Environmental Monitoring Report

Bi-Annual Report
April – June 2014

MON: Western Regional Road Corridor Development Project – Phase I

Prepared by E. Khasar, Environment Consultant for the Government of Mongolia and the Asian Development Bank.

ENVIRONMENTAL MONITORING REPORT

Bi-annual Report

April - June, 2014

WESTERN REGIONAL ROAD CORRIDOR DEVELOPMENT PROJECT

Prepared by E.Khasar, Environmental consultant for the Project

CONTENTS

ABBREVIATIONS

MRT – Ministry of Road and Transportation

ADB – Asian Development Bank

MEGD – Ministry of Environment and Green Development

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

GRM – Grievance Redress Mechanism

COMO – Community Outreach and Monitoring Officers

1. INTRODUCTION

1.1 ABOUT THE REPORT

Purpose of this report is to summarize and analyze the environmental monitoring performance in the first half of 2014 construction season as well as providing updated status on implementation of the Environmental Management Plan for the Western Regional Road Corridor Development Project. The report covers Package 1 and Package 2 sections of the road.

Within this report we have visited following main aspects of environment and provided evaluation on how the Project is been implementing its goals in each aspect: Environmental requirements and responsibilities; Environmental monitoring and management; Environmental protection and mitigation measures; and Grievance Redress Mechanism.

The report is prepared by the Environmental Specialist of the Project Implementation Unit with inputs provided from the EMR by the contractor. The Contractor Jiangsu Jianda Group has hired a local environmental consulting organizations to carry out environmental monitoring activities for the project. Environmental protection and monitoring works previously carried out for the Project are included and summarized in the bi-annual Environmental monitoring reports submitted in 2013.

1.2 BRIEF INTRODUCTION TO THE PROJECT

The Government of Mongolia has received a grant and loan from Asian Development Bank to support the construction of several section along 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 under the Western Regional Road Corridor Development Program.

The first package (110.8 km from Temeen Khuzuu to Baga Ulaan Pass) of Phase I is being implemented under Grant 0107. Package II (103.3 km section of road from Baga Ulaan Pass to Mankhan soum) is being implemented under WRRCIP Multi-tranche Financing Facility. Jiangsu Jianda Co., Ltd was selected as the road construction contractor while Construction Supervision Company is KCI LLC.

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.

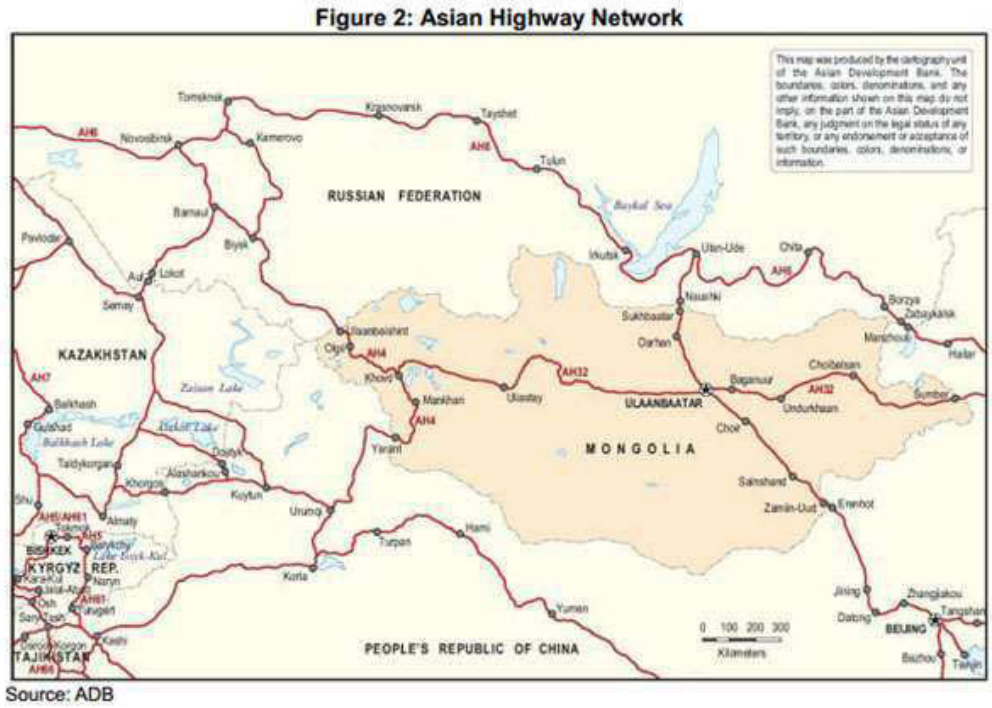
The Government of Mongolia, with financial support from Asian Development Bank (ADB) is upgrading the internal transport network in the western region to improve trade and transit links between Mongolia and neighboring countries. The outcome of the Project will be an efficient and safe regional transport route that links Xinjiang Uygur Autonomous Region in the People's Republic of China and Siberia in the Russian Federation through western Mongolia.

Table 1: Phases of the development of roads

Road section	Description	Length, km
Package 1	Temeen Huzuu-Baga Ulaan pass	110.8
Package 2	Baga Ulaan pass to Mankhan soum	103.3
Package 3	Mankhan –Khovd	85.3
Package 5	Ulgii-Khashaat	60

Figure 1: Project location

Figure 2: Asian Highway network



Source: ADB

1.3 Baseline Environmental Condition

The project area is located within the Altay-Sayan eco-region that includes Mongolia, China, Russia and Kazakhstan. The Altai Mountains in Mongolia's Western region stretch approximately 1500 km. The region is relatively high altitude, with the project area elevations ranging from 1400m to 2600m. The area is characterized by dry steppe and steppe. The proposed project alignment will primarily follow existing roads that pass through mountain areas, hills, valleys and plains which are largely dry with sparse vegetation.

Figure 3: Altay Mountains

Monthly mean precipitation and snow cover data for the project area shows that the area is relatively dry and that winter snow is at its deepest in January for both the Khovd and Bayan-Ulgii provinces. This demonstrates a short construction period to the contractors as the months without snow cover are limited. The project area has continental, cold and dry climate with harsh winters. During the period from late October to mid-March the ground is covered with snow. The snow cover prevents deep soil freezing, acts as a water source for herdsmen, wild and domestic animals during the winter, and causes spring floods in the rivers and streams.

The surface water resources in the project area are characterized by rivers, streams, springs and lakes. A complex area of lakes, marshes, and ponds is in the project area such as the Depression of the Great Lakes.

A significant land use in the corridor is for grazing livestock. The livestock in the area are dominated by large herds of goat and sheep as well as cattle and camels. The vegetation on which the livestock graze includes sparse grassland close to water bodies.

The habitat in the project area has been highly modified and degraded by human activity, not least by the existing multi-track earth road network. Sparse vegetation near the corridor is heavily grazed by livestock. The project area does not encroach upon any recognized critical habitat or legally protected area.

Bodonch canyon which serves as the main tunnel between the northern and southern parts of the Altay mountain, is 90 km long valley along the Package 1 road starting from the Baga Ulaan Pass all the way to Altay soum center. Bodonch river which is considered an environmentally sensitive area flows through the Bodonch canyon.

Figure 4: Bodonch canyon and Bodonch river

2. ENVIRONMENTAL PROTECTION AND MANAGEMENT

2.1 Environmental responsibilities

Environmental Impact Assessment for the Western Regional Road Corridor Development project was conducted by "Eco-Altay" Co., Ltd in 2009. The EIA report provides description of potential impacts on environment. Impact mitigation measures and scope of monitoring activities are defined in the Environmental Protection Plan and Environmental Monitoring Plan respectively.

According to Mongolian Law on Environment, the Project proponent and its contractors are obliged to carry out Environmental Protection and Monitoring Plans as well as to implement the mitigation measures required on the EIA report.

MEGD endorses annual Environmental management plan which includes environmental protection and monitoring plans as well as the necessary budgets related to implementation. The Citizens' Representative Assemblies of provinces, the capital city, soums and districts, their Presidiums and local environmental inspectors supervise the implementation of the EMP at the end of each year.

In the Western Regional Road Corridor Development Project case, the contractor is responsible for the implementing the actions defined in the EMP while the Project Implementation Unit is responsible for supervising the implementation works and preparation of quarterly reports to MRT and ADB. The contractor fulfill its environmental duties by hiring a local environmental consulting firm to conduct the monthly environmental monitoring activities for them.

In addition, necessary 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 environmental mitigation measures identified in the EMP shall be included in detailed engineering designs, works and other contracts for the project. The environmental protection, monitoring and construction workers' health and safety provisions shall be incorporated in both of the labor and the construction supervision contract. During construction activities,

consultations and information sharing shall be conducted in accordance with the community consultation and engagement plan.

In May 2012 Environmental Protection Law was amended by Mongolian Parliament. There were some newly added clauses on environmental audit and status of state inspection officers and requirements for mining activities. There are no significant changes that would impact the Western Regional Road Corridor Development Project.

2.2 Objectives of the Environmental Management Plan

The main objectives of an Environmental Management Plan are:

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. Managing construction works and operations to prevent or at least minimize adverse impacts on the environment.
4. Implement environmental and mitigation measures specified in the contract documents.
5. Develop action plan for implementing mitigation measures where and when needed
6. Provide safeguard to all workers from any hazard associated with the construction operations and ensure protection of their health
7. Ensure protection of the health and welfare of road side communities by minimizing nuisance including pollution.
8. 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 Key Environmental Issues

Following environmental issues arise during the road construction work:

1. During the construction over rivers and streams, a temporary reduction in water quality occur because of increased turbidity and suspended sediment from uncontrolled run-off from the construction sites.
2. Dust will be generated and mobilized by construction activities. Dust generation mostly affect people living close to the construction sites.
3. The herdsmen in the project area need access to their pasture lands and need to cross the road in order to graze their livestock. Construction activities interfere with livestock grazing requirements.
4. The area has permafrost which cause engineering challenges and potential changes to local hydrology.
5. Wildlife migration routes that cross the existing road corridor have been identified at a number of points along the road alignment, thus have impact on their wildlife migration routes.
6. Waste disposal from construction camps
7. Borrow pits are used at some points along the road.

All of the impacts mentioned above are projected as temporary impacts that could be reduced or avoided with a proper implementation of mitigation measures. There will be no residual impacts.

2.4. Environmental supervision

The construction supervisor – Korea Consultants International Co., Ltd has implemented daily, filed supervision on environmental protection works and compliance of environmental requirements and standards. Environmental compliance sheets and checklists in the Appendix A are the main tools for the field supervisors for their daily inspection works. Results of their environmental inspection works are included in the Monthly Reports provided by the KCI Co., Ltd.

2.5 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.
There are a number of quarries and borrow pits along the Project road that are under active operation currently.

Package1: (Temeen Huzuu hill – Baga Ulaan Pass, 110.8km)

There are 3 quarries for producing aggregates for cement and asphalt concrete, graded crushed stone base course material located around STA.12 on the right 2 km away from Altay soum center, at STA.54 on right and STA.92 are under operation.

6 borrow pits for embankment material, 16 borrow pits for sub-base material and 3 borrow pits for gravel shoulder material are under operation. It's worth noting that the Contractor is had taken embankment material from several unapproved borrow pits. The supervising engineers have been strongly instructing the Contractor not to collect any material from unapproved places. The issue was discussed at a joint meeting with the Contractor and the supervising party and the Contractor has pledged to stop using the unauthorized borrow pits. Contractor is no longer using unapproved borrow pits and is responsible for rehabilitation of all the spots it used as borrow pits.

Comment [U1]: Updated

Package 2: (Baga Ulaan Pass – Mankhan soum center, 103.3 km)

There are 24 borrow pits for embankment work have approved by the local Government of Mankhan and Must soums at the beginning of May and June 2013 respectively that are under operation.

There are 10 borrow pits for sub-base material have approved by the local Government of Mankhan and Must soums. All 10 borrow pits are under operation. 13 borrow pits for gravel shoulder material are under operation for gravel shoulder work started from May 2014.

The quarry for production of aggregates for base course, cement and asphalt concrete located at STA.54 on the right 0.5 km away from the project road alignment is operating from beginning of April 2014.

Figure 5: Quarry site, Package 1.

Figure 6: Quarry site, Package 2.

2.6 Waste disposal

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

- Wastes from camp activities are delivered to the appointed spoil pits and dumpsites.
- Wastes coming from workers' accommodation are deposited in designated places within the campsite before burning or delivery to the approved local dumpsite. Garbage containers with adequate lids/covers are provided in such places around the campsite and well maintained.
- Some road construction wastage has been removed from the construction site to the designated location in accordance with the related regulations on waste removal.

2.7 Water resources

The Package 1 and Package 2 road crosses 2 rivers: Bodonch river and Tsahiriin river. There are bridges being built over the river crossing points. In Bodonch canyon, to make proper construction of road damn, the river diverged. Since the Bodonch river is very important to livelihood of local people, our contractor and its engineers have been paying a great attention to the Bodonch river. The contractor has dig water wells around each of its campsites along the road.

Figure 7: Tsahiriin River nearby the main camp of Package 2.

Water protection activities:

- The Contractor constructed temporary bridges on the diversion road crossing water channel at the bridge No.1, No.2, No.3, No.4 and No.7 along the Package 1 road. Temporary pipe culvert has been built at bridge No.2 (STA.56+840) for Package 2.
- Installed septic tanks and sock well to treat waste water and sewerage water at campsites
- Construction of locally acceptable drainage system to treat surface water from camp sites and workshops
- Supplying the site employees with fresh drinking water. Well water has been tested regularly and the test results conform to the drinking water standard.
- Concrete mixer trucks are not allowed to be washed at the water stream.
- Fuel storage areas at the campsites are secured by concrete slab to protect leakage of fuel and spillage.
- Bitumen storage area is under good security to ensure no adverse impacts or contamination of ground water.

2.8 Campsite environment

- Ditches were constructed on both sides of the camps to prevent the camps from being damaged by the rain stream. Maintenance and repairing of the side ditches were conducted through regular cleaning and trimming.
- Sealed septic tanks are set for toilet outside of the camp by burying the pipes underground.
- A dedicated personnel is employed to take care of indoor cleaning for accommodation and offices. The cleaning items are provided by the contractor once a month for engineers to make the thorough cleaning, including bed sheets, bedcover washing, floor and furniture cleaning.

Figure 8: Workers' accomodation at the Package I Main camp.

Figure 9: Package 2, Main camp

- The campsite yard is covered with crushed stone together with concrete path, the access roads including drainage lines is kept neat and clean by spraying water regularly to control the dust.

2.9 Health and Safety

Specific tasks implemented within the Health and Safety Plan:

- Appointment of Health and Safety manager for the entire project as well as Health and safety engineers at Package 1 and Package 2 sites. They are in responsible for ensuring that all construction sites, camps, sub-camps and workshops are complied with the Technical Specification Requirements for Health and Safety.
- Designating an ambulance vehicle, equipped with basic first-aid kits in case of emergency accidents.
- Establishing emergency response plan in case of emergency situation occurs
- 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.
- Installation of temporary traffic signs, arrangement of temporary drainage and diversion

Health and safety manager carries out following works:

- Establishment of safety control system
- Appointment of safety inspectors for every work team
- Educate workers on health and safety issues
- Explain the health and safety aspect of the method of protection and prevention against accidents
- Hold weekly safety education meeting and register attendance
- Conduct on-site inspection regularly
- Ensure the first-aid and emergency services and items are available
- Ensure all personnel wear the personal protective equipment while working
- Help provide a clean and hygiene living condition for the construction and camp staffs
- Drinking water quality control
- Maintain the good status of heavy machineries and give instruction of safety operation to drivers and operators
- Implementation of
- HIV/AIDS prevention program
- Reporting of accidents to Engineers as soon as possible

Health and safety engineers 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
- Fill in the Health and Safety checklist sheet regularly
- If any risks are found, inform it to field supervisors and recommend appropriate mitigation measures

2.10 Noise prevention

Noise and air pollution at the construction sites were minimized through proper maintenance of equipment & vehicles in accordance with the relevant standards. Precautionary measures implemented were:

1) Workers who are regularly working at active operational points where noise level

could be high are required to wear earmuffs which will protect them from harmful and long exposures to noise originating from construction machinery. Compressor and crushing operators shall wear his earmuffs while working.

2) Noise level at the vehicles and construction machinery are monitored regularly with particular attention to silencers and mufflers to maintain noise levels within the specified limits.
3) There are no places near equipment having noise levels that exceed 90 decibels at site.

2.11 Dust prevention

- Embankment sections – spraying water by water truck regularly
- Around campsite - spraying water by water truck regularly
- Traffic passage and access roads- Since it is very difficult practically for the Contractor to control the whole passage of traffic, the Contractor is able to send water spray trucks to the active operational sites only.
- Crushing plant – Package 1: spraying water by nozzle connected to water tank while working. Package 2: Crushing plants are not erected yet.
- Asphalt plant to reduce smoke emission – Package 1: Dust collector equipped to the plant is working properly. Package 2: not erected yet.

Unit supervisors inspected implementation of EPP and EMP on regular basis. For detailed information about implementation, please refer to Appendix A.

Figure 10: Water spray truck, Bodonch canyon

3. ENVIRONMENTAL MONITORING

3.1. Methodology

Since controlling the adverse impacts from the road construction activities are essential for the Project, the Environmental Monitoring Plan was designed to ensure prevention and regular control of the adverse impacts on the environment and protection of the health and welfare of construction workers and road side communities. The contractor has appointed dedicated personnel at both Package 1 and Package 2 sections to ensure a proper implementation of the monitoring plan.

The contractor carried out monitoring tests and sampling activities for soil, water and air quality according to the 2014 Monitoring schedule. Considering the construction season is relatively

short in Mongolia, we setup a higher frequency of monitoring activity (once every month starting from May to October). All of the monitoring activities were conducted in accordance with relating laws, regulations and standards of Mongolia.

The monitoring team has identified monitoring spots along the road, around the workers' camp and mixing plants and along the Bodonch River that are considered environmentally sensitive spots.

Monitoring team specialists have conducted dust and noise level measurements, taken soil and water samples at the selected monitoring spots. Dust and noise level measurements were conducted by specialists from the Institute of Meteorology of Khovd province who used devices Dust Trak and VoltCraft. Test analysis for soil and water samples were conducted at the Laboratory of National Geographic Academy in Ulaanbaatar.

Figure 11: Noise measurement device used for monitoring

Figure 12: Dust Trak used for monitoring

3.2 Environmental Monitoring Budget for 2014

Table 2: Environmental monitoring budget for Package 1.

Monitoring indicators	Location of monitoring	Frequency	Necessary costs (USD)	Standards
1. Air quality monitoring Dust measurments (PM10)	At 10 points along the road, mixing plant, workers camp and borrow pits	Every month	290$ at each point x 10 points x 6 times = 17,400$	MNS:4585-98 MNS:3384 MNS:4048 MNS:5885 : 2008
2. Water quality monitoring Chemical and heavy metals analysis	Take water samples at 10 spots	Every month	330$ at each sample x 10 samples x 6 times = 19,800 $	MNS: 3934 MNS: 5667
3. Noise monitoring maximum allowed level by decibels	At 10 spots along the road, worker's camp and mixing plant	Every month	50$ at each spot x 10 spots x 6 times = 3,000 $	MNS: 0012-1-009:1995
4. Work place condition, safety & hygiene	At all applicable places	Every month	6 times 6,000$	Health law, Hygiene rules, Occupational health and safety

				procedures
5. Soil quality monitoring Chemical and heavy metals analysis	At 10 spots along the road and mixing plant	Every month	320$ at each spot x 10 samples x 6 times = 19,200 $	MNS: 5850:2008
6. Flora monitoring Species and density	Along the road corridor	Once a year	2000$	Guidelines for field survey
7. Fauna monitoring Species, population and migration	Along the road corridor	Once a year	2000$	Guidelines for field survey
Total			**69,420$**	

Table 3: Environmental Monitoring Budget for Package 2, SW1-1

Monitoring indicators	Location of monitoring	Frequency	Necessary costs (USD)	Standards
1. Air quality monitoring Dust measurments (PM10)	At 2 points along the road, mixing plant, workers camp and borrow pits	Every month	290$ at each point x 2 points x 6 times = 3,480$	MNS:4585-98 MNS:3384 MNS:4048 MNS:5885 : 2008
2. Water quality monitoring Chemical and heavy metals analysis	Take water samples at 2 spots	Every month	330$ at each sample x 2 samples x 6 times = 3,960 $	MNS: 3934 MNS: 5667
3. Noise monitoring maximum allowed level by decibels	At 2 spots along the road, worker's camp and mixing plant	Every month	50$ at each spot x 2 spots x 6 times = 600 $	MNS: 0012-1-009:1995
4. Work place condition, safety & hygiene	At all applicable places	Every month	6 times 1120$	Health law, Hygiene rules, Occupational health and safety procedures
5. Soil quality monitoring Chemical and heavy metals analysis	At 2 spots along the road and mixing plant	Every month	320$ at each spot x 2 samples x 6 times = 3,840 $	MNS: 5850:2008
6. Flora monitoring Species and density	Along the road corridor	Once a year	500$	Guidelines for field survey

7. Fauna monitoring Species, population and migration	Along the road corridor	Once a year	500$	Guidelines for field survey
Total			**14,000$**	

Table 4: Environmental Monitoring Budget for Package 2, SW1-2

Monitoring indicators	Location of monitoring	Frequency	Necessary costs (USD)	Standards
1. Air quality monitoring Dust measurments (PM10)	At 3 points along the road, mixing plant, workers camp and borrow pits	Every month	290$ at each point x 3 points x 6 times = 5,220$	MNS:4585-98 MNS:3384 MNS:4048 MNS:5885 : 2008
2. Water quality monitoring Chemical and heavy metals analysis	Take water samples at 3 spots	Every month	330$ at each sample x 3 samples x 6 times = 5,940 $	MNS: 3934 MNS: 5667
3. Noise monitoring maximum allowed level by decibels	At 3 spots along the road, worker's camp and mixing plant	Every month	50$ at each spot x 3 spots x 6 times = 900 $	MNS: 0012-1-009:1995
4. Work place condition, safety & hygiene	At all applicable places	Every month	6 times 1,180$	Health law, Hygiene rules, Occupational health and safety procedures
5. Soil quality monitoring Chemical and heavy metals analysis	At 3 spots along the road and mixing plant	Every month	320$ at each spot x 3 samples x 6 times = 5,760 $	MNS: 5850:2008
6. Flora monitoring Species and density	Along the road corridor	Once a year	500$	Guidelines for field survey
7. Fauna monitoring Species, population and migration	Along the road corridor	Once a year	500$	Guidelines for field survey
Total			**20,000$**	

Table 5: Environmental Monitoring Budget for Package 2, SW1-3

Monitoring indicators	Location of monitoring	Frequency	Necessary costs (USD)	Standards
1. Air quality monitoring Dust measurments (PM10)	At 2 points along the road, mixing plant, workers camp and borrow pits	Every month	290$ at each point x 2 points x 6 times = 3,480$	MNS:4585-98 MNS:3384 MNS:4048 MNS:5885 : 2008
2. Water quality monitoring Chemical and heavy metals analysis	Take water samples at 2 spots	Every month	330$ at each sample x 2 samples x 6 times = 3,960 $	MNS: 3934 MNS: 5667
3. Noise monitoring maximum allowed level by decibels	At 2 spots along the road, worker's camp and mixing plant	Every month	50$ at each spot x 2 spots x 6 times = 600 $	MNS: 0012-1-009:1995
4. Work place condition, safety & hygiene	At all applicable places	Every month	6 times 1120$	Health law, Hygiene rules, Occupational health and safety procedures
5. Soil quality monitoring Chemical and heavy metals analysis	At 2 spots along the road and mixing plant	Every month	320$ at each spot x 2 samples x 6 times = 3,840 $	MNS: 5850:2008
6. Flora monitoring Species and density	Along the road corridor	Once a year	500$	Guidelines for field survey
7. Fauna monitoring Species, population and migration	Along the road corridor	Once a year	500$	Guidelines for field survey
Total			**14,000$**	

3.3 Monitoring results

3.3.1. Soil quality monitoring

Table 6: Chemical analysis

Sampling point	Depth, sm	pH_{H_2O} (1:5)	$CaCO_3$ %	Humus %	$EC_{2.5}$ dS/m	mg/100g	
						P_2O_5	K_2O
Urtiin Camp	0-50	8.35	2.91	0.610	0.103	0.72	9.4
Mogoin Khar quarry at Bodonch	0-15	8.19	2.18	1.360	0.257	1.06	11.5
Khujirt quarry	0-15	8.03	1.45	1.969	0.432	1.34	14.2
Bodonch canyon	0-15	8.40	2.18	2.707	0.090	1.83	12.4
Borrow pit at Tsagduultain bridge	0-15	8.12	0.00	4.479	0.501	2.49	21.7
Main camp of Package I	0-15	8.24	3.64	0.614	0.145	0.42	6.8
Borrow pit at Ovoo	0-15	8.28	0.00	3.644	0.225	1.37	15.1
Tsahiriin River	0-15	8.47	4.73	2.655	4.360	1.83	12.9
Maanit camp, Package II	0-15	8.21	0.00	1.600	0.080	1.24	10.4

Table 7: Soil composition analysis

Sampling point	Depth, sm	Size of soil separates, % (mm)		
		Sand (2-0.05мм)	Dust (0.05-0.002мм)	Mud (< 0.002мм)
Urtiin Camp	0-15	67.4	23.9	8.7
Mogoin Khar quarry at Bodonch	0-15	65.9	23.4	10.6
Khujirt quarry	0-15	70.3	21.2	8.4
Bodonch canyon	0-15	54.2	35.1	10.6
Borrow pit at Tsagduultain bridge	0-15	44.0	44.6	11.4
Main camp of Package I	0-15	64.5	23.9	11.7

Borrow pit at Ovoo	0-15	57.2	31.9	10.9
Tsahiriin River	0-15	54.2	34.5	11.2
Maanit camp, Package II	0-15	64.5	27.8	7.7

Table 8: Heavy metals analysis

Sample No.	Sampling point	Depth, sm	Content of heavy metals mg/kg				
			Cr	Pb	Cd	Ni	Zn
5	Bodonch canyon	0-15	131.7	2.8	0.033	203.3	172.3
9	Tsahiriin River	0-15	28.0	24.8	0.048	8.6	211.2
	Mongolian Standard (MNS 5850 : 2008)		150	100	3	150	300

Based on the laboratory test analysis, it can be concluded that there is no soil contamination along the road. In the heavy metals analysis heavy metals contents in the soil samples were within the standard levels. The only parameter that was not within the standard level was that the Nickel content in the soil sample from Bodonch river has slightly exceeded the standard level. During the sight observation the monitoring team did not found any sign of soil contamination or spillage of oil etc. A low grade concentration of certain minerals or metals in soil of certain area occurs. However, our monitoring team will pay special attention to the soil monitoring spot near to Bodonch Bridge during their next monitoring activity in June. To ensure the soil quality at the spot, we will the take several soil samples at the spot for further heavy metals analysis.

3.3.2 Water quality monitoring

Table 9: Chemical analysis 1

Sampling point		Urtiin camp, kitchen	Urtiin camp, well water	Bodonch River	Khujirt camp, kitchen	Unit	Drinking Water Standard (MNS 900:2005)
Parameters	*Sample No.*	*1*	*2*	*3*	*4*		

Turbidity		no turbidity	39.2	no turbidity	no turbidity	**mg/l**	**1.5**
Mineralization		886.40	855.02	197.7	359.56	**mg/l**	**1000**
Reaction		8.81	8.58	8.56	8.37	**pH**	**6.5-8.5**
EC		1.142	1.287	0.244	0.482	**dS/m**	
Hardness		8.5	8.0	2.2	4.0	**mg/l**	**7.0**
CO_3^{2-}		6.0	0.0	6.0	3.0	**mg/l**	
HCO_3^-		305.0	311.1	115.9	158.6	**mg/l**	
Cl^-		95.8	95.8	14.2	28.4	**mg/l**	**350**
SO_4^{2-}		215.7	217.3	13.2	70.0	**mg/l**	**500**
Ca^{2+}		88.6	85.0	34.1	54.9	**mg/l**	**100**
Mg^{2+}		49.0	45.7	5.8	14.8	**mg/l**	**30**
Na^+		126.3	100.1	6.9	25.1	**mg/l**	**200**
K^+		2.7	2.7	1.6	4.7	**mg/l**	

Table 10: Chemical analysis 2

Sampling point		**Bodonchiin Bridge**	**Tsahiriin River**	**Maanit camp, kitchen**	**Unit**	**Drinking Water Standard (MNS 900:2005)**
Parameters	***Sample No.***	***5***	***9***	***10***		
Turbidity		no turbidity	1583.2	no turbidity	**mg/l**	**1.5**
Mineralization		243.7	415.33	668.12	**mg/l**	**1000**
Reaction		8.41	8.35	8.18	**pH**	**6.5-8.5**
EC		0.284	0.488	0.916	**dS/m**	

Hardness		2.8	4.3	8.5	**mg/l**	**7.0**
CO_3^{2-}		4.5	1.5	1.5	**mg/l**	
HCO_3^-		128.1	176.9	158.6	**mg/l**	
Cl^-		21.3	24.8	74.5	**mg/l**	**350**
SO_4^{2-}		31.3	107.0	228.0	**mg/l**	**500**
Ca^{2+}		38.1	46.3	110.6	**mg/l**	**100**
Mg^{2+}		10.5	23.8	36.4	**mg/l**	**30**
Na^+		9.9	35.0	57.0	**mg/l**	**200**
K^+		2.7	2.0	1.6	**mg/l**	

Table 11:Chemical analysis 3

Sampling point		**Camp 28, well water**	**Quarry at 5 Ovoo, well water**	**Package 1 Main camp, kitchen**	**Package 2 Main camp, kitchen**	**Unit**	**Drinking Water Standard (MNS 900:2005)**
Parameters	***Sample No.***						
Turbidity		no turbidity	no turbidity	no turbidity	no turbidity	**mg/l**	**1.5**
Mineralization		366.9	780.85	615.19	748.28	**mg/l**	**1000**
Reaction		8.04	8.03	7.83	7.96	**pH**	**6.5-8.5**
EC		0.438	1.045	0.797	1.028	**dS/m**	
Hardness		4.0	9.6	6.6	6.9	**mg/l**	**7.0**
CO_3^{2-}		0.0	0.0	0.0	0.0	**mg/l**	
HCO_3^-		167.7	167.7	146.4	289.7	**mg/l**	

Cl^-		28.4	99.4	53.2	46.1	**mg/l**	**350**
SO_4^{2-}		74.9	282.4	248.6	241.2	**mg/l**	**500**
Ca^{2+}		56.1	126.7	45.7	54.1	**mg/l**	**100**
Mg^{2+}		14.7	40.3	52.2	50.8	**mg/l**	**30**
Na^+		25.1	64.4	64.4	64.4	**mg/l**	**200**
K^+		4.7	1.56	4.72	2.0	**mg/l**	

Table 12: Heavy metals analysis

Sampling point	Sample No.	Content of heavy metals mg/l				
		Cr	Pb	Cd	Ni	Zn
Water sample from Bodonch River	2	0.000	0.008	0.001	0.035	0.043
Water sample from Tsahiriin River	9	0.000	0.038	0.002	0.090	0.240
Drinking Water Standard (MNS 900:2005)		0.05	0.01	0.003	0.02	5

The monitoring team have taken water samples at the environmentally sensitive points and wells nearby construction camps that are used for drinking. The 2 main surface water resource along the Package 1 and Package roads are Bodonch river and Tsahiriin river. Other water samples were taken from wells and kitchens at the construction camps to ensure workers' health protection. The indicator of turbidity in water sample from Tsahiriin river was at 1583 which can be considered very high comparing to the standard level 1.5. The main reason is construction of a bridge over the river. However 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 either within or close to the standard level. Therefore, it can be concluded that the Bodonch and Tsahiriin river are free from heavy metal contamination. Main indicators for Bodonch river sample are all within the standard level.

Increase in turbidity level without heavy metals contamination in the Tsahiriin river is not a serious issue since the nature of the impact is temporary. However, following preventive measures were taken:

- An instruction was given to the Contractor and its engineers to minimize the impact.
- Notices sent to households who reside along the river about the temporary turbidity and recommended them using the river water from the upper side of the bridge or well water for the cattle breeding purposes.
- We will keep the regular communication with the herders to avoid any conflict and pay special attention to monthly water monitoring results to ensure the impact is minimized.

Comment [U2]: Updated.

Laboratory test results for the water samples from the well and kitchen water show that all the indicators are within the allowed level of Drinking Water Standard of Mongolia, thus could be used for human drinking. The only water sample that has a turbidity level exceeding standard level is from the well nearby Urtiin camp. However, the kitchen water sample taken at the Urtiin camp shows no turbidity. Further water samplings for test analysis will be made at the Urtiin camp in June.

3.3.3 Dust measurement

Table 13: Measured dust concentration levels at the monitoring spots.

No.	Measurement point	Average dust concentration per hour (mg/m3)	Maximum allowed level (mg/m3)
1	Urtiin camp	0.097	0.100
2	Mogoin Khar quarry	0.035	
3	Khujirtiin am quarry	0.27	
4	Khujirtiin am camp	0.085	
5	Camp 54	0.174	
6	Tsagduultiin am	0.537	
7	Camp 28	0.189	
8	Boomiin am	0.847	
9	Package I Main Camp	0.551	
10	Package II Main	0.067	

	Camp - quarry		
11	Maanit	0.085	

The monitoring team has chosen 11 points around construction camps, quarries, mixing plants and the most actively operating construction points where dust generation is relatively high. 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 allowed level at 5 spots and very close to allowed level (slightly exceeding) at 3 other spots. Dust generation levels have exceeded the standard level significantly at Tsagduultiin am quarry, 5 Ovoo quarry and the Main camp of Package 1 during the active construction hours.

Figure 13: Specialists from the Institute of Meteorology of Khovd province measuring dust concentration level

3.3.4 Noise measurement

Table 14: Measured noise level at the monitoring spots

No.	Measurement point	Max level recorded	Maximum allowed level (dB)
1	Urtiin camp	88.9	90
2	Mogoin khar quarry	55.1	
3	Khujirt quarry & mixing plant	87.8	
4	Khujirt camp	68.0	
5	Bodonch river bridge	82.1	
6	Bodonch canyon	81.3	
7	Tsagduult am quarry	77.2	
8	Camp 28	76.5	
9	Package 1 Main camp	69.3	
10	5 Ovoo quarry	86.5	
11	5 Ovoo camp (Package 2 main camp)	66.5	
12	Tsahiriin River	41.8	
13	North camp of Package II	53.9	

The monitoring spots chosen for noise measurement were the same as dust measurement spots, noise disturbance could be highest at those spots given the heavy workload, traffic of trucks and active operation. Maximum allowed level of noise during day time is 90 decibels according to the Mongolian Standard on Ambient Air Quality. At all of the 13 monitoring spots, the noise levels were within the allowed level. Thus, it can be concluded that the noise level at the active operation points are within the standard level.

3.4. Community work

PIU Environmental monitoring consultant had 2 field trips to the Project site in May and June respectively. During the field trips, the consultant had organized meetings with environmental inspection officers of the local government, COMO officers and local residents who live along the Project road and visited to the environmental monitoring spots. Most of the local residents

have positive opinion about the Project as evidenced by the fact that many households are planning to start a service business along the road once the construction completes.

We have hired Community Outreach and Monitoring Officers in Mankhan, Altai and Must soums in 2013 who help us to implement the Grievance Redress Mechanism. Our COMO officers, D.Uuganbayar at Mankhan soum, B.Damdinjav at Altai soum and P.Bayanzul in Must soum, all had weekly work schedule that includes organizing training sessions, group discussion, conducting household survey and visits, site inspection and complaints reporting.

The COMO officers have organized group discussions among local residents during which current status of the Project is introduced to them. The group discussions have covered 170 people in Altai soum, 162 people in Must soum and 88 people in Mankhan soum.

The COMO officers have taken a household survey along the road corridor. The survey result shows that 25 households of Must soum and 43 households of Altai soum are residing at 5-20 km distance from the Project road. Exact location sheep yards, number of household members, education level and employment information are included in the survey. Detailed survey results will be included in a Quarterly Community Consultation Report which will be submitted later this month.

Comment [U3]: Updated

4. CONCLUSION

The PIU, its consultants and contractors demonstrated a satisfactory level of environmental due diligence in the implementation of the project. The environmental protection measures and environmental compliance monitoring and reporting as set out in the Contract have been progressed within required budget and time scales.

Environmental protection measures, health safety requirements are well implemented in accordance with Environmental Management Plan. Soil, water and air quality monitoring was carried out in May and June. The Contractor has hired local professional organization such National Geographic Academy and Meteorology Institute of Khovd province to conduct to field monitoring and laboratory analysis that were included in the monthly report.

Community Outreach & Monitoring Officers in Altay, Must and Mankhan soum have presented benefits, progress status and environmental protection activities of the Project to local residents

on weekly basis and working to address their key concerns that will be reflected in the further operational works.

During the monitoring period, there were temporary impacts such as dust arising, noise disturbance and damaged landscapes (borrow pits and quarries) occurred, but those impacts were controlled and minimized successfully.

Recommendation for further environmental work:

1. Contractor shall continue monthly monitoring activities to ensure control of dust generation, noise disturbance and other impacts on environment. PIU and supervising units shall analyze monthly monitoring results and plan proper actions and mitigations measures if any impacts are found exceeding allowed levels.
2. Water and wildlife movement monitoring specialists are expected to be chosen and start their work in the quarter 3. PIU will ensure the surveys will be executed in accordance with ADB standards in a timely manner. Final report on wildlife movement survey will be the main guideline for planning of wildlife cross points along the road. Final report on Water quality monitoring will be an important document that will help ensure surface and ground water sources in the Project area are free of pollution, contamination and serious impacts.
3. Impacts on Tsahiriin River need close monitoring especially at the points where river crossing bridges are being built. Preventive measures need to be maintained and checked regularly to ensure no oil spillages and contamination.
4. Rehabilitation of quarries and borrow pit spots along the Package 1 road need close monitoring. With the Package 1 construction work is expected to be completed this year, quarry sites finished exploited shall be recovered.

APPENDIX A.

Table 15: Compliance Report on Environmental Protection Measures

SL. No	Place	Concern issue	Recommended measures	Implementation/ Compliances	Remedial Measures
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.	Compliances	
		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.	Compliances	

SL. No	Place	Concern issue	Recommended measures	Implementation/ Compliances	Remedial Measures
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 WHO standards	Compliances.	
		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.	Provided	
		Kitchen and dining environment.	Provision of adequate ventilation, fixing of hand basins and cleanliness	Provided	

SL. No	Place	Concern issue	Recommended measures	Implementation/ Compliances	Remedial Measures
		Drainage at the camp	Provision of storm water drainage to nearby drain/stream outside the camp area.	Provided	
			Avoid stagnation of water inside the camp.	Compliances	
		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.	Compliances	
		First aid facilities,	Physician for facilitating round the clock service	First Aid Facilities Available	Well Cooperation with Local Hospitals, Doctor will come to SWC if needed.

SL. No	Place	Concern issue	Recommended measures	Implementation/ Compliances	Remedial Measures
		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.	
		Stock pile	Maintenance of stockpile height at a maximum of 4 meter	Implemented	

SL. No	Place	Concern issue	Recommended measures	Implementation/ Compliances	Remedial Measures
3.	Quarry/Borrow area.	• Material collection • Compliance with Environmental Law, 2006.	• 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 NEPA, M/O Mines and local authority (if any) for e×traction of stone from riverbed.	Compliances	
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 river/stream	Compliances	. 

SL. No	Place	Concern issue	Recommended measures	Implementation/ Compliances	Remedial Measures
			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.	Compliances	
6.	Fire fighting equipments at the 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.	Compliances	

SL. No	Place	Concern issue	Recommended measures	Implementation/ Compliances	Remedial Measures
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.	Compliances	
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	Implemented	
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.	Compliances	
10.	Construction workers related Impact at the camp and at the construction sites.	• Unhygienic and littered environment around the camp, • Exposure to hazards, transmission of	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	Compliances	.

SL. No	Place	Concern issue	Recommended measures	Implementation/ Compliances	Remedial Measures
		diseases among workers, water-borne diseases to workers.	inspections and vaccination among the workers.		
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.	Compliances	
13.	Environmental officer	In absence of environmental officer contractors activities will may not going on as environment friendly.	Immediate placement of environmental officer.	Available	

2.5.3 Environmental Protection Checklist

Table 16: Drainage and Protection Structures Construction Stage Checklist for Compliance with EPP

SN	Work Description	EPP Compliance		Improvements Required (Detail)
		Yes	No	
1	Setting out/Layout Should not have adverse effect on the Environment		N	
2	Traffic Diversion Road is EPP Friendly	Y		
3	Water Course Diversion (if any) as per EPP/EMP Guidelines	Y		
4	Dust Control as per EPP Guidelines	Y		
5	Irrigation/River Water Course Quality not disturbed. If disturbed, Lab test for baseline and after disturbance required	Y		
6	Natural Habitat outside ROW not affected, if any.	Y		
7	Trees, Plantations outside ROW not affected, if any	Y		
8	Noise effect to nearby settlement as per EMP/EPP Guidelines	Y		
9	Water courses are protected from fuel and silt contamination/spillage	Y		
10	Traffic Control signs are properly laid out.	Y		
11	All safety measures are in place during construction	Y		
12	Disposal of surplus material to a safe and	Y		

	approved location			
13	Surface water drainage Observed. Ponding of surface water (rain) do not e×ist.	Y		
15	Spillage of Hazardous Material into water courses is effectively prevented	Y		
16	Clean up of Construction debris after works completed as per EPP	Y		
17	Site Sanitation and Sewerage Waste location is safely set up.	Y		
18	Nearby Settlements Disturbances reduced to minimum	Y		

Table 17: Road Earth Works Construction Stage Checklist for Compliance with EPP

SN	Work Description	EPP Compliance		Improvements Required (Detail)
		Yes	No	
1	Setting out/Layout is as per Construction drawing within ROW	Y		
2	Traffic Diversion Road EPP friendly as per approved TCP	Y		
3	Water Course Diversion (if any) as per EPP/EMP Guidelines	Y		

4	Dust Control as per EPP Guidelines	Y		
5	Irrigation/River Water Course Quality not disturbed. If disturbed, Lab test for baseline and after disturbance required	Y		
6	Natural Habitat outside ROW not affected, if any.	Y		
7	Trees, Plantations outside ROW not affected, if any	Y		
8	Noise effect to nearby settlement as per EMP/EPP Guidelines	Y		
9	Water courses are protected from fuel and silt contamination/spillage	Y		
10	Traffic Control signs are properly laid out.	Y		
11	All safety measures are in place during construction.	Y		
12	Disposal of surplus material to a safe and approved location including temporary road to disposal site.		N	Surplus material from cut sections are scattered on the area near cut sections that should be arranged by spreading or be stockpiled with the formation that match to the existing natural grounds.
13	Surface water drainage Observed. Pounding of surface water (rain) do not exist.	Y		
15	Spillage of Hazardous Material into water courses is effectively prevented	Y		
16	EmbanSTA.ent erosion on cut sections has been addressed on the design and construction stage.	Y		

17	Clean up of Construction debris after works completed as per EPP	Y		
18	Site Sanitation and Sewerage Waste location is safely set up.	Y		
19	Nearby Settlements Disturbances reduced to minimum	Y		

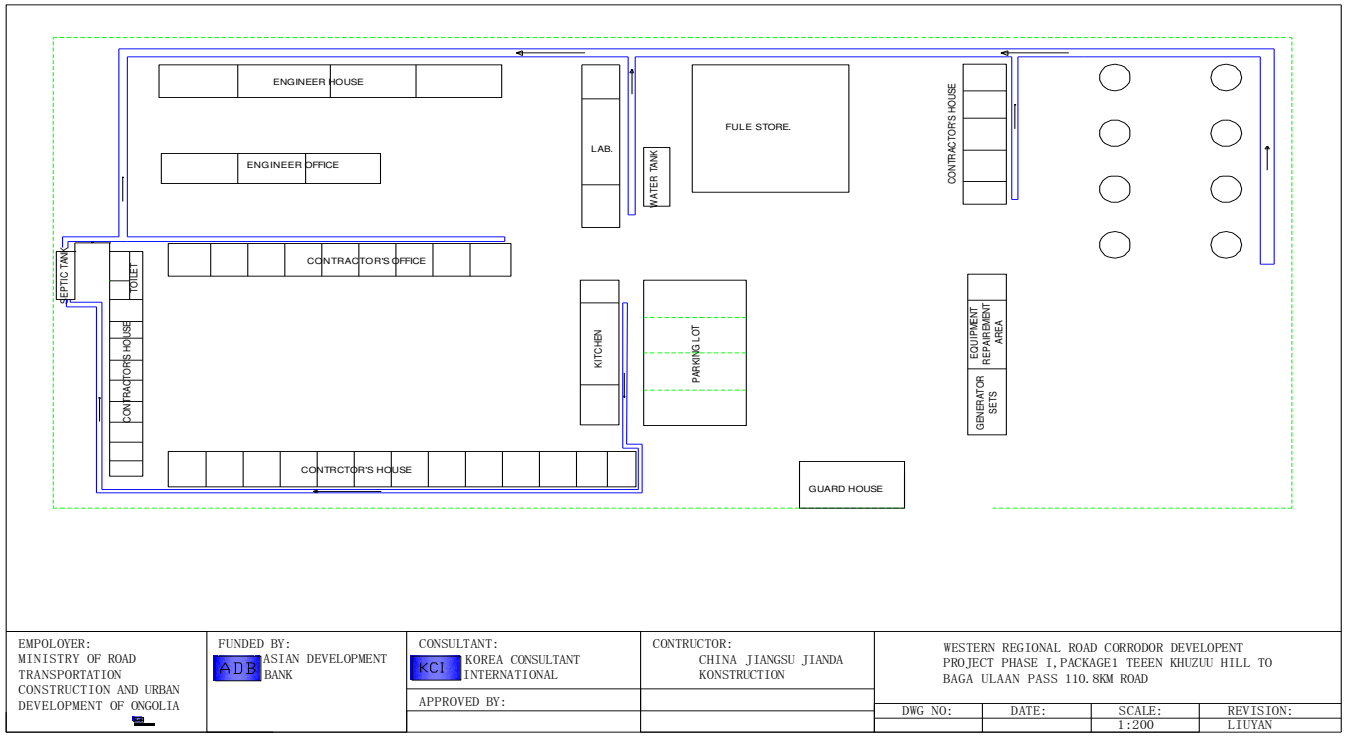
Table 18: Road Pavement Works Construction Stage Checklist for Compliance with EPP

SN	Work Description	EPP Compliance		Improvements Required (Detail)
		Yes	No	
1	Setting out/Layout is as per Construction drawing within ROW	Y		
2	Traffic Diversion Road EPP friendly as per approved TCP	Y		
3	Traffic Control for ongoing construction is effectively set up.	Y		
4	Dust Control as per EPP Guidelines	Y		
5	Health and Safety Measures are observed on site.	Y		
6	Natural Habitat outside ROW not affected, if any.	Y		

7	Trees, Plantations outside ROW not affected, if any	Y		
8	Noise effect to nearby settlement as per EMP/EPP Guidelines	Y		
9	Water courses are protected from fuel and silt contamination/spillage	Y		
10	Traffic Control signs are properly laid out.	Y		
11	All safety measures are in place during construction.	Y		
12	Disposal of surplus material to a safe and approved location including temporary road to disposal site.	Y		
13	Surface water drainage Observed. Ponding of surface water (rain) do not exist.	Y		
15	Spillage of Hazardous Material into water courses is effectively prevented	Y		
16	Clean up of embanSTA.ent slopes and plantations is as per Contract Document scope of works requirement.	Y		
17	Clean up of Construction debris after works is completed as per EPP	Y		
18	Site Sanitation and Sewerage Waste location is safely set up.	Y		

APPENDIX B.

Figure 14 : Layout Drawings of Camp facilities



APPENDIX C.

Table 19: 2014 Environmental Work Plan for the PIU environmental monitoring consultant

No.	Tasks	Actions	Timing
1	Overcontrol on field monitoring on soil, air quality, noise, water and flora	Jointly develop a complete schedule of monitoring activities for 2014 with the contractor	10-May
		Review locations of current monitoring spots and make recommendations if necessary	15-May
		Let the environmental monitoring consultant submit quarterly monitoring activity report sheet which includes laboratory test analysis and measurements.	2-3 times
		Analysing the results of monitoring activities and recommend proposed actions for the contractors	
2	Having wildlife movement survey	Ensure the wildlife movement survey is conducted in accordance with the schedule	15-Mar
		Review Wildlife Movement Survey Report to ensure the results are satisfactory and recommend the animal crossing points to engineering department	30-Oct
3	Conduct training workshops	Workshop on EMP Implementation and reporting for the contractor Jiangsu Jianda staffs twice	April 15-20
4	Conduct public consultation	Work closely with Local community officers /Public Consultation centers/	
		Arrange meetings with local soum Governors and environmental and inspection staffs	4 times (during each visit)
		Conduct questionnaire based survey among local residents to determine their areas of main concern	15-Jun
5	Regular site visits	Make field visit 4 times	April 20, June 15, July 30, October 25
		To have approved Field visit plan by the Project Coordinator before each trip and submit report after the trip. Make sure the Field visit plan covers all necessary meetings, visits to monitoring spots and soums and examination of EMP implementation.	
6	Having Comprehensive Environmental records file	Making a Comprehensive environmental records file which includes environmental protection plan checklist sheets, health and safety checklist sheets, monitoring checklist sheets and GRM checklist sheets.	25-Feb
		Making timely updates on the Comprehensive environmental records file and make sure to include it in quarterly reports to Project Coordinator and MRT.	