
Environmental Assessment Report

Union Road (UNR)

Name of the Sub-project : Baoikhula Bazar-Nallapara hat via Dubail UP office,
Bathulihat, Fultara Hat Road

Slice No. : UNR-36

Upazila : Delduar

District : Tangail



Second Rural Transport Improvement Project
Local Government Engineering Department

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1. Sub Project Description

Name of the Sub-project : Baoikhula Bazar-Nallapara hat via Dubail UP office, Bathulihat, Fultara Hat Road

ID No. : 393233002

District Name : Tangail

Name of the Upazila : Delduar

Length of the Road : 10.336 km (effective length 3.849 km) from ch. 5 +800 km – ch.16+136 km

Location of the sub-project

Delduar Upazila is located at 24.1417°N 89.9667°E and bounded by Basail, Mirzapur, Nagorpur and Tangail Sadar Upazila. The road is 10.336 km long, starts at Bathuli Hat and ends at Nallapara Hat [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
Dubail, Fazilhati	Bathuli, Ratnauri, Moista, Karmanna, Betbari, Fultara, Mounshinagar, Lalhara, Nallapara	Bathuli Hat	Nallapara Hat	No Maintenance	Earth Work, WBM, ISG, Brick on End Edging, Dense Carpeting, Seal Coat & Surface Drain

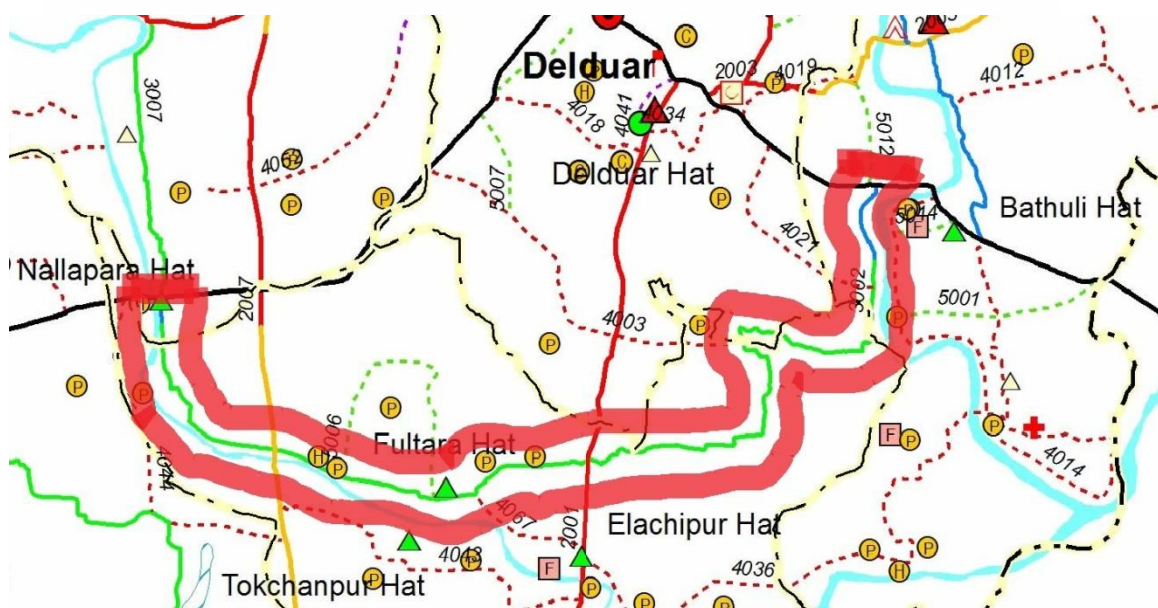
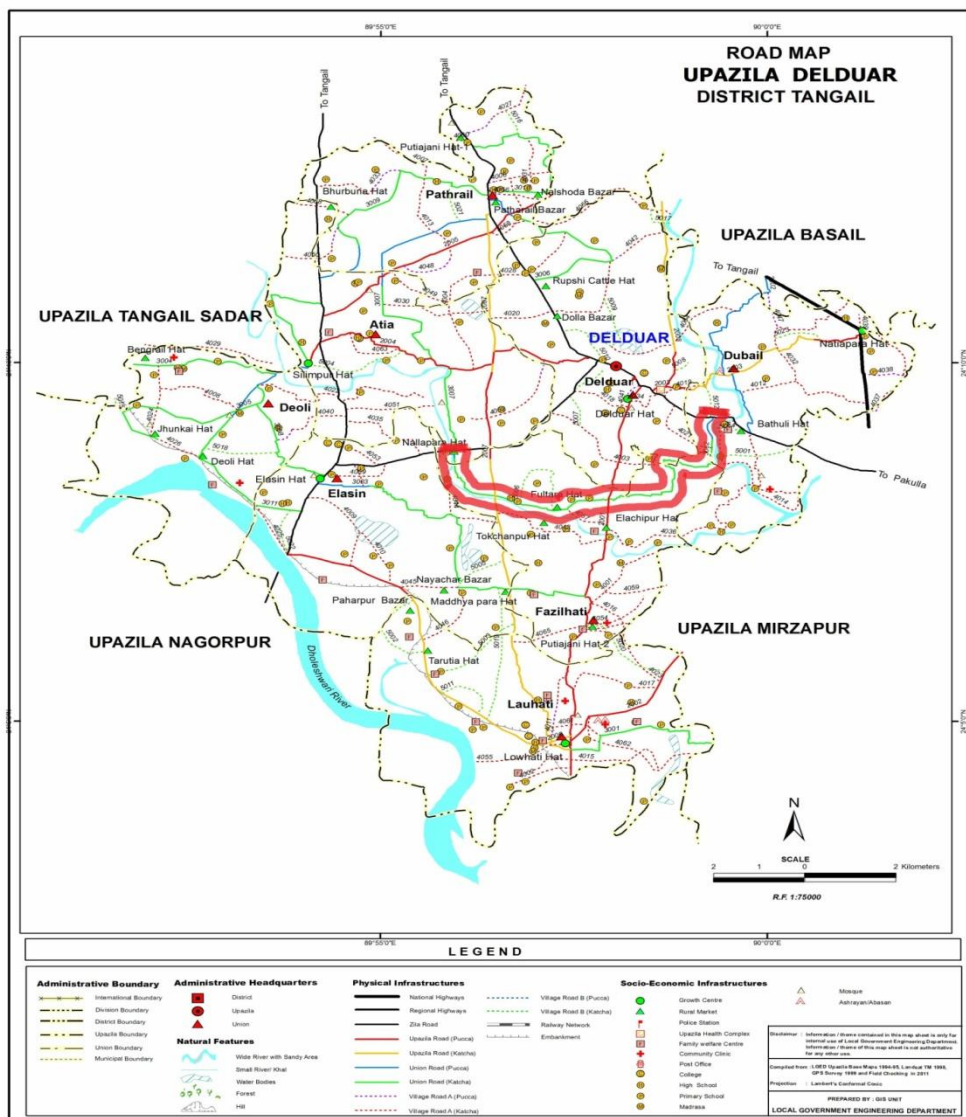
Table-1.1

Brief Description of the sub project

Union road (UNR) improvement includes construction of bituminous road on the existing earthen road. Major components of the works include earthwork at whole chainages (earth volume 16314 cum), base coarse, Improve sub grade, Brick at edge, 25mm dense carpeting, Surface Drain at chainages 7065m, 10065m, 10712m, 6030m, 10825m, 11040m, 12025m, 13690m, 6425m, 7665m, 10660m, 12410m, 12450m, 14202m, 14510m, 14590m, 8460m, 9100m, 10580m and 6630m to 6690m. Protective work such as RCC Pre-cast Pile with CC Block at chainage 7825m to 7850m (B/S), 7922m to 7937m (R/S), 7925m to 7929m (L/S) and Toe Wall with CC Block at chainage 12895m to 12907m (B/S) and 12915m to 12927m (B/S).



Photograph of the proposed Road



2. Detail Environmental Features

The UNR has a length of 10.336 km (Effective Length 3.849 km) starting from 5+800 km - 16+136 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
5800-6100	√		Housing area, Agricultural Land, KG School
		√	Housing area, Agricultural Land
6100-6400	√		Housing area, Agricultural Land
		√	Housing area, Agricultural Land
6400-6700	√		Housing area, Agricultural Land
		√	Mosque, Housing area, Agricultural Land
6700-7000	√		Housing area, Agricultural Land
		√	Housing area, Agricultural Land
7000-7300	√		Housing area, Agricultural Land, Boro Mastea GPS
		√	Housing area, Agricultural Land
7300-7600	√		Housing area, River
		√	Mastea Madrasha, GPS, Community Hospital, Mohila Madrasha
7600-7900	√		Housing area, Agricultural Land, River
		√	Housing area, Agricultural Land
7900-8200	√		Housing area, River
		√	Housing area
8200-8500	√		Housing area, Agricultural Land
		√	Housing area, Agricultural Land
8500-8800	√		Housing area
		√	Housing area, Agricultural Land
8800-9100	√		Housing area, Mosque
		√	Agricultural Land
9100-9400	√		Housing area, Agricultural Land
		√	Agricultural Land
9400-9700	√		Housing area, Agricultural Land
		√	Housing area, Agricultural Land
9700-10000	√		Housing area, Agricultural Land
		√	Housing area, Agricultural Land, Community Clinic
10000-10300	√		Housing area, Agricultural Land
		√	Agricultural Land
10300-10600	√		Agricultural Land
		√	Agricultural Land
10600-10900	√		Housing area, Agricultural Land
		√	Agricultural Land
10900-11200	√		Housing area
		√	Housing area
11200-11500	√		Housing area, Mosque
		√	Housing area
11500-11800	√		Housing area, Gaspara Bazar
		√	Housing area, Shop

Chainage	Right	Left	Environmental Features
11800-12100	√		Housing Area, Shop
		√	GPS, Housing Area, Shop
12100-12400	√		Housing Area, Agricultural Land
		√	Housing Area
12400-12700	√		Agricultural Land
		√	Agricultural Land
12700-13000	√		Housing Area, Agricultural Land
		√	Housing Area, Agricultural Land
13000-13300	√		Housing Area, Agricultural Land, Fultara Bazar
		√	Housing Area, Agricultural Land, Fultara Bazar
13300-13600	√		Housing Area, Agricultural Land
		√	Housing Area, Agricultural Land, Mosque
13600-13900	√		Housing Area
		√	Housing Area, Tamisuddin Girls High School
13900-14200	√		Housing Area, Agricultural Land
		√	Housing Area, Agricultural Land
14200-14500	√		Agricultural Land
		√	Agricultural Land
14500-14800	√		Housing Area, Agricultural Land
		√	Agricultural Land
14800-15100	√		Housing Area, Agricultural Land
		√	Agricultural Land
15100-15400	√		Housing Area, Agricultural Land
		√	Housing Area
15400-15700	√		Housing Area
		√	Housing Area
15700-16000	√		Housing Area, Agricultural Land
		√	Housing Area
16000-16136	√		Saw Mill, Bill Boroni Bazar, Lallapara High School
		√	River, Housing Area, Bill Boroni Bazar

3. Baseline Data

3 (a) Physical Environment

3. a.1 Atmosphere and Climate

Meteorological conditions of the area are more or less similar as in central part of the country with respect to temperature, rainfall and humidity. The project 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 90% of the rainfall occurs. The annual average maximum temperature is about 36⁰C and minimum temperature is about 12.7⁰C. Annual rainfall is about 1,469 mm (ref. Tangail, 2012).

3.a.2 Topography

The sub-project area mainly comprises of plain agricultural land and almost flat with few undulations. River Elangjani and Futjani flow nearby the sub-project area. The depressions and canals are dominated by organic clay and peats. Most depressions and canals are tectonically controlled. The average ground elevation of the project area is about 13.5m PWD. According to the information collected through public consultation, this area is considered as a flood free area and not affected in severe floods such as 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 several locations on and off the road. At Chainage 7065m, 10065m, 10712m, 6030m, 10825m, 11040m, 12025m, 13690m, 6425m, 7665m, 10660m, 12410m, 12450m, 14202m, 14510m, 14590m, 8460m, 9100m and 10580m water logging was observed surrounding the area of the sub-project as the road lacks adequate opening to drain out water. Water logging was also observed at chainage 6630m to 6690m on the road due to lacks of adequate drainage facilities to drain out rain water. At present there is no existing drainage facility in the proposed UNR.

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 3m to 6m. Potable ground water is available at an average depth of 40m to 60m. Ground water quality of HTWs used 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	0.002	Up to 0.05	Within permissible limit
Iron	2.37	Up to 1.00	Within permissible limit
Chloride	14	150-600	Below the standard

Source: Bangladesh National Drinking Water Quality Survey, 2009 by BBS and UNICEF

3.a.4.2 Surface Water: The proposed road sub project road 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 Elangjani and Futjani are situated few kilometres away from the sub-project area. There is no remarkable sources of water pollution such as industries, brick fields, etc observed in the sub-project area.

3.a.5 Noise

Noise is an impediment to the quality of the environment in the study area. Many vehicles such as motor cycle, cars, tempo, votvoti, tractor, three wheelers, auto rickshaw, microbus etc. move on the road during day and nights. These vehicles generate noise in the subproject area but within tolerable limit. No other perceptible sources of noise generation such as factories, industries, brick field etc found near by the sub-project area.

3.a.6 Air Quality

Ambient air quality data was not available. There was no a remarkable source of air pollution such as brick field observed near the sub-project area. Several small industries were found near by the sub-project areas which pollute air. Generally, quality of air is clean but due to poor condition of road surface, dust is generated that contributes to air pollution.

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, Krishnachura, Jarul, Hizal, Sheora, Chambal, Siris etc. No endangered floral species are reported. The dominant fruit-bearing trees include Mango, Jackfruit, Banana, Coconut, Litchi, Pine apple, Papaya 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, Chil, Pecha, Tia, Bok, Machranga, Bok, Kak, Tuntuni, Bou katha kow, Bulbuli, Kokil etc

3.(c). Stakeholder Consultation:

During the data collection, 3 public consultation meeting were held at Ahehel ebaid Academy Bathuli, Gaspara Bazar and Fultara Bazar. The list of participants, photograph and details of the discussion meeting are attached as Annex-1 and their recommendations are highlighted below:

- 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.
- Noise level to be kept low, up to a tolerable limit.
- Drainage system along the road to be improved for better communication of the local people.

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. Turbing 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?	√				√	Baseline data shows that water are logged at 7065m, 10065m, 10712m, 6030m, 10825m, 11040m, 12025m, 13690m, 6425m, 7665m, 10660m, 12410m, 12450m, 14202m, 14510m, 14590m, 8460m, 9100m, 10580m and 6630m to 6690m. 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 turbing and compaction will be carried out

Screening Questions	Yes	No	Scale of Impact			Remarks
			High	Medium	Low	
						after completion of earth work.
▪ 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	√				√	There exists no historical or cultural important sites to be

Screening Questions	Yes	No	Scale of Impact			Remarks
			High	Medium	Low	
etc.)?						damaged/degraded by the proposed road., there exist 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 will not 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 10.336 km road (from ch.5+800 km -16+136 km) having effective length 3.849 km, which passes through different types of environmental features like pond, agricultural land, shop/ bazar, mosque, educational institutions 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 7065m, 10065m, 10712m, 6030m, 10825m, 11040m, 12025m, 13690m, 6425m, 7665m, 10660m, 12410m, 12450m, 14202m, 14510m, 14590m, 8460m, 9100m and 10580m, surrounding the area of the sub-project as the road lacks adequate opening to drain out water. Water logging was also observed at chainage 6630m to 6690m on the road due to lacks of adequate drainage facilities to drain out rain water. Temporary interruption of natural drainage and local drainage congestion may also occur during construction of drainage structures.

Mitigation:

- Three numbers of Box-Culvert at chainage 7065m, 10065m and 10712m will be provided to avoid water accumulations or congestion.
- Sixteen number of X-drain at chainage 6030m, 10825m, 11040m, 12025m, 13690m, 6425m, 7665m, 10660m, 12410m, 12450m, 14202m, 14510m, 14590m, 8460m, 9100m, and 10580m will be provided to avoid water accumulations or congestion.
- One V-drain at chainage 6630m to 6690m will be provided to avoid water accumulations or congestion on the road.
- 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. However, in this sub-project sensitive area like High School (2 nos.), Primary School (3 nos.), KG School (1 no.), Madrasha (2 nos.), Health clinic (2 nos.) etc. is 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.
- A 60m long Boundary wall in front of Madrasha would be provided to minimize noise and to improve traffic safety

5.6 Water Quality: The road passes by few number of water bodies such as pond and there are no remarkable sources of water pollution has found. The water may deteriorate if construction material including borrow/fill material 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. <ul style="list-style-type: none">• 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<p>Improper stack yard (without fence, light, signboard) may cause accident/health hazard.</p> <p>Improper equipment (not conforming the relevant standard) may lead to environmental pollution leakage of fuels, lubricants and emitting black smoke.</p>	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 crowdly 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 need to be incorporated 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 2nos@Tk.50,000.0	100000.00
	b) Dust suppression measures [10.30 km@Tk. 2000.00/Km]	20,600.00
	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: 2 nos of Tube well @Tk.10,000.00	20,000.00
	b) Sanitation: 4 nos. of Toilet (2 nos for women and 2 nos for men) @Tk. 5000.00	20,000.00
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: Three numbers of Box-Culverts and sixteen numbers of Cross-drain and one V-drain would be provided.	6302462.11
5	Turfing on embankment top and slope [38668.6 sqm @Tk. 15.5/sqm]	599363.3
6	Clearing and grubbing	65115.00

Annex-1: Public Consultation

Public Consultations Findings for Baoikhula Bazar-Nallapara hat via Dubail UP office, Bathulihat, Fultara Hat Road

Site: Ahehel Ebaid Academy Bathuli

Road: Baoikhula Bazar-Nallapara hat via Dubail UP office, Bathulihat, Fultara Hat Road

Date: 08. 12. 2013

Time: 10.00 a.m. to 12.00 p.m.

A public consultation meeting was held during 10.00 a.m. to 12.00 p.m. on 8th December, 2013 at Ahehel Ebaid Academy Bathuli located in the sub-project area. Around 24 people participated in the meeting. Md. Mobarok Hossain, a Farmer, Md. Tofazzel Hossain, a Businessman and Md. Mashud Mia, a Teacher, were nominated by the participants to speak for them.

Md. Abdul Mojib Biswas, Field Engineer and Md. Abu Bakar, Field Supervisor were present as Facilitators.

During the consultation, the participants expressed appreciation for the proposed road subproject, as according to them, it will improve their communication mode and will end the sufferings of the present day difficulties of communication in the area. The improvement of the road will bring various socio-economic development, as they opined.

Various environmental issues, potential during construction of the UNR have also been discussed. They included air/dust pollution, water pollution, noise pollution, improper disposal of waste, deterioration of drainage condition etc.

The participants expressed that all required measures for environmental protection to be carried out during construction, although they thought that noise pollution will not be a big issue. Moreover, spraying of water will reduce dust pollution.

. Various queries of the participants were answered by Md. Abdul Mojib Biswas up to their satisfaction.

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

- 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.
- Noise level to be kept low, up to a tolerable limit.
- Drainage system along the road to be improved for better communication of the local people.

List of Participants-01

Focused Group: 1 Date & Time: 08.12.13 / 10 Am
 Location: Bethuli K. G. School, Delduar, Tangail

Sl No	Name, Address	Telephone No.	Occupation	Signature
1	শ্রী: উল্লাস (স্বামী)	০১৭০১-৯২৫৫২	শ্রমিক	উল্লাস
2	শ্রী: সানিউল হান্নাম	০১৯২-৬০২০০৫	শ্রমিক	সানিউল
3	শ্রী: সানিউল হান্নাম	০১৯৭-২৬৯১৫	শ্রমিক	সানিউল হান্নাম
4	শ্রী: সানিউল হান্নাম	০১৭২১-৩৯৫৫৫	শ্রমিক	সানিউল
5	শ্রী: সানিউল হান্নাম	০১৯৯১-৯৬৯৫৫	শ্রমিক	সানিউল
6	শ্রী: সানিউল হান্নাম	০১৭০১-৯২৫৫২	শ্রমিক	সানিউল
7	শ্রী: সানিউল হান্নাম	০১৭৭৭-৯২৫৫২	শ্রমিক	সানিউল
8	শ্রী: সানিউল হান্নাম	০১৭৭৭-৯২৫৫২	শ্রমিক	সানিউল
9	শ্রী: সানিউল হান্নাম	০১৭৭৭-৯২৫৫২	শ্রমিক	সানিউল
10	শ্রী: সানিউল হান্নাম	০১৭৭৭-৯২৫৫২	শ্রমিক	সানিউল
11	শ্রী: সানিউল হান্নাম	-	শ্রমিক	সানিউল
12	শ্রী: সানিউল হান্নাম	০১৭৭৭-৯২৫৫২	শ্রমিক	সানিউল
13	শ্রী: সানিউল হান্নাম	০১৭৭৭-৯২৫৫২	শ্রমিক	সানিউল
14	শ্রী: সানিউল হান্নাম	০১৭৭৭-৯২৫৫২	শ্রমিক	সানিউল
15	শ্রী: সানিউল হান্নাম	০১৭৭৭-৯২৫৫২	শ্রমিক	সানিউল

Focused Group: 1 Date & Time: 08.12.13 / 10 Am
 Location: Bethuli K. G. School, Delduar, Tangail

Sl No	Name, Address	Telephone No.	Occupation	Signature
16	শ্রী: উল্লাস (স্বামী)	০১৭০১-৯২৫৫২	শ্রমিক	উল্লাস
17	শ্রী: সানিউল হান্নাম	০১৭০১-৯২৫৫২	শ্রমিক	সানিউল
18	শ্রী: সানিউল হান্নাম	০১৭০১-৯২৫৫২	শ্রমিক	সানিউল
19	শ্রী: সানিউল হান্নাম	০১৭০১-৯২৫৫২	শ্রমিক	সানিউল
20	শ্রী: সানিউল হান্নাম	০১৭০১-৯২৫৫২	শ্রমিক	সানিউল
21	শ্রী: সানিউল হান্নাম	০১৭০১-৯২৫৫২	শ্রমিক	সানিউল
22	শ্রী: সানিউল হান্নাম	০১৭০১-৯২৫৫২	শ্রমিক	সানিউল
23	শ্রী: সানিউল হান্নাম	০১৭০১-৯২৫৫২	শ্রমিক	সানিউল
24	শ্রী: সানিউল হান্নাম	০১৭০১-৯২৫৫২	শ্রমিক	সানিউল



Photograph of the Public Consultation

Annex-2: Public Consultation

Public Consultations Findings for Baoikhula Bazar-Nallapara hat via Dubail UP office, Bathulihat, Fultara Hat Road

Site: Gaspara Bazar

Road: Baoikhula Bazar-Nallapara hat via Dubail UP office, Bathulihat, Fultara Hat Road

Date: 08. 12. 2013

Time: 3.00 p.m. to 5.00 p.m.

A public consultation meeting was held during 3.00 p.m. to 5.00 p.m. on 8th December, 2013 at Gosapara Bazar, located in the sub-project area. Around 15 people participated in the meeting, who live nearby the subproject.. . Md. Tofazzel Hossain Khan, a UP Chairman was selected by the participants to chair the meeting Md. Danes mia, a Farmer, Md. Shahidul Islam, a Businessman and Md. Rahat Hossain, a Service holder were nominated by the participants to speak for them.

Md. Abdul Mojid Biswas, Field Engineer and Md. Abu Bakar, Field Supervisor were present as Facilitators.

During the consultation, the participants expressed appreciation for the proposed road subproject, as according to them, it will improve their communication mode and will end the sufferings of the present day difficulties of communication in the area. The improvement of the road will bring various socio-economic development, as they opined.

Various environmental issues , potential during construction of the UNR have also been discussed. They included air/dust pollution, water pollution, noise pollution, improper disposal of waste, deterioration of drainage condition etc.

The participants expressed that all required measures for environmental protection to be carried out during construction, although they thought that noise pollution will not be a big issue. Moreover, spraying of water will reduce dust pollution.

. Various queries of the participants were answered by Md. Abdul Mojid Biswas up to their satisfaction.

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

- Taking all steps required for protection of environmental qualities during the construction of the road.
- Water spraying to be continued properly to minimize dust pollution during construction.
- Noise level to be kept low.

List of Participants-02

Focused Group.....2..... Date & Time.....08-12-13/ 3 pm

Location...ମାଟୁଆଳୀ ଗ୍ରାମ... (ବିନୟାପୁର ବ୍ଲକ୍, ଖୋର୍ଦ୍ଧା)

Sl No	Name, Address	Telephone No.	Occupation	Signature
1	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ	୦୨୧୮-୨୫୫୮୨୦	ପ୍ରବନ୍ଧୀ	ଶ୍ରୀନାଥ ଟଙ୍କ
2	କେ: ଡାକ୍ତର ଗାନ୍ଧୀ ମିଶ୍ର	୦୨୧୦-୫୦୨୦୫	ଡାକ୍ତର	କେ: ଡାକ୍ତର ଗାନ୍ଧୀ ମିଶ୍ର
3	କେ: ଗୋବିନ୍ଦ ମିଶ୍ର	୦୨୨୧-୨୫୫୫୫	ପ୍ରବନ୍ଧୀ	କେ: ଗୋବିନ୍ଦ ମିଶ୍ର
4	କେ: ଅନିଲ ଚାନ୍ଦ	୦୨୨୦-୫୦୨୨୫	ପ୍ରବନ୍ଧୀ	କେ: ଅନିଲ ଚାନ୍ଦ
5	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ	୦୨୨୦-୫୦୨୨୫	ପ୍ରବନ୍ଧୀ	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ
6	କେ: ଡାକ୍ତର ମିଶ୍ର	୦୨୨୦-୫୦୨୨୫	ପ୍ରବନ୍ଧୀ	କେ: ଡାକ୍ତର ମିଶ୍ର
7	କେ: ଶ୍ରୀନାଥ ମିଶ୍ର	—	ପ୍ରବନ୍ଧୀ	କେ: ଶ୍ରୀନାଥ ମିଶ୍ର
8	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ	୦୨୨୦-୫୦୨୨୫	ପ୍ରବନ୍ଧୀ	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ
9	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ	୦୨୨୦-୫୦୨୨୫	ପ୍ରବନ୍ଧୀ	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ
10	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ	୦୨୨୦-୫୦୨୨୫	ପ୍ରବନ୍ଧୀ	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ
11	କେ: ଶ୍ରୀନାଥ ମିଶ୍ର	୦୨୨୦-୫୦୨୨୫	ପ୍ରବନ୍ଧୀ	କେ: ଶ୍ରୀନାଥ ମିଶ୍ର
12	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ	—	ପ୍ରବନ୍ଧୀ	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ
13	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ	୦୨୨୦-୫୦୨୨୫	ପ୍ରବନ୍ଧୀ	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ
14	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ	୦୨୨୦-୫୦୨୨୫	ପ୍ରବନ୍ଧୀ	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ
15	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ	୦୨୨୦-୫୦୨୨୫	ପ୍ରବନ୍ଧୀ	କେ: ଶ୍ରୀନାଥ ଟଙ୍କ



Photograph of the Public Consultation

Annex-3: Public Consultation

Public Consultations Findings for Baoikhula Bazar-Nallapara hat via Dubail UP office, Bathulihat, Fultara Hat Road

Site: Fultara Bazar

Road: Baoikhula Bazar-Nallapara hat via Dubail UP office, Bathulihat, Fultara Hat Road

Date: 08. 12. 2013

Time: 2.00 p.m. to 3.00 p.m.

A public consultation meeting was held during 2.00 p.m. to 3.00 p.m. on 8th December, 2013 at Fultara Bazar located in the sub-project area. Around 17 people participated in the meeting. Md. Haider Bhuiyan, a Farmer, Md. Hanif Bhuiyan, a Businessman and Md. Mosarraf, a UP member were nominated by the participants to speak for them.

Field Engineer Md. Abdul Mojib Biswas and Field Supervisor, Md. Abu Bakar were present as Facilitators

During the consultation, the participants expressed appreciation for the proposed road subproject, as according to them, it will improve their communication mode and will end the sufferings of the present day difficulties of communication in the area. The improvement of the road will bring various socio-economic development, as they opined.

Various environmental issues, potential during construction of the road, have also been discussed. They included air/dust pollution, water pollution, noise pollution, improper disposal of waste, deterioration of drainage condition etc.

The participants expressed that all required measures for environmental protection to be carried out during construction, although they thought that noise pollution will not cause much problem to them. Moreover, spraying of water will reduce dust pollution. They also opined that improvement of drainage to be very important for better communication of local people.

Their queries were answered by Md. Abdul Mojib Biswas up to their satisfaction.

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

- 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.
- Noise pollution to be kept low in order to reduce up to a tolerable limit.

List of Participants-03

Focused Group.....3..... Date & Time.....09-12-13-2 Pm-4:00

Location.....සුභසාගි නගර, (හික්කුම, පැයිරි)

Sl No	Name, Address	Telephone No.	Occupation	Signature
1	M.A. Mohan Sankar	012696133	Chairman	Amir
2	MD. Muneel Khan	0120006038	ආයතන -	Amir
3	මා. මහජන දිසා	01714899316	ආයතන	Amir
4	මා. මහජන දිසා	01724520724	ආයතන	Amir
5	මා. මහජන දිසා	0172696290	ආයතන	Amir
6	මා. මහජන දිසා	01912918824	ආයතන	Amir
7	මා. මහජන දිසා	01734719426	ආයතන	Amir
8	මා. මහජන දිසා	0177548732	ආයතන	Amir
9	මා. මහජන දිසා	01718945753	ආයතන/පාලන	Amir
10	මා. මහජන දිසා	01716980966	ආයතන/පාලන	Amir
11	මා. මහජන දිසා	01781313930	ආයතන	Amir
12	මා. මහජන දිසා	01733882440	ආයතන	Amir
13	මා. මහජන දිසා	06077326795	ආයතන	Amir
14	මා. මහජන දිසා	01739397335	ආයතන	Amir
15	මා. මහජන දිසා	01758821638	ආයතන	Amir

16. මා. මහජන දිසා 01781809210 ආයතන Amir
17. මා. මහජන දිසා ————— ආයතන Amir



Photograph of the Public Consultation