Environmental Monitoring Report

Annual Report
Project Number: 41193-015 and 41193-019
January 2017

Mongolia: Western Regional Road Corridor Investment Program, Tranches 1 and 2

Prepared by the Project Implementation Unit (Ministry of Road and Transportation Development) for the Government of Mongolia, Ministry of Environment and Tourism, and the Asian Development Bank.

Document Title	EMR 2016 (covering January– December 2016)		
Prepared by	PIU	**Issue Date**	
Reviewed by		**Review Frequency**	12 Months
Approved by		**Version**	Final
Finalized in December 2016		**Total Pages**	**81**

2016

ANNUAL ENVIRONMENTAL MONITORING REPORT

Western Regional Road Corridor Development Program

Project Implementation Unit

12/28/2016

CONTENTS

ABBREVIATIONS

MRT – Ministry of Road and Transportation

ADB – Asian Development Bank

MET – Ministry of Environment and Tourism

EIA- Environmental Impact Assessment

DEIA- Detailed Environmental Impact Assessment

EMP- Environmental Management Plan

EPP- Environmental Protection Plan

EMR-Environmental Monitoring Report

PIU – Project Implementation Unit

COMO – Community Outreach Monitoring Officers

HSE – Health, safety and environment

1. INTRODUCTION

1.1 ABOUT THE REPORT

This annual Environmental Monitoring Report summarizes environmental works and activities carried out by the Project Implementation Unit, the Contractors, the Supervising consultant and their environmental staff and consultants. It also provides evaluation on implementation of the Environmental Management Plan for the Western Regional Road Corridor Development Project during the 2016 construction season which lasted between April and October.

This report is prepared by the PIU Environmental Monitoring Consultant E.Hasar with inputs from the Contractors.

The report comprises of following sections:

1. Section 1 provides brief introductions to this EMR report, updates on construction progress and description of the environmentally sensitive areas.
2. Section 2 describes environmental requirements, EMP objectives, environmental personnels and trainings organized.
3. Section 3 provides summary of community consultation activities took place during the 2016 construction season.
4. In Section 4, mitigation measures and actions undertaken during 2016 have been summarized.
5. In section 5, environmental monitoring activities carried out in 2016 and the corresponding results have been analyzed.
6. Section 6 provides conclusion of environmental works in 2016 and recommendations on further activities.

1.2 PROGRESS UPDATE

Tranche-1 section:

Construction was completed in 2015 and the road section has been handed over to the Government of Mongolia in October 2015. The contractor CJJC has maintained some of its personnels and equipments at their construction camp sites in 2016 for a guarantee period. The contractor did handover and maintenance jobs as described in water resource management section in EMR.

Tranche-2 section:

2016 construction season for the Tranche-2 section has commenced on April 18, 2016 The Tranche-2 section, which connects Khovd provincial center to Ulaanbaishint border point, is divided into 4 lots. The contractor for the lots CW1-1, CW1-3 and CW 1-4 is Huashi Enterprises Co., Ltd while the contractor for lot CW1-2 is HKB International LLC. Inter Continental Technocrats (ICT) LLC has been chosen as the supervising consultant for all four lots of the Tranche-2.

Table 1: Construction work progress rate for Tranche-2 section

Lots	Start and end points	Length, km	Actual work progress rate as of October 30, 2016	Targeted work progress rate up to October 30, 2016
CW1-1	Shurga bridge to Khashaat pass	50 km	17.2%	29.62%
CW1-2	Khovd provincial center to Shurga bridge	53.9 km	24.91%	33.22%
CW1-3	Khashaat pass to Tolbo lake	60 km		
CW1-4	Tsagaannuur village to Ulaanbaishint border town	25.8km	Has not started yet.	

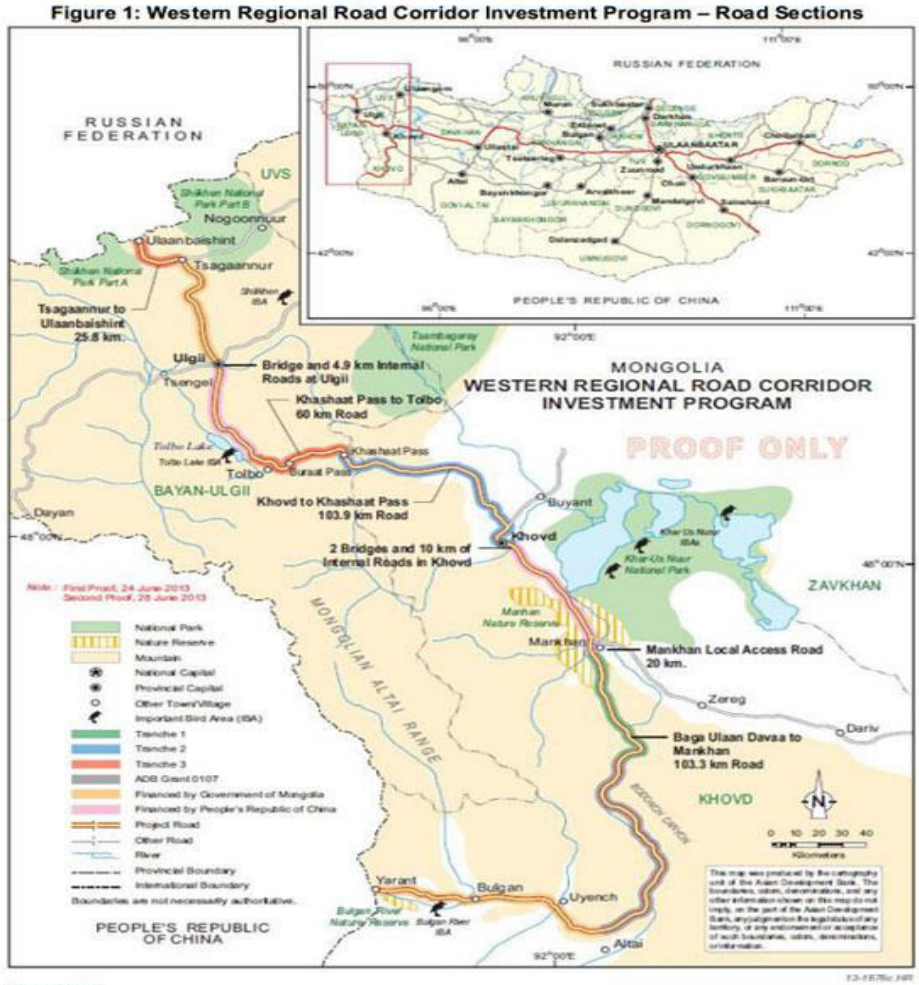
Contract Package CW1-1: During the 2016 construction season, the Contractor has mobilized total 111 laborers, of which 96 are Chinese workers and 15 are local workers. A total of 71 equipments were mobilized, of which 12 were owned and 71 were hired by the contractor. These resources were deployed on installation of the culvert pipe manufacturing plant and crusher plant and earthworks such as site clearance and embankment construction works.

Contract Package CW1-2: During the 2016 construction season, the Contractor has mobilized total 194 laborers, of which 156 are Chinese workers and 38 are local workers. A total 131 equipments were mobilized including AC mixing plant, Crushing plant and concrete mixing plant at the project site. The Contractor has three bridge construction teams at the site. These resources were deployed on activities of establishment of main camp for the Contractor's and the Engineer's staff, which is located at Km 76+740, sub camps for structure works (bridge and culvert construction works) which are near Km 57+240, Km 68+980 and Km 82+800 of the road of Contract Package CW1-2 and earthwork comprising site clearance and embankment filling

and cutting and preparatory works of bridge construction works. Site clearance was made for 43.18km section and sub-base construction was made for 34.6 km section.

Contract Package CW1-3: During the 2016 construction season, the Contractor has mobilized total 163 laborers, of which 79 are Chinese workers and 84 are local workers. A total of 84 equipments are mobilized at the project site. These resources were deployed on construction of camp which is located at 200m on RHS of Km 66+000 of the road of Contract Package CW1-3 for the Contractor and Engineer's staff, two (2) sub-camps at 256m on LHS of Km 81+500 and at 557m on RHS of Km 114+163 respectively, identification of locations of borrow areas and quarries, survey work, site clearance, earthwork and culverts. Construction progress is not in line with the planned schedule.

Figure 1: Project location



Source: ADB

1.3. ENVIRONMENTALLY SENSITIVE AREAS FOR TRANCHE-2 SECTION.

5 environmentally sensitive areas were identified along Tranche-2 road corridor. The key criterions for identifying such areas were number and location of sensitive receptors such as local herders, grazing land, important water resources and wildlife habitat. A separate EMP was developed for environmentally sensitive areas within the domestic DEIA update works.

1. **Buraat river valley:** is located in the CW1-3 section between STA.74 and STA.80. Buraat is a tight river valley (less than 1 km wide at some points) with much of the valley is covered by grassland and marshes. There are 3 permanently dwelling households and a fodder field in the valley.
2. **Olon nuuruud:** is located at the end point of CW1-3 section nearby Khashaat pass between STA.98+500 and STA.101+500. This area has an important surface and ground water resources and a habitat to a number of migratory bird species during summer season. The road crosses the Hongor Ulun river and passes through northern part of the area.
3. **Buyant river delta:** is located at the lot CW1-2, between STA.82+900 and STA.88+200. Buyant river is the second largest river in the region and is one of the main tributaries to the Great Lakes. Buyant river valley is a home to agricultural planting and livestock pasture for the local people. There are about 1800 households of Buyant, Khovd and Jargalant soums plant watermellon down stream.
4. **Hongio river valley:** is located at the lot CW1-1 section between STA.2+800 and STA.21+600. This area has important historical remainings such as sculptures and tombs. The Hongio river is the main drinking water source for livestock during summer time. The river valley is tight (2-3 km wide at some points) with much of the valley is covered by grasses and marshes. Hongio river valley is one of the main pasture lands for herds people of Erdeneburen soum during summer time with 70-80 herder households residing there.
5. **Bayan lake:** is a small lake which seizes around 10 hectares of area nearby the Tsagaan nuur village of Nogoonnuur soum. This area is elevated 2230m above sea level. This lake serves as a habitat for migratory bird species during summer time. Within the updated

domestic DEIA, this sensitive area is set out as covering 711 hectares of area around the lake between STA.4+800 and STA.23+800 of the lot CW1-4.

Figure 2: Buraat river valley, lot CW1-3, Tranche 2.

2. ENVIRONMENTAL PROTECTION AND MANAGEMENT

2.1. ENVIRONMENTAL REQUIREMENTS

Environmental responsibilities for the Contractors and their construction activities are stated in the Contract signed between the ADB, MRT and the contractors. On one hand, all the construction activities shall meet ADB's rules and standards regarding environmental protection, and on the other hand, it shall obey the environmental laws and regulations of Mongolia.

The Contractors are also responsible for obtaining necessary permission on quarry sites, borrow pits and drilling water wells from the local soum Governments. In addition, funding and expenses related to implementation of the Environmental Management Plan and report preparation are included in their contracts.

According to the requirements specified in the "Regulation on EMP Approval for Projects in Mongolia", any project has to update its EMP and DEIA report every 5 year to reflect recent changes in project development, planning or design. Domestic DEIA for the WRRCDP project was developed and approved by the MET back in 2009. Thus, the project DEIA for Tranche-2 section has been updated and approved by MET in 2016.

2.2. DEIA UPDATE WORKS

The DEIA update works have started on June 16, 2016. Environmental field survey was conducted by the DEIA Team between June 23 and July 3. Baseline Environmental Survey and Project Description chapter of the DEIA report was completed on July 25 and General Impact Assessment was issued by the Ministry of Environment and Tourism on July 29, 2016. The DEIA report has been completed and approved by MET on November 18, 2016. Also, within the process of DEIA update works, public consultation meetings at Buyant, Erdeneburen, Khovd, Tolbo and Nogoonnuur soums. More detailed information about the outcomes of the consultation meetings are provided in Section 3 of the EMR.

The DEIA Team was comprised of 9 environmental and social specialists.

Table 2. Time contribution by each specialist

No.	Position	Time contribution as of Aug 30 /person/month
1	DEIA Team Leader	2.5
2	Soil specialist	2
3	Climate and air quality specialist	2
4	Flora specialist	2
5	Fauna specialist	2
6	Hydrologist	2
7	Hydrogeologist	2
8	Social specialist	2.5
9	EIA specialist	2.5
	Total time contribution	**19.5 person/months**

The updated DEIA report has reflected recent updates on the project planning, such as wildlife crossings and site-specific mitigation measures for the environmentally sensitive areas. Also, it

reflected changes in environmental laws and regulations of Mongolia by updating the legislation section.

2.3 KEY OBJECTIVES OF EMP:

The project EMP defines mitigation and monitoring measures and describes the institutions and mechanisms to monitor and ensure compliance. Such institutions and mechanisms will seek to ensure continuous improvement of environmental protection activities during preconstruction, construction, and operation of the project in order to prevent, reduce, or mitigate adverse impacts. The EMP draws on the domestic EIA and on discussions and agreements made with the relevant government agencies. This environmental management plan (EMP) was prepared in line with ADB's SPS 2009. Specific measures are developed in relation to the design, construction and operation of each project component and the impacts identified in relation to physical, biological, cultural and socio-economic resources.

Key tasks for the contractor during implementation of the Environmental Management Plan are to:

1. Ensure that environmental requirements specified in the contract documents are adequately performed.
2. Carry out construction and supportive activities in compliance with all relevant Government laws, rules and regulations including environmental laws in force.
3. Manage construction works and operations to prevent or at least minimize adverse impacts on the environment.
4. Implement environmental protectionand mitigation measures specified in the EMP.
5. Employ necessary personnel, local consultant to carry out environmental protection measures and monitoring activities.
6. Allocate a budget necessary for carrying out environmental monitoring activities.
7. Provide safeguard rules to protect workers from any accident and hazard associated with the construction operations and ensure protection of their health
8. Ensure protection of the health and welfare of road side communities by minimizing nuisance including pollution.

9. Observe the laws and other environmental regulations of the country and liaise with the Engineer and statutory authorities for the smooth and efficient operation to complete the Project.

The contractors have developed EMP Implementation Plan for 2016 that include mitigation measures, identification of environmental monitoring spots, monitoring schedule and budget. The contractors' 2016 EMP's reviewed and were approved by PIU on April 15. In order to fulfil their environmental duties, the contractors have contracted with local professionals and laboratories who carried out field monitoring works for them.

2.4. ENVIRONMENTAL PERSONNELS

The PIU employs E.Hasar as the environmental monitoring consultant for the project who is responsible for implementing the EMP, training contractors' environmental staffs and handling environmental issues related with the project on daily basis. He started working at the PIU in January, 2014 and on April 01, 2016 his contract was extended through 2018 construction season.

The environmental monitoring consultant has visited the Project area 5 times in 2016, during March 15-19, May 01-06, June 11-16, August 01-06 and October 01-06. The field trips were aimed to i). carry out to environmental monitoring works ii). visit environmentally sensitive points, construction camps and nearby soum centers to undertake observations, measurements iii) organize interviews and meetings with environmental staff of the contractors and soum administration to find out existing problems. During the field trips, he had carried out following tasks:

1. Organized meetings with environmental officers of Khovd, Buyant, Erdeneburen and Tolbo soums on monthly basis
2. Organized meetings with Khar Lake Khovd River Water Basin Administration.
3. Visited monitoring spots to conduct air quality measurements and take soil and water samples that were sent to professional laboratories to have chemical and contamination tests.
4. Organized EMP trainings for contractor's environmental staffs.
5. Checked EMP implementation status and provide feedback.

The contractors employ field environmental staffs at their respective sites who are responsible for implementing the EMP and coordination of environmental monitoring. The CW1-1 construction team has employed Mr.Uyanzorig as a designated environmental personnel Mr.Bayasgalanbat was appointed as Safety staff who is responsible for implementing Safe Operation Procedure and conducting daily safety check-ups.

Figure 3. Environmental and Safety staffs of the lot CW1-1 Team.

The CW1-3 construction team has employed a Chinese environmental staff for 2016 construction season, but planning to hire a local environmental specialist from Bayan-Ulgii provincial center for the 2017 construction season as instructed by the PIU environmental consultant.

The CW1-2 construction team employs Mrs. Dungaamaa as its environmental staff since September 2015.

As specified in the EIA, the PIU is planning to hire community outreach monitoring officers for the lots CW1-1, CW1-2 and CW1-3 respectively.

2.5. ENVIRONMENTAL TRAININGS ORGANIZED

As part of his duties, the PIU environmental monitoring consultant has organized EMP trainings to the contractors and their key staffs. Following table shows EMP trainings conducted during the first half of 2016.

Table 3. Trainings

Training	Date	Attendants	Key topics presented
Environmental requirements	2016.03.18	Zhang Wang Guo - CW1-2 Team Leader Cai Juhong - CW1-1 Team Leader Li Zhiyong - CW1-3 Team Leader Zhang Haoran - Director of HKB Mongolia Xiong Yi - Director of Huaxi Mongolia	Necessary permission and approvals, relevant authorities to apply to, necessary documents to prepare and legal implications
EMP Implementation	2016.03.20	Dungaamaa - Environmental staff of CW1-2 Uyanzorig - Environmental staff of CW1-1	Impact mitigation measures proposed in the project EIA, timing, relevant standards to obey, monitoring spots, law requirements
Management of environmentally sensitive areas	2016.05.03	Dungaamaa - Environmental staff of CW1-2 Uyanzorig - Environmental staff of CW1-1 Khurts - Translator of CW1-3	Sensitive features of environment in Hongio, Buraat and Olon Nuur valleys, potential receptors, prevention and mitigation measures planned, wildlife crossing points, livestock crossing points, environmental monitoring and follow-up measures to take on
Health and safety	2016.06.12	Zhang Wang Guo - CW1-2 Team Leader Cai Juhong - CW1-1 Team Leader Li Zhiyong - CW1-3 Team Leader Bayasgalan - CW1-1 Safety staff	Safety measures specified in the EIA, implementation status of safety measures
Updated EMP for the project	2016.10.02	Dungaamaa - Environmental staff of CW1-2 Uyanzorig - Environmental staff of CW1-1 Khurts - Translator of CW1-3	Presenting updated EMP for the project and provides key requirements and mitigation measures set out in the EMP.

3. PUBLIC CONSULTATION AND GRIEVANCE REDRESS MECHANISM

During the 2016 construction season, following public consultation activities were carried out.

3.1. Pre-construction consultation for Tranche-2 section:

During the ADB Mission in March, 2016, the mission team had met with several key stakeholders such as the Khar Lake and Khovd River Basin Administration, Governors of Tolbo and Buyant soums and road side communities. The key points of consultations were:

- Mrs.Enkhsuren, the head of Khar lake and Khovd River Basin Administration, said they will prefer to grant pemissions to project contractors on usage of surface water instead of ground water. In accordance with State Strategy on Water Consumption, the Government of Mongolia prefers consumption of surface water over ground water due to its limited ground water resource.
- Buyant soum governor Nergui siad the soum center faced an ice accumulation issue in 2016 winter. Initially, the soum authorities suspect that the ice accumulation was caused by Buyant river diversoin at the points of bridge construction. However, a professional organization study concluded that the issue was caused by an unusual low temperature days and heavy snow falling in December and January, rather than a river diversion.
- Tolbo soum governor Aniversadet expressed the soum administration will provide full support on the construction activity. The CW1-3 team leader agreed to hire as many people as possible from the Tolbo soum and execute landfilling works at the central dumpsite of the soum center.
- A kazakh family whose fodder planting yard is affected by the road construction met the mission team. The Tolbo soum governor said the soum administration will actively engage in further compensation talks with the family to solve the issue.

3.2. Household survey in Hongio river valley

The PIU Environmental monitoring consultant has conducted consultation among 16 herder households who reside in the Hongio river valley during June 10 and June 13 by visiting each household. Survey participants said they temporarily dwell in the Hongio river valley between June 10 and August 25.

Key points of discussions were:

- ❖ Since the road alignment passes on the northern side of Hongio river, the herder households said they have no problem to dwell on the southern side of the river during construction period.
- ❖ Herder households requested access and deviation roads for them to travel soum center during the construction.
- ❖ Wrestling events of Erdeneburen soum's naadam festival held on the Hongio river valley early July every year. Thus the CW1-1 team might need to temporarily stop the construction works or reduce the workload significantly during these days to allow local people celebrate the holiday. Also, a big crossing need to be made adjacent to the festival point (STA.18).

Figure 4. Environmental consultant's household visit in Hongio river valley.

3.3. Public consultation during the DEIA update works

The Tranche-2 road goes through territories of 7 bags of Khovd, Erdeneburen, Tolbo and Nogoonnuur soums. Bag is the smallest administrative unit in Mongolia. As required in DEIA Law of Mongolia, the EIA team organized consultation meetings at each bag. The key stakeholders engaged were:

- Local soum administrations
- Local bag administrations
- Local residents

In total, 252 local residents have attended the consultation meetings held at 7 bags.

3.3.1. Consultation at Hongio bag of Erdeneburen soum:

Lot CW1-1 of the Tranche-2 road alignment goes through Hongio bag territory between STA.00 and STA.25. The ESIA Team has organized a community consultation meeting among the Hongio bag residents in order to reflect their opinions in the ESIA report on August 22, 2016.

Participants: B.Tsedendamba – Head of Citizen Representative Council of the Hongio bag, Kh.Munkhjargal – Environmental officer of the Erdeneburen soum, representatives of 47 herder households of the Hongio bag.

Key points:

D.Batnyam, local herder: Construction of this road is welcomed by us – the herders in Hongio bag. It will help to imporve our living standards. Our main concern is whether the road will have livestock crossings to allow the local herders to access to their winter and spring shelters.

N.Olonbayar, local herder: We fully support the road project. I hope the road will be good quality and construction will complete soon. When the road construction will be completed?

E.Odkhuu, Hongio bag Governor: The road goes through our bag territory about 25 km. The road will help bring prosperity to us. I am pleased that the construction is progressing well and quick enough. My suggestion to the contractor is to erect warning signs/boards around the borrow pits.

B.Sosorbaram, local herder: I am pleased that the road goes through our bag territory and will connect us to provincial center. Since a part of our pastureland is affected by road construction activities, I hope the construction completes as soon as possible. And I think there are many borrow pits along the alignment, thus the contractor shall pay attention to rehabilitation.

Kh.Munkhjargal, environmental officer of Erdeneburen soum: The soum Governor has issued a letter to the PIU requesting for livestock crossings at 15 points in Erdeneburen soum. Also, the soum administration would like to request the project to create a water well for our Hongio bag residents. The key concerns are protection of ancient tombs, earth tracks and water supply.

B.Tsedendamba: We request following things:

1. The road alignment goes through marshland in western part of Hongio valley (between STA.5 and STA.8), thus we suggest to change alignment in order to avoid the marshland.

2. Make improvement works at 5 springs within the bag territory.

3. Dispose camp waste to central dumpsite of the Erdeneburen soum once a month.

4. Pay waste fee and water use fee to local government regularly.

3.3.2. Consultation at Shurga bag of the Erdeneburen soum:

Lot CW1-1 of the Tranche-2 road alignment goes through Hongio bag territory between STA.25 and STA.50. The ESIA Team has organized a community consultation meeting among the Shurga bag residents in order to reflect their opinions in the ESIA report on August 21, 2016.

Participants: E.Nyamdeleg – Head of Citizen Representative Council of the Shurga bag, Kh.Munkhjargal – Environmental officer of the Erdeneburen soum, representatives of 80 herder households of the Shurga bag.

Key points:

D.Nyamsuren, local herder: Construction of this road is important to our lives. My main concern is there are too many borrow pits (13 borrow pits for CW1-1). The soum administration shall pay attention to proper use and rehabilitation of the borrow pits.

L.Bayantsagaan, local herder: I am happy that we will drive a sealed road to Khovd city. Water supply for herders is an issue along the road corridor as herders have insufficient access to water resource. Shurga river only has temporary flow. Thus we request the project to create a water well for us.

D.Nyamsuren, local herder: The road construction has no serious negative impacts on environment. I support the project.

B.Lkhagva-Ochir, local herder: It’s very useful project for us. We support it.

E.Nyamdeleg, Head of Citizen Representative Council of the Shurga bag: We have following suggestions:

1. Create a water well for Shurga bag herders.

2. All the borrow pits shall be rehabilitated and handed over to soum government.

3. Create livestock crossings according request by the soum Governor.

3.3.3. Consultation at Khovd soum of the Khovd province.

Lot CW1-2 of the Tranche-2 road alignment goes through Baruunsalaa bag territory between STA.56 and STA.85. The ESIA Team has organized a community consultation meeting among the Baruunsalaa bag residents in order to reflect their opinions in the ESIA report on September 08, 2016.

Participants: A.Bolatbek – Head of Citizen Representative Council of the Baruunsalaa bag, Sh.Aibol – Environmental officer of the Khovd soum, representatives of herder households of the Baruunsalaa bag.

Key points:

Kh.Batyinkeld, local resident: Construction of this road is vital to development of western regions of Mongolia. It's also important that the contractor needs to implement mitigation measures properly. The EIA report has been developed well by a professonal team. I am supportive of the project as well as the EIA report.

Kh.Koyanbai: The borrow pits shall be rehabilitated according to Mongolian standards. The soum government shall ensure the contractor disposes its waste properly and all construction activities comply corresponding laws.

Kh.Amirjan: Construction of the road is economically beneficial, but it may have some adverse impacts on environment. Environmental officers shall impose strict control over environmental compliance.

3.3.4. Consultation at Tolbo Nuur bag of Tolbo soum:

Lot CW1-3 of the Tranche-2 road alignment goes through Tolbo Nuur bag territory. The ESIA Team has organized a community consultation meeting among the bag residents in order to reflect their opinions in the ESIA report on September 14, 2016.

Participants: S.Erbol – Head of Citizen Representative Council of the Tolbo Nuur bag, bag governor N.Serikbol, representatives of 32 herder households of the bag.

Key points:

Serikbol, bag governor: The key impact is dust emission.

Khuntbek, local resident: My main concern is traffic safety. Vehicle drivers shall be careful not to hurt livestock. The contractor needs to erect signs at points where speed shall be limited.

Khavdyirkhali: My winter shelter is nearby a small lake. In my observation, dust emission is the main environmental issue. The EIA report is really good one.

3.3.5. Consultation at Hongor Ulun Bag of Tolbo soum

Lot CW1-3 of the Tranche-2 road alignment goes through the Hongor Ulun bag territory between. The ESIA Team has organized a community consultation meeting among the bag residents in order to reflect their opinions in the ESIA report on September 14, 2016.

Participants: Khumarbek – Head of Citizen Representative Council of the Tolbo Nuur bag, the bag governor Khurmatbek, representatives of 41 herder households of the bag.

Key points:

Khurmetkhan, Tolbo Nuur bag governor: It is a good thing that a sealed road is being constructed in our soum. However, there are some negative impacts, such as use of many borrow pits and traffic accidents that livestock are hit by vehicles. In order to mitigate these impacts, the contractor needs to rehabilitate borrow pits in a good manner and erect signages along the deviation road to warn vehicle drivers to limit speed.

O.Klaskhan: Our bag territory has unique landscape which consists of high mountains, hills and rivers. Thus, there is a certain risk of traffic accident. Road signs will help mitigate it. Also, dust emission will pollute surface water. The contractor needs to ensure dust emission is reduced and impacts on roadside community is mitigated.

Merzetkhan: My winter shelter is nearby the Kharz spring. The construction activity could have certain impacts, but the EIA report has included many mitigation measures, and I satisfied with it.

3.3.6. Consultation at Buraat bag of Tolbo soum

Lot CW1-3 of the Tranche-2 road alignment goes through the Buraat bag territory between. The ESIA Team has organized a community consultation meeting among the bag residents in order to reflect their opinions in the ESIA report on September 14, 2016.

Participants: O.Erkinbek – Head of Citizen Representative Council of the Buraat bag, and representatives of 32 herder households of the bag.

Key points:

S.Kadirbol, local resident: Vehicle speed shall be limited at points nearby herder shelters nad pastures. Warning signages shall be erected as well.

N.Murat, local resident: My winter shelter is nearby the Buraat river bridge. Run-off flood occurs every spring, thus deviation road should be selected carefully. The EIA report is good one. I support construction of the road.

3.3.7. Tsagaannuur village of Nogoonnuur soum.

Lot CW1-4 of the Tranche-2 road alignment goes through the territory of Tsagaannuur village of Nogoonnuur soum. The ESIA Team has organized a community consultation meeting among the village residents in order to reflect their opinions in the ESIA report on September 16, 2016.

Participants: D.Esbolat – Governor of the Tsagaannuur village, Village treasurer T.Almasbek, Social officer of the village S.Satjol, village accountant Mubarek, social officer of the village school B.Lonjoo, state registration officer B.Aisule and representatives of the village residents.

Key points:

D.Esbolat, village governor: The Chinese firm who was chosen as the contractor has not commenced their works yet. This road will connect our village to border town and enables the passeger cars to have convenient journey. EIA was developed in good manner, the impacts and mitigation mesures are accurate and clear. I am supportive of the EIA report.

T.Almasbek, village resident: We hope the construction of the road commences as soon as possible and the road will be of good quality. The EIA report is a good one.

S.Satjol: I have participated in opening ceremony of Huashi LLC in September 2015. However, the construction commencement has been delayed. Once they start construction, they should collaborate with village administration. The EIA report looks good.

B.Mubarek: All members of the village citizen council are supportive of the project. Construction of this 25.8km road shall be completed as soon as possible.

B.Lonjoo: This road will enable local residents to travel to Russia and make trades. The EIA report includes impact assessment and EMP.

B.Aisaule, local resident: This road will help to accelerate the village development.

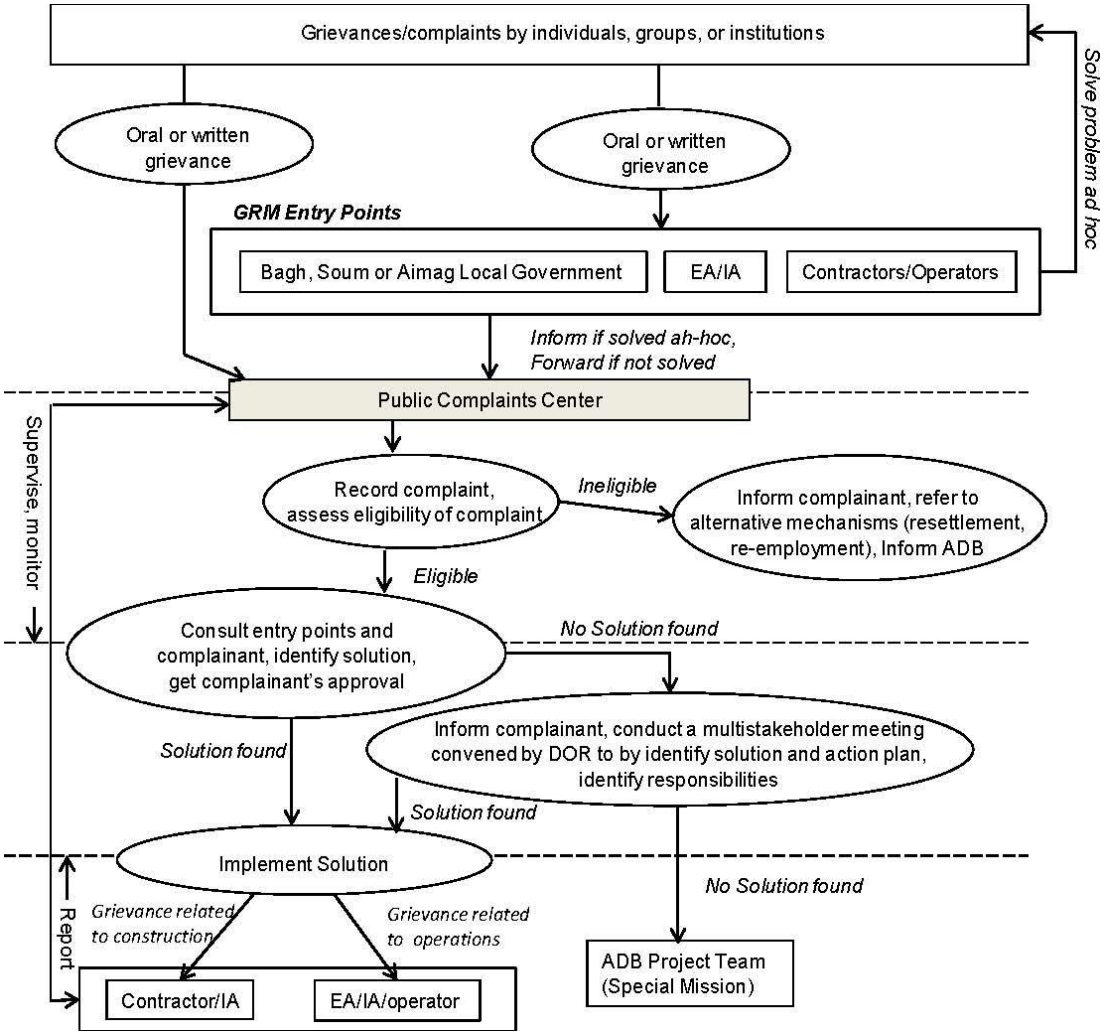
B.Khumarkhan: EIA report is properly developed. I am supportive of it. The road will contribute to development of Tsagaannuur free trade zone.

3.4. Summary of key points raised during the consultation

1. Pay attention to landscape barriers when planning the deviation road route in Buraat bag, CW1-3
2. Erection of signages along the deviation road at points nearby livestock pasture and herder households
3. Execute rehabilitation of borrow pits in accordance with Mongolian standards
4. Implement mitigation measures to reduce dust emission, such as regular water spray
5. Create water well for local herders in Hongio and Shurga bags, CW1-1
6. Create livestock crossings
7. Erect signages around borrow pits which will help to prevent from accidents
8. Re-consider road alingment in western Hongio between STA.5 and STA.8.
9. Help improve 5 spring in Hongio bag, CW1-1
10. Waste shall be disposed to central dumpsite of the respective soum centers on monthly basis.

3.5. Grievance Redress Mechanism:

The proposed GRM for the project as specified in the EIA is shown in below chart.



There are 3 main GRM entry points: local administration, EA and the contractors. The contractors' environmental staffs and Chinese-Mongolian translators are responsible for receiving complaints from local residents and pass it to managers and EA. The PIU environmental consultant has developed a good relationship with each soum and bag governors and organize monthly meetings with them to discuss complaints raised by local residents.

Aslo, the PIU is planning to hire community outreach monitoring officers at each lot to implement GRM measures.

Following complaints were raised from local communities in 2016:

1. Buyant soum administration complained that the ice accumulation surrounding the soum center is caused by Buyant river diversion. The complaint was issued in February 2016. The Khar lake and Khovd River Basin Administration has appointed a professional inspection team to the Buyant soum. The inspection team concluded that the ice accumulation issue was not caused by Buyant river diversion, thus the complaint was invalid.
2. The road alignment passes through one corner of a fodder yard for a kazakh family in Buraat river valley (CW1-3, STA.79). The CW1-3 construction team, Tolbo soum governor and the affected household had discussed the issue and agreed on 3.5 million MNT compensation for the family.
3. Erdeneburen soum governor has issued a letter to PIU in April, 2016. In the letter, the governor recommended the project to create livestock crossings for local herders at 15 points along the CW1-1 road. The request was passed to the supervising consultant ICT Sain LLC engineers and the contractor. The suggested livestock crossings will be made 2017 fall once the pavement works are completed.

4. MANAGEMENT OF ENVIRONMENTAL IMPACTS

4.1. AIR QUALITY MANAGEMENT

Dust management

The contractors have employed water spray trucks to reduce dust generation at the active construction points. Dust emission level could be at its highest and might disturb the road side communities and workers, thus the contractor is taking the appropriate mitigation measure by operating the water spray trucks that will make the embankment construction sites, side roads and diversion roads. Additionally, dust and noise monitoring works are carried out each month.

Figure 5. Water spray trucks

Following mitigation measures to protect sensitive receptors from air quality issues have been implemented:

- **Asphalt plants and concrete batching plants** is located at least 1000 m downwind from the nearest dwellings in order to reduce the impact of fumes on humans and to be fitted with necessary equipment such as bag house filters to reduce fugitive dust emissions.
- The location of the stockpile is on downwind of sensitive receptors.
- **Construction site management.** Water is sprayed on construction sites and material handling routes where fugitive dust is generated.
- **Air quality monitoring is** undertaken at the selected monitoring spots on monthly basis to ensure dust level is within the maximum allowed level.

Noise prevention

The potential noise impacts are mitigated through following measures as defined in the EMP:

- Source control: Maintain all exhaust systems in good working order; undertake regular equipment maintenance;
- Locate sites for concrete-mixing and similar activities at least 500 m away from sensitive areas;
- Consider the use of mobile noise barriers if nomadic ger dwellers establish their summer residence near to construction sites;
- Operate between 8am-6pm only and reach an agreement with nearby residents regarding the timing of heavy machinery work, to avoid any unnecessary disturbances;
- Provide advance warning to the community on timing of noisy activities.

4.2. WATER RESOURCE PROTECTION

Tranche-1 section.

There are a couple springs in the Khavchig canyon: Dund Us and Ehen Us. The contractor CJJC has constructed cumulation ponds for each spring that allows them to control direction and level of water flow. The contractor was instructed to repair the pond for Ehen Us spring and increase the flow by reducing the level at ougflowing gate.

Figure 6. Control pond for Dund Us spring

Figure 7. Control pond for Ehen Us spring

There is another spring in the Bodonch canyon (STA.59, Package 1) and its flow has been crossed by the project road. Since there is a risk of ice accumulation at the point during winter period, the contractor hs digged a tunnel to Bodonch river on downside of the road. It will allow the spring water flow to the Bodonch river straightforward and faster, thus reduce chances of ice accumulation to occur.

CJJC handed over 6 wells to the local administrations in a good condition. Contractor CJJC has created 9 during its operation, 6 wells are in good condition that are located at: STA.13, STA.28 of Package 1, STA.18, STA.45, STA.57 and STA.87 of Package 2. The other 3 wells are broken or is not suitable for further use. The well at Khujirt quary site (STA.76, Package 1) has a very deep water table (150-160m), thus not suitable for local herder to use. The well at Tavan Ovoo quarry site (STA.55, Package 2) and Maanit camp are been broken.

CW1-1:

The road alignment crosses Shurga and Hongio rivers. Protection of Hongio river valley from potential pollution is important. About 70-80 herder households reside in the Hongio river valley between early June and late August. The Hongio river serves as an important drinking water resource for the herders' livestock. There will be temporary limited access to pastureland for the herder households who reside in the Hongio valley during summer season.

Figure 8: Hongio river

The contractor has obtained permission on water well drilling at 3 spots from the Erdeneburen soum administration. However, no well is created due to deep water table. Thus, the contractor is using Shurga and Hongio river water for both drinking and construction purposes and has obtained a written approval from the Erdeneburen soum administration and Khar Lake and Khovd river basin administration to draw river water at 6 points.

Sewage generated from the workers' camp is disposed to a designated waster storage containers that are installed in a pit and covered with concrete path.

Figure 9: Designated waste water removal facility.

CW1-3:

The road alignment crosses Buraat and Hongor Ulun rivers and passes in 3km distance from Holboo lake which is a home to a number of bird species during summer time. The contractor will construct new bridges on both rivers. Protection of the surface water resources from pollution is a critical task for the lot CW1-3.

The contractor has obtained permission from the Tolbo soum administration on drilling of water wells at 3 spots: nearby the main camp site (STA.65), nearby the planned quarry site (STA.65). No water well is created at CW1-3 section due to water table at the drilled spots were too deep (150-200m).

The contractor is been using water from Buraat, Hongor Ulun, Hongio and Hatuu rivers and thus, obtained a written approval from the Tolbo soum administration and Khar Lake and Khovd river basin administration office. Currently, the main camp drinking water is supplied from Hatuu river which is a tributary to Tolbo lake while drinking water for the sub-camp at STA.114 is supplied from Hongio river.

Figure 10. Holboo lake, STA.100

Buraat river diversion was executed in July at STA.77. A flood survey is necessary at the site in order to prevent potential damage.

Figure 11. The point where the Buraat river has been diverted.

The contractor has constructed water protection embankments at 3 points where the deviation road crosses Buraat and Hongor Ulun rivers to prevent from oil spill, at STA.72+500, STA.75+800 and STA.100+700 respectively. Culverts will be installed under the deviation which allows water flow.

Figure 12. Deviation road embankment over the Hongor Ulun river. STA.100+700

Waste water of the main camp site is disposed to designated pit with concrete base. However, it might cause a bacterial pollution to surrounding soil cover, the contractor was instructed to use designated neutralizers into the waste water cumulated in the pit before disposing it to an approved place.

CW1-2:

The road alignment crosses 3 streams of the Buyant river. 2 bridges with length of 150 will be built over the stream No.1 and 2. At the stream No.3, the culverts will be installed under the road embankment. Preventing from pollution of Buyan river water is very important because there are about 1800 households are residing on downstream of Buyant river. Also, around 30-40 herder households settle down in the delta temporarily in May.

The contractor is been using water from Buyant river and and has obtained water use permission from the Khovd soum administration and Khar Lake and Khovd river basin administration bureau. There is one water well drilled at the main camp site, but the water table is very deep (160 m).

Figure 13. Buyant river.

In order to prevent oil spillage which could pollute Buyant river, the contractor has constructed a a temporary embankment over 3 streams of the Buyant river. A total of 146 culverts are being installed under the deviation road. It was a well planned mitigation measure that meets EMP requirements.

Figure 14: A deviation road embankment over the Buyant river

The contractor has installed a designated storage container at the main camp site to collect waste water. Once, the container is full, collected waste water is disposed to the central dumpsite of Khovd city. The contractor was instructed to use designated neutralizers into the collected waste water in the container before disposing it to the Waste Water Treatment Plant of the Khovd city.

4.3. LANDSCAPE AND SOIL RESOURCES

Operation of a paved road will improve the environment as it provides an alternative to currently driving through multiple unimproved earth tracks, which has contributed to land degradation.

CW1-1:

The CW1-1 construction team has exploited 14 borrow pits along the CW1-1 road alignment. For all 14 borrow points, the contractor has obtained written approval from the local governor of the Erdeneburen soum. The contractor has nearly completed embankment construction between STA.24 and STA.50. There are 3 borrow pits in the Hongio river valley, 1 nearby Hongio bridge and 2 others at midway point of the valley.

Figure 15. A borrow pit at CW1-1 section. STA.24

The quarry site for the CW1-1 section is located neaby the main camp where the contractor produces aggregates for cement and asphalt concrete, graded crushed stone base course material located. Necessary permissions were obtained for the quarry site. A blasting was executed at the quarry site by a local professional firm in August. There is no herder households residing in 5 km radius of the quarry site, thus any noise and vibration impacts were minimal.

Figure 16. Preparation for a blast work at the quarry site. CW1-1.

CW1-3:

The construction team has planned to use 23 borrow pits and has obtained approval from the local governor of the Tolbo soum for 11 borrow pits. Approval for the remaining 12 borrow pits were already applied to the soum governor. The main quarry site is located nearby the main workers' camp at STA.65. Another quarry site planned at STA.96.

CW1-2:

The contractor has obtained permission to use 24 borrow pits from the local soum governors, but exploited only 12 of them. The quarry site is located in 4 km distance from the main camp nearby Khatuugiin Khutul.

Khovd-Ulgyi fiber optic cable line was traversed with the road alignment at 3 points: STA.70+800, STA.101+280 and STA.85+540 respectively. Cable line removal agreement was signed with Cabel Land LLC on October 24th and removal works have been completed.

The old quarry site was demolished and rehabilitated properly. Technical rehabilitations have completed, however a concrete stone was left for the request from the local administration.

Figure 17: Rehabilitation at the old quarry site

4.4. WASTE MANAGEMENT

Waste management procedure is defined as follows:

- Domestic and waste construction materials will be disposed to a designated waste collection points at each camp site.
- Prohibit construction workers throwing waste at or nearby the construction areas
- Sewage generated by camp sites are collected in septic tank or a designated pits.
- The contractors have signed "Agreement on waste handling" with the Tolbo, Jargalant and Erdeneburen soum administrations.
- Construction waste will be delivered to the central dumpsite of the soum center. In accordance with the "Agreement on waste handling", the contractor pays a waste disposal fee of 400,000 MNT per month to the soum administration for using the local dumpsite.

As part of its contract duties, the contractor HKB has executed cleaning and landfilling works at the central dumpsite of the Khovd provincial center in September, 2015. CW1-3 construction team is also planning to execute cleaning and landfilling works at Tolbo soum's dumpsite with its own machineries. There will not be any fees for using the central dumpsite of the Tolbo soum.

Figure 18. Waste collection point at the main camp site, CW1-1.

4.5. CAMP SITE MANAGEMENT

The main camps for lots CW1-1 and CW1-2 was constructed before the commencement of the construction in April while construction the main camp of lot CW1-3 was completed in June. The main camp of the lot CW1-1 which covers 2.8 hectares of area is located on the right side of the road alignment at STA.31+400 while the sub camp which covers 0.3 hectares of area is located on the left side of the road alignment at STA.9+100.

The CW1-3 construction team has constructed 3 camps. The main camp is located on the right side of the road alignment at STA.66+300 while the sub camps are located at STA.81+500 and STA.114+163 respectively.

The main camp of the lot CW1-2 is located on the right side of the road alignment at STA.76+740 while 3 sub camps are located at STA.57+240, STA.68+980 and STA.96+500 respectively.

Waste collection points, sanitation system, rest rooms, canteen, ventilliator, dorms and office rooms are available at all camp sites. The camp site is protected by surrounding drainage and fences. Necessary permissions were obtained from local government for all of the camp sites. In order to establish comfort for workers, the camp sites are provided with concrete basketball field and convenient dormitory rooms for staffs. As shown in the Appendix A, the camp site meets all the basic requirements.

Figure 19. The main camp for the lot CW1-1.

Figure 20. Main campsite environment, CW1-3

4.6. WILDLIFE PROTECTION

The Olon nuuruud depression has multiple lakes and small ponds that serve as summer dwelling home to bird species. According to observation of environmental staffs of Tolbo soum and local residents, the main bird species in the depression include gull, scoter, goose, crane and swan. Especially, Holboo lake and Hongor Ulun river (STA.101) are the main habitats for bird species between May and September.

According the National bird survey results in Mongolia, breeding season for the bird species is between late May and late June while the nursing period of baby birds is July. It's important for the contractor to plan the road construction with consideration of aboe mentioned periods. Additionally, identifying key bird breeding spots in the Olon nuuruud depression is equally important for protection wildlife. Within the framwork of the project EIA update work, a bird specialist teacher of the Khovd University has worked at CW1-3 section between June 24-June 26. He made observation and conducted interviews with local herders in the Olon nuuruud depression. The bird survey report is expected to be submitted to the EIA update team around 10th of July. Once the key breeding spots are identified in the depression, the contractor will plan appropriate protection measures.

Wildlife crossings the recommended in the Wildlife movement survey are shown in below table:

Table 4. The proposed wildlife crossing point at the Buraat pass

No.	Wildlife species	Longitude*	Latitude*	Elevation, m
Lot CW1-1				
Гарц 1	Argali sheep, ibex, snow leopard	48.41935	90.93569	1867
Гарц 2	Argali sheep, ibex, snow leopard	48.40641	90.87063	1952
Гарц 3	Argali sheep, ibex, snow leopard	48.40230	90.85270	1977
Lot CW1-3				
Гарц 4	Argali sheep, ibex, snow leopard	48.46631	90.46074	2625
Lot CW1-4				
Гарц 1	Argali sheep, ibex	49.50969	89.52537	2234
Гарц 2	Argali sheep, ibex	49.56787	89.46545	2267

Mr.Buuveibaatar, who is employed by the PIU as wildlife movement consultant, has conducted second phase wildlife movement survey in 2016. The first phase of the survey was conducted in 2015 and as a results of last year's survey, he had recommended 17 wildlife crossing points along the WRR road alignment.

In his 2016 survey, he focused on determining distribution and density of mountain ungulates along the road corridor. The key results of the 2016 survey were:

- According to the Mongolian Red List of Mammals, there are 43 species of mammals can be found in the region along the ADB funded road projects and the majority of species are rodents. Of these, 81% are categorized as Least concerned or Data deficient, while 7% are "Endangered" and 12% are "Near threatened", respectively.
- Besides the desktop study, I conducted a field research during 15-25 May 2016, to estimate density and abundance of argali and ibex in promixity to the wildlife mitigation sites via walking, horseback, or vehicle in preselected sample areas.
- In total, 3 groups and 34 individuals of argali, and 2 groups and 13 individuals of ibex observed around the Khashaat and Buraat passes. While only 2 groups and 15 individuals of argali were observed in the study area along the Tsagaannuur-

Ulaanbaishint road.

- Density estimates of argali and ibex are 0.248 and 0.095 individuals/km 2 , respectively, which translates to total population of 339 individuals of argali and about 130 individuals of ibex in 1,368 km 2 area around the Khashaat and Buraat passes. In the ca. 90 km 2 survey area along the the Tsagaannuur-Ulaanbaishint road, estimated density of argali was 0.079 individual/1 km 2 , giving an estimate of 56 animals.

- Repeated surveys over the years with greater survey efforts (e.g. more observation points across larger area) at the same season will help accurate monitoring of the populations around the wildlife mitigation sites.

4.7. HEALTH AND SAFETY

Health and Safety Plan for construction teams include following tasks:

- Appointment of Health and Safety manager who is responsible for ensuring that all construction sites, camps, sub-camps and workshops are complied with the Technical Specification Requirements for Health and Safety.
- Training for construction and camp staffs on work safety
- Regular safety meetings at construction site and other work places
- Setting up requirements on wearing safety reflective vests, proper work boots, hard hats, rubber boots, safety gloves, goggles etc. at work places.
- First-aid kits deployed in the main camps, sub-camps, workshops and quarry sites.

Figure 21. First aid tools possessed by the medician at the CW1-1 main camp.

Health and safety staffs carry our following works on daily basis:

- Checking up workplace arrangements and identify risks
- Checking up the Health and safety principles, determine actions to be taken to improve the work place safety
- Dress inspection before the construction workers go out to workplace
- Checking the abnormal status and risk factors for the heavy machineries and equipments and determine preventive measures
- Clear signs placed at construction sites in view of the public, warning people of potential dangers such as moving vehicles, hazardous materials and excavation and raising awareness on safety issues.
- Heavy machinery will not be used after day light and all such equipment will be returned to its overnight storage area/position before night.
- If any risks are found, inform it to field supervisors and recommend appropriate mitigation measures

Figure 22. Medician and first aid tools employed at the CW1-3 main camp.

4.8. PROTECTION OF CULTURAL HERITAGES

CW1-1:

There are 23 ancient tombs exist within 20m distance of the road alignment in the Hongio river valley. Of which, 13 tombs are located under or very close to the road alignment, thus need to be removed by professional organization. 16 tombs have been protected with visibility fencing. Below table shows locations of the tombs that need to be removed.

Figure 23. An ancient tomb protected in Hongio river valley

CW1-3:

There are 4 ancient tombs and 1 ancient sculpture have been discovered along the CW1-3 road alignment. The 4 tombs are located at STA.86+400, 95+800 and 107+400 (2 tombs) marks respectively. There is an ancient sculpture on the Buraat pass (STA.84). The contractor has raised awareness of physical cultural resources among its construction staffs.

CW1-2:

The contractor has conducted a census of physical cultural heritages along the road alignment before the commencement of construction works. 8 ancient tombs were discovered along the road alignment, of which 2 tombs are located nearby Bridge No.1 in the Buyant river delta. There are a couple of ancient rock paintings at STA.67+950. The contractors will pay attention to protection of the paintings before and during blast works.

Table 5. Location of physical cultural heritages.

No.	Description	Road marks
1	Ancient tomb	STA.83+677
2	Ancient tomb	STA.83+677
3	Ancient tomb	STA.83+677
4	Ancient tomb	STA.86+630
5	Ancient tomb	STA.87+680
6	Ancient tomb	STA.87+680
7	Ancient tomb	STA.87+680
8	Ancient tomb	STA.87+000
9	Rock paintings	STA.67+950

All these tombs have been protected with visibility fencing back in May and removed by professional archaeological team in October.

Figure 24. Visibility fencing for ancient tombs

3. ENVIRONMENTAL MONITORING

3.1 ENVIRONMENTAL MONITORING SPOTS

Environmental monitoring spots were selected based on impact degree, potential impact receptors and vulnerability. For each lot, there 10 monitoring spots. Of which, 12 monitoring spots are located within the environmental sensitive areas. Below tables show the selected monitoring spots for each lot:

Table 6: Environmental monitoring spots for CW1-1 section.

Location of the monitoring spots	Road mark	Potential receptors
Nearby Shurga river bridge	STA.49	Shurga river
Ontsiin Khutul	STA.43	Surrounding environment
Shar nuur	STA.29	Surrounding environment
Nearby construction camp	STA.26	Hongio canyon, camp workers, nearby tombs
Quarry site	STA.25	Hongio river, nearby residents and tombs
Borrow pit	STA.24	Hongio river, nearby residents and tombs
Hongio bridge	STA.15	Hongio river, nearby residents and tombs
Hongio valley 3	STA.11	Hongio river, nearby residents and tombs
Bayan Enger	STA.8	Nearby herder families and a small restaurant
Khashaat pass	STA.1	Surrounding environment

Table 7: Environmental monitoring spots for CW1-3 section.

Location of the monitoring spots	Road mark	Potential receptors
Khashaat pass	STA.119	Surrounding environment and residents
Hongor Ulun river	STA.101	Upstream of Hongor Ulun river, migratory birds
Holboo lake	STA.101	Holboo lake and migratory birds
Nearby sub-camp	STA.114	Physical pollution on surrounding environment
Shar bulag	STA.98	Physical pollution on surrounding environment
Nearby quarry site	STA.96	Physical pollution on surrounding environment
Buraat pass	STA.84	Physical pollution on surrounding environment
Buraat valley 1	STA.75	Buraat river and surrounding environment
Buraat valley 2	STA.79	Buraat river and a herder family right along the road alignment
Nearby main camp and quarry site	STA.65	Physical pollution on surrounding environment

Table 8: Environmental monitoring spots for CW1-2 section.

Location of the monitoring spots	Road mark	Potential receptors
Nearby waste water treatment plant	STA.93	60 farmer households, Waste Water Plant and its treated water removal area
Nearby bridge No.1 at Buyant river	STA.86	30-40 herder household, ancient tomb, 3 streams of Buyant river
Nearby bridge No.2 at Buyant river	STA.85	3 streams of Buyant river
River crossing point at stream No.1	STA.84	Stream No.1 of Buyant river
Ulaan Bogoch spring	STA.94	Spring water and surrounding environment
Nearby quarry site		Physical pollution on surrounding environment
Nearby main camp		Physical pollution on surrounding environment
Nearby a herder's cattle yard	STA.69	A herder family right along the road alignment
Nearby a herder's spring shelter	STA.53	A herder family right along the road alignment
Nearby Shurga river bridge	STA.50	Shurga river

3.2 MONITORING PARAMETERS:

In accordance with the project EMP requirements, ADB standards and Mongolian regulations on environmental protection, the Contractor has chosen following parameters for environmental monitoring measurements:

- Dust concentration level (m3/mg)
- Noise emission level (mega Hertz)
- Water chemical contents: turbidity, mineralization, hardness and contents of other chemicals
- Water contamination: contents of Pb, Zn, Cd, Cr and Ni.
- Soil chemical contents: sand, mud and contents of other chemical elements.
- Soil contamination: contents of Pb, Zn, Cd, Cr and Ni.
- Hygiene inspection: inspection on waste and sewage removal, physical condition of camp sites, hygiene condition of kitchen and canteen, drinking water standards.

3.3 MONITORING ACTIVITIES

The contracted local laboratories sent a team of experts to carry out field monitoring works every month. The environmental monitoring team has conducted dust and noise level measurements using devices Dust Trak and VoltCraft, taken soil and water samples at the selected monitoring spots. Test analysis for soil and water samples were conducted at the Laboratory of National Geographic Academy in Ulaanbaatar and at the Laboratory of Khovd province Institute of Meteorology.

Figure 25: Noise dust measurement devices used for monitoring

3.4 MONITORING FREQUENCY AND SCHEDULE

Considering the relatively short construction season in Mongolia due to climate condition, the Contractor has planned to carry out the environmental monitoring activities on monthly basis between May and October, 6 times per year during 2016.

Table 9: Environmental monitoring schedule

<table>
<tr><th rowspan="2">Monitoring parameters</th><th colspan="2">2016</th><th colspan="2">2017</th><th rowspan="2">2018</th></tr>
<tr><th>Frequency</th><th>Months of monitoring</th><th>Frequency</th><th>Months of monitoring</th></tr>
<tr><td>1. Air quality monitoring</td><td rowspan="4">Every month</td><td rowspan="4">May - October</td><td rowspan="4">Every month in the 1st half of the year, once a quarter in the 2d half of the year</td><td rowspan="4">May, June, July and October</td><td rowspan="6">Once a year if necessary</td></tr>
<tr><td>2. Water quality monitoring
Chemical and heavy metals analysis</td></tr>
<tr><td>3. Work place condition, safety & hygiene</td></tr>
<tr><td>4. Soil quality monitoring
Chemical and heavy metals analysis</td></tr>
<tr><td>5. Plant monitoring</td><td>Once a year</td><td>September</td><td>Once a year</td><td>June</td></tr>
<tr><td>6. Wildlife monitoring</td><td>Once a year</td><td>September</td><td>Once a year</td><td>June</td></tr>
</table>

3.5. MONITORING RESULTS

3.5.1. Soil quality monitoring

CW1-1:

Table 10: Soil contamination analysis, May 2016

Spot No.	Name of the monitoring spot	Depth sm	Content of heavy metals (mg/kg)				
			Cr	Pb	Cd	Ni	Zn
1	Nearby Shurga river bridge	0-30	18.7	4.8	0.021	22.0	63.4
2	Ontsiin Khutul	0-30	16.9	3.2	0.083	16.4	48.2
3	Shar nuur	0-30	41.3	2.3	0.037	27.1	37.8
4	Nearby construction camp	0-30	28.4	7.5	0.012	39.5	93.1
5	Hongio bridge	0-30	20.0	3.4	0.054	24.3	32.5
6	Hongio valley 1	0-30	17.5	6.1	0.027	15.6	62.1
7	Hongio valley 2	0-30	33.9	2.9	0.123	34.7	23.2
8	Hongio valley 3	0-30	32.7	4.2	0.091	18.1	74.0
9	Bayan Enger	0-30	18.5	4.1	0.108	19.2	39.8
10	Khashaat pass	0-30	13.2	6.2	0.119	14.9	54.3
Mongolian Standard (MNS 5850 : 2008)			**150**	**100**	**3**	**150**	**300**

Table 11: Soil contamination analysis, June 2016

Spot No.	Name of the monitoring spot	Depth sm	Content of heavy metals (mg/kg)				
			Cr	Pb	Cd	Ni	Zn
1	Nearby Shurga river bridge	0-30	13.8	7.5	0.031	24.6	72.0
2	Ontsiin Khutul	0-30	21.2	5.1	0.063	18.9	50.8
3	Shar nuur	0-30	34.7	2.4	0.044	28.0	31.4
4	Nearby construction camp	0-30	27.8	6.9	0.079	42.3	82.2

5	Hongio bridge	0-30	19.6	3.8	0.067	24.6	28.6
6	Hongio valley 1	0-30	18.2	6.9	0.032	12.7	53.9
7	Hongio valley 2	0-30	22.1	4.1	0.168	36.1	25.7
8	Hongio valley 3	0-30	56.7	4.7	0.119	17.5	66.3
9	Bayan Enger	0-30	33.0	3.5	0.094	19.3	37.7
10	Khashaat pass	0-30	45.5	7.2	0.120	11.8	59.2
Mongolian Standard (MNS 5850 : 2008)			**150**	**100**	**3**	**150**	**300**

Table 12: Soil contamination analysis, July 2016

Spot No.	**Name of the monitoring spot**	**Depth sm**	**Content of heavy metals (mg/kg)**				
			Cr	**Pb**	**Cd**	**Ni**	**Zn**
1	Nearby Shurga river bridge	0-30	15.6	7.2	0.046	19.0	70.5
2	Ontsiin Khutul	0-30	20.4	6.3	0.057	16.8	43.4
3	Shar nuur	0-30	32.1	2.8	0.039	28.3	34.8
4	Nearby construction camp	0-30	27.6	6.1	0.063	42.2	62.6
5	Hongio bridge	0-30	18.3	4.8	0.058	24.9	24.3
6	Hongio valley 1	0-30	18.9	7.8	0.041	15.7	51.7
7	Hongio valley 2	0-30	27.7	4.6	0.095	38.2	29.2
8	Hongio valley 3	0-30	52.2	4.0	0.086	16.8	63.0
9	Bayan Enger	0-30	33.5	3.3	0.069	17.3	37.5
10	Khashaat pass	0-30	45.3	6.5	0.101	13.1	55.3
Mongolian Standard (MNS 5850 : 2008)			**150**	**100**	**3**	**150**	**300**

Table 13: Soil contamination analysis, August 2016

Monitoring Spot No.	Name of the monitoring spot	Depth sm	Content of heavy metals (mg/kg)				
			Cr	Pb	Cd	Ni	Zn
1	Nearby Shurga river bridge	0-30	13.6	7.5	0.042	18.0	62.2
2	Ontsiin Khutul	0-30	18.9	5.9	0.061	19.5	40.8
3	Shar nuur	0-30	26.5	3.1	0.032	24.5	33.7
4	Nearby construction camp	0-30	28.1	5.7	0.049	37.9	51.0
5	Hongio bridge	0-30	20.3	5.0	0.050	21.6	26.5
6	Hongio valley 1	0-30	17.7	6.2	0.038	15.0	49.5
7	Hongio valley 2	0-30	26.4	4.8	0.084	36.1	28.7
8	Hongio valley 3	0-30	47.1	4.3	0.065	17.4	57.6
9	Bayan Enger	0-30	32.3	3.9	0.073	16.8	38.0
10	Khashaat pass	0-30	41.7	5.4	0.093	12.7	57.1
Mongolian Standard (MNS 5850 : 2008)			**150**	**100**	**3**	**150**	**300**

Table 14: Soil contamination analysis, September 2016

Monitoring Spot No.	Name of the monitoring spot	Depth sm	Content of heavy metals (mg/kg)				
			Cr	Pb	Cd	Ni	Zn
1	Nearby Shurga river bridge	0-30	14.8	7.3	0.045	17.8	62.1
2	Ontsiin Khutul	0-30	1.9	6.2	0.058	18.3	44.8
3	Shar nuur	0-30	21.3	3.6	0.029	23.4	31.6
4	Nearby construction camp	0-30	26.4	5.1	0.037	32.0	47.0
5	Hongio bridge	0-30	22.0	5.5	0.042	21.4	26.7
6	Hongio valley 1	0-30	16.5	5.8	0.039	18.2	48.9

7	Hongio valley 2	0-30	20.9	5.7	0.065	34.1	27.5
8	Hongio valley 3	0-30	48.2	4.6	0.059	18.9	51.2
9	Bayan Enger	0-30	34.0	4.2	0.064	16.4	33.8
10	Khashaat pass	0-30	42.5	6.3	0.078	13.5	49.0
Mongolian Standard (MNS 5850 : 2008)			**150**	**100**	**3**	**150**	**300**

The monitoring team has chosen 10 monitoring spots for soil sampling within the CW1-1 section. Environmentally sensitive points such as quarries, workers camp, nearby restaurants and Hongio river valley are chosen as monitoring spots. As result of the contamination analysis, heavy metals contents in the soil samples were within the standard levels. Based on the laboratory test analysis, it can be concluded that there is no soil contamination.

CW1-3:

Table 15: Soil contamination analysis, May 2016

Spot No.	Name of the monitoring spot	Depth sm	Content of heavy metals (mg/kg)				
			Cr	Pb	Cd	Ni	Zn
1	Khashaat pass	0-30	9.3	6.6	0.014	18.7	12.5
2	Hongor Ulun river	0-30	45.5	5.4	0.019	32.5	23.8
3	Holboo lake	0-30	40.6	4.8	0.018	33.1	17.2
4	Nearby sub-camp	0-30	11.2	11.2	0.024	18.3	33.7
5	Shar bulag	0-30	32.3	8.6	0.035	26.4	41.1
6	Planned quarry site STA.96	0-30	37.1	14.9	0.032	29.6	36.1
7	Buraat pass	0-30	28.6	7.3	0.057	12.5	14.4
8	Buraat valley 1	0-30	26.3	7.3	0.121	15.9	14.7
9	Buraat valley 2	0-30	27.5	6.0	0.186	16.3	19.2
10	Nearby main camp and quarry site	0-30	40.0	12.3	0.078	47.6	27.5

Mongolian Standard (MNS 5850 : 2008)	**150**	**100**	**3**	**150**	**300**

Table 16: Soil contamination analysis, June 2016

Spot No.	Name of the monitoring spot	Depth sm	Content of heavy metals (mg/kg)				
			Cr	Pb	Cd	Ni	Zn
1	Khashaat pass	0-30	12.6	5.8	0.016	15.7	14.1
2	Hongor Ulun river	0-30	48.7	5.1	0.018	28.6	23.7
3	Holboo lake	0-30	41.4	5.6	0.023	33.0	18.2
4	Nearby sub-camp	0-30	13.7	14.9	0.021	12.4	26.9
5	Shar bulag	0-30	32.1	10.0	0.029	29.3	38.1
6	Planned quarry site STA.96	0-30	43.5	13.8	0.037	29.9	49.7
7	Buraat pass	0-30	28.2	7.2	0.085	18.4	15.0
8	Buraat valley 1	0-30	21.3	6.4	0.154	15.5	13.2
9	Buraat valley 2	0-30	29.6	5.5	0.132	15.0	19.3
10	Nearby main camp and quarry site	0-30	37.6	12.9	0.107	41.5	30.0
Mongolian Standard (MNS 5850 : 2008)			**150**	**100**	**3**	**150**	**300**

Table 17: Soil contamination analysis, July 2016

Spot No.	Name of the monitoring spot	Depth sm	Content of heavy metals (mg/kg)				
			Cr	Pb	Cd	Ni	Zn
1	Khashaat pass	0-30	16.3	5.7	0.022	19.9	25.5
2	Hongor Ulun river	0-30	34.5	4.8	0.017	27.5	19.2
3	Holboo lake	0-30	37.2	5.3	0.021	32.0	17.8
4	Nearby sub-camp	0-30	29.2	12.9	0.016	11.4	24.1
5	Shar bulag	0-30	32.6	11.4	0.035	23.7	31.0

6	Planned quarry site STA.96	0-30	43.1	12.3	0.029	29.8	42.6
7	Buraat pass	0-30	28.6	7.7	0.061	20.6	21.9
8	Buraat valley 1	0-30	28.7	6.0	0.112	18.2	12.6
9	Buraat valley 2	0-30	26.2	6.3	0.087	14.8	27.3
10	Nearby main camp and quarry site	0-30	33.9	14.8	0.105	39.1	28.0
Mongolian Standard (MNS 5850 : 2008)			**150**	**100**	**3**	**150**	**300**

Table 18: Soil contamination analysis, August 2016

Monitoring Spot No.	**Name of the monitoring spot**	**Depth sm**	**Content of heavy metals (mg/kg)**				
			Cr	**Pb**	**Cd**	**Ni**	**Zn**
1	Khashaat pass	0-30	14.7	5.9	0.026	20.0	28.4
2	Hongor Ulun river	0-30	28.9	4.1	0.021	28.7	18.8
3	Holboo lake	0-30	42.5	5.2	0.019	30.3	16.5
4	Nearby sub-camp	0-30	25.7	11.8	0.017	12.5	22.3
5	Shar bulag	0-30	29.1	10.6	0.028	23.4	29.0
6	Planned quarry site STA.96	0-30	40.8	11.9	0.031	27.9	36.8
7	Buraat pass	0-30	27.4	8.5	0.052	19.1	21.5
8	Buraat valley 1	0-30	30.2	5.7	0.087	17.7	11.3
9	Buraat valley 2	0-30	24.3	6.7	0.072	15.2	25.0
10	Nearby main camp and quarry site	0-30	31.7	15.0	0.093	38.9	27.2
Mongolian Standard (MNS 5850 : 2008)			**150**	**100**	**3**	**150**	**300**

Table 19: Soil contamination analysis, September 2016

Monitoring Spot No.	Name of the monitoring spot	Depth sm	Content of heavy metals (mg/kg)				
			Cr	Pb	Cd	Ni	Zn
1	Khashaat pass	0-30	13.4	5.8	0.028	19.3	27.7
2	Hongor Ulun river	0-30	22.1	3.9	0.024	25.2	19.0
3	Holboo lake	0-30	43.5	5.0	0.021	30.5	17.2
4	Nearby sub-camp	0-30	27.2	12.6	0.016	13.6	20.5
5	Shar bulag	0-30	28.7	10.9	0.019	22.8	25.3
6	Planned quarry site STA.96	0-30	33.6	12.7	0.026	24.0	31.4
7	Buraat pass	0-30	29.0	7.3	0.036	18.4	22.1
8	Buraat valley 1	0-30	28.6	6.4	0.058	19.3	13.6
9	Buraat valley 2	0-30	25.1	7.1	0.065	14.1	22.0
10	Nearby main camp and quarry site	0-30	32.3	11.7	0.070	29.9	30.5
Mongolian Standard (MNS 5850 : 2008)			**150**	**100**	**3**	**150**	**300**

The monitoring team has chosen 10 monitoring spots for soil sampling within the CW1-3 section. Environmentally sensitive points such as quarries, workers camp, nearby restaurants and Buraat river valley are chosen as monitoring spots. As result of the contamination analysis, heavy metals contents in the soil samples were within the standard levels. Based on the laboratory test analysis, it can be concluded that there is no soil contamination.

CW1-2:

Table 20: Soil contamination analysis, May 2016

Spot No.	Name of the monitoring spot	Depth sm	Content of heavy metals (mg/kg)				
			Cr	Pb	Cd	Ni	Zn
1	Nearby waste water treatment plant	0-30	29.1	1.6	0.86	23.2	154.1
2	Nearby bridge No.1 at Buyant river	0-30	11.0	2.9	0.027	12.5	34.8
3	Nearby bridge No.2 at Buyant river	0-30	17.6	3.3	0.026	14.9	34.4
4	River crossing point at stream No.1	0-30	14.5	2.4	0.029	23.4	36.2
5	Ulaan Bogoch spring	0-30	9.6	7.5	0.32	69.8	28.1
6	Nearby quarry site	0-30	56.8	16.7	0.154	27.1	29.8
7	Nearby main camp	0-30	52.3	23.2	0.309	42.4	30.0
8	Nearby a herder's cattle yard	0-30	13.3	17.8	0.106	11.3	83.3
9	Nearby a herder's spring shelter	0-30	19.1	18.3	0.104	32.2	59.2
10	Nearby Shurga river bridge	0-30	22.5	21.4	0.072	37.6	27.0
Mongolian Standard (MNS 5850 : 2008)			**150**	**100**	**3**	**150**	**300**

Table 21: Soil contamination analysis, June 2016

Spot No.	Name of the monitoring spot	Depth sm	Content of heavy metals (mg/kg)				
			Cr	Pb	Cd	Ni	Zn
1	Nearby waste water treatment plant	0-30	47.3	3.5	0.84	29.1	135.4
2	Nearby bridge No.1 at Buyant river	0-30	16.7	2.4	0.091	12.0	33.5
3	Nearby bridge No.2 at Buyant river	0-30	17.2	3.9	0.052	17.8	31.7
4	River crossing point at stream No.1	0-30	12.8	4.1	0.037	25.5	42.6
5	Ulaan Bogoch spring	0-30	10.0	9.5	0.21	69.3	29.8
6	Nearby quarry site	0-30	49.3	18.2	0.116	26.9	26.0

7	Nearby main camp	0-30	58.6	20.8	0.329	45.0	31.1
8	Nearby a herder's cattle yard	0-30	14.7	17.4	0.498	11.6	74.7
9	Nearby a herder's spring shelter	0-30	18.9	27.2	0.127	32.9	69.4
10	Nearby Shurga river bridge	0-30	23.2	23.5	0.081	41.8	18.1
Mongolian Standard (MNS 5850 : 2008)			**150**	**100**	**3**	**150**	**300**

Table 22: Soil contamination analysis, July 2016

Spot No.	**Name of the monitoring spot**	**Depth sm**	**Content of heavy metals (mg/kg)**				
			Cr	**Pb**	**Cd**	**Ni**	**Zn**
1	Nearby waste water treatment plant	0-30	41.4	3.9	0.092	28.5	106.0
2	Nearby bridge No.1 at Buyant river	0-30	19.7	2.6	0.088	11.9	29.2
3	Nearby bridge No.2 at Buyant river	0-30	16.8	2.7	0.061	16.3	31.8
4	River crossing point at stream No.1	0-30	12.7	3.0	0.045	22.3	37.5
5	Ulaan Bogoch spring	0-30	13.5	3.5	0.017	58.0	26.2
6	Nearby quarry site	0-30	49.2	11.9	0.093	29.7	25.6
7	Nearby main camp	0-30	48.3	17.3	0.279	45.1	31.0
8	Nearby a herder's cattle yard	0-30	17.8	14.9	0.320	12.5	67.1
9	Nearby a herder's spring shelter	0-30	19.1	23.1	0.085	30.9	69.3
10	Nearby Shurga river bridge	0-30	25.5	20.8	0.067	41.0	20.0
Mongolian Standard (MNS 5850 : 2008)			**150**	**100**	**3**	**150**	**300**

Table 23: Soil contamination analysis, August 2016

Monitoring Spot No.	Name of the monitoring spot	Depth sm	Content of heavy metals (mg/kg)				
			Cr	Pb	Cd	Ni	Zn
1	Nearby waste water treatment plant	0-30	34.8	4.0	0.089	24.6	82.3
2	Nearby bridge No.1 at Buyant river	0-30	23.2	2.5	0.086	12.9	29.7
3	Nearby bridge No.2 at Buyant river	0-30	17.5	2.4	0.058	15.0	33.6
4	River crossing point at stream No.1	0-30	12.3	2.8	0.043	21.7	35.9
5	Ulaan Bogoch spring	0-30	18.6	5.1	0.024	43.4	28.0
6	Nearby quarry site	0-30	46.8	9.3	0.078	28.1	25.5
7	Nearby main camp	0-30	40.1	14.7	0.123	33.5	30.2
8	Nearby a herder's cattle yard	0-30	19.2	14.8	0.252	12.2	56.3
9	Nearby a herder's spring shelter	0-30	19.5	20.9	0.078	28.7	64.0
10	Nearby Shurga river bridge	0-30	26.1	18.7	0.094	37.3	17.6
Mongolian Standard (MNS 5850 : 2008)			150	100	3	150	300

Table 24: Soil contamination analysis, September 2016

Monitoring Spot No.	Name of the monitoring spot	Depth sm	Content of heavy metals (mg/kg)				
			Cr	Pb	Cd	Ni	Zn
1	Nearby waste water treatment plant	0-30	39.1	28.1	0.077	24.0	75.2
2	Nearby bridge No.1 at Buyant river	0-30	27.5	9.6	0.071	11.6	27.0
3	Nearby bridge No.2 at Buyant river	0-30	18.6	4.8	0.063	13.8	33.5
4	River crossing point at stream No.1	0-30	10.2	3.0	0.052	17.5	31.6
5	Ulaan Bogoch spring	0-30	14.7	5.7	0.029	42.9	28.3
6	Nearby quarry site	0-30	33.5	7.8	0.064	25.3	23.1
7	Nearby main camp	0-30	37.3	9.8	0.089	31.0	29.2
8	Nearby a herder's cattle yard	0-30	18.4	16.2	0.112	12.9	47.4
9	Nearby a herder's spring shelter	0-30	17.3	18.1	0.081	28.4	58.0
10	Nearby Shurga river bridge	0-30	22.6	19.5	0.077	34.8	15.7
Mongolian Standard (MNS 5850 : 2008)			150	100	3	150	300

The monitoring team has chosen 10 monitoring spots for soil sampling within the CW1-2 section. Environmentally sensitive points such as quarries, workers camp, spring, herder shelters and Buyant river delta are chosen as monitoring spots. As result of the contamination analysis, heavy metals contents in the soil samples were within the standard levels. Based on the laboratory test analysis, it can be concluded that there is no soil contamination.

3.5.2. Water quality monitoring

CW1-1:

Table 25: Water Chemical analysis, May 2016.

Parameters	Shurga river	Hongio river	Workers' camp, kitchen	Kitchen of small restaurant at Hongio bridge	Kitchen of small restaurant at Bayan Enger	Measuring unit	Drinking Water Standard (MNS 9000:2005)
Turbidity	0.00	0.00	0.10	0.15	0.10	**mg/l**	**1.5**
Mineralization	152.1	119.60	182.50	172.90	106.10	**mg/l**	**1000**
Reaction	6.43	6.57	6.28	6.94	7.19	**pH**	**6.5-8.5**
EC:	0.10	0.12	0.17	0.23	0.31	**dS/m**	
Hardness:	1.50	1.40	1.90	4.70	4.80	**mg/l**	**7.0**
CO_3^{2-}	1.50	1.10	1.80	1.20	1.30	**mg/l**	
Cl^-	12.90	7.30	11.60	22.80	24.30	**mg/l**	**350**
SO_4^{2-}	17.00	17.30	25.10	31.60	40.00	**mg/l**	**500**
Ca^{2+}	33.20	37.80	46.90	52.70	50.50	**mg/l**	**100**
Mg^{2+}	3.50	3.10	3.60	5.20	4.3	**mg/l**	**30**
Na^+	27.1	18.40	18.20	23.90	21.80	**mg/l**	**200**

Table 26: Water Chemical analysis, June 2016.

Parameters	Shurga river	Hongio river	Workers' camp, kitchen	Kitchen of small restaurant at Hongio bridge	Kitchen of small restaurant at Bayan Enger	Measuring unit	Drinking Water Standard (MNS 9000:2005)
Turbidity	0.00	0.42	0.23	0.19	0.07	**mg/l**	**1.5**
Mineralization	193.4	124.50	177.10	130.40	92.8	**mg/l**	**1000**
Reaction	6.76	6.62	6.30	7.07	7.23	**pH**	**6.5-8.5**
EC:	0.11	0.13	0.15	0.22	0.30	**dS/m**	
Hardness:	1.80	1.70	1.70	3.90	4.30	**mg/l**	**7.0**
CO_3^{2-}	1.60	1.20	1.90	1.20	1.40	**mg/l**	
Cl^-	17.10	12.80	14.50	20.60	23.80	**mg/l**	**350**
SO_4^{2-}	14.90	18.20	21.70	28.20	33.50	**mg/l**	**500**
Ca^{2+}	37.00	37.80	42.40	48.30	47.10	**mg/l**	**100**
Mg^{2+}	3.20	3.30	3.20	4.70	4.6	**mg/l**	**30**
Na^+	24.8	19.90	19.70	22.40	17.60	**mg/l**	**200**

Table 27: Water Chemical analysis, July 2016.

Parameters	Shurga river	Hongio river	Main camp, kitchen	Kitchen of small restaurant at Hongio bridge	Kitchen of small restaurant at Bayan Enger	Measuring unit	Drinking Water Standard (MNS 9000:2005)
Turbidity	0.00	0.16	0.19	0.12	0.23	**mg/l**	**1.5**
Mineralization	196.8	135.8	172.0	152.70	126.1	**mg/l**	**1000**
Reaction	6.71	6.69	6.67	6.73	6.91	**pH**	**6.5-8.5**
EC:	0.12	0.15	0.15	0.16	0.19	**dS/m**	
Hardness:	1.70	1.80	1.80	2.20	4.50	**mg/l**	**7.0**

CO_3^{2-}	1.40	1.30	1.50	1.30	1.70	**mg/l**	
Cl^-	19.20	17.30	17.10	18.00	22.20	**mg/l**	**350**
SO_4^{2-}	14.80	15.30	15.50	17.80	25.20	**mg/l**	**500**
Ca^{2+}	41.60	40.70	42.90	45.00	39.60	**mg/l**	**100**
Mg^{2+}	3.80	3.50	3.50	3.60	4.1	**mg/l**	**30**
Na^+	21.2	23.10	22.80	22.70	18.90	**mg/l**	**200**

Table 28: Water Chemical analysis, August 2016.

Parameters	**Shurga river**	**Hongio river**	**Main camp, kitchen**	**Kitchen of small restaurant at Hongio bridge**	**Kitchen of small restaurant at Bayan Enger**	**Measuring unit**	**Drinking Water Standard (MNS 9000:2005)**
Turbidity	0.08	0.45	0.11	0.43	0.15	**mg/l**	**1.5**
Mineralization	175.1	142.6	160.5	152.90	129.7	**mg/l**	**1000**
Reaction	6.84	6.92	6.79	6.57	7.12	**pH**	**6.5-8.5**
EC:	0.13	0.14	0.17	0.15	0.22	**dS/m**	
Hardness:	1.67	1.72	1.75	2.14	2.38	**mg/l**	**7.0**
CO_3^{2-}	1.51	1.49	1.53	1.28	1.56	**mg/l**	
Cl^-	16.40	18.20	16.70	17.40	19.80	**mg/l**	**350**

SO_4^{2-}	15.20	14.80	16.00	18.10	23.40	**mg/l**	**500**
Ca^{2+}	38.20	39.7	40.8	44.90	42.00	**mg/l**	**100**
Mg^{2+}	4.60	4.00	3.70	3.50	4.2	**mg/l**	**30**
Na^{+}	25.0	24.70	23.50	24.10	20.50	**mg/l**	**200**

Table 29: Water Chemical analysis, September 2016.

Parameters	**Shurga river**	**Hongio river**	**Main camp, kitchen**	**Kitchen of small restaurant at Hongio bridge**	**Kitchen of small restaurant at Bayan Enger**	**Measuring unit**	**Drinking Water Standard (MNS 9000:2005)**
Turbidity	0.00	0.63	0.07	0.12	0.13	**mg/l**	**1.5**
Mineralization	168.3	157.5	151.7	141.20	132.3	**mg/l**	**1000**
Reaction	6.74	6.88	6.72	6.63	6.85	**pH**	**6.5-8.5**
EC:	0.12	0.10	0.16	0.13	0.19	**dS/m**	
Hardness:	1.71	1.68	1.74	1.92	1.97	**mg/l**	**7.0**
CO_3^{2-}	1.54	1.53	1.51	1.36	1.48	**mg/l**	
Cl^{-}	18.80	19.90	18.10	15.40	18.20	**mg/l**	**350**

SO_4^{2-}	16.80	15.00	16.50	17.70	21.60	**mg/l**	**500**
Ca^{2+}	32.00	38.6	33.1	40.00	37.30	**mg/l**	**100**
Mg^{2+}	3.90	3.70	4.00	3.80	4.1	**mg/l**	**30**
Na^{+}	22.4	27.10	20.00	21.30	29.60	**mg/l**	**200**

Table 30: Water Heavy metals analysis, 2016.

Name of the monitoring spot	Month	Content of heavy metals				
		Cr	Pb	Cd	Ni	Zn
Shurga river	May	0.01	0.001	0.001	0	0.07
	June	0.01	0.002	0.000	0.01	0.09
	July	0.00	0.003	0.001	0.01	0.07
	August	0.01	0.002	0.001	0.02	0.06
	September	0.00	0.001	0.001	0.01	0.03
Hongio river	May	0.02	0	0.001	0.01	0.05
	June	0.01	0.001	0.002	0.01	0.06
	July	0.01	0.002	0.001	0.00	0.05
	August	0.01	0.001	0.000	0.01	0.02
	September	0.01	0.000	0.002	0.00	0.08
Drinking water standard of Mongolia (MNS 9000:2005)		0.05	0.01	0.003	0.02	5

The monitoring team have taken water samples at the environmentally sensitive points and from

the kitchen of construction camp and nearby small restaurants. The heavy metals analysis shows no sign of contamination in the river water. All of the indicating figures representing Pb, Zn, Cd, Cr and Ni contents were within the standard level. Therefore, it can be concluded that the Hongio and Shurga rivers are free of any heavy metal contamination. Laboratory test results for the other water samples from the well and kitchen show that all of the indicators are within the allowed level of Drinking Water Standard of Mongolia, thus could be used for human drinking.

CW1-3:

Table 31: Water Chemical analysis, May 2016.

Parameters	***Buraat river***	***Hongor Ulun river***	***Holboo lake***	***Kitchen of main camp***	***Ktchen of sub-camp***	**Measuring unit**	**Drinking Water Standard (MNS 9000:2005)**
Turbidity	0.10	0.50	0.60	0.51	0.19	**mg/l**	**1.5**
Mineralization	134.7	111.00	111.30	323.80	145.30	**mg/l**	**1000**
Reaction	6.86	7.79	7.79	7.83	6.92	**pH**	**6.5-8.5**
EC:	0.21	0.24	0.23	0.26	0.20	**dS/m**	
Hardness:	4.25	3.70	3.70	6.90	3.40	**mg/l**	**7.0**
CO_3^{2-}	1.70	1.20	1.20	1.90	1.50	**mg/l**	
Cl^-	16.60	13.80	14.00	41.50	28.90	**mg/l**	**350**
SO_4^{2-}	18.20	23.30	23.80	27.10	22.50	**mg/l**	**500**
Ca^{2+}	49.40	52.30	53.30	31.60	33.10	**mg/l**	**100**
Mg^{2+}	4.20	3.40	3.50	17.90	9.7	**mg/l**	**30**
Na^+	19.4	16.10	16.00	42.40	28.90	**mg/l**	**200**

Table 32: Water Chemical analysis, June 2016.

Parameters	***Buraat river***	***Hongor Ulun river***	***Holboo lake***	***Kitchen of main camp***	***Ktchen of sub-camp***	**Measuring unit**	**Drinking Water Standard (MNS 9000:2005)**
Turbidity	0.00	1.3	1.28	0.22	0.26	**mg/l**	**1.5**
Mineralization	135.0	121.80	121.10	272.50	159.30	**mg/l**	**1000**
Reaction	5.54	7.72	7.70	7.96	6.15	**pH**	**6.5-8.5**
EC:	0.19	0.28	0.28	0.20	0.29	**dS/m**	
Hardness:	1.80	2.90	2.80	5.70	2.00	**mg/l**	**7.0**
CO_3^{2-}	1.80	1.30	31.0	1.70	1.30	**mg/l**	
Cl^-	24.20	11.60	11.50	38.9	27.1	**mg/l**	**350**
SO_4^{2-}	12.1	20.30	20.50	28.20	23.00	**mg/l**	**500**
Ca^{2+}	52.50	50.90	50.70	28.00	42.70	**mg/l**	**100**
Mg^{2+}	3.60	2.10	2.20	6.30	5.8	**mg/l**	**30**
Na^+	18.00	15.30	17.40	33.20	25.10	**mg/l**	**200**

Table 33: Water Chemical analysis, July 2016.

Parameters	***Buraat river***	***Hongor Ulun river***	***Holboo lake***	***Kitchen of main camp***	***Kitchen of sub-camp***	**Measuring unit**	**Drinking Water Standard (MNS 9000:2005)**
Turbidity	0.25	0.5	1.03	0.16	0.12	**mg/l**	**1.5**
Mineralization	143.0	117.10	105.9	0.61	132.40	**mg/l**	**1000**
Reaction	6.38	7.67	7.19	7.65	6.92	**pH**	**6.5-8.5**
EC:	0.21	0.24	0.25	0.18	0.23	**dS/m**	
Hardness:	1.30	2.20	2.30	3.00	2.10	**mg/l**	**7.0**

CO_3^{2-}	1.70	1.30	1.9	1.50	1.20	**mg/l**	
Cl^-	28.00	13.50	12.90	28.1	25.7	**mg/l**	**350**
SO_4^{2-}	12.3	17.60	17.70	22.30	25.00	**mg/l**	**500**
Ca^{2+}	39.90	44.10	43.80	25.80	42.90	**mg/l**	**100**
Mg^{2+}	4.50	2.30	2.20	4.60	4.2	**mg/l**	**30**
Na^+	17.50	16.70	16.50	26.90	28.30	**mg/l**	**200**

Table 34: Water Chemical analysis, August 2016.

Parameters	***Buraat river***	***Hongor Ulun river***	***Holboo lake***	***Kitchen of main camp***	***Kitchen of sub-camp***	**Measuring unit**	**Drinking Water Standard (MNS 9000:2005)**
Turbidity	0.37	0.39	0.42	0.10	0.08	**mg/l**	**1.5**
Mineralization	132.0	111.10	97.8	92.3	116.00	**mg/l**	**1000**
Reaction	6.93	7.28	7.32	7.05	7.01	**pH**	**6.5-8.5**
EC:	0.24	0.28	0.19	0.20	0.26	**dS/m**	
Hardness:	1.52	1.99	2.07	2.83	2.02	**mg/l**	**7.0**
CO_3^{2-}	1.60	1.50	1.8	1.60	1.50	**mg/l**	
Cl^-	21.60	18.40	16.00	27.3	26.8	**mg/l**	**350**

SO_4^{2-}	14.1	19.90	18.50	19.00	20.80	**mg/l**	**500**
Ca^{2+}	35.20	41.00	44.50	26.30	47.20	**mg/l**	**100**
Mg^{2+}	4.20	2.80	2.30	3.70	4.00	**mg/l**	**30**
Na^{+}	16.80	16.60	17.10	21.80	25.00	**mg/l**	**200**

Table 35: Water Chemical analysis, September 2016.

Parameters	***Buraat river***	***Hongor Ulun river***	***Holboo lake***	***Kitchen of main camp***	***Kitchen of sub-camp***	**Measuring unit**	**Drinking Water Standard (MNS 9000:2005)**
Turbidity	0.81	0.62	0.69	0.06	0.17	**mg/l**	**1.5**
Mineralization	114.0	112.60	119.1	87.8	93.0	**mg/l**	**1000**
Reaction	6.54	6.78	6.79	6.87	7.08	**pH**	**6.5-8.5**
EC:	0.23	0.25	0.21	0.18	0.22	**dS/m**	
Hardness:	2.63	2.74	2.67	3.05	2.35	**mg/l**	**7.0**
CO_3^{2-}	1.50	1.60	1.7	1.70	1.30	**mg/l**	
Cl^{-}	18.40	19.60	17.10	24.5	20.0	**mg/l**	**350**

SO_4^{2-}	13.9	17.40	16.80	16.60	21.20	**mg/l**	**500**
Ca^{2+}	38.50	37.20	41.30	40.80	43.90	**mg/l**	**100**
Mg^{2+}	3.70	3.20	2.60	3.40	3.10	**mg/l**	**30**
Na^{+}	15.60	16.10	18.20	19.00	20.30	**mg/l**	**200**

Table 36: Water Heavy metals analysis, May 2016.

Name of the monitoring spot	Month	Content of heavy metals				
		Cr	Pb	Cd	Ni	Zn
Buraat river	May	0.00	0.001	0.001	0.01	0.03
	June	0.01	0.001	0.000	0.01	0.00
	July	0.01	0.003	0.001	0.00	0.02
	August	0.03	0.002	0.000	0.01	0.07
	September	0.01	0.001	0.001	0.00	0.05
Hongor Ulun river	May	0.00	0.000	0.001	0.00	0.02
	June	0.02	0.005	0.002	0.01	0.03
	July	0.01	0.002	0.001	0.01	0.05
	August	0.01	0.001	0.001	0.00	0.03
	September	0.02	0.003	0.002	0.01	0.09
Drinking water standard of Mongolia (MNS 9000:2005)		0.05	0.01	0.003	0.02	5

The monitoring team have taken water samples Holboo lake, Buraat river, Hongor Ulun river as well as from kitchens of 2 camp sites in order to ensure workers' health. The heavy metals analysis shows no sign of contamination in the river and lake water samples. All of the indicating figures representing Pb, Zn, Cd, Cr and Ni contents were within the standard level. Therefore, it can be concluded that the surface water resources are free of any heavy metal contamination. Laboratory test results for the other water samples from the camp kitchens show that all of the indicators are within the allowed level of Drinking Water Standard of Mongolia, thus could be used for human drinking.

CW1-2:

Table 37: Water Chemical analysis, May 2016.

Parameters	Buyant river	Workers' camp, kitchen	Measuring unit	Drinking Water Standard (MNS 9000:2005)
Turbidity	0.00	0.50	**mg/l**	**1.5**
Mineralization	93.9	124.50	**mg/l**	**1000**
Reaction	6.21	8.16	**pH**	**6.5-8.5**
EC:	0.14	0.15	**dS/m**	
Hardness:	2.3	4.70	**mg/l**	**7.0**
CO_3^{2-}	1.60	1.40	**mg/l**	
Cl^-	31.10	28.70	**mg/l**	**350**
SO_4^{2-}	13.40	19.40	**mg/l**	**500**
Ca^{2+}	55.30	36.90	**mg/l**	**100**
Mg^{2+}	2.40	18.00	**mg/l**	**30**
Na^+	34.2	21.90	**mg/l**	**200**

Table 38: Water Chemical analysis, June 2016.

Parameters	Buyant river	Workers' camp, kitchen	Measuring unit	Drinking Water Standard (MNS 9000:2005)
Turbidity	0.2	0.9	**mg/l**	**1.5**
Mineralization	139.20	293.00	**mg/l**	**1000**
Reaction	7.80	8.30	**pH**	**6.5-8.5**
EC:	0.21	0.33	**dS/m**	
Hardness:	2.30	3.70	**mg/l**	**7.0**
CO_3^{2-}	2.10	0.00	**mg/l**	
Cl^-	113.10	146.50	**mg/l**	**350**
SO_4^{2-}	16.10	21.80	**mg/l**	**500**
Ca^{2+}	34.30	67.60	**mg/l**	**100**
Mg^{2+}	31.60	49.30	**mg/l**	**30**
Na^+	7.20	24.10	**mg/l**	**200**

Table 39: Water Chemical analysis, July 2016.

Parameters	Buyant river	Workers' camp, kitchen	Measuring unit	Drinking Water Standard (MNS 9000:2005)
Turbidity	0.7	0.7	**mg/l**	**1.5**
Mineralization	126.50	143.10	**mg/l**	**1000**
Reaction	7.70	7.90	**pH**	**6.5-8.5**
EC:	0.27	0.31	**dS/m**	
Hardness:	2.50	2.90	**mg/l**	**7.0**
CO_3^{2-}	1.90	1.50	**mg/l**	
Cl^-	102.00	116.10	**mg/l**	**350**
SO_4^{2-}	18.50	21.60	**mg/l**	**500**
Ca^{2+}	40.20	54.10	**mg/l**	**100**

Mg^{2+}	32.90	44.50	**mg/l**	**30**
Na^{+}	8.90	15.00	**mg/l**	**200**

Table 40: Water Chemical analysis, August 2016.

Parameters	**Buyant river**	**Workers' camp, kitchen**	**Measuring unit**	**Drinking Water Standard (MNS 9000:2005)**
Turbidity	1.1	0.9	mg/l	**1.5**
Mineralization	122.3	136.6	mg/l	**1000**
Reaction	7.5	7.6	pH	**6.5-8.5**
EC:	0.23	0.30	dS/m	
Hardness:	2.8	3.1	mg/l	**7**
CO_3^{2-}	2.4	1.7	mg/l	
Cl^{-}	94	109.2	mg/l	**350**
SO_4^{2-}	19.1	17.5	mg/l	**500**
Ca^{2+}	37.9	48.4	mg/l	**100**
Mg^{2+}	33.8	42.7	mg/l	**30**
Na^{+}	8.4	14.8	mg/l	**200**

Table 41: Water Chemical analysis, September 2016.

Parameters	Buyant river	Workers' camp, kitchen	Measuring unit	Drinking Water Standard (MNS 9000:2005)
Turbidity	1.3	0.2	mg/l	**1.5**
Mineralization	129.7	133.5	mg/l	**1000**
Reaction	7.1	7.4	pH	**6.5-8.5**
EC:	0.22	0.28	dS/m	
Hardness:	3.0	3.9	mg/l	**7**
CO_3^{2-}	2.8	1.9	mg/l	
Cl^-	96.8	104.5	mg/l	**350**
SO_4^{2-}	19.4	16.9	mg/l	**500**
Ca^{2+}	40.1	47.2	mg/l	**100**
Mg^{2+}	38.8	42.5	mg/l	**30**
Na^+	8.0	12.6	mg/l	**200**

Table 42: Water Heavy metals analysis, 2016.

Name of the monitoring spot	Month	Content of heavy metals				
		Cr	Pb	Cd	Ni	Zn
Buyant river	May	0.00	0.002	0.000	0.00	0.09
	June	0.01	0.001	0.001	0.00	0.11
	July	0.00	0.001	0.001	0.01	0.18
	August	0.01	0.002	0.000	0.00	0.23
	September	0.02	0.001	0.001	0.01	0.19
Kitchen of the main camp	May	0.03	0.005	0.002	0.00	0.17
	June	0.03	0.007	0.001	0.01	0.25
	July	0.03	0.002	0.002	0.01	0.31
	August	0.02	0.003	0.001	0.01	0.29
	September	0.01	0.001	0.002	0.00	0.27
Drinking water standard of Mongolia (MNS 9000:2005)		0.05	0.01	0.003	0.02	5

The heavy metals analysis shows no sign of contamination in the river water. All of the indicating figures representing Pb, Zn, Cd, Cr and Ni contents were within the standard level. Therefore, it can be concluded that the Buyant river is free of any heavy metal contamination. Laboratory test results for the other water samples from the well and kitchen show that all of the indicators are within the allowed level of Drinking Water Standard of Mongolia, thus could be used for human drinking after fully boiling.

3.5.3. DUST MEASUREMENT

Dust measurements were made nearby construction camps, borrow pits, active construction sites and small restaurants where human traffics are relatively high The monitoring team specialists have measured dust concentration levels with average value of one hour duration. Average dust concentration level per hour is shown in the below table. The maximum allowed level of dust concentration is 0.1 mg/m3 according Mongolian Standard on Ambient Air Quality. Measured dust concentration level was within the standard level at all 30 monitoring spots. Since measured dust levels are very close to the maximum allowed level at the active construction sites, such as nearby quarry site and borrow pits or embankment construction points, following measures were recommended to the contractor to reduce dust level:

- All trucks transporting earth materials shall be covered with tarpauling
- Fine particle stockpiles nearby the crusher need to be covered with tarpaulin.

Figure 26. Dust measurement activity on July 1.

CW1-1:

Table 43: Measured dust concentration levels, 2016.

Monitoring Spot No.	Name of the monitoring spot	Average dust concentration level /per hour/, mg/m3					Standard level
		May	June	July	Aug	Sep	mg/m3
1	Nearby Shurga river bridge	0.053	0.048	0.033	0.022	0.018	0.1
2	Ontsiin Khutul	0.078	0.075	0.039	0.027	0.023	
3	Shar nuur	0.069	0.079	0.078	0.043	0.031	
4	Nearby construction camp	0.067	0.072	0.052	0.060	0.057	
5	Hongio bridge	0.042	0.053	0.1	0.099	0.089	
6	Hongio valley 1	0.021	0.018	0.098	0.1	0.097	
7	Hongio valley 2	0.012	0.014	0.045	0.071	0.083	
8	Hongio valley 3	0.009	0.01	0.013	0.017	0.047	
9	Bayan Enger	0.021	0.017	0.015	0.012	0.029	
10	Khashaat pass	0.005	0.009	0.01	0.018	0.015	

CW1-3:

Table 44: Measured dust concentration levels

Monitoring Spot No.	Name of the monitoring spot	Average dust concentration level /per hour/, mg/m3					Standard level
		May	June	July	Aug	Sep	mg/m3
1	Khashaat pass	0.019	0.023	0.047	0.036	0.048	0.1
2	Hongor Ulun river	0.017	0.012	0.016	0.019	0.046	
3	Holboo lake	0.017	0.012	0.015	0.018	0.012	
4	Nearby sub-camp	0.026	0.02	0.041	0.053	0.039	
5	Shar bulag	0.034	0.017	0.015	0.020	0.022	

6	Planned quarry site STA.96	0.048	0.021	0.012	0.017	0.021	
7	Buraat pass	0.054	0.033	0.023	0.029	0.032	
8	Buraat valley 1	0.031	0.024	0.022	0.048	0.053	
9	Buraat valley 2	0.029	0.028	0.029	0.037	0.061	
10	Nearby main camp and quarry site	0.083	0.079	0.068	0.073	0.082	

CW1-2:

Table 45: Measured dust concentration levels in 2016.

Monitoring Spot No.	**Name of the monitoring spot**	**Average dust concentration level /per hour/, mg/m3**					**Standard level**
		May	**June**	**July**	**August**	**Sep**	**mg/m3**
1	Nearby waste water treatment plant	0.018	0.012	0.009	0.013	0.008	0.1
2	Nearby bridge No.1 at Buyant river	0.006	0.009	0.097	0.094	0.097	
3	Nearby bridge No.2 at Buyant river	0.007	0.008	0.073	0.098	0.093	
4	River crossing point at stream No.1	0.013	0.011	0.059	0.086	0.079	
5	Ulaan Bogoch spring	0.063	0.055	0.023	0.038	0.018	
6	Nearby quarry site	0.097	0.078	0.1	0.1	0.096	
7	Nearby main camp	0.085	0.083	0.067	0.072	0.053	
8	Nearby a herder's cattle yard	0.076	0.047	0.021	0.020	0.019	
9	Nearby a herder's spring shelter	0.038	0.031	0.013	0.019	0.021	
10	Nearby Shurga river bridge	0.026	0.016	0.01	0.063	0.023	

3.5.4. NOISE MEASUREMENT

The monitoring spots chosen for noise measurement are same as the monitoring spots for dust measurement. Maximum allowed level of noise during day time is 90 decibels according to the Mongolian Standard on Ambient Air Quality. At all of the 30 monitoring spots, the noise levels were within the allowed level.

CW1-1:

Table 46: Measured noise levels, 2016

Monitoring Spot No.	Name of the monitoring spot	Measured noise level /dB/					Standard level
		May	June	July	Aug	Sep	dB
1	Nearby Shurga river bridge	57.1	38.6	24.5	21.5	14.8	90
2	Ontsiin Khutul	71	69.7	31.7	23.0	12.6	
3	Shar nuur	75.5	72.3	58	26.2	13.1	
4	Nearby construction camp	59.3	70.6	62.6	57.9	43.4	
5	Hongio bridge	41.1	33.8	89.9	84.2	87.1	
6	Hongio valley 1	18.2	24.2	73.1	78.1	82.8	
7	Hongio valley 2	9.3	17.9	20.2	33.8	59.0	
8	Hongio valley 3	10.5	10.1	18.3	20.4	35.2	
9	Bayan Enger	26.8	21.4	19.8	15.1	27.0	
10	Khashaat pass	11.3	19	11.6	14.9	16.2	

CW1-3:

Table 47: Measured noise levels

Monitoring Spot No.	Name of the monitoring spot	Measured noise level /dB/					Standard level
		May	June	July	Aug	Sep	dB
1	Khashaat pass	48.7	32.5	71.5	57.8	44.0	90
2	Hongor Ulun river	36.5	37.9	29.7	19.0	49.7	
3	Holboo lake	45.9	36.8	28.6	20.5	30.1	
4	Nearby sub-camp	54.4	31.3	53.2	48.7	32.6	
5	Shar bulag	32.3	27.1	24.9	21.1	24.5	
6	Planned quarry site STA.96	39.9	27.5	21	18.6	17.9	
7	Buraat pass	37.5	42	26.3	22.0	28.7	
8	Buraat valley 1	50.8	35.7	26.5	41.3	72.4	
9	Buraat valley 2	56.1	38.1	31	40.9	63.3	
10	Nearby main camp and quarry site	79.8	82.6	72.3	67.5	70.9	

CW1-2:

Table 48: Measured noise levels in 2016

Monitoring Spot No.	Name of the monitoring spot	Measured noise level /dB/					Standard level
		May	June	July	August	Sep	dB
1	Nearby waste water treatment plant	52	29.5	14.8	17.4	11.4	90
2	Nearby bridge No.1 at Buyant river	16.4	13.1	86.7	73.9	69.7	
3	Nearby bridge No.2 at Buyant river	17.9	14.9	72.9	77.2	81.5	
4	River crossing point at stream No.1	33.8	19.7	55.8	63.5	54.3	
5	Ulaan Bogoch spring	82.5	69.3	24	27.6	38.9	
6	Nearby quarry site	90	79.2	85.3	89.0	52.6	
7	Nearby main camp	89.7	66.9	70.6	52.1	37.0	
8	Nearby a herder's cattle yard	24.8	32.1	24.2	33.7	20.5	
9	Nearby a herder's spring shelter	12.9	18.4	17	27.1	24.2	
10	Nearby Shurga river bridge	14.1	23	11.5	14.2	17.7	

4. CONCLUSION

In order to implement the EIA and EMP requirements, the contractors have developed their EMP's for 2016 that contain mitigation measures and detailed monitoring plan for 2016-2018 period. The contractors employ environmental staffs as well as contracting with local professionals to carry out field monitoring activities (sampling and measurements).

The construction works were commenced in April with exception of the environmentally sensitive areas. The environmental protection measures specified in the EMP were implemented successfully. The main highlights of environmental work in the 2016 were i). The contractors' awareness of environmental protection has been raised to a satisfactory level ii). Necessary permissions were all obtained for the construction activities iii). Physical cultural heritages were

protected well until the rescue excavation iv). The deviation road embankments over 3 streams of the Buyant river shows the project could avoid polluting surface water resources in its further activities. This was probably the first ever deviation road embankment over a river in Mongolia and will serve as a good practice example for further road construction projects in the country. Overall, the Project has demonstrated a satisfactory level of environmental due diligence in the first half of 2016.

Important points for the next contruction season:

For all contractors

- The contractors will start implementing site-specific mitigation measures from the updated DEIA and EMP. Corresponding trainings will be made by the PIU environmental monitoring consultant.
- The contractor will continue its monthly monitoring activities to ensure the impacts are within control.
- Workers at dusty places, such as quarry sites will be required to wear protection masks regularly.
- Provide oil absorbing blanket to re-fuel truck drivers.
- Trucks transporting earth materials shall be covered with tarpaulin or equivalent items.

Lot CW1-1:

- Construction Teams will construct deviation road embankments over Hongio river during the bridge repair period in 2017.
- Create livestock crossings at 15 points that are recommended by Erdeneburen soum governor.
- Create wildlife crossings at STA.6+508, STA.7+956 and STA.13+496 in accordance with the Mongolian standard MNS6515: 2015.

Lot CW1-3:

- There will be dewatering during construction between STA.96 and STA.97. Drawn water shall not be disposed to nearby lakes, small ponds or Hongor Ulun river. The contractor need to have spring protection work which will be aimed to lower water level at STA.96+450.

- Waste water facility at the main camp shall be renewed wit a septic tank made of steel. In order to prevent from bacterial pollution to surrounding soil, the Contractor shall use designated neutralizer to put into the septic tank before disposing it.
- Create wildlife crossing at STA.85+407 in accordance with the Mongolian standard MNS6515:2015.
- Identify location of livestock crossings through consultation with Tolbo soum administration.

Lot CW1-2:

1. Organize consultation with Jargalant, Khovd and Buyant soum administrations to identify locations of livestock crossings along the road.
2. Waste water facilities at all camp sites need to be upgraded by using designated neutralizer to prevent from bacterial pollution to surrounding soil.
3. Pay special attention to protection of the rock paintings at STA.67+950.
4. Pay special attention to protection of Ulaan Bogoch spring which is drinking water source for hundreds of households.
5. Properly relocate the sacred stone stockpile (Ovoo) at the Bogochiin Khutul with corresponding ritual activities involving local lama.

APPENDIX A.

Table 49: Compliance Report on Environmental Protection Measures

No	Place	Concern issue	Recommended measures	Implementation status
1	Road Construction site	Use of Safety tools (goggles, gloves, dress, helmet, shoes, etc. by the Construction workers/ engineers.	Availability of safety tools at the camp and at the construction site.	Implemented
		Temporary Sign and Signals for construction works	Important signals like Line marker post, STA. post, Aerial markers, Intermediate aerial markers, Warning signs and Identification signs etc. should be made available along the road.	Implemented
2.	Construction camp	Water supply	• Arrangement for elevated service reservoir / tank. • Availability of taps in bathroom, toilet, kitchen and dining space • Ensure drinking water quality through tests as per Mongolian standards	Implemented
		Sanitation	• Provision of water closet and flushing system in toilet and bathroom • Effluent transportation arrangement into septic tank for treatment and disposal through soak pits.	N/a Implemented
		Kitchen and dining environment.	Provision of adequate ventilation, fixing of hand basins and cleanliness	N/a
		Drainage at the camp	Provision of storm water drainage to nearby drain/stream outside the camp	Implemented

No	Place	Concern issue	Recommended measures	Implementation status
			area.	
			Avoid stagnation of water inside the camp.	Implemented
		Solid waste	Placement of waste collection bins (one for two rooms), and Immediate modernization of waste disposal dig with cover and proper handling at the camp.	Implemented
		First aid facilities,	Physician available at camp site	Implemented
		Workshop	• Structure modification with raised impervious platform and shed/roof. • Collection of drips on tray and storing in drum for re-use or safe disposal • Soaking arrangement with dry sands in case of accidental spillage and disposal in deep pit away from water body	Implemented. N/a N/a
		Stock pile	Maintenance of stockpile height at a maximum of 4 meter	Implemented
3.	Quarry/Borrow pits.	• Material collection • Compliance with Environmental Law, 2012.	• Preparation of a plan for required and available quantity supported by survey data and profiling of the river at the material collection point • Collect permission from local authority.	Implemented Implemented
4.	Unplanned Hill cutting,	Unplanned hill cutting and disposal of spoil earth and debris materials will lead to erosion of the hill and will deposit the eroded soil on the road site.	• Maintain necessary slope to the hill cutting area and staged disposal of spoil earth from hill cutting with adequate • compaction and erosion protection measures to prevent all kinds of soil movement on the constructed road, valleys, agricultural lands, and	Implemented

No	Place	Concern issue	Recommended measures	Implementation status
			river/stream courses.	
5.	Crusher Plant at site.	Dust pollution at the site resulting different diseases of the residence of the camp	• Regular spray water at the dust area and the entire internal road, inside the camps. • Arrangement for water sprinkler throughout the crushing time, wearing of masks, goggles, etc., and regular health checking of the crusher equipment operators/workers at the site.	Implemented Implemented
6.	Camp, Offices	Fire fighting equipments should be placed at the camp and office	Immediate placement of fire fighting equipments so that it can visible and in case of any emergency, it can be utilized.	Implemented
7.	Transport and equipment movement at the camp.	E×cessive dust polluting surrounding environment of the camp and sound pollution due to transport movement in the camp.	Equipment meeting environmental standard in respect of sound should be used in the camp and construction area.	Implemented
8;.	Tree plantation at the road, camp and at the offices.	For the better environment it is required to plant tree along the road side, camp, offices etc.	Tree plantation along the road, at the camp and at the offices should be implemented immediately	N/a
9.	Storage and use of chemicals, fuel and lubricant at the camp and at the offices.	Soil pollution for spilled out from the vehicles, bituminous drum etc. at the camp and at the offices.	Strict chemical and solid waste handling and storage practices should be followed.	Implemented
10.	Construction workers related Impact at the camp and at the construction sites.	• Unhygienic and littered environment around the camp, • E×posure to hazards, transmission of diseases among workers, water-borne diseases to workers.	The local workers should be oriented to hygienic disposal of solid waste, hazardous materials, and proper handling methods. And also should be provided regular health inspections and vaccination among the workers.	Implemented

No	Place	Concern issue	Recommended measures	Implementation status
11.	Traffic Signal	Without traffic signal accident may be happened	Signal Man should be provided at the construction site.	Implemented
12.	Accommodation in the camp	According to size of the room accommodation of the workers should be provided.	Accommodation of the workers should have enough space and should be cleaned everyday.	Implemented
13.	Environmental officer	In absence of environmental officer contractors activities will may not going on as environment friendly.	Immediate placement of environmental officer.	Implemented