



Environmental Monitoring Report

Bi-Annual Report
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Mongolia: Western Regional Road Corridor Investment Program, Tranches 1 and 2

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Environmental Monitoring Report

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BI-ANNUAL ENVIRONMENTAL MONITORING REPORT



Western Regional Road Corridor
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CONTENTS

1. INTRODUCTION.....	3
About report.....	3
About the Project.....	3
Environmentally sensitive areas.....	6
2. ENVIRONMENTAL PROTECTION AND MANAGEMENT.....	8
Environmental requirements.....	8
Key objectives of contractor's EMP	9
Public Consultation and GRM Mechanism.....	10
Environmental Trainings.....	11
Environmental Personnel.....	15
DEIA Update works.....	16
Air quality management.....	17
Noise prevention.....	19
Water resources.....	20
Landscape and soil resource.....	25
Waste disposal.....	28
Wildlife movement survey in 2016.....	29
Health and safety.....	30
Camp management.....	31
Cultural heritage protection.....	33
3. ENVIRONMENTAL MONITORING.....	34
Environmental monitoring spots.....	34
Monitoring parameters.....	35
Environmental Monitoring activities	36
Environmental monitoring schedule.....	37
Soil Quality Monitoring	38
Water Monitoring.....	44
Dust Monitoring results.....	52
Noise Monitoring.....	56
4. CONCLUSION.....	57

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 bi-annual environmental monitoring report is aimed to summarize environmental works and activities carried out by the Project Implementation Unit, the Contractors, the Supervision Party and their environmental staff and consultants. It also provides evaluation on implementation of the Environmental Monitoring Plan for the Western Regional Road Corridor Development Project during the first half of the 2016 construction season covering months between January and June.

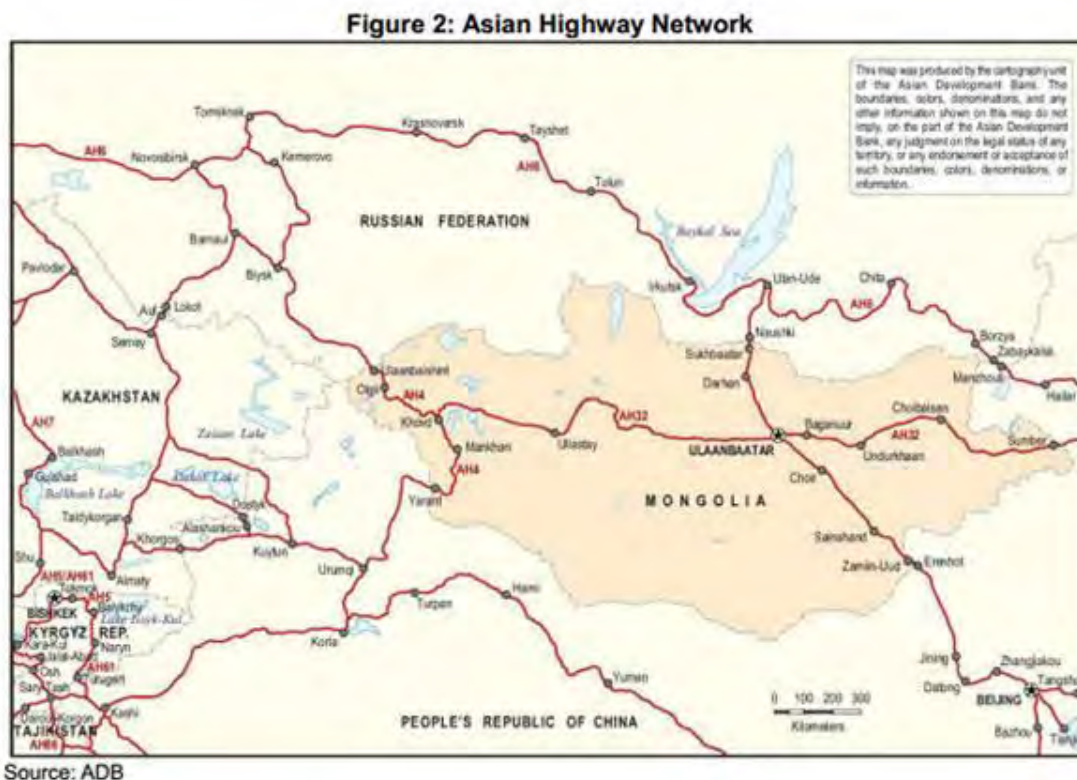
This report is prepared by the Environmental Monitoring Consultant E.Hasar with inputs from the Contractors.

The report comprises of following sections:

1. Section 1 includes brief introductions to this EMR report and the project and description of the environmentally sensitive areas.
2. Section 2 contains environmental requirements, EMP objectives, environmental personnels and a summary of management actions taken to implement the Environmental Management Plan.
3. In section 3, environmental monitoring activities carried out in the first half of 2016 and the corresponding results have been analyzed.
4. In section 4, all the aforementioned works and activities have been summerized and important points on further activities have been provided.

1.2 ABOUT THE PROJECT

The Government of Mongolia has received a grant and loan from Asian Development Bank to support the construction of several sections of the 748km road from Yarant at the border of People's Republic of China through Khovd and Ulgii to Ulaanbaishint at the border of Russian Federation as part of the Western Regional Road Corridor Development Program. The road is part of the Asian Highway network, Route 4 (AH4, 6,024 km), as shown in Figure 2, and is a designated Central Asian Regional Economic Cooperation Corridor 4a, which links Novosibirsk city of Russia with Karachi seaport in Pakistan.

Figure 1: Asian Highway network**Tranche-1 section:**

Construction was completed in 2015 and the road 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 which a guarantee period for them. The contractor has left some handover jobs as described in water resource section in this report.

Tranche-2 section:

Tranche-2 section of the project road has commenced construction on April 18, 2016 and will be completed by 2018. 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 June 30, 2016	Targeted work progress rate up to June 30, 2016
CW1-1	Shurga bridge to Khashaat pass	50 km	8.61%	13.21%
CW1-2	Khovd provincial center to Shurga bridge	53.9 km	11.50%	11.28%
CW1-3	Khashaat pass to Tolbo lake	60 km	3.03%	5.88%

Contract Package CW1-1: During the month of June 2016, the Contractor has mobilized total 139 labors out of which 96 are Chinese workers and 43 are local workers and 65 numbers of equipment at the project site. 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. The Contractor has completed 24 km site clearance and 187,431.50m³ embankment fill as physical road construction work.

Contract Package CW1-2: During the month of June 2016, the Contractor has mobilized total 354 labors out of which 320 are Chinese workers and 34 are local workers and 143 numbers of equipment 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. The Contractor started excavation of foundation of the bridge at Km 82+305 and box and pipe culverts. Plain concrete for some culverts and some bridges foundation has been done. Hard rock explosion has been completed.

Contract Package CW1-3: During the month of June 2016, the Contractor has mobilized total 163 labors out of which 73 Chinese workers and 90 local workers and 64 numbers of equipment 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. The Contractor started doing site clearance from Km 66+000 to Km 70+000 and Km 115+000 to Km 116+620 as physical road construction work.

Figure 2: Project location



1.3. ENVIRONMENTALLY SENSITIVE AREAS FOR TRANCHE-2 SECTION.

1. **Bayan lake:** is located in CW1-4 section nearby the Tsagaan nuur village. This lake serves as a habitat for migratory bird species during summer time.
2. **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 is two permanent dweller and a number local herders reside in the valley during summer time.
3. **Olon nuuruud:** is located at the start point of CW1-3 section nearby Khashaast pass at STA.101. 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 nearby its start point – Holboo lake.

4. **Buyant river delta:** is located at the start of the Package 2, nearby Khovd provincial center. Buyant river is the second largest river in the region and is one of the main tributaries for 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.
5. **Hongio river valley:** is located at the end of CW1-1 section between STA.5 and STA.19. 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 grass and swash. 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.

Figure 3: Hongio river valley, lot CW1-1, Tranche 2.



2. ENVIRONMENTAL PROTECTION AND MANAGEMENT

2.1. ENVIRONMENTAL REQUIREMENTS

The EIA report for the project states that the contractors are responsible for conducting monthly environmental monitoring in accordance with Mongolian standards. Environmental monitoring works shall cover aspects such as air quality, soil pollution, water quality and camp site policy implementation. The EIA report provided necessary baseline data for the project, description of potential impacts, mitigation measures to minimize negative impacts and associated costs, information on consultations undertaken, GRM and EMP including mitigation and monitoring measures, institutional responsibilities, training plans and associated budget.

Environmental duties and responsibilities for the Contractor and its 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 from the local soum Governments on using quarry and borrow pits and drilling water wells. In addition, funding and expenses related to implementation of the Environmental Management Plan and report preparation are allocated and included in work contracts and the construction supervision contracts.

The contractors have developed EMP Implementation Plan for 2016 that include mitigation measures that are set out in the EIA report, identification of environmental monitoring spots, monitoring schedule and budget. The contractor's EMP for 2016 is approved by PIU on April 15. In order to fulfil their environmental duties, the contractors have contracted with local professionals and laboratories who will carry out the planned monitoring works. Environmental Monitoring Reports for the months of May, June and July have been submitted to PIU.

2.2 KEY OBJECTIVES OF CONTRACTOR'S EMP:

The 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 protection and 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.

2.3. 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 his contract was extended through 2018 construction season on April 01, 2016.

The environmental monitoring consultant has visited the Project area 4 times in 2016, during March 15-19, May 01-06, June 11-16 and August 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, Erdeneburen and Tolbo soums on monthly basis
2. Organized meetings with Khar Lake 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 4. Environmental and Safety staffs of the lot CW1-1 Team.



The CW1-3 construction team has employed a Chinese environmental staff for the months of April, May and June who has left the job. CW1-3 construction team is now planning to hire a local environmental specialist from Bayan-Ulgii provincial center 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.

2.4. PUBLIC CONSULTATION AND GRIEVANCE REDRESS MECHANISM

In the first half of 2016, following public consultation meetings were held.

Pre-construction consultation for Tranche-2 section:

During 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 permissions 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.

Consultation meetings during the DEIA Update works:

The DEIA update team has organized public consultation meetings 2 times. The first phase meetings were held between June 18 and June 23. Buyant, Khovd, Erdeneburen and Tolbo soum governors, environmental officers and other administration staffs were attended. All soum administration staffs expressed their support of the WRR project. The only issue raised during these meetings was:

- ❖ Local herders need to have livestock crossings at several points along the road. Thus the soum authorities will issue an official request to PIU to recommend livestock crossing points later this year.

Second phase public consultation meetings were held in September. DEIA Team has presented the draft DEIA report and the main findings to local residents by attending bag level meetings in

each soum. There were 10 consultation meetings were held and a total of 300 people had attended. There were no issues and complaints raised during the meetings.

The PIU Environmental monitoring consultant has conducted consultation among 16 herder households who reside in the Hongio river valley between 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:

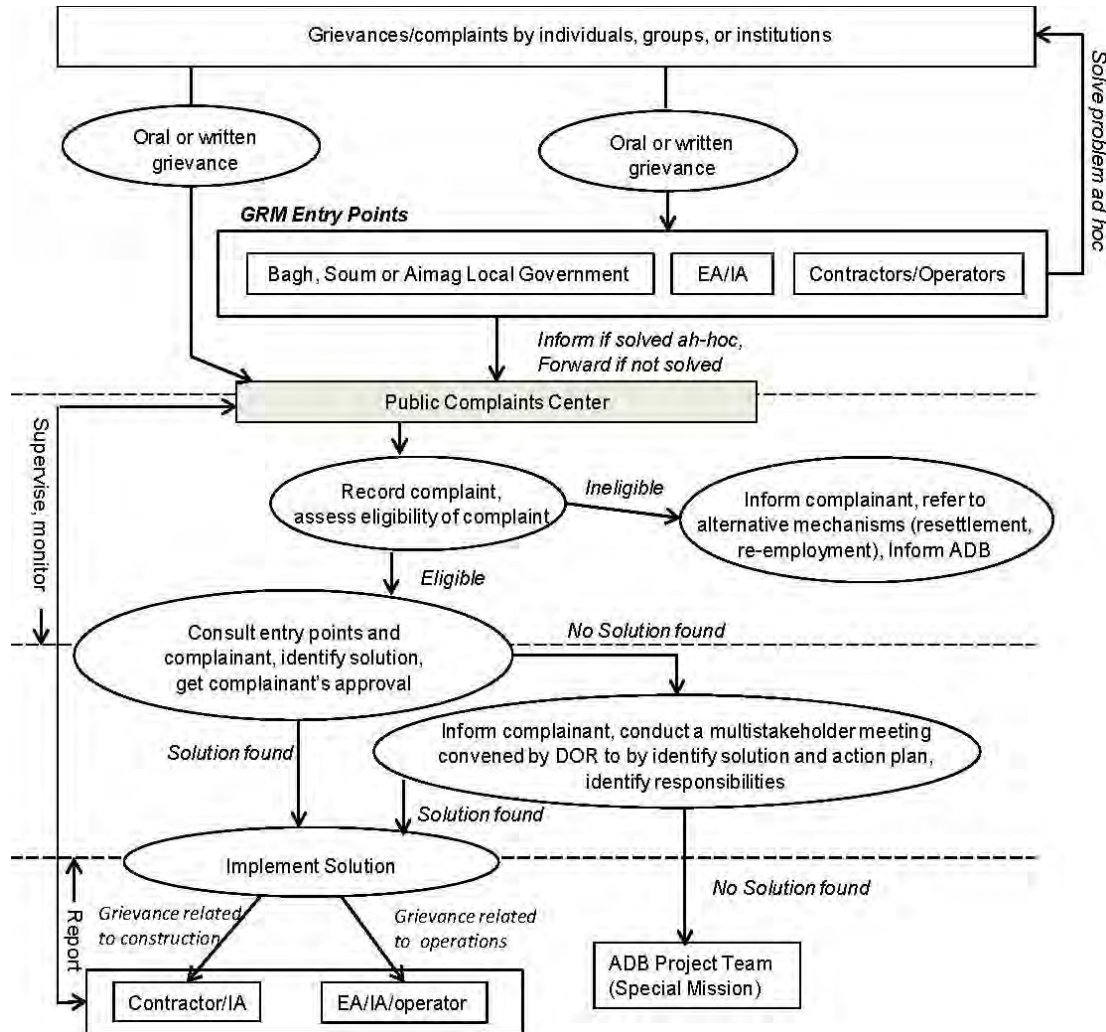
Figure 5. Environmental consultant's household visit in Hongio river valley.



- ❖ 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).

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.

In the 1st half of 2016, following complaints were raised from local communities:

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.

2.5. 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 2. 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

BI-ANNUAL ENVIRONMENTAL MONITORING REPORT

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

2.6. 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 Aug 1 and submitted to the Ministry of Environment and Tourism to obtain General Impact Assessment. The DEIA draft report has been completed and submitted to local soum administrations for review and approval. According to the Amendment 1 of the contract, draft DEIA report shall be developed by Aug 14 and final DEIA report shall be approved by MET by October 14.

Table 3. DEIA update work stages and progress

No.	Tasks within the DEIA update work	Progress rate	Date of completion
Completed tasks			
1	Field survey	100%	2016.07.03
2	Baseline Environmental Survey report	100%	2016.07.31
3	Project description	100%	2016.07.31
5	Assessment of environmental impacts	100%	2016.08.14
6	Risk assessment	100%	2016.08.14
7	Waste Management Plan	100%	2016.08.14
8	Mitigation measures	100%	2016.08.14
9	Environmental Management Plan	100%	2016.08.25
Ongoing tasks			Expected date of completion
	General Impact Assessment	80%	2016.09.12
10	Consultation and approval by local bag governors	50%	2016.09.16
11	EMP for environmentally sensitive areas	70%	2016.09.16

12	Submission MET		2016.09.19
13	Approval by MET		2016.10.14

The DEIA Team has employed 9 environmental and social specialists for the development of the DEIA report.

Table 4. 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 DEIA Team has submitted draft DEIA report to PIU Environmental Monitoring Consultant on August 25 for review. The update DEIA report was submitted to the Ministry of Environment and Tourism on September 30.

2.7. AIR QUALITY MANAGEMENT

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. The contractors is employing 6 water spray trucks to reduce dust generation at the active construction points. Additionally, dust and noise monitoring works are carried out each month.

Since the road alignment is on northern side the Hongio river, the local herders may temporarily move the other side of the river during construction. CW1-1 team's environmental specialist

Uyanzorig has conducted simplified household survey among 16 herder households who dwell in the Hongio valley in summer.

Figure 6. Water spray truck, CW1-1



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. The contractor employ 8 water spray trucks in order to control dust generation.
- ❖ **Air quality monitoring** is undertaken at the selected monitoring spots on monthly basis to ensure dust level is within the maximum allowed level.

Figure 7. Water spray truck, CW1-2.



2.7. 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.
- ❖ Notify nearby herder households and local soum administration 2 days prior to any blasting.

2.9. 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 outflowing gate.

Figure 8. Control pond for Dund Us spring



Figure 9. 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 was instructed to make 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.

In accordance with the contract, CJJC needs to hand-over 6 wells to the local administrations in a good condition. Of the 9 water wells 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 quarry 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. he contractor will construct a new bridge on the Hongio river. 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 10: 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 low 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.

Waste water or sewage from the workers' camp will be disposed to a designated waster storage containers that are installed in a pit and covered with concrete path.

Figure 11: Designated waste water removal facility.



CW1-3:

The road alignment crosses Buraat and Hongor Ulun rivers and passes nearby 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.

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 well is created so far because water table at the drilled spots were too deep (150-200m).

The contractor is planning to use 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 the sub-camp at Sta.114 drinking water is

supplied from Hongio river.

Figure 12: Buraat river valley



According to the road design, a diversion of the Buraat river was executed in July at STA.77. A flood survey is necessary at the site in order to prevent potential damage.

Figure 13. The point where the Buraat river has been diverted.



PIU environmental consultant has instructed the contractor to construct deviations at 3 points where the temporary road crosses Buraat and Hongor Ulun rivers, at STA.75, STA.79 and

STA.101 respectively. Culverts will be installed under the deviation which allows water flow. The contractor will use HKB team's deviation constructed on Buyant river as a model for its deviations at Hongor Ulun and Buraat rivers.

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 choose one of the following 2 options to properly dispose its waste water:

- ❖ Add designated neutralizers into the waste water cumulated in the pit
- ❖ Or, draw the cumulated waste water once a week to dispose to the central dumpsite of the Tolbo soum

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 planning to use water from Buyant river 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 14. Buyant river.



In order to prevent oil spillage which could pollute Buyant river, the contractor has constructed 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 15: 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 one of following 2 options for the next construction season:

- ❖ Add designated neutralizers into the collected waste water in the container before disposing it
- ❖ Or, the collected waste water shall be disposed to Waste Water Treatment Plant of the Khovd city instead of the central dumpsite.

2.10. LANDSCAPE AND SOIL RESOURCES

Tranche 1:

4 borrow sites were used by the contractor in 2016. Rehabilitation at the remaining 4 borrow points are expected to be completed in October.

Tranche-2:

CW1-1:

The construction team is planning to exploit 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. The other half of the CW1-1 alignment has certain difficulties because of numerous ancient tombs and fiber optic connector lines in Hongio river valley. However, the contractor has gotten approval from the Supervising consultant to start construction between STA.1 and STA.24 with site specific omissions at certain points. There will be 3 borrow pits are planned in the Hongio river valley, 1 nearby Hongio bridge and 2 others at midway point of the valley.

There will be 1 quarry site for the CW1-1 section which locates neaby workers' camp where the contractor will produce aggregates for cement and asphalt concrete, graded crushed stone base course material located. Necessary permissions were obtained for the quarry site. An explosion is planned at the quarry site which will be conducted by a local professional firm.

Figure 16. A borrow pit at CW1-1 section. STA.24



CW1-3:

The contractor is planning to exploit 20 borrow pits along the CW1-3 road alignment and has obtained exploitation approval from the local governor of the Tolbo soum for 10 borrow pits.

The main quarry site is planned nearby the main workers' camp at STA.65 which will be use for embankment materials only. On June 20, the supervising engineers of ICT Sain LLC has instructed the contractor to find another quarry location before the asphalt cover phase begins. Another quarry site planned for the CW1-3 section locates at STA.96.

CW1-2:

The contractor will exploit 12 borrow pits and has obtained necessary permissions from the local government. There will be 1 quarry site which locates neaby in 4 km distance from the main camp. The old quarry site which was planned last year was demolished and rehabilitated properly. Technical rehabilitations have completed, however a concrete stone was left for the request from the local administration.

The contractors's construction team has obtained permission on 6 camp sites from the Khovd soum administration. Besides the main camp, there are 3 sub-camps and 2 bridge camps. The sub-camps for bridge construction is located in Buyant river delta. In compliance with Water Law of Mongolia, the contractor has undertaken protection measurs such as placing toilet and waste pit outside the water protection zone.

Figure 17: Rehabilitation at the old quarry site



2.11. WASTE MANAGEMENT

Following measures have been taken to ensure effectiveness of environmentally appropriate systems of collecting, transporting and depositing of wastes:

- ❖ The contractors have signed "Agreement on waste handling" with the Tolbo and Erdeneburen soum administrations.
- ❖ In accordance with the "Agreement on waste handling", municipal waste from workers' camp will be disposed to the appointed landfill site nearby camp.
- ❖ 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.
- ❖ Waste water or sewage from the workers' camp will be disposed to a designated waster storage containers that are installed in a pit and covered with concrete path.

Figure 18. Waste collection point at main camp, CW1-3



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

2.12. WILDLIFE MOVEMENT SURVEY IN 2016

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/km², respectively, which translates to total population of 339 individuals of argali and about 130 individuals of ibex in 1,368 km² area around the Khashaat and Buraat passes. In the ca. 90 km² survey area along the the Tsagaannuur-Ulaanbaishint road, estimated density of argali was 0.079 individual/1 km², 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.

2.13. HEALTH AND SAFETY

Specific tasks implemented within the Health and Safety Plan:

- ❖ 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 19. 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 20. Medician and first aid tools employed at the CW1-3 main camp.



2.14. CAMP SITE MANAGEMENT

Workers camp sites were constructed before the commencement of the construction in April. Waste collection points, sanitation system, rest rooms, canteen, ventilator, dorms and office rooms are available in the camp. The camp site is protected by surrounding drainage and fences. In order to establish comfort, the camp site is provided with concrete basketball field and convenient dormitory rooms for staffs.

Figure 21. The main camp for the CW1-1 section.



Figure 22. Toilet with flush system provided at the main camp, CW1-3



Waste water or sewage from the workers' camp will be disposed to a designated waster storage containers that are installed in a pit and covered with concrete path.

2.15. PROTECTION OF CULTURAL HERITAGES

CW1-1:

The contractor has taken the protection measure for physical cultural heritages by erecting visibility fencing for all ancient tombs in the Hongio river valley. The workers are instructed not to destruct or touch the tombs until professional archeological team come to rescue the tombs.

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. 2 tombs are located nearby Bridge No.1 in the Buyant river delta. The contractor have erected visibility fencing to protect the tombs.

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 determined by the PIU environmental consultant. Below tables show the selected monitoring spots for each lot:

Table 5: 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 6: Environmental monitoring spots for CWI-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 7: Environmental monitoring spots for CWI-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 8: Environmental monitoring schedule

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

3.5. MONITORING RESULTS

3.5.1. Soil quality monitoring

CW1-1:

Table 9: Heavy metals analysis for soil samples, 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 10: Heavy metals analysis for soil samples, 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

BI-ANNUAL ENVIRONMENTAL MONITORING REPORT

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 11: Heavy metals analysis for soil samples, 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

CW1-3:

Table 12: Heavy metals analysis for soil samples, 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 13: Heavy metals analysis for soil samples, 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

BI-ANNUAL ENVIRONMENTAL MONITORING REPORT

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 14: Heavy metals analysis for soil samples, 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

CW1-2:

Table 15: Heavy metals analysis for soil samples, 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 16: Heavy metals analysis for soil samples, 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

BI-ANNUAL ENVIRONMENTAL MONITORING REPORT

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 17: Heavy metals analysis for soil samples, 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

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.

3.5.2. Water quality monitoring

CW1-1:

Table 18: 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 19: 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 20: 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

CW1-3:

Table 21: Water Chemical analysis, May 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	0.10	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	

BI-ANNUAL ENVIRONMENTAL MONITORING REPORT

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 22: Water Chemical analysis, June 2016.

Parameters	<i>Buraat river</i>	<i>Hongor Ulun river</i>	<i>Holboo lake</i>	<i>Kitchen of main camp</i>	<i>Kitchen of sub-camp</i>	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 23: Water Chemical analysis, July 2016.

Parameters	<i>Buraat river</i>	<i>Hongor Ulun river</i>	<i>Holboo lake</i>	<i>Kitchen of main camp</i>	<i>Kitchen of sub-camp</i>	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

CW1-2:

Table 24: 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	

BI-ANNUAL ENVIRONMENTAL MONITORING REPORT

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 25: 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 26: 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 27: Water Heavy metals analysis, May 2016.

Name of the monitoring spot	Content of heavy metals				
	Cr	Pb	Cd	Ni	Zn
Shurga river	0.01	0.001	0.001	0.00	0.07
Hongio river	0.02	0.000	0.001	0.01	0.05
Buraat river	0.00	0.001	0.001	0.01	0.03
Hongor Ulun river	0.00	0.000	0.001	0.00	0.02
Buyant river	0.00	0.002	0.000	0.00	0.09
Kitchen water of the main camp, CW1-2	0.03	0.005	0.002	0.00	0.17
Drinking water standard of Mongolia (MNS 9000:2005)	0.05	0.01	0.003	0.02	5

Table 28: Water Heavy metals analysis, June 2016.

Name of the monitoring spot	Content of heavy metals				
	Cr	Pb	Cd	Ni	Zn
Shurga river	0.01	0.002	0.000	0.01	0.09
Hongio river	0.01	0.001	0.002	0.01	0.06
Buraat river	0.01	0.001	0.000	0.01	0.00
Hongor Ulun river	0.02	0.005	0.002	0.01	0.03
Buyant river	0.01	0.001	0.001	0.00	0.11
Kitchen water of the main camp, CW1-2	0.03	0.007	0.001	0.01	0.25
Drinking water standard of Mongolia (MNS9000:2005)	0.05	0.01	0.003	0.02	5

Table 29: Water Heavy metals analysis, July 2016.

Name of the monitoring spot	Content of heavy metals				
	Cr	Pb	Cd	Ni	Zn
Shurga river	0.00	0.003	0.001	0.01	0.07
Hongio river	0.01	0.002	0.001	0.00	0.05
Buraat river	0.01	0.003	0.001	0.00	0.02
Hongor Ulun river	0.01	0.002	0.001	0.01	0.05
Buyant river	0.00	0.001	0.001	0.01	0.18
Kitchen water of the main camp, CW1-2	0.03	0.002	0.002	0.01	0.31
Drinking water standard of Mongolia (MNS9000:2005)	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.

3.5.3. DUST MEASUREMENT

CW1-1:

The monitoring team has chosen 10 points around construction camps and nearby small restaurants where human traffics are relatively high and several spots in the Hongio river valley where there are about 40-50 herders families are dwelling this summer. 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 10 monitoring spots. Since construction works have yet to commence in the Hongio river valley, dust level is remote to none. 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 are 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.



Table 30: Measured dust concentration levels, May 2016.

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

CW1-3:

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 10

monitoring spots. Since embankment works have yet to commence in some parts of the section, dust concentration was at a natural level. 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 are 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.

Table 31: Measured dust concentration levels

Monitoring Spot No.	Name of the monitoring spot	Average dust concentration level /per hour/, mg/m3			Standard level mg/m3
		May	June	July	
1	Khashaat pass	0.019	0.023	0.047	0.1
2	Hongor Ulun river	0.017	0.012	0.016	
3	Holboo lake	0.017	0.012	0.015	
4	Nearby sub-camp	0.026	0.02	0.041	
5	Shar bulag	0.034	0.017	0.015	
6	Planned quarry site STA.96	0.048	0.021	0.012	
7	Buraat pass	0.054	0.033	0.023	
8	Buraat valley 1	0.031	0.024	0.022	
9	Buraat valley 2	0.029	0.028	0.029	
10	Nearby main camp and quarry site	0.083	0.079	0.068	

CW1-2:

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 10 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 are 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 27. Dust measurement



Table 32: Measured dust concentration levels

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

3.5.4. NOISE MEASUREMENT

CW1-1:

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 10 monitoring spots, the noise levels were within the allowed level.

Table 33: Measured noise levels

Monitoring Spot No.	Name of the monitoring spot	Measured noise level /dB/			Standard level dB
		May	June	July	
1	Nearby Shurga river bridge	57.1	38.6	24.5	90
2	Ontsiin Khutul	71	69.7	31.7	
3	Shar nuur	75.5	72.3	58	
4	Nearby construction camp	59.3	70.6	62.6	
5	Hongio bridge	41.1	33.8	89.9	
6	Hongio valley 1	18.2	24.2	73.1	
7	Hongio valley 2	9.3	17.9	20.2	
8	Hongio valley 3	10.5	10.1	18.3	
9	Bayan Enger	26.8	21.4	19.8	
10	Khashaat pass	11.3	19	11.6	

CW1-3:

Table 34: Measured noise levels

Monitoring Spot No.	Name of the monitoring spot	Measured noise level /dB/			Standard level dB
		May	June	July	
1	Khashaat pass	48.7	32.5	71.5	90
2	Hongor Ulun river	36.5	37.9	29.7	
3	Holboo lake	45.9	36.8	28.6	
4	Nearby sub-camp	54.4	31.3	53.2	
5	Shar bulag	32.3	27.1	24.9	
6	Planned quarry site STA.96	39.9	27.5	21	
7	Buraat pass	37.5	42	26.3	
8	Buraat valley 1	50.8	35.7	26.5	

BI-ANNUAL ENVIRONMENTAL MONITORING REPORT

9	Buraat valley 2	56.1	38.1	31	
10	Nearby main camp and quarry site	79.8	82.6	72.3	

CW1-2:

Table 35: Measured noise levels

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

4. CONCLUSION

In order to implement the EIA and EMP requirements, the contractors have developed section-specific 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. Most of the environmental protection measures specified in the EMP were implemented successfully. The main highlights of environmental work in the first quarter 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.

4.1.Recommendations for next half of the construction season:

Following recommendations are provided for further activities in the second half of 2016:

Tranche-1:

1. Water collection pond for the Ehen Us spring needs to be repaired and the outflowing gate shall be leveled down.
2. Make a tunnel on the downside of the road to increase the spring water flow to the Bodonch river at STA.59, Package 1.
3. Hand-over 6 water wells to the local soum government in good condition before October 30, 2016.
4. All camp sites shall be demolished or cleaned properly and handed-over to the local soum governments.
5. Complete rehabilitation at the 4 remaining borrow sites and hand-over to the local soum governments.

Tranche-2:

6. Preventing the surface water resources from pollution is one of the most important, if not the most important, goal for the project. Construction Teams of CW1-1 and CW1-3 lots shall construct similar deviation road embankments over Hongio, Buraat and Hongor Ulun rivers.
7. Removal of several tombs in CW1-1 and CW1-2 sections are important for proceeding of further construction.
8. Place control on fiber optic cable removal works to prevent damaging ancient tombs nearby.

9. The domestic DEIA report is been updated and near completion. The contractors need to start implementing site-specific mitigation measures from the updated EIA from September. Corresponding trainings will be made by the PIU environmental monitoring consultant.
10. The contractors need to continue their monthly monitoring activities to ensure the impacts are within control.
11. Workers at dusty places, such as quarry sites, need to wear protection masks regularly.
12. Provide oil absorbing blanket to re-fuel truck drivers.
13. Trucks transporting earth materials shall be covered with tarpaulin or equivalent items.

APPENDIX A.

Table 36: 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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

BI-ANNUAL ENVIRONMENTAL MONITORING REPORT

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	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Material collection Compliance with Environmental Law, 2012. 	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> 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

BI-ANNUAL ENVIRONMENTAL MONITORING REPORT

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	<ul style="list-style-type: none"> 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. 	<p>Implemented</p> <p>Implemented</p>
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.	Excessive 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.	<ul style="list-style-type: none"> Unhygienic and littered environment around the camp, Exposure 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

BI-ANNUAL ENVIRONMENTAL MONITORING REPORT

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