Environmental Assessment Report

Union Road (UNR)

Name of the Sub-project :**Dhamrai Pourasava (Bata gate) to Jalsin Bazar Road**
Slice No. :**UNR-12 (I)**
Upazila :**Dhamrai**
District :**Dhaka**

Second Rural Transport Improvement Project

Local Government Engineering Department

Contents

1. Sub Project Description

Name of the Sub-project : Dhamrai Pourasava (Bata gate) to Jalsin Bazar Road
ID No. :326143009
District Name : Dhaka
Name of the Upazila : Dhamrai
Length of the Road :4.50km

Location of the sub-project

Dhamrai Upazila is located at 23.500°N 90.02°E and bounded by Kaliakoir, Savar, Singair, Manikganj Sadar, Saturia, Nagarpur and Mirzapur Upazila shown in location map. The road is 4.50 km long, starts at Bata Gate and ends at Jalsing Bazar [details are listed in **Table-1.1**].

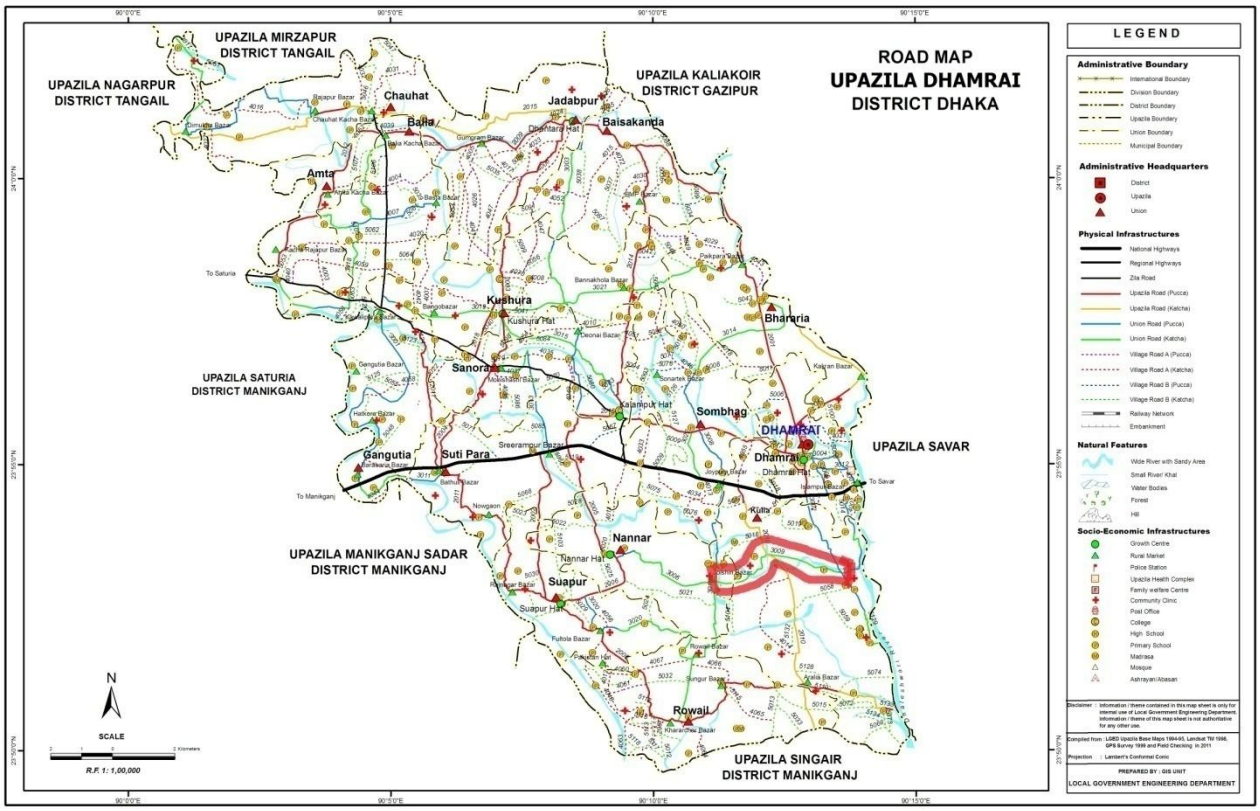
Name of the unions the road passes through	Name of the road side villages (at least 5 nos)	Starting point of the road	End point of the road	Year of construction/Last maintenance	Major items included in estimates
Nannar, Dhamrai, Kultia	PurbaPachimBarigaon, Kaknail, Laurakundu, Charpara, Kandapara, Jalsing	Bata Gate	Jalsing Bazar	No Maintenance	Earth Work, WBM, ISG, Brick on End Edging, Dense Carpeting & Surface Drain

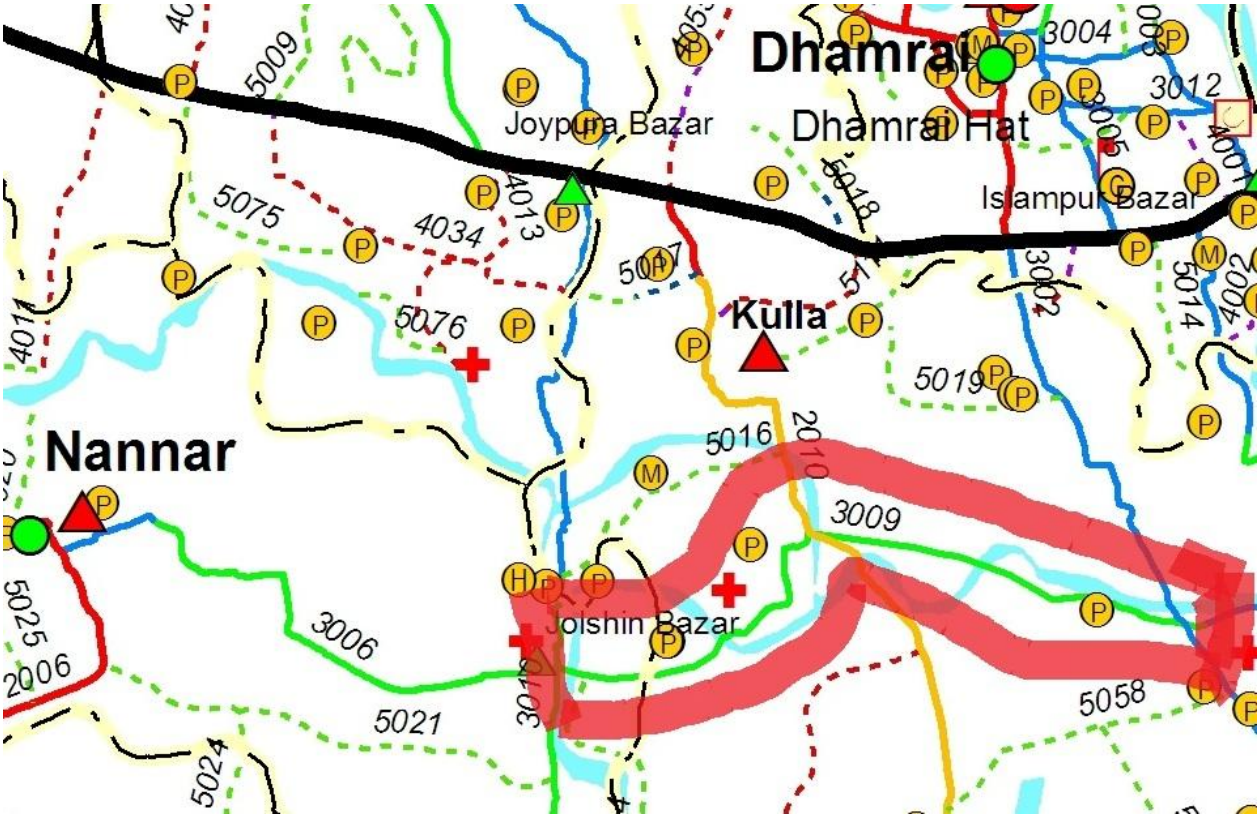
Table-1.1

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 4.5 km from chainage 4950m to 10150m excluding a BC road from chainage 5390m to 6090m which is constructed by another project. Major components of the works includes earthwork (earth volume 10,263.446 cum), base coarse Improve sub grade, Brick at edge, 25mm dense carpeting etc. Protective work such as Palisadingsis required at chainage 5350m to5370m,7405m to 7455m, 7715m to 7745m, 8255m to 8285m, 8375m to 8405m (Total 160m) and Retaining Wall with CC Block is required from chainage 8500m to 8525m.

Photograph of the proposed Road





Location map of the sub project

2. Detail Environmental Features

The UNR has a length of 4.50 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 can be seen in the table below:

Chainage	Right	Left	Environmental Features
00-300	√		Pond, Nurani Agro Food Complex, House
		√	Pond, Bata Company
300-600	√		Pond, House, Shop
		√	Shop, House
600-900	√		Agricultural Land, Shop, House
		√	Theimmaculate Textile Ltd, Shop
900-1200	√		HaziMotalebShikder Ideal School, Shop, House
		√	House, Low Agricultural Land, Shop
1200-1500	√		House, Shop
		√	Mosquito, House
1500-1800	√		House, Shop
		√	72 No Chhoybaria Primary School, Shop, House
1800-2100	√		Agricultural Land
		√	House, Shop
2100-2400	√		House, Shop, Agricultural Land
		√	House, Shop
2400-2700	√		House, Agricultural Land
		√	House, River, Agricultural Land
2700-3000	√		House, Shop
		√	House, Bangshi River
3000-3300	√		House, Agricultural Land
		√	House, Agricultural Land
3300-3600	√		ShishuPalliKindergarden, Barigaon Bazar
		√	House, Agricultural Land
3600-3900	√		Barigaon Mosque
		√	House, Agricultural Land
3900-4200	√		House, Shop, Agricultural Land
		√	House, Shop
4200-4500	√		House
		√	House, Agricultural Land, Pond
4500-4800	√		House, Shop
		√	Agricultural Land, Poultry Firm
4800-5100	√		House, Agricultural Land
		√	Agricultural Land
5100-5400	√		Agricultural Land, Poultry Firm
		√	Agricultural Land, House
5400-5700	√		Agricultural Land, Poultry Firm
		√	Agricultural Land, Poultry Firm, House
5700-6000	√		Agricultural Land, Poultry Firm
		√	Agricultural Land
6000-6300	√		Agricultural Land, Poultry Firm, House, Chatal
		√	Agricultural Land, House, Shop

Chainage	Right	Left	Environmental Features
6300-6600	√		Naurakundu Mosque, Poultry Firm
		√	Agricultural Land, House, Shop
6600-6900	√		Naurakundu Primary School, Naurakundu Bazar
		√	Agricultural Land, House, Naurakundu Bazar
6900-7200	√		House, Shop
		√	Agricultural Land, House, Mosque
7200-7500	√		Low Agricultural Land, House
		√	Agricultural Land, House, Poultry Firm
7500-7800	√		House, Shop, Agricultural Land
		√	House, Agricultural Land
7800-8100	√		House, Naurakundu Community Clinic
		√	House, Agricultural Land
8100-8400	√		House
		√	Eidgah, Pond, House
8400-8700	√		Poultry Firm, Graveyard, House
		√	Poultry Firm, Agricultural Land, School
8700-9000	√		Kundupara Mosque, Pond, House
		√	House, Pond
9000-9300	√		House, Agricultural Land
		√	House, Agricultural Land
9300-9600	√		House, Agricultural Land, Jalsing Bazar
		√	House, Agricultural Land, Jalsing Bazar
9600-9650	√		Jalsing Bazar
		√	Jalsing Bazar

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 36^0C and minimum temperature is about 12.7^0C. Annual rainfall is about 1,329 mm (ref. Dhaka, 2012).

3.a.2Topography

The sub-project area mainly comprises of plain agricultural land and almost flat with few undulations.River Pateshwariflows nearby the sub-project area. The depressions and canals are dominated by organic clay and peats. The cluster lies on the Madhupur Clay with its average thickness of about 10 meters consists of over-consolidated clayey slit and is underlain by the Pleistocene DupiTila formation. Most depression and canals are tectonically controlled.The average ground elevation of the project area is about 10m PWD.According to the information collected through public consultation, this area is considered as a flood affected area and affectedin severe floods of1988, 1998 and 2004. A general topographic condition is found in the flowing photograph:

3.a.3Drainage

Drainage congestion and water logging was not observed on and off the road as it has adequate opening to drain out water. But, there is a possibility of water logging due to construction activities.

3.a.4Water 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 4m to 7m. Potable ground water is available at an average depth of 110m to 220m.Ground water quality of HTWs for drinking purposes isprovided in the following table:

Drinking water quality parameters	Average contents of HTW water (mg/L)	Permissible limit (mg/L), Bangladesh standard	Comments
Arsenic	0.008	Up to 0.05	Within permissible limit
Iron	1.13	Upto 1.00	Exceed permissible limit
Chloride	21	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 (about 10 nos.), 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 Bangshi flows nearby the sub-project area.There is no remarkable source of water pollution such as heavy industries, brick fields, etc. in the sub-project area.

3.a.5Noise

Noise is not a major impediment for the quality of the environment inthe study area. Vehicles such as motor cycle, tempo, mini truck,votvoti, tractor trailer 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 perceptiblesources of noise generation such as factories, industries, etc. are found near by the sub-project area.

3.a.6Air 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 subproject 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, Minjiri,Acacea, Jarul, Hizal, Sheora, Krishnachura, Siris, Koroi,Chambal etc. No endangered floral species are reported. Thedominant fruit-bearing trees include Mango, Jackfruit, Banana, Coconut, Guava, Pineapple, Lichi etc.

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

reported. Some birds found in common Bengali name include Chorui, Doel, Ghugu, Shalik, Chil, Pecha, Tia, Bok, Masranga, Kak, Tuntuni, Bulbuli, Kathokra, Kokil etc.

3(c)Stakeholder Consultation:

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

- Adequate drainage facilities to be provided at all chainagesto avoid water accumulations or congestion.
- Effective measure to be taken to minimize all the adverseenvironmental impactsof road construction works.
- Steps to be taken for minimizing the air pollution by spraying water at the construction sites.
- Noise pollution to be effectively minimized up to a tolerable limit.

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 bythe 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 body.
▪ 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?		√				Drainage congestion and water logging was not observed on and off the road as it has adequate opening to drain out water. Water logging may 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?		√				Diversion structure and sufficient opening will be provided to increase drainage facility during construction period.
▪ 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.
▪ Negative impact on soil stability and compactness?	√				√	Turfing on embankment top and slope will be provided to

Screening Questions	Yes	No	Scale of Impact			Remarks
			High	Medium	Low	
						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 bussiness
▪ 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 mosques, where some care to be involved during construction, where

Screening Questions	Yes	No	Scale of Impact			Remarks
			High	Medium	Low	
						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. No drainage congestion has been observed along the road alignment. 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 4.50 km road, which passes through different types of environmental features like pond, agricultural land, shop/ bazar, mosque, school 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 ofunsuitable 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 atany specific location, severalsmall 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 congestionwas not observed on and off the road. But,temporary interruption of natural drainage and local drainage congestion may also occur during construction of drainage structures.

Mitigation:

- Proper diversion structure and sufficient opening to drain out water should be developed during construction of drainage structure 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 affecting the sensitive areas. However, in this sub-project sensitive area like Primary School (3 nos.), Mosque (16nos.),Health Clinic(1 no.) 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

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 qualitymay 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 minimise 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, eg. 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 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	50,000.00
	b) Dust suppression measures[4.50 km @Tk. 2000.00/Km]	9,000.00
	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 @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	Turfing on embankment top and slope [21647.0sqm @Tk. 15.5/sqm]	335528.5
5	Clearing and grubbing	21000.0

Annex-1: Public Consultation

Public Consultations Findings for DhamraiPourasava(Bata gate) to Jalsin Bazar Road
Site: Naurakundu Bazar and Jalshin Bazar
Road: DhamraiPourasava (Bata gate) to Jalsin Bazar Road
Date: 27.11. 2013
Time: 11.00 a.m. to 4.30 p.m.

Public consultation meeting were held during 11.00 a.m. to 4.30 p.m. on 27th November, 2013 at Naurakundu Bazar and Jalshin Bazarlocated in the sub-project area.Mr. Hassem Ali, a Farmer, Mr. Shirajul Islam, a Farmer, Mr. Shawkat Ali, a Businessman and Md. Abdullah-Al-Harun, a Teacherspeak on behalf of the participants. Md. Saidur Rahman (SAE, LGED), Md. Rafiq Mia (Work Assistant) and Md. Shamim Mia (Field Enumerator, D&SC) were present as Facilitators.

According to the participants, the road need to be improved immpediately, as they are facing various problems due to the existing earthen road. Improvement of the road will provide many facilities including related socio-economic benefits including communication imprvement.

During discussion the envirnental issues which may be affected during the road construction like, water pollution, dust pollution were discussed. It was also discussed that improper disposal of construction waste will also affect the environmental quality of the area. Moreover, the participants were asked to cooperate for provision of earth (less productive soil) for the construction of the road, which they agreed.

The participants requested for adopting all measures to reduce/avoid the environemntal hazard during road construction including spraying of water during construction.

The queries made by the participants were replied by the Facilitators Md. Shamim Mia properly.

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

- Adequate drainage facilities tobe provided at all chainagesto avoid water accumulations or congestion.
- Effective measure to be taken to minimize all the adverseenvironmental impactsof road construction works.
- Steps to be taken for minimizing the air pollution by spraying water at the construction sites.
- Noise pollution to be effectively minimized in up to a tolerable limit.

List of Participants

Sl. No	Name of Respondent/Participant	Gender Male/ Female	Social Status /Profession	Contact Number	Signature/ LTI
1	MR. Hassan Ali	M	Farmer		
2	Md. Aziz Miah	M	Farmer		
3	Md. Mazno Miah	M	Business	01914643012	
4	Md. Abbas ali	M	Business	01911459263	
5	Md. Anju Kamoran	M	Farmer	01784-570863	
6	Md. Kaium miah	M	Farmer		
7	Md. jahangir	M	Farmer	01915227531	
8	Md. Sirajul	M	Farmer	01915-373221	
9	Md. Sohel miah	M	shop Kipper		
10	Md. Shajahan Miah	M	politician	01719756475	
11	Md. Badesh Ali Fakir	M	Business	01921692826	
12	Md. Shawkat Ali	M	Business	01843980730	
13	Md. Saddam Hossain	M	Student	01687695477	
14	Md. Razib Hossain	M	Student	01915025749	
15	Md. Zalil B.Sc	M	Business	01918459451	
16	Md. Zalal uddin	M	FARMER		
17	Md. Abdullaha-Al-Harun	M	Teacher	01912684969	
18	Md. Sadek Ali	M	Farmer	01923474517	
19	Md. Burhan Uddin	M	Teacher	01911276341	

Photograph of the Public Consultation