Mongolian Ministry of Energy

Ulaanbaatar Heating Sector Improvement Project

Draft
ENVIRONMENTAL and Social MANAGEMENT PLAN

February 2019
Table of Contents

1 Introduction ................................................................................................................................................. 5

2 Project Description and Justification ........................................................................................................ 7
  2.1 Ulaanbaatar Heating Sector Improvement Project ............................................................................ 7
  2.2 District Heating Network Upgrade – Group 1 Activities ..................................................................... 8
  2.3 Project Justification ............................................................................................................................. 10

3 Policy and Legal Framework ..................................................................................................................... 11
  3.1 World Bank Environmental and Social Framework ............................................................................ 11
    3.1.1 ESS1 Assessment and Management of Environmental and Social Risks and Impacts ........ 11
    3.1.2 ESS2 Labor and Working Conditions ......................................................................................... 12
    3.1.3 ESS3 Resource Efficiency and Pollution Prevention and Management .................................... 12
    3.1.4 ESS4 Community Health and Safety .......................................................................................... 12
    3.1.5 ESS5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement ................ 13
    3.1.6 ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources 13
    3.1.7 ESS8 Cultural Heritage ............................................................................................................... 13
    3.1.8 ESS10 Stakeholder Engagement and Information Disclosure .................................................. 13
  3.2 Environment, Health and Safety Guidelines of the World Bank ......................................................... 14
  3.3 Mongolian Legislation ......................................................................................................................... 14
    3.3.1 Environmental Impact Assessment .............................................................................................. 14
    3.3.2 Air Quality .................................................................................................................................... 15
    3.3.3 Occupational Health and Safety ................................................................................................. 15
    3.3.4 Asbestos Regulation ..................................................................................................................... 15
    3.3.5 Waste Management ...................................................................................................................... 16

4 Environmental and Social Assessment ................................................................................................... 17
  4.1 Assessment Methodology ..................................................................................................................... 17
    4.1.1 Scoping and risk assessment ....................................................................................................... 17
  4.2 Air Quality ............................................................................................................................................ 17
    4.2.1 Existing Air Quality ..................................................................................................................... 17
    4.2.2 Asbestos ...................................................................................................................................... 18
    4.2.3 Impact Assessment ....................................................................................................................... 20
    4.2.4 Mitigation Measures ..................................................................................................................... 20
  4.3 Water Quality ....................................................................................................................................... 21
4.3.1 Existing Environment ........................................................................................................................................... 21
4.3.2 Impact Assessment ............................................................................................................................................... 21
4.4 Noise ........................................................................................................................................................................... 22
  4.4.1 Existing Noise Environment ................................................................................................................................. 22
  4.4.2 Impact Assessment ............................................................................................................................................... 22
  4.4.3 Mitigation Measures .............................................................................................................................................. 23
4.5 Traffic Management ................................................................................................................................................... 23
  4.5.1 Existing Environment ........................................................................................................................................... 23
  4.5.2 Impact Assessment ............................................................................................................................................... 24
  4.5.3 Mitigation Measures .............................................................................................................................................. 25
4.6 Waste Management ................................................................................................................................................... 25
  4.6.1 Existing Environment ........................................................................................................................................... 25
  4.6.2 Impact Assessment ............................................................................................................................................... 25
  4.6.3 Mitigation Measures .............................................................................................................................................. 25
4.7 Community Health and Safety ............................................................................................................................... 26
  4.7.1 Existing Environment ........................................................................................................................................... 26
  4.7.2 Impact Assessment ............................................................................................................................................... 26
  4.7.3 Mitigation Measures .............................................................................................................................................. 28
4.8 Occupational Health and Safety ............................................................................................................................. 28
  4.8.1 Existing Environment ........................................................................................................................................... 28
  4.8.2 Impact Assessment ............................................................................................................................................... 28
  4.8.3 Mitigation Measures .............................................................................................................................................. 29
4.9 Impact on Water Use and Energy Use ....................................................................................................................... 29
4.10 Air pollution load reduction estimate .................................................................................................................... 30
4.11 Due Diligence Review .............................................................................................................................................. 30
5 Environmental Management Plan – mitigation tables .............................................................................................. 32
6 Environmental Monitoring Plan .................................................................................................................................. 45
7 Institutional Arrangements ......................................................................................................................................... 47
  7.1 Institutional Arrangement in the Design Stage ......................................................................................................... 47
  7.2 Institutional Arrangement in the Construction Stage ............................................................................................... 47
    7.2.1 MOE ................................................................................................................................................................. 48
    7.2.2 UBDHC ............................................................................................................................................................ 48
    7.2.3 PMU ................................................................................................................................................................. 49
7.2.4 Environmental Supervisors.................................................................49
7.2.5 Contractor .........................................................................................50
7.2.6 Monitoring Agency ...........................................................................50
7.3 Institutional Arrangement in the Operation Stage ...............................51
7.3.1 MOE .................................................................................................51
7.3.2 UBHDC .............................................................................................52
7.3.3 Monitoring Agency ...........................................................................52
7.4 Capacities of the Institutions .................................................................52
8 Cost Estimate ..........................................................................................53
9 Grievance Redress Mechanism ...............................................................54
10 File Keeping and Reporting .................................................................54
Annex 1 Environmental Assessment Screening Form .................................57
Annex 2 Asbestos Management Plan ..........................................................62
Annex 3 General Traffic Management Plan ..............................................70
1 Introduction

Located in the heart of central Eurasia, Mongolia is a landlocked country of mountains and plateaus, featuring a sunny, arid climate. During the country’s long winter-heating season, temperatures regularly fall below -30 °C, making the capital city of Ulaanbaatar the coldest one in the world. Combined heat and power (CHP) plants, via district heating (DH) networks, provide heat and hot water to Ulaanbaatar’s urban centers and smaller cities. Heat-only boilers (HOBs) are used for small central networks at the provincial (aimag) level and for county-level (soum) centers, while smaller fuel-inefficient boilers are commonplace in traditional ger areas. Individual ger residences in Ulaanbaatar’s expanding peri-urban areas rely mainly on solid fuel–fired heating stoves (coal and wood). Emissions from fuel-inefficient stoves are a major contributor to ground-level air pollution, making Ulaanbaatar one of the world’s most polluted cities, especially during the winter when PM2.5 levels can reach up to 20 times those considered safe. Poor air quality in Ulaanbaatar has been linked to an increased risk of respiratory disease and even mortality (World Bank 2011).

Overall, the single largest source of particulate pollution in Ulaanbaatar is coal combustion in households and low-pressure boilers, followed by power plants. Other sources include traffic, dust resuspension, open burning of waste and the brick industry. In addition to being a large source of ambient air pollution, polluting fuels such as raw coal and biomass use for cooking and heating contribute to a significant additional burden to the health of the population from household air pollution.¹

Last decade a couple of surveys on ambient and household air pollution and its impact were locally conducted and findings of these surveys have been used for evidence-informed decision making. A joint research team of Mongolia and Canada estimated in 2011 that 29% of cardiopulmonary deaths and 40% of lung cancer deaths in the UB city are attributable to ambient air pollution. Moreover, as a result of the study carried out in the National Center for Maternal and Child health in collaboration with the USA research team, spontaneous abortion incidence per calendar month ranged over more than 3.6 times in December of 2011 than in May, revealing a striking seasonal pattern of variation and indicating the possible impacts of air pollution on reproductive health.¹

Ulaanbaatar’s heating sector is struggling to meet accelerating demand growth. Over the past two decades, population growth in Mongolia’s capital city has increased exponentially, mainly due to rapid rural-to-urban migration, and it is expected to reach 1.9 million by 2035. With urbanization and economic growth, new buildings are being built at a rapid pace, requiring connections to the district heating (DH) network. Over the next decade, it is projected that urban heating demand will grow by an average annual rate of 5–6 percent.

At the same time, the DH network is deteriorating. About two-fifths of the population (some 120,000 households) are supplied from the DH network. However, the system is dilapidated, resulting from a lack of investments for needed rehabilitation and upgrading in past decades. For many years, the DH system in Ulaanbaatar has operated with large water losses. This has exposed pipes to high levels of oxygen because of large water replenishment needs and use of partially untreated water, which, in turn, has corroded steel pipes and destroyed meter and control devices. Little has been done to reduce water losses and improve water quality to prevent corrosion of pipes and valves as well as blocking of heat exchangers,

pumps, and heat meters. The total length of transmission pipelines is about 130 km (dual pipe) with pipe diameters in a range of 200-1,200 mm. It is estimated that 50 percent of the transmission pipelines are in poor technical condition, urgently requiring replacement. The secondary (distribution) network, with a total trench length of about 226 km, has a variety of owners and operators and also requires major rehabilitation and replacement.

This objective will be achieved through: (i) increasing capacity of transmission pipes in the urban area and extending the network into selected ger areas, which in turn will enable more distributors to connect their secondary pipes to the DH network; (ii) rehabilitating and upgrading existing transmission pipes to improve heat supply efficiency; and (iii) modernization of UBDHC’s DH pumping stations.

---

2  Project Description and Justification

2.1  Ulaanbaatar Heating Sector Improvement Project

The World Bank is financing the Ulaanbaatar Heating Sector Improvement Project which seeks to enable access to modern heating services and improve efficiency of the district heating network in selected project areas of Ulaanbaatar. The project development objective (PDO) will be achieved through: (i) increasing capacity of transmission pipes in the urban area and extending the network into selected ger areas, which in turn will enable more distributors to connect their secondary pipes to the district heating (DH) network; (ii) rehabilitating and upgrading existing transmission pipes to improve heat supply efficiency; and (iii) modernization of Ulaanbaatar District Heating Company’s (UBDHC) pumping stations.

The project has two components. Component 1 (US$39 million) involves the rehabilitation and expansion of the DH network comprising replacement of poorly insulated and leaking pipes and expansion loops, upgrading of existing - and installation of new - booster pumping stations, installation of individual heat substations at building level, as well as network expansions and reinforcements. The proposed component will finance investments to three subcomponents: (i) rehabilitating and upgrading the DH transmission network in selected districts; (ii) expanding the network to selected near-urban ger areas; and (iii) pumping station modernization.

- Subcomponent 1.1 includes rehabilitation and upgrading of the DH network in selected urban areas. The subcomponent will include (i) Replacement of existing 5a and 3g pipelines (the subject of this EMP); and (ii) replacement of other pipelines to be identified and justified as priority in implementation phase.

- Subcomponent 1.2 is consequential to Subcomponent 1.1 by extending the transmission pipelines into new areas that are undergoing large-scale settlement to provide better access to services for ger areas residents and to combat high pollution levels. The details of subcomponent will be defined in the implementation phase of the project.

- Subcomponent 1.3 will support the modernization of DH pumping stations, including the replacement of selected pumps with smart booster pumps/heat exchangers. The planned booster pumps will complement the ongoing upgrading of the transmission line from Central Heating Plant 3 (CHP3) to add capacity to connect more customers. The details of this subcomponent will be defined in the implementation phase of the project.

Component 2 will finance activities aimed at support policy and institutional reforms in the medium to long term and strengthening UBDHC’s technical, operational, fiduciary and corporate resource management functions, and ensuring effective Project implementation. This component is proposed to include two main subcomponents: Subcomponent 2.1. Strengthening of operational and fiduciary function of UBDHC; and technical assistance to the key stakeholders on sector planning and regulation, and institutional arrangement; and Subcomponent 2.2. Implementation support for project management, including environmental and social preparatory and implementation work, monitoring and evaluation, and incremental operating expenses of the Project Management Office (PMO).
2.2 District Heating Network Upgrade – Group 1 Activities

This Environmental Management Plan (EMP) assesses the potential impacts associated with the demolition and replacement of DH transmission pipelines 5a and 3g between CHP3 and Narnii Road (the Project) as shown on Figure 1. The details of the 5a and 3g are as follows:

<table>
<thead>
<tr>
<th>Subcomponent 1.1. Rehabilitation and upgrading of the DH network in selected urban areas</th>
<th>Project Description</th>
<th>Estimated Construction period</th>
<th>Est Cost (US$ Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Replacement of existing “5a” 2xDN800 pipeline from CHP-3 to TK-1699 with 2xDN1000 (2.8 km)</td>
<td>6/20 to 10/21</td>
<td>9.620</td>
</tr>
<tr>
<td>2</td>
<td>Replacement of existing “3g” 2xDN400 and 1xDN600 from TK-521 to TK-328 with new 2xDN700 pipeline (1.4 km)</td>
<td>6/20 to 10/21</td>
<td>4.810</td>
</tr>
</tbody>
</table>

The Project will involve the following activities:

- demolition and removal of the existing pipelines 5a and 3g and associated support structures;
- installation of the new 5a pipeline in the same above-ground location as existing;
- installation of the new 3g pipeline underground from 5a connection to the main railway line in Khoroo 1. The Selbe River and railway crossing will be overhead as at present.

The underground installation of the 3g pipeline will involve the following construction works:

- dismantling of existing pipes and concrete culverts disposal of waste material to a UB municipal landfill;
- prepare the existing concrete channels for preinsulated pipe installation;
- excavation for the preinsulated pipes, where the existing routing cannot be maintained due to design criteria, and excavation works for the new pipe routes;
- pipeline welding, subsurface burial and backfilling; and
- restoration of the roads, pavements and other surface coverings excavated during the installation.

Construction activities are anticipated to take 5-6 months in total for the refurbishment. Laying of the 3g pipeline underground will likely be done in sections (100-200 meters) with disturbance expected for 2 weeks per section. Materials are expected to be imported with a local civil construction contractor to be engaged for the construction work.
Figure 1  Location of 5a and 3g Transmission Pipelines
2.3 Project Justification

The DH system is in urgent need of rehabilitation and extension; the costs of non-action, including the adverse effects on human health, are enormous. If no action is taken to improve service levels and extend the DH system, water and heat losses will rise further, and the number of system failures will increase.
3 Policy and Legal Framework

3.1 World Bank Environmental and Social Framework

The World Bank is committed to supporting Borrowers in the development and implementation of projects that are environmentally and socially sustainable, and to enhancing the capacity of Borrowers’ environmental and social frameworks to assess and manage the environmental and social risks and impacts of projects. The Environmental and Social Framework (ESF) defines 10 specific Environmental and Social Standards (ESSs) which are designed to avoid, minimize, reduce or mitigate the adverse environmental and social risks and impacts of projects (World Bank, 2016).

ESS 1 Assessment and Management of Environmental and Social Risks and Impacts requires borrowers to prepare an environmental and social assessment (ESA) to identify and assess the potential environmental and social impacts of a proposed project, evaluate alternatives, and design appropriate mitigation, management, and monitoring measures. The ESA aims to ensure that projects are environmentally and socially sound and sustainable and must be proportionate to the risks and impacts of the project. The ESA informs the project design and identifies mitigation measures and actions and to improve decision making. This Environmental and Social Management Plan (ESMP) is the ESA for the scope of works described in Chapter 2.

The following sections describe the applicability of the ESSs to this project. ESS 7 Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities and ESS 9 Financial Intermediaries are not relevant.

3.1.1 ESS1 Assessment and Management of Environmental and Social Risks and Impacts

The project will produce positive environmental and social benefits, such as reduction of air pollution emission, improved heating efficiency and reduced risk of respiratory illnesses. The physical activities to be supported by the project will may result in some environmental risks and impacts related to construction, solid waste, wastewater, dust, noise, occupational hazards associated with asbestos, welding, traffic and height fall, and traffic safety and disruptions during the construction stage. During the operation stage, the adverse environmental impacts relate to noise, vibration and potential heat injuries for operating staff. In addition, the heating sources, e.g. CHPs, have already been retrofitted or are being retrofitted - not in anticipation of this project, should not be regarded as project associated facilities. The due diligence review was conducted for the CHP3 to ensure it is in compliance with the domestic requirements of Mongolia.

There is the potential for some access restrictions (pedestrian and vehicle) during the construction period, which may need to be mitigated. No specific ethnic minority groups reside in the project sites (in Ulaanbaatar). Influx impacts are anticipated to be negligible given the project size and primarily local workforce, however due diligence will be undertaken and included in the social assessment. Heating pipelines will be constructed under roads potentially disturbing local traffic, increasing traffic volumes
and traffic risks for roadside communities, workers at site and road users. Social risks and impacts have been further defined during the SIA, which was prepared by PMU on behalf of the client prior to Appraisal, along with the stakeholder engagement plan.

3.1.2 ESS2 Labor and Working Conditions

Based on available information, the project is expected to involve a limited number of direct and contracted workers. All the workers are to be from local communities in UB. Labor management procedure and a labor GRM has been developed as part of the ESMP and incorporated into the ESCP. These procedures will be in place and operating before the engagement of the first workers. The labor management procedures specifically exclude child labor and forced labor.

Asbestos is likely to be found in the process of replacing aging pipes and could affect the health of the workers on site and community members. An asbestos management plan has been prepared and incorporated into this ESMP to establish procedures in line with the GIIP and EHSGs of the WB for identification, removal, storage, transportation and disposal of asbestos containing materials (ACM), while providing protection and training to operating workers on site and risks to any community members who have the potential to be exposed to ACM.

3.1.3 ESS3 Resource Efficiency and Pollution Prevention and Management

This project will not significantly increase water consumption. Conversely, the project will help reduce water loss in the DH system which is now highly permeable (leaking) by replacing distribution pipelines. Although this project will use energy for district heating, the total energy consumption is to be reduced as this project will prevent boiler and stove use in the future. This project will not use or procure pesticides and will not produce toxic waste during the operation stage. Asbestos is likely to be found in the process of replacing aging pipes, which could affect the health of workers on site. An asbestos management plan has been prepared and incorporated into the ESMP.

3.1.4 ESS4 Community Health and Safety

The project area is located on a plateau with low risk of earth quake and flooding. A limited number of workers will be used for construction of the facilities given the overall size of the project. It is expected that all of the contracted workers will be from local communities, thus the impacts from influx of workers on local communities are anticipated to be negligible. The location of the project in a highly urbanized environment further reduces these risks. Notwithstanding this, influx has been further assessed and adequate controls proposed in the social assessment to address the assessed risks. The pipelines will be constructed on road alignments and existing transmission buried in some areas which may disrupt local traffic (pedestrian and vehicle) during the construction phase. In addition, the increased number of vehicles transporting equipment and materials on the roads nearby the communities may pose a road safety risk. A general traffic management plan has been developed as part of this ESMP to guide the contractor to prepare their site-specific traffic management plans.
This project will not affect any ecosystem services that communities depend on. The project will not involve any production, storage, transportation and use of hazardous materials, apart from asbestos. Asbestos management procedures will be in place before the commence of the contracts to control health impacts on nearby communities. The morbidity due to respiratory diseases under the context of heavy air pollution in heating season in Ulaanbaatar may be reduced by project interventions. Use of security personnel at the sites is very limited and will not cause a material threat to local communities. In addition, this project will not build or repair any dams, or use reservoir water.

3.1.5 ESS5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

Project activities will take place in southern Ulaanbaatar where land has been occupied for several decades. The main form of land use in these districts is light industry, commercial and residential. No physical displacement from residential structures or land acquisition is expected under this project. A small number of business structures (kiosks) and private fences have been illegally established in the transmission safety right of way and will need to be relocated. A Resettlement Plan (RP) has been prepared for these structures and assets (Annex 4).

3.1.6 ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources

The project area is urban and intensively modified by human activities with no critical or natural habitats. The exception is the Selbe River which is traversed by the 3g pipeline. The Selbe River is a natural habitat with low biodiversity value. The works on the river bottom will be of temporarily character (lasting few days) and the habitat values of the Selbe River are not expected to be impacted by the project activities.

3.1.7 ESS8 Cultural Heritage

No legally protected physical cultural heritages are anticipated in the work implementation area. In addition, no physical cultural heritages are found in or near the sub-component 1.1. However, chance find procedures has been incorporated in the ESMP due to the earthworks, and exclusion list has been established under the ESMF to avoid any legally protected cultural heritages from the sub-component 1.2 and 1.3. No impacts on intangible cultural heritage are anticipated as the project will not involve any commercial development of physical cultural heritages. No intangible heritage impacts were identified by stakeholders during consultation activities.

3.1.8 ESS10 Stakeholder Engagement and Information Disclosure

The key stakeholders identified at present include the communities, households and institutions to be serviced and affected by the project. Other interested parties include government agencies responsible for management of environmental protection, cultural heritage, as well as the labor district inspection department, occupational safety, district land department and the public health department and district
traffic police. No specific ethnic minority groups reside in the project areas. Existing facilities including the CHP and distribution network operators will be regarded as technical stakeholders to the project.

A Stakeholder Engagement Plan (SEP) has been developed. The GRM will respond to complaints throughout the project lifecycle and is devised to promptly respond to any project grievances. These may be construction related such as temporary restrictions to pedestrian and vehicle traffic.

3.2 Environment, Health and Safety Guidelines of the World Bank

Based on the analysis of the project activities, following ESHGs of the World bank Group are used in the project EA:

- Energy Conservation;
- Hazardous Materials Management;
- Occupational Health and Safety Guideline by the World Bank
- Noise;
- Waste Management;
- Traffic Safety
- Waste Management Facilities;
- Community health and Safety
- Good Practice Note: Asbestos: Occupational and Community Health Issues
- Good Practice Note: Road Safety

3.3 Mongolian Legislation

The following sections summarize the Mongolian legislation relevant to the proposal.

3.3.1 Environmental Impact Assessment

The Law on Environmental Impact Assessment 2012 regulates environmental impact assessment (EIA) for development in Mongolia. Under the Law an EIA is required “...for all new projects and existing plants, factories, services and building facilities that are planned to be renovated and expanded and projects that will make use of natural resources in one way or another”. This includes the DH rehabilitation activities proposed under this project. The first stage of the EIA process involves a General EIA which is undertaken by a Ministry of Environment and Tourism (MET) assessment expert based on the project description, feasibility study and baseline environment. The MET expert will then determine if: a) the project should be rejected based on potential significant environmental harm; b) the project may be implemented without further EIA; or c) a Detailed EIA is required to further investigate potential environmental impacts.
3.3.2 Air Quality

The revised 2012 Law on Air replaced the 1995 Law on Air. It addresses ambient air protection, pollution prevention, mitigation of emissions of air pollutants and its control. The Law addresses air pollution coming from ger districts and includes such measures as expanding access to electricity for ger districts, determining on an annual basis an air quality improvement zone where a number of prohibitions (e.g. on burning raw coal) apply, and supporting migration from city to rural areas. The Law provides for incentives for households to install insulation, improve stoves and introduce other energy-efficient and environmentally friendly measures.

3.3.3 Occupational Health and Safety

The Law on Occupational Safety and Hygiene 2008 specifies requirements for ensuring a safe and hygienic work environment for employees. Where an employee may be exposed to toxic and dangerous chemical substances (including asbestos), explosives, explosive devices, radioactive, and biologically active substances the employer must take preventative measures to protect the health of employees. This includes training on the impacts of these substances and exposure protection measures. An employer must provide appropriate protective equipment for its employees at no cost to the employee.

3.3.4 Asbestos Regulation

The Law on Toxic and Hazardous Substances (LTHS) regulates the use of toxic and hazardous substances including asbestos. Under this Law, the Mongolian government define prohibited substances and those that have restricted use. All forms of asbestos are included in the list of restricted substances. Thhe Article of 3.1.4 of the LTHS permits use of restricted substances for specific purposes under strict control and in regulated amounts. Under this specific article, asbestos and asbestos containing materials (ACM) are allowed to be used in the energy sector for thermal insulation and heat resistant materials.

Mongolian National Standard MNS 4990:2015 Occupational Health and Safety, Occupational Health and Hygiene requirements sets regulatory occupational exposure limits for airborne contaminants at workplace. This standard state occupational exposure limits for asbestos for 8 hour-Time Weighted Average as 0.1 fibers per cubic centimetre (f/cc) (or 100 fibers per liter; f/L) of air.

At the time of writing ESMP Mongolia did not have a regulatory regime for managing ACM (removal, handling, disposal, etc.). There are currently no standards for asbestos exposure (beside occupational) and no policy for detection of asbestos in buildings (or other structures) before demolition. Damiran et al. (2015) noted an immediate and urgent need for the Mongolian government to develop a comprehensive action plan and road map for the elimination of asbestos exposure with the ultimate goal of a total ban on the use of asbestos. As an interim measure, employers must implement and enforce internationally accepted occupational hygiene practices, including engineering and administrative controls shown to reduce exposures to asbestos.
An Asbestos Working Group founded recently in Mongolia has developed a regulation based on the Occupational Safety and Health Administration (OSHA) Standard 1910.1001 - Asbestos. The regulation is awaiting approval by the Minister of Labor and Social Security which is expected by January 2020.

3.3.5 Waste Management

The Law on Waste Management 2017 governs the collection, transportation, storage and landfilling of household and industrial waste, and reusing of waste as secondary raw materials. The Law covers regular solid waste and hazardous waste, except radioactive waste. The 2017 Subprogramme on Improvement of Waste Management in Ulaanbaatar, for the period 2017-2020, supports implementation of the national Waste Management Improvement Programme 2014-2022 and defines an objective for Ulaanbaatar City for improvement of waste disposal site infrastructure and modernization of site operational equipment.
4 Environmental and Social Assessment

This chapter assesses the environmental impacts associated with the proposed activities described in Chapter 2. A separate Social Impact Assessment (SIA) has been prepared (Ministry of Energy, 2019).

4.1 Assessment Methodology

4.1.1 Scoping and risk assessment.

Scoping refers to the process of identifying and evaluating potential environmental and/or social risks and impacts in order to identify those that are likely to be relevant and potentially significant. The screening/scoping form in Annex 2, was used to determine the relevant risks associated with the Project. A screening / scoping form is included in Annex 2.

The scoping exercise identified the relevant potential environmental and social risks associated with the proposal. The risk assessment examined the consequences, probability of occurrence, and relative significance of relevant potential negative impacts associated with the proposed activities. The results of the risk assessment are summarized in below.

4.2 Air Quality

4.2.1 Existing Air Quality

Air pollution has become one of the most challenging issues in Mongolia, exacerbated during winter time because of solid fuel combustion. Especially, the capital city Ulaanbaatar where more than 47% of total population live in is the most air pollution affected area in the country. In fact, during winter, Ulaanbaatar’s air pollution is caused by households and low-pressure heat-only boilers (HoBs) burning raw coal in Ger district (80%); motor vehicle (10%); coal-fired power plants (6%); and solid waste and soil degradation (4%).

The 2016 WHO report "Ambient Air Pollution: A Global Assessment of Exposure and Burden of Disease" offers an estimation of modelled population exposure to particulate matter (PM2.5) and the number of deaths attributable to ambient air pollution in Mongolia. It estimates that high exposure of the population in urban areas of Mongolia is 51 μg/m3. This caused 40 premature deaths per 100,000 inhabitants in 2012 in Mongolia, or 1,123 premature deaths in total.

In recent years, both ambient and indoor air pollution have become among the most pressing environmental health problems. The annual PM2.5 air pollution concentration (average nearly 70 μg/m3) in Ulaanbaatar is higher than the Mongolian Air Quality Standard (25 μg/m3) and the WHO Air Quality Guidelines (10 μg/m3) as shown in Figure 2. In 2016, a UNICEF-funded assessment of hygienic and sanitary conditions and indoor air quality in schools showed that that the PM2.5 concentration was 3.1–10.05 times higher in sampled schools than the national standard on air quality.
Figure 2  
**Ulaanbaatar annual mean concentration PM2.5/PM10 (μg/m) 2011-2015**

Figure 3 shows the PM2.5 levels in Ulaanbaatar on January 9, 2019 and the relative hazards to human health.

**PM2.5 24-hour mean 25 μg/m³**

*Figure 3  Hourly air quality readings in Ulaanbaatar, 9 January 2019*

4.2.2  **Asbestos**

Asbestos is a group of minerals that possess high tensile strength, flexibility, resistance to chemicals, thermal degradation, and electrical resistance. These materials have been used in many products, including insulation and fireproofing materials, automotive brakes, textile products, cement, and wallboard materials. Mongolia has been using asbestos in thermal power plants, metal processing and
construction industries as a component of thermal insulation and construction material since 1960\(^3\). With the extremely low temperatures experience in Ulaanbaatar the heating infrastructure is insulated to avoid heat loss during transmission. Historically, the pipe insulation has comprised a matrix of wool and asbestos encased in cementitious material. It is estimated that 50 percent of the transmission pipelines are in poor technical condition, urgently requiring replacement. The insulation on these pipeline sections is often compromised exposing asbestos containing material (ACM) to the atmosphere with the potential for liberation of asbestos fibres (see Figure 4) if disturbed or removed.

Asbestos is present in outdoor air in urban environments in concentrations between 0.01 and 0.20 fibers per litre (f/L). At this concentration the risk of becoming ill is very low. By comparison the Mongolian National Standard (MNS) workplace limit is 100 f/L. Most people who develop asbestos-related diseases have worked on jobs where they frequently breathed in large amounts of asbestos fibers. For example, thermal power plant workers in Mongolia have been exposed to indoor airborne asbestos concentrations approximately 10 times the MNS limit (930 f/L)\(^4\).

![Figure 4](image)

**Figure 4**  
Typical transmission pipeline section with exposed asbestos containing insulation

Asbestos fibres enter the body by inhalation of airborne particles or by ingestion and can become embedded in the tissues of the respiratory or digestive systems. Prolonged exposure to asbestos can

---

\(^3\) World Health Organisation and Health Sciences University of Mongolia (2012) *National Asbestos Profile of Mongolia*.  
cause numerous disabling or fatal diseases. Among these diseases are asbestosis, an emphysema-like condition; lung cancer; mesothelioma, a cancerous tumor that spreads rapidly in the cells of membranes covering the lungs and body organs; and gastrointestinal cancer\(^5\) (OSHA, 1995). The risk of developing asbestos-related disease, like lung cancer, from asbestos exposure is associated with the level and duration of exposure, length of time since first exposure, the fibre type, and concurrent exposure to tobacco smoke and other carcinogens. Although there is no absolutely safe level of exposure to asbestos fibres, occasional exposure to low levels of fibres poses only a low risk to human health.

### 4.2.3 Impact Assessment

During the construction phase there is the potential for dust nuisance from construction activities and worker safety hazards from asbestos exposure. The potential for exposure of workers to airborne asbestos is associated with the demolition of the existing pipeline. The pipe insulation contains a proportion of friable asbestos containing material (ACM) that could be disturbed during demolition. In situ, the ACM is not a risk, but demolition activities have the potential to disturb the friable asbestos releasing fibres into the breathing zone of demolition workers. As the work-site is outside and therefore not contained (such as in a building) the risk of fibre inhalation is relatively lower however this also makes containing asbestos fibers more difficult. With the full implementation of the Asbestos Management Plan provisions it is unlikely that the Mongolian asbestos occupational exposure limit (Occupational exposure of workers to airborne asbestos concentrations in excess of 0.1 fiber per cubic centimetre (f/cc) (8 hour-Time Weighted Average) – MNS4990:2015) will be exceeded. The risk of community exposure to hazardous asbestos concentrations is very low due to the distance from site activities. Exceptions are unauthorized facilities within pipeline easement. The volume of asbestos potentially disturbed in any one location is limited meaning the fibre concentration at remote receptors will likely be at background levels in the absence of any mitigation measures.

### 4.2.4 Mitigation Measures

Mitigation measures for potential worker asbestos exposure are described in the Asbestos Management Plan (Annex 3). This plan is generic and has been developed in consultation with a Mongolian asbestos expert in coordination with the Bank experts. Given the lack of regulation and awareness around asbestos management, exposure and potential health impacts, a critical mitigation measure is the involvement of a recognized expert to conduct training, assist in preparation of an activity-specific construction asbestos management / removal plan and provide ongoing oversight of demolition activities.

---

4.3 Water Quality

4.3.1 Existing Environment

The project activities are situated in the catchments of the Selbe River and Tuul River which flow through Ulaanbaatar. The existing 3g above-ground pipeline crosses the Selbe River adjacent to the Engels Street bridge as shown in Figure 5 and the replacement pipeline will also be installed above-ground. The Selbe river is a natural habitat with low biodiversity value. In most of the year, there is little flow in the river of Selbe.

![Image of Pipeline 3g Crossing of Selbe River at Engels Street Bridge](image)

*Figure 5 Pipeline 3g Crossing of Selbe River at Engels Street Bridge*

4.3.2 Impact Assessment

During pipeline demolition there is the possibility that debris may fall into the river; however, this can be minimized and if happens, collected and disposed of. During construction activities there is the potential for water pollution from sediment runoff from excavation sites, fuel spills from vehicles and machinery, dewatering of excavated trenches after rain and disposal of hydrotest water.

The demolition of the existing pipeline and construction of the new will require access to the river bed for removal of existing and installation of new pipe supports. Installation of the supports will require foundation construction in the river bed which has the potential to cause temporarily and minor sedimentation of the river water. With proper planning and implementation of mitigation measures potential that works will be affected by flooding is minimal, yet contingency measures for such an event
will be developed. It is anticipated that the existing pipeline will be removed by crane situated on the Engels Street bridge meaning that large construction equipment will not be used in the river bed.

The new 3g pipeline will be installed partially underground and will involve excavation of trenches. Whenever these trenches are open there is the potential for rain water or groundwater to accumulate. In this situation trenches will need to be pumped-out to allow construction works to proceed. This trench water is unlikely to contain any significant pollutants, aside from low concentrations of suspended sediment; however, it will need to be pumped out to sewer to avoid stormwater pollution. Similarly pipeline pressure test water will also be disposed to sewer. All in all, the impact on the water quality in the river of the Selbe is temporary and will dissolve shortly after the construction is completed.

The potential for water pollution from construction activities is expected to be of low significance as shown in the following risk assessment table.

The risks will be handled through implementation of Construction Environmental Management Plan including water pollution mitigation measures and flood emergency plan and disposal of trench and hydrotest water to sewer

4.4 Noise

4.4.1 Existing Noise Environment

The existing noise environment in the vicinity of the UB DH network is typical of a developing country urban setting with the dominant noise sources being traffic and industry. The background noise level in this context will be relatively high compared with a rural environment for example. A recognized measure of noise disturbance is the number of decibels (dB) above background levels with an average of 5 dB and peak of 15 dB for tonal or impulsive noise likely to cause annoyance.

4.4.2 Impact Assessment

The main continuous noise sources during construction will be site operation such as trucks, excavators and cranes which is not expected to be significantly above background noise levels. There will be intermittent higher noise levels associated with specific activities such as jack-hammering/concrete breaking, saw cutting, hammering and other demolition activities. While this intermittent noise is likely to exceed the threshold for tonal or impulsive noise it will only be temporary in any one location. Similarly, the elevated background noise levels associated with plant operation will only be temporary such that an individual receptor will to be subject to noise disturbance over an extended period. Given the temporary nature of the elevated noise sources this impact is considered tolerable and of low significance.

It is proposed that the 3g crossing of Industrial Street be undertaken on two separate weekends to avoid traffic impacts at this location. While the work location is in close proximity to apartment buildings it is considered reasonable given the short-duration of activities and the avoidance of traffic disruption. Permission will be requested and if granted announcement made.
Particular receptors (eg. schools, hospitals) are more susceptible to noise disturbance however few if any of these facilities are situated in close proximity to pipeline worksites. Further, it is understood that the Yanzagiin Naizuud kindergarten (which is very close to the pipeline easement) will be closed during the summer construction period.

4.4.3 Mitigation Measures

The key mitigation measures for noise impacts will be adherence to standard construction hours and notification of forthcoming noisy works. Standard construction hours are generally 07:00 to 18:00 Monday to Friday and 08:00 to 13:00 on Saturdays with no work permitted on Sundays. Exceptions to these work hours may be acceptable for specific activities to avoid associated impacts such as traffic delays or service interruption or kindergarten operating hours. Special permissions will be requested.

Notifications to nearby receptors of forthcoming works will allow residents to prepare for a short period of noisier works. Generally, this temporary noise is accepted by the community given the overall beneficial nature of the project in terms of air quality improvements.

4.5 Traffic Management

4.5.1 Existing Environment

The 5a pipeline route traverses a light industrial area in Khoroo 3 partially along roadsides. Traffic volume along these roads is generally low and involve both residential and industrial vehicles. Figure 6 shows a typical 5a pipeline section in this area. The 3a pipeline route traverses similarly low traffic volume roads and backstreets although a crossing of Industrial Street is required as shown in Figure 7. Traffic volumes along Industrial Street are moderate and there is potential for construction-related traffic congestion at this location.

During pipeline demolition and installation and trenching along road corridors there will be a need to temporarily occupy portions of the roadway requiring traffic control or diversions. Similarly plant movements, materials and equipment deliveries and waste disposal will potentially cause traffic disruption.
4.5.2 Impact Assessment

Temporary road occupancy during the construction period is might result to traffic disturbances and inconvenience to road users. Alternative routes will be provided if needed or alternative working hours if premitted. During the construction, the construction vehicles will be used, increasing the traffic low
on the roads. In addition, there would be impact on the safety of the workers at site by the construction vehicles. It is expected that in the construction peak, about 10 construction vehicles will be generated each day. Where roads are reduced to single lane or traffic is otherwise disrupted traffic management measures will be implemented by the contractor to ensure safe passage of vehicles through construction zones and minimal delays.

4.5.3 Mitigation Measures

A General Traffic Management Guidelines that will guide the preparation of the site-specific Traffic Management Plan have been developed for the project and are included as Annex 4. More specifically, as part of its bid, the successful Contractor is required to submit a preliminary TMP, which will ultimately form part of the ESMP.

4.6 Waste Management

4.6.1 Existing Environment

The project activities will generate various waste streams that need to be managed. Demolition of defective pipeline sections will generate steel, concrete, pipe insulation (likely containing asbestos) and other waste materials. Excavation of trenches will generate road pavement and concrete waste as well as surplus fill. In addition, there will be various sources of general construction waste generated by the contractors. Liquid waste will include sewage from contractor facilities and wastewater from trench dewatering and pipeline pressure testing.

The Ulaanbaatar Municipality operates three landfills: Moringin Davaa, Narangiin Enger and Tsagaan Davaa all of which are able to accept asbestos waste. UBDHC will need to enter into a contract with the Municipality and pay associated fees to dispose of the construction waste. Liquid waste (sewage, trench water and pressure test water) can be disposed of into sewer subject to agreement with the system operator.

4.6.2 Impact Assessment

The main risk associated with waste management is the management of asbestos containing material (ACM) expected to be present in pipeline insulation. These risks are associated with generation of asbestos dust during waste handling, transport and disposal. Once asbestos is properly placed in a landfill and backfilled there is no risk to human health or the environment. Asbestos is inert in a landfill environment and cannot be leached to groundwater.

4.6.3 Mitigation Measures

All asbestos containing waste generated by the Project will need to be managed in accordance with the Asbestos Management Plan and site-specific asbestos removal plans. The site-specific plans will provide prescriptions for packaging, transporting and disposing of asbestos waste to ensure that asbestos fibres
are not released. The demolition methodology will aim to limit disturbance to the ACM by removing pipe sections with insulation intact. Removal of insulation from pipe sections should be minimized to avoid asbestos fiber generation. It is recommended that a dedicated landfill cell be established at the chosen landfill site so that asbestos can be isolated from potential disturbance.

All other waste materials will need to be safely stored at the construction site and transported to the landfill designated by Ulaanbaatar Municipality. The spoil will be stockpiled (stabilizing slopes) and covered before transported by the contractors to the sites designated by UB Urban Committee. The UB Urban Committee has agreed to take this spoil for site grading and levelling in other projects. After the domestic garbage is collected, it will be processed by the public sanitation (municipal) department.

4.7 Community Health and Safety

4.7.1 Existing Environment

The existing transmission pipeline is situated in very close proximity to roads, industrial and commercial facilities, community facilities, residential premises and footpaths. In many cases unauthorised facilities are situated within the pipeline easement (five metres either side of the pipeline).

4.7.2 Impact Assessment

Construction activities will by necessity be undertaken in very close proximity to various facilities used by the community; hence there is an elevated risk to community health and safety. The key risks include mobile construction equipment, construction site hazards, traffic disruptions/changes, noise and dust emissions and potential asbestos exposure. Noise, dust and asbestos issues are addressed in previous sections.

Construction activities in close proximity to pedestrian movement areas pose a high community safety hazard. The construction footprint, equipment movement areas and traffic disruptions will likely intersect with pedestrian movement during the construction phase. Although temporary there will be a need to re-route pedestrians around construction sites often on to roadways and other hazardous locations. Construction sites themselves pose numerous community safety hazards including equipment operation, open trenches and various personal safety hazards.

Utility disruption is also expected for a limited duration during the works period, namely for hot water supply to residential apartments and business. Disruption of steam supply is particularly pertinent to the 40-manufacturing business (vodka, dairy, drinks) in the light industrial area near to CHP3, who are clients of the power plant that need high temperatures for manufacturing processes. Other interruptions in municipal services and utilities may occur because of accidental damage to pipelines for water supply, electricity, underground power cables and communication cables (including optical fibre cables) during construction. Any of these disruptions in service can affect the economy, industries, businesses and residents’ daily life.
Inconveniences to residents and businesses, including small businesses, are inevitable during the construction period. These inconveniences will, however, have a temporary nature. Hot water disruptions will be limited for 2-4 weeks; this disruption occurs similarly every summer in Ulaanbaatar whilst maintenance work is undertaken in sections, so residents should not experience this differently as a result of the project. Similarly, businesses continue operations during these periods and as such are not anticipated to need to suspend operations from disruptions caused by the project construction.

The impact is initially assessed as moderate, with a medium magnitude (short 2 week duration, temporary impact) some areas of vulnerability among the population (elderly, disabled) with some ability to adapt to project changes; although changes in utility are within the range commonly experienced within the household and community. Activities will be undertaken during summer months to limit the utility disturbance to residents and businesses. For example, heating-off-season, school vacation period. Together with mitigations, utility impacts can be lowered to minor with appropriate measures. These impacts will be carefully managed, see Section 6 for further details.

The community safety in the operation stage will be improved. Their exposure to the asbestos will be eliminated by the project, and the potential safety risk due to the above ground heating pipeline will be largely reduced. The current situation where the heating pipeline is above ground, not well insulated is dangerous as there is 120°C water in the pipelines under 10 bar pressure which could cause burns if someone access pipeline easement un authorized.

The estimated workforce is anticipated to be 50-100 persons, with less than 100 persons at peak construction; this includes workers for both the material transportation and installation activities. The workforce is anticipated to be sourced locally with materials sourced internationally by an international supplier (with good standing, meeting bank EHS requirements); as such no influx is anticipated as all workers will already reside in Ulaanbaatar. No influx of opportunity seekers is anticipated; there will be no work camps and only a small workforce, hence it is unlikely to attract opportunity seekers looking for employment or to establish shops supplying the workforce. As such influx impacts are not anticipated and are evaluated as ‘negligible’; for this project. Risks associated with an international supplier are considered low, as these are anticipated to be international firms that follow good environmental and worker safety and health practices equivalent to Bank safeguard requirements.

Gender based violence (GBV) or sexual exploitation and abuse (SEA) impacts are assessed as negligible-minor, given the urban setting, locally sourced workforce (no worker camps) and short construction period. No risks on GBV or SEA were mentioned during the consultations. The impact magnitude was assessed as low, as the impact would be local, rare and affects a small proportion of receptors of a short duration. There is still potential for opportunistic misbehaviour of the workforce towards women in the city during the construction period, as such minimisation and management measures are included. After mitigation, these impacts are assessed as negligible.
4.7.3 Mitigation Measures

As far as practicable pedestrian access will need to be maintained in the vicinity of construction sites to avoid public inconvenience. At times it will be necessary to prevent pedestrian access where construction activities pose unacceptable hazards.

Pedestrian movement will be a key component of site-specific traffic management plans developed by the contractor. Specific measures to ensure pedestrian safety will be required including establishment of temporary walkways, pedestrian traffic control and movement restrictions around equipment movement areas.

All construction sites will need to be adequately barricaded to prevent unauthorized access. This may involve the erection of hoardings or similar structures to isolate construction activities and prevent access. All visitors to construction sites will be required to report to the site office and be inducted on health and safety requirements.

Specifically, for the kindergarten, due to the proximity of kindergarten to the road and pipeline currently passing over the kindergarten, the new pipeline replacing the old one will be buried under the kindergarten playground. Alternative alignment would call for demolition of houses. In consultation with the kindergarten manager, it is understood that during the heating season the children are playing indoor given the very harsh weather, and there is time period during summer when kindergarten is closed. Construction shall be performed during the summer months when the kindergarten is closed. In the event that construction can’t be executed during the holiday season, then permission of the school is to be obtained; and temporary bridges erected at places where the students pass and enclose scaffolds with dense meshes to ensure the safety of people passing by.

4.8 Occupational Health and Safety

4.8.1 Existing Environment

Mongolia has an established OHS regulatory regime based around the Law on Labor Safety and Hygiene 2008. The main causes of industrial accidents in Mongolia are:

- Lack of safety culture and behavior among workers;
- Limited knowledge and experience to enforce OSH laws and regulations;
- Employers' budget for OSH is less than the legal minimum requirement;
- Lack of employees specialized in OSH in private entities; and
- Noncompliance and ignorance in construction companies of safety rules and norms.

4.8.2 Impact Assessment

The Project involves civil construction activities which involve typical hazards to employee health and safety. The particular hazards associated with the Project’s construction include equipment operation
(including mobile plant), working near road traffic, crane operation, powerlines, working at heights, falls into and collapse of excavations and exposure to hazardous substances (eg. asbestos).

4.8.3 Mitigation Measures

At bid stage contractors will be required to demonstrate their OHS credentials, including evidence of an OHS Policy. Prior to construction commencing an OHS Plan will need to be prepared, including provisions for traffic management and asbestos management.

Construction workers may breathe asbestos during demolition of existing heating pipes, asbestos collection and transfer. Health hazards from breathing asbestos dust include asbestosis, a lung scarring disease, and various forms of cancer (including lung cancer and mesothelioma of the pleura and peritoneum). These diseases usually arise decades after the onset of asbestos exposure.

During the operation phase, the exposure to hot working conditions in repair operation in heating season can result temperature stress-related injury or death. Use of personal protective equipment (PPE) to protect against other occupational hazards can accentuate and aggravate heat-related illnesses. Extreme temperatures in permanent work environments is not involved in the project.

Proper measures for occupational health and safety should be developed to protect workers from being damaged, and an asbestos management plan has been prepared in line with the EHSGs of the Bank.

4.9 Impact on Water Use and Energy Use

The project will not cause increase of water use but will reduce the water use. The old, leaking pipeline will be replaced by new and water tight pipelines under the project. Approximately 1.2% of the water losses of 3.5 million m3 would be saved equal to 48,000m3 each year. The savings are low because most water losses take place in small pipes and secondary network, not in large transmission pipes.

In addition, the project will support a TA on water use efficiency for whole loop. The TA will produce suggestions to improve the water use efficiency which will be implemented by the MOE. It is expected the water use efficiency in the loop will be greatly improved due to the implementation of the suggestions.

The project will reduce the energy use by replacing the poorly insulated pipelines with well insulated pipelines, using building level heat exchangers which is smart to respond the heat demand, preventing small coal burning stoves from being built in the future.

The energy savings in total /network heat losses, preventing stoves and connecting customers to district heating would be 337 MW after the entire project has been completed and the customers connected in UB with 151 MW heat demand in total. This is a very robust estimate as the pipelines and areas remain undefined.
4.10 Air pollution load reduction estimate

Through reducing coal consumption for heating generation, the Project investment will result in emission reductions of both local air pollutants and greenhouse gas. The WB team supported the client with the estimation of the GHG emission reduction. The table below provides a summary of the estimated annual emission reduction when the system is operated at full capacity.

<table>
<thead>
<tr>
<th>Emissions reduced (ton/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO\textsubscript{2}</td>
</tr>
<tr>
<td>SO\textsubscript{2}</td>
</tr>
<tr>
<td>NO\textsubscript{x}</td>
</tr>
<tr>
<td>PM (CHP vs. HoB)</td>
</tr>
</tbody>
</table>

4.11 Due Diligence Review

The CHP 3 will provide heat source for the project. CHP 3 is using coal for power generation, and it has obtained licenses for heat generation, heat supply regulation and heat distribution issued by Energy Regulatory Commission of Mongolia (ERC).

The CHP 3 was retrofitted in 2014 to meet the increasing demand for electricity in the city of Ulaanbaatar. The current heat production capacity of the CHP 3 amounts to 780 MW, which consists of 495 MW and 285 MW of the high- and low-pressure parts, respectively. On the other hand, the heat transmission capacity at the outlet gates of CHP 3 is 698 MW using the estimate of 2.5 m/s water flow that is typical at the main DH circulation pump outlet of CHP plants. This indicates that there prevails idle heat production capacity in the cogeneration (e.g. CHP) mode equal to 81 MW. Moreover, by tapping heat directly from the boiler to the DH system through the pressure reduction valve, temporarily there would be even more idle heat production capacity, but not in the high-efficient CHP, but in the boiler operation mode.

In next few years to come, CHP3 plant is expected to face a major retrofit which would increase the CHP production capacity, driven by the increasing need of electric power. In the heating part, it would result in higher production capacity in high- and low-pressure parts as follows:

- The heat production capacity of the high-pressure part would increase from 494 MW to 645 MW by 2024. The construction is about to start in 2020 already, as stated by MoE in summer 2019. For high pressure part, the detailed EIA and Feasibility study have been prepared and approved by MET.
- The heat production capacity of the low-pressure part would increase from 285 MW to 465 MW by 2024. The feasibility study has been approved, and the financing negotiations are underway with Russians. For the low-pressure part, the detailed EIA has been prepared.
In such a way the heat production capacity could increase from the current 780 MW to 1,110 MW by year 2024. The incremental heat production is 330 WM in 2024, which can meet the demand of the project estimated at 151 MW.

CHP 3 takes water from groundwater aquifers for cooling and make-up and has signed a water usage agreement with the Tuul River Basin Administration. According to the regulation for EIA of Mongolia, a Detailed EIA (similar to EIA report) should be done by CHP-3 every 4-5 years, and this year’s Detailed EIA has been approved by MET (that includes Feasibility study of new ash yard that CHP-3 will build). The environmental monitoring report is submitted to the MOE each year. Pollutant emissions from the power plant comply with relevant Mongolian requirements.

According to this year’s Detailed EIA, the flue gas from the boilers is discharged after dust removal by cyclones. Boiler water preparation produces brackish water. The CHP 3 uses this brackish water for carrying the ash into the ash ponds and reused again in the system. The domestic or non-industrial waste water from the toilets and bathrooms is discharged into the city wastewater treatment plant. Boiler cleaning water is collected by the professional cleaning agency with a container and discharged into the disposal system only after the wastewater meets the required standard. The bottom ash washed with water in the tank located at the bottom of the combustion chamber flows into the bottom ash removal canal and finally enters the ash pond. After the ash in the ash pond is precipitated, the upper layer water spills into the well located in the middle of the ash pond, then enters into filtered water pond and then pushed by the pressure pump for the reuse in ash removal system. A after the ash pond were filled with coal ash, the plant will cover the soil on the upper ground of the pond and then hand over the ash pond to the land service of the Khan-Uul district. In total, five ash ponds were filled with coal ash generated by the CHP 3 since it started its operation. In order to avoid of environmental pollution by fly ash and dusts to be generated from 4 ash ponds with total of 43.3 hectares area, the “Tsetsergeljilt (Gardening)” LLC planted 3000 willows in 11-hectare area during 2006-2007 which showed a good result.
5 Environmental Management Plan – mitigation tables

This section presents the measures to be taken during the implementation and operation of a project to eliminate or offset adverse environmental and social impacts, or to reduce them to acceptable levels. The second table in Chapter 5 refers to sensitive points identified in SIA (like kindergarten, specific crossings) for which specific mitigation measures are defined.

<table>
<thead>
<tr>
<th>Period</th>
<th>Item</th>
<th>Environmental Factor</th>
<th>Mitigation Measures</th>
<th>Implementing Agency</th>
<th>Supervision Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESIGN</td>
<td>DH network</td>
<td>Pipe Network Route Selection</td>
<td>Consider route layout of pipe network comprehensively from relocation quantity, investment, construction difficulty, and cost of land acquisition.</td>
<td>Design institute</td>
<td>World Bank, UBDHC</td>
</tr>
<tr>
<td></td>
<td>Natural Environment</td>
<td>Acoustic Environment</td>
<td>In design of pipe network routes, consider noise impacts on residents during construction, and whenever possible, avoid them reasonably.</td>
<td>Design institute</td>
<td>World Bank, UBDHC</td>
</tr>
<tr>
<td></td>
<td>Solid Waste</td>
<td></td>
<td>• For the underground pipelines, consider balance the earthwork with other works to minimize the spoil disposal.</td>
<td>Design institute</td>
<td>World Bank, UBDHC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Asbestos is banned from use in new works and renovations.</td>
<td>Design institute</td>
<td>World Bank, UBDHC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ecological Environment</td>
<td>Whenever possible, lay pipes along roads to reduce destruction of vegetation and grassland.</td>
<td>Design institute</td>
<td>World Bank, UBDHC</td>
</tr>
<tr>
<td></td>
<td>Social Environment</td>
<td>Cultural Resources</td>
<td>Avoid legally protected cultural heritages.</td>
<td>Design institute, Cultural relics departments</td>
<td>World Bank, local cultural relics departments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Land Acquisition and Relocation</td>
<td>Structure impacts (shops and fixed assets) in the Right of Way will be mitigated through the Resettlement Plan</td>
<td>Design institute, social impact</td>
<td>World Bank, UBDHC</td>
</tr>
<tr>
<td>CONSTRUCTION</td>
<td>DH network</td>
<td>Natural Environment</td>
<td>Acoustic Environment</td>
<td>Atmospheric Environment</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>------------</td>
<td>---------------------</td>
<td>----------------------</td>
<td>-------------------------</td>
<td></td>
</tr>
</tbody>
</table>
| Impact on Traffic and Business | • Adopt construction methods with minimal impact on residents’ life and traffic when crossing railways, roads or rivers.  
• Make full preparation and conduct detailed investigation of roads and underground utilities along the routes. | | | |
| CONSTRUCTION units | | | | |
| Design institute | World Bank, UBDHC | | | |
| | | | | |
| Natural Environment | • In order to reduce noise of construction equipment, provide regular repair and maintenance to machinery, keep them in sound state and attested as required, and reduce noise pollution caused by poor operating status of equipment; strengthen regular overhaul and maintenance of power machinery and equipment;  
• Reasonably arrange the construction site to prevent too high noise level at some parts and try to keep high-noise construction equipment far from sensitive areas to minimize noise during the construction period;  
• Set speed limit for roads near noise sensitive areas and reduce or prohibit horn blaring;  
• Whenever possible, avoid simultaneous operations of high-noise equipment; restrict operation hours and prohibit operations during nighttime. Shut down the idle equipment in time.  
• Set up sound insulation fences around construction site.  
• Enhance environmental supervision in construction period.  
• Limit works during daytime, for different arrangements ask for special permission | | | |
| UBDHC, Local environmental management department | | | | |
| | | | | |
| Atmospheric Environment | • Construction site must be fenced with construction enclosure;  
• Set special canopy for building materials prone to air-borne dust and cover raw materials using dust cloth during construction;  
• Suppress dust by sprinkling water during earthworks; during strong windy weather, stop earth work.  
• Materials and garbage shall be transported in closed containers, and should not be spread into the air or handled roughly, and guarantee | | | |
<p>| UBDHC, Local environmental management department | | | | |</p>
<table>
<thead>
<tr>
<th>Water Environment</th>
<th>Construction units</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Public toilets (facilities) is encouraged to be used in the work field during construction. Temporary mobile toilets are supposed to be set up if there is no public sanitation nearby.</td>
<td>UBDHC, Local environmental management department</td>
</tr>
<tr>
<td>• Sedimentation tanks should be set, muddy water used in the construction should be clarified in the sedimentation and then be reused to the extent possible;</td>
<td></td>
</tr>
<tr>
<td>• Sand, cement and other materials should be protected from rain when being stacked in the construction site, which will prevent surface runoff from the rain to pollute nearby natural waters.</td>
<td></td>
</tr>
<tr>
<td>• The pipeline pressure test wastewater shall be discharged into the sewage network.</td>
<td></td>
</tr>
<tr>
<td>Issue</td>
<td>Details</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>Domestic wastewater of construction personnel shall be incorporated into the local sewers.</td>
<td></td>
</tr>
<tr>
<td>A Flood Emergency Management Procedure will be developed for works undertaken in the river bed.</td>
<td></td>
</tr>
<tr>
<td>All excavations within the river bed will be adequately protected (eg. coffer dam) to minimize risk of sedimentation</td>
<td></td>
</tr>
<tr>
<td>No refueling, maintenance or hazardous materials storage is permitted in the river bed.</td>
<td></td>
</tr>
<tr>
<td>Construction wastes should be transported to location designated by urban administration agency; construction waste cannot be dumped randomly and dumping sites for construction waste are not allowed to be set randomly, construction wastes are also not allowed to be sold and accepted.</td>
<td></td>
</tr>
<tr>
<td>Set domestic waste garbage cans at construction sites, collect domestic waste, and public sanitation departments will treat domestic waste in a unified manner.</td>
<td></td>
</tr>
<tr>
<td>About 6,000 m³ spoil will be produced under the sub-component 1.1, the spoil will be stockpiled with stable slope and covered before transported by the contractors to the designated sites. UNDHC has made commitment to use the spoil for site grading in other works. Coordination should be maintained by the UBDHC with its contractors.</td>
<td></td>
</tr>
<tr>
<td>For asbestos, please refer to the Asbestos Management Plan. The plan calls for preparation and implementation of Asbestos Remedial Plan and trainings</td>
<td></td>
</tr>
<tr>
<td>Temporary storage of materials and waste should be within pipeline easement (5 m to each side)</td>
<td></td>
</tr>
</tbody>
</table>

**Solid Waste**

**Ecological Environment**

Whenever possible, work within the scope of land acquisition during the construction period to reduce damage to vegetable and grassland near land for temporary use and work areas.

**Construction units**

| UBDHC, Local environmental management department |

---

5 February 2020  
DRAFT  
35
<table>
<thead>
<tr>
<th>Social Environment</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water and Soil Conservation</strong></td>
<td>Cover and enclose earthwork to prevent soil erosion at temporary dumps during construction.</td>
<td>Construction units</td>
<td>UBDHC, Local environmental management department</td>
</tr>
<tr>
<td><strong>Cultural Resources</strong></td>
<td>• Observe local cultural customs, strictly manage construction personnel, and prevent acts conflicting with local cultural customs during construction. • If cultural resources are found during construction, suspend construction and report to local cultural relics departments according to the Law of the Mongolian laws and regulations of cultural resources, and resume construction after unearthing of cultural resources and issuance of building commission.</td>
<td>Construction units</td>
<td>UBDHC, Local cultural relics departments</td>
</tr>
<tr>
<td><strong>Land Acquisition and Relocation</strong></td>
<td>Land acquisition for pipe network is temporary. A feedback mechanism for the construction period shall be established to collect opinions of people affected.</td>
<td>UBDHC</td>
<td>World Bank Local governments</td>
</tr>
<tr>
<td><strong>Daily life of Residents</strong></td>
<td>• Notice boards shall be set up at construction sites to inform the public of the construction content and construction period, ask for public understanding of inconvenience caused by the construction, and indicate the contact person and complaint hotline. • Relevant power agencies should be consulted in advance to confirm power use plan. The construction units shall contact relevant departments in advance to determine pipeline connection scheme, get ready for connection of temporary pipeline, and in sections where space is not enough, transform the utility lines first to prevent temporary water and electricity failure and impacts on normal power and water supply to residents, shops and enterprises along the lines. • For construction near kindergartens, erect temporary bridges at places where the students pass and enclose scaffolds with dense meshes to ensure the safety of people passing by.</td>
<td>Construction units</td>
<td>UBDHC, Local environmental management department, World Bank</td>
</tr>
</tbody>
</table>
• The hanging height and direction of construction lamps shall not affect the rest of residents at night.
• Site selection of pipe stacking shall be reasonably designed far from kindergartens and residents, if possible, and the pipes shall be neatly piled and taken care of by specially designated personnel.
• Safe pedestrian access will be ensured by the contractor. Information distribution (in the SEP) to residents, letters, construction notice board.
• Utility disruption (hot water) for residents and businesses will be notifications to households and business. Limiting period of disturbance (2-4 weeks).
• Temporary steam supply to manufacturing businesses managed together with CHP3 for disruption period.

Traffic Safety

- Prepare site specific Traffic Management Plan as per general TMP
- In order to minimize impacts of the project construction on the life of urban residents and urban traffic, make unified shunt planning for the routes of vehicles in urban road traffic to prevent traffic jam; when necessary, cooperate with public security and communications administration authorities to ensure smoothness and normal operation of urban traffic, and issue a notice to reassure the public in advance by radio, TV and newspaper
- Stress safety rules to drivers;
- Drivers shall improve their driving skills and must hold driving license;
- Restrict driving time and work out a driver shift schedule to prevent the drivers from being too tired;
- Avoid dangerous roads and driving in dangerous periods of the day to reduce the possibility of accidents;
- Regularly maintain vehicles and use parts authorized by manufacturers to avoid serious accidents due to equipment failure or premature failure of parts;
### OHS

**General:**
- Construction workers should wear safety helmets.
- Checking all electrical cords, cables, and hand power tools for frayed or exposed cords regularly.
- Provide workers with potable drinking water and safe food.
- Proper use of ladders and scaffolding when erecting a heating network in the air and take measures to prevent workers from falling.
- The experienced workers should be used to operate the construction machinery, operate in strict accordance with the operating procedures, and train the operators if necessary.

#### Welding operation related injuries:
- Use baffles in welding areas and offer welding goggles and/or masks to welding workers.
- Provision of proper eye protection such as welder goggles and/or a full-face eye shield for all personnel involved in, or assisting, welding operations. Additional methods may include the use of welding barrier screens around the specific work station (a solid piece of light metal,

- Cooperate with local communities and competent authorities to improve road signs, increase visibility, and enhance overall road safety, especially roads near schools and other areas with children. Carry out traffic education and pedestrian safety education jointly with local communities;
- Coordinate with emergency handling personnel to ensure proper first aid treatment when accidents happen;
- Whenever possible, use materials which can be locally purchased to shorten transportation distance; build relevant facilities (such as workers’ dormitory) close to project sites and carry workers using buses so as not to increase traffic flow;
- Take traffic safety control measures and use road signs and signalmen to warn people and vehicles of dangers.
- For traffic safety issues, please refer to Traffic Management Plan.
canvas, or plywood designed to block welding light from others). Devices to extract and remove noxious fumes at the source may also be required.

**Industrial Vehicle Driving and Site Traffic:**
- Training and licensing industrial vehicle operators in the safe operation of specialized vehicles such as forklifts, including safe loading/unloading, load limits
- Ensuring drivers undergo medical surveillance
- Ensuring moving equipment with restricted rear visibility is outfitted with audible back-up alarms
- Establishing rights-of-way, site speed limits, vehicle inspection requirements, operating rules and procedures (e.g. prohibiting operation of forklifts with forks in down position), and control of traffic patterns or direction
- Restricting the circulation of delivery and private vehicles to defined routes and areas, giving preference to ‘one-way’ circulation, where appropriate
- The space provided for each worker, and in total, should be adequate for safe execution of all activities, including transport and interim storage of materials and products.
- Passages to emergency exits should be unobstructed at all times. Exits should be clearly marked to be visible in total darkness. The number and capacity of emergency exits should be sufficient for safe and orderly evacuation of the greatest number of people present at any time, and there should be a minimum two exits from any work area.

**Traffic safety:**
- Emphasizing safety aspects among drivers
- Improving driving skills and requiring licensing of drivers
- Adopting limits for trip duration and arranging driver rosters to avoid overtiredness
• Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.
• Coordination with emergency responders to ensure that appropriate first aid is provided in the event of accidents
• Using locally sourced materials, whenever possible, to minimize transport distances. Locating associated facilities such as worker camps close to project sites and arranging worker bus transport to minimizing external traffic.

Falls:
• High fences should be established along both sides of the open trenches, and warning signs shall be set to prevent construction workers from falling.
• Installation of guardrails with mid-rails and toe boards at the edge of any fall hazard area;
• Proper use of ladders and scaffolds by trained employees
• Use of fall prevention devices, including safety belt and lanyard travel limiting devices to prevent access to fall hazard area, or fall protection devices such as full body harnesses used in conjunction with shock absorbing lanyards or self-retracting inertial fall arrest devices attached to fixed anchor point or horizontal life-lines
• Appropriate training in use, serviceability, and integrity of the necessary PPE;
• Inclusion of rescue and/or recovery plans, and equipment to respond to workers after an arrested fall;
• Asbestos related damage: for OHS issues related to asbestos, please see the Asbestos Management Plan. The plan calls for preparation and implementation of Asbestos Remedial Plan and trainings

Heat Damage:
### Incidents

- Adjusting work and rest periods according to temperature stress management procedures provided by ACGIH, depending on the temperature and workloads;
- Providing temporary shelters to protect against the elements during working activities or for use as rest areas;
- Use of protective clothing;
- Providing easy access to adequate hydration such as drinking water or electrolyte drinks, and avoiding consumption of alcoholic beverages.

#### Incidents

- Promptly notify the Bank of any incident or accident within 48 hours after learning of the incident or accident, related to the Project which has, or is likely to have, a significant adverse effect on the environment and the affected communities, the public or workers.
- Provide sufficient detail regarding the incident or accident, indicating immediate measures taken or that are planned to be taken to address it, and any information provided by any contractor and supervising entity, as appropriate.
- Subsequently, as per the Bank’s request, prepare a report on the incident or accident and propose any measures to prevent its recurrence.

### Operation

<table>
<thead>
<tr>
<th>DH network</th>
<th>Natural Environment</th>
<th>Acoustic Environment</th>
<th>Pipeline damage risk</th>
<th>Energy conservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Choose pumps with low noise and keep maintenance and repair regularly.</td>
<td>Strengthen engineering quality control, pipe network inspection and discover the damaged pipe timely and repair it.</td>
<td>Choose pumps with low noise and keep maintenance and repair regularly.</td>
<td>Promptly secure and repair distribution system leaks</td>
<td></td>
</tr>
<tr>
<td>• The foundation of pumps should adopt vibration reducing measures. Acoustic shield should be added to reduce noise.</td>
<td></td>
<td>The foundation of pumps should adopt vibration reducing measures. Acoustic shield should be added to reduce noise.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The pumping station should be equipped with soundproof windows or soundproof rooms.</td>
<td></td>
<td>The pumping station should be equipped with soundproof windows or soundproof rooms.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

UBDHC | Local environmental management department
UBDHC | Local environmental management department
UBDHC | World Bank
<table>
<thead>
<tr>
<th>Social Environment</th>
<th>• Regularly verify correct operation of steam traps in steam systems and ensure that traps are not bypassed. Since steam traps typically last approximately 5 years, 20% should be replaced or repaired annually</th>
<th>UBDHC</th>
<th>Local governments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Improve the heating efficiency of the project area and the living standards of residents in the project area.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Mitigation measures for Sensitive Points

<table>
<thead>
<tr>
<th>Subproject</th>
<th>Environmental protection targets</th>
<th>Environmental pollution mitigation measures</th>
<th>Implementing agency</th>
<th>Supervision agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH network</td>
<td>Residence at both sides of the pipe network</td>
<td>• Pipe network construction shall be performed in the daytime and rest period of surrounding residents shall be avoided. Construction can’t be executed at night unless permission of residents is obtained.</td>
<td>Contractor</td>
<td>UBDHC</td>
</tr>
</tbody>
</table>
|            | Kindergarten                      | • Construction shall be performed during the summer months when the kindergarten is closed. In the event that construction can’t be executed during the holiday season, then permission of the school is to be obtained; and temporary bridges erected at places where the students pass and enclose scaffolds with dense meshes to ensure the safety of people passing by.  
• For construction near kindergartens, erect temporary bridges at places where the students pass and enclose scaffolds with dense meshes to ensure the safety of people passing by. | Contractor | UBDHC |
|            | Three intersections               | • Operation shall be performed during the period with small passenger and traffic flow.  
• Use construction methods with less traffic impact.  
• Construction site must be fenced with construction enclosure to ensure pedestrians and vehicles safety.  
• Obtain consent from the traffic management department before construction. | Contractor | UBDHC, Local traffic safety department |
|            | The Selbe River                   | • Stacking wastes in river is not allowed.  
• Discharging any pollutant into river is prohibited.  
• Obtain consent from the river management department before construction. | Contractor | UBDHC, Local river management department |
<p>|            | The railway crossed               | • The heating pipe crosses over the railway. | Contractor | UBDHC, Local railway |</p>
<table>
<thead>
<tr>
<th>Subproject</th>
<th>Environmental protection targets</th>
<th>Environmental pollution mitigation measures</th>
<th>Implementing agency</th>
<th>Supervision agency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• Stacking construction materials around the railway is not allowed. • Operation shall be performed during the period without train passing. • Obtain consent from the railway management department before construction</td>
<td>management department</td>
<td></td>
</tr>
<tr>
<td>Operation period</td>
<td>Residence at both sides of the pipe network</td>
<td>• Strengthen engineering quality control, pipe network inspection and discover the damaged pipe timely and repair it.</td>
<td>UBDHC</td>
<td>Local government</td>
</tr>
</tbody>
</table>
## Environmental Monitoring Plan

<table>
<thead>
<tr>
<th>Period</th>
<th>Subproject</th>
<th>Targets of monitoring</th>
<th>Monitoring point</th>
<th>Items</th>
<th>Frequency</th>
<th>Total cost</th>
<th>Monitoring agency</th>
<th>Responsibility agency</th>
<th>Supervision agency</th>
<th>Standards and specifications to be implemented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction period</td>
<td>DH network</td>
<td>Site specific Traffic Management Plan</td>
<td>At the construction site</td>
<td>Checking the implementation of TMP</td>
<td>Ongoing</td>
<td>Included in the bid price</td>
<td>Supervising engineer</td>
<td>UBDHC</td>
<td>Supervising engineer</td>
<td></td>
</tr>
<tr>
<td>Dust and exhaust gas</td>
<td>Kindergarten</td>
<td>At other sites - noise monitoring upon request from community</td>
<td>PM_{10}, PM_{2.5}, TSP concentration</td>
<td>Construction peak time Monitoring once for successive 2 days, once for day and night</td>
<td>$3000</td>
<td>1 day per month during construction period when there is construction activity within 200 m</td>
<td>UBDHC</td>
<td>Local environmental management department</td>
<td>Ambient Air Quality Standard MNS 4585:2016</td>
<td></td>
</tr>
<tr>
<td>Period</td>
<td>Subproject</td>
<td>Targets of monitoring</td>
<td>Monitoring point</td>
<td>Items</td>
<td>Frequency</td>
<td>Total cost</td>
<td>Monitoring agency</td>
<td>Responsible agency</td>
<td>Supervision agency</td>
<td>Standards and specifications to be implemented</td>
</tr>
<tr>
<td>--------</td>
<td>------------</td>
<td>-----------------------</td>
<td>------------------</td>
<td>-------</td>
<td>-----------</td>
<td>------------</td>
<td>-------------------</td>
<td>--------------------</td>
<td>-------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>Kindergarten</td>
<td>at other sites - noise monitoring upon request from community</td>
<td>Equivalent continuous sound level</td>
<td>Construction peak time Monitoring once for successive 2 days, once for day and night</td>
<td>$500</td>
<td>Qualified agency engaged by the project owner through contracting</td>
<td>UBDHC</td>
<td>Local environment management department</td>
<td>Standard for Noise Levels in Residential and Civil Construction MNS 0012–1–009:1985</td>
</tr>
<tr>
<td></td>
<td>Waste management; Asbestos management</td>
<td>Along the pipelines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water quality</td>
<td>Selbe River</td>
<td></td>
<td>S$</td>
<td>Every working day during the construction of the pipeline crossing above the river</td>
<td>$ 100</td>
<td>Qualified agency engaged by the project owner through contracting</td>
<td>UBDHC</td>
<td>Local environment management department</td>
<td>Surface water quality standard</td>
</tr>
</tbody>
</table>
7 Institutional Arrangements

As the project implementing agency, MOE will be responsible for the overall project implementation and compliance with loan assurances and all the requirements specified in the ESMP.

7.1 Institutional Arrangement in the Design Stage

In the design stage, MOE would organize implementation of environmental management with coordination of UBDHC, the design institute under supervision of the local environmental management department and the World Bank.

During the design stage, MOE and UBDHC each appointed one staff to coordinate ESMP implementation, which will take charge of (i) coordinating environmental issues;(ii) Ensure the measures in ESMP are considered in design documents;(iii) incorporate investment in environmental protection into project budget.

7.2 Institutional Arrangement in the Construction Stage

Environmental management in the construction period involves MOE, UBDHC, PMU, supervision agencies and contractors, and is subject to supervision and examination by the World Bank and the local environmental management department. See Table 7-1 for institutional arrangement in the construction Stage.

Table 7-1 Institutional Arrangements in the Construction Stage

<table>
<thead>
<tr>
<th>Type of institutions</th>
<th>Name of institutions</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervision</td>
<td>Local environmental management department</td>
<td>Supervision and management of issues related to environmental protection in the project.</td>
</tr>
<tr>
<td></td>
<td>World Bank</td>
<td>Supervise and examine ESMP implementation in the construction period.</td>
</tr>
<tr>
<td>Management</td>
<td>MOE</td>
<td>Project implementation unit responsible for supervision of environmental management in the construction period, including the period from start of construction to completion, and responsible for project environmental management.</td>
</tr>
<tr>
<td></td>
<td>UBDHC</td>
<td>Project coordination and management, including environmental management and environmental supervision of the project, supervision and examination of ESMP implementation.</td>
</tr>
</tbody>
</table>
Project coordination and management, including environmental management and environmental supervision of the project, supervision and examination of ESMP implementation, and guarantee of incorporation of environmental mitigation measures in bidding documents and construction contracts.

<table>
<thead>
<tr>
<th>Implementation</th>
<th>Contractor</th>
<th>Implementing environmental mitigation measures in the construction period.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consulting Services</td>
<td>Environmental monitoring agency</td>
<td>Entrusted by UBDHC to assist and oversee ESMP implementation and monitoring.</td>
</tr>
<tr>
<td></td>
<td>Environmental supervisors</td>
<td>Strictly control quality of environmental protection work and supervise contractors in implementation of environmental mitigation measures.</td>
</tr>
</tbody>
</table>

### 7.2.1 MOE

**Staff:** During the construction period, the MOE will appoint one staff to take full charge of environmental management and supervision.

**Responsibilities:**

- Report to the World Bank and implement World Bank suggestions in the ESMP of the project;
- Coordinate with other authorities to solve environmental problems;
- Supervise implementation of ESMP;
- Provide coordination in examination of environmental work (including World Bank examination).
- Support UBDHC in finding appropriate arrangement for asbestos disposal with existing landfill operators

### 7.2.2 UBDHC

**Staff:** During the construction period, the UBDHC will appoint one staff to take full charge of environmental management and supervision, and ESCP.

**Responsibilities:**

- Report to the MOE and implement World Bank suggestions in the ESMP of the project;
- Assist the PMO in work;
- Report to the local environmental management department and coordinate with other authorities to solve environmental problems;
- Employ, supervise and coordinate the environmental monitoring agency;
- Record and sort out complaints during project construction, report to MOE, explain handling results to the public and address public complaints;
• Provide coordination in environmental examination (including World Bank examination);
• Document management, departmental coordination, publicity and report, etc.

7.2.3 PMU

Staff: During the construction period, the PMU will appoint or hire one staff to take full charge of environmental management and supervision, and ESCP.

Responsibilities:
• Report to the UBDHC and implement World Bank suggestions in the ESMP of the project;
• Compile and implement environmental mitigation measures for the project and carry out daily environmental management of the project;
• Ensure implementation of environmental mitigation measures required by ESMP of the project;
• Ensure project bidding documents and construction contracts include environmental mitigation measures specified in ESMP and ESCP;
• Assist the environmental monitoring agency in work;
• Supervise the implementation of the mitigation measures specified in the ESMP, and Site specific Asbestos Removal Plan through regular site visits
• Support organization of trainings for Asbestos Management
• Conduct regular site inspections and to verify environment performance of the project on construction sites;
• Record and sort out complaints during project construction, report to UBDHC, explain handling results to the public and address public complaints;
• Organize implementation of environmental management training plan;
• Review semi-annual environment monitoring reports;
• Provide coordination in environmental examination (including World Bank examination);
• Document management, departmental coordination, publicity and report, etc.

7.2.4 Environmental Supervisors.

Environmental supervisors: Environmental supervisors will be employed by the UBDHC to take charge of environmental supervision of the project.

Responsibilities:
• Fill out the environmental checklist;
• Complete environmental supervision, examine relevant environmental reports, supervise contractors to execute mitigation measures during construction period;
• Supervise and examine domestic wastewater treatment, construction wastewater treatment, soil erosion protection measures, waste gas, dust and noise control measures, construction and domestic garbage treatment, and epidemic prevention in construction areas;
• Propose solutions to environmental protection problems encountering contractors during construction;
• Ensure the contractors compile and submit monthly environmental reports;
• Examine monthly environmental reports and raise formal or informal opinions on the handling of various problems in work. When necessary, communicate and coordinate opinions with contractors via project supervision engineers;
• Observe impacts of construction activities on people living around the construction areas and ascertain whether the contractors need to take extra protection measures. Impose a fine on contractor ineffective in implementation of measures, if any;

7.2.5 Contractor

Staff: Each contractor shall have one full-time or part-time personnel to take charge of environmental protection during the construction period.

Responsibilities:

• Prepare contractors ESMP
• Prepare site specific Traffic Management Plan
• Prepare with the assistance of the specialist Site specific Asbestos Removal Plan
• Examine construction progress, quality and operations of environmental protection facilities and handle problems arising during construction;
• Implementing relevant environmental mitigation measures required by ESMP;
• Communicate and negotiate with the masses in project areas during construction, and set up bulletin to inform the public of construction activities and hours and provide information of the contact person and contact method to facilitate public supervision of construction activities;
• Conduct the accounting of annual environmental protection funds used;
• Report execution situation of environmental protection terms in the contract;
• Submit monthly environmental report to PMO.

7.2.6 Monitoring Agency

The UBDHC will entrust a capable environmental monitoring agency to assist and oversee ESMP implementation and monitoring.

Responsibilities:

• Assist in updating ESMP and environmental management and monitoring, as needed;
• Entrust a qualified agency to monitor important parameters in project construction areas and impacted areas and compile monitoring reports;
• Supervise the implementation of the mitigation measures specified in the ESMP, and Site specific Asbestos Removal Plan through regular site visits;
• Prepare semi-annual environment monitoring reports and submit them to PMO;
• Review bidding documents and construction contracts to ensure that mitigation measures required by the EMSP are incorporated into bidding documents and construction contracts;
• Identify any environment-related issues, and propose necessary corrective actions;
• Review environmental monitoring reports;
• Provide training to the MOE, UBDHC, PMO, contractors on ESMP implementation, World Bank Environmental and social Framework, EHSGs, and GRM in accordance with the training plan defined in the ESMP.

7.3 Institutional Arrangement in the Operation Stage

In the operation period, UBDHC will implement environmental management. In addition, UBDHC will entrust a capable environmental monitoring agency to assist implement environmental management and the monitoring plan for the operation period as specified in the ESMP. See Table 7-2 for institutional arrangement in the operation Stage.

Table 7-2 Institutional Arrangement in the Operation Stage

<table>
<thead>
<tr>
<th>Type of institutions</th>
<th>Name of institutions</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervision</td>
<td>Local environmental management department</td>
<td>Supervise and manage issues related to environmental protection in the operation period.</td>
</tr>
<tr>
<td></td>
<td>World Bank</td>
<td>During the operation period, supervise and examine implementation of environmental mitigation measures in the ESMP.</td>
</tr>
<tr>
<td>Management</td>
<td>MOE</td>
<td>Supervise environmental management in the operation period.</td>
</tr>
<tr>
<td>Implementation</td>
<td>UBDHC</td>
<td>Implement environmental mitigation measures in ESMP during the operation period.</td>
</tr>
<tr>
<td>Consulting Services</td>
<td>Environmental monitoring agency.</td>
<td>Entrusted by the UBDHC to be responsible for environmental monitoring and compilation of semiannual environment monitoring reports.</td>
</tr>
</tbody>
</table>

7.3.1 MOE

Staff: During the operation period, MOE will appoint one staff to take full charge of environmental management.

Responsibilities:

• Report implementation situation of environmental management in the operation period to the World Bank;
• Coordinate UBDHC and other authorities to solve environmental problems;
• Supervise implementation of ESMP;
• Provide coordination in environmental examination (including World Bank examination).
7.3.2 UBHDC

Staff: During the operation period, UBHDC will have one staff to take charge of environmental management and receive guidance and supervision of the local environment department and MOE.

Responsibilities:

- Take charge of environmental management of the project during the operation period;
- Increase the consciousness of environmental protection of management personnel;
- Establish environmental management regulations for the project during the operation period;
- Coordinate with the local environmental management department and MOE in environmental management, supervision and examination;
- Employ, supervise and coordinate the environmental monitoring agency;
- Collect monitoring data of the CHP 3 and incorporate them into the semi-annual report.

7.3.3 Monitoring Agency

The UBHDC will entrust a capable environmental monitoring agency to assist and oversee ESMP implementation and monitoring.

Responsibilities:

- Entrust a qualified agency to monitor important parameters proposed in the monitoring plan during the operation period and compile monitoring reports;
- Supervise the implementation of the mitigation measures specified in the ESMP through regular site visits;
- Prepare semi-annual environment monitoring reports and submit them to UBHDC;
- Review environmental monitoring reports;
- Provide training to the MOE and UBHDC on monitoring and pollution control technologies in the operation period, and GRM in accordance with the training plan defined in the ESMP.

7.4 Capacities of the Institutions

The capacity of MOE, UBHDC, PMO, and contractors’ staff and environmental supervisors responsible for ESMP implementation and supervision will be strengthened. All parties involved in implementing and supervising the ESMP implementation must have an understanding of the goals, methods, and practices of project environmental management. The project will address the lack of capacities in environmental management through (i) institutional capacity development, and (ii) training.

The capacities of the MOE, UBHDC, and PMO to coordinate environmental management will be strengthened through a set of measures: (i) The appointment of qualified environment specialists within the staff to be in charge of ESMP coordination, including GRM and coordination of environmental impact monitoring, training, reporting, etc.; (ii) The contracting of an environmental monitoring agency to guide and verify MOE, UBHDC, PMO, environmental supervisors and contractors in implementing the ESMP;
(iii) The appointment of environment specialist(s) by the PMO on their staff to conduct regular site inspections and to verify environment performance of the project on construction sites.

The representatives of MOE, UBDHC, PMO, environmental supervisors and contractors will receive training in ESMP implementation, supervision, and reporting, and on the Grievance Redress Mechanism. Special focus will be given to asbestos management training and preparation of site-specific asbestos removal plans. Training will be provided by the environmental monitoring agency in close coordination with the WB and other exerts. See Table 7-3 for the training program. The contractor and supervising engineer will Conway the trainings to workers on site.

<table>
<thead>
<tr>
<th>Training</th>
<th>Attendees</th>
<th>Contents</th>
<th>Times</th>
<th>Period</th>
<th>Number of Participants</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESMP adjustment and implementation</td>
<td>The representatives of MOE, UBDHC, PMO, supervisors and contractors</td>
<td>Development and adjustment of the ESMP, roles and responsibilities, mitigation measures, monitoring, supervision, reporting procedures.</td>
<td>Once (before construction)</td>
<td>2</td>
<td>10</td>
<td>$1000</td>
</tr>
<tr>
<td>ESMP implementation, preparation of monthly</td>
<td>The representatives of PMO and contractors</td>
<td>Mitigation measures required in the ESMP, GRM, contents and reporting procedures of the monthly environmental report.</td>
<td>Once (before construction)</td>
<td>2</td>
<td>8</td>
<td>$800</td>
</tr>
<tr>
<td>environmental report</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asbestos management plan</td>
<td>The representatives of PMO, contractors, supervisors, and relevant...</td>
<td>World Bank requirements for asbestos, measures to prevent asbestos hazards, collection methods and disposal of asbestos.</td>
<td>before implementation of any works contract</td>
<td>2-4</td>
<td>8</td>
<td>$800</td>
</tr>
<tr>
<td>Review experience and improvement</td>
<td>The representatives of MOE, UBDHC, PMO, supervisors and contractors</td>
<td>Review experience of the ESMP implementation and suggest improvement.</td>
<td>Once (during construction)</td>
<td>1</td>
<td>10</td>
<td>$500</td>
</tr>
<tr>
<td>Environmental management during the operation</td>
<td>The representatives of MOE and UBDHC</td>
<td>Monitoring and pollution control technologies in the operation period, ESMP of the project, monitoring data of the CHP 3 to be collected.</td>
<td>Once (After construction is completed and before operation)</td>
<td>2</td>
<td>5</td>
<td>$500</td>
</tr>
</tbody>
</table>

8 Cost Estimate

Cost estimates for ESMP implementation, including mitigation measures, environmental impact monitoring, public consultation, training, employment of environmental monitoring agency and environmental supervisors are summarized in Table 8-1. Total budget for implementing the items of the ESMP is $22,600. The environmental monitoring agency will bear all environmental impact monitoring costs and the costs for training during the construction and operation stage. UBDHC will ensure the necessary budgets are available for the environmental monitoring agency and environmental supervisors. Contractors will bear the costs for all mitigation measures during construction, including specified in the bidding documents and construction contracts as well as those to mitigate unforeseen
impacts due to their construction activities. MOE and UBHDC will bear the costs related to environmental supervision by their own staff.

Table 8-1 Estimated Budget for ESMP Implementation

<table>
<thead>
<tr>
<th>ESMP Item</th>
<th>Estimated Cost</th>
<th>Sources of funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigation measures</td>
<td>$4000</td>
<td>World Bank loan</td>
</tr>
<tr>
<td>Environmental impact monitoring (contracted by the environmental monitoring agency)</td>
<td>$1500</td>
<td>World Bank loan</td>
</tr>
<tr>
<td>Training</td>
<td>$3600</td>
<td>World Bank loan</td>
</tr>
<tr>
<td>Public consultation</td>
<td>$2500</td>
<td>World Bank loan</td>
</tr>
<tr>
<td>External monitoring by the environmental monitoring agency.</td>
<td>$6000</td>
<td>World Bank loan</td>
</tr>
<tr>
<td>Environmental Supervisors</td>
<td>$5000</td>
<td>World Bank loan</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$22,600</strong></td>
<td></td>
</tr>
</tbody>
</table>

9 Grievance Redress Mechanism

For details of the GRM, please visit the Stakeholder Engagement Plan.

10 File Keeping and Reporting

10.1 File Keeping

During the implementation of ESMP, the WB, PMO, UBDHC, MOE, environmental monitoring agency and the contractors shall properly keep the respective files. Staffs appointed for environmental and social management take full charge of keeping the files. See table 10-1 for the requirements for file keeping.

Table 10-1 File Keeping Requirements

<table>
<thead>
<tr>
<th>Institution</th>
<th>Files need to keep and procedure of file keeping</th>
</tr>
</thead>
</table>
| Contractors | • Record the time of on-site inspection, the implementation of mitigation measures and the issues found;  
• Prepare monthly environmental reports and submit the reports to the PMO by the end of the month;  
• If the PMO makes Suggestions for improvement, record the implementation of the suggestions and archive them;  
• Save photos of construction site inspection and suggestions implementation.  
• Keep all permits available on site |
| Environmental supervision engineers | • Fill out the environmental checklist and save it;  
• Record the rectification suggestions and rectification actions taken by contractors;  
• Submit the environmental checklist to the PMO by the end of the month. |
| PMO | • Save the monthly environmental reports submitted by the contractors and the semi-annual reports submitted by the environmental monitoring agency.  
• Save photos of on-site inspection and training, and records regarding GRM. |
| UBDHC | • Save the monthly environmental reports submitted by the contractors and the semi-annual reports submitted by the environmental monitoring agency.  
• Save photos of on-site inspection and training, and records regarding GRM. |
| MOE | • Save the semi-annual reports submitted by the environmental monitoring agency. |
| Environmental monitoring agency | • Prepare semi-annual environment monitoring reports and submit them to PMO;  
• Save photos of on-site inspection and training, semi-annual environment monitoring reports, and the professional monitoring reports. |
| WB | • Save the semi-annual reports submitted by the PMO and other documents submitted by the PMO. |

### 10.2 Reporting

The contractor, environmental monitoring agency and the PMO shall record project progress, management plan implementation and environmental quality monitoring results, and timely report to related departments, which mainly includes contents of following parts:

1. Environmental monitoring agency and contractor shall make detailed recording for execution of ESMP and timely report to the PMO as defined in the monitoring plan

2. Progress reports such as monthly report, semi-annual report and annual report, etc prepared by the PMO must include contents of ESMP progress, such as ESMP execution progress and implementation effectiveness, etc.

3. ESMP and ESCP implementation report shall be submitted to the World Bank before January 1st and July 1st each year. The report is composed of two parts: ESMP implementation summarization report and professional monitoring report (atmospheric monitoring report and noise monitoring report as an attachment to the EMP implementation summarization report). The ESMP implementation summarization report.

EMP implementation report can include following main contents:

(a) Project progress, such as pipe ditch excavation, pipe network construction progress, etc;

(b) Implementation and effectiveness of mitigation measures;

(c) The identified environmental and social problems; and solutions to the problems and the final results;
(d) Training plan execution;

(e) Public complaint, if complaint occurs, record main contents of complaint, solutions and public satisfaction;

(f) ESMP execution plan in the next year.
Annex 1  Environmental Assessment Screening Form
# Ulaanbaatar Heating Sector Improvement Project

## Environment Assessment Screening Checklist – December 2019

### Section 1 – Size and scale of the proposed project

<table>
<thead>
<tr>
<th>Questions to be considered</th>
<th>Yes/no/N.A./brief description</th>
<th>Is this likely to result in a significant impact – yes/no? Negative or positive? Long-term, short-term or irreversible?</th>
<th>Does the potential impact need to be further investigated? Will it require management?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 What area of land will be developed? (indicate size of area, in m² or km²)</td>
<td>Replacement of 4.2km of district heating network transmission pipeline</td>
<td>Moderate construction phase impact, but will contribute to a significant positive social and environmental impact</td>
<td>No further investigation required. Construction impact management through ESMP</td>
</tr>
<tr>
<td>2.2 Will a large amount of energy, water or other natural resources be required for project construction or operation?</td>
<td>District heating requires large amounts of energy to generate heat. The project will contribute to a significant increase in the efficiency of the heating system through reduction in system heat/water losses</td>
<td>No significant increase in energy use, but positive impact on energy efficiency and reduction in air pollution</td>
<td>No further investigation required</td>
</tr>
<tr>
<td>2.3 Will a large workforce be needed for construction and operation? Is a local and/or external workforce to be employed?</td>
<td>No. The estimated workforce is anticipated to be 50-100 persons; including both transportation and construction activities. The workforce is expected to be local.</td>
<td>No. Labor influx impacts are not anticipated and are considered negligible for this project.</td>
<td></td>
</tr>
<tr>
<td>2.4 What is the expected timeframe for the project? (including construction, operation, closure and decommissioning – if appropriate)</td>
<td>A construction period of 4-6 months is proposed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5 February 2020

DRAFT

58
### Section 2 – Project Location

*This includes all aspects of the project that are required to support construction and operation*

<table>
<thead>
<tr>
<th>Questions to be considered</th>
<th>Yes/no/N.A./brief description</th>
<th>Is this likely to result in a significant environmental, social, or cultural heritage-related impact – yes/no? Negative or positive? Long-term, short-term or irreversible?</th>
<th>Does the potential impact need to be further investigated? Will it require management?</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 Is the project to be located within or adjacent to an area vulnerable to natural hazards (e.g. low-lying coastal area, waterways, floodplain, wetland, steep sloping land)?</td>
<td>Yes. Pipeline route crosses Selbe River</td>
<td>No significant impact anticipated</td>
<td></td>
</tr>
<tr>
<td>4.2 Is the project to be located adjacent to a sensitive site or facility (e.g. village, historical or archaeological or culturally significant site, conservation reserve, school, hospital/ medical facility)?</td>
<td>Yes, 1 x kindergarten</td>
<td>No significant impact as kindergarten will be closed during the construction period.</td>
<td></td>
</tr>
<tr>
<td>4.3 Is the project likely to impact on existing land uses/activities?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.4 Will the project be located in or near natural habitats (coastal area, conservation areas, protected areas, coral reefs, geothermal or volcanic field, forests etc.)</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5 Are there special land zoning considerations that need to be taken into account (e.g. will the project be within a conservation reserve, rural, urban or industrial area)?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Section 3 – Environmental and Social Impacts

<table>
<thead>
<tr>
<th>Aspect of the environment</th>
<th>Questions to be considered</th>
<th>Yes/no/N.A./brief description</th>
<th>Is this likely to result in a significant impact – yes/no? Negative or positive? Long-term, short-term, irreversible?</th>
<th>Does the potential impact need to be further investigated? Will it require management?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5.1 Topography, geology and soils</strong></td>
<td>5.1.1 Destruction, covering or modification of any unique geological or landscape feature?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.1.2 Soil contamination or disturbance of previously contaminated soils?</td>
<td>Possible unknown contaminated soil</td>
<td>Unlikely</td>
<td>Managed as required if contamination is discovered</td>
</tr>
<tr>
<td></td>
<td>5.1.3 Disturbance of soils that are fragile, or susceptible to erosion or compaction?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.1.4 Creation of steep slopes or other unstable land conditions?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.1.5 Changes in the channel of a stream, a floodplain, or the bed of the ocean or lagoon?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>5.2 Water</strong></td>
<td>5.2.1 Extraction or use of ground, surface or tank water resources, leading to reduction in the volume and quality of water available for the public water supply?</td>
<td>No</td>
<td>Water for district heating is already allocated</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.2.2 Pollution of ground, surface, coastal or sea water, via direct or indirect discharges or seepages; or through interception of an aquifer by drilling, cuts or excavations?</td>
<td>Yes. Potential for construction related water pollution</td>
<td>Unlikely to be significant. Hydrotest and other wastewater to be disposed to sewer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.2.3 Changes in currents, or the course or direction of marine or fresh water movement?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.2.4 Changes in runoff, drainage patterns or absorption rates?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.2.5 Coastal, stream or river flooding?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>5.3 Air</strong></td>
<td>5.3.1 Release of dust?</td>
<td>Yes</td>
<td>Minor dust emissions during construction phase</td>
<td>Standard mitigation measures to manage dust</td>
</tr>
<tr>
<td></td>
<td>5.3.2 Release of hazardous, toxic or noxious air pollutants/emissions?</td>
<td>Yes. Pipeline insulated in asbestos-containing material posing OHS risk</td>
<td>Not significant if managed</td>
<td>Activity-specific CESMP and training program to be developed with oversight from asbestos specialist</td>
</tr>
<tr>
<td></td>
<td>5.3.3 A significant increase or decrease in local or regional greenhouse gas emissions?</td>
<td>No</td>
<td>Additional heat generation capacity is not proposed</td>
<td></td>
</tr>
<tr>
<td><strong>5.4 Noise</strong></td>
<td>5.4.1 A significant increase in existing (baseline) noise levels that will adversely affect people or animals?</td>
<td>No</td>
<td>Construction noise may result in moderate short-term impacts</td>
<td></td>
</tr>
<tr>
<td><strong>5.5 Plant life</strong></td>
<td>5.5.1 Damage to or clearing of vegetation communities (e.g. upland forest)?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.5.2 Damage to or destruction of important plant communities?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.5.3 A reduction in agricultural crop production?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.5.4 The farming or production of an exotic plant species?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.5.5 The spread or introduction of an invasive plant</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.6 Animal Life</td>
<td>5.6.2 Reductions in the numbers of unique, rare or endangered animal species?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>----</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.6.3 Reductions in animal populations harvested regularly for human consumption (e.g. fisheries)?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.6.4 Damage to or destruction of habitat for animal communities on land or in rivers?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.6.5 Barriers to the migration or movement of animals?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.6.6 The farming or production of an exotic animal species?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.6.7 The spread or introduction of an invasive animal species?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.7 Natural resources</td>
<td>5.7.1 The extraction, harvest or consumption of natural resources (e.g. timber, minerals, water)?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.7.2 A noticeable increase in the rate of use of any natural resource?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.7.3 Substantial depletion of non-renewable resources?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.8 Human communities</td>
<td>5.8.1 Encroachment into existing settlement areas or customary lands?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.8.2 Influx of an external workforce or in-migration to the project area?</td>
<td>NA</td>
<td>Locally-recruited workforce</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.8.3 Demand for additional housing to accommodate an external workforce?</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.8.4 Increased traffic or increased use of roads and the existing transport system; and an increase in associated health risks (dust, noise)?</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.8.5 Increased demand for and disruption to social services and infrastructure (e.g. water and energy supply, communications, sewage and waste disposal, fire protection, police, schools, medical care)?</td>
<td>Yes</td>
<td>Temporary disruption to heating system with minor impacts on industrial users</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.8.6 A reduction in visual amenity?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.8.7 Infringement on customs or customary rights?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.8.8 Social change or impacts on traditional governance structures, resulting in community dislocation or loss of community cohesion?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.8.9 Restrictions in access to customary areas or restrictions in resource use in customary areas? Restrictions to protected areas and / or legally protected areas?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.8.10 Changes in access to or the quality of recreational opportunities?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.9 Waste</td>
<td>5.9.1 Generation of waste requiring disposal?</td>
<td>Yes. Waste concrete and steel pipeline sections</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.9.2 Generation of hazardous or other toxic waste?</td>
<td>No. Asbestos is not considered environmentally hazardous</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.9.3 Generation of wastewater or other liquid waste?</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Annex 2   

Asbestos Management Plan

ULAANBAATAR HEATING SECTOR IMPROVEMENT PROJECT

DRAFT Asbestos Management Plan

This Asbestos Management Plan is principles-based and will be revised during implementation with the assistance of an asbestos expert to provide more specific guidance on management of asbestos containing materials (ACM) encountered under the project. The Management Plan draws on good international industry practice with the objective of protecting worker and community health.

1. Background and Problem Definition

Asbestos is a group of naturally occurring fibrous minerals with current or historical commercial usefulness due to their extraordinary tensile strength, poor heat conduction, and relative resistance to chemical attack (WHO). The properties that make asbestos fibers so valuable to industry are its high-tensile strength, flexibility, heat and chemical resistance, and good frictional properties.

There are two main types of asbestos containing materials (ACM): a) friable and b) bonded.

   a) Friable asbestos products are soft and loose and can be crumbled into fine material or dust with very light pressure, such as crushing with your hand. Such products usually contain high levels of asbestos (up to 100% in some instances), which is loosely held in the product so that the asbestos fibers are easily released into the air. Friable asbestos products are dangerous because the asbestos fibers can get into the air very easily and may be inhaled by people living or working in the vicinity. Bonded asbestos products are made from a bonding compound (such as cement) mixed with a small proportion (usually less than 15%) of asbestos.

   b) Bonded asbestos products are solid, rigid and non-friable. The asbestos fibres are tightly bound in the product and are not normally released into the air. When in good condition, bonded asbestos products do not normally release any asbestos fibres into the air and are considered a very low risk for people who are in contact with them, as long as appropriate safety precautions are used when they are disturbed (enHealth 2013).

The asbestos used as heat insulator in DH belongs to friable asbestos products. And asbestos content can be up to 100%. Commonly Loose asbestos lagging\(^6\) (asbestos content up to 100 %) were used or Asbestos fabrics, tapes and cords\(^7\) (asbestos content highly variable, from 3-90 %). (EC, 2011\(^8\))

Asbestos fibres enter the body by inhalation of airborne particles or by ingestion and can become embedded in the tissues of the respiratory or digestive systems. Prolonged exposure to asbestos can cause numerous disabling or fatal diseases. Among these diseases are asbestosis, an emphysema-like condition; lung cancer; mesothelioma, a cancerous tumour that spreads rapidly in the cells of membranes covering the lungs and body organs; and gastrointestinal cancer (OSHA, 1995).

Currently, about 125 million people in the world are exposed to asbestos at the workplace. Approximately half of the deaths from occupational cancer are estimated to be caused by asbestos. In 2004, asbestos-related lung cancer, mesothelioma and asbestosis from occupational exposures resulted in 107,000 deaths and 1,523,000

\(^6\) Loose asbestos lagging was used as a filling material for heat- and soundproofing and as protection against fire for pipe ducts and fireproof doors.

\(^7\) Asbestos tapes and cords are found as heat and fireproof sealing material in fireproof doors and fireproof shutters, in smokeproof doors and gates, in kilns, boilers and high-temperature installations, in flanges on heating pipes and ventilation ducts. Cords and tapes were also used as filling materials in expansion joints

\(^8\) Practical Guidelines for the Information and Training of Workers Involved with Asbestos Removal or Maintenance Work
Disability Adjusted Life Years (DALYs). In addition, several thousands of deaths can be attributed to other asbestos-related diseases, as well as to nonoccupational exposures to asbestos. (WHO, 2018)

Most people who develop asbestos-related diseases have worked on jobs where they frequently breathed in large amounts of asbestos fibres. For example, in the past, construction workers using unsafe practices may have frequently encountered asbestos fibre levels well above background levels. The current regulated workplace limit (over an eight-hour period) is 100 fibres per litre of air (which is between 500 and 10,000 times background levels). In the past, workers in asbestos milling or mining often encountered fibre concentrations a million times higher than background levels.

Mongolia, like many other countries in Asia, continues to use asbestos, with over 90% used in the construction sector. Furthermore, there has been the significant past use of asbestos in Mongolia, over many decades. Renovation and demolition activities in the energy and construction sectors will pose a continuing risk of the development of asbestos-related diseases. Proper oversight of such activities and the safe removal and disposal of asbestos must be considered to avoid these risks.

The Ulaanbaatar centralized district heating network supplies approximately 380,000 urban households. The network comprises several steam generators and a transmission and distribution system connecting to households. With the extremely low temperatures experience in Ulaanbaatar the heating infrastructure is insulated to avoid heat loss during transmission. Historically, the pipe insulation has comprised a matrix of wool and friable asbestos encased in cementitious material. It is estimated that 50 percent of the transmission pipelines are in poor technical condition, urgently requiring replacement. The insulation on these pipeline sections is often compromised exposing ACM to the atmosphere and the potential for liberation of asbestos fibres.

2. Regulatory Environment

*International Labour Organisation (ILO)*

The International Labour Conference at its 95th Session in 2006 adopted a resolution noting that all forms of asbestos, including chrysotile (so called blue asbestos), are classified as human carcinogens by the International Agency for Research on Cancer (IARC), and expressing its concern that workers continue to face serious risks from asbestos exposure, particularly in asbestos removal, demolition, building maintenance, ship breaking and waste handling activities. The resolution calls for the elimination of the future use of asbestos and the identification and proper management of asbestos currently in place as the most effective means to protect workers from asbestos exposure and to prevent future asbestos-related diseases and deaths.

The ILO Asbestos Convention, 1986 (No. 162), provides for the measures to be taken for the prevention and control of, and protection of workers against, health hazards due to occupational exposure to asbestos. Key provisions of Convention No. 162 concern:

- replacement of asbestos or of certain types of asbestos or products containing asbestos with other materials or products evaluated as less harmful;
- total or partial prohibition of the use of asbestos or of certain types of asbestos or products containing asbestos in certain work processes; and
- measures to prevent or control the release of asbestos dust into the air and to ensure that the exposure limits or other exposure criteria are complied with and also to reduce exposure to as low a level as is reasonably practicable.

The ILO Occupational Cancer Convention, 1974 (No. 139), provides for the measures to be taken for the control and prevention of occupational hazards caused by carcinogenic substances and agents. Key provisions of Convention No. 139 concern:
• periodically determining the carcinogenic substances and agents to which occupational exposure shall be prohibited or made subject to authorization or control;

• making every effort to have carcinogenic substances and agents to which workers may be exposed in the course of their work replaced by non-carcinogenic substances or agents or by less harmful substances or agents;

• reducing the number of workers exposed to carcinogenic substances or agents and the duration and degree of such exposure to the minimum.

**World Bank Policy**

The World Bank policy on asbestos (World Bank Group, 2009) promotes good practice in minimising the health risks associated with ACM by:

• avoiding its use in new construction and renovation; and

• by using internationally recognized standards and best practices to mitigate health and safety risks when removing existing ACM.

In all cases, the Bank expects borrowers and other clients of World Bank funding to use alternative materials wherever feasible. ACM should be avoided in new construction, including construction for disaster relief. In reconstruction, demolition, and removal of damaged infrastructure, asbestos hazards should be identified, and a risk management plan adopted that includes disposal techniques and end-of-life sites.

**Mongolian Asbestos Regulation**

The Law on Toxic and Hazardous Substances (LTHS) regulates the use of toxic and hazardous substances including asbestos. Under this Law, the Mongolian government approves lists of substances which are prohibited and those that have restricted use. All forms of asbestos are included in the list of restricted substances. Article of 3.1.4 of the LTHS permits use of toxic and hazardous substances at permitted places for specific purposes under strict control and in regulated amounts. For example, all forms of asbestos and asbestos containing materials are allowed to be used in the energy sector for thermal insulation and heat resistant materials.

Mongolian National Standard MNS 4990:2015 Occupational Health and Safety, Occupational Health and Hygiene requirements sets regulatory occupational exposure limits for airborne contaminants at workplace. This standard states occupational exposure limits for asbestos for 8 hour-Time Weighted Average as 0.1 fiber per cubic centimetre (f/cc). As carcinogen, there is no allowed exposure limits for asbestos in general environment. Exposure to asbestos shall be determined based on air sample collected worker’s breathing zone and analysis of Phase Contrast Microscopic or Transmission Electron Microscopic method.

The Law on Occupational Safety and Hygiene 2008 specifies requirements for ensuring a safe and hygienic work environment for employees. Where an employee may be exposed to toxic and dangerous chemical substances (including asbestos), explosives, explosive devices, radioactive, and biologically active substances the employer must take preventative measures to protect the health of employees. This includes training on the impacts of these substances and exposure protection measures. An employer must provide appropriate protective equipment for its employees at no cost to the employee.

Employers of workers who are involved in asbestos removal are required to implement engineering and administrative controls and provide protective equipment to ensure asbestos exposure does not exceed 0.1 fibre per cubic centimetre over an eight-hour period (equivalent to the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL)).
At the time of writing Mongolia does not have a regulatory regime for ACM. Damiran et al. (2015) noted an immediate and urgent need for the Mongolian government to develop a comprehensive action plan and road map for the elimination of asbestos exposure with the ultimate goal of a total ban on the use of asbestos. As an interim measure, employers must implement and enforce internationally accepted occupational hygiene practices, including engineering and administrative controls shown to reduce exposures to asbestos.

An Asbestos Working Group in Mongolia has developed a regulation based on the Occupational Safety and Health Administration (OSHA) Standard 1910.1001 - Asbestos. The regulation is awaiting approval by the Minister of Labor and Social Security which is expected by January 2020.

3. **Asbestos Removal Procedures**

The following is a general list of requirements for asbestos removal activities derived from the Safe Work Australia (2018) *Code of Practice: How to safely remove asbestos*. The pending Mongolian regulation – Safety Instruction on Asbestos Handling – will include comparable measures.

*Supervision*

All asbestos removal activities must be supervised by a trained expert. For this project the supervision team will comprise the consultant asbestos specialist and the duly trained contractor’s supervisor.

*Training*

A training program will need to be developed for the contractor’s workers that will be involved in the removal, packaging, transport and disposal of ACM. The training program must be appropriate for the activity, undertaken prior to the commencement removal activities and include the following elements:

- the nature of the hazards and risks
- how asbestos can affect a person’s health and the risks arising from exposure to airborne asbestos
- the control measures in place and maintenance of the asbestos removal control plan for that job
- the methods and equipment that will be used to do the job properly
- choosing, using and caring for personal protective equipment (PPE) and respiratory protective equipment (RPE)
- decontamination procedures
- waste disposal procedure; and
- emergency procedures.

Two levels of training are proposed under the Safety Instruction on Asbestos Handling:

- Supervisor (40 hours) - focused on planning and organizing asbestos removal and handling activities; and
- Worker (8 hours) - focused on hazard awareness, protective equipment and following the asbestos management plan.

*Asbestos Removal Control Plan*

An Asbestos Removal Control Plan is a document that identifies the specific control measures to be used to ensure workers and other people are not at risk when asbestos removal work is being conducted. It is focused on the
specific control measures necessary to minimise any risk from exposure to asbestos. An asbestos removal control plan helps ensure the asbestos removal is well planned and carried out in a safe manner. The Control Plan must include details of:

- how the asbestos removal will be carried out, including the method, tools, equipment and PPE to be used; and
- the asbestos to be removed, including the location, type and condition of the asbestos.

Each contractor will be required to prepare its own Control Plan which will need to specify the PPE that will be provided to workers and also the budget provision in its bill of quantities (BoQ).

**Access Control**

Signs are to be erected at each removal site to indicate where the asbestos removal work is being carried out and barricades erected to delineate the asbestos removal area. Access to the removal area must be limited to the following people:

- workers who are engaged in the removal work;
- other people who are associated with the removal work; and
- people who are allowed under the Regulations to be in the asbestos removal area (for example inspectors, emergency service workers).

**Decontamination**

Decontamination for the work area, workers, PPE and tools used in asbestos removal work is an important process in eliminating or minimising exposure to airborne asbestos fibres, particularly to people outside the asbestos removal work area. The risks of each individual asbestos removal job should be assessed to determine the appropriate decontamination procedure.

Decontamination facilities must be available to decontaminate the asbestos removal work area, any plant used in that area, workers carrying out the asbestos removal work, and other persons who have access to the asbestos removal area because they are associated with the asbestos removal work.

**Waste Containment and Disposal**

Proper disposal of ACM is important not only to protect the community and environment but also to prevent scavenging and reuse of removed material. ACM should be transported in leak-tight containers to a secure landfill operated in a manner that precludes air contamination that could result from ruptured containers (World Bank, 2009).

The removal contractor must ensure that asbestos waste is contained and labelled before it is removed from the asbestos removal area. Waste must be disposed of as soon as is practicable at a site authorised to accept asbestos waste. The disposal site and method for disposal and containment will be determined in consultation with the Municipality of Ulaanbaatar.

**Removing Friable Asbestos**

The asbestos within the pipe insulation is friable posing an increased risk of airborne fibre generation. All friable asbestos must be removed using the wet spray method. This method requires the use of a constant low-pressure water supply for wetting down asbestos and related items to suppress asbestos fibres. Asbestos fibres are significantly suppressed under this method however they are not entirely eliminated so the use of RPE is also essential. Consideration should be given to applying a polyvinyl acetate (PVA) emulsion as it may be more effective than water in minimising fibre release. Fully or partially enclosing shall be used at worksite with friable asbestos removal to avoid asbestos contamination spread to environment.
4. **Personal Protective Equipment**

Asbestos removal is a high hazard activity, appropriate personal protective equipment (PPE) must be worn regardless of other health and safety control measures in place. PPE must be selected to minimise the risk to health and safety by ensuring it is:

- suitable for the nature of the work and any hazard associated with the work;
- a suitable size and fit and reasonably comfortable for the person wearing it;
- maintained, repaired or replaced so it continues to minimise the risk, including ensuring that the PPE is clean, hygienic and in good working order; and
- used or worn by the worker, so far as is reasonably practicable.

Workers must be provided with information, training and instruction in the proper use and wearing of PPE; and its storage and maintenance. A worker must, so far as reasonably able, wear the PPE in accordance with any information, training or reasonable instruction.

The effectiveness of PPE relies heavily on workers following instructions and procedures correctly, as well as fit, maintenance and cleaning. If PPE must be used for long periods, if dexterity and clear vision are needed for the task, or if workers have not been adequately trained on how to fit and use PPE properly, workers might avoid using it.

PPE includes the following items:

- **Coveralls** - ideally disposable coveralls should be provided which are of a suitable standard to prevent tearing or penetration of asbestos fibres; one size too big, as this will help prevent ripping at the seams; and fitted with hood and cuffs to prevent entry of asbestos fibres;

- **Gloves** - gloves should be worn when conducting asbestos removal work. If significant quantities of asbestos fibres may be present, single-use disposable nitrile gloves should be worn. Gloves used for asbestos removal work should be disposed of as asbestos waste;

- **Safety footwear** - safety footwear (for example steel-capped, rubber-soled work shoes or gumboots) should be provided for all workers removing asbestos. Safety footwear should be laceless, as laces and eyelets can be contaminated and are difficult to clean. The footwear should remain inside the asbestos removal area for the duration of the asbestos removal work and should not be shared for hygiene reasons;

- **Respiratory protective equipment (RPE)** - all workers engaged in asbestos removal work must wear RPE conforming to the appropriate international standard, which in the Mongolian context is MNS 6654:2017 Occupational Health and Saftey, Occupational Health and Hygiene Requirements. The selection of suitable RPE depends on the nature of the asbestos removal work, the probable maximum concentrations of asbestos fibres expected and any personal characteristics of the wearer that may affect the facial fit of the respirator (for example facial hair and glasses).

5. **Waste Transport and Disposal**

When developing a waste transport and disposal plan, the following should be taken into account:

- the containment of waste so as to eliminate the release of airborne asbestos fibres;
- details of any asbestos or ACM to be left in situ;
- the location and security of waste storage on site;
- the transport of waste within the site and off site;
- the location of the waste disposal site;
• approvals needed from the relevant local disposal authority; and
• any local disposal authority requirements that may apply to the amount and dimensions of asbestos waste.

Loose asbestos waste must not accumulate within the asbestos removal work area. The loose asbestos waste should be placed in labelled asbestos waste bags or wrapped in heavy-duty polyethylene sheeting (minimum 200 μm thickness) and labelled. Once the labelled asbestos waste has been removed from the asbestos removal area it should either be placed in a solid waste drum, bin or skip; or removed immediately from the site by an approved/licensed carrier for disposal.

6. Specific guidance for the Ulaanbaatar Heating Sector Improvement Project

A detailed methodology for the removal activities under the Urban Heating Project will be prepared by the asbestos expert in consultation with the World Bank/AIIB, UB District Heating Company and the asbestos removal contractor. Methodology will focus on workers and community safety and follow above laid guidelines as well as Mongolian regulation – Safety Instruction on Asbestos Handling when adopted. The methodology will be prepared in advance of project works and will be a condition for initiation of tendering for works.

The methodology will focus on:

i) Requirements for contractor’s and stipulations of clauses in the tendering documents

ii) Risk assessment – determining the content of asbestos and risks of exposure incurred by workers, to assess them and to take the necessary precautions.

iii) Notification to the occupational health and safety authority responsible for the work site of any demolition, refurbishment and maintenance work prior to commencement

iv) Work plan\(^9\) with working instructions- lay down the technical and personal protective measures to be taken in a work plan. Working instructions for workers should be concise and clearly formulated

v) Training of project stakeholders and training of contractor and workers: initial and ongoing\(^10\) should be planned and documented.

vi) Transport, Storage and Disposal of Asbestos

---

\(^9\) It should address the following points: a) arranging the building site and access arrangements; b) how the work and the work procedures are to be carried out, including consideration of technical precautions and personal protective equipment; c) how the work is going to be supervised; d) how unforeseen issues are to be dealt with; e) rules on working hours and breaks (especially when respiratory protective equipment is used); f) dealing with waste; g) re-opening of the site after completion of the work; h) communication.

\(^10\) Training of workers should include: a) the properties of asbestos and its effect on health including the aggravating effect of smoking, b) medical examination requirements, c) specific products containing asbestos used in the work, d) tasks during which exposure can occur, e) safe work practices and use of personal protective equipment, f) decontamination procedures, g) what to do in the case of breakdowns, accidents and other emergencies, h) how to deal with waste.
References


Safe Work Australia (2018) *Code of Practice: How to safely remove asbestos*. October 2018

Traffic Management Plan guidelines

The general traffic management plan guidelines for the Project are developed for the purpose of guiding the preparation of site-specific Traffic Management Plan and ensuring traffic safety in the local communities and the construction sites during the construction of the Project. These guidelines are developed based on the local requirements of UB, and the WB EHSGs and Good Practice Note on Road Safety of the WB, ESF including (i) Safe Workplaces at Construction site, (ii) Safe Vehicle at Construction site, (iii) Safe Driver and Driver-related practices, (iv) Traffic safety, (v) Emergency Preparedness and response.

I. Purposes

This guideline aims to ensure the traffic safety in the local communities and at the construction sites in the construction process of the Project, in particular, to protect the pedestrians, bicyclists, and workers including the materials supply workers, construction workers, and transport vehicle drivers.

II. Preparation of site specific TMP

As part of its bid the successful Contractor is required to submit a preliminary TMP, which will ultimately form part of the contractor ESMP. Before work commencement, updated TMP approved by local authority will be submitted to PMU. It will be presented to the workers on a regular basis.

The site specific traffic management plan will provide for:

a) the safety of the workers at the worksite and the public passing through or adjacent to the worksite;
b) overall strategy for the management of traffic, including traffic staging methodology during various stages of the work;
c) temporary traffic management arrangement for each stage of the works (including delivery of raw material on site);
d) arrangement and number of traffic controllers required for each stage of the works;
e) emergency access – for both workers and any emergency services vehicles travelling through the worksite; any unusual hazards or job specific requirements e.g. nearby school or access to shops;
f) use of alternative routes or detours as required;
g) provision for over-dimensional vehicles;
h) provision of safe passage for pedestrians, cyclists and people with disabilities;
i) provision for, and impact on, public transport (e.g. delay to buses/trams, restrictions on passenger access to bus or tram stops, potential for traffic to queue across an adjacent railway crossing), including where possible, priority for public transport;
j) provision for access to abutting properties;
k) duration and times for conducting the works (e.g. day or night operation);
l) traffic management arrangements at the worksite outside normal working hours or when workers are not present at the site (after-care);
m) arrangements to address and monitor the risk of end-of-queue collisions due to a build-up of traffic at worksites;
n) emergency response procedures and contact details;
o) the actions to be taken to address crashes – including the requirement for root-cause analyses as a means to understand if further traffic management needs to be put in place to mitigate the risks and to help prevent that situation re-occurring; and,
p) communication arrangements.
III. Measures to be included in the TMP

a) General Measures

- Warning signs and night warning lights shall be erected at road intersections, crowded areas, and places with traffic safety hazards such as hospitals, schools, kindergartens and other spaces of public activities;
- Warning signs and speed limit signs shall be provided, and full-time traffic command personnel shall be assigned at sensitive receptors such as sites of pipeline construction in the community affecting road traffic or involving vehicles entering the community;
- Passages to emergency exits should be unobstructed at all times. Exits should be clearly marked to be visible in total darkness. The number and capacity of emergency exits should be sufficient for safe and orderly evacuation of the greatest number of people present at any time, and there should be a minimum two exits from any work area;
- Constant contact shall be kept with the traffic management department during the construction period to coordinate matters concerning transportation vehicles entering the construction sites;
- Traffic signs and facilities shall be erected at obvious positions in the construction sites of the construction works and on both sides of main passages, road intersections and temporary roads; special personnel shall be assigned for proper maintenance of such signs. The requirements of traffic organization in the construction stage shall be consistent with the respective requirements and regulations of the UB.

b) Traffic measures for construction activities near communities

- Obstacles with impacts on traffic shall be removed and then sidewalks are properly dealt with to provide space for pedestrian according to the relevant regulations;
- Visible signs shall be erected at road intersections to remind vehicles intending to enter the closed construction sections to bypass; traffic signs and traffic guidance facilities shall be provided on site;
- A full-time traffic coordinator shall be assigned to keep timely contact the traffic police department;
- Special personnel shall be assigned for traffic diversion during the construction period.
- The road surface shall be kept clean and tidy to ensure that no construction dust is raised;
- A traffic coordination office shall be established as a special body of traffic management;
- Signs shall be erected according to the national standards, and fences at the road intersections shall be well aligned and rounded;
- No materials shall be stockpiled on traffic lanes;
- No traffic changes shall be made until at the consent of the traffic police in the event of any special circumstances in the construction stage;
- Stronger efforts shall be made in safety education at the community level as well as for drivers of the transportation vehicles engaged in the implementation of the Project;
- Emphasizing safety aspects among drivers;
- Improving driving skills and requiring licensing of drivers;
- Adopting limits for trip duration and arranging driver rosters to avoid overtiredness;
- Avoiding dangerous routes and times of day to reduce the risk of accidents;
- Use of speed control devices (governors) on trucks, and remote monitoring of driver actions;
- Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure;
- Minimizing pedestrian interaction with construction vehicles;
- Collaboration with local communities and responsible authorities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations where children may
be present. Collaborating with local communities on education about traffic and pedestrian safety (e.g. school education campaigns);

- Coordination with emergency responders to ensure that appropriate first aid is provided in the event of accidents;
- Using locally sourced materials, whenever possible, to minimize transport distances. Locating associated facilities such as worker camps close to project sites and arranging worker bus transport to minimizing external traffic.

c) Industrial Vehicle Driving and Site Traffic

Poorly trained or inexperienced industrial vehicle drivers have increased risk of accident with other vehicles, pedestrians, and equipment. Industrial vehicles and delivery vehicles, as well as private vehicles on-site, also represent potential collision scenarios. Industrial vehicle driving and site traffic safety practices include:

- The space provided for each worker, and in total, should be adequate for safe execution of all activities, including transport and interim storage of materials and products;
- Training and licensing industrial vehicle operators in the safe operation of specialized vehicles such as forklifts, including safe loading/unloading, load limits;
- Ensuring drivers undergo medical surveillance;
- Ensuring moving equipment with restricted rear visibility is outfitted with audible back-up alarms;
- Establishing rights-of-way, site speed limits, vehicle inspection requirements, operating rules and procedures (e.g. prohibiting operation of forklifts with forks in down position), and control of traffic patterns or direction;
- Restricting the circulation of delivery and private vehicles to defined routes and areas, giving preference to ‘one-way’ circulation, where appropriate.

d) Key traffic signs and facilities

- The construction sites shall be separated from the carriageways with enclosure of no less than 1.8m in height and made of zinc-iron corrugated boards (green) with a thickness of not less than 2mm. Slogans about construction safety and civilized construction shall be erected and unrelated persons shall not be allowed to enter the construction sites.
- Signs on the construction sites shall be conspicuous. Road signs shall be set up at a certain distance in front of and behind the construction sections indicating "Bypass Here, Construction Works Ahead" or "Slow Down; Construction Works Ahead". Full warning lights shall be provided at night.
- Obvious signs shall be set up at the entrance and exit of the construction sites, and special personnel shall be assigned for traffic maintenance to reduce the interference and avoid accidents between road construction machinery and dump trucks entering and leaving the construction site and non-constructional vehicles.
- Temporary traffic guidance signs and prohibition signs shall be set up at the various intersections and temporary roads in cooperation with the traffic management authority and assistance shall be provided to the traffic management authority in proper traffic management for temporary roads.

IV Emergency preparedness and response plan

Emergency preparedness and response plan shall be developed based on traffic risks during construction, mainly including:

- The contractors shall make a contact list, to include all the internal and external supporting organizations and personnel, as well as the name, profile, address and contact information (telephone and e-mail) of each organization. The list shall be updated on a yearly basis. The emergency preparedness and handling plan shall be adjusted, checked and updated as per the equipment, personnel and facilities;
• Emergency staff shall be coordinated with to ensure proper emergency treatment in case of an accident;
• Traffic control measures shall be adopted to warn the pedestrians and vehicles about the dangers by road signs or signalmen;
• An emergency shall be handled in the shortest time to ensure proper treatment of an emergency (traffic accident or traffic safety);
• Contractors shall establish the accident reporting mechanisms and submit the report when finish treating an emergency;
• Employees shall be provided with trainings and drills of related procedures to improve their emergency response capabilities.