached as Appendix 3), and an infrastructure investment proposals workshop on 29 February 2016 (summary workshop notes are attached as Appendix 4).

\(^1\) Since extended to end-March 2016
This final report documents the study's findings and recommendations for follow-up action, including proposals for investment in supporting infrastructure and energy savings, as well as recommendations for institutional strengthening.
2 Study background

Ulaanbaatar has experienced rapid urbanization since the 1950s, the pace of which has dramatically accelerated since the early 2000s. Its average annual urban population growth rate stood at 4% between 2000 and 2009, before rising to 5.2% p.a. since 2010. About 1.3 million inhabitants presently (2015) live in Ulaanbaatar, a city that was planned for half a million. Its expansion continues to be fuelled by important in-migration flows, attracting approximately 30,000 new settlers every year since 2005 (Statistics Department UB, 2014).

The city has two distinct parts: a formal urban core area consisting mainly of blocks of apartment buildings, and three tiers of unplanned Ger areas (informal settlements): inner- middle- and fringe-locations. While the formal urban area is connected to central infrastructure and has access to urban services and utilities, the Ger areas lack access to the infrastructure network like central city heating, water supply, sanitation, and, in some cases, electrical supply as well as paved roads, in addition to receiving inferior urban service provision. The economic activities and socioeconomic profiles of these two areas differ significantly, and given that an estimated 60% of the city’s population lives in these Ger areas, this divergence has both localized and citywide impacts.

Ger areas are extensive, low-density (mostly peri-urban) area settlements of poor and medium income households, characterized by loosely aligned plots surrounded by fences, keeping an irregular right-of-way that remains unpaved, and are served by poor urban basic services and socioeconomic facilities. The majority of households, however, have land tenure. The Ger areas’ population is presently estimated at 800,000. During 2000–2010, the population of Ger areas increased by about 400,000 and is estimated to grow by another 400,000 during the next 10 years from in- migration and natural population growth2.

Ger areas are facing severe social and environmental challenges. The lack of safe piped drinking water supply to households—residents walk to water kiosks and fill canisters on hand-trolleys even during very cold winter temperatures; poor sanitation—households almost exclusively rely on open pit latrines; poor waste collection; and lack of urban lighting have created highly unsanitary living conditions and high levels of soil and groundwater pollution. Air pollution is among the most severe in the world, particularly during winter due to inadequate household heating systems as Gers’ dwellings are heated through rudimentary stoves that burn low quality coal and wood, creating a severe hazardous conditions, together with unpaved, dusty roads adding to these unhealthy conditions.

Ulaanbaatar, as the capital city of Mongolia has an independent administration. The capital city covers an area of 4700 square kms and is divided in 9 districts of which 6 (Bayangol, Bayanzurkh, Chingeltei, Khan-Uul, Songinokhairkhan and Sukhbaatar) are in the central area and 3 (Bagakhangai, Baganuur and Nalaikh) are distant from the center. The distant districts are located over 50 kms from the city center.

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2 This growth accelerated particularly after the Land Law of Mongolia 2002 came into force, as this enshrined legal land rights to any settler family to a fenced plot of up to 700 m2 at marginal cost.
The Parliament of Mongolia approved the MUB 2020 Development Master Plan and Development Concepts Plan 2030 (MUB Master Plan) in February 2013. The MUB Master Plan postulated that the population within the Ulaanbaatar area in 2030 should not exceed 50.3% of the total Mongolian population. The Master Plan envisages UB to grow as a poly-centric expansion with two main centers and 6 sub-centers, as well as several satellite centres.
3 Study area

3.1 Location of CHP 5

The plan to build a fifth power plant in the eastern part of the city is in response to the fact that the current power plants - 2, 3 and 4th (located in the western part of the city) are unable to meet the growing needs of heat and electricity in Ulaanbaatar. The CHP5 will be located on a 45.4 ha site in Bayanzurkh District's 11th Khoroo, on the opposite side of Urgakh Naran sub-district. The site is accessible via the road heading to Nalaikh at the east of Ulaanbaatar and is adjacent to the railroad track that runs from Ulaanbaatar to China (see Map 1 below).

Map 1 Location of CHP 5 (coloured centre)

3.2 Development of CHP 5

The CHP 5 plant is developed under a Build-Own-Operate and Transfer (BOOT) concession arrangement between the Government of Mongolia and an international private consortium. It will take about 5 years to complete during 2016 – 2020. The CHP 5 will generate 450 MW of electricity supply and has a heat supply capacity of 504 Gcal/h or 586 MW.

The government will contribute the 45.4 ha of land (purchased from two private owners), and will provide the water supply main line from the water source to the plant (through the intermediate reservoir shown center-top in map1 above), the human waste disposal line from the plant to the main sewer line along the main road, as well as the heat supply distribution transmission lines. The government will purchase all heat and electricity generated by the plant during the period of the concession (25 years) at a pre-agreed pricing formula.

The Cities Development Initiative for Asia has supported a pre-feasibility study (PFS) for the water supply, the sewer line and the heat supply transmission line, with a draft PFS report completed in December 2015. Under this PFS various heat transmission routing options have been prepared and
evaluated, as well as the conceptual designs of the heat transmission pipelines for the agreed preferred routing, of the heat exchanging stations and the booster pump station, as well as the concept designs for the water supply intake pipe-line and the sewerage connection to the main sewer line. An initial environmental impact assessment has been performed, and social and resettlement issues have been assessed (on the basis of the agreed preferred routing – see section 3.3. below - there are no major resettlement issues envisaged). Financial and economic analysis has been prepared.

The investment needed for the new heat transmission infrastructure is estimated in the PFS at about $ 68 million. The ADB is considering a soft loan for financing the heating network and power transmission lines (loan conditions are under review between ADB, MoE and MoF). The executing/implementing agencies will be the Ministry of Energy (MoE), the Ulaanbaatar District Heating Company (UBDHC), and Ulaanbaatar Municipal Government (MUB).

### 3.3 Agreed Proposed Heat Supply Distribution Transmission routing

The routing of the heat supply distribution transmission lines has been agreed between the Government (MoE), MUB and ADB in September 2015, based on heat demand projected for the different Master Plan planning units in Bayanzurkh district by the City's Master Planning Agency, considering supply from other sources, as well as site specific considerations, such as ease of construction of the lines, and the need to minimize relocation of existing structures and their residents. The outcome is shown in map 2 below.

Map 2 Agreed routing of CHP 5 heat supply distribution transmission lines (shown in red and green)
3.4 Boundaries of study area

The study area had been defined in the inception report as the spatial area impacted by the heat production, - transmission and - distribution resulting from the development of the CHP 5 plant. The electricity generated by the CHP 5 feeds into a national power grid, which is already well established in Ulaanbaatar, so no specific localized spatial impact of that is envisaged. In the delineation of the study area the consultants therefore considered the likely impact of the additional heat distribution system (as well as also considering the additional water supply) from the plant as the dominant criteria in defining the study area boundaries.

The MUB Master Planning Agency estimates of heat demand for 2030 and 2020 for Master Plan (MP) planning units in Ulaanbaatar city were taken as the starting point for the definition of the study area (see table 1 below). This was cross-checked with the above agreed proposals for heat transmission routing from the CHP 5 plant as defined by the ADB/CDIA CHP-5 Infrastructure Development consultants team, from which it was concluded that with these transmission routing proposals most of the MP planning units in Bayanzurkh District are envisaged to receive heat from the CHP 5 plant, with the exception of two planning units (units 12 and 13 on the west side, which in the context of the envisaged divided East-West dual city heating system are to be provided with heat by the existing CHP 3 and 4 (see maps 3 and 4 below).

These two planning units are considered fully developed and no major urban expansion is envisaged in them. The radar station-related township of Khonkhor away from the city towards Nalaikh is not envisaged to receive CHP 5 heat supply and is thus also excluded. Several planning units (most probably units 16 and 18) are expected to be served with heat supplied by the CHP 5 in combination with the Heat only Boiler (HoB) in Amgalan area, which started operating in September 2015 with a designed
heat generation capacity of 300 Gcal/h. Such planning units have conservatively been considered as part of the study area (the exact impact of the CHP 5 supply separate from that of the Amgalan HoB is difficult to estimate at present, as combined heat supply will not be operational before 2020).

With the heat supply distribution transmission routings fully finalized, it is clear that the very minor modifications made since the inception mission do not affect the definition of the study area, which can therefore be taken as confirmed.

Map 4: Study Area

It has been further confirmed that the proposed water supply intake in the upper Tuul watershed area and the closed water transmission pipe from the source to the CHP 5 plant will not impact on the study area boundary, and neither will the sewerage connection from the plant to the main recently upgraded city sewer line nearby along the main road.

3.5 Typology of the study area and its projected growth

Bayanzurkh District
Bayanzurkh is the largest district of Ulaanbaatar, and covers an area of 1,244.1 square kilometers, located in the east and south-eastern part of the city, neighboured by Khan-Uul and Sukhbaatar districts. Population-wise the district is the largest in Ulaanbaatar (and indeed in the country) with 266,000 people in 2010, which increased to 309,000 in 2014 for an average annual population growth
of 3.8% in that period. Bayanzurkh district has 85,970 households registered in 28 Khorooos. The number of population in each Khoroo is quite uneven, as shown in diagram 1 below.

Diagram 1: Distribution of Bayanzurkh population by Khorooos

Source: Bayanzurkh District Development Plan Progress report, 2015

About 23,200 households in Bayanzurkh district are living in apartments that are connected to city infrastructure services (37% of the population). Apartment complexes are located in the center of the district, but are expanding to the Ger districts in the last 2-3 years. Most universities, administration buildings, hotels and other service centers are located in the Khorooos close to the center of the city. 63% of Bayanzurkh population are living in Gers or houses within the Ger districts and are not connected to central infrastructure. The Ger districts within Bayanzurkh are located in the north, northeast and south east area.

4,700 businesses and organizations are active in the district, of which 151 are public, 420 are NGOs, 18
are limited companies and 3,345 are limited liability companies. Also there are 49 state-owned and 13 local-owned manufacturing properties, which shows the importance of manufacturing in the capital’s economic development. Also located in the district are some of the largest markets of the capital such as Daa Khuree, Narantuul and Dunjingarav as well as several drink and beverage factories.

As noted in section 2 above, the Master Plan envisages a poly-centric urban development for UB, with “Ikhtoiruu”, an old city center, to be complemented by the new city center “Shine-Yarmag” and 6 sub centers, namely Shine khot, Songsolon, Gurvaljin, Bayankhoshuu, Selbe, and Amgalan. Bayanzurkh district as the eastern region of the total of 8 geographic planning regions will be developed as a mixed land use region with a new city sub center, high technology industry, intellectual center, residential buildings, and micro districts with eco-friendly industries.

Study area

Within Bayanzurkh district seven residential planning units, three Ger districts (Dari-Ekh, Sharkhad and Khujirbulan areas), and the industrial area nr. 4 near Uliastai will receive heat from the new CHP 5 in combination with the Amgalan HoB. Table 1 below shows the acreage, population and number of household projection and allocated heat consumption according to information provided by the MUB Master Planning Agency’s Infrastructure Division.

Table 1  Population growth and expected (allocated) heat consumption sourced from CHP-5 and Amgalan HoB by Master Plan planning district3 for the assessment study area

<table>
<thead>
<tr>
<th>No</th>
<th>Planning unit name</th>
<th>Power plants</th>
<th>Area in ha</th>
<th>2010</th>
<th>Heat cons. GKal/h</th>
<th>2020</th>
<th>Heat cons. GKal/h</th>
<th>2030</th>
<th>Heat cons. GKal/h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>HH number</td>
<td>Pop. number</td>
<td>HH number</td>
<td>Pop. number</td>
<td>HH number</td>
<td>Pop. number</td>
<td>HH number</td>
</tr>
<tr>
<td>10</td>
<td>X unit ChP-5(70%)</td>
<td>150</td>
<td>4,618</td>
<td>16,575</td>
<td>6</td>
<td>4,550</td>
<td>16,835</td>
<td>43</td>
<td>4,760</td>
</tr>
<tr>
<td>14</td>
<td>XIV unit Amgalan</td>
<td>214</td>
<td>5,031</td>
<td>19,256</td>
<td>10</td>
<td>11,200</td>
<td>41,440</td>
<td>106</td>
<td>11,200</td>
</tr>
<tr>
<td>15</td>
<td>XV unit Amgalan</td>
<td>135</td>
<td>6,031</td>
<td>22,532</td>
<td>57</td>
<td>5,800</td>
<td>21,460</td>
<td>55</td>
<td>5,800</td>
</tr>
<tr>
<td>16</td>
<td>XVI unit ChP-5, Amgalan</td>
<td>123</td>
<td>3,546</td>
<td>14,008</td>
<td>19</td>
<td>3,700</td>
<td>13,690</td>
<td>35</td>
<td>5,100</td>
</tr>
<tr>
<td>17</td>
<td>XVII unit ChP-5</td>
<td>220</td>
<td>6,227</td>
<td>24,079</td>
<td>3</td>
<td>6,700</td>
<td>24,790</td>
<td>63</td>
<td>9,000</td>
</tr>
<tr>
<td>18</td>
<td>XVIII unit ChP-5, Amgalan</td>
<td>149</td>
<td>2,499</td>
<td>9,668</td>
<td>5</td>
<td>6,600</td>
<td>12,210</td>
<td>31</td>
<td>3,450</td>
</tr>
<tr>
<td>31</td>
<td>XXXII unit ChP-5</td>
<td>720</td>
<td>320</td>
<td>992</td>
<td>2</td>
<td>3,300</td>
<td>12,210</td>
<td>31</td>
<td>8,200</td>
</tr>
</tbody>
</table>

Residential areas

| 40 | Dari-Ekh ChP-5(40%) | 149   | 1,292 | 7,743 | -     | 2,640 | 9,768 | 27 | 2,720 | 10,064 | 28 |
| 41 | Sharkhad ChP-5(40%) | 173   | 2,792 | 10,963 | - | 3,920 | 14,504 | 41 | 3,880 | 14,356 | 40 |
| 42 | Uliastai ChP-5     | 441   | 3,998 | 14,587 | - | 2,300 | 8,510 | 24 | 2,300 | 8,510 | 24 |

Ger areas

| 46 | Industry-4 ChP-5   | 647   | 3,687 | 13,773 | 1 | 4,100 | 15,170 | 39 | 6,200 | 22,940 | 58 |
|    | Industry            | 647   | 3,687 | 13,773 | 1 | 4,100 | 15,170 | 39 | 6,200 | 22,940 | 58 |

Total

| 3,121 | 40,678 | 154,176 | 103 | 54,810 | 190,587 | 493 | 62,610 | 231,657 | 598 |


The areas planned to receive heating from CHP-5 are mostly Ger districts, business areas and residential areas having buildings with social services entities (table 1 above). Heat is currently not

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3 CHP 5 and Amgalan HoB combined in planning units 16 and 18, tentative Amgalan supply in units 14 and 15, and partial CHP supply in units 10, 40 and 41.
supplied from the existing central heating supply systems to these areas, which are mostly heated from independent heat only boilers (HoBs) of which there are 45 in Bayanzuurk district. Households living in Ger districts generally heat their residences with coal or wood which is one of the main causes of air pollution in the city due to their location (generally on hill slopes, mostly upstream from prevailing wind, so that smog generated there blows into the city centre in the Ulaanbaatar valley).

Given the heat demand allocation projected by the city’s Master Planning Agency in the study area of 598 Gkal/h by 2030, the development of the CHP 5 and its heating transmission lines infrastructure is an essential investment to significantly enhance coverage from the city’s district heating system. However, table 1 indicates that the combined CHP 5 and Amgalan HoB heat generation capacity is not envisaged to be sufficient to provide the study area completely with heat by 2030. Partial coverage is foreseen in one residential district and two Ger areas, with a residual shortage of about 55.0 Gcal/h. In these areas therefore the present prevailing heat provision through private HoBs and coal/wood fires in Gers is anticipated to continue (low residential densities and steep elevations limit the feasibility of central heat supply in parts of these planning areas).

With some 154,000 population in 2010, the study area had about 58% of Bayanzurk district population in that year. This is projected to grow by 2.2% annually during 2010-2020 to a bit under 191,000, and by slightly less than 2% annually during 2020-2030 to reach almost 232,000 in 2030. These projected growth rates are low compared to the Bayanzurk actual population growth rate of 3.8% during 2010-2014. With more rapid population growth than planned, the proportion of population covered by the fixed heat supply generated by CHP 5 and Amgalan HoB will, of course, be less.

As indicated in the above table 1, it is envisaged that the density of apartment settlement areas will increase by 1.22 % in 2020 and 1.72 % in 2030, compared to 2010. On the other hand, the density in Ger districts will decrease by 0.2 % in 2020 and 0.01 % in 2030 compared to 2010. For industrial areas these percentage increases are 1.1% and 1.7 % respectively.
4 Study area development

4.1 Visioning and strategic orientation for the study area

A visioning and strategic orientation workshop for the study area was undertaken with major stakeholders on 25 November 2015, in which the visions from the UB Master Plan⁴, the Bayanzurkh District Development Plan⁵ and the National Urban Assessment⁶ were matched with the projected CHP 5 heat distribution transmission lines (summary notes are shown in Annex 3).

With regard to the overall strategic orientation for the study area it was concluded that out of the various broader strategic directions noted above, the development of the study area with its focus on the best utilisation from the limited central source heat supply should respond to the following three broad strategic orientations:

1) Compact city growth, i.e. densification in order to efficiently and equitably deliver urban services;
2) Poly-centric development with Sub-centers (in line with the Master Plan priorities for UB city as a whole);
3) Integration of heat supply distribution with other urban services, particularly transport.

Other strategic points raised in the workshop were:
- the need for a temporary heat supply distribution solution up to 2020, as CHP 5 will not come on-stream earlier than that year;
- a concern that the CHP 5 supply capacity by then will not be adequate to service the Eastern side of the city;
- special concern is required for the Ger areas and to ensure their balanced re-development, with due concern for cost-recovery potential and affordability issues.

These strategic orientations and concerns form the framework for the development directions and – proposals in the study, as outlined in the below sections, and as developed further in the final (project formulation) stage of the study (as documented in chapter 5 below).

4.2 Harmonisation with major on-going development projects in the study area

The new heating supply from CHP 5 to the study area will serve a significant proportion of the study area’s population, but it will not be sufficient to cover all demand, as noted in section 3 above. This makes it all the more important to ensure that major on-going development projects and heat supply proposals in the study area will be harmonised, so that mutually beneficial solutions can be identified to improve overall efficiency and equity of heat delivery. The following are the major efforts initiated by MUB and Bayanzurkh District.

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⁴ Ulaanbaatar 2020 Master Plan and Development Approaches for 2030, State Great Khural Resolution 23, 8 February 2013, Technical Summary 2014, p. 9 and 15
⁵ Bayanzurkh District Development Plan, Volume 2.1 Final DPP, June 2015, pp. 23-25
⁶ National Urban Assessment, Interim Workshop notes, 23 October 2015
Development of partial detail master plan

Six consulting contractors have been assigned by the Master Planning Agency of MUB to prepare the planning and blue print of the partial master plans on the territory of 12 planning units in Bayanzurkh district within the framework of the 2020 master plan. The contractors will finalize the drawings and blue prints of the partial master plans in the first quarter of 2016.

Table 2. Partial master plan development in Bayanzurkh district

<table>
<thead>
<tr>
<th>№</th>
<th>Planning Unit name</th>
<th>Name of the contracted design company</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dari-Ekh</td>
<td>Forum art LLC</td>
</tr>
<tr>
<td>2</td>
<td>10, 14, 15, 16, 17, 18, 31 sub-districts</td>
<td>Nart design, Art construction LLC</td>
</tr>
<tr>
<td>3</td>
<td>Sharkhad</td>
<td>New urbanism LLC</td>
</tr>
<tr>
<td>4</td>
<td>Khujirbulan</td>
<td>Art city LLC</td>
</tr>
<tr>
<td>5</td>
<td>Uildver-4, Uliastai</td>
<td>Tumed LLC</td>
</tr>
</tbody>
</table>

Terms of reference for the development of the partial master plans include:

- To apply the estimated population numbers in Master Plan 2020 and 2030 to the partial planning of the planning units;
- To plan that water will be supplied from the central pipelines;
- To plan that heating will be supplied from the central heating systems and independent heating sources will be planned at the distant Ger areas;
- To plan waste water discharge to central network and local solution in fringe Ger areas.

The consultants’ team had a meeting with the planning teams of the contracted design companies, who are about to complete their tasks in accordance to the terms of reference and to introduce their survey outcomes to the Master Planning Agency. It became necessary to consider re-location of some households to create lines for road networks, engineering network and safety zone for the water supply pipelines of the sub-districts in the partial master plans. The engineering network of the Ger districts with low rise apartments should be planned as optimal as possible to improve the efficiency and density. However, it is important to clearly define the steps of organising and re-locating the land-owning resident households in line with the provisions of the new law on urban re-development (see section 4.5 below).

Ger Areas Redevelopment Projects:

Ger area re-development projects have started in 2012 and are on-going in four of the above planning units (in Khoroo 10, 14, 16 and 18). Developers for these specific re-development areas have prepared master plans for their areas approved by the Master Planning Agency at the MUB. The re-development projects in the Ger areas are implemented with the objectives to do a proper urban planning, improve the road network (thereby opening up the exit and entry points to the site), providing the heating and water supply networks, and meeting the demand for housing apartments. In addition, they aims to improve the social and public service supply to the residents living in the Ger districts and isolated areas.

Under the MUB Master Plan Sharkhad, Khujirbulan, Dari-Ekh and other areas with Ger housing are planned to be “regular” districts with housing apartments. At the time of the study, redevelopment projects were on-going (started in 2012) in the 10th, 14th, 16th and 18th planning units of the Master Plan (see text box 1, table 3 and map 6 below). The development formula is that the Ger residents
contribute their land, the city government contributes the cost of infrastructure, and the re-housing development process is managed by a private developer. After rehousing the original Ger residents, the developer builds and sells additional apartments in the market. The program aims to increase residential densities about 4-5-fold from 70-80 persons per ha. to about 320 persons per ha.

Text box 1: An on-going Ger Area Redevelopment Project: the Baganat Apartment Complex

In the most advanced Ger Area re-development project in the study area (in the 16th Khoroo), the developer (the Baganat Urguu LLC) has completed the construction of two 16 storey apartment buildings late 2015 – early 2016 to rehouse the 280 original Ger households living in the area before the re-development project took place. During negotiations in 2013 88% of the Ger households agreed to participate in the re-development scheme and to exchange their land right for the ownership right of an apartment. During the site clearance and redevelopment the Ger households lived in nearby rental apartments for two years, paid for by the developer.

The relocated households have traded their land title for ownership and possession of an apartment, and the valued land price was offset against the apartment cost. The surrendered land value of some households was adequate to meet the cost of the apartment, but others had to finance a balance payment (70% loan, 15% government subsidy and 15% own cash
contribution), while some ended up owning more than one apartment. All original Ger households on the site have been rehoused in the two apartment buildings.

Further apartment buildings to be realised are envisaged to be sold to a target group of buyers set by MUB (mostly nurses, teachers and other lower middle class households with fixed income), for which there is a waiting list. Densities will increase from about 50 persons per ha. to about 515 persons per ha. or more than a ten-fold increase (as compared with 70-80 persons per ha. to about 320 persons per ha, or a 4-5 fold increase for GADA/GAHP projects overall).

Major site infrastructure comprises internal roads, foot paths, water supply, sewerage and electricity lines, as well as heat distribution piping from a heat distribution centre. Heating was planned to be supplied from the newly established HoB at Amgalam, but the apartment buildings on the project site have their own heating source as a backup.

Within the study area the above Ger area redevelopment projects under implementation cover 470 ha of land. As shown in table 3, in some parts of the study area the population will significantly exceed the population projected under the Master Plan estimations for 2030. With the increased population in the re-development sites, individual connections to the engineering network, improved infrastructure supply distribution will cause increased water and heating consumption and volume of waste water to be disposed. This will pose significant challenges to deliver on the additional engineering infrastructure needed.
Table 3. Population size of planning units in the study area and re-development sites

<table>
<thead>
<tr>
<th>Planning units</th>
<th>Population</th>
<th>Projected re-development site (after completion)</th>
<th>Projected 2020</th>
<th>Projected 2030</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-th sub-district</td>
<td>17,872</td>
<td>6,073</td>
<td>24,100</td>
<td>24,500</td>
<td>In line with projections</td>
</tr>
<tr>
<td>14-th sub-district</td>
<td>21,767</td>
<td>47,426</td>
<td>41,400</td>
<td>40,300</td>
<td>Will significantly exceed projections</td>
</tr>
<tr>
<td>15-th sub-district</td>
<td>31,107</td>
<td>No re-development site</td>
<td>21,500</td>
<td>20,900</td>
<td>Has already exceeded projections</td>
</tr>
<tr>
<td>16-th sub-district</td>
<td>31,699</td>
<td>32,500</td>
<td>27,200</td>
<td>36,700</td>
<td>Will significantly exceed projections</td>
</tr>
<tr>
<td>17-th sub-district</td>
<td>14,136</td>
<td>3,175 (land re-adjustment)</td>
<td>25,000</td>
<td>32,400</td>
<td>Significantly lower than projections</td>
</tr>
<tr>
<td>18-th sub-district</td>
<td>15,811</td>
<td>11,296</td>
<td>24,400</td>
<td>24,800</td>
<td>Will exceeded projections</td>
</tr>
<tr>
<td>31-th sub-district</td>
<td>-</td>
<td>12,100</td>
<td>29,600</td>
<td></td>
<td>No current data</td>
</tr>
<tr>
<td>Sharkhad</td>
<td>22,962</td>
<td>-</td>
<td>36,100</td>
<td>34,900</td>
<td>Lower than projections</td>
</tr>
<tr>
<td>Khujirbulan</td>
<td>8,300</td>
<td>-</td>
<td>8,400</td>
<td>8,400</td>
<td>In line with projections</td>
</tr>
<tr>
<td>Uildver-4, Ulaastai</td>
<td>15,800</td>
<td>-</td>
<td>15,200</td>
<td>22,300</td>
<td>In line with projections</td>
</tr>
</tbody>
</table>

Source: Survey by Nart design LLC under detailed planning, November 2015

The overall planning picture is one of increased densification, particularly in planning units 14, 15, 16 and 18, while density increases will be lower than planned in the northern Ger areas.

**Ger Area Land Readjustment Projects:**

The Ger Area Housing Project (GAHP) has been established in 2013 to mobilize residents around the opportunities to collectively improve their living environment and develop land re-adjustment projects based on their interest and feedback. At the time of the study there are 8 planning units in Ulaanbaatar in which residents of possible land re-adjustment sites have established their temporary representative council for this purpose, and more are being mobilized. Preliminary development studies have been completed and detailed project designs will be elaborated with participation and contributions by the residents.

Under the land re-adjustment framework, the households prefer to keep their land and to build detached and town houses, and low rise apartments with business spaces. In comparison to GADA’s Ger redevelopment schemes, GAHP takes a more hands-on role in the management of the land re-adjustment process, rather than solely relying on the implementing developer.

Two of the initial land re-adjustment sites are in Bayanzurkh district which are “Dari-Ekh town” just outside the study area in the 27th Khoroo with 293 households and “Tsaiz town” in the 19th Khoroo with 175 households (see map 6 below for the locations).

Map 6. Location of Ger area redevelopment and land readjustment project sites in the study area
A summary of the eight sites under planning is provided in table 4 above. Site areas vary considerably depending on locations, as do initial densities and proportion of non-residential land in the plans. Interestingly, it appears from the data in the table that the land re-adjustment projects generally manage to achieve the 4-5 fold increase in residential densities.
**District Development Plan of Bayanzurkh district:**

The World Bank’s Clean Air Project with funding of the Japan Fund for Social Development supported the preparation of a District Development Plan (DDP) by building capacity of the district staff in 2015. It was the first time that any district in UB as developed its own development plan. The district development plan, at first, identified challenges and then prioritized challenges to define solutions to them. The solutions to the challenges are proposed as projects. The plan identified sets of projects to be implemented till 2030. Investments of those projects are scheduled in the district investment plan. The first batch of the projects will be implemented from 2016 as scheduled in the 3-year investment plan included in the DDP. The proposed investment packages (as shown in map 7 below) include the following:

**Package-1: Infrastructure supply and improvement of transportation system:** Access to infrastructure and transportation are the most pressing challenges to the district residents. Therefore, these issues should be solved first. In Bayanzurkh district, East-4 interchange on Peace Avenue is the main congestion spot. Because East-4 connects Bayanzurkh District and central area, traffic volume is high around the interchange. The vertical trunk road Nam Yanjugiin street of the eastern part of the city show a high traffic volume all day long. The street in the shopping center area of "Narantuul" ITC "Ogoomor" auto parts shopping center, linking between Peace Avenue and Narnii road, attracts much traffic.

Map 7  Bayanzurkh District Development Plan investment project packages

**INTEGRATED PROJECTS - DDP2030**

![Map of Bayanzurkh District Development Plan investment project packages](Image)

Source: Bayanzurkh DDP report, June 2015
Package -2: Establishing micro centres in the 19th and 27th Khorooos: The micro centres will be established as pilots in the Ger districts in these Khorooos. In comparison with other Khorooos in the district, the selected Khorooos have lower infrastructure supply and poorer infrastructure development.

Package-3: Land clearing, investment for additional development, improvement of the district appearance, and social facilities which are needed for the redevelopment sites. Social infrastructure will be established to keep and free some land considering the expected growth of the population and major infrastructure to be implemented under the strategic planning.

Package -4: Developing tourism and recreational activities and improving the living environment: Special protection zones around the Tuul, Uliastai, and Selbe rivers will be established and the following schemes will be implemented: some areas of the Uliastai and Tuul river basins will be developed as public recreational centre, and the Selbe river basin will be protected and rehabilitated.

In addition, all projects to be implemented up to 2030 have been identified and prioritized. The above mentioned projects in the eastern part of the city which will be heated from CHP5 are in different stages of implementation.

**Retrofitting of old apartment buildings to save energy**

About 20% of the housing stock in Ulaanbaatar comprises of social housing apartment buildings constructed during the socialist era (some 47,000 housing units in over 1,000 apartment buildings, of which about 8,150 units in the study area), mostly through using the pre-cast panel building technique. These buildings are generally structurally sound, but poorly insulated. A pilot project supported by German Development Cooperation and MUB in 2007 (pictured below) demonstrated that substantial energy savings gains could technically be achieved with relatively simple insulation measures.

*MUB-GTZ Pilot Project in Bayanburd 2007-8 before and after rehabilitation*

CDIA supported a PFS to upscale this city-wide during 2008/2009\(^7\). The technical specifications of the rehabilitation indicated potential heat energy savings of approx. 50 - 60% of pre-rehabilitation heat consumption, with substantial potential reduction in CO2 emissions. The CDIA-proposed programme envisaged the rehabilitation of about 40,000 housing units at unit costs of between USD 6,000 – 12,000 (average of USD 160/m²) over a period of 15 years. The rehabilitation entailed insulation of outside

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\(^7\) CDIA/MUB Pre-Feasibility Study on Thermo-Technical Rehabilitation of Pre-Cast Panel Buildings in Ulaanbaatar, Final Report, May 2009
walls, replacement of windows and outside doors, repairs of heating pipes and radiators, the installation of heat control valves and heat cost allocators as a basic package, to be complemented by other construction measures as needed.

Various reports have taken this further, in an ADB/CDIA supported base-line monitoring study for CDM credits in 2010, and a Feasibility Study for KfW in 2011. A preparatory study for a subset of 22 buildings having 1,465 apartments in Khoroo 16 in Bayanzurkh district was undertaken by GIZ in 2013. The program has recently been updated in a study by MUB Master Planning Agency and a financial modelling study by XacBank, supported by GIZ and MUB. Based on this study, the program is envisaged to be implemented in ten phases. Costs have been reduced by deleting non-thermo technical rehabilitation items, and were estimated at about $ 65/m². Cost recovery of about 50% of this through a phased betterment fee over a ten years period has been found to be feasible based a survey of resident’s willingness to pay (the balance proposed to be contributed by MUB through the utilisation of Japanese-Mongolian Joint Crediting Mechanism (JCM) climate change mitigation funds).

Policy-wise this rehabilitation effort is within the scope of the newly established Capital City Housing Corporation (NOSK). Clearly the Study Area will obtain significant benefits if such heat consumption saving measures will focus on the apartment buildings served by the CHP 5 heat supply, enabling this supply to be distributed much more efficiently and equitably.

### 4.3 Additional infrastructure requirements identified

**Specific infrastructure items identified**

As noted in table 3 above, the population is estimated to grow rapidly in several planning units as a result of the Ger area redevelopment projects undertaken, and this impacts on infrastructure requirements in several ways, as was discussed in the visioning and strategy workshop for the study area (see Appendix 3 for details).

Constructing a new main road around the northern ring of Dari-Ekh, connecting north and east, and developing the East-West BRT route and expanding it to the proposed sub-center in Amgalan will be needed to improve the transportation capacity to cater to the increased population in the eastern part of the city.

Current waste water collectors are relatively new and have a compatible capacity. However, the capacity of the waste water network should be enhanced, and this should be reviewed in detail.

There is a need to develop and implement projects to improve the flood protection dam along the Uliastai and develop the basin area as a recreational center as planned in the Bayanzurkh District Development plan.

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For efficient and environmentally acceptable solid waste collection and disposal in the eastern part of the city, the Tsagaan davaa waste dump site in the northeast must be improved into a sanitary landfill, with waste segregation and recycling; some collection routes will have to be adjusted and additional collection vehicles purchased and brought into service.

Due to increased number of houses and apartments with engineering network, as well as the growth of water customers in the outer eastern part of the city, such as in Nalaikh and Khonkhor areas and resulting from operations of the CHP 5 itself, water consumption will increase significantly. Thus, there is a need to develop and implement a project to establish an additional surface water source from the Tuul river.

USUG expressed their concept for water supply for CHP5 as it technically possible to supply from the intermediate reservoir during 2020-2025. To ensure stable water supply for CHP-5, USUG suggests to construct a new reservoir besides the intermediate reservoir area to keep a constant reserve amount of water to meet consumption of CHP 5 by 2025. A feasibility study is on-going on an additional water source from the Tuul water complex for city development and CHP 5 for the period beyond 2025.

New metering and billing technology will be required to be introduced for apartment heating systems, which will provide the possibility to pay for the actual heat consumption in order to use the heating generated from the CHP efficiently.

Ground and spring water overflow and freeze are affecting about 100 Ger area households and 3 entities located southeast of the 9th Khoroo and northwest of the 10 Khoroo in the Sharkhad area. This causes significant problems to the area residents. This area should be studied carefully and a decision made whether the natural state of the area should be kept or if it should be further developed.

**Integrated investment Action Plan**
MUB has prepared an integrated Investment Action Plan 2016-2020 in support of the implementation of the Master Plan, which is currently pending final approval of the Cabinet of Ministers. The above proposals have been cross-checked with the investment action plan, and this confirmed that some of the proposals have already been included in it and are funded under its provisions. Such projects therefore do not require to be developed further in investment requirement terms by the consultants team, but the consultants have developed some suggestions for modified designs as discussed in section 4.5. and 5.1 below. All remaining recommended (and unfunded) projects are discussed in section 5.2 below.
4.4 Institutional, legal, and regulatory constraints

Master Plan Implementation Tools
The UB Master Plan is a very broad planning document, augmented by detailed master plans for specific areas, such as described in section 4.2 above. This set of plans is incomplete in that it lacks instruments for enforcement and guidelines for land (re-) development. A draft zoning code has been prepared, but requires to be reviewed and following such review given legal force through a regulation.

The newly approved 2015 law on urban redevelopment provides guiding principles for:

a) reconstruction of built-up areas that do not meet urban planning requirements;
b) demolition and reconstruction of buildings and structures that do not comply with the requirements of building usage;
c) reorganization of Ger areas;
d) re-planning and redevelopment of Ger areas; and
e) re-planning and redevelopment of public spaces.

Importantly, this piece of legislation establishes respecting social interests and rights, and ensuring public and community participation as the leading principles in re-development. The law i.a. specifies that no area re-development project can proceed unless at least 80% of the area residents/land owners agree to its terms and conditions. Rules and regulations to implement the law are still being developed with JICA support, and this is important to ensure a) proper valuation of contributed land; b) proper determination of compensation to dispossessed owners; c) operationalize community participation in the process (i.a. through the establishment of residents representative organizations if more than 75% of residents agree to organize themselves as such, as provided for in the law), and d) ensuring more balanced area re-development in terms of outcomes.

Heat supply for industries in the proposed Uliastai light industrial zone
The visioning and strategy workshop participants noted that central heat supply from CHP 5 is preferable as it will help to reduce power and heat costs for the industries in the industrial area, which in turn will lead to cost reduction of the industrial output. On the other hand, the development of the industrial area will provide an increased number of heat supply customers on the back of strong population growth in the district. The alternative separate heat supply for industries through their own HoBs is intrinsically less efficient and more costly.

There is a need to use advanced technology, e.g. in using renewable energy along with taking heat and electricity from the central system, as well as in promoting the re-use of sewage. As considered in the Master Plan, light and high technology industries should use automatic heat and electricity regulators to optimize their heat and electricity utilisation.

Condominium owners associations (Sukhs) and community development committees
Condominium owners in existing apartment buildings are generally (and by law) organised in condominium owners associations (Sukhs). These associations are responsible for the management and maintenance of common space (incl. external walls and roofs, and elevators in buildings with more than 5 storeys) outside the individual apartments. The association charges a fee for its services to the
apartment owners and is accountable to the general assembly of owners. An association may be responsible for one or more apartment buildings.

However, since such associations have originated from the socialist period, their roles and responsibilities are still associated with the state by many residents; moreover, the existing legislation is not entirely clear about rights and responsibilities of the association vis-a-vis its members, and their enforceability. In consequence, the associations tend to be under-funded and have limited capacity to perform their functions.

For new apartment buildings the developer has to operate and maintain the building facilities for three years after completion of the building, during which time a condominium owners association must be formed, to which the operation and maintenance of the common spaces of the building must be handed over. In the case of the Ger area re-development and land readjustment schemes this role could be taken on by the community development committees as provided for in the above law on urban re-development. However, formation of such committees is voluntary, and clearly these processes therefore require to be strengthened.

Heat distribution issues (incl. tariffs)
For heat supply the Ulaanbaatar City District Heating Company (UBDHC) provides heat to a heat distribution centre owned by the building developer. After the developer completes its above operation and maintenance responsibility period, a housing company has to take over the responsibility for heat distribution and revenue collection. This could be either done by a municipal City Housing Company (CHC, of which there are 44 in Ulaanbaatar), which also have this responsibility for the old social housing stock dating from the socialist era. This responsibility may also be taken on by a private housing company (of which there are 23), which will happen if the near-by CHC refuses to offer the services.

The housing company in turn can enter into a heating supply contract with individual apartment owners or with the buildings’ condominium owners association. The corresponding assets (pipes and substations) are usually still owned by the building developer although the asset ownership should be transferred to MUB after three years with a buy-out. Nevertheless, the assets are registered in the books of the housing companies and they can claim depreciation charges.

According to existing regulations, the housing companies pay a fee to UBDHC for operating the heat facilities, and these costs are included in the tariff charged to apartment owners.

Presently UBDHC applies the same tariff to the housing companies as to its other direct customers. The tariff is charged by UBDHC per GCal used, while the final customers (the apartment owners) are charged per m² by the housing company. This theoretically results in a surplus for the housing company, which can finance its operations out of this surplus. However, the current financial and institutional situation in the heat distribution sector is not operationally sustainable. CHCs cause high costs and generate significant losses. Merging these companies into one Distribution Company combined with an appropriate reorganization would contribute to improving the sector’s financial and operational performance.
**Demand side heat consumption management**

Demand side management aims to implement energy efficiency measures to reduce heat consumption and, eventually, heating costs. If customers will be charged for heating in accordance with their actual consumption, they would have an incentive to reduce their heat consumption. Accordingly they could be motivated to invest in such measures by themselves or to enter into a corresponding contract with a third party.

However, neither building-wise energy use metering nor apartment-wise energy use metering and consumption-based billing is mandatory at present. Revisions in the Mongolian Energy Efficiency Law have recently been approved, and under these modifications regulations can be framed which makes progress towards energy efficiency through building renovation and - construction easier. Promotion of consumption-based metering and – billing could be undertaken in two steps:

a) implementing mandatory building-wise metering and consumption-based billing, which is relatively easy to implement, and

b) promote installation of thermostatic valves, heat cost allocators or individual sub-meters, and apartment-wise consumption-based billing, which is more complicated. For old (social) apartment buildings also the existing single piping system through the building would need to be replaced by a dual piping system to make this possible. Customers might receive soft loans or grants covering the equipment costs fully or partly. Such financial incentives are likely necessary, particularly if all apartment owners have to agree.

Physical heat consumption demand management measures in the building stock have two components: (i) in the heat supply (piping and sub-station) system to the building and (ii) within the building itself. The heat supply system to the building should be improved by UBDHC (it will benefit from the reduction in system losses). If there are any improvements required within the building, these should be included in the within-building package (such as insulation of pipes, moving from single to double piping). As noted in section 4.2 above, for the old socialist-era panel buildings a combined building insulation and internal heat distribution system improvement is recommended. This has recently been applied with different funding support in nine public services buildings to generate heat savings efficiently\(^{11}\), and these experiences can be emulated in insulating residential apartment buildings.

However, ultimately consumption-based billing to the apartment owners is an indispensable condition to create adequate incentives for energy saving and efficiency improvements. The regulatory framework governing this requires to be adapted.

**Housing Sector Management**

There are a number of Government and city housing agencies operating in Ulaanbaatar with diverse, but not always clear responsibilities. Given capacity constraints it is not logical for MUB to have three separate housing agencies (NOSK, GADA, GAHP) while some housing oversight roles in the city (such as noted in section 4.2 above, for the old socialist-era panel buildings a combined building insulation and internal heat distribution system improvement is recommended. This has recently been applied with different funding support in nine public services buildings to generate heat savings efficiently\(^{11}\), and these experiences can be emulated in insulating residential apartment buildings.

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\(^{11}\) 3 school buildings have been insulated in UB funded by USAID. 2 of these school buildings are located in Shankhad area in Bayanzurkh district, and their implementation has been supported by GIZ technical assistance. The remaining 6 buildings are schools, hospital and kindergarten buildings in western provinces Khovd and Zavkhan, funded by Swiss Development Cooperation agency. Further preparatory work on this has been supported by GIZ for all technically eligible school and kindergarten buildings in Ulaanbaatar (viz: GIZ, Thermo-Technical Retrofitting of State-owned Schools and Kindergartens in Ulaanbaatar, Mongolia, Preliminary study, Main Report, 2014).
as the oversight on developers and condominium owners associations) are imperfectly regulated and implemented. An integral review of institutional roles will help to resolve this.

**Urban development information**

The visioning and strategy workshop provided important CHP 5 heat distribution information to the participants, and was appreciated as such. However, such information sharing should not be incidental, but in the interest of overcoming capacity constraints, information sharing between the different development agencies of MUB should be improved and made more structural.

### 4.5 Suggested modifications in development orientation of on-going development schemes

**Ger area re-development and land-readjustment schemes**

The re-development schemes as currently implemented under GADA’s auspices will lead to a five-fold increase in housing and population density in the redevelopment areas through the development of high-rise (generally 9-16 storeyed) apartment buildings, if fully implemented. However, this may not be operationally feasible due to:

a) affordability limitations (the target group may not be able pay a cost-recovery apartment price, even with 70% loan financing), and

b) apartment market constraints (the overall market for apartments in the city is fairly saturated).

This may result in (s)low uptake of the apartments, increased vacancy rates and a slow-down or even complete standstill of the re-development projects, which is not in the interest of any of the parties involved.

This suggests that even in on-going re-development schemes, consideration should be given to partial re-design, introducing a greater diversity in housing types and standards, and aiming for a more mixed development, including social facilities and business premises. Resident communities should play an organised role in articulating (priced) housing preferences, and this should be seen by the developers as a serious indication of target group market demand. Additionally, it would be helpful to ensure that the re-housing land valuing estimations and negotiations are more balanced and mutually beneficial, by letting this be led by an independent neutral organisation, rather than by the developer. The new law on re-development mandates maximum community participation and provides for such approaches. GADA has indicated that it is open to diversifying its approach.

In effect this would mean that the *Ger* area re-development projects and *Ger* area land re-adjustment schemes would more closely resemble each other. Specific design modification suggestions on this are made in section 5.1 below.

Given limited capacity in GADA and GAHP, serious consideration should be given by MUB to merge these efforts with a unified policy and implementation oversight organisation.

**Integrating infrastructure development, affordable housing options and detailed master planning**

Infrastructure development, including heat supply distribution, to date remains a sectorally-driven engineering-oriented activity; housing developers often plan housing schemes speculatively with little regard to market demand (as evidenced by the current oversupply of luxury and middle-class
apartments), and the preparation of detailed master plans (as reviewed by the study team – see section 4.2 above) continues to be a primarily blue-print land-use exercise, with only limited consideration of market demand for the land use the plans prescribe. This means that the combined outcome is sub-optimal as compared to an area-based integrated approach.

The Bayanzurkh District Development Plan has attempted to integrate the spatial planning effort with infrastructure and housing development considerations and community participation inputs. This is an approach to be taken further at the level of detailed area planning, and ensuring that market demand for housing, commercial and light industrial space is matched appropriately with physical and social infrastructure development preparation. In almost all on-going detailed planning schemes there is room for improvement in that regard. The redevelopment of the Da Khuree car market site offers an excellent opportunity to take this further in a truly integrated market-responsive manner, to make the best possible use of trunk infrastructure (including the new heat supply from CHP 5) around the site. This is discussed in further detail in section 5.1. below.

**Retrofitting of old apartment buildings to save energy**

This approach has been demonstrated to be technically viable with enormous heating saving potential since the GIZ supported pilot of refurbishing one apartment building in Chingeltei district in 2007-8. The various up-scaling proposals since then have reinforced this message, with the recent XacBank study suggesting that this is worth doing even in the absence of consumption-based metering and billing for the individual apartments (as long as this is installed at least at the piping entry point to each building), given the very high heat saving potential and the fact that this applies to 20% of the city’s housing stock.

The study simultaneously cautioned that lack of action on the refurbishment of the buildings would lead to further dilapidation and the need to demolish and replace, which is more expensive. In actuality, a growing number of old apartment buildings is currently already on the MPA replacement list (about 70, but only a few in the study area). Retro-fitting of the apartments has to-date been undertaken on a piece-meal basis, generally by individual apartment owners, which is obviously sub-optimal, as many of the energy-savings benefits relate to refurbishment of common elements in the buildings. It is therefore imperative that the refurbishment program is now taken up aggressively with MUB in the lead. In the study area this has a special significance – full scale implementation by the time the CHP 5 comes on stream in 2020 means that about 10-15% more households in the study area will benefit from the additional heat supply than would otherwise be the case.

**Timing of CHP 5 heat supply delivery and development planning**

As noted above, on current development schedule, the CHP 5 heat supply will be available in 2020. This means that until that time intrinsically less efficient interim arrangements through area-based Heat-only-Boilers (HoBs) supply will have to continue and be temporarily expanded. At the same time, planning for other infrastructure (particularly road and public transport) and area re-development schemes can already consider the option of taking heat supply from the CHP 5 network, as development of these schemes generally also takes 3-5 years (or more) to mature. This applies particularly to the road network improvement and extension in Bayanzurkh district and the planning of the East-West BRT line.
4.6 Additional development directions suggested based on experience elsewhere

The following additional development directions may be given consideration in the future development of the study area:

**New Ger areas**

While the overall strategic direction in the study area will be one of consolidation and densification to better utilise limited infrastructure and urban services, the growth of Ger areas on the fringes of the study area is likely to continue, as stimulated by the almost free land tenure rights conferred to new settlers by the 2002 land act. Inevitably these new Ger areas technically cannot benefit from the new CHP 5 heat supply in the foreseeable future. At the same time, the Ger area re-development projects and land re-adjustment schemes do have the potential to accommodate large numbers of new residents within their sites. In consequence, it may be logical to treat settlers in the fringe areas as clients for these re-development schemes, in the sense that their land title may be used as (part-) payment for a housing opportunity in such a scheme.

The fringe land thus freed-up needs to be protected by MUB from any further new settlement. In the longer term the unlimited exercise of the settlement land right almost free of charge is unsustainable. Steps have already been taken in that direction recently by limiting the exercise of this right to apply only in designated areas considered suitable for settlement and urban development. Early charging of fees to the settlers to cover the costs of the (inevitable) future delivery of infrastructure and urban services would at least partially re-balance the present financial incentive for settlement. While this may not be politically popular (particularly in an election year) some further restraining measures will be unavoidable.

Infrastructure improvement and development can be used as spatial structuring mechanisms. This will have particular reference to the above emerging peri-urban settlements in the study area, where it is important to define and safeguard infrastructure rights-of-way ahead of infrastructure delivery.

**Community participation**

Urban development globally, elsewhere in UB and in the study area itself (particularly in the Bayanzurkh DDP development and in the land readjustment schemes) indicate the need to work in concert with communities in re-planning existing areas (not only Ger areas) to provide affordable housing opportunities, and efficient and equitable heat supply. This calls for developing guidelines and manuals to implement the new urban re-development law and build capacity in communities to effectively participate and in government agencies to work with communities as partners.

**Emulating lessons from elsewhere**

While affordable housing development models and land-readjustment have been applied quite widely abroad, these approaches are relatively new in Mongolia. As part of the Ger area re-development and establishment of sub-centres program supported by ADB in the Selbe and Bayankhoshuu Districts, land re-adjustment activities with Ger area community participation have started. Separately a concept for an Affordable Housing project in Selbe sub-center is under preparation. It will be important for the
study area development to learn from these projects’ concepts, positive and negative experiences as they unfold. For instance:
1) New detailed master plans may reflect on the previous experiences of planning and developing the sub-centers and coordinate them with housing redevelopment along the lines of the Affordable Housing project;
2) Ger area redevelopment projects in the study area should be matched with Master Plan requirements and the Bayanzurkh District Development Plan;
3) In planning such areas, it will be helpful to assess early on if there will be scope for emulating the above Affordable Housing project;
4) New ideas generated from the lessons learned from the land re-adjustment activities in the Ger areas elsewhere in Ulaanbaatar can be applied into the planning of Dari-Ekh, Sharkhad and Khujirbulan.

4.7 Summary proposed development strategy for the study area

As amplified in the above sections, the main ingredients for the development strategy for the study area are consolidation and densification throughout the study area, making better use of existing and programmed infrastructure and through modified Ger area re-development schemes.

Balanced urban development to ensure affordability of housing options to all and improving mobility to ensure access to employment and housing will be important strategic considerations in that context.

Sub-center development in Amgalan/Uliastai will be promoted, and the re-development of the re-development of the Da Khuree car market site provides an ideal opportunity to test new approaches. Simultaneously, the development strategy will continue to protect nature reserves along the Tuul, Selbe and Uliastai rivers.

Specific suggestions to re-design on-going area redevelopment projects in support of this and to utilise the new CHP 5 distributed heat more efficiently and equitably are discussed in section 5.1. below, and suggestions for additional supporting (infrastructure) investment projects to help achieve this are described in section 5.2.
5  Recommended infrastructure investment proposals

5.1  Re-design of On-going Investment Projects

Several on-going development efforts have been identified in section 4.2 above, for which some re-design may enhance the effectiveness of their implementation, particularly vis-à-vis heat supply utilisation (as outlined in section 4.5). This includes investment schemes already listed in the MUB integrated Investment Action Plan 2016-2020 in support of the implementation of the Master Plan and for which funding is already provided in the plan. The two most prominent such schemes are the programme of Ger Area Redevelopment projects and that of the Ger Area Land Readjustment Projects. Suggested changes in design/development features of these schemes are discussed in sections 5.1.1 and 5.1.2 below.

In addition, there are some areas under partial master planning, where there are opportunities for smart investment for the same purpose (i.e. to more efficiently utilise heat supply from CHP 5), but where these planning efforts have not yet proceeded far enough to be able to already translate them into concrete investment proposals at this time. In sections 5.1.3 and 5.1.4 – Uliastai light industrial area - these opportunities are flagged for follow-up action.

5.1.1  Ger Area Redevelopment Projects

Introduction and background

There are four on-going schemes in the study area (24 for UB as a whole) and 5-6 schemes in the pipeline (for the city as a whole 50 schemes have been commissioned to date). The total number of program scheme locations planned is 75 city-wide, covering a total number of 1,500 ha. The objective is to achieve residential densities of 5 times the pre-project housing densities. Approved developer-managed area redevelopment plans under implementation comprise relatively uniform re-development exclusively with high-rise (generally 9-16 storeyed) apartment buildings (with apartment sizes a mixture of 40 m² and 60 m² options), if fully implemented. The development formula is that Ger residents contribute their land, the city government provides a grant for the infrastructure, and the entire re-development process is managed by a private developer which is given a concession by the city government, including the freedom to sell apartments in the market after those needed to re-house residents have been sold to them using the land for apartment ownership swap mechanism.

Several of the schemes (two in Bayanzurkh, i.e. Baganat, 16th Khoroo – described in text box 1 above - and Nart Town, 14th Khoroo) have reached the stage where the original Ger residents have been permanently re-housed in high-rise apartment buildings (after having been temporarily housed off-site for about 2 years at the developer’s expense) through a valued exchange of land for ownership of an apartment building, with any investment balance funded through a subsidized loan scheme (70% loan at 5% interest p.a., 15% down payment and 15% subsidy).

Problem statement

The challenge now is how the development of the remainder of these sites (for the market) should continue under current market conditions. The balance of new apartments to be constructed were to be sold to a medium-to-low level target group identified by the city government. However, as noted
in section 4.5 above and as acknowledged by GADA, it may not be operationally feasible to stick to the original designs under current conditions due to:

a) affordability limitations (the target group may not be able pay a cost-recovery apartment price, even with 70% loan financing), and

b) apartment market constraints (the overall market for apartments in the city is currently quite saturated).

This may result in (s)low uptake of the apartments, increased vacancy rates and a slow-down or even complete standstill of the re-development projects, which is not in the interest of any of the parties involved. For the schemes in Bayanzurkh District it would also mean that the expected heat supply from CHP to these areas would be inadvertently under-utilised.

**Suggested changes in design/development (process) features**

As noted above, the objective of the re-development schemes as currently implemented under GADA’s auspices is to achieve a five-fold increase in housing and population density. This can also be achieved by introducing a greater diversity in housing types and standards (compare e.g. the below overview of GAHP land re-adjustment sites), and aiming for a more mixed development, including social facilities and business premises, which would respond better to current housing market and economic conditions.

Subject to carrying out detailed demand studies for housing in specific areas, as a broad guideline a mixture of row houses, low-rise apartment buildings (up to 5 floors) and high rise apartment buildings is suggested to provide for diversity of supply, with a notional distribution of 20%, 40% and 40%. Within these categories there should be a fairly wide range of housing unit sizes, ensuring that also poorer households will be able to afford them. The row houses (townhouses) at 140-170 m2 would generally be double storey, some of which could be split into two units. For the apartments a size range of 30 m2 – 80 m2 is recommended (at the current average cost of $450/m2, this works out at $13,500 - 36,000 construction cost per apartment), with 1, 2, 3 and 4 rooms apartment options to cater to different buyers’ preferences and affordability.

Resident communities should play a more prominent and organised role in articulating (priced) housing preferences, and this should be considered by GADA and its developers as a serious indication of target group market demand. Additionally, it would be helpful to ensure that the re-housing land valuing estimations and negotiations are balanced and mutually beneficial, by letting this be led by an independent neutral organisation, rather than by the developer. The new law on re-development mandates maximum community participation and provides for such approaches, and this should be reflected in the scope of work for developers to be given concessions for new re-development sites.

An alternative target group to be re-housed on land freed up in the early stages of Ger Area Redevelopment Projects could be residents from other Ger areas on land less suitable for residential use (e.g. on hill-sides having flooding/landslides risks); these residents would surrender their existing land right to the city government in exchange for a housing option in the redevelopment site, and the city government would then pay the developer the value of the land surrendered. To cover any balance investment cost remaining the rehoused household would take advantage of the above financing
arrangement. The city government and the state will need to take appropriate measures that the areas vacated by the families would be appropriately protected, and not resettled again.

5.1.2 Ger Area Land Readjustment Projects

Introduction and background
The Ger Area land re-adjustment projects prepared under the auspices of the Ger Area Housing Project (GAHP) take as their starting point the aspirations and agreement of the resident communities for their area development, and, like for the Ger Area Re-development Schemes includes the concept of a valued exchange of land for housing unit ownership.

GAHP supports the community-building process leading to community-based area re-development plans. This is a time-consuming process, which has been going on for more than two years, and in consequence the community-agreed development plans have only recently been finalised in physical terms for 8 sites in the city as a whole (a summary overview is shown below), of which one site in the study area and one adjacent to it in Bayanzurkh district.

In most communities a community organisation or company has been established to oversee the preparation and implementation of the plans. Investment costing and revenue sharing estimates are under preparation. For the medium-term plan period another 19 sites are in the pipe-line, of which 4 in Bayanzurkh district). Of the six sites in Bayanzurkh district at least four will benefit from the heat to be supplied by CHP 5.

The plans’ features make it clear that the communities’ aspirations go beyond the re-blocking of plots of land which is commonly understood by the term land readjustment internationally, but propose an integrated re-development of their areas. GAHP is receiving JICA support for the planning process.

Problem statement
The community-based area re-development have been drawn up in the context of the implementation of the city’s master plan, but separately from the city’s regular detailed planning processes.

As one of its tasks the recently established City Housing Corporation (NOSK) has been requested by the city government to arrange for the preparation of partial master plans for these areas in line with standard planning provisions. In consequence NOSK has requested consulting firms to submit bids for such assignments for the 8 areas, but using a standard bidding terms of reference without linking this design work to the work already undertaken by the communities with GAHP support. This work is also envisaged to continue to be supported by JICA in three sites and by GIZ in one of the sites.

Consequently, the issue at hand is one of adequate coordination of these efforts with the objective of enhancing the quality of the re-development proposals and bringing them in the mainstream planning process, while retaining the community-agreed housing and infrastructure proposals as much as possible.

Suggested changes in design/development features
As an immediate action, the above bidding process needs to take reference to and incorporate the (positive) demand-driven features of the planning work already undertaken and agreements made by the communities, and the winning bidders must be required to carry out their assignments in close consultation with the community organisations established in the areas.

At the same time, these organisations need to be encouraged by GAHP to make the best possible use of the design consultants to improve and augment the plans already prepared, including investment costing, financial modelling and the establishment of implementation arrangements.

An agreement will also be needed between NOSK, GAHP, JICA and GIZ to determine the best possible use of the external technical assistance resources to achieve this.

In the longer term, there is a need to structurally mainstream the Ger Area land re-adjustment process in the regular spatial planning and design processes. The new urban redevelopment law provides an excellent opportunity to adjust standard detailed planning and design Terms of References for consultants prepared and issued by the Master Plan Agency to incorporate (the now mandatory) community participation in in planning the redevelopment sites.

5.1.3 Da Khuree Car Market Site Redevelopment

Introduction and background
The Da Khuree second hand car market is being relocated from Bayanzurkh district to a site on the western fringe of UB. The present car market site of about 6 ha is leased by a private party. Although the lease appears to have expired, it may be extended. The lessee initially intended to use the land for residential development, but in discussions with the Master Plan Agency it was decided to devote it to commercial/light industrial use for car makers sales outlets, showrooms and maintenance & repair facilities. The city government then requested that part of the area be used for social facilities (primarily schools), but the lessee refused to cede land for that purpose, and hence the redevelopment proposal is not taken further at this time.

Problem statement
Consultants appointed by MPA are currently preparing the detailed master plan for MPA planning unit 17 (which includes the Da Khuree market site), and cannot satisfactory finalise their plan in the absence of a resolution of the dispute. This is unfortunate, as the re-development of the Da Khuree car market site offers an excellent opportunity to take this further in a truly integrated market-responsive manner, and make the best possible use of trunk infrastructure (including the new heat supply from CHP 5) around the site.

Suggested development direction
Leaving the area in limbo in a dispute negates the importance of investment in infrastructure already made in the area, and of investment yet to be made, such in access to CHP heat. Given the location of the area, the most logical land use is mixed residential/commercial/light industry land use, implying that social facilities should also be included.
5.1.4 Uliastai Light Industrial Area Redevelopment

Introduction and background

The Master Pan Industry-4 planning unit covers 647 ha of land in Kharoo 9, 10 and 23. The total 2015 population of the planning unit was a little under 16,000. Several industries, warehouses are located in the south west part of the area. There are Ger areas on the both side of Uliastai river. Central heating, water supply and sewerage network coverage from the city center ends at the MCS TiGer and Coca Cola plants area. Social buildings further north-eastwards are supplied by individual heat boilers and water supply and waste water disposal systems. Ger area residents use individual wood and coal fires for heating, water supply from collective water kiosks and pit latrines for sewage disposal on each plot. According to the partial master plan being prepared by the Master Plan Agency assigned consultant (Tumed Co.Ltd, see table 2 on p. 18 above), the existing Ger area on the east bank of Uliastai river is envisaged to have mixed industrial and residential land use on 304 ha along the river.

Map 8 Uliastai planning area and water resource protection zone (in blue)

Problem statement

The development of the partial master plan for the area is ongoing and expected to be completed by March 2016. Part of the detailed planning area (the above 304 ha) covers a protected internal water resource zone for the city (map 8). According to the legal requirements for water resource protection zones it is not allowed to construct petrol station, warehouse of chemical industries, farming and pit latrines, which could pollute water sources.

Suggested development direction

The (not yet completed) detail master plan needs to ensure that the main water source is adequately protected, even though the overall area east of Uliastai river is earmarked for mixed industrial/residential land use. The Ger area redevelopment program (section 5.1.1 above) can be extended into Amgalan sub center development, which is located within the Industry-4 planning unit area. This could include the connection of the re-developed residential area to heating and waste
water networks as part of the Amgalan sub center development project. In addition, the implementation of the Uliastai river bank project (project 7, section 5.2.7 below) is of high priority for the protection of water resources in the area.
5.2. New investment projects

Given the limited resources available for the study, the level of detail in project descriptions for investment projects for supporting infrastructure varies significantly. For already programmed but not yet funded investment proposals, design and cost data from existing sources have been used and scrutinized. For new projects identified by the study team only an initial scoping and costing of the investment have been prepared (based on discussions with project originators and/or potential financiers), but with sufficient detail to include these projects in a possible infrastructure investment planning and prioritization exercise. The proposed projects are shown on the below location map (map 9) and summarized in the text below, based on the more detailed project briefs in Annex 5.

Map 9

Location of Proposed Investment Projects

5.2.1 Thermo-technical Rehabilitation of Pre-cast Panel Apartment Buildings

Summary description
Thermo-technical Rehabilitation of Pre-cast Panel Apartment Buildings (project 1) covering about 8,150 apartments in 240 buildings in the study area, comprising:
- Outer walls, basements, roofs and other common areas insulation of the buildings
- Replacements of windows and outside doors as needed
- Internal radiators and heat piping upgrading, incl. change from one pipe to two pipe system
- Installation of heat control valves and heat consumption meters at the entry of the buildings and in each apartment
- Other construction measures as needed

Capital costs are estimated at MNT 76 billion. The program of retro-fitting old apartment buildings is referred to in the city’s medium investment action plan 2016 - 2020 as a priority action area, but no funds have yet been allocated. Main benefits are 30-60% in energy consumption savings, related cost-
savings and reduction in CO₂ emissions, and improved living conditions of the residents and extension of the economic life-time of the buildings.

Recommendation
The envisaged insulation and installation of heat consumption measurement devices is probably the most cost-effective investment of all proposed projects in terms of more efficiently utilising heat supply from CHP 5 (depending on the composition of the investment package and instituting consumption-based billing for heat, a 30-60% reduction of pre-retrofitting heat consumption can be achieved, see project 1 data in Annex 5), and should therefore be taken forward by MUB as a matter of priority.

The approach should be applied on a building-by-building basis. Given the importance of insulating common spaces, this cannot be left to individual apartment owners, which is the rationale for MUB to take the lead. Given the complexities in project implementation and operation (see section 4.4. above), external financial and technical assistance is recommended. Detailed feasibility study work has been done, but requires to be updated. It is suggested that a dialogue with external support agencies listed in the attached project brief (Annex 5, project 1) is initiated shortly on the basis of the project brief.

5.2.2 Extension of envisaged East-West BRT line

Summary description
Extension of the BRT stretch on Peace Avenue between Officers Palace and Amgalan SubCenter, Bayanzurkh District. This will comprise an extension on the main road by about 4 km, including 2-3 bus stops/stations. The BRT program is referred to in the city’s medium investment action plan 2016-2020 and is funded, but the present proposal is an extension to the envisaged program, and therefore unfunded.

Capital costs are estimated at MNT 32 billion. Main benefits of the extension are that it enhances the mobility of the area residents, lead to transportation cost savings and reduce CO₂ emissions.

Recommendation
The envisaged investment proposal can easily be incorporated in the feasibility and design work for the East-West BRT line, which is under consideration by MUB and ADB. It is suggested that this is done on the basis of the attached project brief (Annex 5, project 2).

5.2.3 North-eastern by-pass road

Summary description
Extension and widening of ring road system by about 8 km from the north (H4/H5), Sharkad – Uliastai river, South up to crossing with Nalaikh Highway. The allocation for the road program included in the city’s medium investment action plan 2016-2020 is an aggregate amount. This is a new project, but could be included for funding. Capital costs are estimated at MNT 14 billion. Main benefits of the by-

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2. This could also build on the GIZ Project Design Document entitled The thermo-technical rehabilitation of public and apartment buildings in Ulaanbaatar / Mongolia, November 2013. This design document addressed a the rehabilitation of subset of 22 buildings with 1,465 apartments in Khoroo 16.
pass are that it enhances the mobility of the area residents, lead to transportation cost savings and reduce CO₂ emissions.

**Map 10 Location of proposed by-pass road**

**Recommendation**

The envisaged investment proposal can easily be incorporated under the ADB-supported Urban Transport Development Investment Program – Tranche 2. It is suggested that this is considered on the basis of the attached project brief (Annex 5, project 3).

### 5.2.4. Ecopark East (Tsagaan Davaa solid waste site upgrading and expansion)

**Summary description**

The 92.6 ha Tsagaan Davaa solid waste dump site receives about 36% of Ulaanbaatar’s solid waste collected (including all of the study area’s solid waste collected). Its access road is poor, and collection not reliable. The present waste sorting and disposal at the site is not well organised. The land fill has not been developed and is not managed in an environmentally acceptable manner. When left alone, these problems will grow with the growing Bayanzurkh population densifying, fuelled by access to CHP 5 heat.

The city government together with the private sector plan to transform the site (as one of two sites) into an Eco park, which will house 8 recycling plants, infrastructural facilities (including site heating), and provide for improvement of the access road (4 km.) and fencing (11.6 km.). The recycling plants are envisaged to re-use 50% of the waste collected and sorted, and process this into marketable products profitably (which makes this project suitable for private sector involvement). The volume of waste still needing to be disposed in the landfill site can be reduced accordingly.
A preliminary feasibility study for the Mongolian National Recycling Association was completed in November 2015. Initial funding for the city government’s contribution was envisaged for 2016, but taken out during budget discussions.

The project is included in the city’s medium investment action plan 2016 – 2020, but unfunded, unless the 2016 allocation is re-instated in a budget review. The capital costs need to be determined in an expanded feasibility study (at a cost of $500,000). Envisaged benefits are an improved environment of residents, 50% waste disposal reduction, additional employment of recycling, enhancing the efficiency of solid waste collection in Bayanzurkh district, and reduction of CO₂ emissions.

**Recommendation**

Building on the preliminary feasibility study, an expanded feasibility study is proposed which will also cover a review of the collection and sorting system and prepare proposals to transform the landfill into a proper environmentally acceptable sanitary landfill. This will also enhance the operational economics of the on-site recycling centre. An Environmental Impact Assessment (EIA) is envisaged to be part of the study. The study will define and formulate the details of the PPP arrangement for the project. It is recommended that funds to carry out the study are sought from the City budget and/or external support (EBRD) on the basis of the attached project brief (Annex 5, project 4).

5.2.5  **Completion of Tuul waste water collector**

*Summary description*
Detailed design of the Tuul collector was prepared in 2008. The Tuul collector project is undertaken by MUB in 4 construction stages. The collector is starting from Mongol Shiltgeen Hotel located in the north east of the city, and ending at the waste water treatment plant. Construction of the 1\textsuperscript{st} and 2\textsuperscript{nd} stages has been completed. Of Tuul-3, 4 km has been completed out of a total 6.9 km. Additional work in 5 places in the waste water collector is needed for proper connection. For Tuul-4, an updated design and cost estimation has been prepared due to road network extension and land allocation along the route of the collector. In order to discharge sewage from Ger area redevelopment project sites in planning units 13 and 14, Uliastai and Khujirbulan the Tuul collector needs to be completed.

Estimated additional capital costs are MNT 12 billion. The envisaged benefits are an improved waste water disposal system, and the ability to have more waste water connections to the system in the study area.

Recommendation
It is suggested that funding for this residual work is found from MUB resources, possibly through the ADB-supported Ulaanbaatar Urban Services and Ger Areas Development Investment Program, on the basis of the attached project brief (Annex 5, project 5).

5.2.6 Integrated Micro Centers

Summary description
The development of Integrated Micro centers is proposed in Khorooos 19 and 27. These centers will comprise:

- Social facilities (school, community center, business incubator, health and trade centers)
- Infrastructure network and facilities,
- Improvement of quality public spaces.

These projects have been proposed in the Bayanzurkh District Development plan, but are not included in the city’s medium investment action plan 2016 – 2020. Capital costs are estimated at MNT 34 billion. Main envisaged benefits are improved living conditions and economic opportunities.

Recommendation
It is suggested that these projects are included in the city’s medium investment action plan 2016 – 2020 on the basis of the attached project brief (Annex 5, project 6). Funding could be found from MUB resources, possibly through the ADB-supported Ulaanbaatar Urban Services and Ger Areas Development Investment Program.

5.2.7 Protection and development of Uliastai river bank

Summary description
The development of a leisure public spaces project, including:
- Defining the Uliastai river protection zone;
- Rehabilitation of riverbanks and flood protection works;
- Development of a water pond for recreational purposes;
- Creation of a biking lane along the river.
This project has been proposed in the Bayanzurkh District Development plan, but is not included in the city’s medium investment action plan 2016 – 2020. Capital costs are estimated at MNT 2 billion. Main envisaged benefits are improved living and environmental conditions.

**Recommendation**

It is suggested that this project is included in the city’s medium investment action plan 2016 – 2020 on the basis of the attached project brief (Annex 5, project 7). Funding could be found from MUB and/or State resources.
5.3. Institutional coordination, capacity development and technical assistance

To implement the design modifications proposed in section 5.1. and the further preparatory actions for new project design and implementation for the investment projects outlined in section 5.2. will require significant capacity, primarily on the part of MUB. In the team’s view the technical capacities to deal with the required follow-up exist in the different agencies of MUB and the private sector, and do not comprise the most serious operational constraints.

At the level of overall city planning the city’s Master Planning Agency (MPA) is relatively well equipped to carry out its tasks of inter-sectoral and interdisciplinary spatial planning for the city (building on the JICA support for master planning and the ADB TA for Ulaanbaatar Urban Planning Improvement Project). The city’s department of strategic policy and planning has the mandate of coordinating inter-sectoral investment planning and programming for the implementation of the Master Plan, and as such has been the lead agency in the preparation of the MUB Integrated Investment Action Plan 2016-2020 (supported by JICA). The MUB Projects and Cooperation Department coordinates technical and financial external assistance efforts to the city, while the MUB Economic Development Agency is in charge of developing and promoting the city’s economic development strategy.

Text box 2: Capacity building technical assistance in urban development in Ulaanbaatar

The Japan International Cooperation Agency (JICA) supported “The Study on City Master Plan and Urban Development Program of Ulaanbaatar City”(UBMPS) in the period 2007-2009, which aimed to formulate a comprehensive city master plan and urban development program including land-use, environment, transport, economic development, institutional arrangements, as well as legal and institutional framework. Based on the results of this study, JICA provided further technical assistance (TA) through the project entitled “Capacity Development Project in Urban Development Sector in Mongolia”(MUGCUP) in the period 2011-2013, which aimed to establish a legal framework for urban development and redevelopment. A major output of the project was the draft Urban Redevelopment Law and related regulations. MUGCUP also aimed to improve the capacities of the Municipality of Ulaanbaatar (MUB) and other stakeholders in terms of implementing urban development and redevelopment projects. Current JICA support builds on this through support to GAHP for its Ger area land readjustment projects and in the area of inter-sectoral investment programming.

Various donors and nongovernmental organizations (NGOs) have cooperated with MUB in terms of individual infrastructure and housing programs and projects including Ger area improvement.

The Asian Development Bank (ADB) supports the implementation of the “Ulaanbaatar Urban Services and Ger Areas Development Investment Program, which also has two capacity-building technical components. ADB further supports the on-going Ulaanbaatar Urban Planning Improvement Project (TA).

GIZ has supported urban development in UB for many years in its bilateral program for Mongolia. It currently provides support through the program of Integrated Resource Management in Asian Cities: the Urban Nexus, in the areas of retro-fitting of apartment buildings and public buildings, Ger area land readjustment and waste water disposal.
In the housing area, the recent establishment of the City Housing Development Corporation (NOSK) with an operational coordination role in developing and coordinating the implementation of an affordable housing strategy for the city (including new settlements, Ger area redevelopment and land readjustment, rental housing and retro-fitting of old apartment buildings) is a good step in the right direction, but NOSK is a new organisation with limited and relatively inexperienced staff.

Given the major element of the above suggested development program in sections 5.1.1 (Ger Area Redevelopment Projects). 5.1.2 (Ger Area Land Readjustment projects) and 5.2.1 (Thermo-technical Retrofitting of Apartment Buildings) and the scarcity of human resources in the agencies which will address them (GADA, GAHP and NOSK), it may be advisable to bring the human resources of NOSK, GADA and GAHP under one roof, and in that way also make more effective use of the external technical assistance resources to MUB, particularly those of ADB, GIZ and JICA, which each have a significant track record in supporting MUB in urban development, as summarized in the above text box.

The study team has recommended two investment projects included in the Bayanzurkh District Development Plan (projects 6 and 7) for inclusion in MUB’s Integrated Investment Action Plan 2016-2020. The fact that these projects had not yet been included reflects the poor co-ordination between MUB and the District, which should be addressed.

External assistance from EBRD may be sought by MUB and the Mongolian National Recycling Association for the expanded feasibility study for Ecopark East (Tsagaan Davaa solid waste dump site upgrading and expansion - project 4), which will also clarify the PPP nature of this MUB project with the Recycling Association.

With regard to the other investment re-design and proposed new projects (projects 2, 3, and 5), the study team considers that existing sectoral organisational and institutional arrangements in the transport and sewerage area are by and large adequate for follow up by MUB.
6 Summary of Recommendations and Follow-up Action Plan

The main suggestions and recommendations of the study are summarized below, along with initial action plan directions for follow up. These are presented in the tables below in terms of: (1) recommended design modifications in existing on-going programmes (section 5.1 above), (2) new investment proposals (section 5.2 above), and (3) suggestions for institutional strengthening (sections 4.4 and 5.3 above).

Recommended design modifications (section 5.1. above)

<table>
<thead>
<tr>
<th>Program</th>
<th>Actions</th>
<th>Actors</th>
<th>Timing</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ger Area Redevelopment Projects</td>
<td>Design parameters review with the objective to achieve a more demand-responsive and energy-efficient housing options mix</td>
<td>GADA/NOSK/developers</td>
<td>1st-2nd quarter 2016</td>
<td>Design guidelines for developers</td>
</tr>
<tr>
<td>Ger Area Land Readjustment Projects</td>
<td>Matching community designs with detailed master planning to ensure that such planning adequately considers community design proposals</td>
<td>GAHP/NOSK/MA/JICA/GIZ/planning consultants</td>
<td>1st-2nd quarter 2016</td>
<td>Revised area development plans</td>
</tr>
<tr>
<td>Da Khuree redevelopment</td>
<td>Resolution of proposed land use dispute, so that the site can be redeveloped timely in the interest of sustainable growth</td>
<td>MPA/area lessee/planning consultants</td>
<td>1st-2nd quarter 2016</td>
<td>Agreed land use plan for the area</td>
</tr>
<tr>
<td>Uliastai light industrial area infrastructure</td>
<td>Include in the next tranche of Ger Area Redevelopment investment, and protect water resources zone; develop Feasibility Study for sustainable urban development of the area</td>
<td>MUB/GADA</td>
<td>By 2017</td>
<td>Feasibility Study</td>
</tr>
</tbody>
</table>

Recommended investment project preparation (section 5.2. above)

<table>
<thead>
<tr>
<th>Project</th>
<th>Estimated investment cost</th>
<th>Follow-up required</th>
<th>Actors</th>
<th>Timing</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Thermo-technical retrofitting of apartments</td>
<td>MNT 76 billion</td>
<td>Preparation of detailed feasibility study of thermo-technical retrofitting of apartments in the study area for external support</td>
<td>Mayor’s Office/NOSK/GIZ/Projects and Cooperation Department/MCUD/MOF</td>
<td>1st-3rd quarter 2016</td>
<td>Proposal for discussion with external support agencies (Russia, ADB, KfW?)</td>
</tr>
<tr>
<td>9. BRT extension</td>
<td>MNT 32 billion</td>
<td>Inclusion of proposed extension in revised BRT plan currently under consideration by MUB and ADB</td>
<td>MUB Transport Office/MPA/BRT consultants/Projects and Cooperation Department/ADB/MCUD/MOF</td>
<td>1st-3rd quarter 2016</td>
<td>Revised BRT Plan for ADB UTDP Tranche 2</td>
</tr>
<tr>
<td>10. North eastern by-pass road</td>
<td>MNT 14 billion</td>
<td>Inclusion of by-pass in road development plans under ADB-supported UTDIP</td>
<td>MUB Transport Office/MPA/Transport consultants/Projects and Cooperation Department/ADB/MCUD/MOF</td>
<td>1st-3rd quarter 2016</td>
<td>Revised Road Development Plan for ADB UTDP Tranche 2</td>
</tr>
<tr>
<td>11. Ecopa rk East</td>
<td>MNT 1 billion (FS)</td>
<td>Preparation of expanded Feasibility Study building on earlier efforts by MRA</td>
<td>Mongolian Recyclers Association/Mayor’s Office/Projects and Cooperation Department/EBRD/MCUD/MOF</td>
<td>1st-3rd quarter 2016</td>
<td>Feasibility Study for implementation</td>
</tr>
<tr>
<td>12. Tuul Waste Water collectors</td>
<td>MNT 12 billion</td>
<td>Resolution of resettlement issue along Tuul 3 and 4 to enable implementation of design</td>
<td>MUB Investment Department/USUG</td>
<td>2016</td>
<td>Projects ready for implementation in 2017 and 2018</td>
</tr>
<tr>
<td>13. Integrated Micro Centers</td>
<td>MNT 34 billion</td>
<td>Preparation of detailed design for each micro-center</td>
<td>MPA Infrastructure Department/Bayanzurkh District</td>
<td>2016</td>
<td>Projects ready for implementation in 2017 and 2018</td>
</tr>
<tr>
<td>14. Uliastai river bank development</td>
<td>MNT 2 billion</td>
<td>Feasibility Study of embankment protection and leisure park</td>
<td>MPA/Planning Consultants</td>
<td>2016</td>
<td>FS completed, detailed designs to be tendered</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Measure</th>
<th>Actions</th>
<th>Lead actors</th>
<th>timing</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity enhancement of Sukhs</td>
<td>3) Strengthening and enforcement of regulations governing the operation of Sukhs 4) Training of Sukh management</td>
<td>Supreme council of Sukhs/MCUD</td>
<td>1st-3rd quarter 2016</td>
<td>Improved regulatory framework, enhanced management of Sukhs</td>
</tr>
<tr>
<td>Preparation of operational regulations for urban re-development law</td>
<td>Detail out operational procedures for all five types of area redevelopment identified in the urban re-development law</td>
<td>JICA/MCUD</td>
<td>2016</td>
<td>Enacted regulations</td>
</tr>
<tr>
<td>Institute consumption-based billing for energy</td>
<td>Formulate and enforce consumption-based billing regulations under energy efficiency law</td>
<td>MoE/GIZ</td>
<td>2016</td>
<td>Enacted regulations</td>
</tr>
<tr>
<td>Consolidate MUB housing institutions</td>
<td>Consider options for institutional integration of GADA, GAHF and NOSK</td>
<td>Office of the Mayor, NOSK, GADA, GAHP, MCUD</td>
<td>1st-3rd quarter 2016</td>
<td>Institutional plan for consolidation of housing institutions</td>
</tr>
</tbody>
</table>

These recommendations are made in the interest of making the best possible and most efficient use of the new heat to be delivered in the study area by the CHP 5 plant. Some of the recommendations go beyond that, in the sense that they will be of help to more energy-efficient urban development for the city as a whole, while also having specific applicability in the study area.

It will be clear that these indicated actions only describe the broad direction of major follow up recommended by the study team. They are not meant to be exclusive, nor comprehensive. In most cases further detailed reviews and studies will be required, and this will take significant amount of time. The objective is that the proposed changes are in place by the time the CHP 5 will be operational in 2020.
Annexes

Annex 1  Study Terms of Reference

Objective and Purpose of the Assignment
The proposed activity will formulate the Mongolia NUA with the objectives of (i) deepening the comprehensive understanding of the urban sector in Mongolia, (ii) improving the Mongolian Government and ADB’s analytical tools and programming capacity in the urban sector, and (iii) formulating a priority project pipeline in the urban sector. Based on assessment of past and ongoing urban sector operations in Mongolia, the NUA will make suggestions on where ADB should focus on from the strategic policy assistance and investments point of view. Mapping systems are particularly promising for urban assessment as a means of visualizing socioeconomic, environmental, demographic, and operational data to support decision-making and development of smart cities. The Mongolia NUA will pilot an integrated web-based interactive mapping and information platform. This will be designed to be replicated and consolidated with other ADB NUAs across Asia and the Pacific.

The activity will be jointly carried out by ADB and Cities Development Initiative for Asia (CDIA), which will finance consulting services for the strategic infrastructure investment plan component. The activity will be developed in parallel with the (i) Human Settlement Project (2015–2017), which is a comprehensive assessment of all urban development aspects in Mongolia, carried out by the Ministry of Construction and Urban Development (MCUD) that will produce a medium- and long-term strategic urban development plan at the country scale; and (ii) Ulaanbaatar Strategic and Economic Development Plan, which is currently under preparation by the Municipality of Ulaanbaatar.

The proposed activity includes three components (i) Mongolia National Urban Assessment, (ii) strategic infrastructure investment plan, and (iii) a pilot for integrated and interactive web-based mapping and information system, and will be implemented in four phases:

Phase 1: Urban development assessment, vision, and scenario. The initial phase will (i) prepare and analyze current and future demographical changes, economic growth, and urban trends; (ii) conduct an urban infrastructure needs and urban sector assessments including asset inventory, performance, coverage, deficit, and the resource gap within the perspective of the future urban changes; (iii) review and assess government urban development plans and strategy at the country level and for each urban region; (iv) assess the current gaps related to the urban sector, institutional, legal, and regulatory framework; (v) analyze structural and social changes in urban activities through the lens of the economy, equity, environment (3E) approach; and (vi) formulate a long-term vision statement together with the governments and main stakeholders on future urban development, functions, and hierarchy.

The vision should be structured around target indicators and objectives and should align current situation, resources, potentiality, and development goal. Urban development scenarios to achieve the urban development vision and objectives will be elaborated. Vision statement, objectives, and scenarios should reflect the 3E approach and the role of the public sector, private sector, and civil society. The preparation of the NUA will follow the draft Manual for Undertaking Preparation of
National Urban Assessments (to be published this year) to ensure consistencies on methodology with other NUAs prepared or under preparation.

**Phase 2: Urban development strategy and road map.** An urban development strategy will be developed to implement the vision, objectives, and preferred scenarios. Strategic policies, actions, and responsibilities will be identified to address urban development core problems, constraints, and priorities. A time-bound action road map which includes investment opportunities, institutional strengthening, and capacity building components will be elaborated. The road map will be in line with the strategic focus of ADB’s country partnership strategy and government plans and will inform them on programing opportunity and enhancement. Detailed indicators will be elaborated under each thematic area. This phase will also look on cumulative benefits and synergies across sectors and stakeholders and will produce impact simulation of ADB lending and non-lending strategies and orientations of current and future programs.

**Phase 3: Infrastructure prioritization and financing plan.** The investments identified in the urban region will be prioritized based on impact, feasibility, and financing opportunities. The prioritization will lead to a strategic infrastructure investment plan that identifies infrastructure options, provides indicative costs, defines resource gaps, and suggests finance options. The priority exercise will look at cross-sector synergy and will define local comprehensive and integrated approach to achieve specific development objectives and the 3E agenda. This will produce a pipeline of prioritized quality projects that are relevant for ADB, government, civil society, and private sector investments. Based on the level of priority and the government demand, project proposals and to some extent, pre-feasibility studies will be formulated.

**Phase 4: Web-based mapping and information system.** Develop a web-based data visualization and mapping application that is capable of supporting interactive urban sustainability assessments at national and urban regional levels to inform strategic policy and resource allocation. The maps will support multiple data layers on a single map, as well as pre-designated filters to assist users with creation of specific data visualizations. Maps will also be embeddable in other websites/applications to support public outreach activities. It will be used to support, illustrate, and simulate the activity main findings, MCUD’s Human Settlement Project and urban region governments’ urban planning program, and ADB’s lending and non-lending activities. The application will be designed with simplicity and ease of use, including tools to enable Mongolia to maintain and update the data content following activity completion and solutions on how to consolidate the mapping system with other ADB NUA initiatives. The consultant will consider commercial enterprise GIS software solutions, open source software, and new cloud offerings such as MapBox, CartoDB, OpenStreetMap, and ArcGIS Online.

**Additional Component - Urban development Assessment of the CHP5 neighboring area in Ulaanbaatar**

A separate international Senior Urban Development consultant, supported by the national Engineer/Urban Infrastructure specialist, will perform the following tasks: a) identify the expansion area where the CHP5 (Combined Heating Power Plant #5) is located; b) once it has been identified (based on urban trends and city growth), and public and street space has been defined, identify the required infrastructure which will prepare the land for urban functions and guide the development
and create a virtuous cycle of investment. Infrastructure investments need to be planned in terms of:
a) service standards and technological choices, including affordability, cost recovery and the possibility
to upgrade and expand; b) investment phasing, determining where and how much to invest.

It is important to link spatial and transport planning. A city’s spatial pattern is enabled by transport, and the development of transport networks shapes cities over the long term. Therefore, the required investment in transport will have to be identified (both between the City Center and the new area, and within the expansion area) and be linked to spatial planning. Mixed-use land policies should be implemented to reduce the distance between residential and employment areas which lessens dependency on cars and travel demand altogether. The consultants will have to identify the need for provision of basic infrastructure for water, energy and waste management for the new expansion area by integrating such infrastructure in urban planning to optimize investment and asset performance.

In particular, the consultant will (i) prepare and analyse current and future demographical changes, economic growth and urban trends in the City; (ii) conduct an urban infrastructure needs and urban sector assessment for the expansion area and assess the deficits/ gaps within the perspective of the future urban changes; (iii) review and assess government urban development plans and strategy at the city level; (iv) assess the current gaps related to the urban sector’s institutional, legal, and regulatory arrangements.

An urban development strategy for the expansion area will be developed to implement the vision, objectives, and preferred scenarios. A phased infrastructure investment strategy and plan which includes investment opportunities in the above mentioned sectors, institutional strengthening, and capacity building components will be elaborated.

Scope of Work
The Senior Urban Development Specialist will be responsible for the overall deliverables related to the additional component of the study: “Urban development Assessment of the CHP5 neighboring area in Ulaanbaatar”. S/he will conduct an urban infrastructure needs- and urban sector assessment against the perspective of future urban changes and propose an urban- and infrastructure development strategy for the identified expansion area. S/he will be supported by the national Engineer/Urban Infrastructure specialist and coordinate and share information with sector experts involved in the NUA. S/he will undertake the following:

Detailed Tasks Senior Urban Development Specialist (International, 60 days, intermittent). The expert will undertake the following activities:

In close consultation with the CDIA task managers, the consultant will lead, coordinate, and elaborate inputs described in the Additional Component of this activity. This includes:
(i) review and assess government and City urban development plans and strategies at UB City level;
(ii) prepare and analyse current and future demographical changes, economic growth, and urban trends;
(iii) formulate a long-term vision together with the City government and main stakeholders on future urban development, functions, and hierarchy related to the expansion area;
(iv) elaborate urban development scenarios to achieve the urban development vision and objectives;
(v) establish an urban development strategy for the CHP5 expansion area to implement the vision, objectives, and preferred scenarios and identify the required infrastructure which will prepare the land for urban functions and guide the development and create a virtuous cycle of investment;
(vi) formulate factors that determine the competitiveness, environmental sustainability, and social development performance of the expansion area and provide the basis for identification and prioritization of investments in the expansion area;
(vii) identify strategic polices, actions, and responsibilities to address area urban development core problems, constraints, and priorities;
(viii) formulate a phased action plan materialized by a time-bound road map which includes investment opportunities, institutional strengthening, and capacity building components which will be elaborated at city level;
(ix) identify investments that will be prioritized based on impact, feasibility, and financing opportunities;
(x) develop a strategic infrastructure investment plan that identifies infrastructure options, provides indicative costs, defines resource gaps, and suggests financing options;
(xi) lead and facilitate stakeholder workshops, including a workshop for consultations on visioning and scoping for consensus and scoping the outputs of the study and proposed urban sector investment programming.

Qualifications and Experience
The expert should have, as a minimum, a Master’s degree in Urban Development Planning, Urban Economics, Regional Planning or other relevant field, and at least 15 years of working experience, preferably in public infrastructure projects and in related technical assistance projects preferably ADB and/or donor-funded in the following: city-wide urban development and/or infrastructure planning, integrated urban and environment planning; national level urban sector analysis and strategic policy; and institutional strengthening, knowledge management, and capacity development. A significant part of this working experience will have been in ADB developing member countries. Prior working experience in Mongolia and knowledge of Mongolian urban issues will be an advantage. The candidate must have excellent oral and written English skills.

Implementation Arrangements
The activity will be implemented intermittently during late August 2015 to end-January 2016. The project office will be set up in Ulaanbaatar City Hall and consultants are required to work closely with the city officers and MCUD (Ministry of Construction and Urban Development) officers.

Outputs/Reports
The consultants will submit the following reports to CDIA, ADB, the City (in English) and to the government (in Mongolian):
(i) Inception report. It will be submitted within 1 month after the commencement of the services. The report includes a detailed work program plus any major inconsistencies in the terms of reference, staffing problems or deficiencies in the government’s assistance.
(ii) Interim report. It will be submitted within 3 months after the commencement of the services. The report includes a preliminary result of activities, updated work program, and any issues and concerns.
(iii) **Draft final report.** It will be submitted within 5-6 months after the commencement of the services. A workshop will be held, attended by relevant stakeholders, to get feedback on the report within 6 weeks after the submission of the draft final report.

(iv) **Final report.** It will be submitted within 1 month after receipt of comments from ADB and the government on the draft final report. The final report shall take into consideration the comments of CDIA, ADB, and the government. A maximum of 10 pages summary report should be included in the final report.
Annex 2  Documents consulted and individuals met

Documents consulted

- Asia Foundation, The informal Economy in Ulaanbaatar: Policy Options to Promote Growth in the Ger Areas, William Turner and Mark Koenig, October 2015
- ADB/CDIA, Ulaanbaatar Urban Renewal and Affordable Housing Project, Interim Report, October 2015
- ADB, Ulaanbaatar Urban Planning Improvement Project (UBUPI), Interim Report, October 2015
- ADB/CDIA, National Urban Assessment, Interim Workshop notes, 23 October 2015
- CDIA/MoE, Pre-feasibility Study on the Heat Transmission Main and Water Supply Infrastructure for the Ulaanbaatar CHP-5, Final Report (draft), November 2015
- GIZ, Thermo-Technical Retrofitting of State-owned Schools and Kindergartens in Ulaanbaatar, Mongolia, Preliminary study, Main Report, 2014
- Government Of Mongolia, Law on Urban Redevelopment (unofficial translation), 2015
- Ulaanbaatar 2020 Master Plan and Development Approaches for 2030, State Great Khural Resolution 23, 8 February 2013, Technical Summary 2014, p. 9 and 15
- World Bank Clean Air Project/Affordable Housing Institute, Technical Assistance to Develop an Affordable Housing Strategy for Ulaanbaatar: Affordable Housing Strategy for Ulaanbaatar, November 2014
- World Bank Clean Air Project, Bayanzurkh District Development Plan, Volume 2.1 Final DPP, June 2015, pp. 23-25
- XacBank, Final report: Elaborating financial mechanisms for the implementation of the Ulaanbaatar Thermo-Technical Renovation Project, for GIZ Integrated Resource Management in Asian Cities: The Urban Nexus, October 2014
Individuals met during the study

*City Government of Ulaanbaatar (MUB)*
Mr. S. Ochirbat, Deputy-Mayor for Urban Development and Investment
Mr. B. Badral, General Manager of Ulaanbaatar City

Mr. D. Otgonbaatar, Head, Project and Cooperation Department
Ms. B. Lkhamsuren, Project and Cooperation Department

Mr. E. Anar, Deputy Head, Master Planning Agency
Ms. B. Tserenbaljid, Head, Infrastructure Division, Master Planning Agency
Ms. Lkhamsuren, Research and Planning Division, Master Planning Agency
Mr. D. Davaajav, Research and Planning Division, Master Planning Agency
Mr. M. Nyambayar, Head, Re-development Division, Master Planning Agency

Mr. S. Bayarbaatar, Director, Strategic Policy and Planning Department
Mr. B. Enkhbayar, Strategic Policy and Planning Department
Ms. D. Shurentsetseg, Strategic Policy and Planning Department

Ms. B. Sarnai, Deputy Director, Capital City Housing Corporation (NOSK)

Mr. S. Gankhuyag, Chairman, *Ger Area Re-development Agency* (GADA)

Mr. Ikhavgadorj, Director of *Ger Area Housing Project* (GAHP)
Mr. A. Buyandelger, Head of Division, *Ger Area Housing Project* (GAHP)
Ms. T. Narantsetseg, *Ger Area Housing Project*
Ms. Kh. Janbota — Urban Planning specialist, *Ger Area Housing Project*
Mr. Minoru Matsui - JICA expert, Land Readjustment Project,

Mr. G. Narangerel, Deputy Director, Urban Planning and Design Institute
Mr. Enkhbaatar, Transport Specialist, Urban Planning and Design Institute

Mr. Enhkjargal, Technical Division, USUG
Ms. Chimegee, Technical Division, USUG

Mr. Z. Zandanpurev, Chairman, Authority of Partial Engineering Supply

*MCUD*
Ms. B. Bayantuul, Strategic Policy and Planning Department
Mr. D. Belegsakhan, Strategic Policy and Planning Department

*Cities Development Initiative for Asia (CDIA) Core Management Team*
Mr. Adolfo Guerrero, Country Coordinator for Mongolia and Senior PPP Specialist
Asian Development Bank (ADB)
Mr. Arnaud Heckmann, Senior Urban Development Specialist, Mongolia Resident Mission
Mr. Raushanbek Mamatkulov- Senior transport Specialist Mongolia Resident Mission

UN-Habitat
Ms. Sh.Enkhtsetseg, Habitat Programme Manager
Mr. Binod Shrestha, Team Leader, MUB/ADB Ger Area Redevelopment Community Engagement and SME Development Project

MUB/ADB Ger Area Redevelopment Improved Urban Planning and Sub-center Development Project Mr. Roy Brockman, Team Leader

MUB/ADB Ulaanbaatar Urban Planning Improvement Project
Mr. Tungalag, Deputy Team Leader

CDIA/ADB CHP 5 Infrastructure Development Consultants Team
Mr. L. Erdenedalai, Acting Team Leader and Senior Energy Specialist
Ms. Z. Yanjindulam, Water and Environmental Engineering Specialist
Ms. T. Enkhchimeg, Senior District Heating Specialist

ADB/CDIA National Urban Assessment (NUA) study Consultants Team
Mr. G. Bat-Erdene, Co-team Leader
Mr. E. Tsolmon, Urban GIS Specialist

Bayanzurkh District Development Plan Preparation Consultants Team
Ms. Z. Tuya, Deputy Team Leader and Urban Planner

ADB/CDIA Ulaanbaatar Urban Renewal Affordable Housing Project Consultants Team
Mr. Marc Popesco, Team Leader/Urban Planner
Ms. B. Sarnai, Deputy Team Leader and Urban Development Specialist

GIZ
Mr. S, Tserendash, Project Manager Ulaanbaatar, GIZ Urban Nexus Program
Mr. S. Tuvshinkhuu, Senior Expert, Energy Efficiency Project, Ministry of Energy

Private planning and engineering firms
Mr. O. Batsiakhan, General Director, Baganat Urguu Co. ltd
Ms.Khishigsuren, Director of “Art City” design company Co.ltd
Mr.D.Jagar, Director of ‘’Nart design’ Architectural company Co.ltd
Mr.D.Batbayar, Director of Forum-Art design company Co.ltd
Mr.B.Enkhtaivan, Engineer “Ulaanbaatar negtgel”
Ms. L. Nyamsuren, Executive Director, Tumed Group Co. ltd

Mongolian National Recycling Association
Mr. D. Byambasaikhan, President

Main points discussed

The workshop was participated in by 26 out of the 41 invited participants. After the break only about 15 participants remained, so it was decided to combine groups a) and b).

Part 1: Vision/strategy:
The presentations and discussions confirmed the need for:

1) Compact city growth, i.e. densification in order to efficiently and equitably deliver urban services
2) Poly-centric development with Sub-centers
3) Integration of heat supply with other urban services, particularly transport

Other points raised were:

- The need for a temporary heat supply distribution solution, as CHP 5 will not come on-stream earlier than 2020
- The CHP 5 supply capacity by then will not be adequate to service the Eastern side of the city
- Special concern is required for the Ger areas and to ensure a balanced re-development
- The need to be mindful of cost-recovery potential and affordability issues
- The need to improve the main waste water pipe line, as it is old and dilapidated
- The need to re-charge the water aquifer

Part 2: Feedback from Thematic working groups working on the following three question:

1. How will the scheme(s) be affected by additional heat supply from CHP 5?
2. What re-design measures will be needed to optimize heat supply utilisation and promote strategic orientation?
3. What additional infrastructure investment and/or other (e.g. capacity building) measures will be required to promote strategic orientation?

Groups a) and b): Ger area re-development projects and detailed area planning

The CHP 5 will enable better connections to the heat supply grid; about 90% of the district will be covered and this supply will serve 30% of the population. There is a need for more efficient heat utilization (consumers need to be made aware) and reduction of heat transmission losses. A concern is that the construction of the heat transmission and distribution lines should be with minimal requirement for the existing population to be (temporarily) resettled.

There is an absolute need for consolidation and densification. There may be a need to revise or update the Master Plan. There is a need for better coordination with other infrastructure plans, and these may need to be re-designed or re-phased. Community participation and consultation is essential. Resource mobilisation (including heat tariff restructuring) needs to be given due consideration.
Group c): Development of industrial estate for light industries in Uliastai

There are mutual impacts: the CHP 5 will help to reduce power and heat costs for the industries in the industrial area, which in turn will lead to cost reduction in the industrial products. The development of the industrial area will provide an increased number of heat supply customers. This is on the back of strong population growth in the district.

There is a need to use advanced technology, e.g. in using renewable energy along with taking heat and electricity from the central system, as well as in promoting the re-use of sewage. As considered in the Master Plan, light and high technology industries should use automatic heat and electricity regulators to optimize their utilisation.

It is important to generate employment in service centers. There is a need to coordinate the provision of infrastructure. The enhancement of the transport system, including public transport, is important. Provision of social infrastructure (health and education) needs to be included, as well as (industrial) waste recycling plants, if scale permits.

Group d): Transport plan for Eastern part of UB

The CHP 5 additional heat supply distribution will stimulate densification, and thus increase pressure on the road network. The proposed transport plan will restructure the roads to provide a proper well-connected network (with radial roads, and additional east-west and north-south connections, with some roads to be widened - a map was drawn up showing this), so that pressure on the main existing arteries will be reduced. Public transport will be an important element (proposed BRT and MRT lines are indicated on the map).

Group e): Proposals for SW disposal site and flood protection/drainage

With the additional heat supply distribution from CHP 5, the Ger area re-development projects will likely lead to be an increased volume of solid waste. This will have a reduced ash contents in it, and lead to a reduction of air pollution. Soil pollution will also be reduced due to reduction of pit latrines. Altogether there will be a positive health impact. There is a need for improved education and behaviour with regard to solid waste disposal, sorting of solid waste and solid waste re-use.

There is a need for more integrated planning. With the increase in built-up areas and additional roads, there is also a need for improved storm water drainage. The proposed flood protection dam can be combined with a recreation zone along river side. There is a need to prepare an integrated flood protection system. There is also a need to provide additional water supply, sewerage network, communication, and electricity supply, with coverage in the additional areas to be served by CHP 5 to be increased.

Plenary discussion on other issues not earlier noted

Expansion of the capacity of the waste water treatment plant (although not in the study area) is needed and there is a need to develop a third sewage transmission line help to reduce the transmission load on the existing two in Bayanzurk district.

Main points discussed

The workshop was participated in by 20 out of the 34 invited participants.

Participants (only those who made inputs)

- S. Ochirbat - Vice Mayor for Urban Development and Investment
- D. Otgonbaatar - Head of the Department of Projects and Co-operation
- Dalanjargalaa - Head of Division of Research and Planning of MPA
- D. Byambasaikhan - President of National Association of Solid Waste Recycling
- S. Tserendash - National Coordinator of “Nexus” project of GIZ
- G. Tsermaa - Senior Specialist of Infrastructure division of MPA
- B. Sarnai - Deputy-Director City Housing Cooperation /NOSK/
- Gansukh - Specialist, Strategic Policy and Planning Department
- Roy Brockman - Project Team Leader of IPA Consulting company
- Adolfo Guerrero - Coordinator for China and Mongolia, CDIA
- Emiel Wegelin - Senior Urban Development Specialist
- D. Myagmar - Infrastructure Specialist

The meeting was opened by introductory remarks of Vice Mayor Ochirbat and Adolfo Guerrero on behalf of CDIA.

The Project Consulting Team (D. Myagmar and Emiel Wegelin) provided feedback on ongoing projects and programs in Ulaanbaatar and presented additional investment projects’ proposals based on development visioning and strategic directions for those areas which will be supplied of heating system by CHP 5, determined in November 2015 by stakeholders.

The suggestions for design modifications were well received.

The following 7 investment project proposals were presented.

**Project 1:** Retro-fitting of Old Apartment Buildings.
Thermo-technical Rehabilitation of Pre-cast Panel Apartment Buildings in BZD (about 240 buildings comprising 8,150 apartments), including outer walls, basements, roofs and other common areas insulation of the buildings. Replacements of windows and outside doors as needed. The project will be resulted in improved living conditions of apartments’ residents, 30% reduction in heat consumption, cost savings of reduced heat consumption, reduction of CO₂ emissions and expanded economic lifetime of the buildings. Capital cost 98 billion tugrug.

**Project 2:** Extension of BRT East-West line
Bus lane stretch on Peace Avenue between Officers Palace and Amgalan SubCenter, Bayanzurkh District. Extension of envisaged BRT line on main road by about 4 km, including 2-3 bus stops/stations.

**Project 3:** Northeastern By-pass Road
From North (H4/H5), Sharkad to Uliastai river, along the river South, up to crossing with Nalaikh Highway. Extension of ring road system by about 10 km. Capital cost 14 billion tugrug.
**Project 4:** Expanded feasibility study for Ecopark East (Tsagaan Davaa solid waste dump site upgrading and expansion). The recycling plants are envisaged to re-use 50% of the collected at Tsagaan Davaa waste, using the latest technology and techniques. To solve problem of enter and exit of Tsagaan Davaa site.

**Project 5:** Completion of Tuul Waste Water Collectors
Complete of Construction and Installation of more than 10 km of sewage lines in stages 3 and 4 of Tuul collectors. Relating to Ger area increasing in east part of the city it is necessary to complete Tuul collectors. But the main problem is in resettlement of residents.

**Project 6:** Integrated Micro-Center in Khoroo 19 and 27
Integrated Micro-center project, including: social facilities (school, community center, business incubator, health and trade centers), infrastructure network and facilities, improvement of quality public spaces. This project is included to Bayanzurkh district development plan and developed to be implemented in the first 3 years of the plan. The project will provide more opportunities to extend infrastructure services surrounding residents. Capital cost: MNT 19.160 billion for Micro center in Khoroo 19 and 14.9 million Micro center in Khoroo 27.

**Project 7:** Protection and Development of Uliastai River Bank
The location of the project is related to 10th and 23th Khoroo of BZDm along Uliastai river. Creation of Leisure public spaces project includes the following activities: to define the Uliastai river protection zone, a rehabilitation riverbanks and flood protection, create a water pond for recreational purpose and create bike lane along river. Capital cost 2,060 billion tugrug.

**Feedback:**

**Dalanjargalan:** The Master plan consists of 47 planning units, and the most of them are developing a detail master plan. These plans and proposals should be linked with plans of those companies who is planning. It is necessary to review the sewer lines and road alignment. It is required to consider newly allocated places in BZD and in Uliastai of new 52 locations of allocation. Would be good if to declare a financing resource for CHP 5 gets where from. Appartment buildings problems should be solved by each building.

**D.Otgonbaatar:** I support the project of Thermo-technical Rehabilitation of Pre-cast Panel Apartment Buildings. We have a new study for BRT and a conclusion will be by the end of the year. The other extension of development plans, new 52 locations of allocation will be considered and we will link with the tranche-3 program of Ger area development.

**S. Tserendash:** (National Coordinator of “Nexus” project of GIZ) We have successfully implemented projects for insulation of old school and kindergarten buildings of State ownership. Further it is important to implement projects in social building which have independent heating recourses to thermo-technical rehabilitation projects.

**G. Tsermaa:** (Senior Specialist of Land Re-planning Department of General Plan) Feasibility study’s cost and general average cost of housing show different results. There is required an accuracy in calculation. Did Consultants do detailed studies? May be they have used some results of our office’s surveys results?

**B. Sarnai:** (Housing cooperation) We understand that Consultants’ work is not to study for a specific project, but to clear old and new priority project proposals for the eastern part of the city. These 7 important projects are not funded as they are not included to the investment integrated plan and plan of this year.
G.Tsermaa: Due to a land acquisition the Tuul collector project is not completed even it has been started in 2009 and 2010. An advanced effective search is needed.

D.Byambasaikhan: (President of National Association of Waste Recycling) It is required to co-operate well with urban development institute. This project has been started already since 2014. Figures in the presentation are limited and we can provide more data.

D.Otgonbaatar: Please submit soon your proposals to be included in performance reports. We have to link all our activities such as to include waste problem to Tranche 2 – Housing project.

Roy Brockman: Tranche-3 project of the ADB-supported Ger Area Development Investment Program will be prepared for implementation soon. Public participation is important. Thermo-technical rehabilitation of pre-cast panel apartment buildings is very important and it has to be linked with capable housing projects and integrated solution of Housing Association and residents for thermo insulation of public use parts of a building. I also support the project of waste sorting and re-cycling.

Gansukh: Insulation project is mentioned in chapter 4 of the Investment plan of the General plan.

Conclusion:

Request from D. Otgonbaatar: Consider and clear all recommendations of the meeting and to submit all recommendations and feedback to the Project Consulting Team in February, before preparation of the Final report of the project.
### Project 1

#### Retro-fitting of Old Apartment Buildings

<table>
<thead>
<tr>
<th>Location</th>
<th>In selected <em>Khoroos</em> (planning districts 10, 15 and 16) in the CHP 5 service area in Bayanzurkh District</th>
</tr>
</thead>
</table>
| **Scope and Description** | Thermo-technical Rehabilitation of Pre-cast Panel Apartment Buildings (about 240 buildings comprising 8,150 apartments), including:  
- Outer walls, basements, roofs and other common areas insulation of the buildings  
- Replacements of windows and outside doors as needed  
- Internal radiators and heat piping upgrading, incl. change from one pipe to two pipe system  
- Installation of heat control valves and heat consumption meters at the entry of the buildings and in each apartment  
- Other construction measures as needed  
The program of retro-fitting old apartment buildings is referred to in the city’s medium investment action plan 2016 - 2020 as a priority action area, but no funds have yet been allocated. |
| **Implementation Time Frame** | FS (incl. needs survey) and Design Q1 – Q3 2016; Loan Agreements Q 4 2016; Tender Process in 2-3 lots in phases Q 4 2016 – Q 1 2017; Construction and Installation in phases Q2 2017 to Q4 2018; Commissioning in phases Q3 2017 – Q 1 2019 |
| **Benefits and Beneficiaries (Financial, Economic Social & Other)** |  
- Improved living conditions of apartments’ residents  
- 30 - 60% reduction in heat consumption  
- Cost savings of reduced heat consumption  
- Resulting reduction of CO2 emissions  
- Expanded economic life-time of the buildings |
| **Capital Cost** | MNT 76 billion (MNT 9.3 million per apartment on average – GIZ/XasBank Study 2014) or $ 49 million. |
| **Operating Cost** | MNT 760 million per annum (1% of capital costs) |
| **Opportunities for Cost Recovery** |  
- 50% through betterment fee paid by residents (phased over 10-20 years)  
- Sale elsewhere of heat consumption saved (30 - 60%) |
| **Possible Financing Sources** |  
- Bi-lateral (Russian and/or Japanese JICA/JCM) development support funds  
- Asian Development Bank Clean Development Fund and Affordable Housing Project loan  
- State budget  
- MUB budget  
- XasBank eco loan  
- Resident down payments of betterment fee  
- Sales of Mansard units |
| **Implementation and Procurement Arrangements** |  
- MUB as implementing agency  
- Development by Joint-venture of specialised developers contracted by MUB  
- Cost recovery and O&M through Apartment Owners Association (Sukh) or Housing Company |
| **Main Project Risks** |  
- Inability of financing partners to support project  
- Lack of interest by Government  
- Weak capacity of stakeholders (Sukhs in particular) and lack of participation of apartment owners in decision making process |
| **Source documents** |  
- XacBank, Final report: Elaborating financial mechanisms for the implementation of the Ulaanbaatar Thermo-Technical Renovation Project, for GIZ Integrated Resource Management in Asian Cities: The Urban Nexus, October 2014;  
- GIZ, Thermo-Technical Retrofitting of State-owned Schools and Kindergartens in Ulaanbaatar, Mongolia, Preliminary study, Main Report, 2014  
### Project 2: Extension of BRT East-West line

**Location**
BRT extension on Peace Avenue between Officers Palace and Amgalan SubCenter, Bayanzurkh District

**Scope and Description**
Extension of envisaged East-West BRT line on the main road by about 4 km, including 2-3 bus stops/stations. The BRT program is referred to in the city’s medium investment action plan 2016 - 2020 and is funded, but the present proposal is an extension to the agreed program, and therefore unfunded.

**Implementation Time Frame**
Recalculations FS and Design Q1 – Q3 2016; Loan Agreements Q 4 2016; Tender Process in phases Q 4 2016 – Q 1 2017; Construction and commissioning in phases Q2 2017 to Q4 2018.

**Benefits and Beneficiaries (Financial, Economic Social & Other)**
- Enhanced mobility of residents
- Transportation cost savings
- Resulting reduction of CO2 emissions

**Capital Cost**
MNT 32 billion (MNT 8 billion per km - ADB info) or $ 16 million

**Operating Cost**
MNT 320 million per annum (1% of capital costs)

**Opportunities for Cost Recovery**
- Bus ticket sales
- Property tax on enhanced property values adjacent to bus stations

**Possible Financing Sources**
- Asian Development Bank Urban Transport Development Investment Program-Tranche 2
- State budget
- MUB budget

**Implementation and Procurement Arrangements**
- MUB as implementing agency
- Development by Joint-venture of specialised developers contracted by MUB
- Cost recovery by UB bus company and MUB (property tax)

**Main Project Risks**
- Inability of financing partners to support project
- Lack of interest by Government
- Weak capacity of stakeholders

**Source documents**
- ADB, Urban Transport Development Investment Program, August 2012
- ADB, Urban Transport Development Investment Program - Tranche1, May 2015

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### Project 3: Northeastern by-pass road

**Location**
From North (H4/H5), Sharkad to Uliastai river, along the river South, up to crossing with Nalaikh Highway.

**Scope and Description**
Extension and widening of ring road system by about 8 km. The allocation for the road program included in the city’s medium investment action plan 2016 - 2020 is an aggregate amount. This is a new project, but could be included for funding.

**Implementation Time Frame**
FS and Design Q1 – Q3 2016; Loan Agreements Q 4 2016; Tender Process in phases Q 4 2016 – Q 1 2017; Construction and commissioning in phases Q2 2017 to Q4 2018;

**Benefits and Beneficiaries (Financial, Economic Social & Other)**
- Enhanced mobility of residents
- Transportation cost savings
- Resulting reduction of CO2 emissions

**Capital Cost**
MNT 14 billion (UB Planning and Design Institute and ADB info)

**Operating Cost**
MNT 140 million (1% of capital cost)

**Opportunities for Cost Recovery**
- Property tax on enhanced property values adjacent to road

**Possible Financing Sources**
- Asian Development Bank Urban Transport Development Investment Program-Tranche 2
- State budget
- MUB budget

**Implementation and Procurement Arrangements**
- MUB as implementing agency
- Cost recovery MUB (property tax)

**Main Project Risks**
- Inability of financing partners to support project
- Lack of interest by Government
- Weak capacity of stakeholders

**Source documents**
- ADB, Urban Transport Development Investment Program, August 2012
- ADB, Urban Transport Development Investment Program - Tranche1, May 2015

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## Project 4

**Expanded feasibility study for Ecopark East (Tsagaan Davaa solid waste dump site upgrading and expansion)**

<table>
<thead>
<tr>
<th>Location</th>
<th>Tsagaan Davaa solid waste dump site in the Northeast of Bayanzurkh district</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scope and Description</strong></td>
<td>The 92.6 ha Tsagaan Davaa solid waste dump site receives about 36% of Ulaanbaatar’s solid waste collected (including all of the study area’s solid waste collected). Its access road is poor, and collection not reliable. The present waste sorting and disposal at the site is not well organised. The landfill has not been developed and is not managed in an environmentally acceptable manner. When left alone, these problems will grow with the growing Bayanzurkh population densifying, fuelled by access to CHP 5 heat. The city government together with the private sector plan to transform the site (as one of two sites) into an Eco park, which will house 8 recycling plants, infrastructural facilities (including site heating), and provide for improvement of the access road (4 km.) and fencing (11.6 km.). The recycling plants are envisaged to re-use 50% of the waste collected and sorted, while in itself being profitable (and therefore suitable for private sector investment). The volume of waste still needing to be disposed in the landfill site can be reduced accordingly. A preliminary feasibility study for the Mongolian National Recycling Association was completed in November 2015. Initial funding for the city government’s contribution was envisaged for 2016, but taken out during budget discussions. The project is included in the city’s medium investment action plan 2016 – 2020, but unfunded, unless the 2016 allocation is re-instated in a budget review. Building on the preliminary feasibility study, the proposed expanded feasibility study will also cover a review of the collection and sorting system and prepare proposals to transform the landfill into a proper environmentally acceptable sanitary landfill, which will also enhance the operational economics of the on-site recycling centre. An EIA will be part of the study. The study will define and formulate the details of the PPP arrangement for the project.</td>
</tr>
<tr>
<td><strong>Implementation Time Frame</strong></td>
<td>FS and Design Q1 – Q3 2016; Project and Loan Agreements Q 4 2016; Tender Processes in phases Q 4 2016 – Q 1 2017; Construction and commissioning in phases Q2 2017 to Q4 2018;</td>
</tr>
</tbody>
</table>
| **Benefits and Beneficiaries (Financial, Economic Social & Other)** | • Improved environment of residents  
• 50% waste disposal reduction  
• Additional employment of recycling  
• Enhancing the efficiency of solid waste collection in Bayanzurkh district  
• Reduction of CO 2 emissions |
| **Capital Cost** | T.b.d - cost of expanded feasibility study $ 500,000 (more if for both Eco Park sites together) |
| **Operating Cost** | T.b.d. |
| **Opportunities for Cost Recovery** | • Recycling operation will be self-financing  
• Waste collection may be augmented by beneficiary residents in kind |
| **Possible Financing Sources** | • Private sector  
• EBRD  
• MUB budget |
| **Implementation and Procurement Arrangements** | • Details of PPP arrangement to be determined |
| **Main Project Risks** | • Inability of financing partners to support project  
• Lack of interest by Government or private sector partner  
• Weak capacity of stakeholders |
<p>| <strong>Source documents</strong> | • ICG Interconsulting Group, Eco Park Preliminary Feasibility Study, November 2015 |</p>
<table>
<thead>
<tr>
<th><strong>Project 5</strong></th>
<th><strong>Completion of Waste Water Tuul Collectors</strong></th>
</tr>
</thead>
</table>
| **Location** | Tuul 3rd stage: from Dunjingarav area to Bridge Gurvaljin 4.5 km; diameter 1000-1200 mm  
Tuul 4th stage: from Bridge Gurvaljin to WWTP 7.5 km; diameter 1500mm |
| **Scope and Description** | Tuul collector project is in 4 stages, including:  
- Tuul-1: 30.2 km waste water collector in Bayanzurkh district area is completed.  
- Tuul-2: 7.1 km waste water collector in Bayanzurkh district area is completed.  
- Tuul-3: from total 6.9 km 4 km is completed. Still missing in 5 places waste water collector to fully connected  
- Tuul-4: Updated design and cost estimation was done due to road network extension and land allocation along route of the collector.  
The intention is to be able to discharge sewage from Ger area redevelopment project sites in 13th and 14th planning units and from Uliastai and Khujirbulan areas through the completed Tuul collector. |
| **Implementation Time Frame** | Complete of Construction and Installation of Tuul 3 Q2 2017 to Q4 2017 and Construction and Installation of Tuul 4; Q2 2018 to Q4 2018. |
| **Benefits and Beneficiaries (Financial, Economic Social & Other)** | • Improved waste water system operation  
• Improved opportunity for connection waste water discharge more consumers in eastern part city |
| **Capital Cost** | • MNT12 billion (Investment department MUB info) additional cost for resettlement. |
| **Operating Cost** | MNT 1.2 million per annum (1% of capital costs) |
| **Opportunities for Cost Recovery** | • Cost will recovered partially by waste water tariff |
| **Possible Financing Sources** | • Asian Development Bank and Ger area redevelopment program  
• State budget  
• MUB budget |
| **Implementation and Procurement Arrangements** | • MUB as implementing agency |
| **Main Project Risks** | • Additional expenses for resettlement of 75 entities settled along trass.  
• To reach consensus with land owners |
| **Source documents** | • USUG meeting with Technical division staff;  
• MUB Investment Agency information,  
• Updated design and cost estimation, 2015 |
### Project 6

**Integrated Micro Center in Khoroo 19 and 27**

<table>
<thead>
<tr>
<th>Location</th>
<th>Bayanzurkh district Khoroo 19 and 27</th>
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</table>
| **Scope and Description** | Integrated Micro center project, including:  
- Social facilities (school Community center, business incubator, health and trade centers)  
- Infrastructure network and facilities,  
- Improvement of quality public spaces, |
| **Implementation Time Frame** | Design and cost estimation of Integrated Micro centers in Khoroo 19 and 27, Q1 2017 to Q3 2017; Procurement and Implementation by stage Q4 2017 to Q4 2020. |
| **Benefits and Beneficiaries (Financial, Economic Social & Other)** |  
- Improved living and environment condition  
- Enhance economic and social development  
- Improved opportunity for connection waste water discharge more consumers  
- Supported implementation of Master plan, to create micro centers  
- Provide more opportunity extend infrastructure service for surrounding residents |
| **Capital Cost** |  
| **Operating Cost** | MNT 3.3 billion (10%) |
| **Opportunities for Cost Recovery** | Cost will recovered through increasing number of consumers |
| **Possible Financing Sources** |  
- Asian Development Bank and Ger area redevelopment program  
- State budget  
- MUB budget |
| **Implementation and Procurement Arrangements** | MUB as implementing agency |
| **Main Project Risks** | Projects will not generate directly revenue but will support revenue generation |
| **Source documents** | Bayanzurkh District Development Plan developed under Clean air project WB, 2015 |

### Project 7

**Protection and Development Uliastai River Bank as Public Leisure Spaces**

<table>
<thead>
<tr>
<th>Location</th>
<th>Along Uliastai river Khoroo 10 and 23 in Bayanzurkh district</th>
</tr>
</thead>
</table>
| **Scope and Description** | Creation of Leisure public spaces project, including:  
- Define Uliastai river protection zone,  
- Rehabilitation riverbanks and flood protection  
- Creating a water pond for recreational purpose,  
- Create bike lane along river, |
| **Implementation Time Frame** | FS Q1 2017 to Q3 2017; Design and cost estimation Q4 2017 to Q2 2018; Procurement and Implementation by stage Q3 2018 to Q4 2019. |
| **Benefits and Beneficiaries (Financial, Economic Social & Other)** |  
- Improved living and environment condition  
- Enhance economic and social development through camping facilities and activities,  
- Improved opportunity for connection waste water discharge more consumers  
- Supported implementation of Master plan, to create micro centers |
| **Capital Cost** | MNT 2.060 billion (info Bayanzurkh District Development Plan) |
| **Operating Cost** | MNT 0.21 billion (10%) |
| **Opportunities for Cost Recovery** | Camping and other activities will recover cost |
| **Possible Financing Sources** |  
- State budget  
- MUB budget  
- donors |
| **Implementation and Procurement Arrangements** | MUB as implementing agency |
| **Main Project Risks** | Lack of coordination and management would cause deterioration of landscape  
- Attracting legal settlement |
| **Source documents** | Bayanzurkh District Development Plan developed under Clean air project WB, 2015 |