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Environmental sanitation in peri-urban ger areas in the city of Darkhan (Mongolia): A description of current status, practices, and perceptions

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Environmental sanitation in peri-urban ger areas in Darkhan (Mongolia): A description of current status, practices, and perceptions

This report has been compiled as part of the Water Research Project IWAS, Model Region Central Asia (Mongolia)

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Дархан хотын гэр хороололын орчний ариун цэвэр, бохир ус зайлуулах асуудал (Монгол Улс): Одоогийн дүр зураг, гэр хороололын оршин суугчдын үзэл бодол.

Энэ илтгэл нь Герман Монголын 'IWAS' төслийн судалгааны хүрээнд хийгдсэн, Төв Азийн загвар бүс нутаг (Монгол Улс).

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Abstract

This report describes the results of a household survey conducted in September 2009 in a selected peri-urban subdistrict (bag) in Darkhan city. A total number of 139 randomly selected households were surveyed about the current status of environmental sanitation, including water supply, sanitation, stormwater management and solid waste management. Special focus was placed on socio-economic issues, the environmental sanitation practices and perceptions of the ger residents, and their attitudes towards and demand for improved environmental sanitation services. The results of the household survey are embedded in further research work assessing the water and sanitation sector in Darkhan city, Darkhan-Uul aimag and Mongolia, specifically in regard to peri-urban ger areas.

The results reveal a problematic situation: Due to improved access to safe drinking water, water consumption and the corresponding wastewater have increased, leading to environmental degradation and potential health risks. Greywater is discharged untreated into greywater holes, open drainage channels or on open fields. Self-built unsealed pit latrines without cleanouts are used on every household's compound. Thus urine and faeces leak into the ground. Stormwater is collected in a perfunctory manner which can lead to stormwater flooding in the rainy season. Most of the interviewees were quite aware of these problems and were willing to contribute towards improvements. From the point of view of the ger residents, sanitation is the most pressing issue they face, followed by water supply, solid waste management and stormwater management.

Keywords: Mongolia, environmental sanitation, peri-urban, ger areas, household survey, current status, practices, perceptions

Үндсэн агуулга

Энэ илтгэл нь 2009 оны 9 сард Дархан хотын гэр хороололд явуулсан санал асуулгын дүнг агуулсан. Нийтдээ 139 айл өрх үүнд хамрагдсан бөгөөдсанал асуулгад өнөөдөр хөндөгдөж байгаа асуудал болох орчны ариун цэвэр, түүний зэрэгцээ усан хангамж, бохир ус зайлуулах, борооны усны менежемент, хог ялгах зэрэг асуудлуудын талаар тусгасан байна. Санал асуулгын гол хэсэгт гэр хороололын оршин суугчдын ус, бохир усны талаарх үзэл бодол, мөн нөхцөл байдлыг сайжруулах талаар яригдсан. Дархан хот, Дархан-Уул аймаг болон Монгол Улсын, ялангуяа гэр хороололын ундны болон бохир усны салбар дахь цаашдын судалгааны ажлуудад санал асуулгын дүн нь тусгагдсан байна**.**

Санал асуулгын дүнгээс харахад бэрхшээлтэй асуудлууд гарч ирж байна. Баталгаатай ундны устай болсоноор усны хэрэгцээ мөн бохир усны хэмжээ өссөн. Энэ нь байгаль орчин, болон хүний эрүүл мэндэд муугаар нөлөөлж байна. Ахуйн хэрэглээнээс бий болсон бохир усыг боловсруулалгүйгээр бохир усны нүх, онгорхой сувгуудаар эсвэл задгай талбайд хаяж асгаж байна. Бүх айлууд эдлэн газар дээрээ жорлонтой. Үүнээс үүдэн газрын доод хэсэгт ялгадас бий болдог.

Борооны ус маш амархан цуглардаг нь борооны улиралд үер болоход хүргэдэг. Санал асуулгад оролцсон хүмүүсийн ихэнх нь энэ асуудлын талаар мэддэг бөгөөд энэ тал дээр арга хэмжээ авахад бэлэн байна. Гэр хороололын оршин суугчид бохир ус зайлуулах нь яаралтай шийдэх асуудал гэж үзэж байна. Үүний дараа усан хангамж, хог ялгах болон борооны усны бодлого орж байна.

Тодотгол үгнүүд: Монгол Улс, орчны ариун цэвэр, бохир ус зайлуулах, пери-урбан, гэр хороолол, айл өрхийн санал асуулга

Acronyms and definitions

ADB	Asian Development Bank
Aimag	Province (administrative division)
Bag	Subdistrict (administrative division)
BMBF	German Ministry of Education and Research
DED	German Development Service
Environmental sanitation	Concept of sanitation comprising water supply, sanitation, stormwater management and solid waste management
Ger	Portable felt dwelling structure, also known as a yurt
Ger area	Informal settlements on the outskirts of cities where basic infrastructure services are poor or non-existent. Ger areas are containing both gers and detached houses
Greywater	Total volume of water generated from washing food, clothes and dishware as well as from bathing
Group	Microdistrict (administrative division)
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
HCES	Household-Centred Environmental Sanitation approach; demand-led planning approach for urban environmental sanitation
IWAS	The International Water Research Alliance Saxony – German-Mongolian Water Research Project funded by the German Ministry of Education and Research (BMBF)
IWRM	Integrated Water Resources Management
JFPR	Japan Fund for Poverty Reduction
Khashaa	Fence; synonym for fenced piece of land; plot of land
Khudag	Water distribution point; water kiosk
LALMCO	Law on Allocation of Land to Mongolian Citizens for Ownership
MDG	Millennium Development Goals
MIC	Microfinance Bank Mongolia
MoMo	Integrated Water Resources Management for Central Asia: **Mo**del Region **Mo**ngolia (MoMo) – German-Mongolian Water Research Project funded by the German Ministry of Education and Research (BMBF)
NGO	Non-Governmental Organisation

Stormwater	Stormwater is the general term for the rainfall runoff collected from roofs, roads and other surfaces before flowing towards low-lying land. It is the portion of rainfall that does not infiltrate into the soil.
Sum	District (county-level administrative division)
UDRC	Urban Development Resource Center; NGO set up in August 2005 with the aim of reducing poverty in Mongolia by improving living environments in ger areas
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Emergency Fund
USAG	Water Supply and Sewage Authority Co. Darkhan City
WHO	World Health Organisation
WSSCC	Water Supply and Sanitation Collaborative Council

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1 Introduction

1.1 Background

The lack of adequate environmental sanitation is a major issue related to sustainable development in many parts of the developing world. This is also reflected in the Millennium Development Goals (MDGs), an integrated set of time-bound targets set at the United Nations Summit in September 2000 with the aim of ending extreme poverty worldwide by 2015. Among these targets is Millennium Development Target 10: to halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation.

Mongolia is one of the countries committed to reaching this target. However, current data suggest that the MDGs for both water supply and sanitation may not be met, particularly in peri-urban ger areas and rural areas (UNICEF & UNDP 2008). Ger areas are low-income informal settlements on the outskirts of cities where basic infrastructure services such as piped water, sanitation, proper roads, public transportation etc. are poor or non-existent. The unplanned growth of ger areas and unprecedented pace of urbanisation brings many challenges, such as unemployment, traffic congestion, air pollution and adverse environmental impacts (Worldbank 2010). In Ulaanbaatar today, more than 60 percent of the population lives in peri-urban ger areas. The percentage of ger residents is also very high in secondary cities such as Darkhan, Erdenet and Khovd.

Lack of adequate environmental sanitation negatively impacts the hygiene and health of the population, especially children. The morbidity pattern of Ulaanbaatar reveals a high rate of water-borne diseases and those related to poor environmental living conditions, such as diarrhoea and hepatitis A (City of Ulaanbaatar 2006).

Water has been identified as a significant divisive factor in urban and rural Mongolia (UNDP 2003). For example, access to drinking water is closely associated with geographic location and income: Ger residents must purchase water at public water kiosks, while apartment dwellers enjoy reliable supplies of piped-in drinking and hot water. Moreover, apartment dwellers pay up to ten times less than ger residents for a certain amount of water (UNICEF & UNDP 2008).

All these issues indicate that there is an urgent need to improve environmental sanitation in Mongolia, particularly in peri-urban ger areas and rural areas (UNICEF & UNDP 2008). Accordingly, frameworks for action to improve living conditions in ger areas have emerged in recent years (PADCO 2005; Worldbank 2010).

Scientific studies in the field of environmental sanitation point out that there is a need for new paradigms and approaches in the strategic planning processes (Mara & Alabaster 2008; SuSanA 2008). Key issues raised in this context are (i) placing the household and its neighbourhood at the core of the planning process, (ii) responding directly to users' needs and demands, and (iii) ensuring the participation of all stakeholders. All these issues are addressed by the Household-Centred Environmental Sanitation approach (HCES) developed by a representative expert group under the auspices of the Water Supply and Sanitation Collaborative Council (WSSCC) (Eawag 2005; Lüthi *et al.* 2009).

The study on which this report is based was conducted with the intention of initiating a participatory strategic planning process corresponding to the HCES approach in a selected ger area in the city of Darkhan. The needs and demands of the ger residents regarding environmental sanitation therefore constitute the main focus of the assessment.

1.2 Aim of this report

The aim of this report is to describe the current status of environmental sanitation in ger areas in Darkhan city. A special focus is placed on socio-economic issues, the environmental sanitation practices and perceptions of the ger residents, and their attitudes towards and demand for improved environmental sanitation services. The study is based on a household survey conducted in September 2009 in a selected peri-urban subdistrict (bag) in Darkhan city as well as further research work assessing the water and sanitation sector in Darkhan city, Darkhan-Uul aimag and Mongolia, with specific regard to peri-urban ger areas.

1.3 The Water Research Projects IWAS and MoMo

This report has been compiled within the framework of the Water Research Project IWAS – The International Water Research Alliance Saxony, Model Region Central Asia (Mongolia). IWAS was set up in 2008 and is funded by the German Ministry of Education and Research (BMBF). The overriding goal of IWAS is to develop specific solutions to particular water related problems using the concept of Integrated Water Resources Management (IWRM).[1]

Research activities within IWAS are closely related to the Water Research Project MoMo – Integrated Water Resources Management for Central Asia: Model Region Mongolia. The aim of MoMo is to develop and implement strategies in IWRM in the Kharaa river catchment and in Darkhan city. It was established in 2006 and is also funded by the German Ministry of Education and Research (BMBF).[2]

[1] For more information see http://www.iwas-initiative.de

[2] For more information see http://www.iwrm-momo.de.

2 Study area, site validation

Darkhan city includes 16 bags. Most ger areas are within bags 1 to 8 in Old Darkhan in the north of the city. Bag 7 in Old Darkhan was selected for conducting the household survey. With regard to the environmental sanitation situation, bag 7 can be characterised as follows:

- Health problems are less severe than in bags 1, 2 and 3 to the west of the railway line in the flood plain of the Kharaa river. Here, many families have private wells on their khashaa and also take surface water out of the Kharaa river. In bag 7 the groundwater table is relatively low so that the residents generally do not have their own wells but instead use water from water kiosks as their main source of drinking water.
- A donor initiative, financed by an ADB loan, facilitated noticeable improvements to the basic infrastructure. These included the connection of 9 water kiosks to the central water supply network, street lighting and other neighbourhood amenities. Due to the improved access to safe drinking water, water consumption per capita increased, leading to adverse impacts on the sanitation situation, mainly with regard to greywater management.
- In the ger areas east of the railway line, as in bag 7, the territory is comparatively hilly and the ground comparatively steep and rocky. Consequently, the risk of stormwater flooding is higher than in the ger areas west of the railway line. Here, then, protection measures against flooding from the river Kharaa are of greater importance (PADCO 2005).
- Between 2003-2005 the Japan Fund for Poverty Reduction (JFPR MON 9015) provided housing finance support to low-income households and contributed towards the development of an integrated community centre in bag 7, which includes a public bathhouse, laundry, hairdresser, a greenhouse and a briquette-making facility (PADCO 2005).
- In bag 7, the NGO UDRC coordinated the establishment of about 8 money-saving groups to support neighbourhood improvement activities. UDRC is currently responsible, among other things, for the bathhouse services.

Overall, the current environmental sanitation situation in bag 7 is inadequate; it is typical of the ger areas in Darkhan and presumably also for peri-urban ger areas in Mongolia in general. Bag 7 was selected as a study area not only because of its representativeness but also because the governor of bag 7 and the NGO UDRC showed considerable interest in the IWAS project.

3 Methodology and process

This report is based on both qualitative and quantitative research methodologies. It pulls together information from (i) a household survey, (ii) key informant interviews, and (iii) a literature review and document analysis.

3.1 Household survey

The primary purpose of the household survey was to collect information about the current status of environmental sanitation in bag 7. Special attention was given to socio-economic issues, the environmental sanitation practices and perceptions of the ger residents, and their attitudes towards and demand for improved environmental sanitation services.

During the survey, a total number of 139 households were surveyed in their homes. This corresponds to about 9% of all households in bag 7. A stratified sampling procedure was utilised to select random samples from 9 microdistricts (groups). The interviews were conducted during the day between 10am and 6pm.

A first version of the household questionnaire was piloted with 3 households and a second version with 14 households. The final survey questionnaire had seven parts: Household and housing characteristics, water supply, sanitation, stormwater management (drainage), solid waste management, household socio-economic characteristics, and concluding questions (see Annex 2). Several features pertaining to household water and sanitation issues were incorporated into the questionnaire design for comparability with large national surveys (UNDP & UNICEF 2004; UNICEF & UNDP 2008; WHO & UNICEF 2006).

The household survey was carried out within 10 days in September 2009 by the author and three enumerators working in two groups. One interview took 26 minutes on average (15 minutes minimum, 60 minutes maximum). The MoMo project office in Darkhan, the local NGO UDRC and voluntary helpers from bag 7 assisted throughout the process of conducting the survey.

3.2 Key informant interviews

In May 2009 and September 2009 key informant interviews were conducted with relevant local authorities, governmental and non-governmental institutions on the basis of pre-defined questionnaires. In total, more than 20 interviews were carried out (see Annex 1). In addition, several non-standardised interviews were held during the process of conducting the household survey.

3.3 Literature review and document analysis

Data were gathered from a literature review and document analysis that included books, reports and journal articles. Some basic data about the natural and physical characteristics of water and sanitation in Darkhan city and the ger areas was extracted from the final report of the MoMo project (MoMo 2009).

4 Baseline conditions

4.1 Town history

The city of Darkhan (Mongolian: Дархан, blacksmith) is located in the north of Mongolia close to the Russian border. It was founded on October 17, 1961. As its name implies, the city was originally conceived as a manufacturing site for Mongolia's northern territory. It was built with extensive economic assistance from the Soviet Union. Since 1989 Darkhan city has been twinned with Zeitz, a small town 40 km south of Leipzig in Germany.

4.2 Structural and administrative data

Darkhan city comprises three zones (see Figure 2): Old Darkhan in the north, New Darkhan in the south and, most southerly, the main industrial zone with heavy industry and the thermal power station. In the north of Old Darkhan there is another, smaller industrial zone.

Ger areas can be found within bags 1, 2 and 3 in the west of Old Darkhan, and bags 5, 6, 7 and 8 in the east of Old Darkhan. These two ger areas in Old Darkhan are separated by the railway line. In New Darkhan there is only one ger area, within bag 15.

Bag 7 is one of the four ger areas in Old Darkhan to the east of the railway line. It is located in the centre of Old Darkhan, next to the market, and has common borders with bag 6 in the north and bag 8 in the south. Bags 6 and 7 are the oldest and most densely populated ger areas in Darkhan (MoMo 2009). People began to settle in bag 7 during the early 1960s. Over time, bag 7 expanded in an eastward direction (interview statement).

The city of Darkhan is the capital of Darkhan-Uul aimag, one of the 21 aimags (provinces) of Mongolia. It corresponds with the administrative division Darkhan sum, one of 4 districts of the province Darkhan-Uul aimag. Darkhan sum includes 16 subdistricts, called bags. Bag 7 consists of 9 groups (microdistricts) which have been defined by the administration of bag 7. Within every group all households are known by their so-called group leaders. The group leaders live in the respective group; they are elected and work in an honorary capacity. Their main task is to support socially deprived people (interview statement). The study area includes bag 7 with the groups I-IX (see Figure 1).

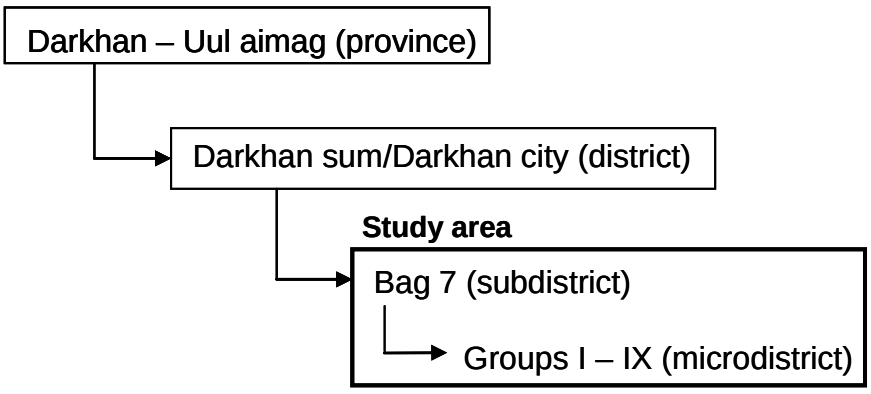

Figure 1: Administrative structure of Darkhan-Uul aimag. Specification of the study area (Source: own representation)

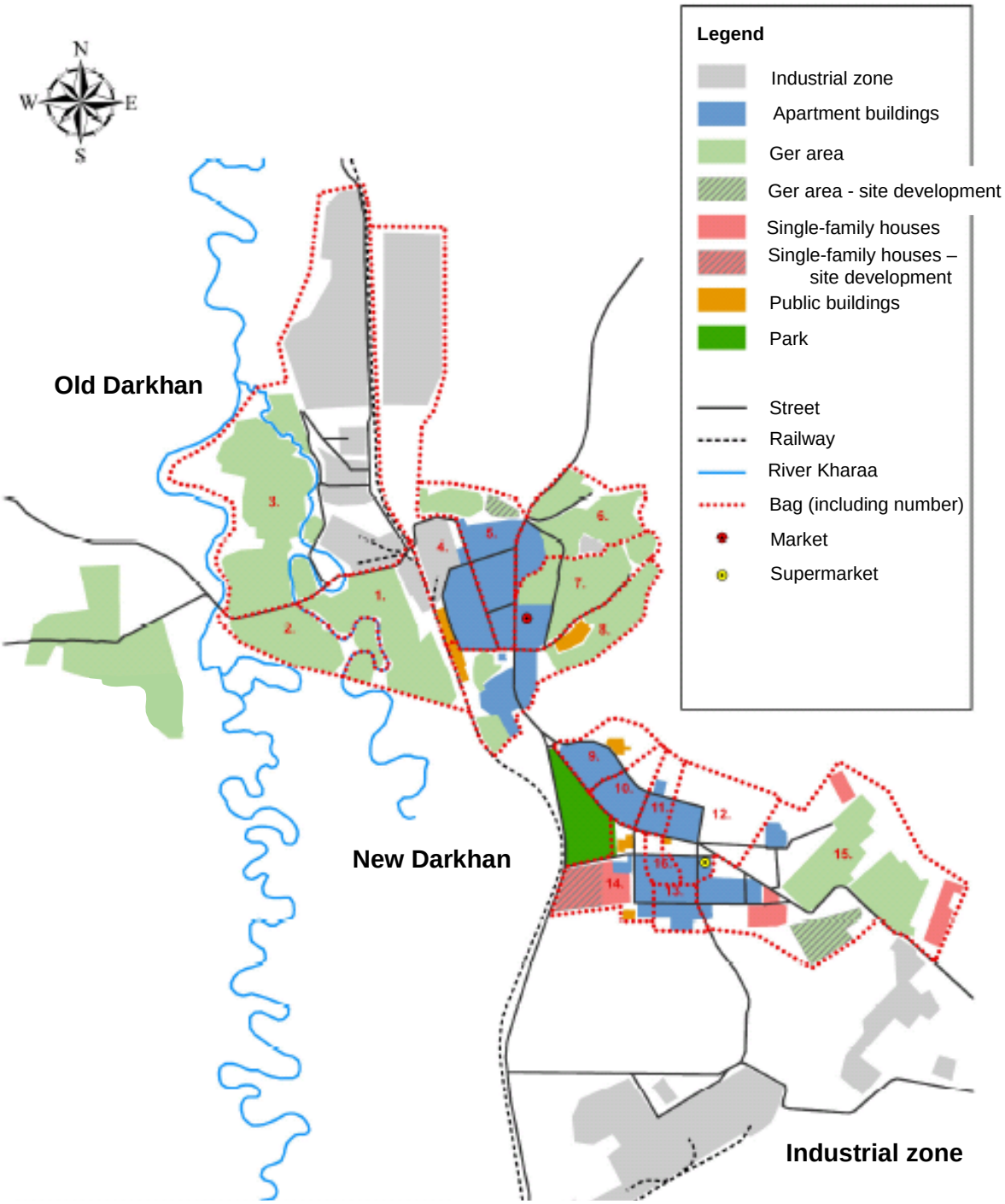

Figure 2: Map of Darkhan city (Source: Römer 2006, modified)

Figure 3 shows a detailed map of bag 7 with groups I-IX, the individual plots of land (Mongolian: khashaa), and basic infrastructure including water supply. The black points mark households that are part of a so-called money-saving group. In bag 7 there are about 8 money-saving groups (interview statement). These were established in 2006 with the help of the NGO Urban Development Resource Centre (UDRC 2009). A money-saving group consists of a group of households living close to each other – usually in the same street – whose aim is to improve the living environment through collective action and money-saving activities. For example, the money-saving group next to the market in the west of bag 7 in group I is saving money to become connected to the central grid for drinking water, sewage and heating in future.

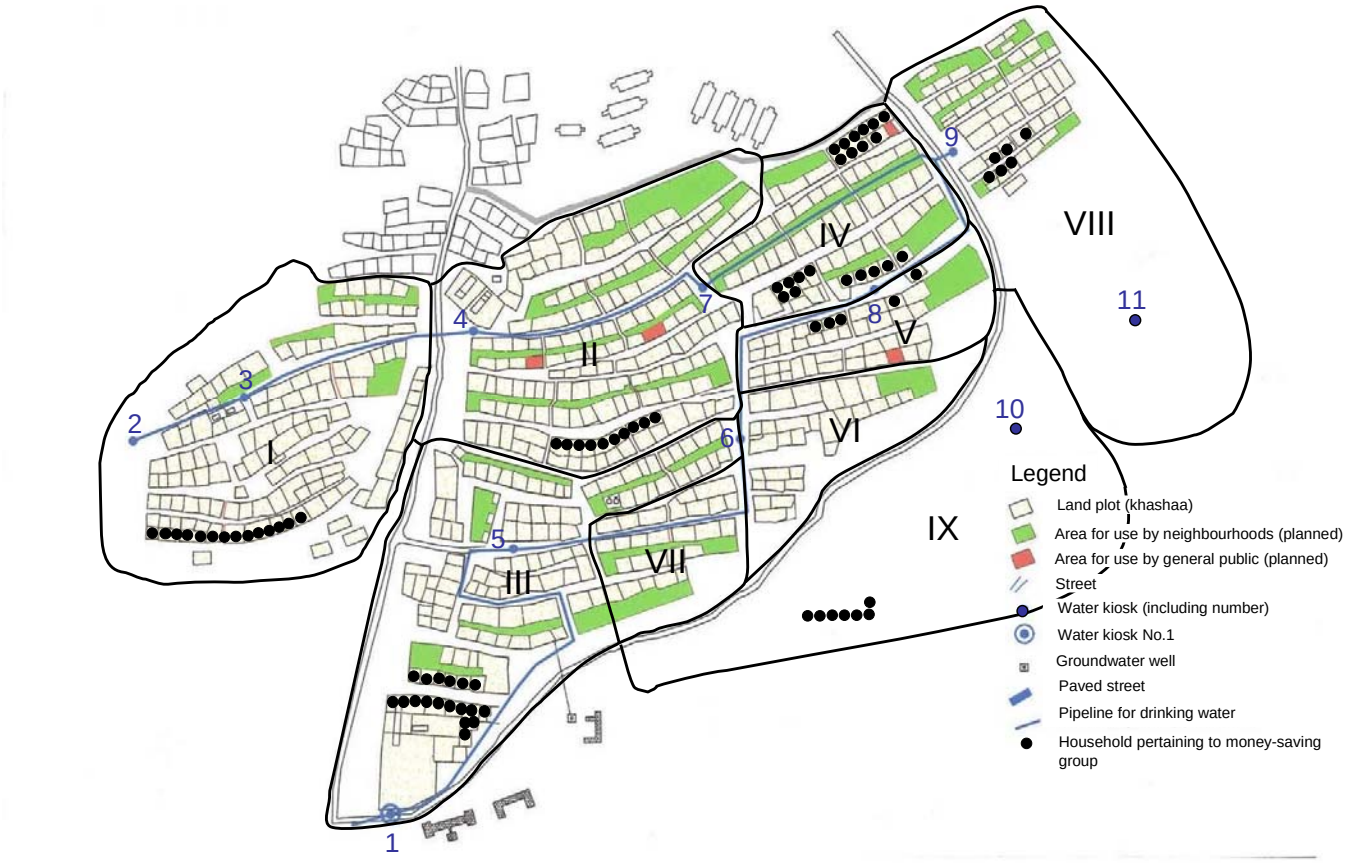

Figure 3: Map of bag 7 (Source: JFPR Mon 9015[3], own representation)

[3] Project for improving living environments of the poor in ger areas Mongolia (MON), set up in 2002 and financed by ADB and JFPR.

4.3 Physical geography, topography, climate

The city of Darkhan is located in the north of Mongolia, on the banks of the river Kharaa. The Kharaa is a tributary of the Selenge river basin, which is the main water inlet for Lake Baikal. The city lies at an altitude of between 700 and 750 metres.

The climate in the Kharaa basin can be characterised as dry winter continental, with mean annual temperatures oscillating around -1.5°C (see Figure 4). Thus the winters are typically very cold, long and dry, and mean monthly temperatures in January are about minus 20°C (with minimum temperatures dropping to minus 40°C). In contrast, the short summers are warm to hot (with an average July temperature exceeding 15°C).

The average annual precipitation is around 282mm, but with a large spatial and temporal variability, which is characteristic for the semi-arid climate zone. The majority of the scarce precipitation falls between June and August (MoMo 2009). During summer, rainfall can occur with high intensities. This means that episodic floods can occur, sometimes of a destructive nature.

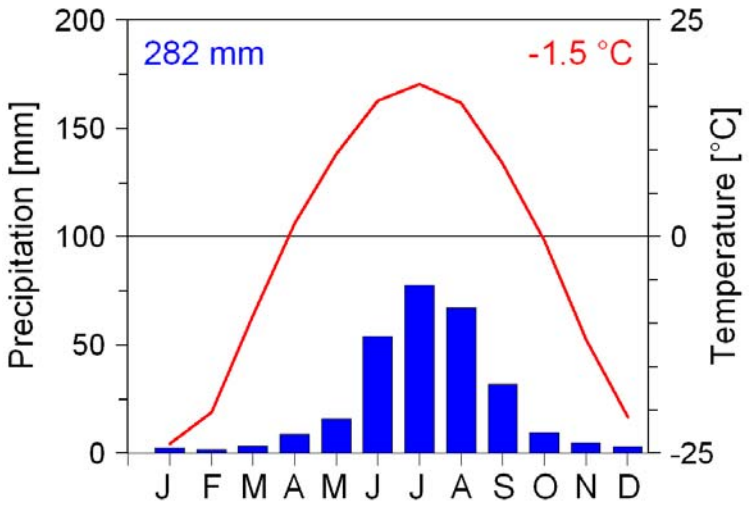

Figure 4: Mean monthly precipitation and temperature based on daily measurements at Baruunkharaa[4] (Source: MoMo 2009)

The territory is rather flat as the city is located in the flood plain of the river Kharaa. Towards the east the territory becomes more and more hilly – this holds mainly for bags 6, 7 and 8 in Old Darkhan to the east of the railway line. In bag 7 there is a gradient of about 1-4% (MoMo 2009).

The groundwater level in the lower catchment area of the Kharaa river beside the city of Darkhan is very high in general, only around 2 to 4 meters on average below ground (MoMo 2009). Ger areas to the west of the railway line are located within the flood plain. Here many

[4] Baruunkharaa is a village about 45km southeast of Darkhan. The data from the meteorological station of Baruunkharaa is also valid, approximately, for Darkhan city.

families have private wells on their khashaa and also take surface water out of the Kharaa river.

In the ger areas to the east of the railway line (bags 6, 7, 8) the distance between the groundwater table and the surface is much greater, which is why the residents generally do not have their own wells. The conductivity of the aquifer is high (10 to 100m per day, sometimes up to 300m per day). The groundwater recharge from precipitation is very low (50-100mm per year) (MoMo 2009).

The water quality of the Kharaa River and the groundwater near the city of Darkhan is generally good. The groundwater is used directly for drinking water by the local water provider USAG (MoMo 2009) (see section 5.1). In the ger areas some of the groundwater is contaminated by unsealed pit latrines – this holds mainly for the ger areas to the west of the railway line (bags 1, 2, 3), where the groundwater level is very high.

4.4 Political and economic situation

After the breakdown of communist regimes in Eastern Europe in late 1989, Mongolia experienced its own Democratic Revolution in early 1990, which led to a multi-party system, a new constitution in 1992, and the rather rough transition to a market economy. Today Mongolia's political system is a parliamentary republic. The parliament is elected by the people and in turn elects the government. The president is elected directly. Mongolia has a number of political parties, the biggest ones being the Mongolian People's Revolutionary Party (MPRP) and the Democratic Party (DP). The MPRP won the last round of parliamentary elections, held in June 2008. In Darkhan city policy is pursued by three political parties: the Communistic Party, the Democratic Party (DP) and the Civic Will Party "Zorig".

Mongolia's economy is based mainly on agriculture and mining. Mongolia has rich mineral resources, and copper, coal, molybdenum, tin, tungsten, and gold account for a large part of industrial production. Furthermore, Mongolia is characterised especially by having a pastoral tradition and economy. Pastoralism is not only part of the Mongolian tradition but is also an important, longstanding element of the country's economy and society due to the soil and climatic conditions.

Today Darkhan city is the second largest industrial centre of Mongolia, with companies operating in heavy industry, light industry, the food industry and the building materials industry. In 1980 Darkhan city generated 10.5% of the total industrial production of Mongolia (Römer 2006). Darkhan-Uul aimag is a key area for agricultural production due to its comparatively beneficial climatic and physical conditions. The most significant land use activity in the Kharaa river basin in terms of surface area is livestock keeping and crop farming (mostly wheat, potatoes and vegetables) (MoMo 2009). In 2008 the total number of livestock was 345,292 in Darkhan-Uul aimag and 102,182 in Darkhan city. This represents an increase of some 50% compared to 2007. Most of the livestock is privately owned (96.3%) (Darkhan-Uul aimag 2009). In 1980 about 30% of Mongolia's agricultural land was located in Darkhan-Uul aimag and Selenge aimag (Römer 2006). There has recently been a marked

increase in agricultural activities as a result of the "Third Campaign for Reclaiming Virgin Lands" supported by substantial amounts of money for agricultural subsidies and loans.

4.5 Demographic and socio-economic data

Darkhan is the third-largest city in Mongolia and has a population of about 75,104. The city comprises about 20,345 households (Darkhan-Uul aimag 2009). According to official data the mean household size is 3.7. Darkhan city covers a territory of 103 km^2 and the population density is about 729 inhabitants per km^2. Since its foundation in 1961 the number of inhabitants has increased continuously by an average rate of 2000 inhabitants per year (Römer 2006). The current growth rate is about 3% per year (MoMo 2009). The main factors driving expansion in the peri-urban ger areas are population growth and in-migration.

The population of bag 7 is 5725 people in 1532 households, which corresponds to approximately 7.6% of the total population and 7.5% of the total number of households of Darkhan city (interview statement). According to this data source, the average number of people per household in bag 7 is 3.7 – the same as for Darkhan city as a whole. However, the household survey revealed a mean household size of 4.5 with no significant difference between summer and winter (see Table 1). Of all the bags in Old Darkhan dominated by ger areas – that is, bags 1, 2, 3, 5, 6, 7 and 8 – bag 7 has the highest population.

With regard to social infrastructure, bag 7 has a hospital, a school and a public bathhouse. Many small kiosks and shops sell goods for daily consumption. The bag also hosts a Mongolian gold company, a tax department, a bank, a hotel and a service station for cars (interview statement). The demographic and socio-economic data generated by the household survey are presented in the table below:

Table 1: Demographic and socio-economic data related to bag 7

Household size[5]	Mean: 4.5; Minimum: 1; Maximum: 12 1-2 individuals: 24 HHs[6] (17,3%) 3-4 individuals: 53 HHs (38,1%) 5-6 individuals: 38 HHs (27,3%) 7 individuals and more: 24 HHs (17,3%)
Sex of respondent	98 women (70.5%); 41 men (29.5%)
Age of respondent	18-40 years: 54 (39.1%) 41-60 years: 56 (40.6%) Older than 60 years: 28 (20.3%)

[5] These values are average values from summer and winter. Children are counted as full individuals.

[6] Abbreviation for „households".

Role of respondent within the household	Head of household: 60 (43.5%); (male 35; female 25) Housewife: 58 (42.0%) Other: 20 (145%)
Education level of respondent	No formal education: 4 (2.9%) Class 1-4: 10 (7.2%) Class 5-8: 39 (28.1%) Class 9-12: 46 (33.1%) Vocational: 12 (8.6%) Polytechnic college: 17 (12.2%) University: 11 (7.9%)
Number of children living in the household[7]	Mean: 1.3; Minimum: 0; Maximum: 6 0 children: 43 HHs (30.9%) 1 child: 42 HHs (30.2%) 2-3 children: 48 HHs (34.6%) 4-6 children: 6 HHs (4.2%)
Number of households with employed (i.e. working) adults	103 HHs (74%)
Household income (n=120)[8]	Mean: 252,016; Minimum: 26,000; Maximum: 1,000,000 Tugrik/month Less than 100,000 Tugrik/month: 15 HHs (12.5%) 100,001-150,000 Tugrik/month: 17 HHs (14.2%) 150,001-200,000 Tugrik/month: 30 HHs (25%) 200,001-300,000 Tugrik/month: 29 HHs (24.2%) 300,001-500,000 Tugrik/month: 24 HHs (20.0%) More than 500,000 Tugrik/month: 5 HHs (4.2%)

[7] These data are for the summer, but there is no significant difference between summer and winter.

[8] Generally the sample size is 139. With regard to some variables, the sample size may be marginally smaller because of missing or inapplicable data. If the sample size is 120 or smaller, this is indicated. This holds for all data in the tables of this report.

Main sources of income (multiple answers possible)	Wages and salaries and other cash income: 133 HHs (97.1%) Support from family and friends: 11 HHs (8.0%) Retirement pension and state welfare benefits: 70 HHs (51.1%) Child benefits: 57 HHs (41.6%) Other: 1 HH (0.7%)
Number of households possessing land	4 HHs (2.9%)
Number of households possessing financial assets	12 HHs (9%)
Number of households keeping animals	24 HHs (17.3%)
Type of animals kept (multiple answers possible)	Yaks: 15 HHs Sheep: 6 HHs Goats: 6 HHs Horses: 5 HHs Chickens: 3 HHs
Places where the animals are kept	On and around the khashaa: 10 HHs (45.5%) Away from Darkhan city: 12 HHs (54.5%)

The data show that female respondents are greatly overrepresented. This may stem from the fact that the interviews were conducted during the daytime. In Mongolia women spend more time on and around the khashaa than men. In general, the proportion of employed men in Mongolia is higher than that of employed women (Janzen *et al.* 2005).

The majority of adults in the households surveyed in bag 7 do not have a college or university diploma. Many of them work as skilled or unskilled workers on the formal and informal labour market. Typical job types include driver, salesperson and construction worker. The high number of salespersons may be due to the fact that bag 7 is located next to the market of Old Darkhan.

People in bag 7 gain income from a variety of sources. The average household income ranges widely from 26,000 to 1,000,000 Tugrik per month. The mean average household income is 252,016 Tugrik per month. According to the current statistical data of Darkhan city, this corresponds approximately to the average monthly income of an unskilled worker (256,200 Tugrik per capita per month). The mean average income per capita in Darkhan city is 305,800 Tugrik per month (Darkhan-Uul aimag 2009).

17.3% of the households surveyed stated that they keep animals. The data do not show a significant spatial distribution of these households within bag 7. The majority of households

keep their animals away from Darkhan city, either in Darkhan-Uul aimag or Selenge-Uul aimag. The distance varies between 7 and 65 km (mean: 32.1km). The number of households possessing land or financial assets is rather low.

4.6 Land ownership and registration status

Prior to Mongolia's socialist era land was common property, its use regulated by nobles and Buddhist monasteries. Since the socialist period, land has become state property. After the dismantling of the socialist system there was a situation of de facto open access, especially for pasture land. In the early 1990s, a clause in the new constitution introduced the idea of private land ownership, permitting the private ownership of all land (urban and arable land) except for pasture land. Recently, a law has been enacted in Mongolia that regulates land privatisation. The purpose of this "Law on Allocation of Land to Mongolian Citizens for Ownership" (LALMCO) from May 2003 is to allocate land to citizens-families for ownership. Citizen-families should receive a plot of land for free, based on family size along with specific criteria, requirements and conditions prescribed by this law. Households in Ulaanbaatar should receive 0.07ha, in Darkhan and Erdenet, 0.35ha in aimag centres and 0.5ha in sum centres. The way the LALMCO is implemented is that the mayors of aimags and sums elaborate a detailed map of the land to be privatised, and the local councils of the aimags and of the capital city are then entitled to decide upon the size, location and purpose of use of land that is designated for privatisation in the following year in each aimag or sum (Schulze 2008). Based on the household survey in bag 7 the current situation with regard to land ownership and registration status can be summarised as follows:

Table 2: Land ownership and registration status based on household interviews

Number of households officially registered (n=116)	105 HHs (75.5%)
Year of registration (n=103)	1971-2009
Number of households in which the head of household is the actual owner of the khashaa (including houses and buildings)	105 HHs (75.5%)
Total area of the khashaa (n=99)	Mean: 917m^2 Minimum: 250m^2 Maximum: 4500m^2
Assumed current value of khashaa (including houses and buildings) (n=69)	Mean: 5,702,899 Tugrik Minimum: 500,000 Tugrik Maximum: 25,000,000 Tugrik

Most of the households (75.5%) are officially registered. Regarding the date of registration, the earliest year mentioned was 1971. The number of registrations increased from the year 2000 onward, with most registrations occurring in the years 2004, 2005 2006 and 2007.

75.5% of the households surveyed are the owners of their khashaa, including the houses and buildings on their plot. Of those who are not the actual owners, the majority stated that the khashaa belongs to relatives. This indicates that land privatisation is already considerably advanced in bag 7. The fact that the percentage of registered households is the same as the percentage of households that own their khashaa indicates that there is a correlation between land registration and land privatisation. This also fits with the fact that the number of registrations increased from the beginning of 2003 – the year when the land privatisation law was enacted in Mongolia (2003).

The mean total area of the khashaas of the households surveyed is 917m^2. Hence it is lower on average than the area the residents of Darkhan could receive according to the law on land privatisation (0.35ha or 3500m^2). However, there are also khashaas which are significantly larger (4500m^2). Regarding the price of private land, 50% of the respondents (n=98) stated that they received the khashaa for free. The highest amount of money an interviewee paid was 7,000,000 Tugrik. The mean current value of the khashaa as estimated by the respondents is 5,702,899 Tugrik.

All in all bag 7 can be characterised as an unplanned but very largely regularised ger area with formal land tenure. As many households have already privatised their land, the costs of relocation, which may be necessary in order to improve the environmental sanitation infrastructure, could be quite high.

4.7 Housing situation

In Darkhan city three distinct types of housing can be identified: apartment buildings, private houses and gers. In ger areas people live in gers and/or in private houses. The private houses are simple, non-permanent one-storey buildings made of wood, stone, or bricks. It can be assumed that nearly all the private houses shown in the following table are located in ger areas because the number of people living in solid private houses in Darkhan city is negligible. Table 3 shows the distribution between the three types of housing in Darkhan city and in bag 7 (data from interview statement):

Table 3: Housing situation in Darkhan city and in bag 7

	Total number		Apartment buildings		Private houses		Gers	
	House-holds	Resi-dents	House-holds	Resi-dents	House-holds	Resi-dents	House-holds	Resi-dents
Darkhan city	20,345	75,006[9]	10,795	37,847	5,337	20,415	4,213	16,744
			53.1%	50.5%	26.2%	27.2%	20.7%	22.3%
Bag 7	1532	5725	-	-	612	2,045	920	3,680
					40.0%	35.7%	60.0%	64.3%

[9] This number differs slightly from the total population of Darkhan city indicated in section 4.5 (75,104).

According to these data, the mean household size in apartment buildings is 3.5, while in ger areas (private houses and gers) it is 3.9. Another important piece of information which can be elicited from this table is that in Darkhan city about a half the residents (49.5%) live in ger areas. Detailed information about the housing situation in bag 7 based on responses from household interviews is summarised in Table 4:

Table 4: Type of buildings in bag 7 based on household interviews

Number of buildings on all khashaas surveyed	Houses (wood): 118 (56.2%) Gers: 71 (33.8%) Houses (stone/brick): 21 (10%)
Number of buildings on a single khashaa (gers and houses)	Mean: 1.5; Minimum: 1; Maximum: 5 1 building: 82 HHs (60.3%) 2 buildings: 42 HHs (30.9%) 3 buildings: 8 HHs (5.9%) 4 buildings: 2 HHs (1.5%) 5 buildings: 2 HHs (1.5%)
Type of buildings in which households live (summer and winter)	House(s) only: 87 HHs (62.6%) Ger(s) only: 38 HHs (27.3%) Ger(s) and house(s): 14 HHs (10.1%)

According to the official data (see Table 3) 40% of all households in bag 7 live in private houses, 60% in gers. Data based on the household survey show a different proportion: 62.6% of all households surveyed in bag 7 live only in private houses and not in gers. Most of these houses are wooden. So the designation “ger area” is slightly misleading.

In general, the residents of the ger areas try gradually to build houses and to move from gers into houses. The data also reveal that there is no significant difference in what type of housing the respondents live in during the summer and winter months. Other buildings the interviewees have on their khashaa are shelters, kiosks and garages.

Generally speaking, every household has its own khashaa. A few cases were identified during the survey in which several households shared one khashaa – sometimes only during specific seasons. This might imply that they also share environmental sanitation facilities and duties (e.g. use of pit latrine and greywater hole, fetching water, solid waste management).

4.8 Physical infrastructure

Darkhan city is connected to Ulaanbaatar by 236km of roads and to Erdenet by 181km of roads. It is located on the Trans-Mongolian Railway at the point where the local line to Erdenet forks off the main line.

Bag 7 has only narrow, unpaved roads which suffer from a lack of regular and adequate maintenance. Stormwater flooding also contributes to the poor state of repair of the roads. Thus, access to the khashaas with cars is possible but difficult, especially during the rainy season. The following table contains information about electricity and telephony in bag 7:

Table 5: Physical infrastructure in bag 7 based on household interviews

Households with electricity	132 HHs (95%)
Households with a conventional telephone connection	3 HHs (2.2%)
Households with a mobile phone	128 HHs (92.1%)
Household monthly expenses for electricity	Mean: 11,173 Tugrik/month Minimum: 3,000 Tugrik/month Maximum: 38,000 Tugrik/month
Household monthly expenses for telephone and mobile phone use	Mean: 23,419 Tugrik/month Minimum: 2,000 Tugrik/month Maximum: 100,000 Tugrik/month

Nearly all households in bag 7 have access to electricity except for isolated households in the east at the top of the hill (groups VIII and IX) (interview statement). 5% of all households surveyed stated that they do not have electricity. The reasons mentioned are: (i) they only recently settled down and thus are not yet registered, or (ii) they have been disconnected because they did not pay the electricity bill in the past.

The mean total monthly expenses of the households surveyed are 11,173 Tugrik for electricity and 23,419 Tugrik for telephone and mobile phone use. 11 households (7.9%) are neither connected to the conventional telephone network nor have a mobile phone.

4.9 Health and hygiene

Water, sanitation and hygiene are three interrelated pillars of public health. In the ger areas in the city of Darkhan public health is a serious issue, given the inadequate level of environmental sanitation services. Most families use self-built, unsealed pit latrines without cleanouts on their khashaa. Urine and faeces can leak from the pit latrines into the ground. In some bags people use private wells on their compounds as an additional source of water. The quality of this water is not controlled, and contamination from pit latrines can not be ruled out.

Information about the health and hygiene situation in the city of Darkhan and the ger areas in particular is scarce. Typical diseases affecting the whole city are heart disease, gastro-intestinal diseases and allergies (interview statement). There is an official medical centre in every bag (interview statement).

In general, the population in bags 1-3 within the flood plain west of the railway line is exposed to higher water-related health risks than the population in the other bags because of the high groundwater level (about 2 to 4 metres below the surface). Here, many families have private wells on their khashaa and draw additional surface water from the Kharaa river (interview statement).

Other potential risks for health and hygiene in the ger areas in the city of Darkhan include the following:

- Water delivered by water kiosks is controlled by the local water provider USAG. Water quality can be problematic if the water is left to stand for a long time or if the water tanks are not cleaned thoroughly. Up to now the laboratory tests done by USAG have not given any indication of values giving cause for concern (interview statement).
- Scattered solid waste can be found almost everywhere in the city and the study area. Often it is dumped in the drains, bringing the risk of blockages and local flooding. Another problem is the enormous amount of air pollution, mainly a result of burning solid waste and coal in the winter.
- Some families keep animals on and around the khashaa (17.3% of all households surveyed in bag 7, see section 4.5). This brings the risk of infections being passed from animals to people.
- Another significant risk to water quality and the health of humans and livestock are the mining activities in the Kharaa catchment, as harmful substances such as heavy metals (mainly Hg, As) may be released into the river and groundwater. This happened on a large scale in April 2007 in Khongor, a village about 20km upstream to the south of Darkhan city (Hofmann & Scharaw 2008).

The following table gives an overview of water-related health and hygiene practices in bag 7:

Table 6: Water-related health and hygiene practices in bag 7 based on household interviews

Type of water container used for fetching water	Plastic: 87 HHs (62.6%) Metal: 52 HHs (37.4%)
Type of vessel used for keeping water	Plastic: 87 HHs (64.0%) Metal: 49 HHs (36.0%)
Number of households whose members had recently been ill due to poor water quality	6 HHs (4.3%)

The household survey revealed that all the households surveyed boil the water to make it safer to drink. Additional treatment methods are not applied, except for cleaning the water containers and vessels thoroughly and fetching water as often as possible so that it is fresh. The only type of disease the households ascribe to poor water quality is diarrhoea, but this does not seem to be a big problem – only 4.3% of the households have been affected recently.

5 Environmental sanitation

5.1 Water supply

In the city of Darkhan water supply and sewage are operated by a single local, state-owned entity – USAG. About 50% of the inhabitants of Darkhan city – mainly apartment dwellers – and over 600 enterprises are provided with a central water supply and sewage services by USAG (PADCO 2005).

USAG draws its water from 18 groundwater wells beside the Kharaa river to the southwest of New Darkhan. Up to now, Darkhan has not suffered from water shortages. Only approximately 30% of the total capacity of the 18 wells is used. The extracted raw water is not treated prior to distribution. The drinking water quality is monitored once a month. Due to the low temperatures in winter, drinking water pipelines are installed at a depth of 3.5-4.5m. USAG provides cold water only. Hot water is supplied by the thermal power station of Darkhan city, which has 8 wells of its own for water extraction. Hot water is also used as drinking water, but this is not monitored (MoMo 2009).

5% of the private households connected to the central water supply network have their own water meter. They pay a charge of 420 Tugrik per m^3 (0.42 Tugrik/litre) to USAG. Households without their own water meter pay a monthly flat rate of 3339 Tugrik per capita (MoMo 2009).[10] USAG intends to increase the number of water meters in the near future. The mean water consumption of households connected to the central water supply network is 265 litres per capita per day.

In the ger areas of Darkhan city water is generally distributed by water kiosks that receive deliveries by trucks. In total there are 33 water kiosks, all of them operated by USAG. Water is always available during the opening hours of the water kiosks, i.e. every day except for Wednesdays and Sundays.

Water from the water kiosk costs 2 Tugrik per litre. Thus residents of the ger areas spend about 5 times more money for one litre of water than residents of the apartment buildings. Due to the scarcity of affordable water, water for drinking, washing and bathing is severely limited in the ger areas in Darkhan.

In Darkhan city there are about 447 private wells in total (interview statement). Most of them are owned by residents of the ger areas who try to meet their water demand using water that is free of charge. To protect health and hygiene, a minimum distance of 50m is prescribed between private wells and pit latrines, while the distance between housing and pit latrines should be 25m – in many cases these requirements are not satisfied (interview statement).

In bag 7 the situation with regard to water supply is generally good compared to the situation in other bags in Darkhan city: there are a total of 11 water kiosks in bag 7. Since 2006, 9 of these water kiosks have been connected to the central water supply network (see Figure 3). Water kiosk No. 1 is additionally used to fill the water trucks by which the remaining two

[10] These fees were introduced on January 1, 2009.

water kiosks, Nos. 10 and 11, are supplied. Water kiosk No. 11, for example, is filled two times a day (interview statement). Officially, there is only one private groundwater well in bag 7, located next to water kiosk No.7. Regarding the current status of water supply and related practices in bag 7, the household survey revealed the following results:

Table 7: Water supply – Current status and practices revealed by household interviews

Main source of drinking water	Water kiosk: 138 HHs (99.3%) Water from other households with private wells: 1 HH (0.7%)
Use of a second source of drinking water	Yes: 60 HHs (43.2%) No: 79 HHs (56.8%)
Second important source of drinking water (multiple answers possible)	Rainwater harvesting: 38 HHs (63.3%) Water from other households with private wells: 25 HHs (41.7%)
Average water consumption	48.2 litres per household per day[11] 12.0 litres per capita per day[12]
Household expenditure for water in summer (n=99)	Mean: 6,311 Tugrik/month Minimum: 500 Tugrik/month Maximum: 60,000 Tugrik/month
Household expenditure for water in winter (n=98)	Mean: 5,246 Tugrik/month Minimum: 500 Tugrik/month Maximum: 60,000 Tugrik/month
Mean household water consumption for…	Drinking: 37.1% Other household needs: 62.8%
Evaluation of drinking water quality	Good: 63 HHs (46.3%) Fair: 65 HHs (47.8%) Poor: 8 HHs (5.9%)

[11] This value was calculated based on the question "How many litres of water does your household consume every day?". An alternative calculation based on the question "How much water do members of your household usually collect from the water kiosk per week?" gives almost the same result.

[12] This value was calculated by dividing the water consumption of a household by the corresponding household size and calculating the mean throughout all households.

Time required to fetch water from the water kiosk (in both directions)	Mean: 11.7 minutes 1 to 10 minutes: 84 HHs (62.2%) 11 to 20 minutes: 45 HHs (33.3%) 21 to 29 minutes: 2 HHs (1.5%) 30 minutes and longer: 4 HHs (3%)
Frequency of fetching water (per day)	Once: 75 HHs (54.7%) Twice: 39 HHs (28.5%) 3-4 times: 10 HHs (7.3%) More than 4 times: 13 HHs (9.5%)
Frequency of fetching water (per week)	2 days: 5 HHs (3.6%) 3 days: 20 HHs (14.5%) 4 days: 25 HHs (18.1%) 5 days: 81 HHs (58.7%) 7 days: 7 HHs (5.1%)[13]
Age and gender of person fetching water (multiple answers possible)	Adult man: 71 HHs (51.1%) Adult woman: 60 HHs (43.2%) Male child (under 18 years): 42 HHs (30.2%) Female child (under 18 years): 23 HHs (16.5%) Differs: 7 HHs (5.0%)
Water transportation	Two wheel cart: 93 HHs (66.9%) Manually: 45 HHs (32.4%) Car: 1 HH (0.7%)
Availability of water from water kiosk	Always available: 118 HHs (84.9%) Almost always available: 13 HHs (9.4%) Sometimes not available: 7 HHs (5%) Very often not available: 1 HH (0.7%)

In bag 7 water kiosks are generally used as the main source of drinking water. 43.2% of the households surveyed indicated that they used a second source of drinking water: (i) rainwater harvesting and/or (ii) water from other households with private wells. In general, in bag 7 only few households have private wells. This can presumably be put down to the fact that in

[13] During the two days per week when the water kiosks are closed, water can be bought from other households with private wells.

bag 7 the groundwater table is very low and the soil very compact. None of the households surveyed stated that they have a well of their own on the khashaa. The majority of those collecting water from other households with private wells live in groups I, II or III. These groups are located in the west of bag 7 next to the market, where the groundwater table is higher than in the hilly east. Rainwater is used mainly for gardening, but also for livestock breeding and clothes washing.

The calculated average water consumption of 12 litres per capita per day seems very low. However, similar data can be found in the Human Development Report Mongolia for ger areas in Ulaanbaatar (UNDP 2003). According to this document, apartment dwellers in Ulaanbaatar consume 240 to 450 litres of water a day compared with 8 to 10 litres for ger residents.[14] According to another study conducted in Ulaanbaatar poor and very poor families sometimes do not collect water due to money problem or often limit the family daily consumption to 20-30 litres per day (UNICEF 2003).

One partial reason for the low water consumption of ger residents in bag 7 in Darkhan might be that only 19.4% of the respondents stated that they have their shower or bath at home. Most of them go to apartment dwellers (e.g. relatives) and/or to the public bathhouse in bag 7 (see section 5.2) to have a shower or bath.

The data on household water expenditure suggest that there is no significant difference between water consumption in the summer and in the winter. This can be explained by the fact that only a small number of households keep animals (17.3%) and gardening activities are not yet widespread either. Where this is the case, water is collected largely from rainwater harvesting.

The quality of drinking water ranges between good and fair according to most of the households surveyed (94.1%). 12.2% of households pointed out that the water is sometimes "rusty". The households surveyed are also broadly satisfied regarding water availability – 84.9% stated that water from the water kiosk is "always available".

The interviewees were also asked about their perceptions regarding the current water supply situation. The results are summarised in Table 8:

Table 8: Household perceptions regarding the current water supply situation based on household interviews

Level of satisfaction with the existing water supply situation	Very satisfied: 51 HHs (36.7%) Fairly satisfied: 76 HHs (54.7%) Not satisfied at all: 12 HHs (8.6%)
Perceived disadvantages regarding the existing water supply situation	- Restricted service of water kiosks (e.g. opening hours, queuing) - Operational disturbances (e.g. water shortages, too low water pressure, freezing pipes)

[14] This data is also quoted by UNDP & UNICEF (2004) and City of Ulaanbaatar (2006).

	- Transportation is time-consuming and stressful (e.g. slippery in winter, dangerous for children and old people) - Sometimes water is of poor quality and unhygienic (e.g. corrosion, oily water, animals around the water kiosk, dirty vessels) - Not enough water for plant production (e.g. fruit trees) - Water is too expensive - No hot water
Suggested measures to improve the existing water supply situation	- To connect every household/khashaa to the central water supply network - To build more water kiosks - To connect water kiosks Nos.10 and 11 to the central network as well - To lower price for water - To build private groundwater wells - To improve water quality (e.g. by disinfection, filtration, water analysis and control) - To improve service of water kiosks (e.g. extended opening hours)
Perception of costs of water supply service	Cheap: 0 HHs Fair and affordable: 41 HHs (29.5%) Expensive and not affordable: 98 HHs (70.5%)

The price of water delivered by the water kiosks in bag 7 is considered "expensive and not affordable" by most of the residents questioned (70.5%). 5 respondents did not know the correct price for water.

25 households – 18% of the households questioned – additionally buy water from other households with private wells, mainly on Wednesdays and Sundays when the water kiosks are closed. In most cases this water is sold for 2 Tugrik per litre which corresponds to the price of water at the water kiosks. At the bathhouse water is sold for 3 Tugrik per litre.

5.2 Sanitation

In the city of Darkhan water supply and sewage are operated by a single local, state-owned entity – USAG. About 50% of the inhabitants of Darkhan city – mainly apartment dwellers – and over 600 enterprises are provided with a central water supply and sewage services by USAG (PADCO 2005).

The wastewater treatment plant was built and put into operation in 1968. It is located in the north of the city, not far from the river Kharaa. The style of construction is Russian and it comprises both mechanical and biological sewage treatment. The total length of the canal system is about 223km. Today, the entire wastewater disposal system of the city of Darkhan is in a very poor condition (MoMo 2009).

Concerning wastewater fees, households have to pay a charge of 450 Tugrik per m^3 to USAG. If households do not have their own water meter, they have to pay a monthly flat rate of 3,577.50 Tugrik per capita (MoMo 2009).[15]

Generally there is no wastewater disposal system in the ger areas of Darkhan city. Only public buildings are connected to the central supply network (hospital, school, public bathhouse). The ger residents use self-built, unsealed pit latrines without cleanouts on their khashaa. These pit latrines normally do not conform to the standards of improved sanitation (UNDP 2007).

There are standards for the construction of pit latrines in ger areas in Darkhan city. These include criteria such as distance from groundwater level, distance from private wells and dwellings, depth and sealing. But normally these standards are not fulfilled (interview statement). Regarding the current status of sanitation and related practices in bag 7 the household survey revealed the following results:

Table 9: Sanitation – Current status and practices revealed by household interviews

Toilet facility usually used	Own toilet facility: 136 HHs (97.8%) Toilet in another household: 3 HHs (2.2%)
Toilet facility shared with other households living on the same khashaa	No: 101 HHs (73.2%) Yes: 37 HHs (26.8%)
Type of toilet facility	Pit latrine without slab/open pit: 3 HHs (2.2%) Pit latrine with slab: 135 HHs (97.1%) Ventilated improved pit latrine: 1 HH (0.7%)

[15] These fees were introduced on January 1, 2009.

Depth of pit latrine	Mean: 3.8m Minimum: 1.5m Maximum: 10.0m
Pit latrine laterally lined	Yes: 60 HHs (45.1%) No: 73 HHs (54.9%)
Year of construction of current pit latrine (n=116)	1984-1993: 4 HHs (3.4%) 1994-1999: 15 HHs (12.,9%) 2000-2004: 23 HHs (19.8%) 2005-2009: 74 HHs (63.8%)
Constructor of pit latrine	Self: 115 HHs (83.3%) Hired person: 2 HHs (1.4%) Do not know: 21 HHs (15.2%)
Costs for construction of pit latrine (n=65)	Mean: 24,354 Tugrik Minimum: 0 Tugrik Maximum: 100,000 Tugrik
Time spent for construction of pit latrine (n=109)	Mean: 2.7 days Minimum: 1 day Maximum: 8 days
Disposal of things in the pit latrine (other than excreta) (multiple answers possible)	Nothing: 104 HHs (75.9%) Greywater: 18 HHs (13.1%) Paper, toilet paper: 13 HHs (9.5%) Ashes: 1 HH (0.7%) Garbage: 1 HH (0.7%)
Disposal of children's stools (< 8 years) (n=60)	Put/rinsed into latrine: 37 HHs (61.7%) Child used latrine: 14 HHs (23.3%) Thrown into greywater hole: 5 HHs (8.3%) Burn: 2 HHs (3.3%) Thrown into garbage: 1 HH (1.7%) Left in the open: 1 HH (1.7%)
(Estimated) operating time of pit latrine (n=56)	Mean: 10.5 years Minimum: 2 years Maximum: 31 years

What households (plan to) do when pit latrine is full	Dig a new pit: 111 HHs (81%) Have pit emptied: 10 HHs (7.3%) Do not know: 16 HHs (11.7%)
Greywater production	Mean: 24 litres per day per household Minimum: 3 litres per day per household Maximum: 200 litres per day per household
Greywater management (multiple answers possible)	Discharge to the yard (e.g. in special hole for greywater): 105 HHs (75.5%) Discharge in pit latrine: 25 HHs (18%) Discharge to the street: 11 HHs (7.9%) Discharge to open drain/gutters: 6 HHs (4.3%) Other: 4 HHs (2.9%)
Places for bathing/having a shower (multiple answers possible)	At another household (apartment dweller): 80 HHs (57.6%) Public shower (e.g. bathhouse): 75 HHs (54%) At home: 27 HHs (19.4%) Other: 2 HHs (1.4%)
Frequency of taking a shower	Every other week: 12 HHs (9.0%) Once per week: 80 HHs (60.2%) Twice per week: 31 HHs (23.,3%) 3 times per week: 7 HHs (5.3%) 4 times and more per week: 3 HHs (2.3%)
Use of public bathhouse of bag 7	Yes: 78 HHs (56.5%) No: 60 HHs (43.5%)
Bathhouse services used (multiple answers possible)	Shower: 74 HHs (93.7%) Hairdresser/hairdryer: 27 HHs (34.2%) Drinking water supply: 2 HHs (2.5%) Public latrine: 1 HH (1.3%)
Gardening activities on the khashaa at present	No: 73 HHs (52.5%) Yes: 66 HHs (47.5%)
If no gardening activities at present: Planning to grow crops on the khashaa in future (n=74)	No: 51 HHs (68.9%) Yes: 23 HHs (31.1%)

Willingness to use sanitized (treated) human sludge as fertilizer (hypothetical question)	Yes, I would use it: 23 HHs (17.4%) No, I would not use it: 86 HHs (65.2%) Do not know: 23 HHs (17.4%)

All households surveyed in bag 7 have their own toilet facility on their khashaa. Sometimes this toilet facility is shared with other households living on the same khashaa (26.8%). There are some public toilet facilities in bag 7 (e.g. in the public bathhouse or in the market hall) but the respondents stated that they do not usually use public toilet facilities.

Nearly all households surveyed (97.1%) use a "pit latrine with slab". This pit latrine is 3.8m deep on average and is used for about 10.5 years (mean). 45.1% of respondents stated that their pit latrine is laterally lined. The primarily used material is wood.

When the pit latrine is full 81% of the households dig a new pit latrine on the khashaa. 10 households (7.3%) want to have the pit emptied but have so far not had any experience with this. Most of them plan to authorise USAG to do so (6 households), but the idea of involving a private contractor was also mentioned (1 household). Costs are assumed to be between 15,000 and 20,000 Tugrik.

Up to now the use of pit latrines has not lead to any serious hygienic or health problems in bag 7 (see section 4.9). As the groundwater table is relatively low the risk of acute groundwater pollution is also rather low. But in the long term the use of simple pit latrines is not a sustainable solution: The soil and groundwater will become polluted, leading to high risks for the health and hygiene of the ger residents; space for new pit latrines on the khashaas is limited. The household survey revealed that many interviewees are already aware of these problems (see in Table 10 "Perceived disadvantages regarding the existing sanitation situation").

It is common practice to discharge greywater into the yard (75.5% of households). Several respondents stated that they have dug out special holes on their khashaa to collect greywater. Unmonitored greywater disposal contributes to the pollution of soil and groundwater. In winter it can not drain. Frozen greywater on the yard and streets is slippery. Another problem is that greywater smells bad in summer. Greywater production of 24 litres per day per household on average seems plausible: According to Table 7 the mean water consumption is 48.2 litres per household per day; 62.5% of this amount (30 litres) is not used for drinking but for "other household needs", which corresponds approximately to greywater production. Also this 62.5% is consistent with data found in other literature: According to UNDP and UNICEF (2004) about 60% of the water consumed by ger residents in Ulaanbaatar is for laundry, washing hands, face and hair, and for dish washing and other needs.

57.6% of the interviewees stated that they go to relatives or friends living in an apartment building to have a shower. As USAG wants to install more water meters in the apartments in the future, the possibility of having a shower for free will cease to exist. Most of the respondents take a shower once a week. In the public bathhouse of bag 7 the regular price for having a shower is 1500 Tugrik for adults and 500, 1000 and 1300 Tugrik for children (under

6 years, 6-12 years, 12-16 years respectively). Currently, about 400 showers are taken on average in the bathhouse per month (interview statement).

47.5% of the households grow crops on their khashaa. Frequently mentioned reasons for not growing crops on the khashaa are that there is not enough space and that the soil is not good enough (e.g. too stony).

The interviewees were also asked about their perceptions regarding the current sanitation situation. The results are summarised in Table 10:

Table 10: Household perceptions regarding the current sanitation situation based on household interviews

Level of satisfaction with the existing sanitation situation	Very satisfied: 10 HHs (7.2%) Fairly satisfied: 78 HHs (56.5%) Not satisfied at all: 50 HHs (36.2%)
Perceived disadvantages regarding the existing sanitation situation	- Poor convenience of pit latrine (stinky, many flies in summer, cold and difficult to get at in winter) - Poor cleanliness and hygiene of pit latrine (no disinfection) - Poor stability of pit latrine - No regular greywater management (slippery in winter, stinky) - Pollution of soil and groundwater - Not enough space for further pit latrines - No evacuation of excreta, pit latrine can not be emptied - Restricted opening hours of public bathhouse
Suggested measures to improve the existing sanitation situation	- To connect households to central wastewater disposal system - To improve pit latrine (e.g. by seat, ventilation, twin pit system, improved cabin, deepening the hole, bricking the walls) - To build pit latrines which can be emptied - To build semi-centralised sewer system for collection and storage (one tank for several households or one street) - To build composting toilets - To introduce standards for building of pit latrines

	- To install showers in every household - To build greywater holes with top cover - To discharge greywater to central sewer system - To conduct awareness-raising campaigns - To introduce disinfection measures
Perception of costs of sanitation facilities (e.g. public shower, construction costs of pit latrine) (n=87)	Cheap: 3 HHs (3.6%) Fair and affordable: 39 HHs (46.4%) Expensive and not affordable: 42 HHs (50.0%)

With regard to the costs of sanitation, 38.3% of all households surveyed (52 households) stated that they do not have to pay anything for the use of sanitation facilities. Most of the remaining households (50.0%), consider the costs to be "expensive and not affordable". The following table depicts how the households judge their own toilet facility with regard to cleanliness, privacy and convenience:

Table 11: Household attitudes regarding their own toilet facility

	Poor	Fair	Good
Cleanliness	13.7%	50.4%	35.9%
Privacy	18.5%	46.9%	34.6%
Convenience	19.1%	44.3%	36.6%

The household survey reveals that the current sanitation situation is perceived as "fair" by most of the respondents (56.5%), 7.2% of the respondents said they were "very satisfied". With regard to the cleanliness, privacy and convenience of their own toilet facility (pit latrine) the respondents made a similar judgment – between 44.3% and 50.4% opted for "fair". This result may be surprising, given that at the same time the interviewees mentioned many disadvantages regarding the existing sanitation situation (see Table 10). Perhaps many respondents perceive the central wastewater disposal system to be the only technical solution, but one which seems unaffordable and out of reach.

5.3 Stormwater management (drainage)

Stormwater management is the management of stormwater runoff, often using water retention facilities to provide controlled release into receiving streams. In Darkhan city the wastewater network and the stormwater network are two separate systems that generally work independently. Both were constructed after the foundation of the city (1961) and during the years following. The stormwater network is operated by the maintenance department of the city, which is also responsible for road maintenance and repair. However, basic maintenance

such as removal of solid waste is usually not done at all. Residents are not asked to pay any fee for the maintenance of the drainage system.

The total length of the stormwater system is 79km, with 39% as subsurface pipes and channels (mainly underneath the main roads), and 61% as open channels outside the city. The stormwater collected in this way is discharged into the flood plain to the west of the railway line (MoMo 2009).

In the ger areas of bag 6 and 7 the entire area (220 hectares) is drained by three open channels that discharge into a storage basin in the southwest of bag 7 next to the market and into the subsurface channels of Old Darkhan.

The ger areas of bag 6 and 7 extend across hilly areas with a 1-4% gradient. Precipitation percolates slowly into the ground. The impervious area is assumed to be 20-25% (MoMo 2009). Stormwater flooding sometimes occurs during the rainy season (June, July, August and September). Large puddles that form after rainfall are an inconvenience to traffic and pedestrians and can cause damage to adjacent buildings. The households' experiences and perceptions with regard to stormwater management are presented in Table 12:

Table 12: Stormwater management – Household experiences and perceptions based on household interviews

Experiences with stormwater flooding on and around the khashaa	Yes: 19 HHs (13.7%) No: 120 HHs (86.3%)
Perceived disadvantages regarding the existing stormwater drainage system	- Not enough channels - Channels not deep enough - Channels in wrong place - No channels next to the street - Channels used as driveways - Channels blocked by solid waste and sand
Suggested measures to improve the existing stormwater drainage system	- To clean it regularly - To restore and expand the old system - To build a new system - To identify somebody who feels responsible for maintenance

The household survey revealed that only few of the households surveyed (13.7%) have ever experienced stormwater flooding. According to them, flooding occurs once or twice a year, mostly only in the yard and not inside the home (ger, house).

5.4 Solid waste management

In Darkhan city, the municipal administration is responsible for solid waste collection and disposal. The municipal administration dictates collection frequency and charges. Solid waste is collected and disposed of at the urban landfill located in the north of Old Darkhan. Up to now there has been no waste separation. The average daily waste production is 0.5 kg per capita. Solid waste consists of organic material, plastic, paper, glass, cans and other metals. There is no detailed information about the quantities of the particular fractions (interview statement). The results of the household survey with regard to solid waste management is summarised in Table 13:

Table 13: Solid waste management – Current status, practices and perceptions based on household interviews

Method of solid waste disposal	Collection by communal service only: 63 HHs (45.7%) Individual disposal only: 34 HHs (24.6%) Collection by communal service and individual disposal: 41 HHs (29.7%)
Method of individual solid waste disposal (multiple answers possible) (n=75)	Burn: 39 HHs (52.0%) Dispose at urban landfill: 26 HHs (34.7%) Bury or compost: 13 HHs (17.3%) Dump away: 6 HHs (8.0%) Collect on khashaa: 6 HHs (8.0%) Dispose of through pit latrine: 1 HH (1.3%)
Perception of costs of solid waste disposal (n=119)	Cheap: 1 HH (0.8%) Fair and affordable: 63 HHs (52.9%) Expensive and not affordable: 55 HHs (46.2%)
Level of satisfaction with the existing solid waste disposal system	Very satisfied: 9 HHs (6.6%) Fairly satisfied: 59 HHs (43.1%) Not satisfied at all: 69 HHs (50.4%)
Perceived disadvantages regarding the existing solid waste disposal system	- No reliable service (too infrequent) - Too expensive
Willingness to sort solid waste (e.g. glass, paper, ashes)	Yes, I would do it: 123 HHs (89.1%) I already do it: 13 HHs (9.4%) No, I would not do it: 2 HHs (1.4%)

In the study area, 45.7% of the households surveyed dispose of their solid waste completely through the municipal service. According to the households surveyed, solid waste is collected irregularly from once every three months up to three times per month. Some of the respondents stated that the service has to be called by telephone, but often it does not come. From those households that collect their solid waste on their khashaa (8%), some wait until municipal waste collectors come to collect it, and some do not know what to do with it.

54.3% of the households dispose of at least some of their solid waste themselves. Here, waste burning is the most common practice (52.0%), mainly during winter time. This leads to an enormous amount of air pollution and potential health hazards. Furthermore, a lot of waste ends up in the drains, under buildings and on open ground. This contributes to drain blockages, local flooding, odour problems and is unpleasant to the eye.

The charge for waste collection, according to the households surveyed, ranges from 300 to 30,000 Tugrik per month (mean: 3,465 Tugrik, n=64) and 200 to 2,000 Tugrik per bag (mean: 649 Tugrik, n=46). 19 households stated that they do not have any costs resulting from solid waste disposal. Most of the remaining households (52.9%), consider the costs to be “fair and affordable”.

Overall, residents in bag 7 are generally dissatisfied with the current solid waste management system. The main reasons mentioned include: there is no reliable service (too infrequent) and it is too expensive.

6 Priority issues and willingness of households to participate in and contribute to improvement of environmental sanitation situation

At the end of the interview the residents were asked to prioritise the environmental sanitation situation according to the level of importance they attach to specific improvements, that is, which ones should be given most attention. The results are summarised in the following figure:

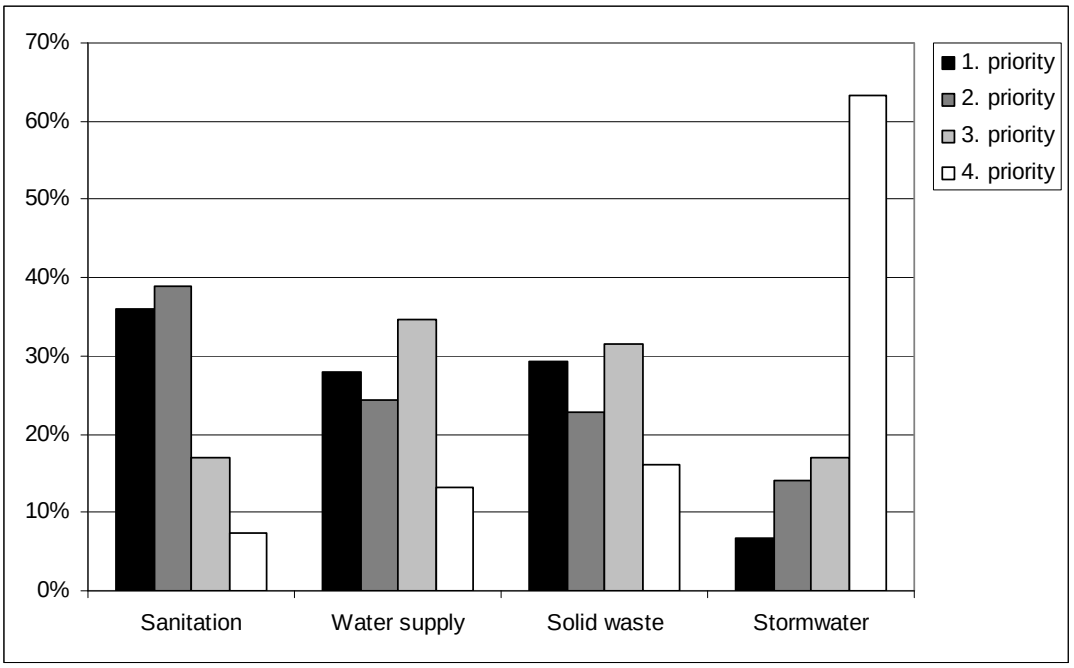

Figure 5: Priorities set by the respondents regarding the environmental sanitation situation in bag 7

More than 35% of the interviewees defined sanitation as the 1st priority issue related to environmental sanitation in bag 7. Stormwater management is clearly defined as the least pressing issue, with approximately 63% of the households surveyed defining it as the 4th priority. Water supply and solid waste management are given similar ratings to one another, with a slight prioritisation of water supply over solid waste regarding the 2nd and 3rd priority respectively; with regard to the 1st priority in each case, solid waste is rated higher than water supply.

These results are not clearly confirmed by the level of satisfaction expressed by the residents with regard to water supply, sanitation and solid waste management as summarised in the following table:[16]

[16] The question of stormwater management (drainage) was not posed.

Table 14: Level of satisfaction with the current environmental sanitation situation based on household interviews

	Very satisfied	Fairly satisfied	Not satisfied at all
Sanitation	7.2%	56.5%	36.2%
Water supply	36.7%	54.7%	8.6%
Solid waste management	6.6%	43.1%	50.4%

While 36.7% of the interviewees are "very satisfied" with the water supply situation, there is great dissatisfaction with the solid waste management situation (50.4% stated they were "not satisfied at all"). This rating implies that the households surveyed think that improvements are more urgent in the area of solid waste management than in the area of water supply (and sanitation).

However, ratings of this nature need to be handled with care. Whether respondents consider an issue to be pressing or whether they are satisfied with their current situation always depends additionally on how realistic they consider measures to improve the situation to be.

The involvement of the municipal authority of the ger areas in the management of environmental sanitation services is still very limited in Darkhan city. While households are asked to pay for water and (mostly) for solid waste collection, there is no financial contribution to stormwater management. With regard to sanitation, the municipal authority does not provide any services except for the bathhouse services.

The interview concluded with questions aimed at finding out to what extent the households surveyed are interested in and willing to participate in joint activities to improve the environmental sanitation situation in bag 7. The results are summarised in the following table:

Table 15: Interest and willingness of the households surveyed to participate in joint activities to improve the environmental sanitation situation in bag 7

How well do you know your neighbours?	Very well: 70 HHs (50.4%) Fairly well: 47 HHs (33.8%) Not at all: 22 HHs (15.8%)
Can you imagine participating in joint activities of households or neighbourhoods to improve your water and sanitation situation?	Yes: 130 HHs (94.2%) No: 6 HHs (4.3%) Do not know: 2 HHs (1.4%)
Have you already participated in community-based activities? (e.g. money-saving groups)?	Yes: 48 HHs (35.6%) No: 87 HHs (64.4%)

94.2% of the households surveyed expressed their willingness to participate in joint activities to improve the environmental sanitation situation in bag 7. 35.6% of the interviewees have already participated in community-based activities in bag 7 such as money-saving groups. It may be that this very high interest and level of willingness is not representative of the whole bag. It may partly be rooted in the fact that the local NGO UDRC and voluntary helpers from bag 7 supported the interview procedure and, in part, pre-selected the households to be surveyed.

7 Annex

7.1 Annex 1: List of institutions interviewed

Name	Organisation
Ms Myagmar	ADB
Mr Hartwig	DED Erdenet
Ms Tuya	Governor bag 3
Ms Urangoo	Governor bag 6
Mr Tserennadmid	Governor bag 7
Mr Sandagdorj	Governor Darkhan sum
Mr Erdenebat	Governor Darkhan-Uul aimag
Mr Marschke, Ms Erlbeck, Mr von Franz	GTZ Ulaanbaatar and Darkhan City
Mr Amgalan	Head, Department for Social Development of Darkhan-Uul aimag and Darkhan sum
Ms Ulziijargal	Hospital Darkhan City
Mr Myagmar	Ministry of Roads, Transportation, Construction and Urban Development
Ms Tuul	Ministry of Roads, Transportation, Construction and Urban Development
Mr Tsedendamba, Mr Purevdorj	National Center for Construction, Urban Development and Public Utilities
Mr Dorjsuren	Secretary General, National Water Committee Mongolia
Ms Boloroo	Specialized Inspection Agency Darkhan- Uul aimag
Ms Enkhjargal, Mr Erdenebayar, Mr Ganbaatar	UDRC Darkhan City
Ms Enkhbayar	UDRC Ulaanbaatar , MIC Bank
Ms Altantuul	Mongolian University of Science and Technology, Ulaanbaator (MUST), Department of Environmental Engineering
Mr Baast	Urban Planning Department Darkhan-Uul aimag
Mr Elbegbayan, Ms Enkhtuya	Water Supply and Sewage Authority Co. Darkhan City
Ms Enkhtsetseg	WHO Ulaanbaator
Ms Enkhtuya	World Vision Darkhan City

7.2 Annex 2: Household survey questionnaire

Date:

Questionnaire No.:

Number of group (I-IX):

Name of enumerator:

Time start:

Time finish:

Part I: Household and housing characteristics

"First I would like to ask some general questions about the household and housing characteristics."

Household

Nr[17]	Question	Possible Answers
1	How old are you?	No. of years:___
2	Gender of respondent	- Male - Female
3	Are you the head of the household? If no: What is your role in this household?	- Yes - No, I am…
6	How many adults (≥ 18 years) live in this household?	- No. of adults:___ (summertime) - No. of adults:___ (wintertime)
7	How many children (< 18 years) live in this household?	- No. of children:___ (summertime) - No. of children:___ (wintertime)
8	What is the highest level of school which you have completed?	- No formal education - Class 1-4 - Class: 5-8 - Class: 9-12 - Vocational - Polytechnic college - University
9	What is the highest level of school the other members of your household (7 years and older) have completed?	- No formal education:___ (number) - Class 1-4:___ (number) - Class: 5-8:___ (number) - Class: 9-12:___ (number) - Vocational:___ (number) - Polytechnic college:___ (number) - University:___ (number)

[17] The questions are not numbered consecutively because after the pre-test of the survey some questions were deleted and others added.

Housing characteristics

Nr	Question	Possible Answers
12	Is the head of household the actual owner?	- No, because___ - Yes, paid land price at that time:___ Tugrik - Assumed value of the piece of land today:_____ Tugrik
13	If no, what is your monthly rent?	- Don't pay rent - _____Tugrik per month
14	Is this piece of land (khashaa) officially registered?	- Yes, since___ - No, because___
15	How many buildings are on this khashaa?	- Ger:___ - House (wood):___ - House (stone/brick):___ - Buildings other (specify):___
16	In how many buildings does your household live?	Summertime - Ger:___ - House (wood):___ - House (stone/brick):___ - Buildings other (specify):___ Wintertime - Ger:___ - House (wood):___ - House (stone\brick):___ - Buildings other (specify):___
17	What is the total area of this khashaa?	- _____ m2 - Length:_____m - Width:_____m
18	Do you have electricity?	- Yes - No, because___
19	What was your electricity bill last month? (i.e., your share if you do not have your own meter)	- _____ Tugrik - Don't know
20	Do you have a telephone connection?	- Yes - No, because___
21	Do you have a mobile phone?	- Yes - No, because___
22	What was your telephone bill last month (including mobile phone)?	- _____ Tugrik - Don't know

Part II: Water supply

"Now I would like to ask you some questions about your water supply situation."

Existing household water supply situation

Nr	Question	Possible Answers
24	What is the main source of drinking-water for members of your household?	- Water kiosk **(A)** - Water from other households who have private taps or wells **(B)** - Private well **(C)** - Rainwater collection - Surface water (river, dam, lake, pond, stream, canal, irrigation channels) - Bottled water - Cart with small tank (provider) - Protected spring - Unprotected spring - Piped water into dwelling (private water connection) - Piped water to yard/plot (private water connection)
25	What is the second most important source of drinking-water for members of your household?	- Water kiosk **(A)** - Water from other households who have private taps or wells **(B)** - Private well **(C)** - Rainwater collection - Surface water (river, dam, lake, pond, stream, canal, irrigation channels) - Bottled water - Cart with small tank (provider) - Protected spring - Unprotected spring - Piped water into dwelling (private water connection) - Piped water to yard/plot (private water connection)
26	How would you evaluate the quality of drinking-water?	- Good - Fair, because___ - Bad, because___
A	**Water kiosk:**	
27	Do you use water from the water kiosk?	- Yes, water kiosk number ___ - No *[go to question 38]*

29	How long does it take to go there, take water, and come back?	- No of minutes:___ - Don't know
30	How many times a day do you fetch water?	- Once - Twice - Three times… - ___ days a week - Don't know
31	Who usually goes to this source to fetch the water for your household?	- Adult woman - Adult man - Female child (under 18 years) - Male child (under 18 years) - Varies - Don't know
32	What do you use for carrying water?	- Car - Two wheel cart - Hand - Other (specify):___ - Don't know
33	Does your water kiosk have water every time you go?	- Always - Almost always - Sometimes - Very often it has no water - Don't know
36	If yes, how much do they charge per litre water from the water kiosk?	- Charge:_____ Tugrik/litre - Other (e.g., flat rate):___ - Don't know
37	How much water do members of your household usually collect from the water kiosk per day/week?	Summertime: - Litres per day:___ - Litres per week:___ Wintertime: - Litres per day:___ - Litres per week:___
B	**Water from other households:**	
38	Do you use water from other households who have private taps or wells?	- Yes - No *[go to question 43]*
39	How much water do members of your household usually collect from other households per day or per week?	Summertime - Litres per day:___ - Litres per week:___ Wintertime: - Litres per day:___ - Litres per week:___

40	If you use water from other households: How do they charge for water?	- Per bucket - Fixed monthly fee - Water provided free - Tugrik per litre:_____ - Don't know
41	If per bucket: How much do they charge per bucket?	- 60l bucket:_____ Tugrik - 40l bucket:_____ Tugrik - 25l bucket:_____ Tugrik - Don't know
C	**Private well:**	
43	Within the perimeter of your khashaa, do you have a private well?	- Yes - No *[go to question 49]*
44	How is this well constructed?	- Tubewell/borehole - Protected dug well - Unprotected dug well - Don't know
45	What is the distance of your well to pit latrines (including pit latrines of your neighbours)?	- Distance:___ m - Don't know
46	For what purposes do you use the water from your well?	- Drinking - Washing of food - Washing of clothes - Washing of dishes - Washing oneself - Other (specify):___
47	Is the private well you use shared with other households?	- Yes - No
48	If yes: How many households share the well?	No of households:___
	General questions:	
49	How many litres of water does your household consume every day (including all sources and uses)?	_____ litres per day - Up to 20 litres per day - 21-40 litres per day - 41-80 litres per day - >80 litres per day - Don't know
50	How much water does your household consume for drinking and other household needs?	- Drinking:_____% - Other household needs:_____% - Don't know
51	Do you know about how much money your household usually spends for water (including all sources and uses)?	- Tugrik per month:_____ (summertime) - Tugrik per month:_____ (wintertime) - Don't know

52	What type of water container do you use for fetching water?	- Metal - Plastic - Other (specify):___
53	In what type of vessel do you keep water?	- Metal - Plastic - Wood - Other (specify):___
54	Do you treat your water in any way to make it safer to drink? (If necessary differentiate between the different water sources you use)	- Yes - No - Don't know
55	If yes, what do you usually do to the water to make it safer to drink?	- Boil - Add bleach/chlorine - Strain it through a cloth - Use a water filter (ceramic, sand, composite, etc.) - Solar disinfection - Let it stand and settle - Other (specify):___ - Don't know
56	Have any of your household members become ill recently due to water quality?	- Yes - No - Don't know
57	If so, which of the following diseases did your household member have?	- Diarrhoea - Hepatitis - Dysentery - Salmonella - Other (specify)

Household attitudes and perceptions about the existing water supply situation

Nr	Question	Possible Answers
58	How satisfied are you with your water supply situation?	- Very satisfied - Fairly satisfied - Not satisfied at all
59	What are the biggest disadvantages of the existing water supply situation?	
60	What measures to improve the existing water supply situation would you suggest?	
61	What do you think about the amount of money you have to pay for water?	- Cheap - Fair and affordable - Expensive and not affordable

Part III: Sanitation

"Now I would like to ask you some questions about your sanitation situation."

Existing household sanitation situation

Nr	Question	Possible Answers
62	What kind of toilet facilities do members of your household usually use?	- Own toilet facility - Toilet facility of other household(s) - Public toilet facility - Other (specify):___
	Own toilet facility	
63	What kind of toilet facility do you have on your khashaa?	- Pit latrine without slab/open pit - Pit latrine with slab - Ventilated improved pit latrine (VIP) - Composting toilet - Toilet with (pour) flush - No facilities or bush or field - Other (specify):___
64	Do you share this facility with other households?	- Yes - No
65	If yes, how many other households share this toilet?	No. of households:___
66	The last time the youngest child of your household (< 8 years) passed stool, what was done to dispose of the stool?	- Child used toilet/latrine - Put/rinsed into toilet or latrine - Thrown into garbage - Buried - Left in the open - Other (specify):___ - Don't know
67	When was your pit latrine constructed?	Year:_____
68	By whom was your pit latrine constructed?	- Self-built - Professional company - Contract worker - Other (specify):___ - Don't know
69	How much did you pay for the construction of your pit latrine?	- _____Tugrik - Own construction work: ___ days - Don't know
70	How deep is your pit latrine?	- Depth:___m - Don't know
71	Is your pit latrine laterally lined? (i.e., does your pit latrine have solid side walls?)	- Yes - No - Don't know

72	Do you dispose other things than excreta in your pit latrine?	- Paper (including toilet paper) - Leftovers - Ashes - Greywater - Other (specify):___ - Nothing
73	What do you do when the pit latrine is full?	- Dig a new pit - Have pit emptied - Other (specify):___ - Don't know
73-2	If you dig a new pit: How often do you have to dig a new pit?	- Every___ years - Never dug a new pit so far - Don't know *[go to question 81]*
74	If you have pit emptied: How often is the pit latrine emptied?	- Every ___ years - Never emptied so far - Don't know
76	Who empties the pit latrine?	- Self - USAG Darkhan - Private contractor - Other (specify):___ - Don't know
79	Does your household have to pay anything to have the latrine pit emptied?	- Yes, _____ Tugrik per emptying - No
	General questions:	
81	How would you describe the condition of your pit latrine in terms of:	- Cleanliness: Good/fair/poor - Privacy: Good/fair/poor - Convenience: Good/fair/poor
88	Where is the greywater of your household discharged?	- In the pit latrine - In the toilet (WC) - To the yard (e.g. special hole for greywater) - To the street - To open drain/gutters - Into the sewer - To natural water way - Other (specify):___
89	How much greywater do you produce?	- ___ litres per day - Don't know
91	Do you use the bathhouse of bag 7? If yes: Which services of the bathhouse do you use?	- Don't use any services because___ - Shower - Public latrine - Hairdryer, hairdresser - Other (specify):___

92	Where can you have a shower/wash yourself?	- At home - At another household (e.g. neighbours, relatives) who have private taps or wells - Public shower (e.g. at the bathhouse) - Other (specify):
93	How often do you have a shower?	Every ___ days
94	If you use public shower: How much Tugrik do you have to pay for one shower?	- Adults:_____ Tugrik - Children:_____ Tugrik
95	Do you grow crops in your garden/on your khashaa?	- Yes - No
96	If no: Are you thinking of growing crops in your garden in the future?	- Yes - No, because____
97	Would you use sanitised (treated) human sludge as fertilizer for vegetables or other horticultural products?	- Yes - No, because___ - Don't know

Household attitudes and perceptions about the existing sanitation situation

Nr	Question	Possible Answers
98	How satisfied are you with your sanitation situation?	- Very satisfied - Fairly satisfied - Not satisfied at all
99	What are the biggest disadvantages of the existing sanitation situation?	
100	What measures to improve the existing sanitation situation would you suggest?	
101	What do you think about the amount of money you have to pay for sanitation facilities (e.g. public shower, public toilet facilities, emptying own pit latrine)?	- No costs - Cheap - Fair and affordable - Expensive and not affordable

Part IV: Stormwater management (drainage)

"Now I would like to ask you some questions about stormwater drainage."

Nr	Question	Possible Answers
103	Have you ever experienced storm water flooding?	- Yes - No *[go to question **111**]*

104	How many times per year is your home/khashaa heavily flooded by stormwater?	Times per year:___
105	In which months does stormwater flooding occur?	- Months:___
106	Did the most serious stormwater flooding in the past year enter your yard/home?	- No flooding - Flooding in yard only - Flooding inside home
107	How high did the flood waters reach?	- Less than ankle deep - At least ankle deep - At least knee deep
109	What are the biggest disadvantages of the existing stormwater drainage system?	
110	What measures to improve the stormwater drainage would you suggest?	

Part V: Solid waste management

"Now I would like to ask you some questions about solid waste disposal."

Nr	Question	Possible Answers
111	Do you have your solid waste collected at your home, and if so by which service type?	- No service - Communal service - Other (specify):___ - Don't know
113	How much do you typically pay to dispose of your solid waste (e.g. the collection fee or fuel for transport etc.)	- Nothing - Tugrik per month:___ - Tugrik per bag:___ - Don't know
114	If solid household waste is not collected by service: How is the waste disposed of?	- Dump away (e.g. on the street, open gutters and channels, empty land, river) - Burn - Bury or compost - Into a pit that is emptied - Into a pit that is abandoned - Other (specify):_____ - Don't know
115	How satisfied are your with the existing solid waste disposal situation?	- Very satisfied - Fairly satisfied - Not satisfied at all

117	How do you consider the costs you have to pay for solid waste disposal?	- No costs - Cheap - Fair and affordable - Expensive and not affordable
118-2	Would you agree to sort your solid waste? (e.g. glass, paper, ashes)	- Yes - No

Part VI: Household socio-economic characteristics

"Now I would like to ask you some questions concerning employment and income."

Nr	Question	Possible Answers
119	How many adults in this household (18 years and older) have employment or are self-employed? (i.e., how many are working)	- Number of people employed:___ - Number of people unemployed:___ - Number of people retired:___
120	Indicate the occupation of each working person:	1.___ 2.___ 3.___ 4.___ …
121	Which is the main source of income of this household?	- Wages and salaries or other cash income - Support from family or friends - Retirement pension and state social benefits - Child benefits - Other (specify):___
122	What is the total monthly income of this household? (or: How much money does your household have at its disposal every month)?	- _____ Tugrik - < 30,000 Tugrik - 30,000-59,999 Tugrik - 60,000-99,999 Tugrik - 100,000-149,999 Tugrik - 150,000-299,999 Tugrik - 300,000-499,999 Tugrik - ≥ 500,000 Tugrik
123	How much money would you estimate all the members of your household spend per week, not including rent?	- Tugrik per week:___ - Don't know

124	Do you have animals?	- No - Yes: - Cattle (Yaks):___ - Horses:___ - Goats:___ - Camels:___ - Sheep:___ - Pig:___ - Chickens:___ - Other (specify):___
125	Where do you keep the animals?	- On and around the khashaa - Aimag (name):___ - Distance from Darkhan:___km
126	Do you have land?	- No - Yes (e.g. for growing crops)
126-2	Do you have financial assets?	- No - Yes (e.g. bank account, stocks)

Part VII: Concluding questions

"Now we come to the concluding questions."

Nr	Question	Possible Answers
128	How well do you know your neighbours?	- Very well - Fairly well - Don`t know
129	Could you imagine participating in joint activities of households or neighbourhoods to improve your water and sanitation situation?	- Yes - No - Don't know
129-2	Have you already participated in community-based activities? (e.g. money-saving groups)	- Yes - No
130	Which of the following improvements do you think one should try the hardest to achieve? Please rank the following items:	- Improving water supply services - Improving sanitation services - Improving stormwater drainage - Improving solid waste disposal

"Thank you very much for this interview!"

8 Photos from bag 7, Darkhan city, September 2009

Photo 1: Typical housing

Photo 2: Public bathhouse (back side)

Photo 3: Convenience store

Photo 4: Kiosk

Photo 5: Water kiosk

Photo 6: Boy fetching water

Photo 7: Special hole for greywater discharge

Photo 8: Pit latrine (outside view)

Photo 9: Stormwater storage basin

Photo 10: Communal collection vehicle

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