Environmental Assessment Report

Union Road (UNR)

Name of the Sub-project : Daowgaon UP office-Battola Bazar Road

Slice No. : UNR-24 (B)
Upazila : Muktagacha
District : Mymensingh

Second Rural Transport Improvement Project

Local Government Engineering Department

Contents

1. Sub Project Description

Name of the Sub-project : Daowgaon UP office-Battola Bazar Road
ID No. : 361652003
District Name : Mymensingh
Name of the Upazila : Muktagacha
Length of the Road : 3.490 km

Location of the sub-project

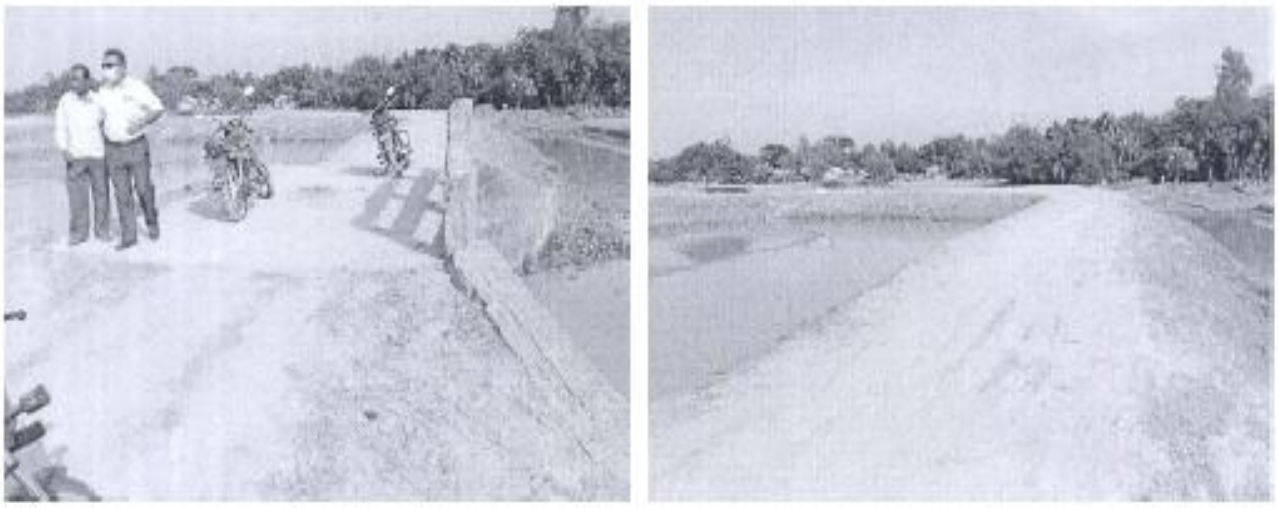
Muktagacha Upazila is located at 24.7583°N 90.2667°E and bounded by Mymensingh Sadar, Fulbaria, Madhupur and Jamalpur Sadar Upazila. The road is 3.490 km long, starts at Daowgaon UP and ends at Chechua-Hatkali GC Road at Bottola [details are listed in **Table-1.1**].

Name of the unions the road passes through	Name of the road side villages (at least 5 nos)	Starting point of the road	End point of the road	Year of construction/Last maintenance	Major items included in estimates
Bhatikandi & Rambhadrapur	Bahadurpur, Shyampur, Jarua, Ramnathpur, Charbahadurpur, Rambhadrapur, Char Niamat & Charguadanga	Bhaitkandi UP	Charguadanga Bazar	No Maintenance	Earth Work, WBM, ISG, Brick on End Edging, Dense Carpeting, Seal Coat & Surface Drain

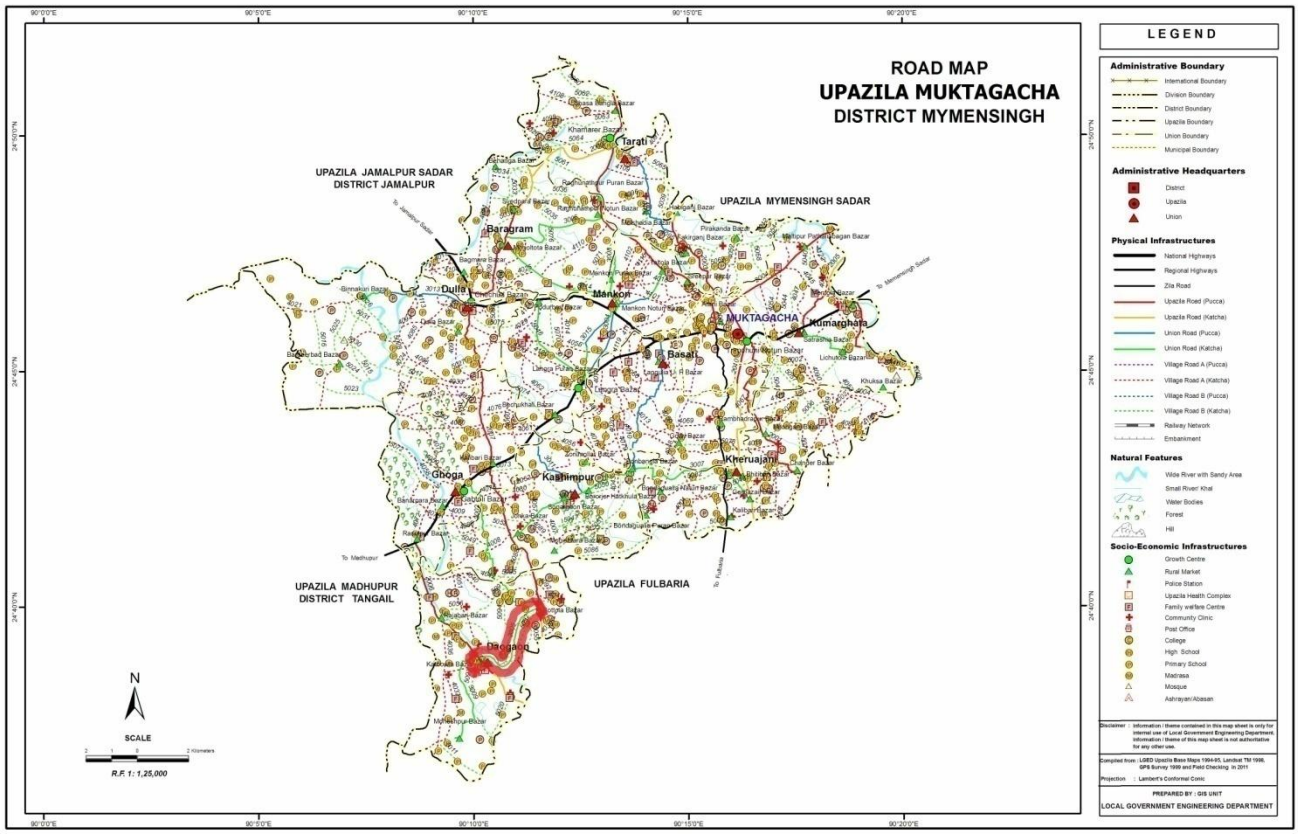
Table-1.1

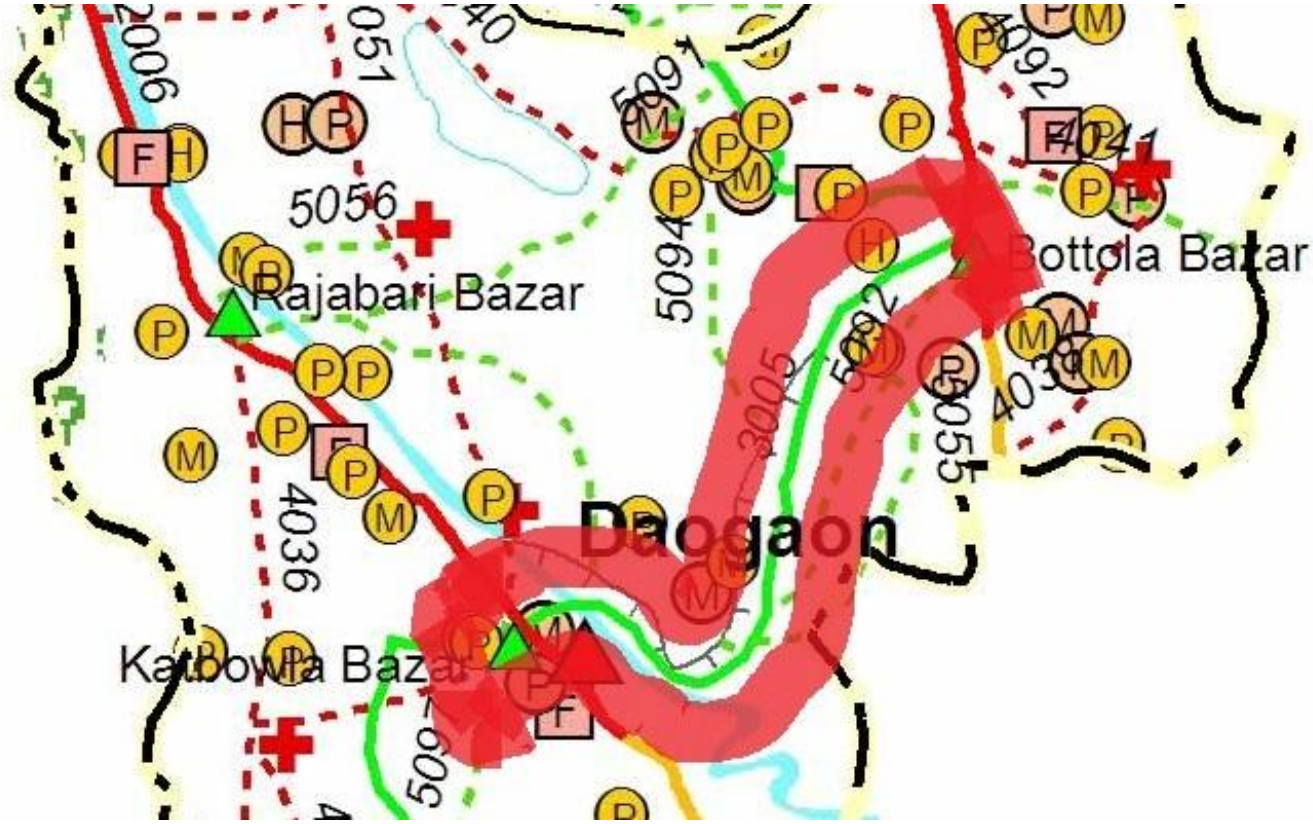
Brief Description of the sub project

Union road (UNR) improvement includes construction of bituminous road on the existing earthen road. The road has a length of 3.490 km. Major components of the works includes earthwork (earth volume 13664Cum), base coarse Improve sub grade, Brick at edge, 25mm dense carpeting etc. Drainage Structure such as Eight numbers of Cross drains at chainage 145m, 925m, 1110m, 1318m, 1480m, 1632m, 2496m and 3034m and Two numbers of Box-culverts at chainage 2206m and 3154m is required to avoid water accumulations or congestion. Protective work such as Palisading work is required at chainage 1025m to 1040m (15m, L/S), 1175m to 1225m (50m, L/S), 2575m to 2595 (20m, L/S), 2700m to 2720m (20m, L/S), 2725m to 2745m (20m, L/S), 2750m to 2775 (25m, L/S), 2750m to 2766m (16m, R/S), 2775m to 2797m (22m, L/S), 2825m to 2861m (36m, L/S), 2900m to 3000m (100m, L/S), 3015m to 3111m (82m, L/S), 3125m to 3163m (28m, R/S), 3160m to 3200m (40m, R/S), 3200m to 3224m (24m, L/S), 3230m to 3250m (20m, L/S), 3375m to 3448m (73m, R/S), 3425m to 3445m (20m, L/S), 3468m to 3490m (22m, L/S) and 3553m to 3583m (33m, R/S).



Photograph of the proposed Road





Location map of the sub project

2. Detail Environmental Features

The UNR has a length of 3.490 km. Detail Environmental features within 100m of the both sides from the centre line were collected @300m longitudinal intervals. The findings of the survey for the aforementioned road could be seen in the table below:

Chainage	Right	Left	Environmental Features
00-300	√		Shop, House
		√	UP office, Shop, Mosque
300-600	√		Housing Area
		√	Housing Area
600-900	√		Housing Area, Shop
		√	Mosque, Shop
900-1200	√		Housing Area
		√	Housing Area
1200-1500	√		House, Agricultural Land
		√	House, Banana Garden
1500-1800	√		Agricultural Land
		√	Agricultural Land
1800-2100	√		Agricultural Land
		√	Agricultural Land
2100-2400	√		Mosque, Housing Area
		√	Housing Area
2400-2700	√		Pond
		√	Pond
2700-3000	√		Fishery
		√	Pond, Housing Area
3000-3300	√		Fishery, Madrasha
		√	Pond, Housing Area
3300-3600	√		Battola Bazar
		√	Battola Bazar
3600-3900	√		Shop, Housing Area
		√	Union Health Complex, Union Land Office, Shop
3900-4030	√		Housing Area, Agricultural Land
		√	Saw Mill, Pond

3. Baseline Data

3 (a) Physical Environment

3. a.1 Atmosphere and Climate

Meteorological conditions of the area are more or less similar to the central part of the country with respect to temperature, rainfall and humidity. The subproject area is situated in humid sub-tropical climate with large variations between summer and winter temperatures and significantly influenced by monsoons during the months of May to September when most of the rainfall occurs. The annual average maximum temperature is about 33.33^0C and minimum temperature is about 12^0C. Annual rainfall is about 1,479 mm (ref. Mymensingh, 2012).

3.a.2 Topography

The sub-project area mainly comprises of plain agricultural land and almost flat with few undulations. River Banar flows nearby the sub-project area. The depressions and canals are dominated by organic clay and peats. Most depression and canals are tectonically controlled. The average ground elevation of the project area is about 13m PWD. According to the information collected through public consultation, the area is considered as a flood free area and not affected in severe floods of 1998, 2004, 2007 and 2012. A general topographic condition is found in the flowing photograph.

3.a.3 Drainage

Water logging and drainage congestion was observed at chainage 145m, 925m, 1110m, 1318m, 1480m, 1632m, 2496m and 3034m on the road due to insufficient drainage facilities. Water logging was also observed at chainage 2206m and 3154m as the road lacks adequate opening to drain out water.

3.a.4 Water Quality

3.a.4.1 Ground Water: Information on ground water quality of the nearest tube-wells along the road has been collected on spot discussion and consultation with the villagers. The depth of ground water level varies from 5m to 8m. Potable ground water is available at an average depth of 50m to 100m. Ground water quality of HTWs for drinking purposes is provided in the following table:

Drinking water quality parameters	Average contents of HTW water (mg/L)	Permissible limit (mg/L), Bangladesh standard	Comments
Arsenic	0.013	Up to 0.05	Within permissible limit
Iron	1.64	Up to 1.00	Exceed permissible limit
Chloride	6.00	150-600	Below the standard

Source: Bangladesh Drinking Water Survey, 2009

3.a.4.2 Surface Water: The road sub project crosses large number of water bodies such as small and medium ponds which are used for multiple purposes. The surface water in ponds is not saline but is not suitable for drinking purposes. All the ponds are man-made and used for fishing, water supply and domestic use. River Banar is situated very close to the sub-project area. There are no remarkable sources of water pollution such as industries, brick fields, etc observed in the sub-project area.

3.a.5 Noise

Noise is not a major impediment for the quality of the environment in the study area. Vehicles such as motor cycle, tempo, mini truck, votvoti, tractor trailor etc move on the road during day and night. These vehicles generate noise in the subproject area but within tolerable limit in most cases. No other perceptible sources of noise generation such as factories, industries, etc found near by the sub-project area.

3.a.6 Air Quality

Ambient air quality data was not available. Quality of air appears to be clean but due to poor condition of road surface, dust is generated, especially during the movement of vehicles that causes air pollution. There are no remarkable sources of air pollution such as heavy industries, brick fields, etc observed in the sub-project area.

3.Base line data:(b) Biological Environment

Flora & Fauna

The project area has some flora of commercial importance. The major tree species found in the area are Mahogany, Betel nut, Rain-tree and (in Bengali and colloquial) Simul, Sishu, Arjun, Kadam, Royna, Mandar, Bot, Dumur, Minjiri, Jarul, Hizal, Sheora, Krishnachura, Siris, Chambal, Euclyptus, Bambo, canes etc. No endangered floral species are reported. The dominant fruit-bearing trees include Mango, Jackfruit, Banana, Coconut, etc.

Besides domestic animals, wild dogs, jungle cat, jackal, mongoose and rodents like ants and snakes of various species are reported, though having a decreasing trend. The endangered animals like Wild cow, Wild Buffalo, Pea fowl, Mugger Crocodile etc. are not reported. Some

birds found in common Bengali name include Chorui, Doel, Ghugu, Shalik, Holud pakhi, Kath thokra, Dahuk, Babui, Chil, Pecha, Tia, Bok, Kak, Tuntuni, Bulbuli, Kokil etc. Amhibians like Kola bang, Kuno bang and Gecho Bang etc. also available, although their number has decreasing trend.

3(c) Stakeholder Consultation:

During the data collection, public consultation meeting were held at Daowgaon and Battola Bazar. The list of participants, photograph and details of the discussion meeting are attached as Annex-1 and their recommendations are highlighted below:

- Adequate drainage facilities at chainage 2206m, 3154m, 145m, 925m, 1110m, 1318m, 1480m, 1632m, 2496m and 3034m to be provided to avoid water congestion.
- Effective measure to be taken to minimize all the adverse impact of construction works.
- Steps to be taken for minimizing the air pollution by spraying water at the construction sites.

4. Screening Format

Screening format was administered for identifying the impacts and their extents and the screening data sheet for this subproject is given below:

Screening Questions	Yes	No	Scale of Impact			Remarks
			High	Medium	Low	
A. **Potential Environmental Impacts during planning and design phase/ Sub-project siting**. Is the sub-project area adjacent to or within any of the following environmentally sensitive areas?						
▪ Protected Area (Forest)		√				The area is not included in designated protected area.
▪ Wetland (Beel, Haor)		√				The area is not located in designated Wetland.
▪ National Park		√				The road has no encroachment of any national park.
▪ Wildlife sanctuary		√				The road is not included in any wildlife sanctuary.
▪ Buffer zone of protected areas		√				The area does not belong to buffer zone of any protected area.
▪ Special area for protecting biodiversity		√				The area does not belong to any special area for protecting biodiversity.
B. Potential Environmental Impacts from construction of new roads. Will the sub-project cause……						
▪ Loss of agricultural land?		√				Required earth will not be collected from agricultural land.
▪ Negative effects on rare (vulnerable), threatened or endangered species of flora or their habitat?		√				No rare species of flora and fauna occur near by the sub-project area.
▪ Negative effects on designated wetlands?		√				The area is not included in any designated wetland.
▪ Negative effects on wildlife habitat, populations, corridors or movement?		√				No wildlife habitat reported to exist nearby the sub-project area.
▪ Negative effects on locally important or valued ecosystems or vegetations?	√				√	Care will be taken, so that local important or valued ecosystem or vegetation is not damaged. Turfing will be done to compensate the loss of

Screening Questions	Yes	No	Scale of Impact			Remarks
			High	Medium	Low	
						vegetation.
▪ Destruction of trees and vegetation?	√					Vegetation may be removed during construction of road. Turfing will be done after the construction.
▪ Impact on fish migration and navigation?		√				The sub-project does not cross any water bodies.
▪ Obstruction of natural connection between river and wetlands inside project area?		√				The sub- project does not cause any obstruction to any natural connection between river and wetlands
▪ Water logging in areas?	√				√	Baseline data shows that water are logged at 2206m, 3154m 145m, 925m, 1110m, 1318m, 1480m, 1632m, 2496m and 3034m. Water logging may also occur due to construction activities. Drainage structure and sufficient opening to drain out water at the above mentioned chainage will be provided to avoid water logging.
▪ Insufficient drainage?	√				√	From baseline date it has been observed that there is insufficient drainage at the above mentioned chainage. So, drainage structure will be provided to increase drainage facility.
▪ Negative effects on surface water quality?	√				√	No liquid / solid waste will be disposed off in water bodies
▪ Negative effects on groundwater quality, quantity or movement?		√				Liquid / solid waste will not be allowed to dispose in ground directly.
▪ Loss of existing buildings, property, economic livelihood?		√				No land acquisition or resettlement is required
▪ Increased soil erosion and/or sedimentation?	√				√	Soil may erode during earth work at slope but turfing and compaction will be carried out after completion of earth work.

Screening Questions	Yes	No	Scale of Impact			Remarks
			High	Medium	Low	
▪ Negative impact on soil stability and compactness?	√				√	Turfing on embankment top and slope will be provided to mitigate negative impact on soil stability and compactness.
▪ Impacts on sustainability of associated construction waste disposal?		√				Construction waste will be disposed in safe place.
▪ Traffic disturbances due to construction material transport and wastes?	√				√	Minimum disturbance is anticipated
▪ Increased noise due to transportation of equipment and construction materials?	√				√	Occur some disturbance within acceptable limit
▪ Increased noise due to day-to-day construction activities?	√				√	Occur some noise disturbance but within acceptable limit
▪ Increased wind-blown dust from material (e.g. fine aggregate) storage areas?	√				√	Proper environmental code of practice will be in place by spraying of water during construction to reduce dust emission.
▪ Health risks to labors involve in activities?	√				√	Some risk during construction is anticipated which will be taken care of by adopting remedial measures incorporated in the contract
C. Potential Impacts of the Improved road. Will the improved road cause …….						
▪ Negative effects on neighborhood or community characters?		√				No negative effect anticipated
▪ Negative effects on local business, institutions or public facilities?		√				Improved road will increase the local business
▪ Potential social conflict between occupational groups-farmers vs. fisheries?		√				The proposed road will not cause any conflict between occupational groups, e.g farmers and fishermen
▪ Degradation or disturbance of historical or culturally important sites (mosque, graveyards, monuments etc.)?	√				√	There exists no historical or cultural important sites to be damaged/degraded by the proposed road., there exist

Screening Questions	Yes	No	Scale of Impact			Remarks
			High	Medium	Low	
						mosques, where some care to be involved during construction, where communication will be improved afterwards.
▪ Blockage of navigation system?		√				No navigation system will be blocked by the road. However, if such issue arises the road alignment to diverted to avoid blockage of navigation
▪ Impediments to movements of people and animals?	√				√	No impediment to movement of people and impediment to movement of animals will be negligible since the road is not wide enough.
▪ Conflicts in water supply rights and related social conflicts?		√				Will not create any social conflict over water supply rights.
▪ Air quality?	√				√	Construction work will involve Earth work, WBM, Brick on end Edging, Carpeting and Surface drain etc. will lead to increase in dust/suspended particulate matter (SPM) around the construction site. Spraying of water; bituminous burning unit to be placed away from residential area, educational/religious institutions to reduce air pollution.

Assessment:

The proposed sub-project (Road improvement) is not located within any environmentally sensitive area and thus not going to create intimidation to important environmental features. In some locations drainage congestion has been observed and drainage system will be developed to minimize the water logging of those particular locations. Some earthwork will be involved, but no agricultural productive soil will be used for the purpose. Earth will be compacted for stabilization. The inputs will be mainly at construction phase and limited within project boundary. Moreover, mitigation measures will be taken according to the EMP for minimizing the air, dust and noise pollution.

5. Specific Impact and Mitigation

This sub-project involves the improvement work of 3.490 km road, which passes through different types of environmental features like pond, agricultural land, shop/ bazar, mosque, education institution etc. For the purpose environmental studies have been carried out (with all the details of individual environmental components) since it is apprehended that, some adverse environmental effects will take place on the existing physical environment. The possible impacts of the improvement work on this road and their mitigation measures have been discussed (component-wise) below:

5.1 Earth Work: The road improvement work consists of earth excavation, earth filling and cutting, removal of unsuitable materials or top soil, preparation of embankment layer, hard shoulder preparation, protective work, etc. These works lead to slope erosion, silt deposition on crop fields, dust blowing, noise and vibration disturbing the local people. As no massive earth work is involved at any specific location, several small volumes of earth from different areas will be arranged by the contractor. However, if large volume of earth is required, the borrow pit may be converted to deeper pond (suitable for fish cultivation).

Mitigation:

- Proper care will be taken during cutting and filling so that slope or toe of the road embankment remain within the right of way and does not disturb the crop.
- Turfing & compaction will be done on the shoulder and slope.

5.2 Temporary interruption of natural drainage and local drainage congestion: Drainage congestion was observed at chainage 145m, 925m, 1110m, 1318m, 1480m, 1632m, 2496m and 3034m on the road that often contribute to local drainage congestion. Drainage congestion was also observed at chainage 2206m and 3154m surrounding the area of the sub-project due to lack of adequate opening to drain out water. Temporary interruption of natural drainage and local drainage congestion may also occur during construction of drainage structures.

Mitigation:

- Eight numbers of Cross drains at chainage 145m, 925m, 1110m, 1318m, 1480m, 1632m, 2496m and 3034m will be provided to avoid water accumulations or congestion.
- Two numbers of Box-culverts at chainage 2206m and 3154m will be provided to avoid water accumulations or congestion. These will be constructed newly, where no such structures exist in the locations.
- Proper diversion structure and sufficient opening to drain out water should be developed during construction work to avoid water congestion.

5.3 Pollution from construction materials: Dumping of construction spoils, including accidental leakage of bitumen, fuel etc in equipment yards, is an important hazard. Both surface and groundwater might be polluted from these contaminants.

Mitigation:

- Safe transport, storage and disposal provisions for construction materials, equipment especially bitumen, fuel etc have to be carried out in order to avoid accidental spillage and loss.
- Bitumen, fuels, lubricants etc and other hazardous materials have to be stored over raised platform not directly on the ground.
- The playground of the educational institutions shall not be allowed to use as a stack yard or work camp site.

5.4 **Dust:** Different construction activities, machinery movement and other works generate dust and impair the air quality. Road improvement work involves breaking up, digging, crushing, transporting and dumping of materials.

Mitigation:

- Water will be sprayed to control the dust, which is the main way to suppress dust in the working site.

5.5 **Noise:** Movement of vehicles generates noise. However, in this sub-project sensitive area like Madrasha, Mosque etc. are likely to be affected from the road side noise.

Mitigation:

- Transportation of the construction materials have to be carried with scheduled time, mainly day time.
- All powered mechanical equipment and machinery shall be fitted with noise abating gear such as mufflers for effective sound reducing.
- Boundary wall in front of School at chainage 0.00m to 25m (25m) and in front of Madrasha at chainage 3587m to 3657m (70m) would be provided to minimize noise and to improve traffic safety.

5.6 **Water Quality:** The road passes by few number of water bodies and no remarkable sources of water pollution has been found. The water quality may deteriorate if construction materials including borrow/fill materials and sand, construction waste, effluent from work camps, food waste etc are allowed to dump in the water bodies.

Mitigation:

- Proper construction management including waste management, training of operators and other workers will be provided to avoid pollution of water bodies.
- Construction waste will be managed in specified bins opening a ditch (not in water bodies or lowland), for which contractor will be made aware.

5.7 **Occupational Safety and Sanitation**: It involves the safety problems of the construction workers and the provision for sanitation and drinking water facilities at work sites. Lack of the latter facilities might severely affect the construction workers' health condition and work efficiency.

Mitigation

- Provision for tube well to ensure potable drinking water and separate toilets for male and female to maintain proper sanitation condition will be made.
- First Aid Box with health facility at each camp site will also be made available.
- Ensure wear of proper PPE (helmet, gloves, safety glass, safety shoes etc) of all workers during work to avoid any personal as well as construction related accident.

6. Environmental Management Plan

Specific Environmental Management Plan (EMP) has been prepared to eliminate, reduce or regulate the adverse impacts for this subproject. This EMP shall be a part of contract document.

6.1 Environmental Mitigation Plan

One of the components of Environmental Management Plan is Environmental Mitigation Plan. The environmental activities and management measures for this sub-project of RTIP-II are addressed and shown in the table below:

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measures	Estimated Mitigation Cost	Responsibility	
				Implementation	Supervision
Preconstruction					
Construction of labour camp	May occur loss of agricultural land, improper waste disposal may affect environment. Also improper sanitation facility will generate health hazard situation for the workers and the area.	Identify the location of construction camps so that minimum disturbance on agricultural land. Camps shall not be located near settlements or near water supply intakes. Place will be kept neat and clean strictly to ensure good sanitary condition. Proper toilet and water supply facilities required.	As shown in section-7	Contractor	LGED & D & SC
Removal of Vegetation	May cause soil erosion and their deposition on nearby crop field, affecting soil quality and productivity.	Vegetation will be removed from the ROW before the commencement of construction after obtaining necessary permissions	As shown in section-7	Contractor	LGED & D & SC
Setting up of Hot mix Plants and crushers	Emission of hot and polluting fumes affecting air quality, causing health hazard and damaging green habitation.	Hot mix plants, crushers and batching plants shall be located at a safe distance from the nearest habitation and dense tree area. The contractor shall obtain necessary approvals from LGED.		Contractor	LGED & D & SC
Identification of debris dumping sites	Indiscriminate dumping may cause nuisance to human habitat, cause hindrance to natural drainage of the surrounding areas.	Location of debris dumping sites shall consider the following and approved by the LGED. • Shall not be located within designated forest areas. • Dumping shall not impact natural drainage courses. Settlements are located at least 1 km away from the site.	As shown in section-7	Contractor	LGED & D & SC

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measures	Estimated Mitigation Cost	Responsibility	
				Implementation	Supervision
Construction					
Earthwork	Slope erosion, silt deposition on crop fields, dust blowing	Proper care will be taken during cutting and filling so that slope or toe of the road embankment remain within the right of way and does not damage the crop.	As described in GCC and in Section 7	Contractor	LGED & D & SC
Material sources	Improper transportation of construction materials may cause environmental pollution through dust generation and spillage	Adequate safety precautions shall be ensured during transportation of quarry material from quarries to the construction site. Vehicles transporting the material shall be covered to prevent spillage. Operations to be undertaken as per the direction and satisfaction of the LGED		Contractor	LGED & D & SC
Disposal of Debris	Improper disposal of debris may cause pollution of surrounding environment, particularly pollution of nearby water courses and hindrance to traffic.	The disposal of debris shall be carried out only at sites identified for the purpose. All arrangement for transportation during construction including provision, maintenance, dismantling and clearing debris, where necessary will be considered incidental to the work and should be planned and implemented as approved and directed by LGED.	As shown in Section 7	Contractor	LGED & D & SC

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measures	Estimated Mitigation Cost	Responsibility	
				Implementation	Supervision
Dust	Cause air pollution	• Vehicles delivering materials should be covered to reduce spills and dust blowing off the load. • In laying sub-base, water spraying is needed to aid compaction of the material. After the compaction, water spraying should be carried out at regular intervals to limit the dust to below • Plants, machinery and equipment shall be so handled (including dismantling) as to minimize generation of dust	As shown in Section 7	Contractor	LGED&D &SC
Noise	Increase of noise level of the construction site	• Noise standard at processing sites, e.g. Aggregate crushing plants, batching plant, hot mix plant , any machinery will be strictly monitored to prevent exceeding of noise standards. • Workers in vicinity of loud noise, and workers working with or in crushing, compaction, concrete mixing operations shall wear	As described in GCC	Contractor	LGED&D &SC
Surface water	Contamination of surface water	• No excavation from the bund of the water bodies. • No debris disposal near any water body. • Prior written permission from authorities is required for use of water for construction activity. • Construction labours to be restricted from polluting the source or misusing the source • Labour camps will be located away from water bodies	As described in GCC	Contractor	LGED&D &SC

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measures	Estimated Mitigation Cost	Responsibility	
				Implementation	Supervision
Water Logging	During construction work or in rainy season water logging may take place	Drainage structure will be built to drain out the rain water. During construction work, diversion structure and sufficient opening should be developed to drain out water	As per BOQ of bidding document	LGED	LGED&D &SC
Construction Safety	Improper stack yard (without fence, light, signboard) may cause accident/health hazard. Improper equipment (not conforming the relevant standard) may lead to environmental pollution leakage of fuels, lubricants and emitting black smoke.	• Adequate precautions will be taken to prevent danger from electrical equipment. • No material or any of the sites will be so stacked or placed as to cause danger or inconvenience to any person or the public. • Fencing and lights shall be provided to protect the public. • All machines to be used in the construction will conform to the relevant Standards, will be free from defect, will be kept in good working order, will be regularly inspected and properly maintained as per norms and to the satisfaction of LGED.			
Health and Safety Measures	Working without health safety gear (PPE) may cause injury to the workers	• At every workplace, a readily available first aid unit including an adequate supply of sterilized dressing material and appliances will be provided as per the Labour Act-2006. • Adequate safety measures and PPE for workers during handling of materials at site will be taken up.	As described in GCC	Contractor	LGED&D &SC

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measures	Estimated Mitigation Cost	Responsibility	
				Implementation	Supervision
Operation Phase					
Traffic Movement	Road accidents may increase due to higher number of vehicles using the roads at increased speeds.	Sight views should be clear and speed breaker/rumble strip should be provided at some crowdy places. Traffic sign to be installed		LGED	LGED
	Noise levels may also marginally increase as more vehicles use the road at higher speeds	Awareness building and administrative measures should be taken		LGED	LGED

6.2 Environmental Monitoring Plan

Environmental Monitoring Plan for this sub-project will help to evaluate the extent and severity of environmental impacts against the predicted impact and the performance of environmental protection measures. The following table has been prepared for monitoring the operation & maintenance phase activities of the sub-project:

Environmental Indicator	Parameters/Units	Means of Monitoring	Frequency / Duration Standards	Responsibilities		Estimated Cost
				Implementation	Supervision	
Air Quality	Measurement PM	Inspection	Once	Contractor	D&SC & LGED	According to GCC and clause 7 of this report
Dust Control	Spraying of water	Visual	Daily	Contractor	D&SC & LGED	According to GCC and clause 7 of this report
Noise Control	Measurement db	Inspection	Once	Contractor	D&SC & LGED	According to GCC
Waste management	Monitoring of collection, transportation and disposal of solid waste. Inspection of construction camp.	Inspection	Daily	Contractor	D&SC & LGED	According to GCC and clause 7 of this report
Health and safety	Monitoring health and safety of workers	Inspection	Daily	Contractor	D&SC & LGED	According to GCC and clause 7 of this report

7 Cost of Environmental Enhancement Works and Mitigation Measures in BoQ's of Bidding Document

In consideration to the above mentioned environmental impacts and their mitigation measures for this sub-project, the following items are included in the BOQ of this sub-project.

Item No.	Description of Item	Costs (Tk)
	ENVIRONMENTAL MITIGATION & ENHANCEMENT WORKS	
1	Overall environmental management in addition to compliance to the clauses 27 & 29 of GCC to the entire satisfaction of E-I-C	
	a) Temporary camp site waste disposal facility improvement 1no@Tk.50,000.0	5,0000.00
	b) Dust suppression measures [3.00 km @Tk. 2000.00/Km]	6,000.00
	c) Prevention of spillage, leakages of polluting materials	5,000.00
2	Providing and maintaining adequate potable water supply and sanitation facilities at camp site and work site to the entire satisfaction of E-I-C	
	a) Water supply: 1 no of Tube well including test results @Tk.10,000.00	10,000.00
	b) Sanitation: 2 nos. of Toilet (1 no for women and 1 no for men) @Tk. 5000.00	10,000.00
3	Rehabilitation of ancillary sites including stockpile sites, brick crushing sites, borrow areas, workforce camp to the entire satisfaction of the Engineer in charge	30,000.00
4	Drainage facilities improvement: Two numbers of Box-Culverts, eight numbers of Cross-drain would be provided.	4833934.00
5	Turfing on embankment top and slope [22,222 sqm @Tk. 15.5/sqm]	344441.0
6	Clearing and grubbing	7279.59

Annex-1: Public Consultation

Public Consultations Findings for Daowgaon UP office-Battola Bazar Road
Site: Daowgaon (chainage 0+000 km)
Road: Daowgaon UP office-Battola Bazar Road
Date: 10. 11. 2013
Time: 9.30 a.m. to 1.30 p.m.

A public consultation meeting was held during 9.30 a.m. to 1.30 p.m. on 10th November. 2013 at Daowgaon UP office located in the sub-project area. Around 10 people participated in the meeting. Md. Mofazul Islam, a Businessman was selected by the participants to chair the meeting. Md. Abul Kashim, a farmer, Md. Fazlu Haque, a shop keeper and Md. Saiful Islam, a CNG driver, were nominated by the participants to speak for them.

Field Engineer Md. Al Nomani and Lab Technician Md. Anamul Kabir, were present as Facilitators..

During the consultation meeting the participants appreciated the proposed road improvement subproject as they are facing communication problem due to the poor condition of the road. According to them, road improvement subproject will also improve various socio-economic conditions of the people of the area.

Discussion was also made on the environmental issues like air/dust pollution, water pollution, noise pollution, improper waste management which will potentially cause environemntal degradation during construction of the road. Discussion was also made that during construction spraying of water will be done during construction which will reduce dust/air pollution.

The participants expressed to offer their all cooperation to reduce the environmental degradation and also mentioned that noise pollution is not a major issue to them. They also expected that, all required measures to be adopted during construction to minimize the environmental hazards.

Various querries of the partcipants were answered by Mr. Kabir up to their satisfaction.

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The summary of the important suggestions during discussion are as follows:

- Adequate drainage facilities at chainage 2206m, 3154m, 145m, 925m, 1110m, 1318m, 1480m, 1632m, 2496m and 3034m to be provided to avoid water congestion.
- Effective measure to be taken to minimize all the adverse impact of construction works.
- Steps to be taken for minimizing the air pollution by spraying water at the construction sites.

List of Participants-01

Name of Road: Dawgaon U.P Office - Bottola bazar road form Ch. 0+00-4+030m

Focus Group Discussions (FGDs)
List of Participants

Focus Group : 1
Location : Chainage 270m

Date & Time : 10/11/13 , 9:30 Am.

SL No	Name Address & Telephone No	Occupation	Signature
1	Mofazzel Hossain 01768914756	Business	[illegible]
2	Shulamim Akdam 01721-740602	Farmer	[illegible]
3	Karamin mondes	Farmer	[illegible]
4	Abul Kashim 01713961023	Farmer	[illegible]
5	Majibor Rahman	Business	[illegible]
6	Mostafa Hossain 01713565631	gram police	[illegible]
7	Saiful gelam 01931847496	CNG -	[illegible]
8	gajadh 01715012671	gram police	[illegible]
9	Fazla Haque - 01742245077	Shop kiper	[illegible]
10	Mazaure - 01913 681943	Business	[illegible]

Photograph of the Public Consultation

Annex-2: Public Consultation

Public Consultations Findings for Daowgaon UP office-Battola Bazar Road
Site: Battola Bazar (chainage 3+500 km)
Road: Daowgaon UP office-Battola Bazar Road
Date: 10. 11. 2013
Time: 3.15 p.m. to 4.30 p.m.

A public consultation meeting was held during 3.15 p.m. to 4.30 p.m. on 10th November. 2013 at Battola Bazar located in the sub-project area. Around 12 people participated in the meeting. Md. Nazrul Islam, a Businessman was selected by the participants to chair the meeting. Md. Hasham Ali, a Farmer, Md. Jamaluddin, a Farmer and Md. Babul Hossain, a Businessman were nominated by the participants to speak for them.

Md. Al Nomani, Field Engineer and Md. Anamul Kabir, Lab Technician were present as Facilitators.
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During the consultation meeting the participants appreciated the proposed road improvement subproject as they are facing communication problem due to the poor condition of the road. According to them, road improvement subproject will also improve various socio-economic conditions of the people of the area.

Discussion was also made on the environmental issues like air/dust pollution, water pollution, noise pollution, improper waste management which will potentially cause environemntal degradation during construction of the road. Discussion was also made that during construction spraying of water will be done during construction which will reduce dust/air pollution.

The participants expressed to offer their all cooperation to reduce the environmental degradation and also mentioned that noise pollution is not a major issue to them. They also expected that, all required measures to be adopted during construction to minimize the environmental hazards.

Their quarries were answered by Mr. Kabir up to their satisfaction.

The summary of the important suggestions during discussion are as follows:

- Adequate drainage facilities at chainage 2206m, 3154m, 145m, 925m, 1110m, 1318m, 1480m, 1632m, 2496m and 3034m to be provided to avoid water congestion.
- Effective measure to be taken to minimize all the adverse impact of construction works.
- Steps to be taken for minimizing the air pollution by spraying water at the construction sites.

List of Participants-02

Focus Group Discussions (FGDs)
List of Participants

Focus Group : 3
Location : Battola bazar (Chainage 3500m)
Date & Time : 10/11/13 , 3:15 PM

SL No	Name Address & Telephone No	Occupation	Signature
1	Faisal Ahammed 01740-571774	Student	Faisal
2	Md. Jemaddin 01754-051353	Farmer.	Jam
3	Usman Ali	"	Usman
4	Md Ubadulla. 01735-027809	Master	[illegible]
5	Md. Narul Islam.	bussiness.	[illegible]
6	Md. Hasham Ali	Farmer.	Hasham Ali
7	Hamman Munshe	business.	[illegible]
8	Alhajes Abdul Agezies.	Master.	[illegible]
9	Nasher Uddin.	business.	
10	Muslem Uddin 01732-189523	Plumber	[illegible]
11	Babul Hossin	bessuns	Babul
12	Abu Shaim	Dajea.	[illegible]

Photograph of the Public Consultation