MON: Regional Road Development Project

Environmental Monitoring Report

Quarterly Report

July – November, 2013

REGIONAL ROAD DEVELOPMENT PROJECT

CONSTRUCTION OF SAINSHAND- ZAMIIN-UUD ROAD

February 2014
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ABBREVIATIONS

ADB – Asian Development Bank

MEGD – Ministry of Nature, Environment and Green Development

EIA- Environmental Impact Assessment

DEIA- Detailed Environmental Impact Assessment

EMP- Environmental Management Plan

EPP- Environmental Protection Plan
1. INTRODUCTION

1.1 PURPOSE OF THE REPORT
The purpose of this report is to summarize and analyze the performance of environmental works by the NP1 and NP2 contractors during the second half of 2013. This quarterly environmental monitoring report consists of eight main parts: an introduction section, the objectives of EMP and environmental responsibilities, key environmental issues, a brief summary of actions taken, environmental monitoring activities, implementation of EMP, structure of the environmental management systems, and conclusion.

1.2 PREPARATION OF THE REPORT
The report is prepared by ICT (Pvt) Ltd with inputs provided by environmental staffs at NP1 and NP2 Contractors. Both of the NP1 and NP2 Contractors have dedicated personnels who will handle all issues regarding environment. Matthew Ma and Mr. Yang are personnels in charge of environment affairs for the Projects NP1 and NP2 respectively. They are in responsible for arranging on-field monitoring activities, providing inputs to this quarterly monitoring reports and making sure the protection measures are implemented accordingly.

1.3 BRIEF INTRODUCTION TO THE PROJECT
This Regional Road Development Project consists of 2 sections: Construction of 62.2 km road starting from 18th Khudag known as Package NP1 is been executed by China Machinery Industry Construction Group Inc while construction of another 62 km road starting from NP1 end point to the Zamiin-Uud border town which is known as Package NP2 is been executed by China Railway First Group Co., Ltd.

Work scopes for those two contractors include the following stages:
- Preparatory activities /mobilization and construction of temporary facilities/
- Site clearance
- Earthworks
- Passage of traffic
- Base and subbase construction
- Bituminous pavement work
- Protection work
- Road furniture and markings
- De-mobilization
- Remedying defects and works during Defects Liability Period (DLP)
1.3.1 Package NP1
The project is located in Erdene soum of Dornogobi aimag of Mongolia. The start point of the road is 85 km from Sainshand town, capital of Dornogobi aimag while the end point is roughly 65 km from Zamiin Uud, the border point of Mongolia and China.
The region of project area is the south eastern part of Mongolia in the midst of the Gobi desert where loose sand and lack of water resources can be considered as challenging situation.
Contract for the construction work was signed on 17th July, 2012. A notice to commencement of works was issued on 2012.12.10 via Consultant’s letter CSZ:TL:187. Completion date of the contract is 2014.07.09.

1.3.2 Package NP2
The project is located right next to the NP1 project starting from the end point of NP1 road all the way to the Zamiin Uud border town. The road design velocity is 80 km/h, covered with 50mm thickness asphalt-concrete, the width of the carriage-way and the edge of paved road are respectively 7m and 1.5m, the whole route is 426.977km long this contract is package NP2 which chainage is K62+200 to K123+996, 61.796 km long. The contracted works have been almost complete.

Figure 1: Asian Highway Map
2. IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT PLAN

2.1 ENVIRONMENTAL RESPONSIBILITY OBJECTIVES OF THE EMP

2.1.1 Environmental responsibility

Detailed Environmental Impact Assessment for the Choir - Zamiin-Uud project was conducted by “Enco” Co., Ltd in 2004. The DEIA 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 DEIA report. MNEGD 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 this Saynshand-Zamiin Uud Regional Road Development Project case, the NP1 and NP2 contractors are responsible for the implementing the actions defined in the EMP while ICT (Pvt) Ltd is responsible for supervising the implementation works and preparation of quarterly report to ADB.

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.

Quarterly environmental monitoring reports shall be prepared and submitted to ADB which include environmental monitoring data (baseline and routine), review of the progress of environmental measures detailed in the EPP and EMP, as well as problems faced and corrective measures taken. Quarterly progress report includes brief overview of environmental situation.

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, its monitoring and construction workers’ health and safety provisions shall be incorporated in works contracts and the construction supervision contract. Before the commencement of the project and during project construction activities, consultations and information sharing shall be conducted in accordance...
with the Stakeholder consultation and participation plan which was described in the IEE.

2.1.2 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. Manage 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.

2.2 KEY ENVIRONMENTAL ISSUES

2.2.1 Key environmental impacts

The contractors shall enhance their environmental awareness and take action to minimize or avoid any adverse effects to the environment. All construction activities and plant facilities under the contractor shall comply with all national laws, ordinances and regulations, or of any other regulatory bodies having proper jurisdiction over the works.

Most of environmental impacts identified in this Project appear to be temporary in nature and associated with the construction phase and can be easily prevented or be mitigated through proper engineering and soil conversation practices as well as by taking appropriate prevention or mitigation measures.
Environmental Protection Plan which was developed within the EIA has determined a total of 14 potential impacts that could be arised from project operation:

- Camps for workers
- Locations of landslide and soil erosion
- Soil degradation and erosion
- Operation of quarries and borrow pits
- Contamination of soil and water resources
- Hygiene and waste disposal
- Flood control
- Air pollution
- Emission from borrow operation, hauling, road construction and batch plants
- Noise emissions
- Blasting operation
- Risks and operational safety
- Risks from hazardous materials
- Risks from explosives

2.2.2 Key environmental issues identified in EMP:

1. Erosion and instability of cut faces, quarries and borrow pits associated with road excavation, embankment formation and road realignment.
2. Erosion of land downstream of the road receiving concentrated outflow carried by drainage structures
3. Impacts on hydrology from erosion and landsides, bridge works, culverts and road run-off drainage
4. Construction or traffic related noise and dust impacts
5. Soil and water contamination by oil, grease, fuel, bitumen etc.,
6. Damage to previously identified cultural heritage, archeological, or historical sites within project area
7. Potential need for acquisition of land and relocation of local households, herdspeople, and crops for construction of road, campsites, workshop and temporary diversion roads.
8. Impact associated with road construction that usually lead to particular complaints from local communities
9. Excavation of borrow pits without permission
10. Failure to suppress dust in villages by watering the road
2.3 A SUMMARY OF ACTION TAKEN IN 2013

To fulfill its environmental duties, the supervising party – ICT (Pvt) Ltd and the NP1 and NP2 contractors have taken below actions in 2013:

1. The environmental specialist of ICT (Pvt) Ltd had a field trip to the road development sites. He arranged meetings with both NP1 and NP2 project leaders, engineers and environmental staffs, having round trip along the road to determine the key environmental issues and the contractors were given instruction on developing EMP and implementation report.

2. Both of the NP1 and NP2 contractors developed Environmental Management Plan for 2013 and having it reviewed and approved by the supervision party – ICT (Pvt) Ltd, the PIU of the Ministry of Road and Transportation and ADB.

3. Field monitoring activities were held 3 times: in June, August and October. Soil and water samples were taken at the sensitive spots and dust and noise measurements were made during the field monitoring activities. Laboratory analysis results are collected and will be described in details in the Section 2.3.

4. A Quarterly Environmental Report was prepared by ICT (Pvt) Ltd with inputs from NP1 and NP2 contractors and submitted to ADB and the PIU of the Ministry of Road and Transportation in August. The report included the results from the first time field monitoring activity in June, EMP objectives and tasks of EMP developed by the contractors and recommended actions for the contractors in second half of 2013.
2.4 ENVIRONMENTAL MONITORING ACTIVITIES AND RESULTS

According to the Environmental Management Plan, the contractors are obliged to carry out soil, water and air quality monitoring tests every 50 days considering the construction season is relatively short. In 2013, our contractors had monitoring activities conducted on July 5, August 30 and October 20. They hired a couple of big, professional and state owned laboratories for the monitoring, namely “The Soil and Water Research Laboratory of Mongolian Geographic Academy” and “The Central Environmental Laboratory of Mongolia”. The laboratories sent their specialists to NP1 and NP2 construction sites to take soil and water samples and measure dust and noise levels and conducted laboratory analysis in their respective laboratories. The results of the laboratory analysis and air quality measurements are shown in details in below sections.

2.4.1 Soil monitoring.

According to the requirements of Environmental Monitoring Plan from the EIA, soil samples should be taken at every 40 km mark along the road and around the workers camp for chemical and heavy metals anlysis. We have identified 2 monitoring spots for NP1 project and 3 spots for NP2 along the road and around the workers’ camp and mixing plants. Soil samples were taken by the specialists of the Soil and Water Research Laboratory of Mongolian Geographic Academy who have conducted chemical and heavy metals analysis. Results of the laboratory analysis are shown in tables below:

<table>
<thead>
<tr>
<th>Monitoring activity number</th>
<th>Date</th>
<th>Sampling point</th>
<th>Depth under ground, sm</th>
<th>pHH2O (1:5)</th>
<th>CaCO3 %</th>
<th>Humus %</th>
<th>EC2.5 dS/m</th>
<th>P2O5 mg/100gr</th>
<th>K2O mg/100gr</th>
</tr>
</thead>
<tbody>
<tr>
<td>#01</td>
<td>July 5</td>
<td>29th km mark</td>
<td>0-20</td>
<td>7.75</td>
<td>5.6</td>
<td>0.869</td>
<td>0.517</td>
<td>0.48</td>
<td>18.5</td>
</tr>
<tr>
<td>#02</td>
<td>Aug 31</td>
<td>NP1 Mixing plant</td>
<td>0-20</td>
<td>6.33</td>
<td>0.91</td>
<td>0.983</td>
<td>2.324</td>
<td>0.7</td>
<td>21.8</td>
</tr>
<tr>
<td>#02</td>
<td>Aug 31</td>
<td>29th km mark</td>
<td>0-20</td>
<td>8.32</td>
<td>3.97</td>
<td>0.508</td>
<td>0.973</td>
<td>0.49</td>
<td>11.7</td>
</tr>
<tr>
<td>#03</td>
<td>Oct 25</td>
<td>NP1 Mixing plant</td>
<td>0-20</td>
<td>8.01</td>
<td>0.28</td>
<td>0.28</td>
<td>0.33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Soil chemical analysis NP2

<table>
<thead>
<tr>
<th>Monitoring activity number</th>
<th>Date</th>
<th>Sampling point</th>
<th>Depth underground, sm</th>
<th>pH H2O (1:5)</th>
<th>CaCO3 %</th>
<th>Humus %</th>
<th>EC 2.5 dS/m</th>
<th>P2O5 mg/100gr</th>
<th>K2O mg/100gr</th>
</tr>
</thead>
<tbody>
<tr>
<td>#01</td>
<td>5-Jul</td>
<td>NP2 Camp</td>
<td>0-40</td>
<td>9.39</td>
<td>0</td>
<td>0.893</td>
<td>0.912</td>
<td>0.43</td>
<td>12.8</td>
</tr>
<tr>
<td>#01</td>
<td>5-Jul</td>
<td>32 km mark</td>
<td>0-40</td>
<td>9.55</td>
<td>0</td>
<td>1.504</td>
<td>3.1</td>
<td>1.29</td>
<td>27.8</td>
</tr>
<tr>
<td>#02</td>
<td>31-Aug</td>
<td>Mixing plant</td>
<td>0-40</td>
<td>7.73</td>
<td>1.78</td>
<td>0.768</td>
<td>0.774</td>
<td>0.61</td>
<td>9.7</td>
</tr>
<tr>
<td>#02</td>
<td>31-Aug</td>
<td>32 km mark</td>
<td>0-40</td>
<td>7.89</td>
<td>0</td>
<td>0.751</td>
<td>0.07</td>
<td>0.61</td>
<td>5.9</td>
</tr>
<tr>
<td>#03</td>
<td>25-Oct</td>
<td>NP2 Camp</td>
<td>0-40</td>
<td>8.01</td>
<td>0</td>
<td>0.48</td>
<td>42</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Heavy metals analysis

<table>
<thead>
<tr>
<th>Monitoring activity number</th>
<th>Analysis date</th>
<th>Sampling point</th>
<th>Depth underground, sm</th>
<th>Heavy metals content, mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cr</td>
</tr>
<tr>
<td>#01</td>
<td>5-Jul</td>
<td>NP1 Mixing plant</td>
<td>0-40</td>
<td>5</td>
</tr>
<tr>
<td>#02</td>
<td>31-Aug</td>
<td>32th km mark along NP2 road</td>
<td>0-40</td>
<td>10.1</td>
</tr>
<tr>
<td>#03</td>
<td>25-Oct</td>
<td>29th km mark along NP1 road</td>
<td>0-40</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Mongolian standard MNS 5850:2008 150 100 3 150 300

Based on the laboratory test results which were carried out 3 times during this year, it can be concluded that there were no serious soil contamination and degradation along the road and around the workers’ camp.

2.4.2 Water monitoring

Since water resource is scarce in the Gobi region and there are no permanent surface water resources along the road, we have identified 2 water monitoring spots along the road. Both of them are wells and the water is being used for construction activities. There were several other wells that are being used by the local herdspeople that are not considered as monitoring spots because they are located more than 10 km away from the road and thus any impacts could be minimal. Water samples were taken by
Regional Road Development Project
Construction of Sainshand-Zamiin Uud road

water specialists of the Soil and Water Research Laboratory of Mongolian Geographic Academy who have conducted chemical and heavy metals analysis. Results of the laboratory analysis are shown in below tables.

Table 4: Water chemical analysis for NP1 samples

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Unit of Measurement</th>
<th>NP1 July</th>
<th>NP1 August</th>
<th>NP1 October</th>
<th>Mongolian Standard on Quality of Drinking Water MNS 900:2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbidity</td>
<td>mg/l</td>
<td>249</td>
<td>70</td>
<td>1.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Mineralization</td>
<td>mg/l</td>
<td>2448.6</td>
<td>826.6</td>
<td>828</td>
<td>1000</td>
</tr>
<tr>
<td>Reaction</td>
<td>pH</td>
<td>8.2</td>
<td>8.16</td>
<td>7.77</td>
<td>6.5-6.8</td>
</tr>
<tr>
<td>EC</td>
<td>dS/m</td>
<td>7.32</td>
<td>1.334</td>
<td>1.24</td>
<td></td>
</tr>
<tr>
<td>Hardness</td>
<td>mg/l</td>
<td>28.8</td>
<td>5.4</td>
<td>4.2</td>
<td>7</td>
</tr>
<tr>
<td>CO3</td>
<td>mg/l</td>
<td>6</td>
<td>48</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>HCO3</td>
<td>mg/l</td>
<td>140.3</td>
<td>244.1</td>
<td>353.8</td>
<td></td>
</tr>
<tr>
<td>Cl</td>
<td>mg/l</td>
<td>1030.4</td>
<td>124.7</td>
<td>117.2</td>
<td>350</td>
</tr>
<tr>
<td>SO4</td>
<td>mg/l</td>
<td>473.1</td>
<td>165.2</td>
<td>192.6</td>
<td>500</td>
</tr>
<tr>
<td>CA2+</td>
<td>mg/l</td>
<td>385.2</td>
<td>34.9</td>
<td>32.2</td>
<td>100</td>
</tr>
<tr>
<td>Mg2+</td>
<td>mg/l</td>
<td>114.1</td>
<td>44.3</td>
<td>31.6</td>
<td>30</td>
</tr>
<tr>
<td>Na</td>
<td>mg/l</td>
<td>293.7</td>
<td>162.8</td>
<td>171.6</td>
<td>200</td>
</tr>
<tr>
<td>K</td>
<td>mg/l</td>
<td>5.8</td>
<td>2.6</td>
<td>2.7</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Water chemical analysis for NP2 samples

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Unit of Measurement</th>
<th>NP2 July</th>
<th>NP2 August</th>
<th>NP2 October</th>
<th>Mongolian Standard on Quality of Drinking Water MNS 900:2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbidity</td>
<td>mg/l</td>
<td>287.3</td>
<td>187.7</td>
<td>8.7</td>
<td>1.5</td>
</tr>
<tr>
<td>Mineralization</td>
<td>mg/l</td>
<td>5583.8</td>
<td>2448.7</td>
<td>178</td>
<td>1000</td>
</tr>
<tr>
<td>Reaction</td>
<td>pH</td>
<td>8.06</td>
<td>8.12</td>
<td>7.38</td>
<td>6.5-6.8</td>
</tr>
<tr>
<td>EC</td>
<td>dS/m</td>
<td>11.87</td>
<td>5.41</td>
<td>0.18</td>
<td></td>
</tr>
<tr>
<td>Hardness</td>
<td>mg/l</td>
<td>64</td>
<td>26.1</td>
<td>0.9</td>
<td>7</td>
</tr>
<tr>
<td>CO3</td>
<td>mg/l</td>
<td>30</td>
<td>36</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>HCO3</td>
<td>mg/l</td>
<td>225.8</td>
<td>374</td>
<td>79.3</td>
<td></td>
</tr>
<tr>
<td>Cl</td>
<td>mg/l</td>
<td>1734.5</td>
<td>722.1</td>
<td>17.8</td>
<td>350</td>
</tr>
<tr>
<td>SO4</td>
<td>mg/l</td>
<td>1887</td>
<td>569.6</td>
<td>69.1</td>
<td>500</td>
</tr>
<tr>
<td>CA2+</td>
<td>mg/l</td>
<td>689</td>
<td>284</td>
<td>15.6</td>
<td>100</td>
</tr>
<tr>
<td>Mg2+</td>
<td>mg/l</td>
<td>354.5</td>
<td>142.6</td>
<td>1.1</td>
<td>30</td>
</tr>
<tr>
<td>Na</td>
<td>mg/l</td>
<td>654.8</td>
<td>316.5</td>
<td>20.2</td>
<td>200</td>
</tr>
<tr>
<td>K</td>
<td>mg/l</td>
<td>8.2</td>
<td>3.9</td>
<td>10.1</td>
<td></td>
</tr>
</tbody>
</table>
Table 6: Heavy metals analysis for water

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Source of sampling</th>
<th>Heavy metals content, mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cr</td>
</tr>
<tr>
<td>NP1 Well</td>
<td></td>
<td>0.1</td>
</tr>
<tr>
<td>NP2 Well</td>
<td></td>
<td>0.01</td>
</tr>
<tr>
<td>Mongolian standard on General quality of water MNS 4586:98</td>
<td></td>
<td>0.05</td>
</tr>
<tr>
<td>Mongolian standard on Quality of drinking water MNS 900:2005</td>
<td></td>
<td>0.05</td>
</tr>
</tbody>
</table>

The results of the laboratory analysis showed water samples from the selected wells have poor quality and thus are not recommended for drinking usage.

In chemical analysis, the features of the water samples have exceeded the allowed level of Drinking Water Quality Standard in many categories, such as turbidity and magnesium. Especially, the laboratory results on turbidity and mineralization level for all the samples were seriously high.

In heavy metals analysis for the sample No.5, its heavy metals compositions are higher than the standard levels in all parameters measured.

Based on the laboratory results for the water samples, instructions on not using the well water for drinking usage were given to NP1 and NP2 contractors. And there was a potential risk that could arise involving the well is local herders may want use waters from those wells for drinking or cattle breeding purposes. NP1 and NP2 contractor took possible preventive actions to prohibit human or cattle usage from the wells. It is worth to mention that the well water was not used for drinking even before the monitoring analysis. The contractors’ food supply staffs were purchasing bottled waters in the nearby border town Erlian and brought it to construction camps.

2.4.3 Air quality monitoring

To ensure dust and noise levels are under control all along the road, we opted to have air quality measurements at different spots every time the laboratory staffs take on monitoring activities. Air quality specialist has conducted dust and noise measurements at randomly selected points (wherever they feel the dust and noise levels are higher) along the road. Measurement results for the dust and noise are shown hereunder:
### Table 7: Dust and noise measurement results for NP1

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Location</th>
<th>Dust concentration (PM10), mg/m³</th>
<th>Noise level, dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29-Jun</td>
<td>4th km mark along the NP1 road</td>
<td>0.07</td>
<td>74-78</td>
</tr>
<tr>
<td>2</td>
<td>29-Jun</td>
<td>35th km mark along the NP1 road</td>
<td>0.023</td>
<td>52-54</td>
</tr>
<tr>
<td>3</td>
<td>29-Jun</td>
<td>54th km mark along the NP1 road</td>
<td>0.017</td>
<td>54-55</td>
</tr>
<tr>
<td>4</td>
<td>27-Aug</td>
<td>54th km mark along the NP1 road</td>
<td>0.122</td>
<td>56</td>
</tr>
<tr>
<td>5</td>
<td>27-Aug</td>
<td>35th km mark along the NP1 road</td>
<td>0.105</td>
<td>48</td>
</tr>
<tr>
<td>6</td>
<td>27-Aug</td>
<td>Mixing plant NP1</td>
<td>0.162</td>
<td>86</td>
</tr>
<tr>
<td>7</td>
<td>27-Aug</td>
<td>4th km mark along the NP1 road</td>
<td>0.385</td>
<td>52</td>
</tr>
<tr>
<td>8</td>
<td>20-Oct</td>
<td>8th km mark along the NP1 road</td>
<td>0.122</td>
<td>62</td>
</tr>
<tr>
<td>9</td>
<td>20-Oct</td>
<td>30th km mark along the NP1 road</td>
<td>0.105</td>
<td>48</td>
</tr>
<tr>
<td>10</td>
<td>20-Oct</td>
<td>Mixing plant NP1</td>
<td>0.162</td>
<td>74</td>
</tr>
<tr>
<td>11</td>
<td>20-Oct</td>
<td>54th km mark along the NP1 road</td>
<td>0.385</td>
<td>44</td>
</tr>
</tbody>
</table>

**Allowed maximum level according to Air Quality Standard of Mongolia:**

<table>
<thead>
<tr>
<th>Dust concentration (PM10), mg/m³</th>
<th>Noise level, dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>60</td>
</tr>
</tbody>
</table>

### Table 7: Dust and noise measurement results for NP2

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Location</th>
<th>Dust concentration (PM10), mg/m³</th>
<th>Noise level, dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30-Jun</td>
<td>10th km mark along the NP2 road</td>
<td>0.015</td>
<td>48-49</td>
</tr>
<tr>
<td>2</td>
<td>30-Jun</td>
<td>40th km mark along the NP2 road</td>
<td>0.006</td>
<td>51-53</td>
</tr>
<tr>
<td>3</td>
<td>27-Aug</td>
<td>40th km mark along the NP2 road</td>
<td>0.04</td>
<td>64</td>
</tr>
<tr>
<td>4</td>
<td>27-Aug</td>
<td>10th km mark along the NP2 road</td>
<td>0.093</td>
<td>66</td>
</tr>
<tr>
<td>5</td>
<td>27-Aug</td>
<td>4th km mark along the NP2 road</td>
<td>0.097</td>
<td>60</td>
</tr>
<tr>
<td>6</td>
<td>20-Oct</td>
<td>NP2 Mixture plant</td>
<td>0.04</td>
<td>48</td>
</tr>
<tr>
<td>7</td>
<td>20-Oct</td>
<td>NP2 road start point</td>
<td>0.093</td>
<td>42</td>
</tr>
<tr>
<td>8</td>
<td>20-Oct</td>
<td>NP2 road end point</td>
<td>0.097</td>
<td>44</td>
</tr>
</tbody>
</table>

**Allowed maximum level according to Air Quality Standard of Mongolia:**

<table>
<thead>
<tr>
<th>Dust concentration (PM10), mg/m³</th>
<th>Noise level, dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>60</td>
</tr>
</tbody>
</table>

According to the Mongolian Standard on Ambient Air Quality, allowed maximum level for dust concentration is 0.100 mg/m³. At certain points along the NP1 road, dust level exceeded the max level during active construction period as the August and October measurement results show. Both of NP1 and NP2 contractors were...
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committed to reducing dust levels by having water spray trucks along the road during working hours.

According to the Mongolian Standard on Ambient Air Quality, allowed maximum level for noise is 60 decibels (dB). At certain points along the road, noise level exceeded the max level by 2-26 decibels. The contractors were well instructed of taking preventive measures such as informing of local herdspeople about noisy works are going to start. All planned actions were taken.

2.5 IMPLEMENTATION OF ENVIRONMENTAL PROTECTION MEASURES

During the second half of construction season (from late July to mid-November) the NP1 and NP2 constructors implemented environmental protection measures successfully according to their EMP. A summary of preventive actions taken by the contractors are described below:

2.5.1 Waste treatment

- Necessary precautions are 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 the special local professional team is employed to carry the garbage to the approved local dumpsite.
- Sewerage line is fully equipped & manhole is provided for easy access to make the regular maintenance by repairmen.
- Wastes coming from workers’ accommodation are deposited in designated places within the campsite before delivery to the approved local dumpsite. Garbage containers with adequate lids/ covers are provided in such places around the campsite and well maintained.
- The accumulated wastes are carried and disposed to a designated local dumpsite approved by the project Engineer and local authority.
- Some road construction wastage has been removed from the construction site to the designated location in accordance with the related regulations on waste removal.
- Proper permission/certificate for land use for the road construction purpose has been obtained before commencement of the work from local administration (that was approved by the head of citizen representative’s khural) according to Mongolian law on Land use.
2.5.2 Campsite environment implement

- Since the construction camps were located at the foot of a small hill, two 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 local 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.
- 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.

2.5.3 Quarries, borrow pits and the spoil area

- In accordance with the requirements in Technical Specification and requirements of the Local government, technical rehabilitation for some of the borrow pits, quarry sites and spoil areas has been conducted. There are a few borrow pits, quarries and spoil spots left that will continue to be utilized next year. After exploiting them next summer, the contractors will be obliged to complete the technical rehabilitation.
- The borrow pits are selected adjacent to the main road and they are approved by the relevant authorities before the commencement of construction work. Based on the site condition, these borrow pits meet the requirements of borrow pits selection. The selected quarry spots are about 30km away from the nearest soum center - Erdene Soum, thus it can minimize the noise, vibration and dust disturbances to the local residents.

2.5.4 Water, dust and noise

Water:

- Drinking waters to the construction workers are provided regularly.
- Water tanks & containers used as storage of water are properly cleaned on regular basis.
- Samples of wastewater from bathrooms, rest rooms, dining rooms, toilet and the
campsite activities were taken to have laboratory analysis to ensure a good health condition is maintained.

Noise:
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) All construction equipment shall conform to a standard of less than 90dB (A).
2) All the vehicles and construction machinery shall be monitored regularly with particular attention to silencers and mufflers to maintain noise levels within the specified limits.
3) Special consideration shall be provided to protect workers from harmful and long exposures to noise originating from construction machinery. Compressor and crushing operators shall wear his earmuffs while working.
4) Local residents were informed of noisy operations when necessary.

Dust:
- Daily maintenance is conducted for AC plant, Crush stone mixing plant, stone crusher plant to suppress the smoke.
- AC plant is equipped with dust collection device to reduce smoke emission
- In dusty areas such as the new embankment construction area or temporary unpaved deviation and access roads, the surface is sprayed with water using water trucks equipped with sprinklers. This procedure is executed effectively to control the excessive spreading of dusts particularly during the dry season.
- Dust and noise measurements were conducted within the monitoring activities 3 times in 2013, in July, August and October by professional staffs from the Central Laboratory of Environment.

2.5.5 Safety and Security Precaution
- Every dump truck driver and heavy equipment operator is strictly selected through checking their detailed backgrounds such as certificates, experience & license issued by Government Agency.
- Drinking is strictly prohibited in the campsites, if anyone breaks the rule, then a punishment is imposed to warn the other staffs.
- Traffic signs, warning and direction signs were erected at crossroad points, diversion roads, culverts and bridge construction areas.
Workers are requested to wear safety helmet and reflecting clothes on certain construction fields such as bridges, culverts and embankment working areas. For the workers who are engaged in special job, they are also equipped with special protection, like safety gloves, eyeglasses, safety shoes, ear protection for workers in stone crusher, eyeshade for welders.

All supervisors working at embankment areas and the main construction vehicles are equipped with radio communication device.

Daily safety meeting were held among supervisors who are responsible for health, safety and traffic control, and the related staffs reported safety condition to their project managers at the end of every month.

Fire extinguishers are provided to the campsites, office buildings and the vehicles.

Special cleaning activities were held at the vehicle & equipment maintenance shops.

Temporary warning boards such as (Danger, Authorized personnel is allowed, No smoking etc.) were erected at the storage areas of fuel and dangerous material.

Construction activities were stopped when there is a bad weather condition to prevent from possible accidents.

Brakes and other safety devices of vehicles and equipments were checked regularly to make sure they are in good condition.

Construction vehicles had technical inspection and proper maintenance on regular basis. In case of any damages to the safety devices of vehicles are found, immediate maintenance actions were taken.

2.5.6 Mitigation of Social Tensions

Main production plants such AC plant, stone crusher plant, crush stone mixing plant are located more than 30 km away from residential area to reduce the potential impacts and conflicts with the local community.

Regular meetings between leaders of local government and the construction representative were held frequently to mitigate possible social disruption.

Our contractors have developed a good relationship with the local government through regular communication. For instance, NP1 and NP2 contactors informed the local authority and the residents of the blasting works 3 days in advance to let them have proper adjustments.

The contractors received support from the local authorities specially on issuance of work visa because the local authority was pleased that the contractors have provided
many job and service opportunities to the local people.

2.6 STRUCTURE OF ENVIRONMENTAL MANAGEMENT SYSTEM

Figure 2: Organizational chart for the environmental management for the Package NP1
Figure 3: Environment Management and Protection Chart for the Package NP2

EP Leader:
Project manager

EP liability

Expended of EP
Regulation of EP
Performance of EP

PS

Manual documents

EP system

Department

Leader

Site leader

Monitor

Site EP

Ensure the achievements of EP

Bonus

Reinforce awareness

EP control

Vegetation, soil

Water protection

Air protection

Noisy control

Geology protection

EP monitor

Temporary check

Periodic check

Boost precaution, ability of EP

Eliminate EP impact
3. **CONCLUSION**

To ensure proper control on environment, monitoring activities were held 3 times: in June, August and October. Soil and water samples were taken at the sensitive spots and dust and noise measurements were made during the field monitoring activities. The results of the monitoring activities revealed there were no soil and water contamination. Noise and dust levels were within the maximum allowed levels in most cases. Informing of noisy operations to local residents and deploying of water spraying trucks have helped to ensure the dust and noise impacts are under control during the active operation periods.

Impact mitigation measures and environmental protection actions on each specific fields such as air quality, soil, water, health and safety, social tensions were implemented successfully.

To ensure health and safety, the contractors employed dedicated cleaning staffs at the campsites, constructed protective ditches on both sides of the camps, provided their staffs with quality drinking waters, foods and sanitary devices and implemented work safety rules.

The contractors have developed a good relationship with the local authority that allowed them to inform coming blast works to local residents and get the support of the local governor on the visa issuance for their Chinese construction workers.

Warning signages were erected at animal crossing points to avoid potential accident involving animals and cattle stock.

NP1 contractor has succeeded 13 borrow pit spots from the previous contractor that were not reshaped. They have conducted technical rehabilitations at some of those sites. There are a few borrow pit spots and quarries that will continue to be exploited next year. Our contractors are committed to complete technical rehabilitation at the damaged sites before the road construction ends next July.

During the active construction period, there were temporary impacts such as dust arising, noise disturbance and damaged landscape (due to borrow pits and drilling works for water exploration) occurred, but those impacts were mitigated and reduced successfully and there will be no residual impacts.

The significance of the impacts arised from the road construction activities could be classified as “Low to moderate environmental significance”.

Both of the NP1 and NP2 contractors carried out the tasks and actions described in their EMP successfully. Overall, it could be concluded that the Saynshand-Zamiin
Uud Regional Road Construction Project has fulfilled its environmental obligations in a good manner. The final evaluation of environmental duties and performance will be assessed in July 2014 when the projects end.
APPENDIX: Photos

NP1 Mixing Plant
NP2 mixing plant

Preparing water supply for NP2 mixing plant
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An environmental specialist conducts soil sampling

Dust and noise measurement