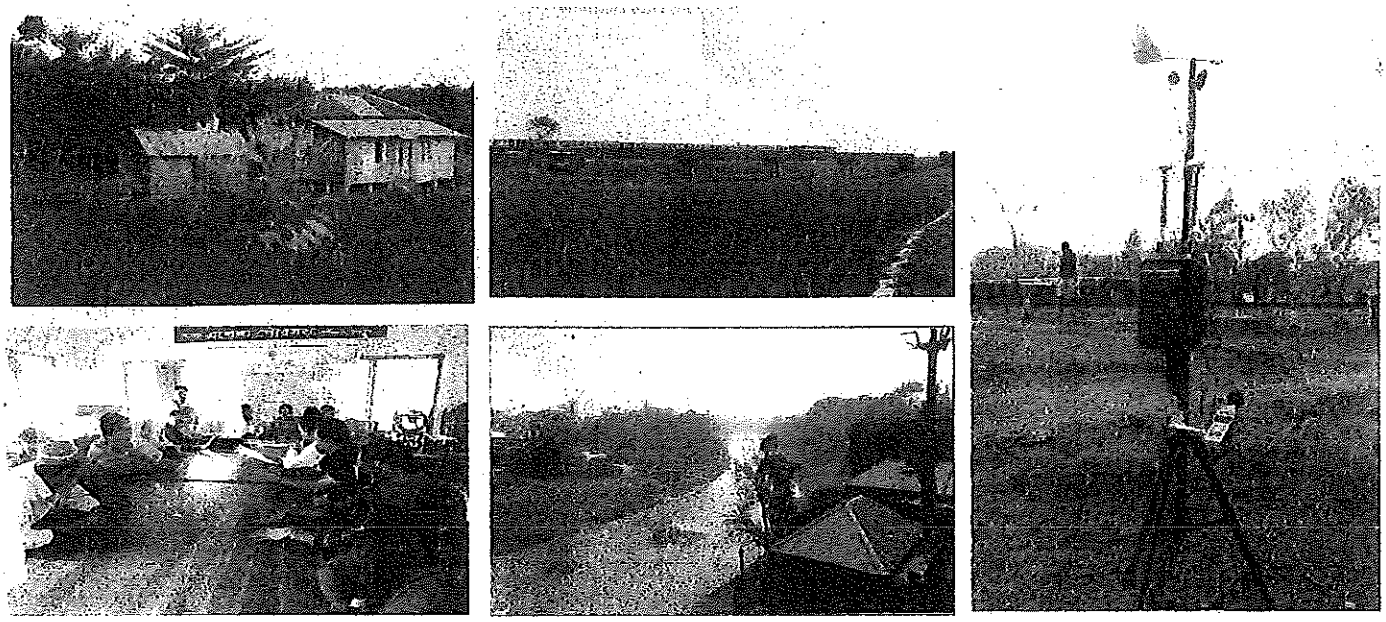
Revised

ENVIRONMENTAL IMPACT ASSESSMENT STUDY OF CONSTRUCTION OF DOUBLE LINE BETWEEN JOYDEBPUR AND ISHURDI SECTION OF BANGLADESH RAILWAY



Bangladesh Railway
Ministry of Railways
Government of the People's Republic of Bangladesh

Prepared by

ENRAC Environment and Resouece Analysis Center Limited (ENRAC)

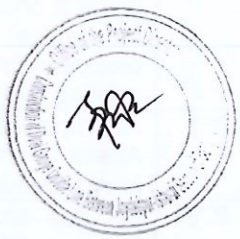
March 2020

DoE Comment Matrix on Joydebpur-Ishurdi Double Line Railway Project

Comment Date: 27 January 2020 and 11 February 2020

#	DOE Comment	Reference	Page	BR Response	Page
1	Provide a At a Glance Table in Project Description chapter	Chapter III		Table 5 has been added in Chapter III	16
2	Specify the total earthwork volume	Chapter III	20	Total earthwork volume is 4 mil m3 that has been added in para 59, Chapter III	21
3	Provide the sources of earthwork materials especially sand and soil	Chapter III	20	The sources of materials are from the construction right of way as well as from authorized sand dealers (para 60)	21
4	Maximum and minimum height of the embankment	Chapter III	19-20	Generally, the maximum and minimum height of the embankment is between 2m and 6m and the average embankment height is 7.6m (para 56, 57)	21
5	Major activities of the project need to be provided in III.B	Chapter III	15	The major activities of the project is shown in Chapter III.B para 48	17
6	Location of construction yards and workers camp	Chapter III		The location of construction yards and worker's camps are not determined yet that will be determined during pre-construction period. However, an environmental management plan for managing the yards and camps has been recommended in Chapter VI.B.8, VI.B.12 and IX (Table 37: 2.4 & 2.5, 2.10 and Table 38: 2.4 & 2.10), which shall be followed during construction period.	74,76, 112, 115, 122, 123
7	Total number of railway stations between Joydebpur and Ishurdi	Chapter III	20	The proposed double line will pass through 23 rail stations; six on the Joydebpur to Bangabandhu Setu East section, and 17 on the Bangabandhu West Setu to Ishurdi section (para 63).	22
8	Location of each large bridge with brief description	Chapter III, IV	35	The list of the large bridge greater than 100m length is provided in Table 11, Chpater III (para 80, page 28) and description of each bridge is provided in para 82 to 93. Location map of each bridge is provided in Figure 15-23.	28- 39
9	Height of the proposed bridges and culverts	Chapter III	23	None of the rivers in this Project corridor are legally designated as navigable waters under BIWTA category. However, local boats are used for crossing the rivers at many locations during floods. The freeboard provided, as shown in Table 9, provides the clearance for such "country boat" navigation under a bridge. Therefore, it is realized that the vertical and horizontal heights of the proposed bridges will not be more than the existing bridges on the same location.	25 (para 73)
10	Include all proposed minor and major bridges list	Annex 13 and 14	268	All proposed minor bridges list is provided in Annex 14 and All proposed major bridges list is provided in Annex 15 13	271-280
11	No Objection Certificate needed from BIWTA for	Annerx 15	278	BR has applied to BIWTA Office on 16 February 2020. The copy of the letters has	281

#	DOE Comment	Reference	Page	BR Response	Page
	bridges clearnce			been attached (Annex 15) that is currently under process.	
12	No Objection Certificate needed from Forest Department for tree cutting	Annerx 16	279	BR has applied to Forest Department on 16 February 2020. The copy of the letters has been attached (Annex 16) that is currently under process.	282
13	Update EIA report if there any change to vertical and horizontal clearance by BIWTA	Chapter III	23	BR apply to BIWTA for horizontal and vertical clearance for all minor bridges (Annex 14) and major bridges (Annex 15). Acccording to BIWTA clearance, if there any change to conceptual design, which will include in the EIA report.	25 (para 73)
14	Tranportation of construction materials	Chapter XI	93	Prior to the start of construction. BR, in consultation with Contractor and local police, will prepare a checklist and guideline for handling of all construction materials and the designation of roads not suited for hauling materials. A dust suppression programme will be used at all times during transportation of construction materials, construction of stations, embankment, and placement of ballast. Dust suppression will include watering on active construction areas, covered the truck with tarpaulin during transportation of construction materials, restricting vehicle speeds to ≤35 km/h., and rapid re-vegetation including grass seeding.	109-110 (table 37, item 1.4 and 2.2)
15	Improve the cover page	Cover page		Modified as suggested during DOE presentation	
16	Submit the final report in color with seal and sign in each page	-	-	Submitted as suggested	-
17	Reorganise thr major bridges in project description and baseline environment	Chapter III, Chapter IV		Reorganized the whole major bridges section in project description and baseline chapter separately under Section Bridges and Culvert in chapter III and section The major bridges under Chapter IV	28-39 and 54-62



EXECUTIVE SUMMARY

Bangladesh Railway signed a Memorandum of Understanding with China Civil Engineering Construction Company (CCECC) for construction of the Double Line Dual Gauge Railway Line between Joydebpur-Ishurdi Section of Bangladesh Railway with the assistance from Government of China through EXIM Bank of China. The CCECC has an intension to commence the construction work in third quarter of 2019 and will complete in four years. Herein this shall be referred to as the Project.

The Project is classified as red category defined in the Environmental Conservation Rules (1997) of the Department of Environment (DoE), Ministry of Environment and Forests, Government of Bangladesh. Therefore, DoE require an Environmental Impact Assessment Study for this Project.

The overall objective of the EIA is to ensure that the Project is built in an environmentally sound and sustainable manner i.e., all negative effects are mitigated and positive impacts are enhanced and that all relevant environmental and social requirements are met.

The proposed approximately 174 km long rail line will pass through five districts, namely Gazipur, Tangail, Sirajganj, Natore and Pabna. It will start from Joydebpur in Gazipur District and end at Ishurdi in Pabna District. It will pass by 23 rail stations as well as four new crossing stations anticipated to be constructed under another Project. The Project will require 204 bridges; each having a total length varying from 1.9 m to 229.45 m. DoE classifies bridges as minor when they are less than 100 m and major when they are equal to or greater than 100 m in length, of which there are 12, seven on the Ishurdi- Bangabandhu Setu West section and five on the Bangabandhu Setu East-Joydebpur section; sections bifurcated by the Bangabandhu Bridge over the Jamuna River.

Potential environmental receptors within the Project area include river crossings, wetland (beel) areas and infrastructure identified within 100 m of either side of the existing rail line. These receptors include those most sensitive to deteriorating environmental parameters: air, soil, water, noise and vulnerable people.

The rail line crosses mostly agricultural land crisscrossed by rivers/canals with loamy soils predominantly on the highlands and clayey soils on lowlands. The majority of the Project's social impact area (a land corridor 100 m of either side of the train tracks extending for 17 km) land use is agriculture (2,614.72 ha), forest (29.26 ha), rail stations (17.14 ha), settlements (653.70 ha) including educational instructions (school and madrasas), places of worship, graveyards, post offices, industries, etc., surface water bodies in streams, ponds, and rivers (162.70 ha) totalling approximately 3,477.52 ha.

The preferred alignment lies on the north side of the existing track, when travelling from Joydebpur to Ishurdi. This selection was selected since locating the proposed alignment on the north side of existing track will result in less land acquisition when compared to the alignment on the south side (most stations are situated in the south side), requiring new land for least 19 stations. Consequently, the quantum of resettlement and associated impacts will be reduced.

The centreline of the new track is proposed at around 7.6 metres from the centreline of the existing track and at around 15 m to 20 m separation distance at the major bridges to facilitate construction of these bridges on the new line without obstructing the existing bridge.

Based on the identified impacts and recommended mitigation measures, an Environmental Management Plan has been prepared. It addresses all impacts and mitigation measures grouped by the project phase in which they are likely to occur. The mitigation measures are considered as successful when the severity of the impacts has either been eliminated or the

residual effect complies with the environmental quality standards, policies, and legal requirements set by DoE. The success is measured via the monitoring programme to be conducted during the Project's construction and operating period.

Though BR will minimise land acquisition, there will be affected people and businesses who will need to be properly compensated. A good number of these shops and businesses are on the north side of the existing BR RoW, where the second track is proposed and which have lease arrangements with BR. There is also some illegal occupancy as detailed in the Resettlement Plan (RP).

An estimated 5,000 to 6,000 people will work on this Project at any one time and most of them will be housed in approximately 30 work camps. The addition of the second track (the Project) will require the placement of approximately 4.0 million cubic metres of sand, earth, brick and ballast, mostly sourced from river dredging and borrow areas arranged by the Contractor.

Air quality samples were taken at six pre-selected sampling stations one at trackside, closest to a settlement area (less than 50 m from the track) and the second at >50 m and ≤100 m distance from the proposed alignment. All parameters were within the acceptable limits specified by DoE (DoE, 1997). Noise readings indicated that when applying the GoB's noise standards for residential areas the noise levels at trackside and at >50m exceeded the standard. However realistically trackside and the 50 m distant lands are not residential and more commonly termed commercial and industrial land use areas. Under this designation noise levels at all locations were within day and night limits.

The surface water quality condition is not potable without treatment; however, it can be used for irrigation in agricultural industry. Ground water of the area is arsenic free but contains iron beyond acceptable limits. Concentration of manganese was higher than DoE standards. Chlorine level was well within DoE safety standards.

The biological characteristics of the aquatic environment indicated the presence of a moderate variety of species and aquatic plants. Blue green algae and planktons were also found in ponds, water bodies and canals. Fish availability was reported in the Project area and fish are cultivated in ponds along the rail corridor. The Project has no notified wildlife habitat or reserve forests within a five kilometre radius of the tracks.

About 335,000 timber, fruit, medicinal plants, aesthetic and flower trees, and banana plants bamboo thickets, each with their own economic, biological, eco-functional and aesthetic significance will need to be cut from the BR RoW. The planting of 1,005,456 trees and plants of different species will not only mitigate the temporary loss due to depletion, but will enhance the rail side environment and enhancement by reducing carbon footprint considerably and bring bringing many indirect benefits to local people.

There will be a loss of agricultural land, structures, dwellings, ecology including wetlands due to the implementation of the Project. Of these features, wetlands are important ecological habitats which will be minimally affected since the existing rail and road embankments have a large number of culverts and bridges already in place. Although the required number of bridges and culverts for the proposed Project has not been finalised, the proposed Project will have adequate balancing culverts. The potential secondary impacts are likely to be trimming of roadside vegetation (live fences). These, however, do not constitute a significant and permanent impact to land use.

There will be 12 major bridges (>100 m span), and these will be constructed parallel to the existing bridges as second bridges. Every effort has been taken to design the crossing alignment such that it minimally impacts people and structures, river flow, and at the same time meets engineering specifications.

All earthworks construction, site clearing, materials stockpiling, station demolition, operation of batch plants, and hauling of materials will generate dust and affect the local air shed. Road dust from the construction of rail line and station access roads is likely to be the most significant direct potential impact on the local community. A dust suppression programme will be implemented and maintained throughout the construction period, including haul road speed limits and maintenance and use of truck canopies.

The visual intrusion of large piles of embankment materials and ballast obstructing views will be considerable but temporary. Given that elevated embankments already exist, these temporary added obstructions do not seem so out of place and material storage areas will be cleared as soon as they are no longer needed. The line of sight will be restored. The key mitigation measure will be restored landscape with planting of trees and understory vegetation, as part of the tree planting programme described in this report.

During construction, noise will be generated mainly from the construction of embankment, pile driving, ballast crushing facilities, station buildings and associated facilities and upgrading existing rail infrastructure, and may affect sensitive residential receivers. Noise generated from the construction machinery, vehicle movements, sounds of construction/demolition of station buildings and associated facilities will have temporary impacts and for a limited period of time in any single location. Excessive noise will be mitigated based on the quarterly construction period noise measurements.

Key potential impacts on flora and fauna will be the clearing of trees and associated understory vegetation, possible dredging activities potentially impacting on aquatic habitats within the rivers, accidental release of wastes or hazardous substances impacting on aquatic and terrestrial habitats or siltation of aquatic or terrestrial habitats due to earthworks or dredging activities. The most effective mitigation measure will be keeping the disturbance to natural vegetation to a minimum, cutting or clearing trees where it must be done and having Contractors work in among the trees, and not clear all trees and then work. This approach will be explained during the mandatory 1-1.5-day contractor safeguards training session.

Environmental sanitation, health issues and disease contamination are common in labour camps. This would stem from poor work camp conditions, inadequate and unsanitary toilet facilities, improper waste disposal, lack of potable water and sanitary washing areas. Standard occupational health and safety mitigation measures, as defined in the EMP will be implemented.

BR will adhere to the key ILO labour codes associated with child labour, forced labour and fair wages for work done, as defined in the EIA and its EMP.

Surface water pollution during the operating period will come primarily from untreated sewage effluent discharged by passing trains, which then washes into local surface waters. BR is investigating means for collecting and treating that sewage. A spill contingency plan and good maintenance of track and rolling stock will help reduce the risk of such accidental spills, and permit rapid action if an accident does occur.

Vibration within 50 m of track side will be an issue, causing windows to rattle and poorly constructed walls to crack when a train passes. Noise and vibration attenuation designs related to sleeper pads, ballast placement and train operating limits will also help to keep noise and vibration as unobtrusive as possible.

Pile driving will also generate vibration and will impact houses up to 1 km away from the work site. Other than limiting work times to daylight hours and addressing complaints quickly, no other effective mitigative measure is available (the Consultant has examined at least six measures, each indicating marginal results at a very high cost).

Operation of at-grade rail crossings often creates serious traffic congestion regardless of location, sometimes blocking traffic even after the train has passed. To mitigate these problems, grade separations will be built at three of the major crossings. Warning signs and gate lights will be installed and warning bells will be operated by approaching trains. Warning signs and disclaimers will be posted in all crossings. Construction of one road over bridges on the Ishurdi to Bangabandhu Bridge and two road bridges on the west end of Bangabandhu Bridge to Joydebpur sections is proposed.

There will be an estimated fuel saving of 16.65 million l/year which translates into a saving of 44,600 tonnes of carbon dioxide (CO_2)/year (using a CO_2-e emission factor of 2.68 kg CO_2-e/l of diesel fuel consumed), and accounting for the fuel used for the additional train trips. By increasing locomotive efficiency or replacing the old locomotives by new ones, these already significant savings would be further increased.

The collected rainwater will be stored in a cistern or tank above the station, and used for all non-potable purposes. This will reduce the need for groundwater extraction and will provide savings on energy used to pump the water. Inadequate provisions of water supply, sewage, sanitation and garbage management at stations may lead to chronic problems. The design must consider estimated passenger throughput at each station and waste facilities to manage all conditions. This has been done, via a separate station design report.

Grievance Redress Committees (GRCs) will be formed in each Upazila Parishad (UZP), the Project passes through to redress the grievances to anyone negatively impacted by the Project and not properly dealt with, ignored or overlooked.

A common impact involves the failure of contractors to properly maintain work camps, allowing sewage to leak, garbage to be left unmanaged, fuel to leak and even bitumen to spill over the ground near the asphalt batch plant, occupational health and safety practices being often ignored, the contractor either not providing adequate safety equipment or not enforcing its use. Contractors will be required to provide hard hats, ear plugs, dust masks and eye protection, and deliver occupational health and safety training sessions, once a year.

The climate risk associated with sea level rise and the need to adjust bridge deck clearances was found to be negligible given the distance of the bridges to a location where sea level rise can be measured.

The establishment of Environmental Unit (EU) in BR is very important and will make the job of implementing environmental and social safeguards much easier and more credible. With this capability, BR can oversee the entire EIA procedure, instead of having it completed by outside consultants.

The potential impacts on the large bridges were examined, focusing on pile driving in water, use of drilling lubricants, work camp operation near the shore and work over a navigation channel. To address these issues a separate EMP, designed to deal with all possible effects that might endanger the river's aquatic environment, was prepared and will be implemented.

No red-flag environmental safeguard issues were identified and all likely impacts can be prevented or mitigated to an acceptable level. BR will fully implement the EIA's Environmental Management Plan and quarterly monitoring will be used to adjust the monitoring programme defined in the EIA. These activities, coupled with the timely reporting will provide the appropriate level of environmental oversight and demonstrate to that the natural environment is being protected while the rail line is built and the system becomes operational and sustainable.

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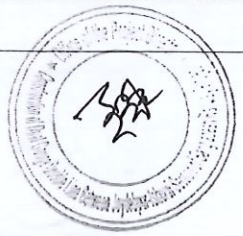

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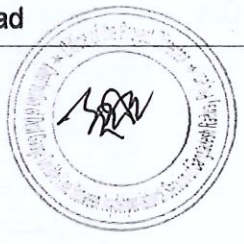
ACRONYMS AND DEFINITIONS

As	=	Arsenic
BADC	=	Bangladesh Agricultural Development Corporation
BCCSAP	=	Bangladesh Climate Change Strategy and Action Plan
BCCTF	=	Bangladesh Climate Change Trust Fund
BCCRF	=	Bangladesh Climate Change Resilience Fund
BD	=	Bangladesh
BIWTA		Bangladesh Inland Water Transport Authority
BoQ	=	Bill of Quantities
BR	=	Bangladesh Railway
BUET	=	Bangladesh University of Engineering and Technology
BWDB	=	Bangladesh Water Development Board
CO	=	Carbon Monoxide
CO2	=	Carbon Dioxide
CPRs	=	Community Property Resources
CRoW	=	Construction Right of Way
The Engineer	=	Construction Supervision Consultant
CWLR	=	Continuous long welded rail track system
dd/mm/yy	=	Date notation to be used
DG	=	Director General
DO		Dissolved Oxygen
DoE	=	Department of Environment
DoF	=	Department of Forest
DPHE	=	Department of Public Health Engineering
ECA	=	Environmental Conservation Act
ECR	=	Environmental Conservation Rules
EIA	=	Environmental Impact Assessment
EMoP	=	Environmental Monitoring Plan
EMP	=	Environmental Management Plan
EMWS	=	Environmental Management Implementation Work Schedule
EPAS	=	Environmental Parameter Air Sampler
EQS	=	Environmental Quality Standards
ESCAP	=	United Nations Economic and Social Commission for Asia and the Pacific
EMiT	=	Environmental Mitigation Table
EMoT	=	Environmental Monitoring Table
EMWS	=	Environmental Management Implementation Work Schedule
EU	=	Environmental Unit
FD	=	Forest Department
Fe	=	Iron
FGD	=	Focus Group Discussion
GHG	=	Greenhouse Gases
GM	=	General Manager
GoB	=	Government of Bangladesh
GPS	=	Global Positioning System
GRC	=	Grievance Redress Committee
GRM	=	Grievance Redress Mechanism
GW	=	Ground Water
ha	=	Hectare
HYV	=	High Yield Variety
IC	=	Inter-City

ICTPs	=	International Conventions, Treaties and Protocols
IEE	=	Initial Environmental Examination
IESR	=	Initial Environmental Scoping Report
ILO	=	International Labour Organisation
IUCN	=	International Union for Conservation and Nature
JICA	=	Japan International Cooperation Agency
Khadi	=	rough textures of the spun cotton
Km	=	Kilometre
km/h	=	Kilometre per Hour
LGED	=	Local Government Engineering Department
LGI	=	Local Government Institute
M	=	Metre
Mn	=	Manganese
MPTS	=	Multipurpose Tree Species
NAPA	=	National Action Plan on Adaptation
NE	=	Northeast
NEMAP	=	National Environmental Management Action Plan
NGO	=	Non-Government Organisation
NM	=	Noise Measurement
NO	=	Nitric oxide
NO2	=	Nitrogen dioxide
O3	=	Ozone
PC	=	Public Consultation
PCRs	=	Physical and Cultural Resources
PM10	=	Particulate Matter less than or equal to 10 microns
PM2.5	=	Particulate Matter less than or equal to 2.5 microns
PAPs	=	Project Affected Persons
PRA	=	Participatory Rural Appraisal
Q/A	=	Questions and Answers
QS	=	Questionnaire Survey
RAP	=	Resettlement Action Plan
RCC	=	Reinforced Cement Concrete
RHD	=	Roads and Highway Department
RoW	=	Right of Way
RLFL	=	Recorded lowest Flood Level
RHFL	=	Recorded Highest Flood Level
RTW	=	River Training Works
S	=	Sulphur
SAARC	=	South Asia Association of Regional Cooperation
SES	=	Socio-Economic Survey
SHWL	=	Standard High Water Level
SO2	=	Sulphur dioxide
SPS	=	Safeguards Policy Statement
SRDI	=	Soil Resource Development Institute
SRMTS	=	SAARC Regional Multimodal Transport Study
SW	=	Surface Water
TDS	=	Total Dissolved Solids
TEU	=	=20 foot equivalent units
TOC	=	Total Organic Carbon
ToR	=	Terms of Reference
TSS =		Total Suspended Solids
UP	=	Union Parishad
UNO	=	Upazila Nirbahi Officer
UZP	=	Upazila Parishad



USEPA	=	US Environmental Protection Agency
VOC	=	Volatile Organic Compound
WQ	=	Water Quality

Currency Equivalents
(As of 18 March 2014)

Currency unit	–	Bangladesh Taka (BDT), American Dollar (USD)
BDT 1.00	=	USD 0.12
USD1.00	=	BDT 77.70

Weights and Measures

1 ha	–	2.47 acre
1 ha	–	10,000 sq.m
1 acre	–	100 decimal

Note

The Construction Supervision Consultant is referred as The Engineer, throughout this report, since this is the terminology used in the construction contract documents.

This Project, is one of seven projects being investigated under the Rail Component. It shall be referred to herein as "the project".

I. INTRODUCTION

A. Background

1. Bangladesh is an important land transport crossroad, linking Nepal, Bhutan, and India (NE part) with SE Asia. Existing connectivity is inadequate and therefore the Government of Bangladesh is undertaking extensive improvements to transport logistics. These improvements should bring significant economic benefits to the countries of the region in general, and to Bangladesh in particular. Priority is being given to the railway sector since it is considered the best land transportation option for the country. It is a better people-moving mode than long distance buses, is more cost effective for transporting bulk freight, and has overall lower adverse environmental impacts than other modes of transport[11].

2. After the 12 January 2010 signing of the Joint Communique between Bangladesh and India, Project for road, rail and waterways transport improvement was approved and seven rail projects were initiated (see **Figure 1**). The 'Construction of Double Line between Joydebpur-Ishurdi Sections' (see **Figure 2**) is one of them. In the remainder of the report, this will be referred to as the Project. Later on in 2015, Bangladesh Railway singed a Memorandum of Understanding with China Civil Engineering Construction Company (CCECC) for construction of the project with the assistance from Government of China through EXIM Bank of China. The CCECC has an intension to commence the construction work in third quarter of 2019 and will complete in four years. Therefore, this Environmental Impact Assessment Report (EIA) intends to cover the environmental issues of the proposed Project and also to secure environmental clearance certificate from the Department of Environment.

3. The objective of this Project is to build a second dual gauge rail line paralleling the existing track between Joydebpur and Ishurdi in the West Zone of Bangladesh Railway. With increasing population and businesses in and around the country, the need for developing a double line railway is crucial for creating employment and business opportunities.

B. Need for the Project

4. The Joydebpur-Ishurdi Double Line Project is an integral component of Bangladesh's regional rail network and will:

- improve the level of service provided by Bangladesh Railway in the northern and southern rail corridor to accommodate increased demands for passenger and freight traffic;
- improve operational efficiency though higher productivity and asset utilisation, mobility and accessibility to the main cities; and provide an economical and safe mode of transport for commodities and goods;
- contribute to improved connectivity for international freight (container) traffic along the Trans-Asian Railway;
- ensure quality of service and reliability for freight and passenger services by eliminating temporary speed restrictions;
- reduce traffic congestion and air pollution through diversion of some road traffic to rail; and
- The construction of this Project will not include the provision of new rolling stock as this will be covered in a separate project. By the construction of double line, the level of

[1] Most major roads in Bangladesh now exceed their design capacity and experience massive and frequent traffic delays, and huge cost to the economy

service provided will improve, leading to increased service for passenger and additional capacity for freight traffic on this link. Additional rolling stock will be procured by Bangladesh Railway under a separate rolling stock procurement Programme.

C. Scope of Environmental Assessment

5. According to Terms of Reference (ToR) submitted to the Department of Environment in the Initial Environmental Scoping Report in October 2013, the following tasks were to be undertaken:

- Conduct field visit, reconnaissance survey and consultation with local stakeholders;
- Collect primary data on water resources, land resources, agriculture, livestock, fisheries, ecosystems and socio-economic conditions through focus group discussions (FGD), rapid rural appraisal (RRA), participatory rural appraisal (PRA), questionnaire survey (QS) and other methods for the establishment of Project baseline conditions;
- Identify important environmental and social components likely to be impacted by the proposed Project;
- Assess environmental and social impacts of the proposed interventions of the double line railway development;
- Conduct comprehensive public consultations; and
- Include in the environmental assessment report an environmental management plan (EMP), which includes a listing of mitigation measures (EMiT) and monitoring tasks (EMoT) as well as timing and responsibility.

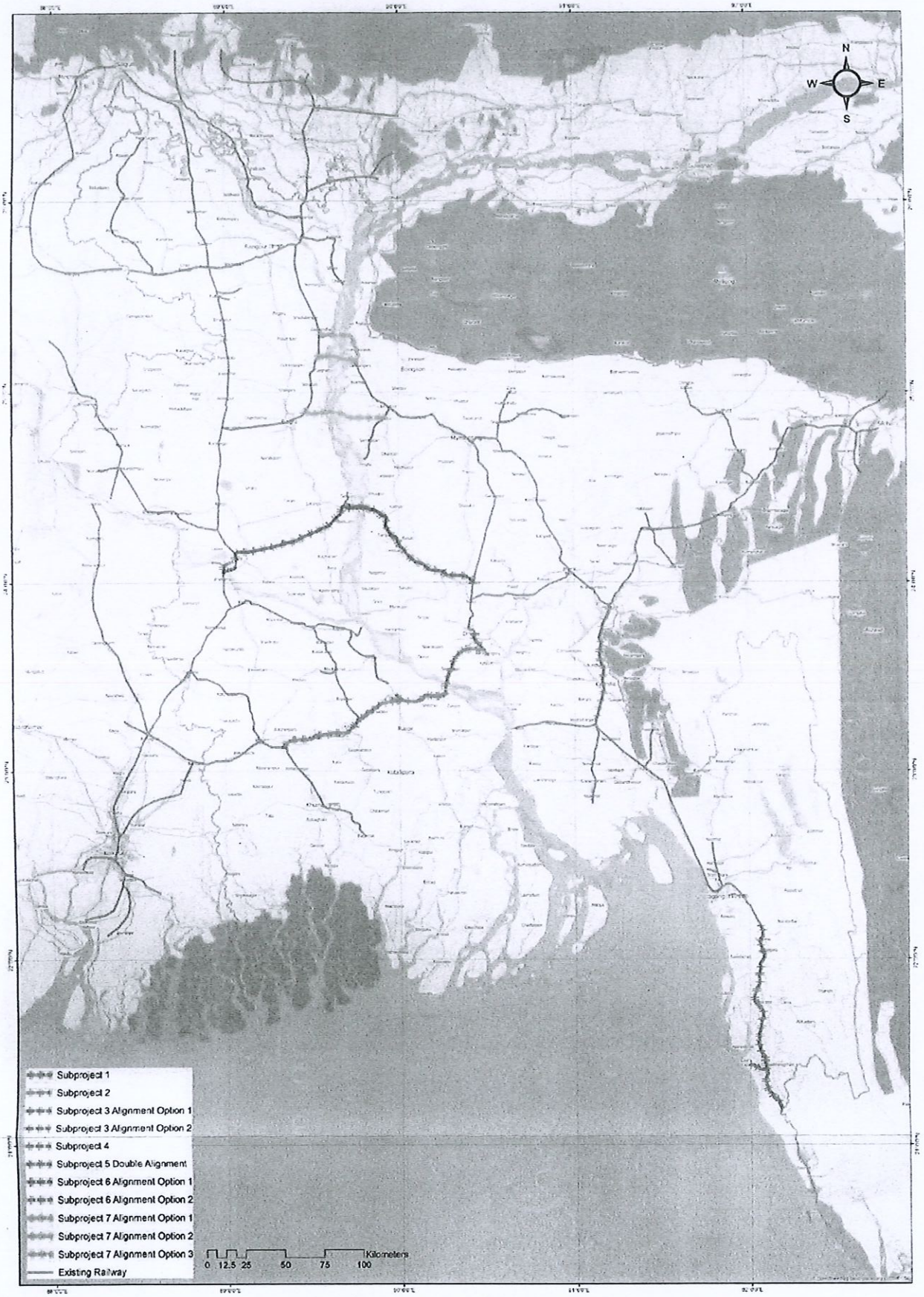


Figure 1: Rail Component: Location of Seven Projects of -Rail Component

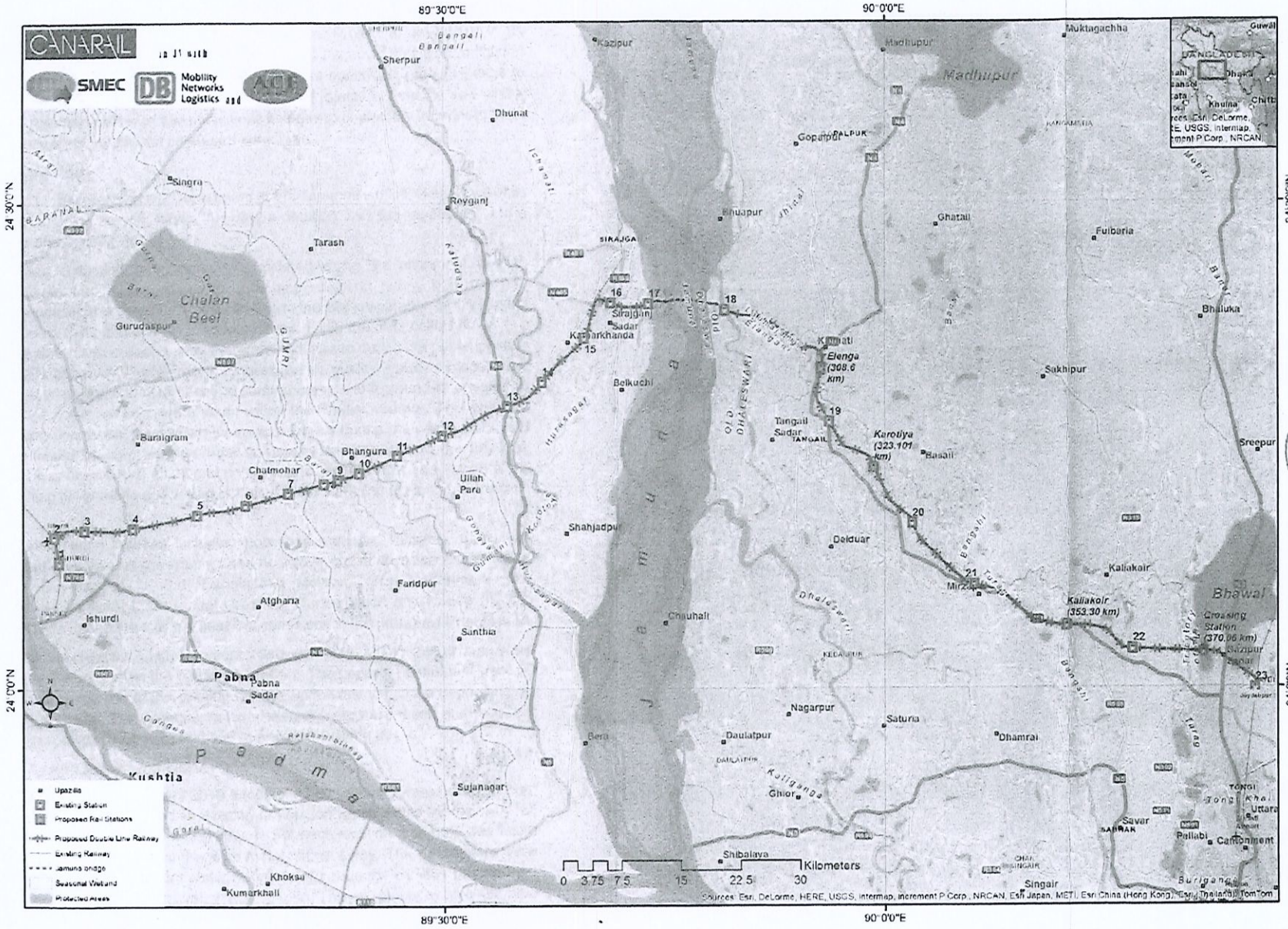


Figure 2: Project – Joydebpur to Ishurdi Double Line (the Project)

D. Objectives of the EIA

6. The overall objective of the EIA is to ensure that the Project is developed in an environmentally sound and sustainable manner insuring that all negative effects are mitigated as best as practical and positive impacts are enhanced. More specifically, the EIA aims to identify the potential impacts likely to be generated by the Project; to quantify and where possible value these, providing BR with a set of actions it needs to implement in order to meet national and international environmental safeguard standards.

E. Methodology

7. In January 2014, BR received the Department of Environment's (DoE's) approval of its Initial Environmental Scoping Report, which included a detailed ToR for the Project and a Table of Contents for the EIA (**Annex 1**).

8. A primary data collection programme was initiated along the alignment in mid-November 2013. Initially the approach was to undertake sampling during both the pre-monsoon and post-monsoon wet seasons. However, due to the late preparation of this Project in May 2013, time constraints and obligation to submit the IESR, the data collection for two seasons was not possible. Data collection was therefore undertaken during the post-monsoon period, but with DoE's approval. The sampling focused on air quality, noise, surface water quality and groundwater quality. A total of 12 air, 16 surface water, and 6 groundwater samples were collected and 24 noise readings were taken within the Project corridor. This provided information on existing conditions, against which measurements during the construction and operational periods would be compared in order to assess any changes to the physical, ecological and socioeconomic environment and define impact significance. The design of the environmental sampling programme and a map showing all the sampling stations are provided in **Annex 2**.

9. Secondary information sources including published material, statistics, maps and reports were collected from various government and non-government organisations such as: Bangladesh Water Development Board, Bangladesh Meteorological Department, Soil Resource Development Institute, International Union for Conservation and Nature (IUCN). These data were used to define the existing baseline conditions in the proposed Project area.

10. The sampling and collection of environmental data was limited to an area on both sides of the existing rail line referred to as the corridor of impact. The general boundaries were 50 m on either side of the centre line of the existing rail line, with a few variations depending on the parameter being sampled. For example, noise measurements were taken at the closest receptor as well as at a distance of 50 m and 100 m from the existing tracks.

1. Air Quality and Noise

11. **Ambient Air Quality** – In January 2019 a total of 12 air samples were collected from six locations in the vicinity of populated or existing rail station areas within the existing rail Right of Way (RoW) between Joydebpur and Ishurdi. For each location a sample was taken near a sensitive receptor and the second approximately 50 m away. The parameters were measured in the field using the Environmental Perimeter Air Sampler (EPAS) (model haz-Scanner) of Environmental Devices Corporation (EDC), USA. The sampler uses an automated air sampling sensor array system and measures seven parameters (CO, NO_2, NO, PM_{10}, $PM_{2.5}$, O_3 and SO_2) as well as air temperature, humidity, wind speed and direction.

12. The instrument was calibrated using standard calibration gases, one for each parameter, certified by USEPA (shipped with the EPAS). A Consultant's environmental specialist travelled to the manufacturer's premises in Canada to receive training and certification in the equipment's operation and calibration. A copy of the EPAS's calibration certificate is provided in **Annex 3**.

Figure 3: Environmental Perimeter Air Sampler

13. Measurements were recorded continuously using a battery-operated Environmental Perimeter Air Sampler (EPAS) (**Photo 1** and **Photo 2**), sampling for one to five minutes repeatedly over a one-hour duration (also selectable on the data logger)[2]. Further, measurements were taken during day and evening periods (see **Annex 4**).

Conversion of Hourly to 24 hour Averages - Agencies, including the GoB's DoE, use the 24-hour collection period as the standard for establishing ambient air quality levels. However, with 12 stations and hundreds of hours of sampling to complete, 24-hour sampling was not technically or financially feasible. Many agencies (e.g., New York State Dept. of Environmental Conservation, California Office of Environmental Health Hazards Assessment, USEPA, Ontario Ministry of Environment) face the same problems and have had to adapt by applying a conversion process using Pasquill's (1961) air mass dispersion tables defining six air mass stability classes (**Table1**) and a set of meteorological conditions (**Table 2**). Using the simple power law principle[3] Schroeder and Jugloff (2012) described the steps for converting one-hour readings to 24-hour values. (J. Schroeder and D. Jugloff, 2012).

14. The stability classes (**Table 1**) are related to average wind speed, daytime solar radiation and night-time cloud cover and a second table (**Table 2**), refining these relationships, was also developed by Pasquill.

[2] Detailed description of this sensor array and the calibration and certification information are provided in Annex 2 of this EIA.
[3] a relationship between two quantities such that one is proportional to a fixed power of the other.

Table 1: Pasquill-Gifford Air Dispersion Stability Classes and Associated Dispersion Exponents

Stability Class	p	Definition
A	0.5	Very unstable
B	0.5	Unstable
C	0.333	Slightly unstable
D	0.2	Neutral
E	0.167	Slightly stable
F	0.167	Stable

Source: Table 1, pg 15, of (J. Schroeder and D. Jugloff, 2012)

Table 2: Meteorological Conditions Used to Define the Stability Classes

Surface wind Speed	Daytime Incoming Solar Radiation			Night Time Cloud Cover	
m/s	Strong	Moderate	Slight	>50%	<50%
< 2	A	A – B	B	E	F
2–3	A–B	B	C	E	F
3–5	B	B–C	C	D	E
5–6	C	C–D	D	D	D
> 6	C	D	D	D	D

Source: Table 2, pg 15, of (J. Schroeder and D. Jugloff, 2012) Note: Grey highlight indicates condition selected for Bangladesh

15. Therefore, taking the simple average of these three values from **Table 1**, the Project stability class was calculated as 0.39 (see below).

$$p = \frac{0.5 + 0.5 + 0.167}{3} = 0.389 \approx 0.39$$

16. This suggests a somewhat unstable air mass, resulting in considerable dilution of a one-hour sample when spread out over a 24-hour period. In order to provide 24- hour averages for the seven parameters the following power-law equation, as defined in Schroeder and Jugloff was applied:

$$C_{24h} = C_{1h}\left(\frac{t_{short}}{t_{long}}\right)^{0.39}$$

17. Where C 1h is the measured 1 hour concentration and C 24h is the estimated average using the exponent 0.39., and "t" is time. Therefore:

$$C_{24h} = C_{1h} \times \left(\frac{1}{24}\right)^{0.39}$$

$$= C_{1h} \times (0.416)^{0.39}$$

$$= C_{1h} \times 0.289$$

18. So for example for the one-hour measurement of PM_{10} of 80.72 µg/m³ the 24- hour average would be:

$$24\ hr\ Avg\ PM_{10} = 80.72 \times 0.289$$
$$= 23.36\ \mu g/\ m^3$$

19. This generalized approach was applied to all data, and the 24-hour averages generated, in order to be able to compare Project results to GoB standards.

20. The Bangladesh University of Engineering and Technology laboratory (BUET) applied the same methodology for some of their data but used 'p' values specific to a given parameter, which ranged between 0.068 for SO_2 to 0.1267 for PM, suggesting extreme dispersion. The USEPA and Government of Ontario, Canada use a 'p' value of 0.29. This Project has adopted a single p-value of 0.39. During construction these data will be field tested by completing a few 24-hour field samples and comparing those averages with the figures generated by the approach defined above.

2. Ambient Noise

21. Ambient noise was measured using a Sper-Scientific Brand TYPE 2 (IEC651 Type 2, ANSI s1.4 Type 2); range 30 – 130 dBA sound recording meter, which was connected to the EPAS sensor array, allowing for simultaneous noise and air quality measurements. Noise levels were measured at six locations along the rail corridor. At each location four measurements were taken, two during the day time (0600-2100), and two during the night time (2100-0600). Measurements were taken at the nearest sensitive receptor or 50 metres from the rail line, and another a further 50 metres distance[4]. For safety reasons night-time measurements were taken only in villages and at road crossing points of the proposed construction area. Measurements were taken using a SPER Scientific Sound metre[5], connected to the EPAS data recorder, thereby permitting locomotive emissions and train noise to be measured together. Noise levels were recorded for one hour periods during the day time and 15 minutes during the night time. Noise measurements were recorded for periods with and without train traffic in order to assemble actual train noise data.

22. Operating period noise levels were predicted using the UK's 1995 Calculating Rail Noise (CRN) parameters, applied in the CadnaA (Computer Aided Noise Abatement) version A4.4 noise modelling software (http://www.datakustik.com/en/products/cadnaa).

3. Surface and Groundwater

23. **Surface water:** A total of 16 surface water samples were collected on 4-8 January 2019. Sample sites were located at river crossings near eight bridges, which are numbered by the Bangladesh Railway as Bridge numbers 23, 24, 27, 35, 14, 42, 75 and 98 on the Joydebpur-Ishurdi section. All samples were collected in plastic sample bottles and analysed within 24 hours of being collected. Samples were stored in ice cooler box and/or fixed as per instructions from the laboratory. The parameters measured were pH, total organic carbon (TOC), total phosphate, total suspended solids (TSS), oil and grease, and dissolved oxygen.

[4] If a night reading exceeded the GOB standard additional readings were taken to identify the dividing line between compliant and non-compliant noise readings

[5] Sper-Scientific Brand, Type 2 (IEC651 Type 2, ANSI s1.4 Type 2); range 30-130 dBA sound recording metre

24. **Groundwater:** A total of six surface water samples were collected on 4-8 February 2019. Samples were taken from six tube well sites selected at homesteads nearest to bridges 14, 75, 98, 35, 27 and 23. All samples were collected in plastic and amber sample bottles, kept in an ice cooler, after necessary stabilisation /fixing, and analysed within 72 hours of collection. The parameters measured were pH, total dissolved solids (TDS), Chloride (Cl), four heavy metals, Arsenic (As), Iron (Fe), Manganese (Mn), and Sulphur (S).

4. Terrestrial and Aquatic Ecological Survey

25. A brief terrestrial and aquatic ecological survey was conducted in the Project corridor to determine habitat characteristics, species composition and distribution, threatened and protected flora and fauna, and important habitat for local migratory species. A tree assessment survey has been conducted by Rail's social assessment group, which will be used for the replacement tree programme.

5. Public Consultations

26. Public consultation sessions were completed at four locations along the corridor at Natun Bazar near Joydebpur Rail Station, Dherua at Mirzapur, RS College at Ullahpara and Boral Bridge site at Ishurdi. One-on-one as well as group discussions were held to record the perception of the proposed work by the local communities and to seek their support, cooperation with suggestions on how to reduce any potential impacts to the community; the local landscape, the agriculture, and the environment (see **Annex 5** for meeting minutes). A detailed land use map was prepared including the locations of environmental sampling, public consultation, and other major features of this Project (see **Annex 2**), and was used during the consultation.

F. Environmental Classification of Project

27. In October 2013, the Department of Environment (DoE), Ministry of Environment and Forests, Government of Bangladesh classified the Project as a Red Category, signifying a full EIA, but agreed that DOE requirements would be adhered to. Therefore, this EIA was prepared according to DOE formatting to meet the requirements of DoE.

II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

A. Bangladesh

28. For the protection, conservation, and management of the biophysical and social environment from damaging development pressures, the Government of Bangladesh has developed a complete legal framework, including laws, regulations, decrees, and standards addressing environmental and social safeguards. These are currently under review and draft materials are being circulated, but cannot be applied until they are promulgated. Of the existing documents, those most relevant to this Project are summarised in this chapter.

1. Environmental Policy, Regulations, and Guidelines of the Government of Bangladesh (GoB)

29. **National Environmental Policy, 1992** - The Bangladesh National Environmental Policy, approved in May 1992, sets out the basic framework for environmental action together with a set of broad sectorial action guidelines. Key elements of the Policy are:

- Maintaining ecological balance and ensuring sustainable development of the country through protection and conservation of the environment;
- Protecting the country from natural disasters;
- Identifying and regulating all activities that pollute and destroy the environment;
- Ensuring environment-friendly development in all sectors;
- Ensuring sustainable and environmentally sound management of the natural resources; and
- Maintaining active association, as far as possible, with all international initiatives related to environment.

30. The Policy seeks to ensure that transport systems, including roads and inland waterways, do not pollute the environment or degrade resources. The Policy states that Environmental Impact Assessments (EIAs) must be conducted before projects are undertaken.

31. **National Environmental Management Action Plan (NEMAP), 1995:** The National Environmental Management Action Plan (NEMAP) is a wide-ranging and multi- faceted plan which builds on and extends the statements set out in the National Environmental Policy. NEMAP was developed to address issues and management requirements during the period 1995 to 2005, and set out of the framework within which the recommendations of the National Environmental Policy were to be implemented. It identified four broad objectives and remains highly relevant today. The four key environmental management directions specified were:

- Identification of key environmental issues affecting Bangladesh;
- Identification of actions necessary to halt or reduce the rate of environmental degradation of the natural environment;
- Sustainable resource use and the conservation of habitats and biodiversity; and
- Improvement of the quality of life of the people.

32. The Environment Conservation Act, 1995 (Amended 2010): The Act is applied by the Department of Environment, (DoE), within the Ministry of Environment and Forest. The Act forms the basis of the country's environmental safeguard system. It authorises the Director General (DG) of DoE to undertake any activity deemed necessary to control, prevent, and

mitigate pollution and to conserve and enhance the quality of environment. It lays out the basic rules on damage to the ecosystem, discharge of wastes, and the agency's power to enter and collect samples as part of any investigation. The Act also defined the powers of DoE to prepare Rules in support of the Act.

33. **Environment Conservation Rules, 1997 (amended 2005):** The Environment Conservation Rules, 1997 are the first set of rules promulgated under the Environment Conservation Act, 1995. These Rules provide for, inter alia, the following:

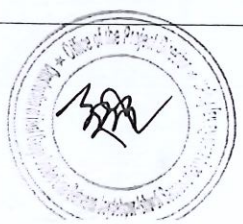
- procedures from planning and completion of EIAs, including the preparation of Environmental Management Plans, document format and content, as well as the and for the provision of environmental clearance;
- national Environmental Quality Standards (EQS) for ambient air, surface water, groundwater, drinking water, industrial effluents, emissions, noise and vehicular exhaust;
- A listing of industries, development projects and other activities. grouped into four environmental assessment categories on the basis of actual (for existing industries/development projects/activities) and anticipated (for proposed industries/development projects/activities) pollutant loading; and
- Procedure for damage-claim by persons affected or likely to be affected due to polluting activities or activities causing hindrance to normal civic life.

34. Depending on the industry, activity, the Project location, type of work, size and severity of pollution loads, DoE classified 186 activities into four environmental assessment categories. These are Green for work that does not require any environmental assessment, Orange that requires Initial Environmental Examination (IEE) and Red, requiring full environmental assessment. Projects 1 through 5 being undertaken as part of the fall under Red Category item 67 of Red Category in Schedule 1 (the listing) of the ECR. Although rail is not specifically mentioned in the Rules, in practice linear transportation development includes railway lines. Red Category Item 68 also applies to most of the Rail and specifies that before construction of bridges with spans ≥100 m, a full EIA must be completed and approved by DoE. This means that any rail line with a bridge having a span of ≥100 m triggers a Red Category or full EIA. This latter requirement is different from the DOE's guidelines which do not categorise on the basis of bridge length, and as such has created conflicts in establishing the type of assessment to be performed. DOE often classifies projects with bridges >100 m long as B requiring IEEs, but Schedule 1 requires a full EIA (Red Category).

35. **The EIA Guidelines for Industry (1997):** The EIA Guidelines is a handbook defining procedures for preparing EIAs and for reviewing them, prepared for the benefit of the development partners, EIA consultants, reviewers, and academicians. The Guidelines provide a step-by-step methodology for the completion of EIAs, following slightly more general ECR 1997 and its subsequent amendments 2002, 2003, and 2010).

2. Secondary Relevant National Legislation

36. **Annex 6** presents an annotated list of the other national legal instruments that have relevance to the proposed Project, addressing both social and environmental project planning and EIA preparation considerations.



B. Relevant International Conventions, Treaties and Protocols (ICTPs)

37. Bangladesh is a party to a large number of international conventions; treaties and protocols (ICTPs) related to the Project and is committed to insuring that these protocols are complied with during all development work. The five applicable ICTPs (**Table 3**) which the BR is also aware of and is complying with are:

Table 3: International Conventions, Treaties and Protocols Signed by Bangladesh

Conventions	Signed	Ratified/Accessed (AC)/Accepted(AT)	Relevance
International Plant Protection Convention (Rome, 1951) and Plant Protection Agreement for SE Asia and Pacific (1999 Revision)		01.09.1978 04.12.'74 (AC)	Ensuring that The Project work or construction materials, do not introduce plant pests
Convention on Wetlands of International Importance ("Ramsar Convention":1971		20.04.1992 (ratified)	Protection of significant wetland and prevention of draining or filling during construction
Convention Concerning the Protection of the World Cultural and natural Heritage (Paris, 1972)		03.08.1983 (AT) 03.11.83 (ratified)	Prevention of damage or destruction of culturally and/or historically significant sites, monuments, etc.
Convention on Biological Diversity, (Rio de Janeiro, 1992.)	05.06.1992	03.05.1994	Protection of biodiversity during construction and op.
Convention on Persistent Organic Pollutants, Stockholm.	23.05.2001	In process	Restrict use of pesticides and herbicides along rail lines

Source: (MoEF, 2013)

C. GoB Environmental Clearance and Public Consultation Procedure

38. Steps to be followed for obtaining the Environmental Clearance Certificate for this rail link are shown in **Figure 4**. For any Orange B or Red category the Project an IEE[6] must be submitted to DoE in order to obtain clearance to proceed to construction or to undertake the full EIA if Orange B is upgraded to Red by DoE. Once the Orange B IEE is approved by DoE, the environmental requirements have been met. All Red Category projects require a DoE approved IEE before proceeding to EIA preparation. For the case of all proposed projects under RAIL, including the current Project, DoE agreed to replace the IEE with the IESR to speed up the document preparation process for RAIL, given that DoE and DOE would be overseeing these submissions jointly. Once the EIA has been approved, the clearance certificate is issued.

[6] The GoB IEE is significantly different from the DOE's IEE; essentially presenting the EIA's ToR and ToC.

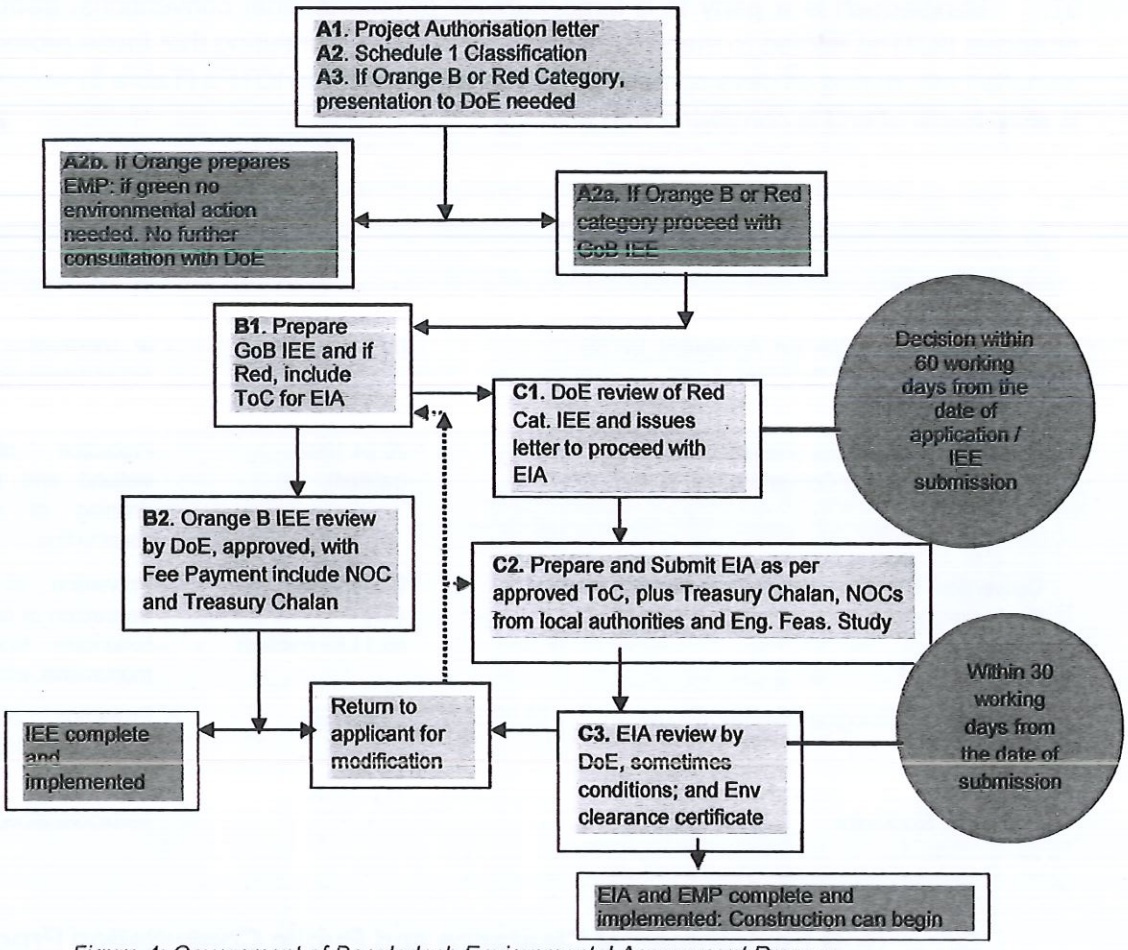


Figure 4: Government of Bangladesh Environmental Assessment Process

39. The Project is a Red Category project and as such has a fully compliant IESR. With this EIA, the Project will have met all GoB environmental safeguard requirements.

40. Public participation/consultation during the EIA process is not a condition in the Act, the ECR 1997, or EIA Guidelines; however is a mandatory requirement of the DOE. The Consultant and DoE agreed that all DOE requirements would be met and, as such, a full public consultation programme is included in the environmental assessment process.

41. DOE's safeguard policies have provisions for compliance monitoring throughout the Project cycle and an accountability mechanism whereby people adversely affected by DOE-financed projects can express their grievances and seek solutions. The procedure referred to as the grievance-mechanism must be defined in every IEE and EIA. It is presented in **Chapter VII** of this EIA.

III. DESCRIPTION OF THE PROJECT

A. General

42. The Rail Component (RAIL – Rail Component), is being implemented by Bangladesh Railway (BR). Its objectives are to improve the integration of BR with other railways in the region and to enhance the effectiveness and efficiency of the country's transport.

43. The Rail Component consists of seven projrcts (Table 4) which in total account for approximately 590 km, or 21% of the existing BR network, but will likely attract up to 80% of the traffic.

Table 4: Projects of Rail Component

Project	Project Description
1	Feasibility Study for Construction of Railway Link from Dhaka-Bhanga-Jessore through Padma Bridge (Phase I and Phase II) and Detailed Design for Phase I (Dhaka-Bhanga Line)
2	Feasibility Study, Detailed Design and Tendering services for Construction of Dual Gauge Double Rail Line and Conversion of Existing Rail Line into Dual Gauge between Akhaura and Laksam
3	Feasibility Study for Construction of Railway Bridge Parallel to the Existing Bangabandhu Bridge with Provision of Dual Gauge Double Track Over the River Jamuna
4	Update previous Feasibility Study and Detailed Design for Construction of Single Line Dual Gauge Railway Track from Dohazari to Cox's Bazar via Ramu and Ramu to Gundum near Myanmar Border
5	Feasibility Study for Construction of Double Line between Joydebpur and Ishurdi Sections
6	Feasibility Study for Strengthening/Re-Construction of Hardinge Bridge to allow Trans-Asian Traffic
7	Feasibility Study for Construction of Railway Bridge Over the Jamuna River near Phulchari-Bahadurabad Ghat including Approach Rail Links

Source: ToR, RAIL-Rail

44. The Bangabandhu Bridge (BBB) across the Jamuna River was opened in 1998 as the only land transport link between east and west Bangladesh. The bridge has a dual gauge (DG) rail track along its northern side. Axle loading on the bridge is restricted to around 16 tonnes and speed is restricted to 20 km/h. This speed limit has been in place since the inception of the bridge. Rail traffic across the Jamuna River is growing and additional rail capacity will be required to meet future population and commerce demands.

45. A dedicated rail bridge over the Jamuna River (SP3) has been proposed, including the relocation of the existing rail track from Bangabandhu Bridge onto a new dedicated double-track DG rail bridge (SP3), approximately 300 m upstream of the existing Bridge. In the early 2030s, it is expected that rail traffic on this route would be restricted by capacity limitation and the Project will relieve this bottleneck by increasing the capacity of the rail lines feeding the new rail bridge (SP3). The Project will be constructed after the SP3 Bridge across the Jamuna River is commissioned.

46. Currently, this is approximately 174 km long single-track line between Joydebpur and Ishurdi, on the route to North Bengal and is also the connection to India via Darsana, with a further connection to India at Jessore (see **Figure 2**). In addition, Ishurdi is an important junction as it not only provides access to connections to India at Darsana and Jessore, but is also the interchange for passenger traffic to Khulna (the third largest city in Bangladesh) and

Rajshahi, with a future connection through Rohanpur to India. The line running north from Ishurdi also provides a connection to Nepal via India. The Project, when implemented after SP3, would increase the current daily capacity of 38 train slots to 88 train slots (where one slot is track path), with the proposed new track located to the right (north) of the existing track while travelling from Joydebpur to Ishurdi. The Project would be classified as a Level of Service Class 'B', with a maximum design speed of 120 km/h[7].

Table 5: Basic Information of the Proposed Railway Project

Items	Descriptions
Proponent	Bangladesh Railway Ministry of Railways Government of the People's Republic of Bangladesh
Project Construction Period	Four years
Approximate Project Cost (in crore Taka)	14,000
Location of the Proposed Track	North side of the existing track, when travelling from Joydebpur to Ishurdi
No. of District Crosses	Crosses five districts: Gazipur, Tangail, Sirajganj, Pabna, and Natore
Length	174 Km
Line Type	Double Line Dual Gauge
Track Gauge	Dual Gauge (DG) consisting of Broad Gauge (BG) with standard track gauge of 1676 mm and Metre Gauge (MG) with standard track gauge of 1,000 mm; 3-rail configuration with one rail as common rail for BG and MG.
Track Spacing	Between main lines: 7 m (minimum 5.3 m), with extra clearances on curves. 12 m at major bridges Between main line and loop lines and between loop lines: 5.3 m generally and not less 4.28 m at locations with space constraints.
Length of Loop Lines	Minimum of 780 m (CSL of 750 m).
Rails	UIC 60 kg/m new rails for the proposed new double track and new loops. BS 90A new/ released reusable rails for the works on existing track.
Sleepers	PSC (Mono block pre-stressed pre-tensioned concrete) sleepers for the entire track.
Ballast	Crushed stone ballast cushion of 300 mm thickness under sleeper at rail seat for main line tracks and 250 mm for tracks on other lines. Note: Final decision on ballast cushion and sub ballast blanket thickness will be based on inputs on fill material from geotechnical investigations.
Points and Crossings	On Concrete Sleepers
Track Gauge	Dual Gauge (DG) consisting of Broad Gauge (BG) with standard track gauge of 1676 mm and Metre Gauge (MG) with standard track gauge of 1,000 mm; 3-rail

[7] The maximum permissible speed is 90 km/h for intercity passenger trains, 80 km/h for Express Mail and 60 km/h for freight trains, and 80 km/h for container trains.

Items	Descriptions
	configuration with one rail as common rail for BG and MG.
Length of loop lines	Minimum of 780 m (CSL of 750 m).
No. of Railway Station	23
Authorised Level Crossings	145
Construction of New Station Buildings	Elenga
Foot Over Bridge	23
Bridges and Culverts	204
Major Bridges (length more than 100 m.)	12
Minor Bridges and Culverts	192
Length of Bridges and Culverts	total length varying from 1.9m to 229.45m
Embankment Height (m)	Generally in an average it is between 7.6m and 8.6m
Total Earthwork Volume	4.0 million cubic metres
Source of Earthwork Materials	Authorized sand dealers and from the Construction Right of Way
Estimated Workers	6,000
Work Camps	30
Land Acquisition	26.973 hectares (ha)
Maximum Operating Speed	Design Speed: 120 km/h Speed: - Maximum Speed for BG: 100 km/h - Maximum Speed for MG: 80 km/h - Maximum Speed for Freight (BG): 100 km/h
Number of Affected Households	4,799

B. Project Boundaries

47. The Project passes through five districts: Gazipur, Tangail, Sirajganj, Natore and Pabna. As shown on **Figure 2**, the alignment extends from Joydebpur (Km 378.12), which is located approximately 36 km north of Dhaka city, and continues north-west to the Brahmaputra-Jamuna River and then south-west to Ishurdi (Km 204.80). The proposed double line will pass by 23 rail stations; six on the Joydebpur to Bangabandhu Setu East section, and 17 on the Bangabandhu Setu West to Ishurdi section. New construction will include construction of two new station buildings like Elenga Station at Kalihati Upozila, Tangail district and 23 foot overbridges.

48. The major activities of the Project as as follows

- construction of railway embankments,
- track and alignment works,
- station buildings including access raods
- main line track and loop/siding developments,
- hydrology and river training works at bridges,
- bridges and culverts,
- installation of signalling and interlocking systems,
- platforms,
- footbridges at stations,
- platform sheds and other associated works.

49. The rail alignment will require bridges over numerous waterways, i.e., 204 bridges and culverts with lengths varying from 1.9 m to 229.50 m. There are 12 major bridges having lengths of more than 100 m.

50. An estimated 6,000 people will work on the Project and most of them will be housed in 30 work camps, with locations to be identified and approved by relevant local authorities before construction mobilisation.

51. The impact assessment will be in general confined to BR's legal right of way which is between 50 m and 100 m centred over the existing track and station sections respectively (**Table 6**). However, in some areas distances were adjusted to incorporate sensitive receptors where excessive noise was predicted, and at river crossings and wetland areas. For these areas the boundary was widened to include an examination of possible effects outside the 100 m boundary.

Table 6: Boundaries Used for Assessing Environmental Impact

Boundary Name	Definition	Value
General Right of Way	Legal RoW of the BR rail line (centred over track) Non station sections:	50 m
	Legal RoW of the BR rail line (centred over track) station sections:	100 m
	Legal RoW of the BR rail line (centred over track) large bridges:	100 m
Air Quality	Along line other than stations (centred over track)	50 m
	Along line passing through stations (centred over track)	100 m
Noise: Since noise is relevant as it impacts a sensitive receptor and there are track sections and	a) the nearest sensitive receptor (record distance);	Distance to be measured from source to receptor, and noise measurement taken
track with station sections as defined	b) + 25 m	Distance to be recorded and noise readings taken
	c) + 50 m	50 m from source
	Stations and station sites	10 m, 25 and 50 m from station footprint.
Surface Water Quality	Upstream at river crossing and at least 5 m from shore	25 m U/S of crossing centreline and at 1 m below surface
	Downstream at river crossing and at least 5 m from shore	25 m D/S of crossing centreline and at 1 m below surface
Groundwater	Tube wells within General RoW of 100 m	Identify tube well and measure distance from work area
Terrestrial Ecosystem	Can be exceptions if conditions warrant	50 m on either side of alignment/tracks
Aquatic Ecosystem	Can be exceptions if conditions warrant	50 m on either side of alignment/tracks
Sensitive protected Environmental components	Wetlands, special habitat, large river crossings.	1 km on either side of alignment/track

C. Project Design

1. Track and Alignment

52. Ishurdi station is at Km 204.80 (with Km 0.00 at Khulna), and surrounding land use is relatively built up with settlements and commercial developments. The track is initially aligned north west to about Km 208, before sweeping to the north east and extending to the Bangabandhu Bridge across the Jamuna River at about Km 287. This section of track is characterised by small urban areas, rural villages and agricultural areas, with a number of water crossings and some ponds. It also crosses Chalan Beel, between Km 245 and Km 258.

53. From the eastern approach of the Bangabandhu Bridge the track is aligned south east to Joydebpur at Km 378.12. This section of track has similar surrounding land uses as well as some forest areas between Km 356 and Km 363. More densely built-up areas are found just west of Joydebpur at about Km 369. Track alignment and land use characteristics are shown in Figure 5. Land use maps are provided in **Annex 2**.

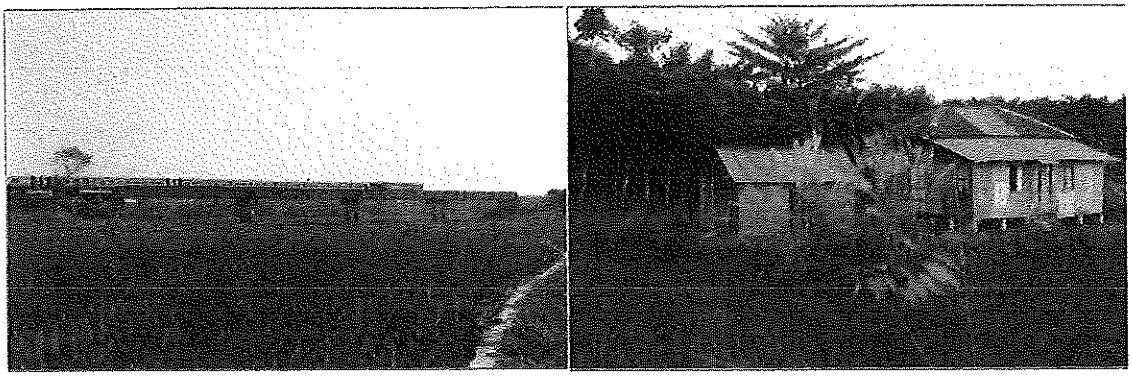


Figure 5: Typical agricultural and village area

54. Key features of the proposed alignment are:

- The proposed new track will be located on the north side of the existing track (i.e., to the right of the existing track while travelling from Joydebpur to Ishurdi), and is within the existing BR RoW. Most of the RoW has as an easement width of 30 m, however this reduces to 11 m between Jamtoil and Joydebpur, and some land acquisition will be required.
- Land acquisition is estimated to be around 26.973 hectares (ha). A total of 13.69 ha of the affected area is homestead land, followed by agricultural land (9.76 ha) and fruit gardens (1.70 ha). In addition, the Project may also result in indirect impacts such as loss of access to land by tenants and informal occupants, and loss of employment and workdays. Resettlement and compensation have been comprehensively addressed in a Resettlement Plan (RP) which has been completed.
- The proposed centre line of the new track will be 7 m from the centre line of the existing track, increased to12 m at major bridges.
- Length of block sections between Bangabandhu Bridge East and Joydebpur are constraints to increasing traffic and four new crossing stations (rail loops) are proposed to reduce the block section lengths. This will be funded under a separate Project.
- The width of the existing embankment top between Ishurdi and Jamtoil is about 5.45 m, and between Jamtoil and Joydebpur about 6.1 m and with double tracking will be increased to 13.53 m on straight track and up to 13.98 m on curved track.

- The alignment is designed to accommodate dual gauge rolling stock with a speed potential of 120 km/h.
- There are 145 authorised level crossings between Joydebpur and Ishurdi. It is proposed that 19 level crossings will be upgraded to accommodate increased traffic volumes.
- Road overbridges are proposed at three locations.

55. The proposed double line (new line) between Ishurdi and Joydebpur is designated as the 'Up Line' and the existing line is designated as the 'Down Line'. Design criteria for alignment, profile and track structure are shown in **Table 7**.

Table 7: Design Parameters for Proposed New Track: Alignment and Profile

Sl. No.	Parameter	Design Criteria and Track Structure
1	Track Gauge	Dual Gauge (DG) consisting of Broad Gauge (BG) with standard track gauge of 1676 mm and Metre Gauge (MG) with standard track gauge of 1,000 mm; 3-rail configuration with one rail as common rail for BG and MG.
2	Track spacing	Between main lines: 7 m (minimum 5.3 m), with extra clearances on curves. (7 m track spacing to facilitate construction of minor bridges on the proposed new track with least disruption to operations on the existing track.) 12 m at major bridges to facilitate construction of bridges on the proposed new track without affecting operations on the existing track. Between main line and loop lines and between loop lines: 5.3 m generally and not less 4.28 m at locations with space constraints.
3	Length of loop lines	Minimum of 780 m (CSL of 750 m).
4	Fixed Structure Clearances	Fixed Structure Clearances will be same as those adopted in Laksam-Chinki Astana double tracking.
5	Rails	UIC 60 kg/m new rails for the proposed new double track and new loops. BS 90A new/ released reusable rails for the works on existing track.
6	Sleepers	PSC (Monoblock prestressed pretensioned concrete) sleepers for the entire track.
7	Ballast	Crushed stone ballast cushion of 300 mm thickness under sleeper at rail seat for main line tracks and 250 mm for tracks on other lines. ***Note**: Final decision on ballast cushion and sub ballast blanket thickness will be based on inputs on fill material from geotechnical investigations.*
8	Points and Crossings	On wooden sleepers 1 in 12 for turnouts taking off Main Line 1 in 8.5 for turnouts taking off loop lines and sidings
9	Dimensions	Railway Schedule of Standard Dimensions (MG and BG). Vertical clearance shall also be according to Bangladesh Railway Schedule of Standard Dimensions (MG and BG).
10	Design Loading	Embankment and the bridges designed for 25 t loading -2008 of Indian Railways Bridge Rules (i.e., 25 tonne axle loads).

Sl. No.	Parameter	Design Criteria and Track Structure
11	Maximum Operating Speed	Design Speed: 120 km/h **Speed:** - Maximum Speed for BG: 100 km/h - Maximum Speed for MG: 80 km/h - Maximum Speed for Freight (BG): 100 km/h

2. Earthworks and Embankments

56. The current embankments are between two metres and six metres high with high embankments of over four metres in some places (**Photo 3, Photo 4, Photo 5,** and **Photo 6**), such as near bridges on deep foundations.

57. Double tracking will require widening of the railway embankment north of the existing track (right hand side from Joydebpur to Ishurdi). Embankments will generally be between two metres and six metres high, side slopes of two horizontal to one vertical (2:1) and a top width of 6.85 m. In some places, such as near bridge approaches, embankments will be up to eight metres. Generally, the average height of the embankment will be 7.6m. Embankments will be constructed from earth fill, overlain with prepared subgrade and ballast. Final embankment design will be based on the geotechnical properties of embankment fill material.

58. The proposed formation level of the new line will generally be kept one metre above the high flood level (HFL) of the area. Formation levels have been fixed, keeping in view the major canals and important rivers and road crossings. The High Flood Level of the new railway line will be determined as observed from the hydrological investigations and analysis.

59. Suitable construction materials for embankments as well as for stations and station-yards, loop lines and platforms will be sourced from outside the proposed RoW. Approximately 4.0 million cubic metres of sand, earth, brick and ballast material will be required. Approximately 40% of these materials will be transported to the Project by truck while the rest will be dredged from rivers and conveyed to the alignment directly. The materials transported by truck will require around 160,000 truck-trips using the RoW or, where necessary, the existing road network. It is not anticipated that any additional borrow pits would be required outside of the BR RoW. Grass planting is proposed on side slopes to minimise the potential for erosion. Stone, concrete block or brick retaining works will be used for embankment slopes where the height is more than six metres and in sections of water logged alignment.

60. Earthworks required at stations and station-yards, for loop lines and platforms will be provided as per design requirements and sand will be sourced mostly from river dredging through third party. Soil will be excavated from the CROW (Construction Right of Way) and will store for later use as cladding materials.

61. Slope Protection Work is required where embankments are subjected to dynamic action of waves from wind or vessels. Where necessary, slope protective works will comprise of hard material with an underlying layer of filter materials. The proposed rail alignment is very close to the existing one and earthworks will be a northern extension of the existing embankment. Slope protection works will also be required along the section of embankment that traverses the southern part of Chalan Beel in Pabna and Sirajganj Districts, a distance of approximately 13 km.

62. Appropriate foundation treatment will be proposed for soft soil locations and according to soil conditions. Where there are constraints in providing full embankment sections due to the need to avoid relocation of significant structures or developments, retaining walls will generally be used.

3. Rail Stations and Buildings

63. The proposed double line will pass through 23 rail stations; six on the Joydebpur to Bangabandhu Setu East section, and 17 on the Bangabandhu West Setu to Ishurdi section. Important stations are:

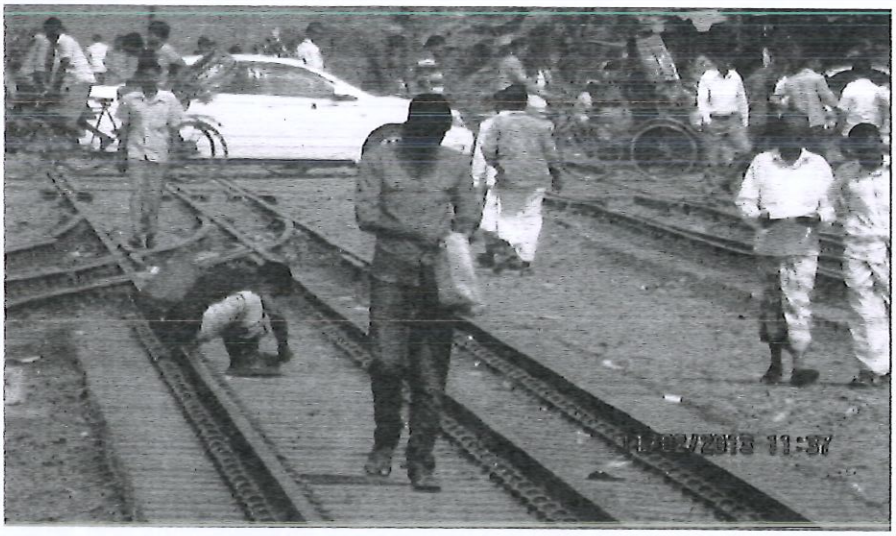


Figure 6: Take Off Point at North End of Joydebpur Station

Figure 7: Fertiliser Godown and Boundary Wall

64. **Ishurdi Junction Station (Km 204.80)** - Ishurdi is the most important junction station of the West Zone of Bangladesh Railway. It is within the administrative district of Pabna. Ishurdi is at Latitude 2407'49.35" N and at Longitude 8903'46.45" E. The station, mainly handles passenger and freight trains from Khulna, Darsana (Indian trains), Parbatipur, Rajshahi, Dhaka etc. There are more than 17 lines in the station yard. All the tracks are of Broad Gauge. Line 6 of the station yard is Ishurdi–Parbatipur Up Main Line and Line 7 is Ishurdi–Parbatipur Down Main Line. Line 8 is the Ishurdi- Sirajganj/Joydebpur/ Dhaka line. The Take-off Point () North of the station yard, space is available at Km 206.525 for accommodating the proposed takeoff point of the Up Main Line to Joydebpur. Accordingly, the

proposed line takes off at Km 206.525 from Line 6 (Up Main Line) and crosses the Down Main line (Line 7) at design Km 206.649. It is to be noted that no other modification to the existing Ishurdi Station Yard has been proposed;

65. **Ullapara Station (Km 262.08)** - This station is a major centre accommodating freight trains to and from India. A fertilizer *godown* (warehouse) belonging to the Bangladesh Agricultural Development Corporation (BADC) is located on the north-east side of the station yard **(Figure 7)**; and

66. **Joydebpur station (Km 378.12)** - This important junction station is on the Dhaka to Mymensingh line and is 34.20 km from Dhaka. The existing Joydebpur to Ishurdi DG line takes off from the north end of Joydebpur station yard. The proposed double line towards Ishurdi will also take off from the north end of the station.

67. There are 23 existing stations, four of which (Saratnagar, Dilpashar, Boral Bridge and Majhgram) will have to be shifted to the north and reconstructed. The stations are classified as 'B'[8] and 'D'[8] Class. In addition, foot overbridges will be constructed at all stations, to allow passengers to traverse safely between the station and the second track. All existing stations will be refurbished and, where feasible, upgraded to include disabled assess, solar power and rainwater tanks. Station information is provided in **Table 8.**

Table 8: Classification and Location of Stations between Ishurdi and Joydebpur

Sl. No.	Name of Stations	Kilometre (Km)	Existing Class of Station	Location
1	Ishurdi Junction	204.80	'B' Class	Station is at middle of the station yard
2	Ishurdi Bypass	208.58	'B' Class	
2	Majhgram	210.98	'D' Class	New Station on north side (T-2)
4	Mooladuli	216.63	'B' Class	Remain on south side
5	Gofurabad	224.27	'D' Class	Station is on south side
6	Chatmohar	229.98	'B' Class	Station is on south side
7	Guakhara	235.12	'D' Class	Station is on south side
8	Bhangura	239.42	'B' Class	Station is on south side
9	Boral Bridge	241.13	'D' Class	New Station on north side (T1)
10	Saratnagar	243.64	'B' Class	
11	Dilpashar	248.41	'D' Class	New Station on north side (T1)
12	Lahirimohanpur	254.13	'B' Class	Remain on south side
13	Ullapara	262.15	'B' Class	Remain on south side
14	Salop	267.45	'D' Class	Remain on south side
15	Jamtoil	274.46	'B' Class	Remain on south side
16	Shahid M. Mansur Ali	280.76	'D' Class	Remain on south side
17	Bangabandhu Setu West	285.28	'B' Class	Remain on south side
18	Bangabandhu Setu East	294.56	'B' Class	Remain on south side
19	Tangail	315.46	'B' Class	Remain on south side
20	Mohera	331.19	'B' Class	Remain on south side
21	Elenga	301.11	'B' Class	New Station on north side (T1)
22	Mirzapur	341.34	'B' Class	Remain on south side
23	Mouchak	362.11	'B' Class	Remain on south side

[8] simply know to stop the train there, or it may be flagged down on demand, etc. Such station is also known as anon-block station or flag station

24	Joydebpur	378.12	'B' Class	Remain on east side
	Proposed new station			

Note:
T1 = TYPE 1 station building has expected passenger throughput of greater than 300 per day
T2 = TYPE 2 station building has expected passenger throughput of 300 or fewer per day

68. In the implementation phase, detailed designs of new stations will be carried out in accordance with BR's codes and standards. Design includes two distinct zones: one incorporating office areas required for operations and the other accommodating spaces for passenger amenities. The two areas are connected by the main concourse. Utility shops (e.g., ATM, fast food) will complement the passenger waiting areas. Rentable spaces (offices, restaurants etc.). The master layout includes demarcated routes for passenger access, ramps for passengers with disabilities, modern information systems, restrooms and fire protection systems. Stations will also incorporate sustainability elements such as solar power and water tanks. Bus bays and parking areas for different modes of motorised and non-motorised vehicles will be provided, which will create efficiency in transport movements in and around the stations.

4. Rail and Loop/Siding Development

69. Four crossing rail stations (rail loops) have been proposed for implementation as soon as the proposed rail bridge parallel to the Bangabandhu Bridge is completed, which are not passenger stations, but rather loops for the purpose of passing of trains. Rail loops are mainly used for wagon parking, loading/unloading and locomotive sidings, which connect back to the main line and crossing arrangement. To determine the optimum location, each loop/siding was evaluated based on location, types of rolling stock, earthworks, and drainage requirements. Proposed locations are:

- Between Bangabandhu Setu East and Tangail at Km 302.02 (Elenga station);
- Between Tangail and Mohera at Km 323.100 (Karotia station);
- Between Mirzapur and Mouchak at Km 350.800 (Kaliakoir station); and
- Between Mouchak and Joydebpur Km 370.073 (Mirer Bazar).

70. These four crossing stations will be implemented by Bangladesh Railway in advance of the full double tracking of the Joydebpur-Ishurdi section.

5. Hydrology design requirements

71. **Hydrological Design** - Hydrological design criteria includes the frequency of floods and the return period of the flood for which the structure will be designed, as well as the freeboard above the design high water level. Based on best engineering practice[9], design criteria have been established for the design of embankment formation, bridges and culverts. The 100 and 50-year model storm flows were applied to properly size culverts and establish a safe freeboard for bridges. Hydrological design criteria are shown in **Table 9.**

[9] BR has not specific guidelines for this.

Table 9: Design Frequency and Bridge Freeboard[10]

Structure	Freeboard (m)	Design Frequency (Return Period in Years)		
		Discharge	Water Level	Velocity
Bridges (>30 m)	1.00	100	100	100
Bridges (<30 m)	0.50	50	50	50
Culverts	0.20	50	50	50
Embankment Formation Level	0.60	20	20	20

Source: (RAIL-Rail, 2013)

72. **Navigation Clearance** - Most perennial rivers in Bangladesh are classified as navigable channels by the Bangladesh Inland Water Transport Authority (BIWTA). BIWTA has specified the horizontal and vertical clearance for various classes of navigation channels, as shown in **Table 10**.

Table 10: Navigation Clearance Requirement

Navigation Class	Horizontal Clearance (m)	Vertical Clearance over SHWL (m)
Class I	76.22	18.30
Class II	76.22	12.20
Class III	30.48	7.62
Class IV	20.00	5.00

Source: (RAIL-Rail, 2013)

73. The datum for measuring the vertical clearance is standard high water level. None of the rivers in this Project corridor are legally designated as navigable waters under any of the above four categories of navigable channels. However, local boats are used for crossing the rivers at many locations during floods. The freeboard provided, as shown in **Table 9**, provides the clearance for such "country boat" navigation under a bridge. Therefore, it is realized that the veretical and horizontal heights of the proposed bridges will not be more than the existing bridges on the same location. However, BR apply to BIWTA for horizontal and vertical clearance for all minor bridges (Annex 13) and major bridges (Annex 14). Acccording to BIWTA clearance, if there any change to conceptual design, which will include in the EIA report.

6. Project hydrology

74. The Project passes through two hydrologic regions, the North Central region and the North West region. These regions are separated by the Brahmaputra-Jamuna River. West of the Jamuna River, topography is relatively low lying, while to the east the topography becomes more elevated.

75. **East Bank**: The proposed railway line from Joydebpur to Bangabandhu Setu East station has 138 crossings with existing rivers and other drainage channels, creeks or khals. Among these crossings there are a total of 58 bridges including five major and 53 minor and 80 culverts. Main river crossings are at the Turag, Turag Branch, and Bangshi and Lohajang Rivers. Inspection of bridges along this section indicated that there are no significant erosion

[10] Freeboard is the additional distance between the mandatory distance between the water surface and lowest bridge girder.

issues and river banks were stable. River training works are therefore not expected, although this will be confirmed following detailed survey and design. Existing rivers and other drainage channels, khals and structures over there are shown in Figure 8, Figure 9 and figure 10.

Figure 8: Bridge No. 14 Over River Turag Showing Stable Bank (view from Downstream)

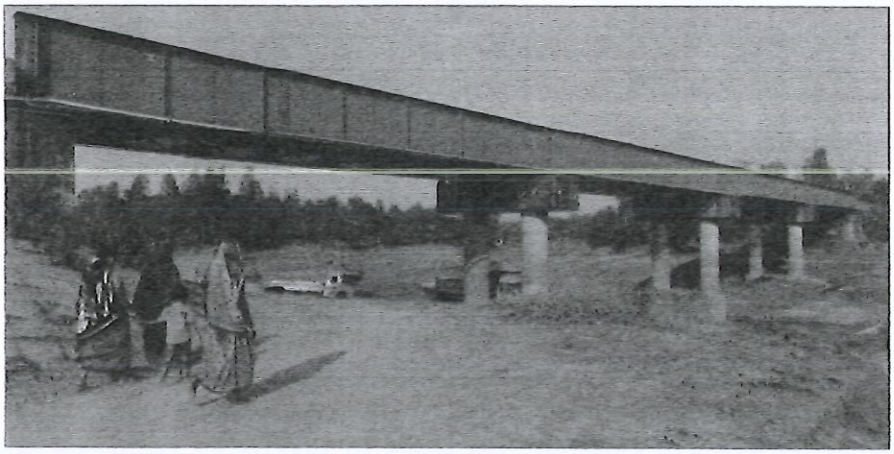


Figure 9: Bridge No. 37 Over River Bangshi Showing Stable Bank (view from upstream)

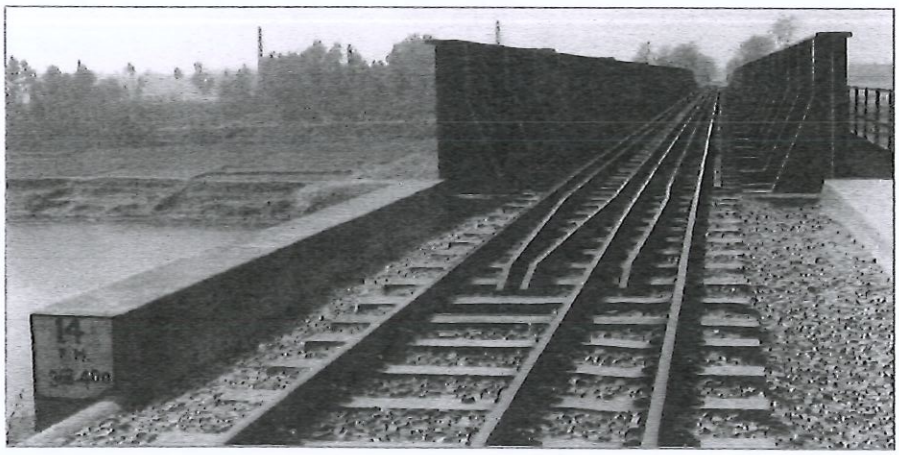


Figure 10 : Bridge No. 14 Existing Steel Semi through Plate Girder Bridge (STPG)

76. **West Bank**: The section of track from Ishurdi to Bangabandhu Setu West has a total of 66 water crossings, out of which 46 are bridges including seven major and 39 minor and 20 culverts. Main river crossings are the Boral, Karatoa, Gumani and Gohala Rivers. A 13 km section of railway embankment from approximately Km 245 (Bridge No.23) to Km 258 (Bridge No. 27) is located in a low lying area, which forms the southern part of Chalan Beel. River River training works are expected along this section of the track, particularly in the section crossing Chalan Beel. Existing rivers and other drainage channels, khals and structures over there are shown in Figure 11 to figure 14.

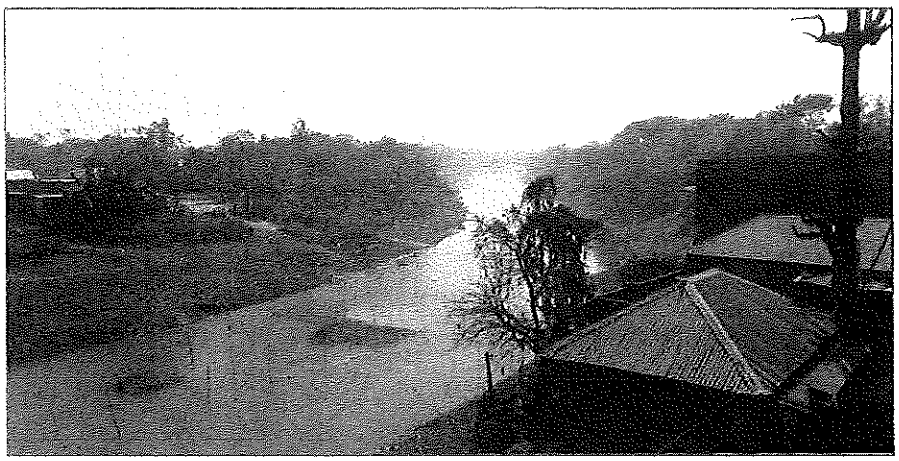


Figure 11: Bridge No. 23 over River Boral (view from Downstream) showing Stable Bank

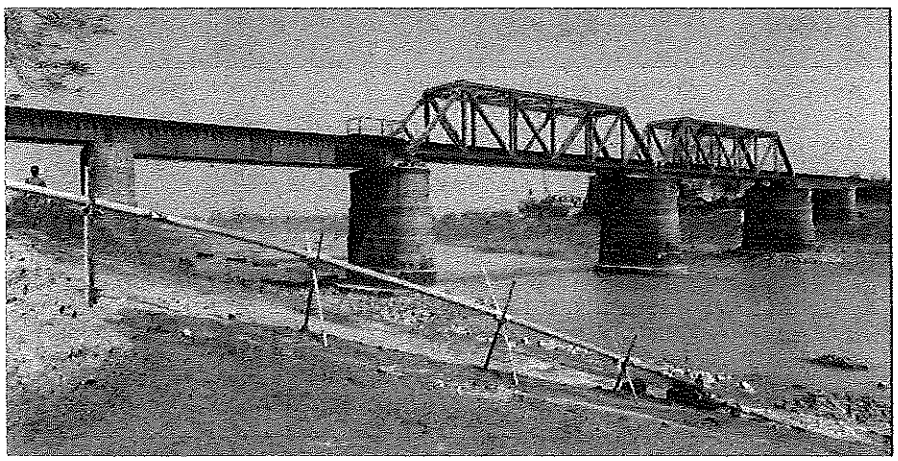


Figure 12: Bridge No. 24 over River Gumani (view from Downstream) showing Stable Bank

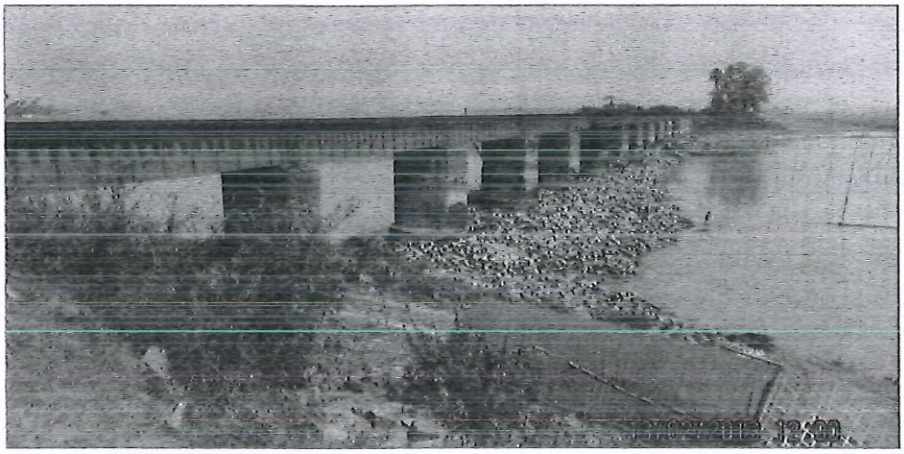


Figure 13: Longest Bridge No. 25 in Beel Area showing Pier Protection and Slope Protection Works

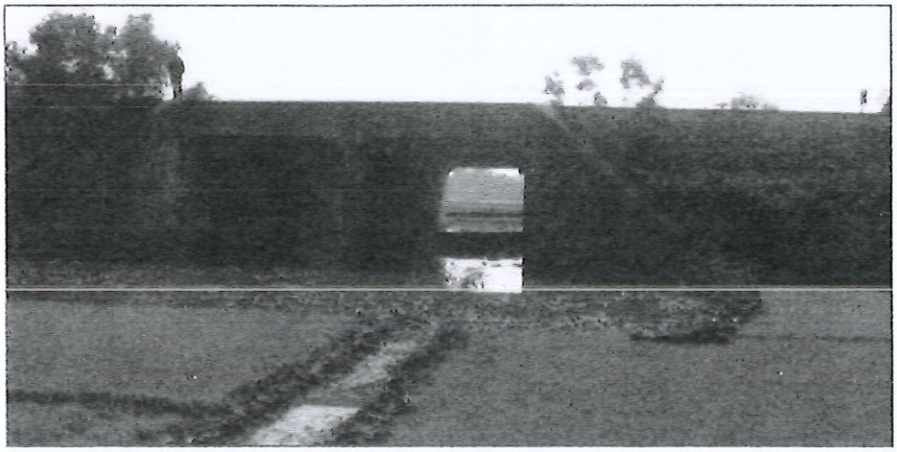


Figure 14: Culvert No. 118 (Km 298.371) on Existing Railway

7. Bridges and Culverts

77. There are a total of 204 bridges with lengths varying from 1.9 m to 229.4 m. All bridges on the proposed line will have ballasted decks.

78. Department of Environment (DoE), classifies bridges as minor when they are less than 100 m and major when they are equal to or greater than 100 m in length. Therefore, the report will concentrate on DoE guideline of ECR 1997.

79. **Bridges less than 100 m**: Bridges having less than 100 m waterway length with multi-span or single span arrangement waterway length are considered as minor bridges. There are 192 minor bridges in the Project. For the proposed line 136 minor bridges will be constructed as single or multiple cell box culverts and 56 minor bridges will be constructed as single or multiple span Steel through plate girder (STPG). See detail list of minor bridges in Annex 13.

80. **Bridges equal to or greater than 100 m**: There are 12 bridges having lengths of more than 100 m; seven on the Ishurdi-Bangabandhu Setu West section and five on the Bangabandhu Setu East-Joydebpur section. See detail list of major bridges in Annex 14. These are shown in Table 11.

Table 11: Bridges more than 100 m

Bridge No. (Proposed)	Chainage (Km)	No. of spans	Length of bridge (m)	River/Canal
West Bank: Ishurdi- Bangabandhu Setu West Section				
23	240.9	5	140.25	Boral River
24	245.4	6	144.20	Gumani River
25	247.3	15	208.40	Beel/Low land
26	249.4	6	116.30	Beel/Low land
26A	250.9	10	130.25	Beel/Low land
27	253.1	6	116.30	Gohala
35	264.8	8	229.45	Karatoa
East Bank: Bangabandhu Setu East-Joydebpur Section				
98	310.5	6	156.30	Louhajang
75	327.0	4	104.20	
71	329.4	4	104.20	
42	351.3	4	104.20	
14	368.4	4	124.20	Turag

81. Description of each major bridges are provided in following sections.

1. Br-23, Boral Bridge, Km 240.976

82. The bridge is located over the Boral River between Bhangoora and Saratnagar rail stations. The river flows north to south and has an average depth of 1.5 m in winter (measured on 5 February 2014). The bridge is 126.6 m long with five spans of 25 m each.

2. Br- 24, Koidanga Bridge, Km 245.400

83. The bridge is located over the Gumani River at Koidanga between Saratnagar and Lahirimohanpur Stations. The river flows north to south with an average dry season depth of 4m (February 2014). The bridge is 133.7 m long with 6 spans of 25 m each.

3. Br-25, Baunjan, Km 247.251

84. The bridge is located over the Baunjandaha Beel and near the village of Baunjan between Saratnagar and Lahirimohanpur Stations. The river flows north to south with an average dry season depth of 2 m (February 2014). The bridge is 203.1 m long with 15 spans of 25 m each.

4. Br- 26, Dilpashadaha, Km 249.352

85. The bridge is located over the Dilpashadaha Beel and near the village of Dahapara between Saratnagar and Lahirimohanpur Stations. The river flows north to south with an average dry season depth of 5 m (February 2014) and increasing by 2 m in the rainy season. The bridge is 107 m long with 6 spans of 25 m each.

5. Br-26A, Bonkriyat Bridge, Km 250.863

86. The bridge is located over a Beel and near the village of Purbo Bonkriyat between Saratnagar and Lahirimohanpur Stations. The river flows north to south with an average dry

season depth of 2 m (February 2014) and increasing by 3.5 m in the rainy season. The bridge is 134.2 m long with 6 spans of 25 m each.

6. **Br-27, Dahakula Bridge, Km 253.094**

87. The bridge is located over the Guhala River between Saratnagar and Lahirimohonpur rail stations. The river flows north to south and has an average depth of 9 m in winter (measured on 5 February 2014) and increasing to 12 m in rainy season. The bridge is 109 metres with 5 spans of 25 m each.

7. **Br-35, Fulijhor, Km 264.768**

88. The bridge is located over the Fuljhor River near the village of Charghatia. The river flows north to south and has an average depth of 6 m in winter (measured on 5 February 2014). The bridge is 229.45 m long with 8 spans.

8. **Br-98, Kouli, Km 310.497**

89. The bridge is located over the Lohajang River near the village of Kouli. The river flows west to east and has an average depth of 2 m in winter (measured on 5 February 2014). The bridge is 155 m long with 6 spans of 25 m each.

9. **Br-75, Pathaguri, Km 326.985**

90. The bridge is located over the Naligang River near the village of Patkhaguri. The river flows west to east and has a shallow depth. The bridge is 103 m long with 4 spans of 25 m each.

10. **Br-71, Habla, Km 329.355**

91. The bridge is located over the Habla/Moragang River, which flows north to south. The river dries up during the dry season. The bridge is 103 m long with 4 spans of 25 m each.

11. **Br-41, Hijaltali, Km 351.340**

92. The bridge is located over the Bongshai River near the village of Hijaltali. The river flows north to south and has a shallow depth. The river dries up during the dry season. The bridge is 351 m long with 4 spans of 25 m each.

12. **Br-14, Ahaki, Km 368.416**

93. The bridge is located over the Turag River near the village of Ahaki. Water depth is 10 m and increases by another 3 m in rainy season. There is a brick field and many industries around the area. The bridge is 368 m long with 4 spans of 30 m each.

94. The superstructure of existing major bridges comprises of steel structures with open deck construction. New bridges will have a ballasted deck construction and be typically at 12 m from the centreline of the existing track. This centre-to- centre distance has been determined to ensure that construction is undertaken safely and minimises any rail disruptions.

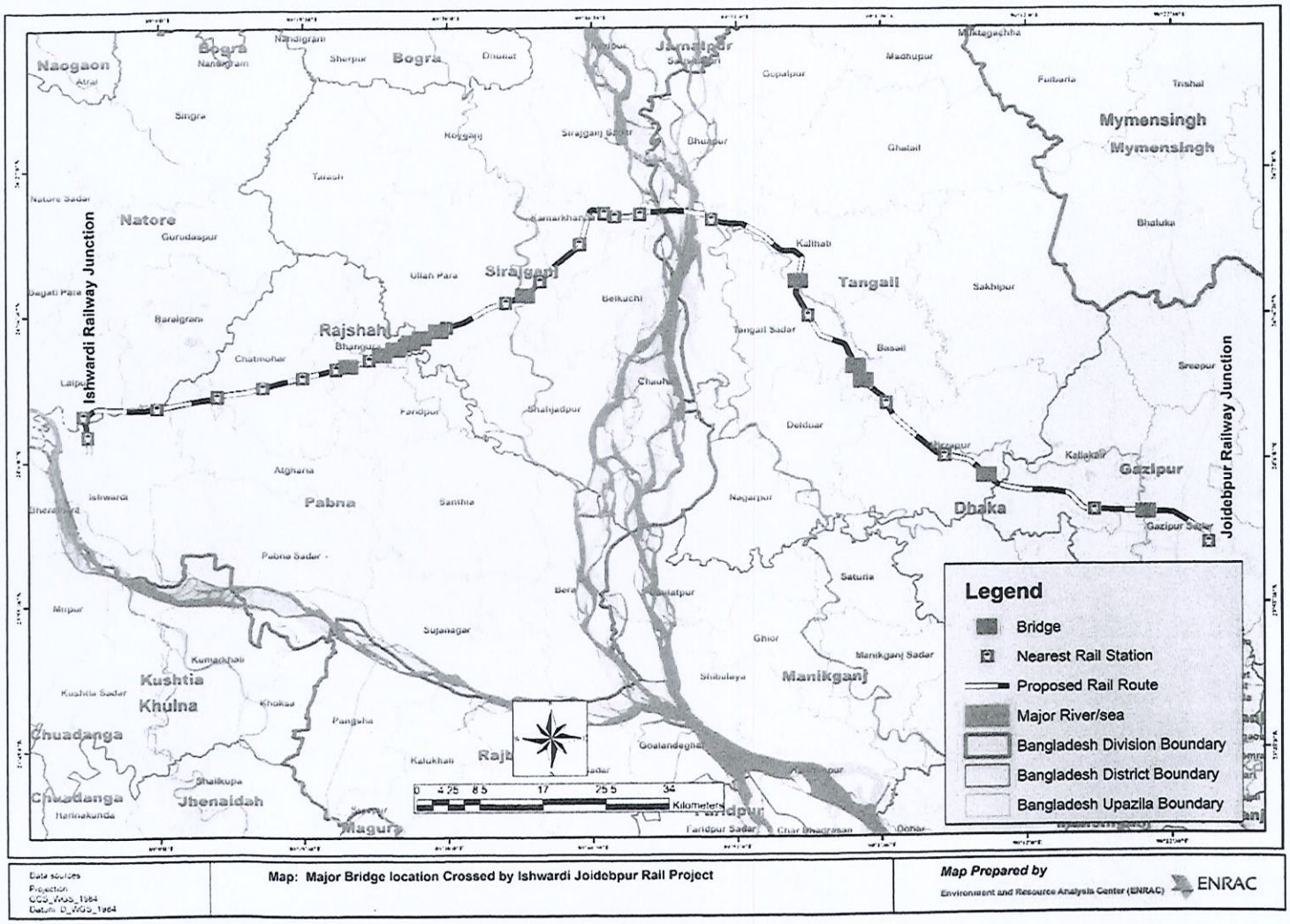


Figure 15: Location of Proposed Major Bridges

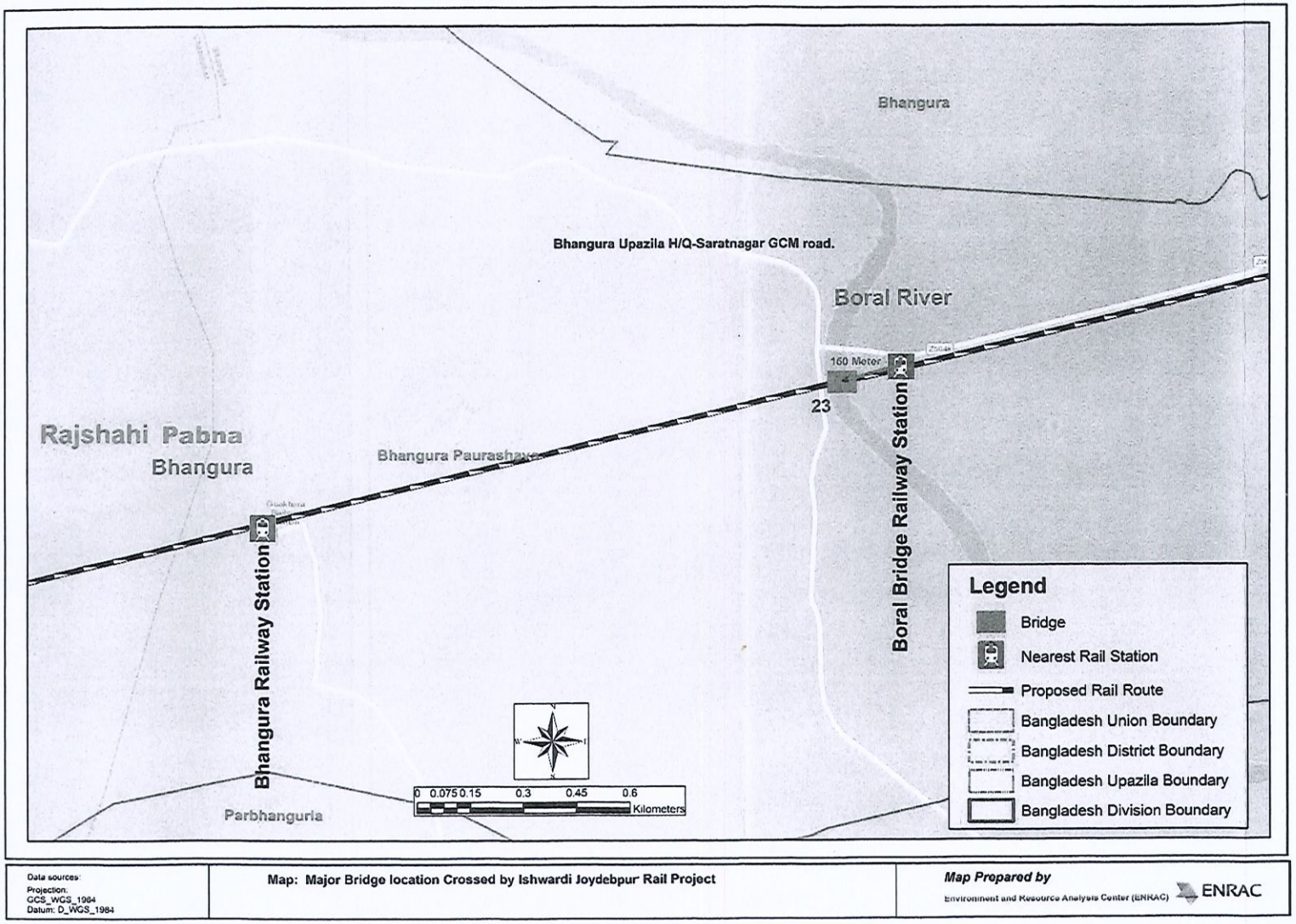


Figure 16: Location of Bridge number 23

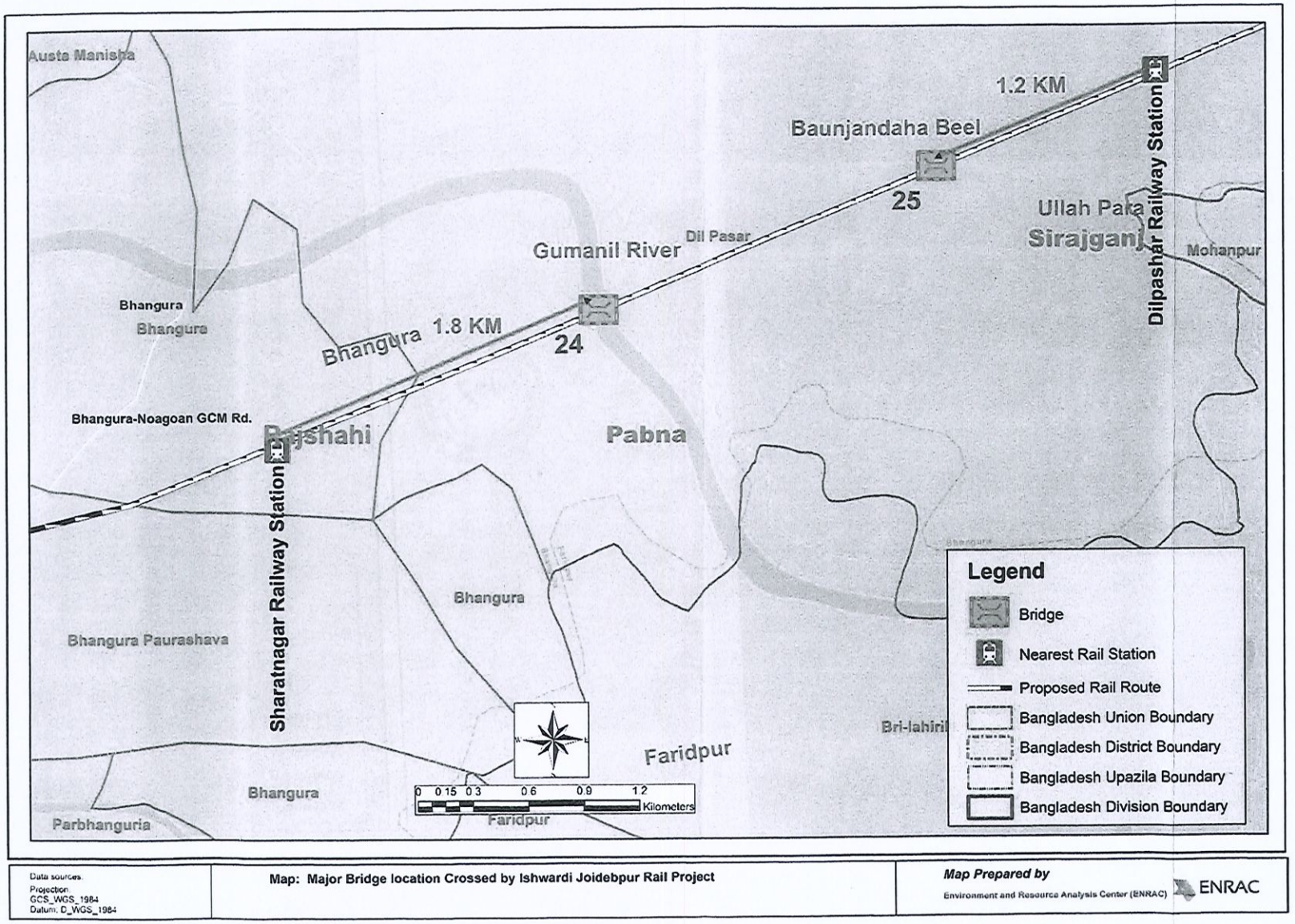


Figure 17: Location of Bridges number 24 and 25

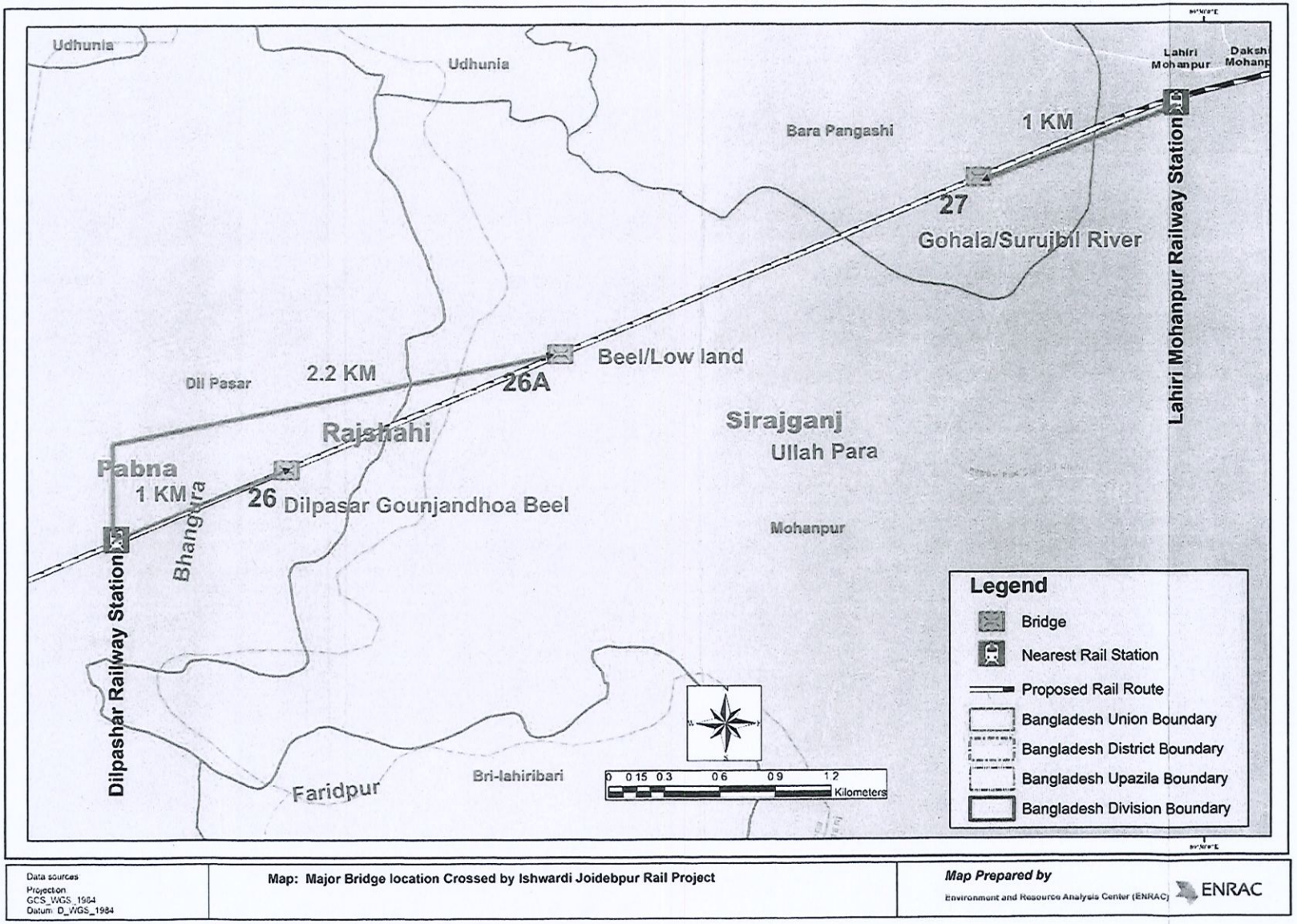


Figure 18: Location of Bridge number 26, 26A and 27

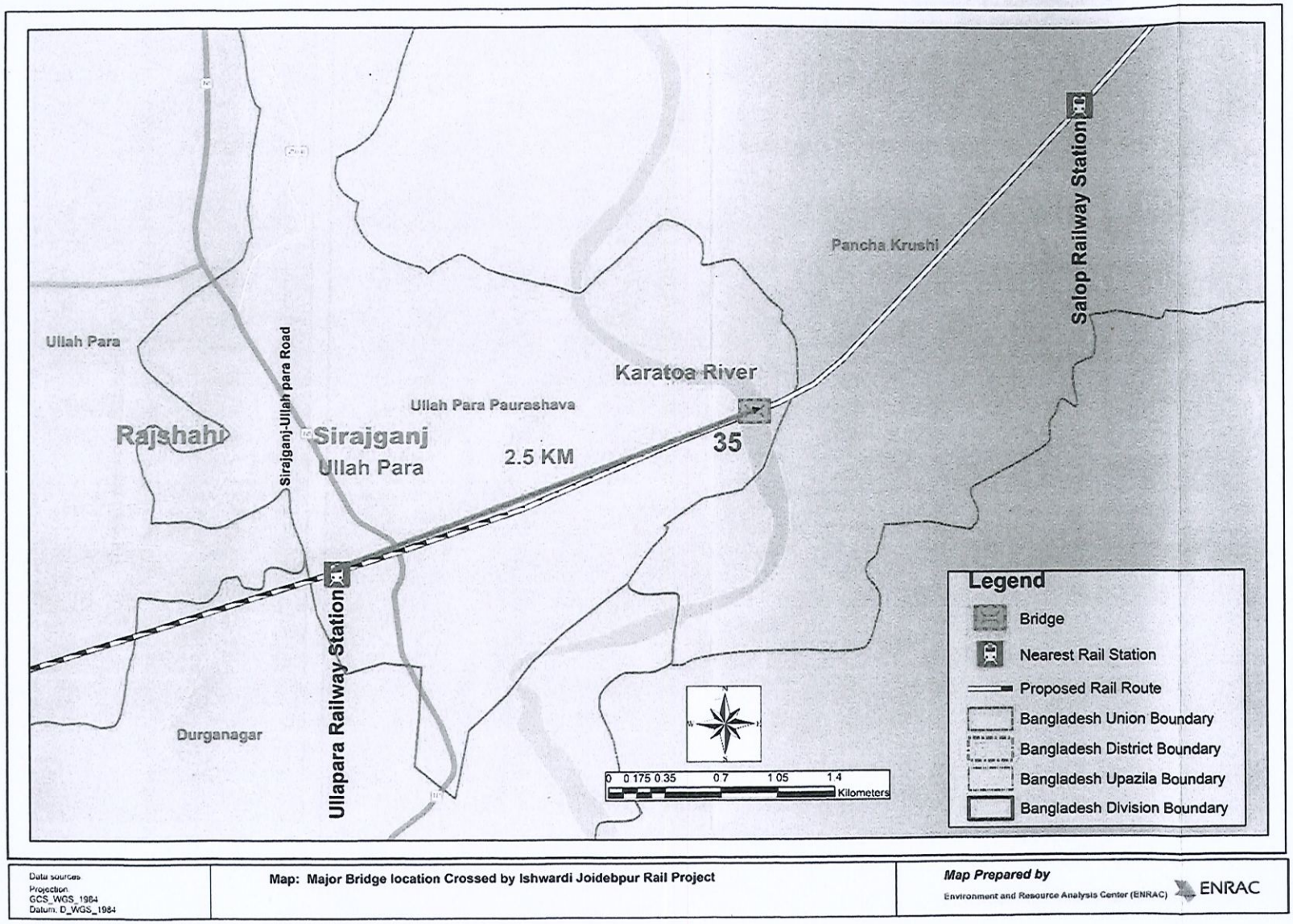


Figure 19: Location of Bridge number 35

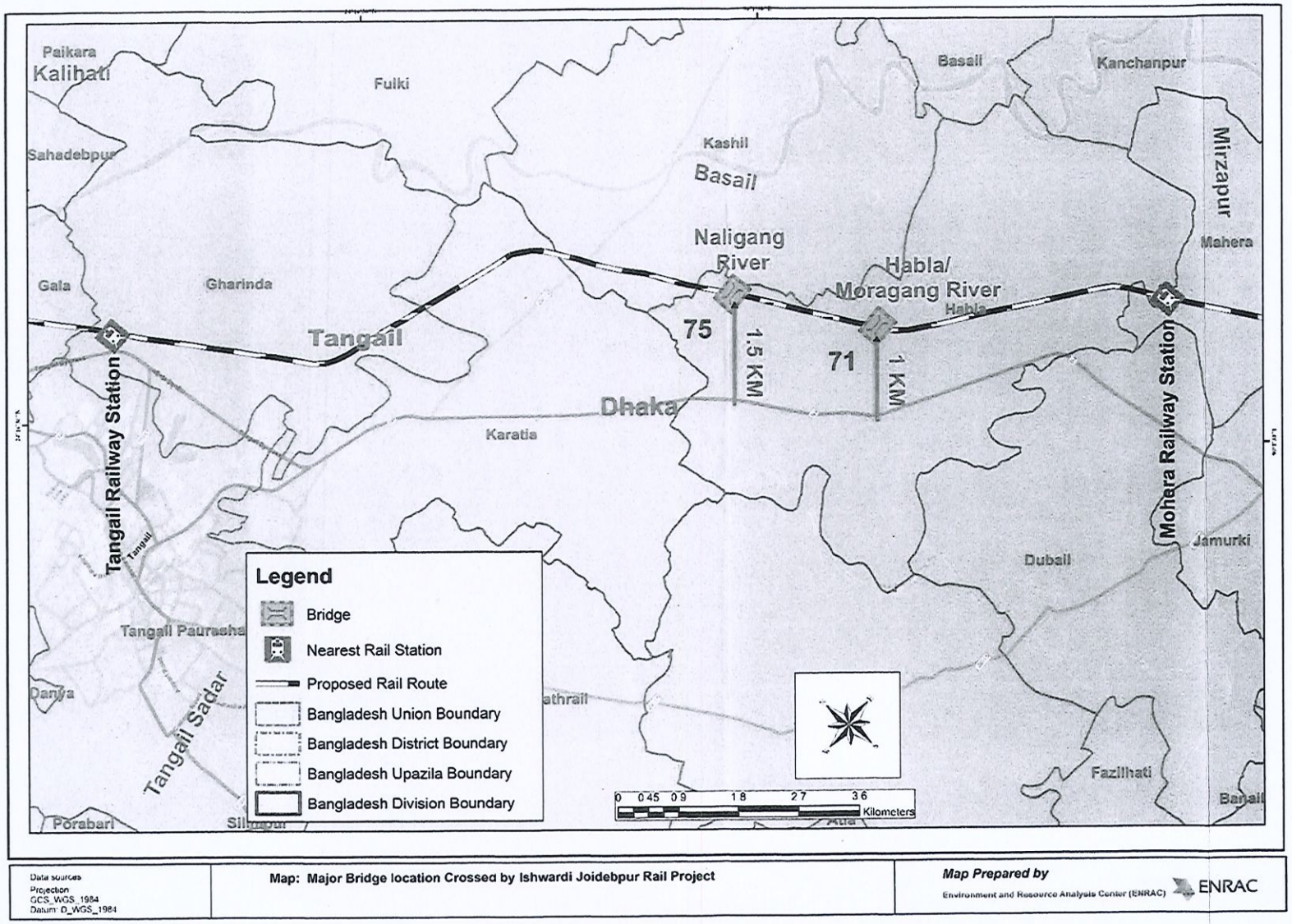


Figure 20: Location of Bridge number 71 and 75

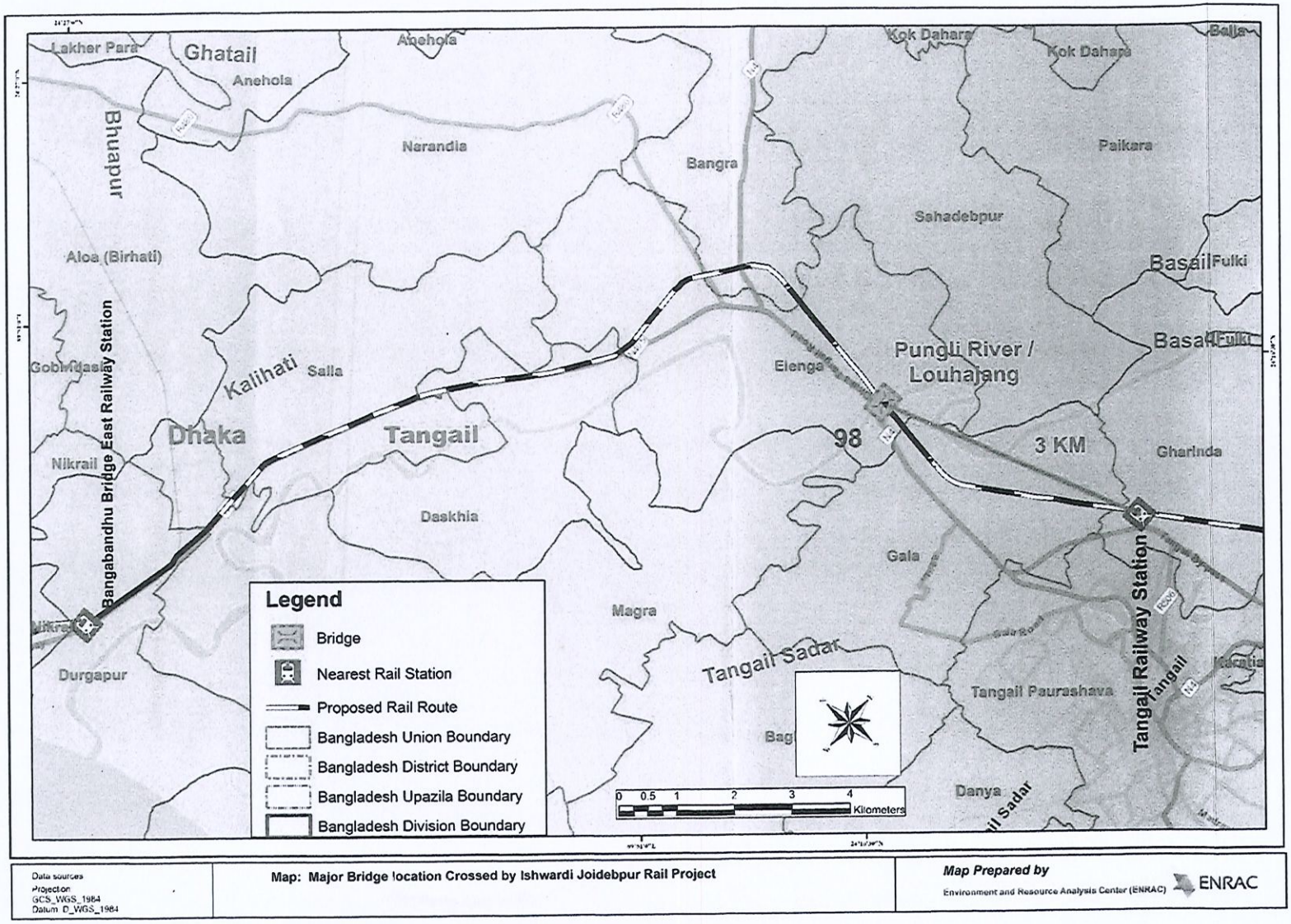


Figure 21: Location of Bridge number 98

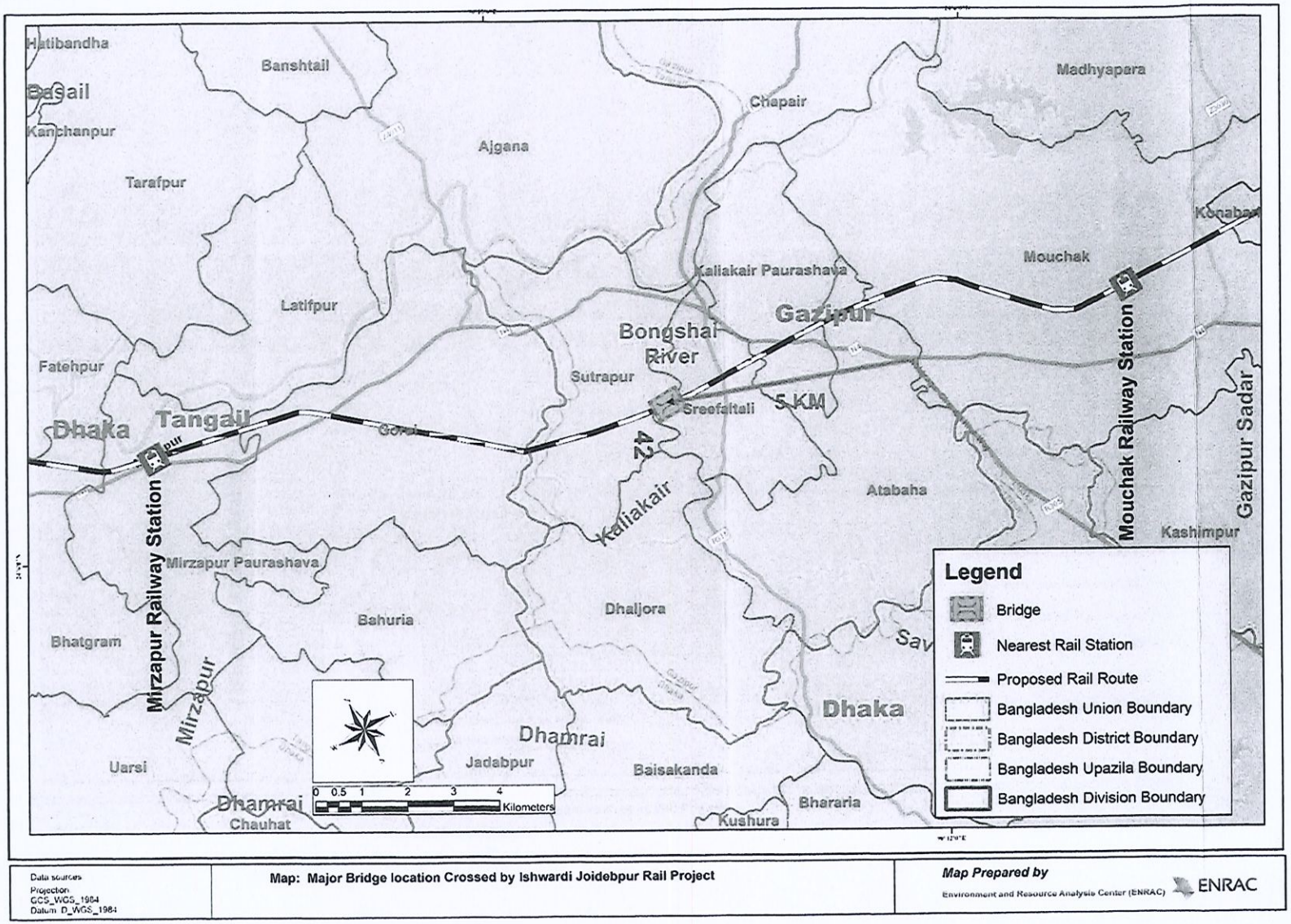


Figure 22: Location of Bridge number 42

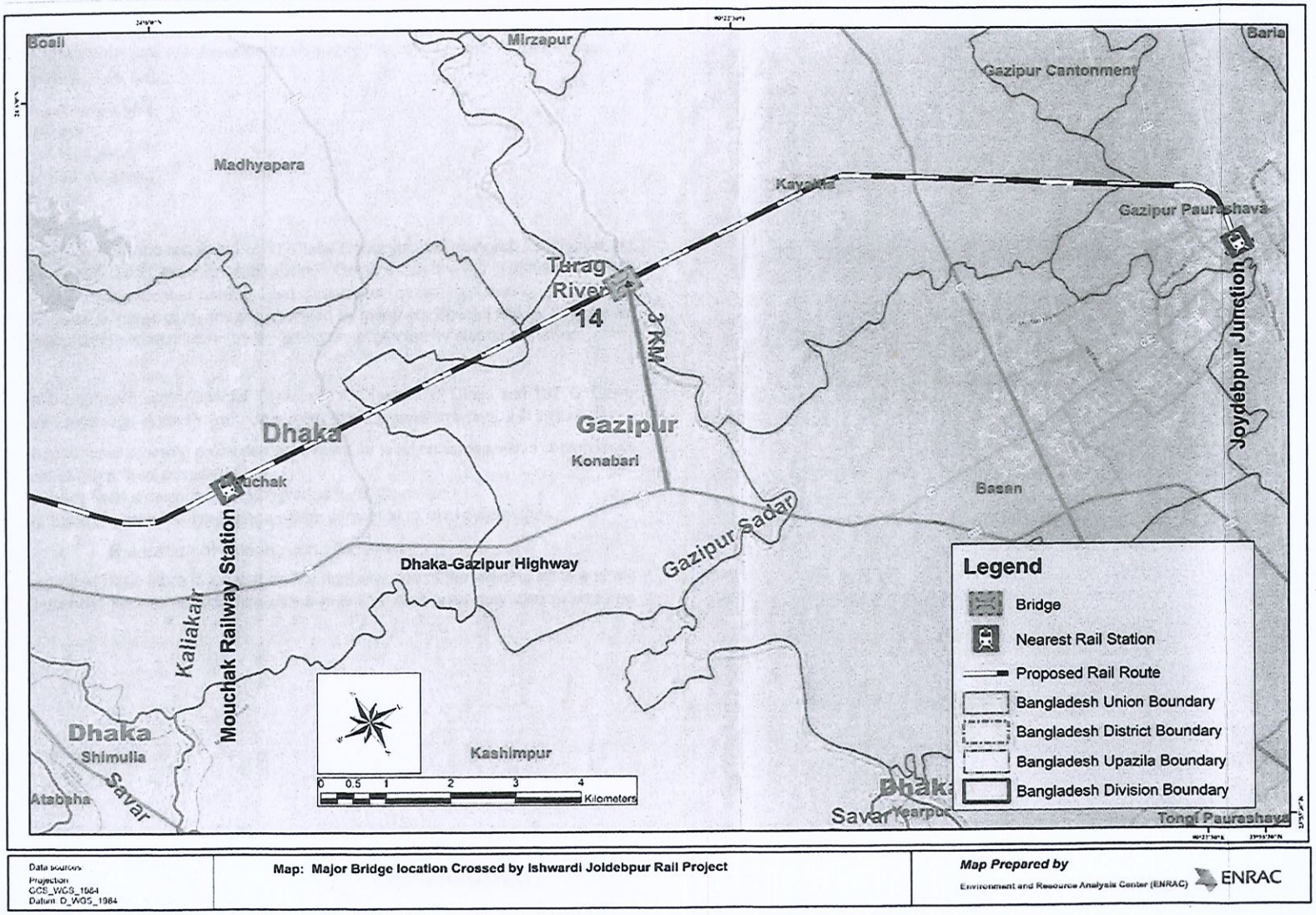


Figure 23: Location of Bridge number 14

8. Level Crossings

95. BR road/rail crossings are classified into 'Special', 'A', 'B', 'C', and 'D' on the basis of a number of criteria, including:

- Volume of road traffic;
- Train speed;
- Road traffic speed;
- Road traffic volumes;
- Visibility; and
- Gradient.

96. All crossings, with the exception of 'D' Class crossings, are manned. Level crossing gates are also classified as "traffic" or "engineering". Gates which are within station limits are called traffic gates; those located between two stations are called engineering gates. Level crossings with barriers, gates or chains are operated by gatemen. Special and 'A' Class level crossings situated within station limits (traffic gates) are protected by station signalling.

97. There are currently eight 'Special' Class, six 'A' Class, 9 'B' Class and 102 'C' Class authorised level crossings in the Project. Upgrading existing level crossings will include:

- Appropriate level crossing protection equipment for level crossings within station limits and out-stations level crossings;
- 25 'C' Class level crossings will be upgraded to 'B' Class; and
- Three 'Special' Class level crossings will be converted to road overbridges.

9. Relocation of Underground Services

98. Underground Optic Fibre is located on the northern side of the existing track and will need to be relocated prior to construction of the new line. Gas lines may also need to be relocated.

IV. DESCRIPTION OF THE ENVIRONMENT

A. Biophysical Environment

1. The Project Area (Study Area)

99. The Project passes through two hydrologic regions, the North Central region and the North West region. These regions are separated by the Brahmaputra-Jamuna River. West of the Jamuna river topography is relatively low lying, while to the east the topography becomes more elevated.

100. *East Bank*: The proposed railway line from Joydebpur to the Jamuna River (Bangabandhu Setu East) has approximately 138 crossings with existing rivers and other drainage channels, creeks or khals. Among these crossings, 5 are major bridges (length equal to or greater than 100 m), 53 are minor, and 80 are culverts. Main river crossings are at the Turag, Turag Branch, Bangshi and Lohajang rivers. The major centre around Joydebpur station is characterised by dense residential and commercial developments. Further west towards the Jamuna river landuse is characterised by some forested areas in the higher eastern areas, and small pockets of urban areas, villages and agricultural areas.

101. *West Bank*: The section of track from Ishurdi to Jamuna River (Bangabandhu Setu West) has 66 crossings. Out of these crossings, there are a total of seven major bridges (length equal to or greater than 100 m), 39 minor bridges, and 20 culverts. Main river crossings are the Boral, Karatoa, Gumani and Gohala rivers. A 13 km section of railway embankment is located in a low lying area, which forms the southern part of Chalan Beel. Similarly, there are densely built up areas around Ishurdi station, giving way to villages and agricultural areas as the track progresses east towards the Jamuna River. Land use maps are provided in **Annex 2.**

102. The study area is generally confined to BR's general legal right of way (RoW), which covers an area within a distance of between 50 m and 100 m from the existing track and stations respectively (**Table 5**). However, the study area was extended outside of the RoW in those areas where sensitive receptors such as residences, wetlands and infrastructure may be impacted by the Project.

2. Climate

103. The Project area has a tropical monsoon climate with four distinct seasons, namely the dry or winter season (December-February); the pre-monsoon hot season (March-May); the monsoon or rainy season (June-September) and the post–monsoon or autumn season (October-November).

104. Temperature, rainfall, humidity and wind data were collected from the nearest meteorological substations located in Tangail and Ishurdi. Meteorological data for the period 2008 to 2012 are summarised in **Table 12** and **Table 13.**

Table 12: Annual Average Climatic Conditions of the Project at Tangail

Station	Year	Parameter											
		Air Temperature (°C)			Precipitation (mm)			Relative Humidity (%)			Wind Speed (km/h)		
		Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average
	2008	17.20	28.90	25.00	0.00	444.00	154.67	72.00	85.00	80.00	2.59	5.74	4.29

Tangail	2009	17.70	29.70	25.41	0.00	329.00	115.92	65.00	86.00	78.17	3.15	6.11	4.61
	2010	15.70	29.60	25.59	0.00	430.00	145.83	66.00	85.00	78.92	2.96	7.04	4.38
	2011	15.40	29.00	24.84	0.00	761.00	153.25	71.00	87.00	79.58	3.33	5.00	4.21
	2012	17.00	29.40	24.73	0.00	246.00	44.58	65.00	83.00	74.00	2.96	5.37	4.35
5 Yearly Average		16.60	29.32	25.12	0.00	442.00	122.85	67.80	85.20	78.13	3.00	5.85	4.37
(BMD, 2013)													

Table 13: Annual Average Climatic Conditions of the Project at Ishurdi

Station	Year	Parameter											
		Air Temperature (°C)			Precipitation (mm)			Relative Humidity (%)			Wind Speed (km/h)		
		Min	Max	Ave.	Min	Max	Ave.	Min	Max	Ave.	Min	Max	Ave.
Ishurdi	2008	17.40	29.10	25.36	0.00	295.00	108.67	69.00	87.00	79.33	2.96	6.11	4.65
	2009	18.10	29.80	25.63	0.00	471.00	168.75	63.00	85.00	76.42	3.52	6.11	4.69
	2010	15.80	29.60	25.83	0.00	174.00	74.50	61.00	86.00	77.42	3.70	7.22	4.80
	2011	15.30	29.30	25.12	0.00	645.00	144.67	65.00	87.00	78.75	3.52	6.30	4.34
	2012	17.30	29.90	25.08	0.00	177.00	26.17	60.00	81.00	70.83	2.59	5.37	4.37
5 Yearly Average		16.78	29.54	25.40	0.00	352.40	104.55	63.60	85.20	76.55	3.26	6.22	4.57
(BMD, 2013)													

105. **Temperature**: Average maximum and minimum temperatures for the last five years (2008 to 2012) were 29°C and 17°C respectively. The five-yearly average temperature was 25°C.

106. **Rainfall:** Rainfall follows the monsoon starting in May, with the highest rainfall occurring in the summer (June to September) when southeast prevailing winds bring moisture-laden air from the Bay of Bengal. The project area from Joydebpur to Tangail experiences higher rainfall compared to the western Tangail to Ishurdi section. The average maximum precipitation for the period 2008-2012 for Tangail and Ishurdi was 442 mm and 352 mm respectively. The year 2011 was a particularly wet year with maximum falls significantly above average (645 mm to 761 mm).

107. **Relative Humidity:** Humidity levels are relatively high during monsoon periods and decline significantly for a relatively short period at the end of the dry season. Relative humidity at Tangail ranged between 85% and 67%, with an average of 78%. Similarly at Ishurdi the range was between 85% and 63%, with an average of 77%.

108. **Wind:** Five year average wind speeds range from approximately 6.0 km/h in the early part of the monsoon to approximately 3.0 km/h at the beginning of the dry season. Wind roses (**Figure 24** and **Figure 25**) for data from Ishurdi and Tangail meteorological substations show south to south east prevailing winds occur for approximately 40% of the year, while north west to westerly winds occur for approximately 25% of the year.

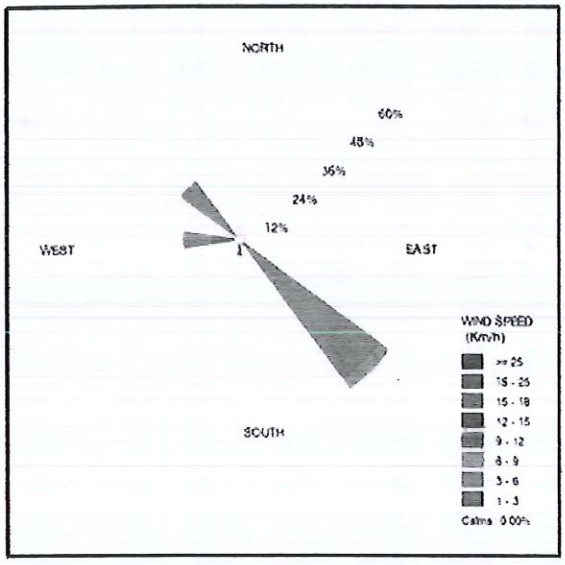


Figure 24: Distribution and Frequency of Wind Force within Ishurdi Substation

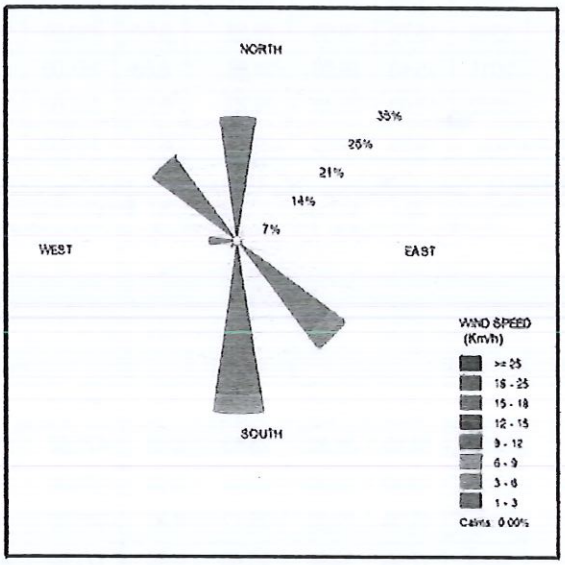


Figure 25: Distribution and Frequency of Wind Force within Tangail Substation

3. Air Quality and Noise

109. **Air Quality:** Air quality samples were taken at six sampling stations. Each sampling station had two test sites, one at sensitive receptors, such as settlement areas less than 50 m from track and the second at around 100 m distance from the proposed alignment. Tests were completed for carbon monoxide (CO), nitric oxide (NO), nitrogen dioxide (NO_2), Sulphur dioxide (SO_2), ozone (O_3), volatile organic compounds (VOC), large particulate matter (PM_{10}), and small particulate matter ($PM_{2.5}$). Results are shown on Table 14.

Table 14 Air Quality Monitoring result in 2014

Sampling ID	Sampling Location	Parameter								
		CO ug/m³	NO ug/m³	NO_2 µg/m³	SO_2 µg/m³	O_3 ug/m³	VOC ppm	PM_{10} µg/m³	$PM_{2.5}$ µg/m³	Air Temp °C
PROJECT_AQ_01	Joydebpur Station	844.61	18.36	17.74	76.59	64.79	0.09	94.61	37.14	29.47
PROJECT_AQ_02_100 m		1,037.98	22.84	18.66	119.20	79.27	2.08	114.91	42.85	28.67
PROJECT_AQ_03	Ratanpur, Mouchak	1,092.31	22.86	12.52	84.07	93.86	1.75	74.97	34.05	25.80
PROJECT_AQ_04_50 m		959.09	21.04	9.96	64.85	82.01	1.04	61.93	45.50	29.61
PROJECT_AQ_05	Mirzapur rail crossing	1,136.11	16.99	14.92	90.22	131.23	2.33	105.28	55.09	15.67
PROJECT_AQ_06_50 m		772.20	10.35	7.19	19.54	93.74	0.14	46.88	18.86	20.40
PROJECT_AQ_07	Sodanadapur SMA Station	747.47	8.04	5.78	10.70	25.42	0.35	60.53	30.16	16.13
PROJECT_AQ_08_50 m		947.11	13.40	7.11	25.32	110.89	1.54	66.58	39.04	15.06
PROJECT_AQ_09	Ullahpara Rail Station	991.73	11.38	7.12	53.53	102.95	0.19	68.39	51.29	18.24
PROJECT_AQ_10_50 m		1,060.48	17.04	9.08	63.22	142.37	1.21	104.16	54.65	20.51
PROJECT_AQ_11	Boral Rail Station	822.79	5.72	3.56	30.35	79.39	0.01	52.40	33.04	26.41
PROJECT_AQ_12_50 m		991.51	9.73	6.93	34.62	93.48	1.30	67.95	36.06	25.66
DoE Air Quality Standard (2006)		**40,000**	**100**	**100**	**365**	**235**	**NSE**	**150**	**65**	

110. Air quality samples were taken at four sampling stations. Each sampling station had two test sites, one at sensitive receptors, such as settlement areas less than 50 m from track and the second at around 100 m distance from the proposed alignment. Tests were completed

for carbon monoxide (CO), nitric oxide (NO), nitrogen dioxide (NO_2), Sulphur dioxide (SO_2), ozone (O_3), volatile organic compounds (VOC), large particulate matter (PM_{10}), and small particulate matter ($PM_{2.5}$). Results are shown on **Table 15.**

Table 15: Air Quality Monitoring result in 2019

Sampling		Parameter								
Sampling ID	Location	CO µg/m³	NO µg/m³	NO_2 µg/m³	SO_2 µg/m³	O_3 µg/m³	VOC ppm	PM_{10} µg/m³	$PM_{2.5}$ µg/m³	Air Temp °C
PROJECT_AAQ_1_ Morning	Mouchak	0.04	0.76	0.91	27.34	10.98	0.21	64.95	42.03	26.23
PROJECT_AAQ_01_ Evening		0.00	0.67	0.63	21.04	18.68	0.00	52.65	28.48	21.57
PROJECT_AAQ_02_ Morning	Elenga	0.03	0.59	0.53	13.04	9.73	0.19	40.33	24.28	26.67
PROJECT_AAQ_02_ Evening		0.00	0.50	0.47	12.55	15.07	0.00	48.01	20.61	17.55
PROJECT_AAQ_03_ Morning	Sirajgonj	0.02	0.44	0.57	2.36	9.86	0.18	43.63	22.83	25.67
PROJECT_AAQ_03_ Evening		0.00	0.42	0.54	2.55	13.51	0.00	39.62	23.37	20.29
PROJECT_AAQ_04_ Morning	Muladuli	0.04	0.53	0.61	3.45	9.01	0.26	35.33	15.90	27.66
PROJECT_AAQ_04_ Evening		0.00	0.49	0.57	3.06	14.15	0.00	39.33	21.85	20.95
GoB Air Quality Standards*		**10 (8 hour)**	**100 (Annual)**	**100 (Annual)**	**365 (24 hour)**	**157 (8 hour)**	**NSE**	**150 (24 hour)**	**65 (24 hour)**	**NSE**

NSE =No Standard Established; Sample stations are shown by ID number and sample location, GPS coordinates are marked on corridor maps in Annex 2, AQ=air quality. (BR, 2013-2019)

111. All monitored parameters shown in *Table 14* **& Table 15** were within the acceptable limits specified by DoE.

112. In additional to the above air quality monitoring **Figure 26** shows typical distribution of air quality parameters immediately before and after a train, at a distance of 100 metres from the track. Concentration of all parameters increased immediately after the train passed, with some exceeding DoE limits, but then dropped back to pre- train passing levels within minutes.

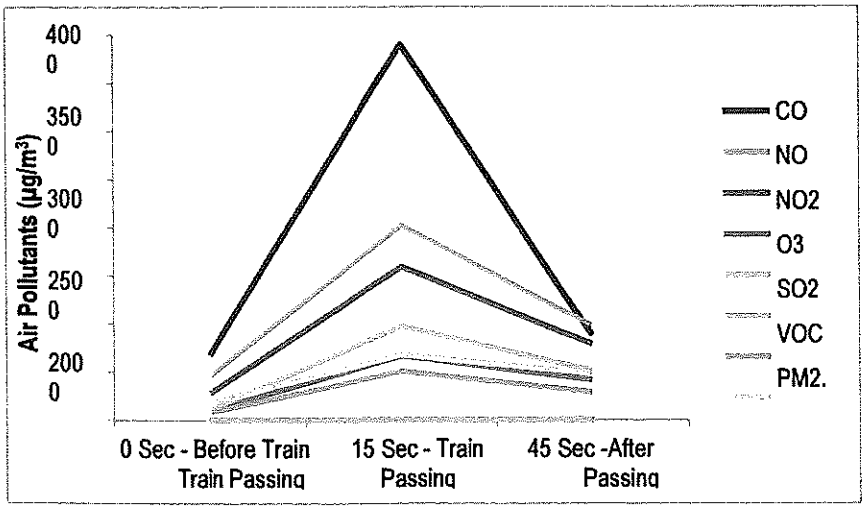


Figure 26: Changes of Air Quality Due to Train Movement

113. **Noise**: Noise readings show some station areas exceeded DoE limits in silent and residential areas but were generally within DoE limits for commercial and industrial areas

(Table 16 & Table 17). Noise levels around rail stations were significantly influenced by road traffic, vehicle horns and music from roadside traders.

Table 16: Noise monitoring result in 2014

Sampling ID	Sampling Location	Sampling Date	Noise Level (Leq) dB	
			Day	Night
PROJECT_NM_1,3_C	Joydebpur Station	2/2/2014	69.10	68.2
PROJECT_NM_2,4_100 m		2/2/2014	68.31	67.2
PROJECT_NM_5,7_C	Ratanpur, Mouchak	2/2/2014	79.5	67.21
PROJECT_NM_6,8_ 50 m		2/2/2014	65.14	62.31
PROJECT_NM_9,11_C	Mirzapur rail crossing	3/2/2014	64.7	59.97
PROJECT_NM_10,12_ 50 m		3/2/2014	57.6	53.91
PROJECT_NM_13,15_C	Sodanandapur Rail Station	4/2/2014	62.61	53.5
PROJECT_NM_12,16_50 m		4/2/2014	57.91	53.1
PROJECT_NM_17,19_C	Ullahpara Rail Station	4/2/2014	70.8	53.49
PROJECT_NM_18,20_50 m		4/2/2014	78.48	48.3
PROJECT_NM_21,23_C	Boral Rail Station	5/2/2014	61.7	54.53
PROJECT_NM_22,24_50 m		5/2/2014	54.7	54.34
DoE Noise Standard		**Areas/Time**	**Day**	**Night**
		Silent areas	45	35
		Residential	50	40
		Mixed	60	50
		Commercial	70	60
		Industrial	70	70
(BR, 2013-2014) The amended schedule-4 of (Noise Measurement Standard) Environmental conservation Rules, 1997 have been considered.				

Table 17: Noise monitoring result in 2019

Sampling ID	Sampling Location	Sampling Date	Noise Level (Leq) dB	
			Day	Night
PROJECT_NM_1	Mouchak	21/01/2019	60.3	50.3
PROJECT_NM_02	Elenga	20/01/2019	55.1	44.8
PROJECT_NM_03	Sirajgonj	19/01/2019	64.7	59.97
PROJECT_NM_04	Muladuli	18/01/2019	55.6	45.5
DoE Noise Standard		**Areas/Time**	**Day**	**Night**
		Silent areas	45	35
		Residential	50	40
		Mixed	60	50
		Commercial	70	60

	Industrial	70	70

(BR, 2013-2014)
The amended schedule-4 of (Noise Measurement Standard) Environmental conservation Rules, 1997 have been considered.

4. Topography, Geology and Soils

114. **Topography:** The area is mainly flat and is crisscrossed by rivers, tributaries, wetlands and canals. Elevation across the study area is characteristically flat, varying from approximately one to two metres above mean sea level. Topography generally slopes north to south, with the low lying Chalan Beel affecting approximately 13 km of the western alignment.

115. Land use maps are provided in **Annex 2**. The total area within the 100 m wide corridor is approximately 3,477.51 ha, with agricultural pursuits being the dominate land use 2,614.72 ha. Other land use include forest 29.26 ha, rail stations 17.14 ha, settlements 653.70 ha including educational institutes (schools and madrasas), places of worship, graveyards, post offices, industries etc., and water bodies 162.70 ha. The low lying Chalan Beel covers approximately 130 ha, which is Subject to regular flooding.

116. **Geology/Seismology:** The geological profile along the proposed alignment consists of alluvial deposits, underlain by deltaic deposits of the Brahmaputra-Ganges- Jamuna River systems. These deposits include mostly fine sandy, silt and clay materials. Numerous incised channels and depressions within the alignment area are lined with recent alluvial deposits comprising lowland alluviums, which are particularly evident along parts of the western alignment where in crosses the Chalan Beel.

117. Bangladesh is situated in one of the most tectonically active regions in the world. Here three major tectonic plates (the Indian Plate, the Tibet Sub-Plate, and the Burmese Sub-Plate) collide and thrust over each other. Earthquakes occur frequently in the wider region.

118. On the basis of distribution of earthquake epicentres and tectonic behaviour of different tectonic blocks, Bangladesh has been classified into three generalised seismic zones as shown in **Figure 27**.

119. The north eastern folded regions of Bangladesh are the most active zones and belong to Zone I. Zone II consists of the regions of recent uplifts. Southwest Bangladesh is a seismically quiet (Figure 27), with the Project predominately in Zone II which is seismically moderately active areas.

120. **Soils:** Soils in the Project area are mostly alluvium comprising clay with silt and are non-calcareous to slightly calcareous in nature. The non-calcareous soils are marked with the presence of minerals (calcite and dolomite) from the Ganges river- deposits and mica and biotite from Jamuna river sediments. The subsoil normally consists of an intercalation of sands, medium fine sands to silt, and sometimes clay.

121. The predominant soil groups of the study area include non-calcareous alluvium soils, grey floodplain soils, and brown-mottled deep grey terrace soils and non- calcareous brown soils. Soils generally have moderate organic matter and are typically deficient in nitrogen, phosphorus, and Sulphur, but contain reasonable amounts of potassium and zinc (SRDI, 1997). Soil in the Chalan Beel area has a higher organic content and associated fertility. Soil pH typically ranges from 7.5 to 8.0.

122. Soils along the alignment support intensive agriculture and thus have been heavily modified with the addition of organic material and fertilisers. No significant erosion was noted along the alignment, although low lying areas are regularly affected by low velocity floodwaters.

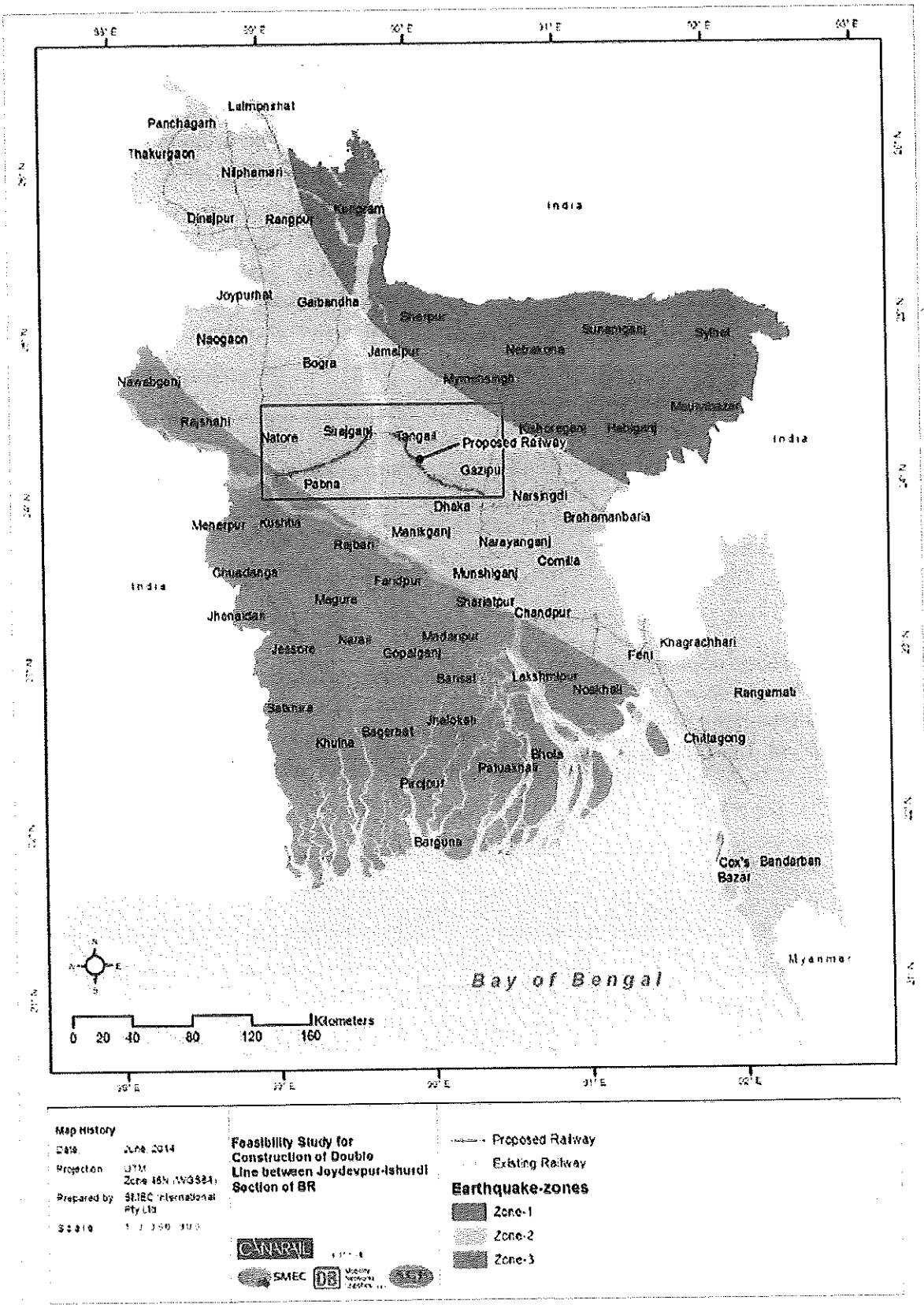


Figure 27: Seismic Zones of Bangladesh

5. Hydrology, Drainage and Surface Water Quality

123. **Hydrology and Drainage:** The Project is situated within the Ganges- Brahmaputra-Jamuna River system. The alignment passes through two hydrologic regions, the North Central region and the northwest region. These regions are separated by the Brahmaputra-Jamuna River. West of the Jamuna river topography is relatively low lying, while

124. Flows are pronounced during the wet monsoonal season, however during the dry season the smaller tributaries are mostly dry due to low rainfall and water extraction for irrigation. The Chalan Beel[11] is situated in the railway corridor to the west of the Bangabandhu Setu West, and remains wet throughout the year. Generally, ponds remain unchanged from year to year due to rejuvenation during the rainy season.

Surface Water Quality

125. Surface water is mainly extracted from khals, canals and ponds and used for washing, bathing and livestock. In the dry season local canals and channels provide water for irrigated boro[12] cultivation and for growing winter crops. Surface water samples were collected from twelve locations in 2014 and 2019. The analytical test results indicate that most of the concentrations were within the range acceptable for irrigation, stock watering and industrial use. The details of the surface water quality have been described in Bridge section of this Chapter.

Groundwater

126. Groundwater samples were collected during the post monsoon season (February 4-8, 2014) from six tube wells located near the Project corridor. The samples were submitted to a laboratory and analysed for pH, total dissolved solids, arsenic, iron, manganese, sulphur and chloride. Analytical results and laboratory certificates are provided in **Annex 4** and summarised in **Table 18**.

Table 18: Groundwater Quality for the Project Area in Post-Monsoon Season 2014

SAMPLE I.D.	Date	Water Body Crosse/Site Description	GPS Location		pH	TDS (mg/L)	As (mg/L)	Fe (mg/L)	Mn (mg/L)	S (mg/L)	Cl (mg/L)
			Latitude	Longitude							
GW_001	7/2/2014	Ahaki, Kona Bari	24°02'06.5"	90°20'36.8"	7.14	172	<0.001	1.81	0.031	<1	2
GW_002	8/2/2014	Patkhaguri	24°11'33.3"	90°00'20.8"	7.10	181	0.002	2.17	0.169	4	7
GW_003	7/2/2014	Pungri, Elenga	24°18'55.9"	89°55'36.0"	6.94	279	0.033	6.66	1.37	4	21
GW_004	4/2/2014	Charghatina	24°17'57.0"	89°35'33.0"	6.98	103	0.024	4.79	0.774	<1	4
GW_005	6/2/2014	Dohokhola	24°15'25.6"	89°29'26.4"	6.96	211	0.020	7.33	0.854	2	5
GW_006	5/2/2014	Boral Bridge	24°12'53.7"	89°22'46.8"	7.13	380	<0.001	0.11	0.587	2	6
DoE Drinking Water Standards					6.5-8.5	1000	0.05	0.3 -1	0.1		150- 600
The Schedule-3(B) of (Standards for Drinking Water) Environmental conservation Rules, 1997 have been considered.											
(BR, 2013-2014)											

[11] Beel is referred to as wet land (low lying area containing water throughout the year). The Chalan Beel is one of the biggest beels of the country situated west of Bangabandhu Setu from Chatmohor to Jamtoil railway stations

[12] The boro rice is commonly known as winter rice. The term boro is Bengali originated from the Sanskrit word "Boro" which refers to a cultivation from Nov-May under irrigated condition.

Groundwater samples were collected during the post monsoon season (January, 2019) from six tube wells located near the Project corridor. The samples were submitted to a laboratory and analysed for pH, total dissolved solids, arsenic, iron, manganese, sulphur and chloride. Analytical results and laboratory certificates are provided in **Annex 4** and summarised in **Table 19**.

Table 19: Groundwater Quality for the Project Area in Post-Monsoon Season 2019

SAMPLE	Water Body	GPS Location		pH	TDS	As	Fe	Mn	SO_4	Cl
I.D.	Crossed/Site Description	Latitude	Longitude		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
GW_001	Begumpur	24° 2' 12.228" N	90° 19' 31.188" E	6.5	71 mg/L	0.001 mg/L	0.07 mg/L	0.03 mg/L	1 mg/L	16 mg/L
GW_002	Elenga	24° 20' 5.388" N	89° 55' 42.816" E	6.4	130 mg/L	0.023 mg/L	1.14 mg/L	1.41 mg/L	1 mg/L	13 mg/L
GW_003	Chala Bazar	24° 23' 9.816" N	89° 40' 8.472" E	6.6	316 mg/L	0.003 mg/L	0.12 mg/L	0.03 mg/L	44 mg/L	83 mg/L
GW_004	Mohammadpur (Chatmohar)	24° 11' 14.064" N	89° 16' 7.932" E	7.0	435 mg/L	0.005 mg/L	0.09 mg/L	0.47 mg/L	2 mg/L	30 mg/L
DoE Drinking Water Standards				6.5-8.5	1000 mg/L	0.05 mg/L	0.3 -1 mg/L	0.1 mg/L	400 mg/L	150- 600 mg/L
The Schedule-3(B) of (Standards for Drinking Water) Environmental conservation Rules, 1997 have been considered.										
(BR, 2013-2014)										

127. Sample results were compared against GoB standards - *Schedule 3(B) of ECR (DoE, 1997)*. In all samples total dissolved solids, arsenic, sulphur and chloride levels were within acceptable limits for potable use. In all samples iron was found to be higher than acceptable limits for potable use, with very high concentrations in GW_003 and GW_005 (>6.5 mg/L). Manganese was found to be higher than acceptable potable standards in all but one sample (GW_001). Elevated iron and manganese levels result from natural subsurface conditions and result in degraded water quality, mostly bad taste.

B. Biological Environment

1. Flora and Fauna

128. **Aquatic biology (Aquatic flora and fauna):** The aquatic environment includes rivers, canals, water bodies and ponds. The rail side agricultural land is mostly inundated during the monsoon season and dries up in the dry season.

129. The Chalan Beel is a permanent water body (wetland) located west of the Jamuna River and crosses approximately 32 km of the Project alignment and is important for a range of activities including fishing, livestock keeping and agriculture. It is one of the largest beel of Bangladesh and comprises a series of beel inter-connected by various channels to form a

continuous 375 km^2 water body with dense aquatic vegetation growth during the monsoon. It extends over four the adjacent districts of (a) Atrai of Naogaon, (b) Singra, Gurudaspour, Baraigram of Natore, (c) Chatmahar and Bhanga of Pabna and (d) Tarash, Ullahpara and Rajgonj of Sirajganj. The beel dries out enormously in winter (December to May) dwindling to 52-78 km^2 and is used as agricultural land for growing irrigated rice and some winter crops. Chalan Beel is fast silting up. In the past it covered an area of about 1,085 km^2 but was reduced to 368^3 km in 1909, of which between 52 and 78 km^2 remained underwater throughout the year. It has since shrunk to only 26 km^2 leaving only patches of water in the central parts. In the early 1900s, Chalan Beel began to be hemmed in by the construction of the Eastern Bengal Railway main line on the west and the Santahar-Bogra branch line on the north. The natural pattern of the water's drainage channels in this area were disrupted by the obstruction caused by the railway construction since railways in these low lands had to be built on high and wide embankments. The rail line over Chalan Beel stretches to 32.31 km from Ullapara (Km 262.08) to Chatmohar (Km 229.77).

130. Biological characteristics indicated the presence of a moderate variety of species and aquatic plants such as (in Bengali) *helencha, hejol, kudipana, kuchuripana, shapla, shaluk, lotus, nol,* solaa *and kalmi.* Aquatic fauna reported in the area includes crabs and oyster/ear shell. No rare or threatened species were identified or recorded in the project area.

131. **Fisheries:** Local villagers reported catching fish in all the water bodies in the Project area, with various species of carp being the most fished. Major fishes in the rivers and canals include carp (rui, catla, mrigal, ghania, kalbaus, kalia), hilsa, catfish (rita, boal, pangas, silon, ayeir, bacha) and snake head (shol, gazar, taki). There are also freshwater shrimp and several other tropical whitefish species. These species are well adapted to high silt loads, elevated water temperatures and low DO levels. Fish are often cultivated in rail side ponds, most often carp and catfish.

132. **Terrestrial Flora:** The most common terrestrial flora around the homesteads and settlements are Rain trees (*Albizia saman*), mango (*Mangifera indica*), coconut (*cocos nucifera*), mahogany (*Swietenia mahagoni*), banana (*Musa sp.*), gogon siris (*Albizia richardiana*), rain tree betel palm (*Areca catechu*) and guava *(Psidiumguajava).* There are some fragmented forested areas near the eastern Project alignment near Joydebpur; however these are not notified as reserved forest. The main tree species found near the Project alignment are (in Bengali and colloquial) *Simul, Sishu, Arjun, Kul, Minjiri, Jarul, Hizal, Sheaora, Khaer and Siris.* The dominant fruit-bearing trees are mango, jackfruit, banana and coconut. Crop-field vegetation includes Aman, which is grown during the wet season, and Boro, which is an irrigated crop grown during the dry winter period. Rabi crops such as mustard and lentils are also grown. Plant species within the Project area include mehgani, arjun, pitali, eucalyptus, bot, jam, akashmoni, auricoliformis, am, kadam, shisoo, koroi, krishna chura, babla, ipil-ipil, shimul and shirish. Weed species include Sessile joyweed (*Alternanthera sessilis),* thorny Amaranth (*Amaranthus spinosus*), Bermuda grass *(Cynodon dactylon),* Smartweed *(Polygonum sp) and* Creeping oxalis *(Oxalis corniculata),* No rare or threatened floral species were identified or recorded in the Project area.

133. **Terrestrial fauna:** There is no notified wildlife habitats within five kilometres of the Project area and, with the exception of the Chalan Beel, there are no significant habitat areas within the Project alignment. Common bird species include crow, myna, cuckoo, kingfisher, pigeon and dove satare, drongo, weaver bird choroi, babui and dahuk. Mammals include fox, monkey, begi, bhodar, heza, and various rodents, Bengal monitor, baghdash and badur. There

are also several species of frog, lizard and snake. No rare or threatened species were identified or recorded in the Project area.

2. Agricultural and Mineral Development

134. Agriculture and small businesses are the dominant sectors of employment for people living along the Project RoW, despite the large-scale movement of labour from agriculture to urban industries, transport and other sectors. Land use within the study area (100 m of either side of the track) is predominantly agriculture.

135. The basin lands are used for irrigated High Yield Variety (HYV) paddy cultivation during the early Amon[13] season. Boro (winter rice) is grown from February through July and Rabi[14], the cooler season rice, between November and April. Two other rice varieties, Amon and Aus[15], are grown throughout the summer. Aman cultivation has the maximum coverage (50%) followed by irrigated Boro (30%) and then other rice species (20%). Other crops include vegetables and horticultural crops. Most of the land in urban areas is associated with housing, industrial, institutional, paddy husking and other purposes such as kitchen gardening. There are no minerals located in the area and no mineral development activities have been identified.

C. Social Environment

136. Land along the Project corridor is rural, semi-urban and urban, with an average density of 1,263 persons per square kilometre. This compares to the average national density of 967 persons per square kilometre. Communities are a mix of rural villages and urban/commercial areas, with approximately 30% of the population living in urban centres. There are no ethnic minority peoples or communities in the Project affected areas.

137. Agriculture is the main source of employment and income, while 10% to 15% of the population is involved in small commercial and business enterprises. Gazipur District has been an industrial hub for garment factories and related businesses. Tangail is the centre for weavers of world famous handloom *sarees* made of both cotton and silk thread with contemporary art motifs and handwork. The District of Sirajganj is renowned for its cottage industries that include weaving, bamboo and cane work, jute and jute goods, goldsmiths, handicrafts, blacksmiths, potteries and woodwork. Pabna is equally famous for sarees and weavers. Ishurdi, the major railway junction in the western zone of Bangladesh Railway, is in Pabna District.

1. Land Requirements and Acquisition

138. The approximately 174 kilometres proposed rail line will be parallel to the existing rail line and will mainly be built on BR lands. However, the socioeconomic survey has identified that approximately 26.973 hectares of private land will need to be acquired for the Project. The substantial part of the affected land is located in Gazipur (8.240 ha), Tangail (11.790 ha), Sirajganj (3.476 ha), Pabna (2.983), and Natore (0.480 ha) districts. Natore will be the least affected district where only 0.480 ha of private land will be acquired. About 50% or 13.688 ha of the acquired land is homestead land and about 36% or 9.755 ha is agricultural land. The remaining land includes fruit garden, water bodies, barren land and commercial structures. It is estimated that a total of 97,000 fruit trees, 173,000 timber trees and 3,400 medicinal trees

[13] Amon is a term used in Bangladesh and east India for lowland rice, grown in the wet season during June to November. Aus is rice, grown in Bangladesh during the early part of the wet season from March to September.
[14] Rabi crops or Rabi harvest refers to agricultural crops sown in winter and harvested in the spring.

will be affected. In addition, 9,200 banana trees, 1,700 papaya trees and 51,000 bamboos will also be affected.

139. The socioeconomic survey also recorded that 4,863 entities (including households, commercial entities and community property resources-CPR) will experience different types of losses due to land acquisition for the Project. Among these, 1440 entities will lose only land and 1,912 will lose residential structures. In addition, 806 entities will lose commercial structures, 118 will lose commercial cum housing structure and 46 will lose other structures. A total of 37 entities will lose trees, 33 will lose CPRs, 26 will lose fishing ground and one will lose access to leased land.

140. **Population and Affected Households (AHs)**: In the study area there are 4,799 households (20,806 persons) that will be affected by the Project. The average AH has 4.34 persons, which is similar to the national average (4.4 as per population census 2011). The number of males and females are 11,252 and 9,554 respectively. The Population age distribution is: below 15 (25.41%), 15-59 (66.09%) and above 60 (8.5%). Children below four years constitute over 6.05% of the total population. Most AHs live in extended families; however, single families are becoming more common due to urbanisation.

141. **Affected Household Occupations**: Some 43% are households are engaged in businesses followed by 20.6% in farming, 13.27% in agriculture labour and 13.25% in paid employment. About 8.34% are housewives taking care of the family and children. Approximately 4.83% are waged labour, factory workers and weavers.

142. **Affected Household Incomes:** Approximately 49.47% of the respondents have an average income of BDT 120,000 per year. Gazipur has the highest income (60.65%) and Natore the lowest income (32.5%). Approximately 34% of the AHs are in the middle income group between BDT 60,000-90,000 per year, with 16% of AHs having yearly earnings of BDT30, 000 per year.

143. **Household Expenditure:** About 45% of the 4,799 AH spent over BDT 120,000 annually and another 40% spent between BDT 60,000 and BDT 120,000 annually. Only 15.4% AH spent below BDT 60,000 annually.

144. **Income Loss:** It is estimated that a total of 1,054 people will lose their jobs because of the loss of business and community structures. Among them 587 are currently employed for more than six months a year and the remaining 467 work for less than six months per year. In terms of number of employees losing jobs in the Project area, Sirajganj, Pabna and Gazipur are the most affected while Natore is the least with only two job losses.

2. Human Settlement in the Right of Way (RoW)

145. Within the RoW there are linear markets, micro industrial units (especially welding) and other businesses. Corrugated sheet shops are common as are pucca (brick wall) structures with reinforced concrete roofs. Block housing areas are scattered within the RoW. People along the alignment are involved in agriculture, day labour, fishing, and transportation. All the land required for the Project is owned by Bangladesh Railway and although most human settlements within the RoW are authorised through leases, there is some illegal occupancy. Most structures are of a temporary construction of corrugated iron, earth and brick.

3. Community Safety

146. Community safety is a significant concern for BR. At present approximately 28 trains pass between Joydebpur and Ishurdi during any 24-hour period. There are 127 level crossings (gates) of different classes[15] along the 174 km stretch classified as: Special Class (8), 'A' Class (6,) 'B' Class (10) and 'C' Class (103). Of the 127 gates only 19 gates are manned ('Special', 'A' and 'B' Classes). Traffic gates are directly controlled by the station masters and the rest are Engineering gates. Safety features consist of manually and chain operated gates for all authorized level crossings.

147. There have been a number of traffic accidents within the Project area caused by ferry operations and water transport (speed boats, manually operated country boats, engine-operated country boats, motor vessels, etc.).

148. The Project runs through 5 districts: Joydebpur, Tangail, Sirajganj, Natore and Pabna. Each district has hospitals and public sector health services, and private medical colleges. All the Upazilas along within the Project area have Upazila Health Complexes (UHCs), with capacities varying between 50 and 100 beds.

149. Each Upazila consists of several Unions and each Union has a Union Health and Family Centre, and a Rural Health Sub-Centre. Service clubs such as Rotary/Lions Clubs and NGOs also arrange temporary healthcare facilities in these areas.

4. Heritage and Culture

150. In the study area, 33 community property resources (CPRs) were identified within the RoW of the Project corridor. These have been confirmed during consultation with local people and also from the information collected from social team of the Consultant. A list of all CPRs has been provided in **Annex 11**.

151. BR will focus maximum efforts on avoiding the PCR and CPRs where possible, or reconstructing them in consultation with the affected communities, local religious leaders and other community representatives.

5. Archaeological, Historical Treasures and Scenic Areas

152. There are no declared (by the relevant authority) archaeological or paleontological sites or structures identified within the Project corridor.

D. The Major Bridges

153. The baseline of each of the 12 major bridges have been briefly described below.

1. Br-23, Boral Bridge, Km 240.976

154. *Water Body Morphology, Geology, Soils and Existing Erosion:* Soils are mainly clay-loam. Flow velocities are relatively low and there were no signs of significant bank erosion;

155. *Hydrology, Drainage and Surface Water Quality:* The river has not been Subjected to flood in recent times. Since the end of winter (February 2014) water has been blocked by

[15] Classes of level crossing are need based. Special class means it has the necessary facilities in the operation of gates followed by A and B. C class gates are basically cattle passes. Usually Special, A and B class gates are manned.

earthen irrigation dams, both up and down stream. There was evidence of water pollution, most likely from wastewater discharges and nutrient runoff;

156. *Flora and Fauna:* Fruit and timber trees are located around the bridge site and consist mainly of mahogany, koroi, acacia, eucalyptus, jackfruit and mango. Animals including jungle cats, jackals, monkeys, squirrels, mongooses, rodents and snakes have been reported. Common fish fauna includes carp, cat fish and local fish species such as Shol, Puti, Tengra, Baim nd Baush (Bangla names). Bird landing sites were not found in the proposed area, but some common bird species were sighted, for example, *chorui, doel, shalik, chil, pecha, kak, tuntuni, bulbuli, kokil* (Bangla names); and

157. *Environmentally Sensitive Areas, Rare and Endangered Species:* The Bridge does not fall under a designated environmentally sensitive area and no endangered flora and fauna species have been reported.

2. Br- 24, Koidanga Bridge, Km 245.400

158. *Water Body Morphology, Geology, Soils and Existing Erosion:* Soils are mainly clay-loam. Flow velocities are relatively low and there were no signs of significant bank erosion;

159. *Hydrology, Drainage and Surface Water Quality*: There were no river impediments or obstructions upstream or downstream of the bridge site. Land is irrigated using river water and groundwater from shallow tube wells. There is a scarcity of drinking water as water levels go down. Water quality is affected by high turbidity and potentially wastewater discharges and nutrient runoff;

160. *Flora and Fauna:* Fruit and timber trees are located around the bridge site and consist mainly of mahogany, koroi, acacia, eucalyptus, jackfruit and mango. Animals including jungle cats, jackals, monkeys, squirrels, mongooses, rodents and snakes have been reported. Common fish fauna includes carp, cat fish and local fish species such as shol, puti, tengra, baim and baush (Bangla names). Bird landing sites were not found in the proposed area, but some common bird species were sighted, for example, *chorui, doel, shalik, chil, pecha, kak, tuntuni, bulbuli, kokil* (Bangla names); and

161. *Environmentally Sensitive Areas, Rare and Endangered Species:* The Bridge does not fall under a designated environmentally sensitive area and no endangered flora and fauna species have been reported.

3. Br-25, Baunjan, Km 247.251

162. *Water Body Morphology, Geology, Soils and Existing Erosion:* Soils are mainly clay-silt. Tidal movements and waves occur during the rainy season and there is stone protection near the existing bridge. There were no signs of significant bank erosion;

163. *Hydrology, Drainage and Surface Water Quality:* The Bridge runs over a beel area; hence water is generally stagnant. The beel is connected to the river in the rainy season. Water quality appeared to be good;

164. *Flora and Fauna:* Fruit and timber trees are located around the bridge site and consist mainly of shimul, khejur, coconut and paikor. Animals including jungle cats, jackals, monkeys, squirrels, mongooses, rodents and snakes have been reported. Common fish fauna includes carp, cat fish and local fish species such as shol, puti, tengra, baim and baush (Bangla names).

Some migratory birds land in the beel during November to February and include chorui, doel, shalik, chil, pecha, kak, tuntuni, and bulbuli (Bangla names); and

165. *Environmentally Sensitive Areas, Rare and Endangered Species:* The Bridge does not fall under a designated environmentally sensitive area and no endangered flora and fauna species have been reported.

4. Br- 26, Dilpashadaha, Km 249.352

166. *Water Body Morphology, Geology, Soils and Existing Erosion:* Soils are mainly clay-loam. Tidal movements and waves occur during the rainy season and there is stone protection near the existing bridge. There were some signs of bank erosion;

167. *Hydrology, Drainage and Surface Water Quality*: There were no river impediments or obstructions upstream or downstream of the bridge site. Land is irrigated using river water and groundwater from shallow tube wells. There is a scarcity of drinking water as water levels go down. Water quality is affected by high turbidity and potentially wastewater discharges and nutrient runoff;

168. *Flora and Fauna:* Fruit and timber trees are located around the bridge site and consist mainly of shimul, khejur, coconut and paikor. Animals including jungle cats, jackals, monkeys, squirrels, mongooses, rodents and snakes have been reported. Common fish fauna includes carp, cat fish and local fish species such as shol, puti, tengra, baim and baush (Bangla names). Some migratory birds land in the beel during November to February and include chorui, doel, shalik, chil, pecha, kak, tuntuni, and bulbuli (Bangla names); and

169. *Environmentally Sensitive Areas, Rare and Endangered Species:* The Bridge does not fall under a designated environmentally sensitive area and no endangered flora and fauna species have been reported.

5. Br-26A, Bonkriyat Bridge, Km 250.863

170. Water Body Morphology, Geology, Soils and Existing Erosion: Soils are mainly clay-loam. Tidal movements and waves occur during the rainy season and there is stone protection near the existing bridge. There were no signs of significant bank erosion;

171. *Hydrology, Drainage and Surface Water Quality*: There were no river impediments or obstructions upstream or downstream of the bridge site. Land is irrigated using river water and groundwater from shallow tube wells. There is a scarcity of drinking water as water levels go down. Water was generally stagnant and water quality is affected by high turbidity and potentially wastewater discharges and nutrient runoff;

172. *Flora and Fauna:* Fruit and timber trees are located around the bridge site and consist mainly of mahogany, koroi, acacia, eucalyptus, jack fruit and mango. Animals including jungle cats, jackals, monkeys, squirrels, mongooses, rodents and snakes have been reported. Fish species include *pabda, boal, baim, puti*. Some migratory birds land in the beel during November to February and include *chorui, doel, shalik, chil, pecha, kak, tuntuni, bulbuli, and kokil* (Bangla names); and

173. *Environmentally Sensitive Areas, Rare and Endangered Species:* The Bridge does not fall under a designated environmentally sensitive area and no endangered flora and fauna species have been reported.

6. Br-27, Dahakula Bridge, Km 253.094

174. *Water Body Morphology, Geology, Soils and Existing Erosion:* Soils are mainly clay-loam and there is stone protection near the existing bridge to control erosion during the rainy season. There were no signs of significant bank erosion;

175. *Hydrology, Drainage and Surface Water Quality:* The River has not been Subjected to flood in recent times. Since the end of winter (February 2014) water has been blocked by earthen irrigation dams, both up and down stream. There was evidence of water pollution, most likely from wastewater discharges and nutrient runoff;

176. *Flora and Fauna:* Fruit and timber trees are located around the bridge site and consist mainly of mahogany, koroi, acacia, eucalyptus, jackfruit and mango. Animals including jungle cats, jackals, monkeys, squirrels, mongooses, rodents and snakes have been reported. Common fish fauna includes carps, cat fish and Local fish species such as *shol puti, tengra,* and *baim* (Bangla names). Bird landing sites were not found in the proposed area, but some common bird species were sighted, for example, *chorui, doel, shalik, chil, pecha, kak, tuntuni, bulbuli, kokil* (Bangli names); and

177. *Environmentally Sensitive Areas, Rare and Endangered Species:* The Bridge does not fall under a designated environmentally sensitive area and no endangered flora and fauna species have been reported.

7. Br-35, Fulijhor, Km 264.768

178. *Water Body Morphology, Geology, Soils and Existing Erosion:* Soils are mainly clay-loam. Flow velocities are relatively low and there were no signs of significant bank erosion;

179. *Hydrology, Drainage and Surface Water Quality:* There are no river bank protection measures or river impediments up or downstream of the bridge site. There was no evidence of water pollution;

180. *Flora and Fauna:* Fruit and timber trees are located around the bridge site and consist mainly of mahogany, koroi, acacia, eucalyptus, jackfruit and mango. Animals including jungle cats, jackals, monkeys, squirrels, mongooses, rodents and snakes have been reported. Common fish fauna includes carps, cat fish and Local fish species such as *shol, puti, tengra,* and *baim* (Bangla names). Bird landing sites were not found in the proposed area, but some common bird species were sighted, for example, *chorui, doel, shalik, chil, pecha, kak, tuntuni, bulbuli, kokil* (Bangla names); and

181. *Environmentally Sensitive Areas, Rare and Endangered Species:* The Bridge does not fall under a designated environmentally sensitive area and no endangered flora and fauna species have been reported.

8. Br-98, Kouli, Km 310.497

182. *Water Body Morphology, Geology, Soils and Existing Erosion:* Soils are mainly sandy-loam. Flow velocities are relatively low and there were no signs of significant bank erosion;

183. *Hydrology, Drainage and Surface Water Quality:* The River has not been subjected to flood in recent times. The river has been blocked for road bridge construction and water levels have been affected by intensive surface and groundwater irrigation. There was evidence of water pollution, most likely from wastewater discharges and nutrient runoff;

184. *Flora and Fauna:* Fruit and timber trees are located around the bridge site and consist mainly of mahogany, koroi, acacia, eucalyptus, jackfruit and mango. Animals including jungle

cats, jackals, monkeys, squirrels, mongooses, rodents and snakes have been reported. Common fish fauna includes carps, cat fish and Local fish species such as *shol puti, tengra,* and *baim* (Bangla names). Bird landing sites were not found in the proposed area, but some common bird species were sighted, for example, *chorui, doel, shalik, chil, pecha, kak, tuntuni, bulbuli, kokil* (Bangla names); and

185. *Environmentally Sensitive Areas, Rare and Endangered Species:* The Bridge does not fall under a designated environmentally sensitive area and no endangered flora and fauna species have been reported.

9. Br-75, Pathaguri, Km 326.985

186. *Water Body Morphology, Geology, Soils and Existing Erosion:* Soils are mainly clay-silts. Flow velocities are relatively low and there were no signs of significant bank erosion;

187. *Hydrology, Drainage and Surface Water Quality:* There are no river bank protection measures or river impediments up or downstream of the bridge site. There was no evidence of water pollution, however water is not suitable for drinking purposes;

188. *Flora and Fauna:* Fruit and timber trees are located around the bridge site and consist mainly of mango, jackfruit, bananas, and coconut, *simul, sishu, arjun, kul, minjiri, jarul, hizal, sheaora, khaer* and *siris*. Animals including jungle cats, jackals, monkeys, squirrels, mongooses, rodents and snakes have been reported. Common fish fauna includes carps, cat fish and Local fish species such as *shol puti, tengra,* and *baim* (Bangla names). Bird landing sites were not found in the proposed area, but some common bird species were sighted, for example, *chorui, doel, shalik, chil, pecha, kak, tuntuni, bulbuli, kokil* (Bangla names); and

189. *Environmentally Sensitive Areas, Rare and Endangered Species:* The bridge does not fall under a designated environmentally sensitive area and no endangered flora and fauna species have been reported.

10. Br-71, Habla, Km 329.355

190. *Water Body Morphology, Geology, Soils and Existing Erosion:* Soils are mainly silty-clay. Flow velocities are relatively low and there were no signs of significant bank erosion;

191. *Hydrology, Drainage and Surface Water Quality:* There are no river bank protection measures or river impediments up or downstream of the bridge site. There was no evidence of water pollution, however water is not suitable for drinking purposes;

192. *Flora and Fauna:* Fruit and timber trees are located around the bridge site and consist mainly of mango, jackfruit, bananas, coconut, *simul, sishu, arjun, kul, minjiri, jarul, hizal, sheaora, khaer* and *siris*. Animals including jungle cats, jackals, monkeys, squirrels, mongooses, rodents and snakes have been reported. Common fish fauna includes carps, cat fish and Local fish species such as *shol puti, tengra,* and *baim* (Bangla names). Bird landing sites were not found in the proposed area, but some common bird species were sighted, for example, *chorui, doel, shalik, chil, pecha, kak, tuntuni, bulbuli, kokil* (Bangla names); and

193. *Environmentally Sensitive Areas, Rare and Endangered Species:* The Bridge does not fall under a designated environmentally sensitive area and no endangered flora and fauna species have been reported.

11. Br-41, Hijaltali, Km 351.340

194. *Water Body Morphology, Geology, Soils and Existing Erosion:* Soils are mainly silty-clay. Flow velocities are relatively low and there were no signs of significant bank erosion;

195. *Hydrology, Drainage and Surface Water Quality:* There are no river bank protection measures or river impediments up or downstream of the bridge site. There was no evidence of water pollution;

196. *Flora and Fauna:* Fruit and timber trees are located around the bridge site and consist mainly of mango, jackfruit, bananas, coconut, *simul, sishu, arjun, kul, minjiri, jarul, hizal, sheaora, khaer* and *siris*. Animals including jungle cats, jackals, monkeys, squirrels, mongooses, rodents and snakes have been reported. Common fish fauna includes carps, cat fish and Local fish species such as *shol puti, tengra,* and *baim* (Bangla names). Bird landing sites were not found in the proposed area, but some common bird species were sighted, for example, *chorui, doel, shalik, chil, pecha, kak, tuntuni, bulbuli, kokil* (Bangla names); and

197. *Environmentally Sensitive Areas, Rare and Endangered Species:* The bridge does not fall under a designated environmentally sensitive area and no endangered flora and fauna species have been reported.

12. Br-14, Ahaki, Km 368.416

198. *Water Body Morphology, Geology, Soils and Existing Erosion:* Soils are mainly silty-clay. There was no bank protection and no signs of significant bank erosion;

199. *Hydrology, Drainage and Surface Water Quality:* There are no river bank protection measures or river impediments up or downstream of the bridge site. Water was almost stagnant or moving very slowly. Water is visibly polluted water with a very unpleasant smell;

200. *Flora and Fauna:* Fruit and timber trees are located around the bridge site and consist mainly of mango, jackfruit, bananas, and coconut, *simul, sishu, arjun, kul, minjiri, jarul, hizal, sheaora, khaer* and *siris*. Animals including jungle cats, jackals, monkeys, squirrels, mongooses, rodents and snakes have been reported. Common fish fauna includes carps, cat fish and Local fish species such as *shol puti, tengra,* and *baim* (Bangla names). Bird landing sites were not found in the proposed area, but some common bird species were sighted, for example, *chorui, doel, shalik, chil, pecha, kak, tuntuni, bulbuli, kokil* (Bangla names); and

201. *Environmentally Sensitive Areas, Rare and Endangered Species:* The Bridge does not fall under a designated environmentally sensitive area and no endangered flora and fauna species have been reported.

1. Hydrology, Drainage and Surface Water Quality

202. **Hydrology and Drainage:** The Project is situated within the Ganges- Brahmaputra-Jamuna River system. The alignment passes through two hydrologic regions, the North Central region and the northwest region. These regions are separated by the Brahmaputra-Jamuna River. West of the Jamuna river topography is relatively low lying, while to the east the topography becomes more elevated.

203. **East (left) Bank:** The dominant rivers are the Turag, Turag Branch, Bangshi and Lohajang rivers. During high flood flows in the Jamuna River, a backwater effect may travel far upstream and thus impact on the hydrology of the rivers crossing the Bangbabandhu Setu East-Joydebpur rail line. The proposed railway line from Joydebpur to Bangabandhu Bridge East has 138 crossings with existing rivers and other drainage channels, creeks or khals. Among these crossings there are a total of five major bridges, 53 minor bridges, and 80 culverts. The eastern bank comprises tributaries of the Jamuna River, which carry rainfall

runoff from the area east of the Modhupur-Bhawal red soil highlands. Flooding is dominated by spills from the Jamuna River.

204. **West (right) Bank:** In the northwest region the dominant rivers are the Rangpur-Karatoa and Dinajpur-Karatoa rivers. Part of the region is also drained by the Bengali River (a right bank distributary of the Jamuna River) and the Boral River (a left bank distributary of the Ganges River). During high flood flows in the Jamuna River, a backwater effect may travel far upstream and thus impact on the hydrology of the rivers crossing the Bangbabandhu Setu West-Ishurdi rail line. The proposed railway line from Ishurdi to Bangabandhu Setu West has 66 crossings. Out of these crossings, there are a total of seven major bridges, 39 minor bridges, and 20 culverts. A 13 km section of railway embankment from approximately Km 245 (Bridge No. 23) to Km 258 (Bridge No.27) is located on the southern part of Chalan Beel.

205. Flows are pronounced during the wet monsoonal season, however during the dry season the smaller tributaries are mostly dry due to low rainfall and water extraction for irrigation. The Chalan Beel[16] is situated in the railway corridor to the west of the Bangabandhu Setu West, and remains wet throughout the year. Generally, ponds remain unchanged from year to year due to rejuvenation during the rainy season.

206. **Water Levels and Discharges:** Annual flood flows for 2.33, 20, 50 and 100 year return periods are presented in **Table 20.**

Table 20: Flood Flows Joydebpur-Ishurdi Rail Section

Rail Section	River	Station	RLFL	RHFL	Distance (Km)	2.33 yr. Flood	20 yr. Flood	50 yr. Flood	100 yr. Flood
Left Bank of Jamuna	Turag	Kaliakoir	6.21	10.48	71.1	7.91	10.05	10.88	11.49
	Turag	Rail Br.			70.06	7.85	10.00	10.82	11.44
	Turag	Mirpur	4.65	8.35	27.93	6.33	7.88	8.49	8.94
	Bangshi	Kawaljani	8.68	12.49	82.65	10.42	12.18	12.88	13.40
	Bangshi	Mirzapur	6.79	11.54	52.65	9.34	10.68	11.20	11.59
	Bangshi	Rail Bridge	-	-	34.40	9.28	10.62	11.14	11.53
	Bangshi	Nayarhat	5.22	9.90	8.65	6.76	8.95	9.80	10.43
	Lohajang	Jugini(R Br.)	10.32	13.79	-	12.18	13.74	14.34	14.80
Jamuna Bridge	Jamuna	Sirajganj	12.94	15.11	-	13.99	15.09	15.51	15.82
	Jamuna	Porabari	10.01	15.14	-	12.26	13.95	14.59	15.08
Right Bank of Jamuna	Bangali	Nalkasengati	10.9	13.49	-	12.07	13.70	14.31	14.78
	Karatoa	UllaparaRly_Cr.	9.97	13.66	-	11.63	13.60	14.35	14.92
	Nangoora	Nangoora Rail Br.	9.84	12.88	-	10.96	12.59	13.22	13.69
	Karatoa-Atrai	Gumani Rail Br.	8.64	12.62	-	10.77	12.63	13.35	13.89
	Boral River	Boral Rail Br.	9.63	12.70	-	10.96	12.38	12.94	13.35

RLFL = Recorded Lowest Flood Level; RHFL = Recorded Highest Flood Level. (RAIL-Rail, 2013)

[16] Beel is referred to as wet land (low lying area containing water throughout the year). The Chalan Beel is one of the biggest beels of the country situated west of Bangabandhu Setu from Chatmohor to Jamtoil railway stations

207. **Surface Water Quality:** Surface water is mainly extracted from khals, canals and ponds and used for washing, bathing and livestock. In the dry season local canals and channels provide water for irrigated boro[17] cultivation and for growing winter crops.

208. Surface water samples were collected from eight locations during the post monsoon season (4-8 February 2014). The samples were submitted to ALS Laboratory and analysed for the presence of total organic content (TOC), total phosphate, total suspended solids (TSS), oil and grease, dissolved oxygen and pH. Analytical results and laboratory certificates are provided in **Annex 4** and summarised in table 21.

Table 21: Surface Water Quality for the Project Areas in Post-Monsoon Season 2014

SAMPLE I.D. (UpS=upstream DnS= downstream)	Date	Water Body Crossed/Site Description	GPS Location		TOC (mg/L)	Total phosphorus (mg/L)	TSS (mg/L)	Oil and Grease (mg/L)	DO (mg/L)	pH
			Latitude	Longitude						
SW_UpS_001	7/2/2014	Turag River (Ahaki)	24°02'11.8"	90°20'37.6"	10.6	0.89	8	<1	7.32	7.78
SW_DnS_002	7/2/2014		24°02'10.5"	90°20'37.1"	10.2	0.88	5	<1	6.57	7.81
SW_UpS_003	7/2/2014	Turag River (Vrengabari)	24°03'48.0"	90°12'40.2"	7.7	0.05	3	<1	6.55	8.5
SW_DnS_004	7/2/2014		24°03'47.9"	90°12'40.0"	8.1	0.06	2	<1	6.73	8.45
SW_UpS_005	8/2/2014	Naligang (Patkhaguri)	24°11'45.1"	90°00'10.5"	7.8	0.08	8	<1	7.22	7.69
SW_DnS_006	8/2/2014		24°11'45.2"	90°00'08.9"	7.7	0.07	6	<1	5.27	7.9
SW_UpS_007	7/2/2014	Louhojong River	24°18'54.8"	89°55'34.6"	2.0	0.16	7	<1	6.31	7.66
SW_DnS_008	7/2/2014		24°18'54.6"	89°55'35.4"	2.8	0.17	5	<1	7.28	7.7
SW_UpS_009	4/2/2014	Fuljhor (Korotoa) River	24°17'56.0"	89°35'36.0"	1.6	0.12	3	<1	7.71	7.9
SW_DnS_010	4/2/2014		24°23'49.0"	89°41'29.6"	1.6	0.12	3	<1	7.73	8.22
SW_UpS_011	6/2/2014	Dohokhola	24°15'26.1"	89°29'21.8"	1.1	0.10	3	<1	6.82	7.59
SW_DnS_012	6/2/2014		24°15'25.5"	89°29'21.5"	1.1	0.10	1	<1	7.14	7.65
SW_UpS_013	5/2/2014	Gomni River	24°13'40.2"	89°25'12.7"	1.7	0.16	40	<1	6.22	8.08
SW_DnS_014	5/2/2014		24°13'40.2"	89°25'14.4"	1.4	0.13	13	<1	7.31	8.05
SW_UpS_015	5/2/2014	Boral River	24°12'53.1"	89°22'45.6"	3.4	0.05	2	<1	6.47	8.02
SW_DnS_016	5/2/2014		24°12'54.2"	89°22'45.8"	3.6	0.13	4	<1	6.79	7.78
					0.2	6	10	0.01	6	
DoE Surface Water Standard for Irrigation									≥5	6.5- 8.5
The Schedule-3(A) of (Standards for Inland Surface Water) Environmental Conservation Rules, 1997 have been considered.										
(BR, 2013-2014)										

209. Surface water samples were collected from four locations during the post monsoon season (January 2019). The samples were submitted to DPHE and BCSIR Laboratory and analysed for the presence of total organic content (TOC), total phosphate, total suspended

[17] The boro rice is commonly known as winter rice. The term boro is Bengali originated from the Sanskrit word "Boro" which refers to a cultivation from Nov-May under irrigated condition.

solids (TSS), oil and grease, dissolved oxygen and pH. Analytical results and laboratory certificates are provided in **Annex 4** and summarised in Table 22.

Table 22: Surface Water Quality for the Project Areas in Post-Monsoon Season 2019

SAMPLE I.D. (UpS=upstream DnS= downstream)	Water Body Crossed/Site Description	GPS Location		TOC (mg/L)	Total phosphorus (mg/L)	TSS (mg/L)	DO (mg/L)	pH
		Latitude	Longitude					
SW_UpS_001	Turag River (Ahaki)	24° 2' 11.796" N	90° 20' 37.572" E	3.02 mg/L	2.67 mg/L	18 mg/L	2.46 mg/L	6.7
SW_DnS_002				3.15 mg/L	2.53 mg/L	26 mg/L	1.92 mg/L	6.8
SW_UpS_003	Louhojong River	24° 18' 54.792" N	89° 55' 34.572" E	2.19 mg/L	0.29 mg/L	15 mg/L	6.57 mg/L	6.7
SW_DnS_004				2.35 mg/L	0.37 mg/L	21 mg/L	5.75 mg/L	6.8
SW_UpS_005	Korotoa River (Fuljhor)	24° 17' 55.968" N	89° 35' 35.988" E	2.09 mg/L	0.83 mg/L	18 mg/L	5.90 mg/L	6.9
SW_DnS_006				2.41 mg/L	0.71 mg/L	15 mg/L	6.04 mg/L	6.8
SW_UpS_007	Khal Near Chatmohor Railway Station	24° 11' 8.664" N	89° 15' 39.852" E	2.95 mg/L	0.65 mg/L	19 mg/L	4.36 mg/L	6.8
SW_DnS_008				2.80 mg/L	0.87 mg/L	34 mg/L	2.44 mg/L	6.7
DoE Surface Water Standard							6 mg/L	6.5- 8.5

210. Sample results were compared against GoB standards - *ECR 1997 (DoE, 1997)*. In all samples concentrations of total phosphate, oil and grease, dissolved oxygen and pH did not exceed GoB standards for potable water. In some samples concentrations of TOC and TSS did not meet potable standards; however, concentrations were within the range acceptable for irrigation, stock watering and industrial use.

V. ANALYSIS OF ALTERNATIVES

A. Alternative to the Project

211. Little consideration was given to planning road or air options to meeting the transportation demand. Not only is the requirement of land for a new or a doubled road very costly, but it would eliminate many hectares of productive agricultural lands, require massive bridge projects, much larger than railway bridges, as well as long and disruptive construction periods. It is also an environmentally unacceptable trade-off.

B. Without the Project Alternative

212. Without the Project, the trains that have operated for the last decade will continue operating without any increase in the level of service or capacity. Running longer trains has been considered, but issues of safety and locomotive capacity, as well as siding capacity would impede efficient operations. Increased passenger demands would continue to be met by buses.

213. Not proceeding with the Project would also negate the requirement for implementing SP3, which relates to relieving severe capacity limitations on the Bangabandhu Bridge across the Jamuna River. Following construction of a new rail crossing across the Jamuna River, the Project is necessary to efficiently feed trains onto the new rail bridge.

214. The existing single track between Joydebpur and Ishurdi is the main commuter and freight line from Dhaka to north Bengal and is also the connection to India via Darsana, with a further connection to India at Jessore. In addition, Ishurdi is an important junction as it provides access to connections to India at Darsana and Jessore, and is the branch-off point for passenger traffic to Khulna (the third largest city in Bangladesh) and Rajshahi, with a future connection through Rohanpur to India. The line running north from Ishurdi also provides a connection to Nepal via India. Without upgrading the Jamuna River crossing (SP3) and installing a second set of tracks between Joydebpur and Ishurdi (the Project), the current level of 26 train sets per day cannot be increased and the current onerous speed and axle restrictions will remain. This would severely constrain future passenger and freight demands with a continued reduction in performance due to insufficient infrastructure.

C. Alternative Alignments

215. Bangladesh Railway considered two alignment options; both within the BR's 100 m Right of Way (RoW). These are:

- *Option 1*: constructing a new track approximately 7.6 m north of the existing rail line; and
- *Option 2*: constructing a new track approximately 7.6 m south of the existing rail line.

216. In determining the preferred rail alignment, the BR survey team considered a range of issues related to economic, technical, safety, environmental degradation, social, and community disruption. The Consultant traversed the track from Joydebpur to Ishurdi and discussed issues with BR personnel and local stakeholders. Comparative analysis was based on following criteria:

- level of environmental disturbance, including physical, chemical and biological impacts;
- interference to the human settlements, and economic activities and structures; direct and indirect impacts on households, and on the integrity of communities;

interference to the social structures e.g., schools, hospitals, primary health clinics, playgrounds and other public facilities;

- minimal interference to cultural structures e.g., places of worship and cemeteries;
- compliance with railway standards for curvature and grading;
- positioning of new bridges to facilitate compliance with alignment criteria for curvature and grading, avoiding interference to sensitive receivers and preventing increased siltation;
- choosing alignment to facilitate release of flood flows; and
- Availability of BR lands.

217. A comparative analysis of the two options is provided in **Table 23**. The likelihood of negative impacts for each criterion was scored between 1 and 5, with 5 being the highest negative impact.

Table 23: Comparison of Likely Impact between Option 1 and Option 2

Environmental and Social Indicators Affected	Likely Impact Option 1 North	Likely Impact Option 2 South
Level of environmental disturbance; noise, smoke, dust	1	2
Interference to the human settlements/structures, economic activities and direct and indirect impacts on households, and on the integrity of communities	1	4
Interference to the social structures e.g., schools, hospitals, primary health clinics, playgrounds and other public facilities	2	4
Interference to cultural infrastructures e.g., worship places and cemeteries	2	2
Compliance with the railway standards for curvature and grading	1	3
Avoiding interference to sensitive receptors and preventing increased siltation following river crossing to facilitate compliance with alignment criteria and grading	2	2
Choosing alignment to facilitate release of flood flows	1	2
Impact considering availability of BR lands	1	3
Likely impact score summation	11 (score 1.4)	22 (score 2.8)
Option rating	1	2
Likely Environmental Impact Scale	1 = very low 2 = low 3 = Moderate 4 = Above average 5 = High	

218. The analysis shows that out of possible score of 40 in 8 criteria the potential negative impacts are much lower in *Option 1* (compared to *Option 2*). Important attributes of *Option 1* are that BR currently owns most of the necessary easement, which will significantly minimise impacts related to land acquisition, resettlement and sensitive areas. Further, in *Option 1* all 'B' Class stations (18) (excluding Ishurdi and Joydebpur) are on the south side of the existing line. There are only three 'D' Class Stations on the north side, which do not have station yards. Therefore the cost for relocating stations is significantly less for *Option 1*. *Option 1* would therefore have significantly lower potential environmental and social impacts than *Option 2*, as well as a lower capital cost. *Option 1* is therefore the preferred Project and is the Subject of this EIA.

D. The Preferred Alignment (Option 1)

219. The proposed double line (new line) between Ishurdi and Joydebpur is designated as the 'Up Line' and the existing line is designated as the 'Down Line'. Key features of the proposed alignment are:

220. The proposed new track will be located on the north side of the existing track (i.e., to the right of the existing track while travelling from Joydebpur to Ishurdi), and is within the existing RoW. Most of the RoW has aneasement width of 30 m, however this reduces to 11 m between Jamtoil and Joydebpur, and some land acquisition will be required.

221. Land acquisition is estimated to be 26.973 hectares (ha). As evident, a total of 13.69 ha of the affected area is homestead land, followed by agricultural land (9.76 ha) and fruit gardens (1.70 ha). In addition, the Project may also entail some indirect impacts such as loss of access to land by tenants and informal occupants, and loss of employment and workdays. Resettlement and compensation have been comprehensively addressed in a Resettlement Plan (RP).

222. The proposed centreline of the new track will be 7 m from the centreline of the existing track and at 12 m at major bridges.

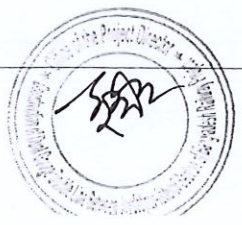
223. Length of block sections between Bangabandhu Bridge East and Joydebpur are constraints to increasing traffic and four new crossing stations (rail loops) are proposed to reduce the block section lengths.

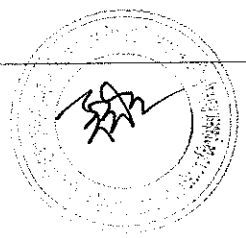
224. The width of the existing embankment top between Ishurdi and Jamtoil is about 5.45 m, and between Jamtoil and Joydebpur about 6.1 m. The embankment top width for the proposed double track will be 13.53 m on straight track and up to 13.98 m on curved track.

225. The alignment is designed to Dual Gauge standards with a speed potential of 100 km/h.

226. There are 145 authorised level crossings between Ishurdi and Joydebpur. It is proposed that 19 level crossings will be upgraded to accommodate increased traffic volumes.

227. Road overbridges are proposed at three locations. Details are contained in the Ancillary Works section of the feasibility study report.





VI. IMPACTS AND MITIGATION MEASURES

228. This section of the Environmental Impact Assessment (EIA) report provides an assessment of the potential environmental impacts resulting from the Project during pre-construction, construction and operations. Wherever possible quantitative assessments have been undertaken, with qualitative evaluations based on past experience.

A. Pre-Construction Period: Project Location and Design

1. Terrestrial Flora (Trees and Plants)

229. The Project will require removal of an estimated 335,152 trees, which includes timber trees (173,103), fruit trees (96,917), medicinal trees and plants (3,413), papaya trees (1,694) banana plants (9,277) and bamboo thickets (50,748). These trees are mostly within the existing BR RoW and on the northern side of the existing rail alignment. Mitigation measures include stabilisation and replanting with similar tree species, which are detailed in **Annex 7**. The number of replacement trees will be up to three times more than the numbers removed. People whose livelihoods are significantly affected by tree removal will be compensated in accordance with the Resettlement Action Plan (RAP).

2. Land Use

230. Land acquisition is estimated to be approximately 26.973 hectares (ha), which includes approximately 13.688 hectares of dwellings and structures, 9.755 hectares of agricultural land and 1.698 hectares of fruit gardens. In addition, the Project may also cause indirect impacts such as loss of access to land by tenants and informal occupants, and loss of employment and workdays. Other landuse impacts may occur due to trimming of roadside vegetation (live fences) and temporary relocation of fence lines at station areas, neither of which would be expected to constitute a significant and permanent impact to land use.

231. Resettlement and compensation have been comprehensively addressed in a Resettlement Plan (RP).

3. Employment and Livelihood

232. The proposal will require removal and relocation of 1,930 residential structures, which range from katcha (earthen house) to three storied buildings. In addition, 806 commercial buildings will need to be relocated.

233. The livelihoods of individuals and communities may be impacted by the Project, through the loss of productive agricultural land and loss of income. In addition, displacement from ancestral homes and loss of employment due to demolition of industrial and commercial structures will be important impacts to mitigate. BR is minimising the loss of these structures through careful realignments at sensitive sites throughout the corridor.

4. Existing RoW and Structures

234. BR Statistical Pocket Book, Site Reconnaissance Survey, and Interviews with BR staff concerning land and loss of structures suggest that these issues will be minor as the whole of the proposed alignment falls within the RoW of Bangladesh Railway. Failure to restrict the design to within the right of way will result in encroachment onto private land. In such a case design must be kept within RoW. If any portion of land becomes subject to the design, consultation with local people is necessary before any land acquisition is enforced. Overall

impacts, however, are likely to be from thedisplacement of stakeholders mostly of lands leased from BR and encroachments onto the railway lands.

5. Heritage and Culture

235. In the Project area (see Section III C), 33 Common Property Resources (CPRs) have been identified as being affected by the construction of the proposed second rail line.

236. The 33 CPRs were identified by local community and Project designers are working to avoid impacting as many as possible, through adjustments to the alignment. The CPRs might be reconstructed by BR according to local wishes. Compensation will be provided according to the guidelines specified in the RP prepared by the Consultant.

6. Infrastructure and Utility Relocation

237. **Overhead Power Line, Telecommunications and Gas Pipelines:** A number of overhead power lines cross the rail corridor, which will need to be relocated. BR will request the electrical authority to undertake this work. These lines and other utilities affected are defined in detail in the feasibility study report.

238. **Safety and Level Crossings**: Operations of at-grade crossings have frequently caused major accidents resulting in severe injuries. They regularly cause serious traffic congestion regardless of location, sometimes blocking traffic even after the train has passed. To mitigate these problems, grade separations will be built at some authorised crossings. In consideration of providing maximum line of sight and movement, it has been proposed to upgrade six 'C' Class crossing gates between Ishurdi and the west end of Bangabandhu Bridge, and 20 'C' Class crossing gates between the east end of the Bangabandhu Bridge to Joydebpur. Further, it is proposed that four overpass bridges be constructed, two on the Ishurdi to Bangabandhu Bridge section and two on the west end of Bangabandhu Bridge to Joydebpur section. Vehicular traffic management systems at level crossings will also be upgraded; and some crossings may be closed, based on usage patterns and their location in relation to the nearest authorised crossing sites. All crossings will be assessed with a view to reducing the total number, without elevating safety concerns. Warning signs will be installed at all unauthorised crossings, indicating the increased traffic and the danger involved.

7. Construction Materials Transportation Plan

239. Transport of construction materials may cause negative impacts related to road degradation, traffic congestion, safety hazards and increased dust and noise problems. A management plan for handling construction materials will be prepared by BR in consultation with the local police. The plan will identify suitable transport routes, appropriate mitigation controls and requirements for monitoring and auditing.

8. Environmental Clauses in Contract and Covenants in Loan Agreements

240. To make sure the contractors address environmental safeguard measures, BR will integrate environmental clauses into the construction contracts.

9. Safeguard Documents, Training in EA and EMP to Contractors and Engineer

241. Starting work without the EIA and its EMP will not provide the intended safeguards to the environment. Therefore, BR will confirm that an electronic and hard copy of the EIA

documentation is distributed to the contractors, upazilas and the Engineer for use during the construction years and beyond.

10. Environmentally Responsive Design Considerations

242. Failure of the design engineers to consider environmentally responsible design that minimises immediate as well as long term impact during the construction and operating periods will jeopardise the implementation. Focus design work on minimising intrusion into natural waters, timing of work to minimise wildlife interference, maintenance of surface runoff and planning location of work camps that minimises short and long term negative effects.

11. Design considerations

243. Designers will consider environmentally responsible designs that minimise immediate as well as long term impacts during the construction and operating periods A focus of the design work will be on minimising intrusion into natural waters, timing of work to minimise potential impacts on surrounding areas maintenance of surface runoff and planning locations of work camps that minimise short and long term negative effects.

12. Station Design

244. Inadequate provision of water supply, sewage, sanitation and garbage management may lead to chronic problems. The design will consider estimated passenger throughput at each station and adequate and appropriate waste facilities to manage all conditions.

13. Bridge Sites

245. There will be 12 major bridges (>100 m span), which will be constructed parallel and to the north of existing bridges. The pre-construction activities in and around bridge sites will include topographic surveys and geotechnical investigations including boring under water. Every effort has been taken to design crossing alignments such that they minimise potential impacts on surrounding areas and river flows.

B. Construction Period Environmental Effects and Proposed Mitigation

246. Construction period effects are those resulting directly or indirectly from a construction activity; be it site clearing or hauling material along a public road or dredging sand from a river. The construction period section of the EMP lists the impacts needing mitigation, the mitigation measures to be applied, where, when and by whom. This section of the EIA identifies how construction-related impacts affect the environment. Secondly, a set of mitigation measures and actions to be taken by the Contractor to avoid or reduce negative impacts on these components of the environment are identified in the EMP and discussed below.

1. Air Quality and Dust

247. Baseline air quality sampling was undertaken along the Project corridor at eight stations providing the baseline against which construction period monitoring will be measured. These results are provided in **Section IV: Description of the Environment** of this EIA report.

248. All earthworks construction, site clearing, materials stockpiling, station demolition, operation of batch plants, and hauling of materials will generate dust and potentially affect the local air shed. Road dust from the construction of rail line and station access roads is likely to be the most significant direct potential impact on the local community. Mitigation measures required of the Contractor will include:

- trucks and rail cars transporting fine materials, soils and wastes to and from the Project site will be covered to reduce the release of dust; andGenerators, compressors, equipment will be shut down when not in use.
- all rock crushing facilities (for ballast production) will have dust suppression technology installed, such as water spray or dust cowling and vacuum systems
- An air emissions monitoring programme is to be undertaken quarterly by the Contractor, according to the plan described in the EMP and the contract specifications and including as a minimum monitoring of NO_2, SO_2, $PM_{2.5}$, and PM_{10}, and
- Site and station access roads, construction and other disturbed areas to be stabilised e.g., with crushed concrete/brick or regularly wet down along heavily used haul roads to reduce dust generation in populated areas.

2. Topography and Landscape

249. The impacts to site topography will be due to the construction of rail embankments, access roads and station buildings, which will rise above known landmarks by as much as seven metres. The surrounding topography is generally flat and comprises agricultural fields and settlements. The low lying Chalan Beel covers approximately 13 kilometres between Jamtoil and Chatmohor, and during the dry season is used for growing rice. The visual intrusion of large piles of embankment materials and ballast will be prominent but temporary landscape elements. Following construction, the new line and stations will be visually integrated with the existing rail infrastructure and no significant long term visual impact is expected. Mitigation measures will include removing stockpile areas as soon as possible, restoration of disturbed areas and tree planting.

3. Surface Water Quality and Hydrology

250. To establish existing water quality in the corridor, baseline surface water quality sampling of water courses crossed by the new line was completed. The results showed that for the most part surface water quality was within DoE standards, with a few parameters exceeding recommended levels (**See Annex 4**).

251. The Project crosses numerous rivers, creeks and the low lying Chalan Beel. Construction activities may impact on waterways crossed due to:

- Sewage discharges and polluted runoff, and waste from work camps and construction operations. The Contractor will be required to implement a waste management plan as described in **Section IX**. The plan includes measures to manage and monitor wastes in accordance with regulatory requirements and best practices. Where necessary additional measures will be implemented to ensure no adverse environmental impacts on surrounding areas and receiving waters;
- River bank erosion is possible if the river width is constricted due to mis- design, incorrect design flows and inappropriate shore pier placement. Bridges have been designed using estimated 100-year flood volumes, which will minimise erosion at the bridge and accommodate flash floods and catastrophic events (if any). During baseline investigations there was minimal bank erosion found at existing bridges and culverts. Consequently, no river training works will be required at the proposed crossing points. However, some river training works will be required on a 13 km section of new track through the Chalan Beel;
- Gully erosion along the exposed track slope during the rainy season may damage field

crops and add to river sediment loads. Stockpiling and placement of embankment materials may also result in erosion of slopes, deposition of silt on crop fields and water bodies. Regular watering, turf and planting native grasses in rows along the track slopes and bridge approaches will reduce the soil erosion risk; and

- River dredging will be undertaken to provide much of the sub-base material for the approximate 174 km long rail embankment. It is estimated that more than five million cubic metres will be dredged. The material is dredged from government-approved sites (permits provided by the Ministry of Water Resources) using a suction dredger. Mostly sand is pumped to the embankment sites in a pipeline (OD 15-25 cm) and discharged onto the ground within the boundary of the embankment and allowed to drain and dry, forming a solid base. Given the high TSS levels in these rivers and that fact that all fish species are well adapted to zero–visibility waters, the dredging operation will temporarily and locally elevate TSS levels downstream of the dredging site. However, this will not create a significant negative impact.

4. Groundwater

252. The Project will require groundwater for use in batch plant operations for bridge structural elements, as well as for potable use in work camps. Groundwater will be pumped from tube wells at least 100 metres deep, which will minimise the potential for depleting shallow aquifers.

253. Approximately 30 work camps will be built to house an estimated 6,000 workers, which will require approximately 180 pit privies. These have the potential for leaching pollutants, mostly nutrients, bacteria and viruses into nearby tube wells. Privies will be appropriately designed and located to minimise the potential for leakages. This will include locating privies well away from water courses and tube wells, and installing impermeable membranes to capture and subsequently treat any leakages. The habit of washing around the periphery of tube wells will be discouraged since this often leads to well contamination and the spread of communicable diseases and signage and designated washing stations will be set up.

5. Noise

254. Potential noise impacts vary based on the noise amplitude, frequency, distance from receivers, site landscape features, topography, presence of obstacles, and meteorological effects. The severity of potential noise and vibration impacts is also linked to the typical background noise and vibration environment e.g., urban or rural. Key Project-related noise sources are the existing train traffic, generators, vehicles, construction equipment, especially pile driving and boring, and human activity.

255. **Screening of noise sources and receptors** - Discussion with design engineers identified the following construction activities that have potential to generate significant noise:

256. Construction of embankments and bridges, which will require new embankment formation, demolition of existing pier and abutments below ground level, excavation, compaction and sheet piling. Numerous culverts will be demolished and reconstructed, and 12 new bridges over 100 metres will be constructed, seven on the Ishurdi-Bangabandhu Setu West section and five on the Bangabandhu Setu East-Joydebpur section.

257. Construction of four new railway stations at Saratnagar, Dilpashar, Boral Bridge and Majhgram while the railway continues to operate. Overpasses will be constructed at each of the stations.

258. **Typical Noise propagation for major works** - It is assumed that peak noise will be generated during bridge piling work occurring at the same time as excavation, bulldozer, filling, and compaction activities. Typical construction equipment and rated noise and vibration levels are provided in Table 24.

Table 24: Noise Rating of Bridge Construction Activities and Equipment

Activity	Plant/Equipment Requirement	No.	Noise Rating (dBA)	% Operating Time
Excavation	32 ton tipper	2	80	75
	20 ton tracked excavators	2	80	75
	20 ton wheeled excavator	1	80	75
Bulldozer	3 ton Mini Digger	1	85	75
Filling	5 ton Dumper and Side Tipping Dumpers	1	88	20
	25 ton Dumpers	3	88	20
Compaction	15 ton Vibratory Roller	1	82	80
Piling	35 ton CFA Piling Rig	1	101	50

259. The equivalent noise level for a typical 10-hour construction period was computed using the equation:

$$L_{AEq,T} = 10 \times \text{Log } 10 \left(\sum p_i x 10^{0.1Li}\right)/T_p$$

W
h
er LAEq, T - the equivalent (energy averaged) continuous A-
e: weighted sound pressure level obtained over the
measurement time interval
Li – is the noise level over that duration, in seconds
Tp – is the duration of total assessment period, in seconds

260. The predicted equivalent continuous A-weighted sound pressure over 10 hours is 92.93 dB(A) at 50 metres from the sources and diverges to 60 dB(A), equivalent to the daytime noise standard for mixed area, at around 667 metres including the background noise. Where necessary non-absorptive temporary/mobile walls will be installed to reduce noise levels to the day time noise standard of 70 dB (A) for commercial areas.

261. Construction of new stations- The construction of new stations will introduce new noise sources from the use of powered mechanical equipment and the carrying out of the construction activities (e.g., erection or dismantling of formwork and hammering) in addition to slowing of trains passing by as it approaches the construction area. **Table 25** provides the noise rating of construction activities for new stations.

Table 25: Noise Rating for Station Construction Activities and Equipment

Equipment/Activity	No.	Noise Level dBA at 10 m from Source	% Acoustical Usage Factor
Concrete Mixer Truck	1	81	15
Dump Truck	2	76	40
Generator	1	73	50
Welder	1	74	40
Formworks	1	88	30
Carpentry	1	90	20
Train passing 8 hours daytime (when train is passing)	18	>90dBA	30

262. The combined construction and train noise level during a 15-hour daytime period from 7:00 am to 10:00 pm was estimated at 73.8 dB (A) at 50 m. Where necessary a three-metre-high noise barrier can be used to reduce noise levels to within the day time noise standard of 70 dB(A) for commercial areas.

263. Noise mitigation measures are included in the EMP (**Section IX**) and include:

- Noise will be measured by the contractor at all sensitive locations quarterly[18] and exceedances will require noise attenuation measures such as temporary baffles, rescheduling or changes to the construction method;
- Investigate any noise-related complaints, record its location and file a single- sheet report with the Engineer. If the complaint is found to be legitimate, i.e., the noise levels measured exceed GoB standards for the land use designation in the area, the contractor must take action to reduce noise, such as posting reduced speed and quite zone signs, diverting haul routes to less densely population roads, erect temporary baffles to reduce construction noise; and
- Undertake noisy (known to exceed standards, such as pile driving) or vibration intensive works during the daytime, where close to settlements.
- The movement of the embankment materials from the dredge deposit sites to the embankment will involve many loads but very short distances since the dredging pipeline is positioned beside the embankment, depositing the sand slurry vary close to where it is needed. Using this method, the noise associated with the movement of large numbers of trucks at no more than 25 km/h is not relevant. the noisy work will come mainly from the construction of embankment, the dredging and transport of embankment materials, station construction and from the upgrading existing rail superstructures such as bridges, and may affect sensitive residential receivers. Where works are required within close vicinity of settlements, it will be undertaken during the daytime. In some cases, some work will have to take place during the night in order to reduce disruption to local traffic which if in sensitive areas such as villages will require temporary noise attenuation measures such as baffles.

6. Terrestrial and Aquatic Flora and Fauna

264. Pre-construction activities will include clearing vegetation replanting and installing appropriate people access features, which are discussed in paragraph 153. Further minor clearing may be required during construction; however, no significant additional impacts to those already described are anticipated. Dredging activities will be localised and undertaken in areas that are well away from sensitive aquatic flora and fauna. During construction measures will be implemented to protect surrounding terrestrial and aquatic flora and fauna. This will include protecting sensitive areas from unnecessary access, minimising sediment and waste discharges and ongoing monitoring of the surrounding area. Details are provided in the EMP (**Section IX**).

265. The proposal will require widening the existing railway embankment through approximately 32 km of the Chalan Beel from Ullahpara (Km 262.08) to Chatmohar (Km 229.98). Of this approximately 13 kilometres from Chatmohor to Dilpasher will require river training works to protect bank stability due to monsoonal wave action. The area of Chalan Beel directly impacted by the proposal will be approximately 64 hectares. As discussed in

[18] Based BR's experience after two years of sampling for the Tongi-Bhairab double tracking Project, and the fact that it is an existing noisy environment, quarterly sampling is all that BR is recommending

Section A.6 the section of Chalan Beel affected by the proposal is water logged during the monsoon season, however during the dry season it is used for agricultural activities. The proposal will not significantly change current drainage, which is controlled by culverts under the existing railway. Mitigation measures will include restricting as much as possible construction activities within the construction corridor, minimising sediment and waste discharges to the Chalan Beel and ongoing monitoring of the surrounding area. Due to the modified nature of this section of the Chalan Beel and proposed mitigation measures it is not expected that the proposal will significantly impact on flora and fauna.

266. Rail bridge construction activities, particularly the in-river pile driving operations, could temporarily impact current practices for capturing fish around bridge sites. However, the environmental monitoring during 2013 and 2014 of the Tongi Bhairab Double Tracking Project, which included intensive in-river pile driving at a number of bridge sites, showed no significant change in water quality and no change in the diversity of and quantity of fish taken by fishers upstream and downstream of these construction sites. Using this project as a guide, the impact on fishers is expected to be marginal.

7. Land Use

267. Pre-construction activities will include land acquisition, which is discussed in Paragraph 154. This will be done in accordance with the Resettlement Plan. Other preconstruction activities include relocating existing infrastructure, are discussed in Paragraph 154. During construction measures will be put in place to minimise direct impacts on adjoining landuse. This will include enforcing constructing activities to designated areas and access routes. Other impacts on adjoining landuse activities relate to noise and dust emissions, and waste discharges are discussed under relevant headings. Construction of bridges may impact on river navigation and measures will be put in place to ensure unhindered movements of country cargo vessels, passenger boats, barges, engine boats, small fishing vessels, etc.

8. Contractor Camp and Yard Management

268. Although the location of the camps is not determined yet, following recommendation shall be followed by the contractor in each of the camp and construction yard areas thoguhtout the corridor. Environmental health issues and disease contamination are common in labour camps. This would stem from poor work camp conditions, inadequate and unsanitary toilet facilities, lack of potable water and sanitary washing areas. Mitigation, as defined in the EMP will involve:

- Weekly compliance checks by BR (it's EU) and the Engineer;
- The contractor will be required to post a cleaning schedule at each toilet and washing facility;
- The contractor will be required to provide potable water (based on WQ tests), sanitary toilet and hygienic accommodation for workers at camp sites at all times and ensure that these facilities are cleaned and disinfected regularly;
- Provide a garbage disposal service such that no garbage or food waste is dumped in the contractor's yard or work camp at any time. There should be no litter or food scraps dumped anywhere but in appropriate bins that are collected and cleaned at least weekly; and
- Ensure provision of PSEs and First-Aid facility at each work camp.
- The work camps and/or construction yards often include fuelling areas which will have to comply with GoB, fuel storage and handling standards. In addition, all fuelling areas

will be required to be equipped with drip pans, proper fuelling nozzles and crank pumps if fuel is dispensed from barrels. Fuelling areas must be located at least 500 m from any housing area.

269. **Vector-borne diseases** - Construction leaves depressions in the ground that allow stagnant puddles to form which are ideal breeding areas for malaria and dengue carrying mosquitoes. This includes outdoor equipment storage, including used tyresStagnant water and puddles, as well as stored construction materials, tyres and empty storage drums are to be inspected every three days to prevent water ponding. This will be required during the entire rainy season and within three days of every major rainfall.

270. **Rail traffic disruption** - The Project activities such as the construction of stations, platforms and platform sheds may temporarily disrupt access paths at railway stations. The Contractor shall construct fences separating the sites at rail stations from public access, and manage passenger movements collaborating with BR dispatch staff.

9. Occupational Health and Safety

271. BR will ensure that the contractor and any subcontractors implement the following mitigative measures:

- Construction workers will be trained in general health and safety matters and on specific hazards of their work;
- Workers will be provided with appropriate personal protective equipment, such as safety boots, helmets, gloves, protective clothing, goggles and ear protection;
- Safe drinking water will be provided to all workers, as confirmed by independent water quality testing and submission or lab results to the Engineer; and
- Contractors are to inform their drivers of the location of noise and safety sensitive areas (CPRs) indicating the 33 sensitive sites identified. In these areas, speed limits will be restricted to 40 km/h and use of vehicle horns and engine breaking will not be permitted at all times, unless in emergency situations.

272. The following labour standards will be enforced -

273. **No hire, use or benefit from child labour** - Child labour (as defined by ILO Conventions 138 and 182) means that no workers under the age of 14 may be hired as general labours, and no workers under the age of 17 are to be hired for hazardous jobs such work on scaffolding, a structures elevated above the ground, etc.;

274. **No bonded labour** - All forms of bonded labour and forced labour, as defined by ILO Conventions 29 and 105 will not be permitted. Forced labour, including prison or debt bondage labour; lending of money (debt slavery) or withholding of remuneration or identity papers by employers or outside recruiters, will be not be permitted on any work sites;

275. **Equal treatment, equal opportunity** - BR expects the contractors to hire workers on the basis of skill and ability to work. There must be equal treatment and equal opportunity (ILO Conventions 100 and 111, and ILO Code of Practice for HIV/AIDS 85) for all who seek employment. No discrimination based on race, caste, origin, religion, disability, gender, sexual orientation, union or political affiliation, or age; no sexual harassment; and

276. **Minimum wage** - BR expects the contractor to pay all labourers and employees according to minimum wage standards as defined in Public Works Department.

277. To that end, the contractor will be required to provide each person hired with a written contract, stating the above and confirming that these conditions are being upheld and include the names and contact information of people to contact within the contractor's organisation, BR and with the Engineer, that any person wishing to file a complaint or table a concern can reach without fear of retribution.

278. BR will instruct the Engineer to undertake a random check of these documents on a monthly basis, report this to BR and take immediate, on-the-spot action if non- compliance is identified.

10. Heritage, Religion and Culture

279. No Physical and Cultural Resources have been identified within the Project area. However, a total of 33 Common Property Resources have been identified throughout the Project area. These CPRs will be minimally impacted due to the construction of the Project.

280. Replacement and relocation to a suitable location will be carried out with the help and consent of the affected local community. Local community and religious leaders will be consulted to determine what modifications may be applied to the works scheduling and methodology to limit these potential impacts. Mitigation measures applied will be based on the joint decision by BR and the local community involved.

11. *Environmental Management Implementation Work Schedule* (EMWS)

281. BR will assist the contractor in preparing the EMWS before the commencement of construction works and monitor compliance with the schedule during construction.

12. Construction Work Areas Decommissioning

282. The Contractor's clean-up of their work camps, operating yards, borrow sites, materials storage areas, etc., can result in problems associated with ground and water contamination, erosion and sedimentation of waterways, and safety issues. Before the final payment is made to the Contractor a decommissioning assessment will be conducted by BR, working jointly with the Contractor. At that time all non-compliant work will need to be brought into compliance, and payment will be released only after BR is satisfied with the Contractors clean-up.

C. Operating Period

283. Major activities during this stage of the project involve operation and maintenance to ensure smooth service of the railway and associated structures. Environmental management measures are included in the EMP (**Section IX**).

1. Environmental Completion Report

284. Environmental expertise will be assigned to obtain, examine and take necessary actions defined in the Construction Period Environmental Completion report.

2. Air Quality and Dust

285. The Project will result in an increase in train movements from the current one per hour to two per hour within six years of the commencement of operations. This will have minimal impact on existing air quality and it is expected that air emissions will comply with National Air Quality Standards. The combination of better equipment, more pollution control devices on the locomotives as the fleet is renewed and cleaner fuel will help to further reduce any air pollution effect due to additional train operations. As discussed in Section VI (F), the

considerable fuel saving resulting from the diversion of road traffic to rail will help to improve current air quality conditions and a positive impact is anticipated. An air quality monitoring programme will be undertaken to establish any changes in emissions as the train traffic increases, which will include sampling during operational Years 1, 3 and 6. Sampling locations will be at selected sensitive receptors and at stations.

3. Surface and Groundwater Quality

286. Surface water pollution during the operating period comes primarily from untreated sewage effluent discharged by passing trains, which then washes into local surface waters. Groundwater contamination could result from poorly dug and inadequately sealed tube wells allowing polluted surface drainage to enter the well and reach the aquifer below. There is also some risk of spillage of fuel and other chemicals from freight trains; however, this latter pollution source has not previously been an issue. Accidental spillage of oil and other chemicals may occur after a train accident with leakage of pollutants into rail side ponds and canals. A spill contingency plan and good maintenance of track and rolling stock will help reduce the risk of such accidental spills, and permit rapid action if an accident does occur. BR is also investigating retrofitting existing cars with holding tanks in order to collect sewage and dispose of it at treatment facilities, and will inspect and ensure that groundwater wells established during construction are secure.

4. Noise and Vibration

287. Train noise along the corridor has been a fact of life for generations and for that reason it was not raised as a significant issue during public consultations. Existing background noise levels are influenced by a range of noise sources, including existing train movements, road traffic, vehicle horns and music from roadside traders. Noise monitoring presented earlier in this EIA above showed that at some station noise levels exceeded DoE limits in silent and residential areas but were generally within DoE limits for commercial and industrial landuse areas.

288. The Project assuming Project 3 is also implemented, will increase the current capacity of the line from 38 to 88 slots per day, with the new track located within 4 m of the existing line (more separation at bridges). The Project would be classified as a Level of Service Class 'B', with a design speed of 100 km/h and with a maximum permissible operating speed of 90 km/h for intercity passenger trains, 80 km/h for Express Mail and 60 km/h for freight trains.

289. The social survey identified 33 Community Property Resources (CPRs) within 50 metres of the rail alignment. These are shown in Table 26. A list of CPRs has been provided in **Annex 11**.

Table 26: Number of Community Property Resources (CPRs) by Category

Category of Community Resources	No. of CPRs
Religious institutions/structures (e.g. Mosque, Graveyard, Eidgah), Educational institutions (e.g. School, Madrasa), Community based associations/institutions (e.g. Samity, Political office), Public offices/institutions (e.g. BADC, LGED, Community clinic, LGI), Cultural Institute, Others (e.g. Shahidminar, Monument, flood shelter), Railway structure, Others (Ticket counter, Public toilet, fish market, NGO office, Grameen Tower etc.)	33 Private 9 Government 24

290. CPRs within 50 metres of the rail alignment will be Subject to resettlement or other mitigation action as presented in the Resettlement Action Plan (RAP). Potential unacceptable

noise impacts for receptors greater than 50 metres for the alignment will therefore require other means of mitigation or compensation.

291. Using the United Kingdom's 1995 Calculating Rail Noise (CRN) parameters, applied in the Cadna (Computer Aided Noise Abatement) version A 4.4 noise modelling software (http://www.datakustik.com/en/products/cadnaa) the 45, 55 60 and 70dBA noise level contours were estimated for years 2014 (current), 2024 (commissioning) and 2034 (maximum capacity). Results are shown on **Table 27.**

Table 27: Estimated Rail Noise for future Railway Operating Scenarios

Year	2014 (64)	2024 (84)	2034 (156)
Train sets	32	42	78
2-Way daily train movements	64	84	156
Noise Level (dBA)	**Distance from rail alignment (metres)**		
45	524	649	outside boundary
55	139	185	253
60	60	82	120
70	7	11	19

292. Findings show that the 60 dBA contour, which represents the preferred night- time maximum noise level, is currently at about 60 metres either side of the track. When the new track is commissioned in 2024 this increases to 82 metres and then further increases to 120 metres at maximum capacity in 2034. Notably the 70 dBA contour only increases to 19 metres from the alignment at peak capacity.

293. This modelling did not include the noise attenuation measures being introduced as part of BR's railway design, namely incorporating rubber padding under the rail sleepers, continuous welded rail and the use of disk or composite block brake shoes, instead of the existing brake shoe systems. These measures will reduce noise levels by 6-9 dBA. Further, the consultant has encouraged BR to undertaken regular surface grinding of the track which further reduces rail noise by 4 dBA. This noise reduction means that at peak capacity the receptors at a distance greater than 50 metres from the alignment will experience noise levels within allowable limits for both day and night time conditions.

294. In addition to proposed noise attenuation measures, BR will attempt to enforce a 50 m no–build residential noise and safety corridor. Agriculture and industrial commercial operations may be permitted inside this zone, but with BR permission, on a case by case basis.

295. Following commissioning of the new track a noise monitoring programme will be undertaken to establish actual noise levels on receivers and any requirements for further attenuation measures. These actions are defined in the EMP and Subsection H of the technical specifications. Other general mitigation measures will be an aggressive replanting programme along the rail embankments.

296. Vibration within 50 m of track side will be an issue, causing windows to rattle and poorly constructed walls to crack when a train passes. BR is relocating dwellings within the 100 m wide RoW and therefore reducing this issue. Vibration will be fully attenuated outside that 100

m wide corridor. Noise and vibration attenuation designs related to sleeper pads, ballast placement and train operating limits will also help to keep noise and vibration as unobtrusive as possible.

5. Flora and Fauna

297. Following construction an extensive replanting programme (see **Annex 7**), will be undertaken over several years, which will require on-going monitoring and maintenance During operations any direct impact on vegetation will relate to trimming overhanging branches and removing undergrowth that may affect train operations. Potential sewage and chemical discharges will be carefully controlled and no significant impacts on aquatic and terrestrial flora and fauna are expected. The EMP will include measures to monitor and protect flora and fauna and, if necessary, further mitigation measures will be implemented to minimise any potential damage.

6. Health and Safety

298. **Level Crossings:** Operations of at-grade crossings have frequently caused major accidents resulting in severe injuries, and even deaths. Further, operations of at- grade rail crossings can create serious traffic jams regardless of location, sometimes causing traffic congestion after the train has passed. These problems may increase has a result of doubling train frequencies from the current one per hour to two per hour within six years of the commencement of operations.

299. To mitigate potential problems at level crossings, grade separations will be built at three of the 15 authorised crossings. The other crossings will be assessed in terms of provision of maximum line of sight and, where feasible, moved to more appropriate locations. Where necessary vehicular traffic management will be monitored and, where necessary, upgraded. Ten unauthorised level crossings will likely be authorised and upgraded but some may be closed, depending on accident rates and location. Warning signs and gate lights will be installed and warning bells will be operated by the approaching train. Warning signs and disclaimers will be posted at all authorised crossings.

300. **Accidents involving Hazardous Materials:** BR has no plans to transport hazardous materials on this rail line. However, BR's hazardous materials transport protocol (Spill Contingency Plan) will be in force and updated as required to improve the emergency response in the event of a spill.

7. Heritage and Culture

301. Proposed new rail operations will not significantly impact on heritage and cultural sites. Communities along the rail route have become accustomed to current rail operations over a long period and doubling train movements over the next six years will not have a significant adverse impact on heritage and cultural aspects.

8. Station Operations

302. The Double line will attract more passengers and therefore create more waste to manage. Poor waste management can lead to polluted conditions. Designs will include appropriately sized facilities for sewage, waste management and utility services. Monitoring will determine the effectiveness of waste management facilities and, if necessary, facilities will be upgraded to accommodate actual waste throughputs. BR will also coordinate with other utility agencies to provide connections to station buildings, as required.

9. Cumulative Effects

303. Doubling the frequency of train movements will lead to additional noise from locomotives and rolling stock and air emissions from diesel combustion and dust generated during the dry season (December to mid-April). The cumulative effect from increased train movements will therefore be more frequent noise events and increased air particulates, particularly during the dry season. It is estimated that most of these impacts will be generally confined to BR's rail corridor, however wider areas may be affected Subject to prevailing weather conditions. A range of mitigation measures are proposed, which will limit potential impacts to acceptable standards. These include improved track maintenance, vegetation planting and placement of gravel at trackside to reduce the dust and improved locomotive maintenance and replacement of aging units. Further, the new tracks are expected to divert thousands of vehicle kilometres from roads to the railway, which will significantly offset the added pollution of locomotive operations. Finally, BR's on-going work to relocate dwellings and inhabited structures out of the BR RoW (as per the LAP and RP) will take most people out of the higher noise zone, which is within 50 m of trackside.

10. Bridges

304. During the operational phase the impact associated with the bridges will be during repair, as well as discharge of any raw sewage from the train as it passes across the bridge. BR is looking into stopping the sewage discharge by installing holding sewage holding tanks on trains. Maintenance work will be infrequent and will minimally affect the water since most components of new bridges do not need painting. However, any maintenance will be planned to take place during the driest part of the year when many of the river channels are dry.

D. Climate Risks

305. Bangladesh is located between the Himalayas in the north and the Bay of Bengal to the south. Climate change poses significant risks for Bangladesh due to increasing temperatures, more variable precipitation, more extreme weather events, and sea level rise. Major flooding events on low lying areas are expected to become more frequent as a result of increased glacial melting in the Himalayas. These changes are already having significant impacts on the country's infrastructure and people's livelihoods.

306. Bangladesh is categorised as a least developed country (LDC) and is therefore exempt from any responsibility to reduce GHG emissions. However, there is increasing recognition within Bangladesh that reducing GHG emissions will be fundamental in underpinning an effective response to climate change impacts. Managing climate change is addressed in a number of strategy initiatives, such as the 'National Action Plan on Adaptation' (NAPA) of 2005, and the 'Bangladesh Climate Change Strategy and Action Plan' (BCCSAP) of 2009. In addition Bangladesh has established a number of funding agencies (such as the Bangladesh Climate Change Trust Fund (BCCTF) and the Bangladesh Climate Change Resilience Fund (BCCRF)), with the prime objective of funding climate change mitigation and adaption initiatives.

307. The Joydebpur-Ishurdi railway line crosses numerous watercourses, including the low lying Chalan Beel. Climate change is likely to increase flooding along this route, resulting in structural damage of embankments and infrastructure, increased erosion and disruption of rail operations. This will result in increased maintenance costs and lost operational revenue.

308. BR has incorporated a range of mitigation measures to address potential climate change impacts. These include:

- Identifying vulnerable areas and incorporating design elements to mitigate flood and erosion effects. This includes incorporating river training works on the section of embankment traversing the Chalan Beel and around bridge abutments. This will also improve protection for existing structures;
- Ensuring existing drainage flows are not significantly changed as a result of the new track. Where ever practicable existing drains will be improved by installing larger and more efficient culverts;
- Using the most updated rainfall data and flood estimates to determine bridge deck and embankment heights; and
- Consideration of predicted future cyclone strengths when designing structural elements, particularly bridges.

309. In summary BR has carefully considered the implications of climate change, particularly as it relates to increased flooding and associated impacts on major infrastructure. A conservative approach has been undertaken to design embankments and bridges to protect against more frequent and larger flood events. A positive impact will be the reduction in GHG emissions from vehicular traffic due to the more efficient use of trains to move people and goods.

E. Carbon Footprint and Greenhouse Gas emissions

310. Carbon footprint is commonly described as the total amount of equivalent carbon dioxide (CO_2) and other greenhouse gases (GHG) emissions released per unit time as a result of the Project. The life cycle includes pre-construction through the operating and maintenance phases (DOE, 2013).

311. Regional air quality may benefit since the added rail service will divert road traffic to rail[19]. However, during the operational stage, the localised air quality will be impacted due to the generation of air emissions by the added diesel train locomotive traffic. Locomotive emissions would result from the combustion of diesel fuel that will mainly generate particulate matters (TSP, PM_{10} and $PM_{2.5}$), Carbon Monoxide (CO), Carbon Dioxide (CO_2), Nitric Oxide (NO), Nitrogen Dioxide (NO_2), Sulphur Dioxide (SO_2), Volatile Organic Compounds (VOCs), and trace levels of non-combustible VOCs (benzene) (Transport for New South Wales, 2012). Air emissions were calculated for the number of locomotives operating along the 174 km line in 2014 (12), 2025 (15), 2028 (18) and 2031 (24). The average diesel consumption was taken to be 4.5 l/km. Air emission estimates are shown in **Table 28.**

Table 28: Annual Air Emissions by Locomotives of Joydebpur and Ishurdi Section

Locomotive	Average	No of	Average Annual Diesel Consumption -DC (Litre)	Emissions Factor* – EF (g/Litre)			Main Engine Emission (DC*EF) (tons/year)		
				NO_x	PM	CO	NO_x	PM	CO
Passenger and Container 2014	2,500**	12	(4.50L*/km)*172 km*360 days*24 trips = 6687360	83.48	2.10	8.54	614.28	15.45	62.84
2025	2,500	15	(4.50L*/km)*172 km*360 days*30 trips = 8359200	83.48	2.10	8.54	767.85	19.31	78.55

[19] Estimates of these potential transfers from road to rail has been discussed in the EIA report

2028	2,500	18	(4.50L♦/km)*172 km*360days*36 trips = 10031040	83.48	2.10	8.54	921.42	23.17	94.26
2031	2,500	24	(4.50L♦/km)*172 km*360days*48 trips = 13374720	83.48	2.10	8.54	1228.56	30.90	125.68

♦ *estimated by Rolling Stock Engineer ; Source Motive Power Division BR. Consumption 3 L/Km for Passenger Train and 7 L/Km for Goods Train*

♦♦ *Gross main engine HP identified in Joydebpur-Ishurdi section ranges from 2000 to 3000. Source: Rolling Stock Engineer; Motive Power Division BR.*

* *EF used for this study has been derived from NESCAUM study. 1 ton = 908,800 grams*

312. Using 2025 as the first year of operation when about three additional train sets (total of 15 trains or 30 trips) will be in service, the estimated fuel saving through the diversion of vehicles from road to rail is estimated to be 20.02 million l/yr20. During that same year the estimated consumption of the 30 trips operating on the line is 8.4 million l/year. This translates into a net saving of more than 11.6 million l/year when deducted from the estimated saving due to diversion. The diverted traffic in 2031, when 24 trains (48 trips) are in operation would save an estimated 30.05 million l/year of diesel fuel.

313. During that same year the estimated consumption of the 30 trips operating on the line is 13.4 million l/year. This means a net saving of 16.65 million l/year of fuel.

314. Based on these data, by 2031, the fuel saving of 16.65 million l/year translates into a saving of 44,600 tonnes of CO -e/year (using a CO -e emission factor of 2.68 kg2CO -e/l of diesel fuel consumed), and accounting for the fuel used for the additional train trips. By increasing locomotive efficiency or retiring the old locomotives for new ones, these already significant savings would be further increased.

F. Summary of Potential Impacts

315. The existing rail lines from Joydebpur to Jamtoil and Jamtoil to Ishurdi have been operating for 16 and over 100 years respectively. The surrounding physical and social environment has adapted to the railway's operations. Safety at rail line crossings remains an ongoing issue, however there are no other significant issues identified during this study. The Project will result in a range of construction related impacts associated with vegetation clearing, land acquisition, relocation of residences and other business and cultural buildings, socio-economic losses as well as potential impacts related to dust and noise emissions, pollution of surface and groundwater, traffic congestion and poor waste management. During rail operations there will be a doubling of train movements with attendant increases in air particulates and noise emissions, additional safety issues at level crossings and potential waste water discharges and diesel/oil spills. All environmental impacts can be mitigated and in many cases avoided by careful planning. Managing and mitigating potential impacts have been addressed in an Environmental Management Plan (EMP) and Resettlement Action Plan (RAP). Implementing these mitigation measures will effectively minimise potential impacts to acceptable levels. However, should monitoring identify any significant issues then additional measures will be identified and implemented.

G. Environmental Benefits and Enhancements

[20] Data on fuel consumption and diversion for Project is 20.02 million litres per year (Economic Analysis Report for PROJECT).

316. **Traffic Diversion and Fuel Savings:** The Project will result in diverting road traffic to rail, which will significantly reduce road congestion, fuel consumption and air emissions. It was estimated that in 2026 there will be a diesel fuel saving of 16.65 million l/year. This is equivalent to 44,600 tonnes of CO_2-e/year. By increasing locomotive efficiency or retiring the old locomotives for new ones, these already significant savings would be further increased.

317. **Improved Railway Stations:** The two new stations will be designed to facilitate access, in particular for elderly and disabled passengers. New and existing stations will incorporate solar panels thereby reducing energy requirements from the grid by up to 30%. Rainwater will also be collected and stored in a cistern or tank above each station, and used for all non-potable purposes. This will reduce the need for groundwater extraction and will provide savings on energy used to pump water.

318. **Enhancement of Environment by Planting:** The Project will require removal of approximately 335,000 trees; however, this will be offset by planning up to 1,000,000 trees. The additional trees will have significant benefits related to improved biodiversity, GHG reduction and to those people who rely on harvesting fruits.

VII. ENVIRONMENTAL GRIEVANCE REDRESS MECHANISM

A. Introduction

319. The description of a grievance redress mechanism (GRM) is not required under the GoB environmental legislation but is mandatory for any DOE-funded project. The DOEs environmental safeguard requirements were carefully considered during preparation of this EIA.

320. Grievance redress refers to the set of actions available to anyone who may be negatively impacted by a project. The overriding principle of any GRM is that it must be non-threatening, easily accessible, quick and impartial, and delivering decisions to the complainant in an unbiased manner. GRMs have been developed for many past donor- funded projects and have been successfully adopted by the GoB[21]. The GRM described in this section builds on that success.

B. Formation and Operation of the Grievance Redress Committee (GRC)

321. Grievance Redress Committees (GRCs) will be formed in each Upazila Parishad (UZP) through which the project passes through. For this project there are 11 Upazilas and 2 Pourashavas as shown in **Table 29**.

Table 29: List of Stations with Unions and Upazilas

Name of Station	Pourashava/Union	Upazila	Name of Station	Pourashava/Union	Upazila
Joydebpur	Gazipur Pourashava	Gazipur Sadar	Dilpashar	Dilpashar	Bhangura
Mouchak	Mouchak	Kaliakoir	Saratnagar	Bhangura	Bhangura
Mirzapur	Mirzapur	Mirzapur	Boral Bridge	Parbhanguria	Bhangura
Mohera	Mohera	Mirzapur	Bhangura	Parbhanguria	Bhangura
Tangail	Gharinda	Tangail Sadar	Guakhara	Parshadanga	Chatmohar
Bangabandhu Setu East	Durgapur	Kalihati	Chatmohar	Mulgram	Chatmohar
Bangabandhu Setu West	Saidabad	Sirajganj Sadar	Gafurabad	Danthia Bamangram	Chatmohar
Shahid M. Mansur Ali	Saidabad	Sirajganj Sadar	Mooladuli	Mulatali	Ishurdi
Jamtoil Jn.	Jamtoil	Sirajganj	Majhgram	Duaria	Lalpur
Salap	Pancha Krushi	Ullapara	Ishurdi Bypass	Gopalpur	Lalpur
Ullapara	Durganagar	Ullapara	Ishurdi Jn.	Ishurdi Pourashava	Ishurdi
Lahirimohanpur	Mohanpur	Ullapara			

322. The project will likely trigger both environmental and social impacts and therefore the GRCs will need to be able to address both areas. Prior to the start of construction BR will meet with the UZP Chairperson to request the establishment of committees with the understanding that they will have to meet when complaints are received. As a minimum the composition of the GRC will be as follows:

- BR Regional Director or Representative — GRC Chair and convener

[21] Padma Bridge, Jamuna Multipurpose Bridge Project, Bhairab Bridge Project

▪ Upazila Parishad Chairman or Representative	GRC Committee member
▪ Female member of concerned ward(s) of the UP	GRC Committee member
▪ Local NGO Representative(Social)	GRC Committee member
▪ DoE representative from District (Environment)	GRC Committee member
▪ Representative where grievance was filed	GRC Committee member

323. When dealing with environmental matters, the GRC should have five permanent members. In order to convene a GRC meeting a quorum of 5 people will be required. Further, the GRC would only be convened if direct communication between the Contractor, the complainant and the Engineer cannot solve the issue quickly. Once the complaint reaches the GRC, the GRC has two weeks to render a decision, based on discussion with all parties involved. The GRC will be used as the third step when filing a complaint.

C. Grievance Procedure

324. To function in a fair and transparent manner, the GRC conditions of operation will form the framework for the decision making process. The process for GRM will be as follows:

325. **Step 1:** The complainant will be advised to first attempt to settle the complaint through direct communication with the other party either in person or by telephone, and a call to the local BR office. If the discussion with the Complainant/Community is successful, the Contractor will be responsible for undertaking corrective measures as defined in the grievance decision and recording the decision and filing that with BR, via the Engineer or the BR ESU.

326. **Step 2:** Should the complaint not be addressed within a week, the next step is to notify the Upazila office and BR of the unresolved issue. The Upazila official will then communicate either to the Contractor or BR and a solution will be discussed with the complainant within one working week. If more time is required, The Upazila or BR should communicate directly with the complainant describing the reasons of the delay.

327. **Step 3:** If Step 2 fails to resolve the issue within two weeks of the receipt of the complaint the GRC should be formed and a formal hearing undertaken. At this point a decision must be rendered within two weeks or the complainant's concerns will be deemed correct and immediate mitigation actions will be required and fully executed within five days of the end of the two-week period.

328. **Step 4:** If Step 3 fails to resolve the issue, the complainant may proceed to legal arbitration. Figure 4 shows a schematic presentation of the GRM. All GRC decisions will be recorded by the GRC, and sent to the local and head office of Bangladesh Railway. The operating conditions of GRC are as follows:

- GRC meetings must be announced and held locally;
- the complainant must be given the opportunity to appear before the GRC prior to or during the GRC decision meeting;
- maximum time for resolution should be one month;
- GRC decisions should be based on majority vote, and should adhere to the objectives defined in the EIA's Environmental Management Plan (and Resettlement Action Plan) and related Construction Contract Specifications;
- GRC will not deal with any matters pending in the court of law;
- any resolution/decision must, as a first priority, deal with eliminating the source of the issue resulting in the complaint and secondly finding ways to mitigate the effect to the

satisfaction of the complainant; and

- Even if only one complaint is received, a GRC meeting must be called within the month the complaint was lodged. Figure 20 shows the flow diagram of Grievance Redress Mechanism.

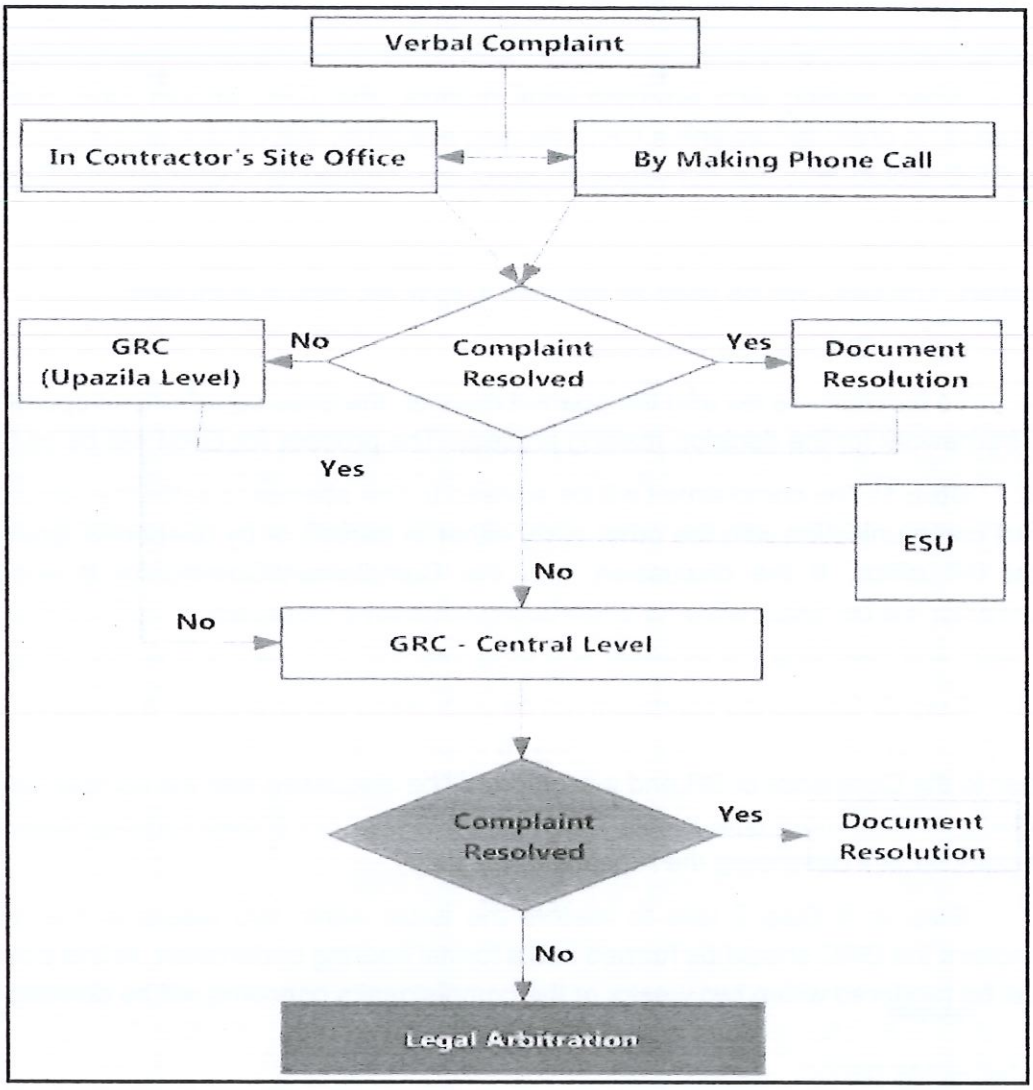


Figure 28: Environmental Grievance Redress Mechanism

D. Publicizing the GRM and GRC

329. Prior to commencing construction, BR or its representative will publicise the establishment of the GRCs, the process, and contact information, via posters placed at every UZP office involved, as well as at every train station in the Project corridor. The poster(s) will be in Bengali and posted within 30 days of the start of construction. The BR representative will check at least monthly to insure that the posters are prominently displayed and provide clear contact instructions and numbers. This procedure and monitoring will be reported in the semi-annual monitoring report submitted to the DOE.

E. Reporting

330. Any grievance filed with the GRC, must be reported in the Semi-Annual report to the Engineer who will then submit a consolidated report to DOE, via BR.

F. Construction Workers Grievance

331. At construction sites, work camps and on-the-job, labourers and other unskilled hired employees of the Contractor can have little recourse when either their living conditions are badly degraded, they are not paid according to agreement, or basics, such as potable water, are not supplied. Under this contract, as part of the written agreement with each hire, the contract or letter of assignment with the work will include the name and contact information of whom within BR and/or the Engineer the person can call with a concern and a second statement indicating that the Contractor will not penalise the worker for reporting a complaint. If the employee is penalised by the Contractor, the Contractor will be levied a fine equal to the employees contract duration from the time of the incident to the end of the contract period, which will be paid to the complainant.

332. In the contractual agreement the employee will be provided specific contact information for a responsible person within BR and the Engineer who will address grievances.

VIII. INFORMATION DISCLOSURE AND PUBLIC CONSULTATION

A. General

333. The purpose of public consultation was to invite comments and detailed suggestions on any environmental and social issues considered relevant by the people living in the area of the Project corridor. The public consultation programme is an essential part of the environmental assessment process and has been undertaken both formally and informally throughout the study to ensure that the knowledge, experience and views of stakeholders and the general public are taken into account during the EIA work. The information shared and recorded (See **Annex 5**) has, where relevant, been applied to justify design, alignment, construction methodology and timing changes, in order to reduce predicted negative effects. This approach satisfies statutory consultation requirements of the DOE.

334. Bangladesh Railway issued letters to relevant Upazila Nirbahi Officers (UNOs) to assist the Consultant to organise public meetings in respective areas of the upazilas (see **Annex 8**). The purpose of public meetings was to invite suggestions, views and objections on matters relating to environmental aspects of the proposed Project. The copy of the draft and final EIA report, and executive summary of the EIA report in both English and Bangla have been placed at the following places for public reference.

- Local offices of Bangladesh Railway at Joydebpur, Mirzapur, Ullahpara and Boral; and
- Head office of Bangladesh Railway, Rail Bhaban, Dhaka.

B. Location of Public Consultation

335. A total of five regional level Project Disclosure consultations were arranged in May, 2014 and another four EMP consultations were arranged in June 2019. Location and date of Project disclosure consultations and EMP disclosure are given in Table 30 and Table 31 respectably.

Table 30: Detailed public consultations information on May 2014

PC. No.	Public Consultation (PC) Locations			Project Discloser Meeting (PD)	
	District	Upazila	Venue	Date	Time
PC-01	Pabna	Ishwardy	Muladuli Union Parishad Office,	26 May 2014	10:30 AM -12:00 PM
PC- 02	Sirajganj	Saidabad	Saidabad Union Parishad Office	26 May 2014	03.30 PM -5.00PM
PC- 03	Mirjapur	Gorai	Gorai Union Parishad Office	27 May 2014	10.00 AM – 11.30 AM
PC- 04	Ullahpara	Pabna	Pabna UNO Office	27 May 2014	03:00 PM – 4:30PM
PC-05	Nikrail	Tangail	Nikrail Union Parishad Office	29 May 2014	10.00 AM – 11.30 AM

Table 31: Detailed EMP disclosure meeting on June, 2019

PC. No.	EMP Discloser Meeting Locations			EMP Discloser Meeting (ED)	
	District	**Upazila**	**Venue**	**Date**	**Time**
PC-01	Pabna	Ishwardy	Muladuli Union Parishad Office,	13/ 06 /2019	10:30 AM -12:00 PM
PC- 02	Sirajganj.	Jamtoil	Union Parishad Office, Kamarkhando,	13/ 06 /2019	3:30 PM -5:30 PM
PC- 03	Tanggail	Kalihati	Ellenga Pourashava, Upozila,	20/06/2019	03:30PM-05:30 PM
PC- 04	Gazipur	Kaliakoyir	Mouchak Union Parishd	20/06 /2019	10:00 AM -12:00 PM

C. Consultation Methodology

336. **Stakeholder Identification Process:** As part of the consultation process, BR invited stakeholders for discussions on the Double Line Project. BR has sent letters of invitation to the UNOs belongs to the Project corridor. A list of participants including staff of DoE, Local Government, Bangladesh railway staff, local women's groups, farmers, businessmen, Project-affected people whose lands border the rail line, have been considered. A list of participants and number of representatives from each category have been detailed in Table 32.

Table 32: Type of Participants for Public Consultation

Sl.	Participants category	Suggested No. of Participants
1	Pourashava Mayor /Union Chairman	2
2	Vice –chairman -women	1
3	Commissioner - Women	2
4	Ward commissioner	3
5	Project Affected People (include both rural and urban)	15 (50% women if possible)
6	Farmer	5
7	Businessman	3
8	Teacher	2
9	Doctor	2
10	NGO representative	2
11	Student	2
12	Local government official	3 (1 representative from Department of Environment)
13	Bangladesh Railway personnel	2
14	Other	1

337. At least 40 persons were invited but the meeting was open to whoever wanted to attend. An attendance sheet of each consultation has been filled in and minutes taken and summarised (see **Annex 5**).

338. **Selection of Public Consultation Locations:** During the field visit held between 23 and 25 June 2013, five locations were selected for public consultation, based on the significance of those areas in terms of resettlement, loss of agricultural lands, loss of trees, and disturbance to livelihood issues.

339. Most of the public meetings were chaired by a UNO/UP representative and/or BR representative. The Consultant disclosed the Project information to attendees and supervised the consultation and public participation process.

340. **Responsibility:** The Consultant assigned a dedicated secretary for each consultation whose responsibility was to record participant comments and submit a report including attendance sheet with signature according to the prescribed format (see **Annex 5**). The Consultant provided answers to most of the queries and issues raised by the participants.

D. Presentation and Discussion of Stakeholder Consultation

341. During the Project disclosure meetings in 2014 and 2019, area maps, drawing and photos of crossing as well as an implementation timetable was tabled and those attended were invited to make comments & suggest changes or just raise issues, which was recorded. The Consultants provided answers to most of the queries and concerns raised by the

participants and, on behalf of BR, indicated specific actions that would be taken. Each consultation had minutes recorded and attendance taken with signatures. BR will assess the input and take actions where relevant, adjust the approach to the EIA and address stakeholder's concerns. Detailed meeting minutes of each of the stakeholder consultations was recorded with the information of each of the attendees and shown in **Annex 5. Figures 21 to 24** show participation of local people and representatives of Government and non-Government organizations during the Project discloser meeting.

Figure 29: Discussion on Technical Details of the Project. Ellenga Paurashava, June 2019

Figure 30: Introduction of the Project by ENRAC.Muladuli, June 2019

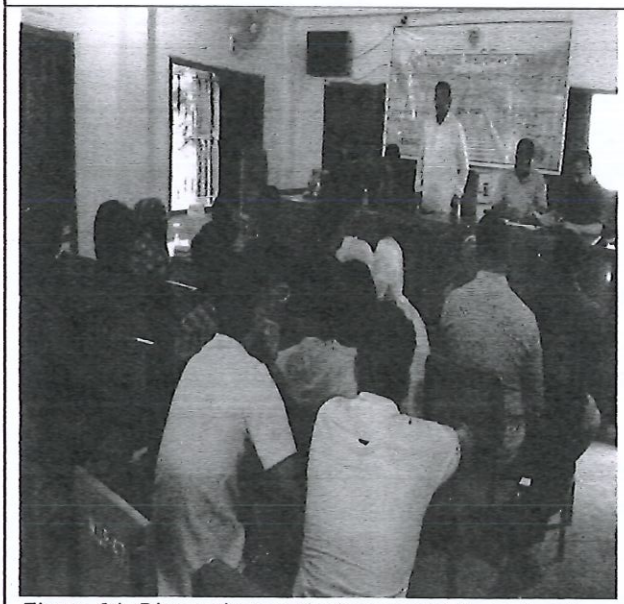


Figure 31: Discussion on Environmental Impact and Mitigations with Project Affected People.Mouchak, Kaliakoir, June, 2019

Figure 32: Comments from Project Affected People. Jantoil, June, 2019

A. Summary of Comments by Participants

342. The summary of the comments/suggestions shared by the audience are presented in Table 33. The comments rose during public consultation at five locations along the Project corridor and BR's replies (provided by the Consultant) are summarized as well.

Table 33: Summary of Public Hearing Issues and Proponent's Response

Number	Issue Raised	Reply from BR/Consultants
PC-1: Project Disclosure Meeting		
1	Social forestation along with the other trees and vegetation will be affected due to the Project activities	The affected person will get proper compensation. Three trees will be planted instead of one which will be demolished during the construction period
2	Due to the implementation of the Project, existing environment will be imbalanced. What will be the solution for existing educational institute, mosque, temple etc	It is true that existing environment will be affected but it is manageable through implementation of appropriate mitigation measures i.e. watering twice a day to reduce dust pollution.
3	This Project is very positive for the local people. It is an asset for us. In near future Bangladesh will be added with India, Myanmar and other nearest countries through the implementation of this type of Project. It will make our economy strong.	Thank you for your good positive comments. Consultant noted the point of optimism.
4	As a result of this Project agricultural land will be affected. It will be a very good decision, if Government can make employment opportunity for affected person.	Government obviously thinks about the affected people. The affected person will get proper compensation and they will be added in the construction actives.
5	Many homeless people have taken shelter in the land of BR. They work in different industry. They have no other place to stay. Before starting the Project, accommodation should be available for these helpless people.	Consultant noted the point of optimism.
6	Long -time construction will cause dust and noise pollution; what type of action will take to reduce this pollution	Proper mitigation measure will be taken during construction period to minimize dust and noise pollution
PC-2: Project Disclosure Meeting		
7	Regarding waste management take necessary measures to keep the environment clean along with assurance of proper compensation for private land acquisition and resettlement, alternative settlement for the affected person should be include in the Project	It is true that existing environment will be affected but it is manageable through implementation of appropriate mitigation measures i.e. watering twice a day to reduce dust pollution. Consultant noted the point of optimism.

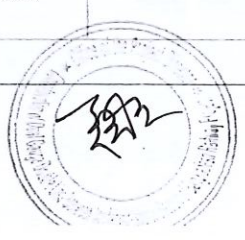
Number	Issue Raised	Reply from BR/Consultants
8	We respect the decision of our Government This Project will be constructed by thinking of loss and benefit of local people.	Government thinks about general people. Necessary changes are included in several times to respect of the local people.
9	Cutting trees causes the negative impact on environment. How it will be managed? What will be solution about the tree owner?	If one tree will need to cut then three seedlings will be planted. Compensation will be given to the tree owner.
10	Due to the implementation of the Project, number of trains will increase which will pose more accident. Also. At the point of level crossing where actually most of the accident happen, will proper guard system incorporate in the proposed Project	For movement of people there will be a number of underpass and overpass. In the point where many people cross the railway, these underpass and overpass will be constructed over this place. All the existing level crossing will be improved to avoid accident with proper guard system.
11	Lack of underpass and overpass accident is increasing day by day. In the new Project should add more underpass and overpass.	Consultant noted the point of optimism.
12	Long-time construction will cause Dust and Noise pollution, what type of action will take to reduce this pollution	Proper mitigation measure will be taken during construction period to minimize dust and noise pollution
13	Many shops, market, houses are located in the railway right of way, and if the Project is within the area what will the owner do or get compensation.	Consultant noted the point of optimism.
PC-3: Project Disclosure Meeting		
14	Tree plantation plan is very appreciable to protect the environment and vegetation cover.	Thank you for your suggestion. We have plan for tree plantation. It will be three to four times higher than cuttings trees.
15	The Project deserves to be applauded. To progress development of the country such kind of Project are very important. But special care should take in the level crossing where most of the railway related accident meet.	Thank you for your good positive comments. Consultant noted the point of optimism.
16	How to determine the value of the land?	A separate team is working for the social and resettlement issues
17	How about the land acquisition due to the implementation of the Project especially in congested densely populated areas? Who	Land acquisition will be minimum. Bangladesh railway have maximum land for the Project. It will need a small amount of land acquisition for the Project. If land acquisition is required,

Number	Issue Raised	Reply from BR/Consultants
	will bear the cost of land acquisition?	the Government will determine the land price on the basis of market price. The price of the land to be paid according to that rate.
18	Good drainage system will be needed. Without it water logging/congestion will be a major problem.	Consultant noted the point of optimism.
PC-4: Project Disclosure Meeting		
19	Such kind of Projects are very necessary for our economy. But a large number of trees will be cut for this Project. So, the number of planting trees should be doubled compare to cutting trees.	Thank you for your suggestion. We have plan for tree plantation. It will be three to four times higher than cuttings trees.
20	We will get benefit from the Project. We can go different area very fast if the Project will be implemented. The local people co-operate with you for this Project.	Thank you for your suggestion.
21	During the construction period, a lot of garbage will be generated. Proper action should be taken against garbage. Along with it huge sound pollution will be occurred during construction time.	Our Consultant noted the point of optimism and sound barrier will be made available in the construction area. Low noise machine will be used for construction.
22	Has any step for the poor people who will be affected by this Project? The landless people who live in the land of BR, what will be the solution for them?	A rehabilitation committee will solve the problem. They will call meeting for several times with local people until solve the problem. The affected people will get priority for employment during the construction period.
PC-5: Project Disclosure Meeting		
23	We respect the decision of our Government This Project will be constructed by thinking of loss and benefit of local people.	Government thinks about general people. Necessary changes are included in several times to respect of the local people.
24	Due to the implementation of the Project, number of trains will increase which will pose more accident. Also. At the point of level crossing where actually most of the accident happen, will proper guard system incorporate in the proposed Project	For movement of people there will be a number of underpass and overpass. In the point where many people cross the railway, these underpass and overpass will be constructed over this place. All the existing level crossing will be improved to avoid accident with proper guard system.
25	Good drainage system will be needed. Without it water logging/congestion will be a major	Consultant noted the point of optimism.

Number	Issue Raised	Reply from BR/Consultants
	problem.	
26	Social forestation along with the other trees and vegetation will be affected due to the Project activities	The affected person will get proper compensation. Three trees will be planted instead of one which will be demolished during the construction period
PC-1: EMP Disclosure Meeting		
27	Ensuring proper compensation to the actual Project affected people for which monitoring the whole compensation programme is very necessary.	Consultant noted the point of optimism. This will be informed to the rehabilitation committee.
28	Fast construction is expected. Long term construction will cause health hazards due to air, water and noise pollution to the local people.	The construction activity will run according to the Environmental Management Plan which ensure that a very impact will be faced by the locality.
29	Take precautionary steps to minimize the damage of public infrastructure, fisheries and agricultural sector.	A number of mitigation plans are included with the EMP of the Project. These will help to avoiding huge losses of infrastructure and other assets like fisheries, agriculture and tree cutting etc.
30	At the time of construction period the drainage system can easily get blocked and which will create water logging. So special measure must be taken.	All of the construction activities will be done with a view to mitigate every negative impact. Precautionary measure will be taken in order to prevent water logging.
31	Safety system at all level crossings must be ensured.	Consultant noted the point of optimism.
32	Waste generated during the Project period should be disposed of properly.	Waste management plan will be followed to minimize waste related damages.
33	It's a good initiative by Bangladesh Government and they appreciated it and will cooperate during implementation.	Thank you for your positive comments.
PC-2 EMP Disclosure Meeting		
34	Water logging during the construction period will increase the miseries of the local people. So, the whole construction process should be maintained in a proper way along with ensuring proper drainage system.	Rehabilitation committee works for the compensation process.
35	They appreciated Bangladesh Railway for the rail Project which is a long cherished dream for the local people. They expressed their optimism to the successful competition of the Project.	Thank you for your positive comments.
36	The tree plantation plan is appreciated. Moreover,	Consultant noted the point of optimism.

Number	Issue Raised	Reply from BR/Consultants
	suggestion is given to plant trees which have very negligible timber value so that people do not cut them later.	
37	During the land acquisition process, only influential people got the additional compensation. So, the whole compensation process should be handle with special care.	Consultant noted the point of optimism. This issue will be referred to the rehabilitation committee.
38	Many shops, markets, houses are located in the Khas land, if the Project in the area, what will the owner do?	Rehabilitation committee works for the compensation process.
39	Fencing system along the rail route is needed for the safety of the students of Sariakandi Girls School and local people during and after the Project.	Consultant noted the point of optimism.
40	Is the design is available for the local people? It would help the local people to understand their losses.	The detailed design will be provided before the construction starts.
41	The Project will generate waste materials, dust and noise. Necessary measure should be taken such as waste management, sound barrier, water spraying, etc.	BR is concerned about the environmental impacts. So here environmental impacts is one of the major consideration. The mitigation measures will be prescribed in the Environmental Management Plan.
42	Fencing system along the rail route is needed for the safety of the students of Sariakandi Girls School and local people during and after the Project.	Consultant noted the point of optimism.
43	What is the source of land filling defined in this Project? How river bank erosion along three major river bridges will be mitigated?	The source of the land filing will be mostly the river dredging materials. A separate EMP is prepared for major bridges and is will be available with EIA documents
PC-3 EMP Disclosure Meeting		
44	Though the Project will be beneficial for the local people but what is going to happen to the mosque, madrasah and graveyard fell into railway land.	A separate team is working on this issue. Consultant also noted the point of optimism.
45	We respect the decision of our Government This Project will be constructed by thinking of loss and benefit of local people.	Government think about the general people. Necessary changes are included several times for minimizing the losses of the local community.
46	Is the design is available for the local people? It would help the local people to understand their losses.	People can see the design before it will be finalized.

Number	Issue Raised	Reply from BR/Consultants
47	Construction materials are requested to keep away far from the agricultural land. Along with this construction of barriers alongside the rail track in the populated area is requested to avoid accidents.	Consultant noted the point of optimism.
48	Construction activities should be closed at the rainy season to avoid water congestion and local sufferings.	Consultant noted the point of optimism.
49	The road which will be harmed due to heavy vehicle movement during construction should be repaired after the construction is done.	Consultant noted the point of optimism.
50	Take necessary measures to keep the environment clean. Sound and air pollution during the construction and operational period should be minimised.	The mitigation measures will be prescribed in the Environmental Management Plan.
PC-4 EMP Disclosure Meeting		
51	Construction sound / vibration will hamper local market and households. Is there any plan to compensate for that?	The solution will be prescribed in the Environmental Management Plan (EMP)
52	As most of the accidents took place within the level crossing. Safety issues are very important. Foot over bridge, overpass, underpass, advanced rail crossing with traffic signals and signs.	Consultant noted the point of optimism.
53	Priority should be given to the local and poor people with opportunities of working during construction. Proper tree plantation must be done on the slope of the embankment of railway.	Consultant noted the point of optimism.
54	Due to the construction work, the existing road will be damaged along with traffic congestion. So, the roads should be widening and maintained till the end of the Project.	Consultant noted the point of optimism.
55	Government must ensure harassment free compensation and involvement of local leaders is a must for handling this issue properly.	Consultant noted the point of optimism.



Number	Issue Raised	Reply from BR/Consultants
56	Due to recent scarcity of ground water all of the construction activity should be handled with proper care.	Consultant noted the point of optimism.
56	The Project will be beneficial for the local people. Along with that the mitigated measures shared on the meeting is appreciated.	Thank you for your positive comments.
57	Is it possible to take any precaution for the railway noise protection?	Sound Barrier will be made in the construction area. Low noise machine will be used for construction.

B. Consultation Outcomes

343. Project Disclosure Meeting –Five public consultations were arranged to disclose the Project. The respective number of participants in the five Project disclosures meeting were PC -1: 31 (93.5% male and 6.5% female), PC-02: 64 (89% male and 11% female), PC-03:41 (97.5% male and 2.5% female), PC-04: 34 (82.3% male and 17.7% female). PC-05: 83 (74.7% male and 25.3% female) In relation to the groups invited, the attendance was reasonably successful in Project disclosure meetings. Table 34 shows the ratio of participants in three consultation meetings.

344. EMP Disclosure Meeting- Another set of four public consultations were arranged focusing on EMP disclosure, were also useful in getting feedback from stakeholders on where the EMP was adequate and where changes were necessary. The respective number of participants in the four EMP disclosures were PC -1: 49 (95.09% male and 4.1% female), PC-02: 37 (97.3% male and 2.7% female), PC-03:35 (82.9% male and 17.1% female), and PC-04: 39 (79.5% male and 20.5% female). In relation to the groups invited, the attendance was reasonably successful in EMP disclosure meetings. Table 34 and Table 35 shows the ratio of participants in consultation meetings.

Table 34: Stakeholder Attendance (Male/Female) in Project Disclosure Consultations

Agency or Participant Affiliation	Location									
	Mooladuli		Saidabad		Gorai		Ullahpara		Nikrail	
Consultations on Project Disclosure	M	F	M	F	M	F	M	F	M	F
Pourashava Mayor /Union Chairman/ UNO	2	0	2	1	1	1	1	1	2	1
Ward commissioner/UP member	3	1	3	2	4	0	6	2	5	4
Project Affected People (include both rural and urban)	8	0	4	0	7	0	3	1	8	1
Farmer	1	0	10	0	10	0	3	0	20	0
Businessman	5	0	1	0	1	0	2	0	5	
Teacher	0	0	1	2	1	0	0	0	1	3
Doctor	0	0	2	0	1	0	0	0	2	1
NGO representative	3	1	5	0	3	0	1	1	5	5
Student	1	0	8	0	2	0	1	0	7	4
Local government official	2	0	4	1	1	0	3	0	5	0
Bangladesh Railway personnel	2	0	4	0	2	0	2	0	1	1
others Group	2	0	14	1	7	0	6	1	1	1
Subtotal (gender wise)	29	2	57	7	40	1	28	6	62	21
Total	31		64		41		34		83	

Table 35: Stakeholder Attendance (Male/Female) in EMP Disclosure Consultations

Agency or Participant Affiliation	Location							
	Muladuli		Jamtoil		Ellenga		Mouchak	
Consultations on Project Disclosure	M	F	M	F	M	F	M	F
Pourashava Mayor /Union Chairman/ UNO	1	0	1	0	1	0	0	0
Ward commissioner/UP member/ UP personnel	1	0	11	0	3	1	2	2
Project Affected People (include both rural and urban)	8	2	3	1	8	2	6	2
Farmer	11	0	4	0	3	1	4	0
Businessman	13	0	12	0	4	0	6	0
Teacher	0	0	0	0	1	1	0	0
Doctor	0	0	0	0	2	0	1	0
NGO representative	0	0	1	0	2	1	0	0
Student	3	0	1	0	2	0	6	2
Local government official	6	0	2	0	0	0	0	0
Bangladesh Railway personnel	0	0	0	0	0	0	0	0
others Group	4		1	0	3	0	6	2
Subtotal (gender wise)	47	2	36	1	29	6	31	8
%	95.9	4.08	97.3	2.7	82.9	17.1	79.5	20.5
Total	49		37		35		39	

345. Overall, participants were supportive and recognised the need for the Project given the current demand for a double line in the study area. They feel the Project has national and international interest that will bring economic development to the country. The summary of consultation outcomes is provided below:

- People in general will benefit;
- Employment opportunities will increase;
- There will be market enhancement;
- There will be air pollution, soil pollution, water pollution and sound pollution;
- Damage to property during construction period may occur;
- Heavy vehicles will cause road damage; communication will be hampered;
- Natural resources including water bodies, rivers and biodiversity will be affected;
- Resettlement problems will arise;
- Traffic jam will increase and sensitive structures will be affected;
- Construction camps may cause health hazards; and
- Alignment through residential and commercial area will cause property loss.

C. Project Benefits Perceived

346. The proposed developmental activities will result in improvement of infrastructure as well uplifting the social structure in the area. The people residing in the nearby areas will benefit indirectly. It is anticipated that the proposed development will provide benefits for local residents during the construction phase as well as during the operational stage.

1. Construction Phase

347. **Employment:** The Project will be constructed over a period of 48 months and require approximately 6,000 persons, most of whom would be unskilled workers. These construction workers will be taken from the local study area to the extent possible. The Project will therefore stimulate local employment and service sectors.

348. **Community Services:** The construction Contractor will employ local people to the extent possible in order to reduce the need for additional infrastructure. In addition, the Contractor will develop the necessary infrastructure, for example, water supply, sanitation, sewerage, medical facilities, etc., for catering to the needs of the Project personnel and their families. The local people will benefit indirectly by these developments.

349. **Improvement of Existing Communication System:** All relevant roads and bridges will be inspected prior to Project construction and will be improved if necessary to take any additional truck loads required for the Project.

2. Operational Phase

350. **Economy - Employment and Income:** Additional staff will be employed during the operational phase, with most of the skilled and unskilled/semiskilled personnel sourced from within the Project area as well as local employment opportunities the Project will have indirect benefits associated with increased business servicing opportunities.

351. **Environment:** A tree plantation programme will be implemented to increase local afforestation and biodiversity, as well as providing shadow and fruit trees. Through this programme, villagers will obtain shadow and fruits trees.

352. **Social:** Most of the participants are optimistic about the Project and are looking forward to perceived benefits related to job opportunities, better communication and services, local market enhancement and improved lifestyle. Representatives from different groups are highly motivated to help this Government initiative and agreed to cooperate for the Project's success.

D. Addressing Stakeholder Concerns

353. Key issues and concerns identified through the consultation process, and the means by which they have been assessed and addressed in this EIA report is provided in **Table 36.** These matters have also been translated in practical actions which are contained in the associated Environmental Management Plan (refer to **Section IX**).

Table 36: Addressing Key Stakeholder Concerns

Key Stakeholder Concerns	Addressing Stakeholders Concerns
Potential impacts to the existing environment.	A detailed Environmental Impact Assessment (EIA) has been undertaken investigating potential impacts to all aspects of the existing environment including surface and groundwater, flora and fauna, air quality and noise. Mitigation measures have been proposed for all Project activities which have the potential for significant negative impacts on the existing environment. **Section IV** of this report provides baseline information for the existing environmental conditions **Section VI** provides a detailed assessment of potential impacts and mitigation measures **Section IX** provides an EMP where practical actions are proposed in order to reduce potential impacts
Potential impacts of noise on the community.	Noise readings were recorded to assess the existing noise conditions. It was observed that noise impacts will be much lesser than a greenfield Project as the study area already has an operating rail line. However, potential impacts have been assessed, and mitigation measures have been provided in **Section VI** including: • Undertaking noise-generating construction works during the daytime (rather than night-time) whenever possible; • Liaising with local community leaders to negotiate specific mitigation measures for sensitive areas such as mosques or schools, which are within the potential noise impact zone; and Investigating any noise-related complaints and–if complaints are valid–providing mitigation

Key Stakeholder Concerns	Addressing Stakeholders Concerns
	measures on a case-by-case basis.
Potential impacts on crop production and surface water bodies.	**Section VI** provides an assessment of activities which have potential for significant negative impacts on agriculture and water, and provides specific mitigation measure to reduce the potential for impacts to occur. This includes: • Installing effective sanitation and waste management systems; • Applying appropriate protocols for the safe transport, handling, use and storage of hazardous substances such as fuels; • Clearly delineating the Project sites in order to reduce the potential for over-clearing of crop land; and • Managing dredging material to reduce the potential for sedimentation/ siltation of surrounding cropland; **Section VI** also provides an assessment of potential impacts to site surface water bodies, including relevant mitigation measures. These include: • Utilising groundwater bores as a water source, rather than pumping from surface water bodies; • Complying with the requirements of Schedule 10 of the ECR regarding discharge of wastewater from the Project sites; • Monitoring water quality within the Study Area on an ongoing basis; and • Managing potential erosion in order to reduce the potential for sedimentation of waterways
Potential impact on livelihoods for farmers and sharecroppers currently using land to be acquired.	All landholders and sharecroppers will be provided compensation in accordance with – at a minimum – relevant Bangladesh legislation such as the *Acquisition and Requisition of Immovable Property Ordinance 1982*.
Potential for increased risk of accidents on the local roads as a result of the Project and road upgrades.	Potential impacts, such as road accidents, were assessed in **Section VI**, and management measures are provided in **Section IX**. Key recommended mitigation measures include: ▪ Developing a Traffic Management Plan and driver code-of- conduct for the site, and enforcing speed limits and other road safety regulations; ▪ Informing Project drivers of sensitive areas where the chances of a collision are higher e.g. schools, markets and madrasas; and ▪ Liaising with community representatives to inform them of increased traffic volumes in certain areas.
Potential for the utilisation of local labour and local business	Local labour and local businesses will be engaged wherever possible.
Potential compensation process: Adherence to laws; and Fair, timely and adequate compensation for loss of land, crops, livelihood, etc.	The requirements of relevant Bangladesh legislation such as the *Acquisition and Requisition of Immovable Property Ordinance 1982* set the minimum requirements for the compensation process. BR will adhere to this process to provide fair, timely and adequate compensation for loss of land, impacts to livelihood, damage to property etc.
Concerns were raised over safety and security of the Project.	Potential impacts to the health and safety of the local community, and relevant mitigation measures, are provided in **Section VI**.

Key Stakeholder Concerns	Addressing Stakeholders Concerns
	▪ Proper traffic sings and signals will be developed in construction areas; ▪ Visible signs and vest will be worn at all times when construction goes on at night; ▪ Work camps will be under periodic monitoring to reduce any health concern; ▪ Sprinklers will be used for dust suppression; and ▪ Proper safety equipment will be used for staff safety.

E. Follow-Up Programme

354. During the five public consultations, a number of issues were raised and representatives of Bangladesh Railway and the Consultant assured participants to follow-up the following issues with them as and when ready.

- Draft EIA report will be shared with the Project affected people;
- Detailed location map will be shared with Project land requirements;
- A tree plantation to replace felled trees during construction will be provided;
- Issue of river bank erosion will be referred to the relevant team of experts (Hydrology and RTW); and
- Issue of rehabilitation of and compensation to PAPs will be referred to the Social Safeguards Team.

F. Conclusion

355. The effectiveness of the EIA is directly related to the degree of continuing involvement of those affected directly or indirectly by the Project. During the construction stage, the Contractor will organize stakeholder consultation meetings periodically involving relevant parties of this Project. During operation stage of the Project, BR should continue this discussion.

IX. THE ENVIRONMENTAL MANAGEMENT PLAN

A. General

356. This Section presents the Environmental Management Plan (EMP) for the Project. The EMP defines a set of mitigation and monitoring actions to be taken, in response to potential impacts predicted to take place during the pre-construction, construction and operating period of the Project. The EMP describes well known and best available mitigative actions to be taken to prevent negative impacts from taking place and if that is not possible to mitigate them to an acceptable[22] level.

357. The main objectives of the Environmental Management Plan are:

- to provide mitigation measures to reduce or eliminate negative impacts;
- to provide measures to off-set or compensate irreversible[23] negative impacts;
- to enhance and maximise positive impacts;
- to define environmental monitoring measures designed to measure compliance with standards and norms and the measure the effectiveness of the mitigation measures implemented;
- to provide institutional arrangement for the implementation of the EMP; and
- to present an implementation schedule of the EMP activities.

358. The EMP will be the main tool with which to manage environmental impacts by preventing impacts from occurring, off-setting the negative effects with best available mitigation measures and enhancing the positive impacts where possible.

359. Based on the identified impacts and recommended mitigation measures as recorded in the EIA, a detailed EMP has been prepared. It addresses all impacts and mitigation measures grouped by the Project phase they are likely to occur in, namely the pre-construction, construction, and operation period. The mitigation measures are considered as successful when the severity of the impacts has either been eliminated or the residual effect complies with the environmental quality standards, policies, and legal requirements set by DoE and DOE. The success is measured via the monitoring programme to be conducted during construction and operating periods of the Project.

360. The EMP (**Table 37** and **Table 38**) will be the main tool with which BR will manage environment impacts by applying technically credible measures and in timely manner. The mitigative measures are considered successful when the impacts have either been eliminated or the residual effect complies with the environmental quality standards, policies, and legal requirements set by DoE. Mitigative measures are tracked via the monitoring programme, which is described in the second (**Table 38**) of two EMP tables, and focuses on construction and operating period impacts.

361. As agreed with DoE, the construction of any large bridge (>100 m spans) which under DoE regulations would normally require their own EIA, and which DoE has exempted BR from doing, will be presented in more detail and with mitigative and monitoring requirements.

[22] Acceptable is defined as an impact that is within GoB permissible standards

[23] an impact that the environment cannot return to its original state from, e.g. the extinction of an animal or plant species

B. Environmental Management Plan - Project Phases

1. Pre-Construction Period

362. Pre-construction will result in land disturbance and tree clearing, however this will be mitigated by minimising disturbed areas and implementing an extensive tree planning programme.

363. The Project will require the construction of four new stations as well as improved access to existing stations. The EMP underscores BR's actions to make sure the designs and alignments are sensitive to local conditions and wishes.

2. Construction Period

364. BR identified mitigative and monitoring actions that will need to be implemented if significant construction-related effects are to be minimised (see EMP **Table 37** and **Table 38**). The following construction activities are likely to trigger negative effects which have been addressed in the EMP:

- Unrestricted movement of machinery and vehicles;
- Earthwork and railway embankments construction;
- Rail and loop/siding development;
- Station access road construction;
- Bridges crossing structures, culverts and any training works;
- Installation of signalling and interlocking system, platforms, foot over bridges at stations, platform sheds and level crossing safety facilities;
- Poor housekeeping practices by the Contractor; and
- Failure to properly implement an occupational health and safety programme.

365. An important aspect will be the effects stemming from the placement of the 3.5-7.0 m high embankment paralleling the existing rail line. The movement of truck-loads of material and pumping of dredged sand, generating noise and dust as well as traffic bottlenecks, will need to be properly managed. Dust suppression and limits to truck traffic during low noise periods, as well as care with idling equipment and fleet maintenance will be important.

366. The embankment slopes will easily erode if not quickly re-vegetated and the Contractor will implement a rehabilitation programme as the work is completed.

367. To better track the air and noise pollution the contractor will be required to undertake a compliance monitoring programme, testing the parameters defined in Section IV and at the same stations as shown in the strip maps (**Annex 2**). Noise monitoring will be completed at the selected CPRs (closest schools, mosques and residences). The schedule will be more or less the same as the sampling completed during the field work for this EIA.

368. Another potential impact involves the failure of Contractors to properly maintain work camps and allowing sewage to leak, garbage to be left unmanaged, fuel to leak and even bitumen to spill over the ground near the asphalt batch plant[24]. Occupational health and safety (OHS) practices are also often ignored and the Contractor will be required to provide hard hats, ear plugs, dust masks and eye protection, and deliver OHS training sessions as required.

369. Construction of 66 major bridges and 138 minor bridges could result in impact on surface water quality. This is particularly true if bentonite drilling mud is used during the pile

[24] The batch plant will only be necessary for the access roads to the stations and for the restoration of the level crossings

boring operations on the larger rivers. River crossing work will therefore be carefully managed and monitored and the Contractor required to provide a bentonite recovery plan, should this material be used.

370. The Project will require concrete for piles, piers and large culverts, which will be manufactured at casting yards. A mobile concrete batch plant will be set up, which will generate noise and dust. The Contractor will be required to have dust and noise suppression features built into any concrete batch plant. Batching plants will incorporate dust and noise suppression features and will be located at approved sites, at least 500 m from the nearest occupied dwelling.

3. Operating Period

371. The environmental management plan addresses the following impacts:

- Possible inadequate clean up and rehabilitation of contractors camps, yards and borrow areas;
- Added noise and air pollution from a doubling of the rail traffic, and impacting on local sensitive receptors; and
- Lack of adequate new safety measures/equipment accounting for the large increase in train traffic across the level crossing.

C. Institutional Arrangement

372. BR's Project Director will have the final say on all administrative and technical decisions during Project construction. The key agencies or units that will have to play major roles in the implementation of the EMP are:

- Bangladesh Railway's newly proposed Environmental Unit;
- The Contractor;
- Engineer (usually an international firm); and
- Department of Environment (DoE).

373. The implementation oversight of all safeguard items in the EMP and indeed the construction contract will be with BR and its EU. When the Engineer is appointed BR's technical management of the work will be delegated to the Engineer. Final approval will always pass through BR (**Figure 33**) with annual audit reports submitted to DOE, who may undertake periodic inspection trips to confirm that safeguards are being fully implemented.

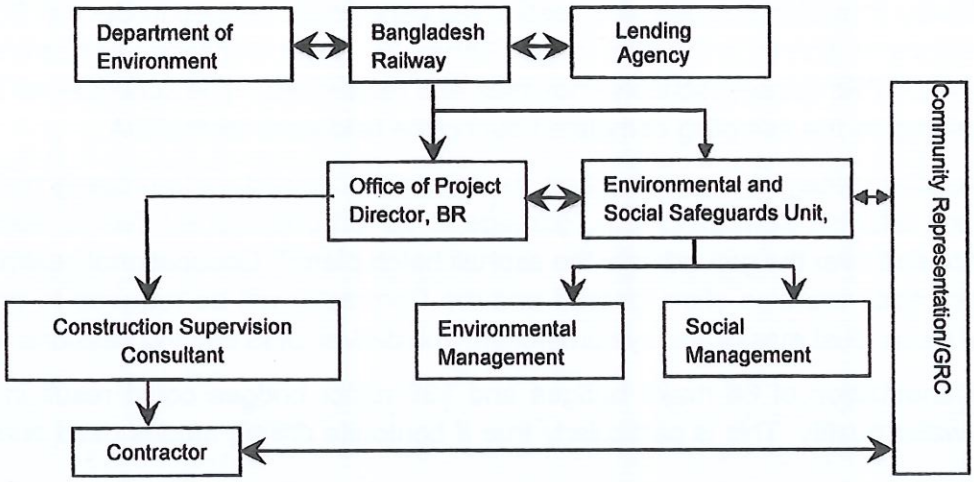


Figure 33: Safeguards Implementation and Reporting Work Flow

374. **BR's Environmental and Social Safeguards Unit (EU):** The objective of an EU is to build enough technical capacity within BR to permit it to oversee environmental and social safeguard matters arising from donor projects and to respond with technical knowledge to specific safeguard issues triggered by the Project activities or community complaints. The unit should be able to manage the Consultant and oversee the Consultant's deliverables. It will need to be able to fully address EIA requirements for the pre-construction and operating periods of the Project and for when the Engineer is no longer on the job. The EU will have to be able to assess environmental data, analyse it and define actions required to address non-compliant findings in a credible and timely manner. Finally, the EU should be able to provide training as needed to both Contractors and BR staff in all aspects of environmental and social safeguards management. Therefore, the EU's main tasks will be to:

- Oversee the implementation of the LAP and RP;
- Implement the EMP;
- Supervise and monitor the progress of the Consultant engaged by BR, for addressing safeguard requirements, such as air quality or resettlement plan implementation monitoring;
- Liaise with all regulatory agencies, including DoE and the public;
- Prepare all manner of safeguard monitoring and compliance reports; and
- Provide training to Contractors and BR staff.

375. At this time BR is in the early stages of planning such a unit within its organisation. During this planning stage BR will appoint at least one safeguards specialist to look after the Project's safeguard needs and be the direct contact for safeguards matters between stakeholders, regulators, donors and BR.

376. **BR's Regional Offices and Staff:** The day-to-day oversight of the construction work on this Project has not been decided but will likely be done by the Regional BR Office and it's Chief Engineer-in-charge. Therefore, the Engineer will work closely with BR's Regional office.

377. **Construction Supervision Consultant/The Engineer:** The proposed framework for implementation of the Project will utilise consultancy services from both international and national companies for the overall management and supervision of construction work and for preparation of the EA documents.

378. **Contractor(s):** A Contractor will be selected on the basis of international competitive bidding will carry out construction work based on a contract containing a set of environmental clauses, conditions and/or specifications. The Contractor will need to demonstrate environmental capacity in the proposal submitted to BR, and be prepared to have that person(s) participate in the mandatory pre-construction training exercise delivered by BR's EU or its Consultant.

379. **Other GoB Organisations:** The organisations involved in regulating the Project are: the Department of Environment (DoE), the Bangladesh Water Development Board (BWDB), the Roads and Highways Department (RHD), the Department of Forests (DF), the Local Government Engineering Department (LGED), the Bangladesh Inland Water Transport Authority (BIWTA), and local administration (UNO, DC, Police, etc.). They will provide supporting services as required.

D. EMP Implementation Arrangements

380. The approved EIA and the certificate from DoE will trigger the implementation phase for the EIA, i.e., the actions to mitigate and monitor the predicted impacts resulting from the building and operation of the Project.

381. BR is committed to exploring the establishment of an EU. The EMP has been integrated into the contract specifications, making it a mandatory set of tasks for the Contractor to implement. By preparing and approving the EIA and its EMP, BR has already confirmed its commitment to following through on the EMP. Until an EU is established BR will assign at least one safeguards specialist to deal with safeguards matters.

382. During the preconstruction period BR will be responsible for implementing the mitigative and monitoring measures, according to the timetable defined in the EMP and submitting a final monitoring checklist prior to the start of construction. BR will insure that the Contractors receive all relevant safeguard documents and that a training workshop be held to help the Contractors understand the EMP, how to prepare their mandatory work plan, and deliver the required documentation.

383. The Contractors will implement all mitigative and monitoring actions (See: Chapter IX), providing environmental safeguard compliance update as a section of the overall Project monthly progress report. The Contractor will also submit semi-annual summaries of surveys, findings and compliance. During the pre-mobilisation workshop BR or its Engineer will review all these requirements (which are all defined in the EIA and its EMP). Construction bid documents will be prepared with a specific environmental bill of quantity section, allowing for unambiguous calculation of environmental penalties.

384. Monthly and quarterly progress reports on EMP implementation will be prepared by Contractor in cooperation with the Engineer appointed by BR. All reports are to be submitted to BR via the Engineer. The quarterly reports will include a compliance monitoring checklist reporting (see **Annex 9**) on the progress of all construction period actions. Incidents of significant contamination/pollution caused by the Contractor's activities shall be reported. Recommendation shall be made for mitigation of environmental damage and for prevention of any recurrences.

385. During the construction period the Engineer will prepare annual environmental due diligence reports, based on the monthly and quarterly submissions by the Contractor. Additional details describing the Implementation arrangements are provided in **Section XI.**

Table 37: Environmental Management Plan: Mitigative Table (EMP)

Project Phase and Environmental Parameters	Project Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
1.0 PRE-CONSTRUCTION (PC) PERIOD : Major input from BR's new Environmental Unit (EU)						
1.1. Trees and Landscape	The Project will require removal of an estimated 335,000 trees, which are mostly within the existing BR RoW and on the northern side of the existing rail alignment. This will result in some ecological and economic loss as well as loss in landscape views and noise and dust barriers.	Mitigation measures include stabilisation and replanting similar tree species, which are detailed in **Annex 7**. The number of replacement trees will be up to three times more than the numbers removed. People whose livelihoods are significantly affected by tree removal will be compensated in accordance with the Resettlement Action Plan (RAP).	At all of the Project sites, particularly embankments, rebuilt stations and at temporary sub grade storage areas.	Replanting programme, as defined in **Annex 7** will be updated and completed early. Cutting will take place throughout the pre-construction period and replanting immediately after each section of rail line is completed.	BR, Local NGOs and BR's EU if available	BR
1.2 Land acquisition, land leased, encroachment, loss of assets	Based on preliminary topographical and social survey the Project involves land acquisition of around 26.973 hectares along the proposed alignment and station areas. As per the findings of the RP survey, a total of 4,799 households will be affected. Among these, 1440 entities will lose only land and 1,912 will lose residential structures. In addition, 806 entities will lose commercial structures, 118 will lose commercial cum housing structure and 46 will lose other structures. A total of 37 entities will lose trees, 33 will lose CPRs, 26 will lose fishing grounds and one will lose access to leased land.	The detailed guidelines for land acquisition and compensation are found in the LAP and RP, which must be applied. BR is making very significant efforts to minimise resettlement but some is unavoidable due to the opportunistic use of BR owned land. BR has revised the alignment at least 4 times to reduce land requirements.	At all of the Project sites, particularly land leased areas and affected agricultural land embankments, and temporary sub-grade storage areas.	Throughout the pre-construction period	BR, Local NGOs and BR's EU if available	BR

Project Phase and Environmental Parameters	Project Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
1.3 Employment and Livelihood	The Project will require acquisition of 26.973 ha of land and approximately 1,054 people will lose their income and employment	Direct and indirect loss of income will be compensated as prescribed in the LAP and RP and must be implemented prior to construction.	Along the alignment	Early during the Feasibility Study work, During detailed design stage; always prior to construction starting in the area where the site is located	BR, Local NGOs and BR's EU if available.	BR
1.4 Transportation of Construction materials	With 4 millions of m3 of construction materials to be moved there is the potential for serious local negative air quality, noise and traffic problems. This will degrade haul routes, due to excessive dust, traffic congestion and increased safety concerns.	Prior to the start of construction. BR, in consultation with Contractor and local police, will prepare a checklist and guideline for handling of all construction materials and the designation of roads not suited for hauling materials.	For the construction site	Daily during pre-construction stage Monitor to Implement the material transport plan daily.	Contractor	BR
1.5 Infrastructure - Utility Relocation	Utility lines such as electric transmission lines, gas pipelines, water lines may be shifted or accessed without approval or knowledge, leading to damage.	Utilities will only be removed and relocates with proper approvals and permits.	Along the alignment.	Permits and locations will be established prior to construction and relocation will then take place	BR, Utility agencies and possibly the EU	BR
1.6 Safety and level crossings	Inadequate planning and design may add to the risk of accidents at level crossings and potentially cause train operating problems	Level crossings will be carefully examined by BR and mitigation measures implemented, such as grade separated crossings, line of sight improvements and aggregation of crossings. At the unauthorised crossings (mostly footpaths) BR will erect warning and safety signs. The construction of grade separated crossings will continue as local communities express the need.	All level crossings	During detailed design and later as traffic builds and problems arise, grade separations will be constructed.	BR and Local officials, as well as the Engineer	BR

Project Phase and Environmental Parameters	Project Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
1.7 Station Design	Inadequate station sewage and garbage management facilities, leading to chronic problems during the operation of the new and upgraded stations.	The design of all waste, water and access facilities for each station will be made and estimated as per passenger through-put at each station.	For All stations	During the Project feasibility or design stages	The Engineer	BR
1.8 Labour Standards	Poorly prepared labour standards, leading to infractions regarding child labour, minimum wage, forced labour, unsanitary working conditions and unsafe water supplies	BR will strictly adhere to ILO conventions concerning these issues, i.e. Conventions C182,C138, C131 and C105	At all construction sites, and at all times.	At all times and for the entire construction period.	BR. The Engineer and Contractor	BR and its EU if in place
2.0 CONSTRUCTION PERIOD						
2.1 The Environmental Management Implementation Work Schedule (EMWS)	Contractor does not prepare a work plan defining details on when mitigation and monitoring actions are to take place, and consequently the EMP requirements may not be fully implemented.	The Engineer will assist contractor prepare the EMWS before the commencement of construction works and monitor compliance with the schedule during construction.	N/A	Within 1 month of Contractor mobilisation.	Contractor with help from the Engineer	Engineer
2.2 Air Quality and Dust	The ambient levels of COx, NOx, SOx, $PM_{2.5}$, and PM_{10} may increase at busy stations and construction areas leading to temporary localised air pollution.	A dust suppression programme will be used at all times during transportation of construction materials, construction of stations, embankment, and placement of ballast. Dust suppression will include watering on active construction areas, covered the truck with tarpaulin during transportation of construction materials, restricting vehicle speeds to ≤35 km/h., and rapid re-vegetation including grass seeding.	All sites, as identified in the monitoring table of this EMP.	One sampling station per location. Each sampling station will include two sampling points per station. Quarterly monitoring over the four year construction period.	Contractor	Engineer

Project Phase and Environmental Parameters	Project Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
		Ambient air quality monitoring for SO_2, NO_2 and $PM_{2.5}$, PM_{10} at busy stations and construction sites will be conducted quarterly, throughout the construction period at sensitive receptors, and immediate remedial actions taken.				
2.3 Topography, Landscape and Soils						
2.3.1 Erosion	Clearing topsoil can lead to increased erosion and dust from unprotected sites. Erosion risk is greatest at embankment slopes and gully erosion during the rainy season may damage field crops in adjacent areas.	Topsoil storage areas must be protected during the dry season from wind erosion by covering. Rapid re-vegetation and use of hydro-seeding and jute erosion protection mats will be applied in areas where erosion is noted during the regular monthly inspections	At all work sites.	Inspection as part of the engineering inspection cycle and reporting to the Engineer.	Contractor	Engineer
2.3.2 Topography and Landscape changes	Visual intrusion due to construction activities, including exposed areas and soil and ballast stockpiles.	Rehabilitation will commence as soon as possible after construction, which will include removal of stockpiles and other construction materials, establishment of fast growing grasses such as Vetiver/Napitar, tree planting and promoting natural vegetation.	Construction areas.	Throughout the construction period.	Contractor	Engineer
2.4 Water Resources						

Project Phase and Environmental Parameters	Project Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
2.4.1 Hydrology and Surface Water Quality	Earthwork activities during embankment construction may result in changes to current drainage patterns. Water bodies and receiving waters near workers' camps and Project site areas may become polluted due to faecal, organic and other contamination.	Ensure all earthworks are constructed according to design and specifications. Wastes, effluents and other contaminant materials to be appropriately stored, handled, and transported. A quarterly surface water quality testing programme will be undertaken during the construction period.	Throughout alignment earthworks, work camps and major construction sites such as bridges and embankments as well as at culvert construction sites. WQ sampling at all bridge construction sites-	Inspect weekly to ensure that drainage is properly maintained. WQ sampling to be conducted quarterly or as agreed jointly between the engineer and the Contractor.	Contractor	Engineer
			upstream and downstream— See EMP monitoring Table for details.			
2.4.2 Groundwater	The potential exists for drinking water sources to be contaminated by the seepage of wastes from workers' camps through the soil profile into the GW aquifer (particularly if wells access the shallow aquifer).	Workforce camps will be located away from water resources. All practical measures such as provision of septic tanks, garbage bags, and other sanitation facilities will be implemented at the construction camps to prevent wastewater and solid wastes from entering wells and groundwater. Wells used for drinking will be regularly tested to ensure portability.	Throughout the alignment, especially where the pile drilling to 30 m depth is conducted, and where any new wells were dug.	When new wells are dug and toilet facilities built near wells.	Contractor to collect and test samples.	Engineer
2.5 Waste Management						

Project Phase and Environmental Parameters	Project Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
2.5.1 Waste Management	Construction camp wastes are often poorly managed and can lead to chronic pollution of surface and groundwater.	Contain all solid wastes at designated locations within construction sites. Service machinery and vehicles at designated maintenance workshops where waste oils and lubricants can be collected and recycled. The monthly monitoring report will provide compliance update	All construction camp and Contractor operation areas, such as batch plants and maintenance yards.	Complete monthly and submit to engineer.	Contractor	Engineer
2.5.2 Station Demolition Waste Materials	Four stations will need to be demolished and reconstructed and other stations will be upgraded as required. This will result in waste requiring management and disposal.	Waste materials will be recycled/reused where possible and sold if remaining waste cannot be used. A record of waste types and quantities will be maintained.	Each station.	Prior to start of demolition of any station.	Contractor	Engineer
2.6 Noise	Construction noise will result from plant and equipment operations, pile driving, power generators, rock crushing, batch plants and movement of construction vehicles, as well as the constant movement of trains along the existing line.	Controls will be put in place to maintain noise levels at ≤ 60 dB (Bangladesh standard) at sensitive receptors such as mosques, schools, populated areas. Controls will include erection of temporary baffle walls, changing work schedules, installing noise mitigation controls on noisy plant and equipment, and properly maintaining plant and equipment.	Sensitive sites within 20 m of rail RoW in the vicinity of the sensitive receptors.	Throughout the construction period, and based on noise measurement surveys.	Contractor	Engineer

Project Phase and Environmental Parameters	Project Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
2.7 Terrestrial and Aquatic Flora and Fauna	Most of the required vegetation clearing will be undertaken during pre-construction activities (see 1.1). During construction there may be potential impacts on adjoining flora and fauna due to poorly managed access to construction areas, dust generated by construction activities, surface water runoff containing elevated sediment and pollutants, and poorly controlled waste management. The proposal will require widening the existing railway embankment through approximately 32 km of the Chalan Beel from Ullahpara to Chatmohor, Of this approximately 13 km from Chatmohor to Dipasher will require river training works to protect bank stability due to monsoonal wave action. The area of Chalan Beel directly impacted by the proposal will be	During construction measures will be implemented to protect surrounding terrestrial and aquatic flora and fauna. This will include protecting sensitive areas from unnecessary access, minimising sediment and waste discharges and ongoing monitoring of the surrounding area. Details are provided in the EMP.	Along the alignment.	Throughout the construction period.	Contractor	Engineer
	approximately 64 hectares. The section of Chalan Beel affected by the proposal is water logged during the monsoon season, however during the dry season it is used for agricultural activities. The proposal will not significantly change current drainage, which is controlled by culverts under the existing railway.					

Project Phase and Environmental Parameters	Project Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
2.8 Land use, Population and Culture						
2.8.1 Land Use	The most significant potential impacts on land use in the Project area will be the removal out of production of approximately 9.755 ha of agricultural land (primarily rice paddy) for the construction of the proposed rail embankment, station access roads and associated facilities.	Land acquisition/requisition will be in accordance with the laws of Bangladesh and as defined in the Project LAP and RP, which specifies a grievance mechanism and timetable for implementation.	At all Project sites, particularly affected agricultural land, rebuilt stations and at temporary subgrade storage areas.	Throughout the construction period.	Contractor	Engineer
2.9 Heritage and Culture	33 CPRs potentially affected by the proposal, will be relocated prior to construction. However, they may be impacts associated with discovery of additional PCRs and CPRs during construction.	CPRs will be relocated in stages, after consultation with local communities. BR has defined a plan to prevent undue damage to these sites and the Contractor must follow this plan closely	At all heritage and cultural sites.	Throughout the construction period.	Contractor	Engineer
2.10 Health , Safety and Contractor Camp						
2.10.1 Health and vector borne diseases	Personal and occupational health issues stemming from unsanitary toilet facilities, lack of potable water and sanitary washing areas	Undertake regular checks and cleaning at all work areas and ensure clean conditions.	All work sites and particularly at Construction	At least twice per week.	Contractor	Engineer
	can lead to common disease outbreaks in work camps. Construction work also creates areas for water to form stagnant puddles, which are ideal breeding areas for malaria and dengue mosquitoes.	Provision of safe potable water, sanitary toilet facilities and hygienic accommodation for workers at camp sites. Provision of First-Aid facilities for workers. Ensure that these facilities are cleaned and disinfected regularly.	camps.			

Project Phase and Environmental Parameters	Project Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
		Inspect for stagnant water and puddles every 3-days, including stored construction materials such as tires and old oil drums-empty to prevent water ponding.				
2.10.2 Worksite safety management	Poor safety and management of worksites by the Contractor can lead to accidents and unsafe working conditions.	Construct fences to separate construction sites at rail stations from public access, and manage train movements collaborating with BR dispatch staff. Contractors must at all times insure that people can move effectively and without undue delay.	All construction areas.	Conduct regular inspections or at least every two months.	The Engineer	BR
2.10.3 HIV awareness	Due to influx of workers in the Project area, AIDS/HIV may spread in the local community	A worker health training programme will be implemented during the construction period. Training will be provided by a health specialist.	All construction camps.	At least every six months.	Contractor	Engineer
2.11 Occupational Health and Safety						
2.11.1-Personal Safety Equipment (PSE)	Contractor does not provide adequate PSE or properly enforce its use, leading to accidents.	Workers will be provided with appropriate personal protection equipment, such as safety boots, helmets, gloves, protective clothing, goggles and ear protection. The Contractor will enforce its use.	At all constriction sites.	Continuously throughout the construction period.	Contractor	Engineer
2.11.2-Disease	See 2.10.1 above				Contractor	Engineer
2.11.3-Safety Training	Lack of safety training by contractor can lead to accidents and lost productivity.	Construction workers will be trained in general health and safety matters and on specific hazards of their work.	All construction areas.	At all times during construction.	Contractor	Engineer

Project Phase and Environmental Parameters	Project Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
2.11.4-Labour Standards	Labour standards ignored or not complied with leading to infractions of basic labour standards as defined by ILO conventions as listed in Item 1.8 above.	*Hire, use of benefit from child labour*-Child labour (as defined by ILO Conventions 138 and 182) means that no workers under the age of 14 may be hired as general labours, and no workers under the age of 17 are to be hired for hazardous jobs such work on scaffolding, on structures elevated above the ground, etc. *Bonded labour*-All forms of bonded labour and forced labour, as defined by ILO Conventions 29 and 105 will not be permitted. Forced labour, including prison or debt bondage labour; lending of money (debt slavery) or withholding of remuneration or identity papers by employers or outside recruiters, will be not be permitted on any work sites. *Equal treatment, equal opportunity*-BR expects the contractors to hire workers on the basis of skill and ability to work. There must be equal treatment and equal opportunity (ILO Conventions 100 and 111, and ILO Code of Practice for HIV/AIDS 85) for all who seek employment. No discrimination based on race, caste, origin, religion, disability, gender, sexual orientation, union or	All work areas under the Contractor and subcontractor control.	Throughout the construction period.	Contractor	Engineer and BR

Project Phase and Environmental Parameters	Project Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
		political affiliation, or age; no sexual harassment. Minimum wage- BR expects the contractor to pay all labourers and employees according to minimum wage standards as defined in public works department.				
2.12 Construction Period Decommissioning	Inspection of sites to be decommissioned by contractor, are: • work camps; • fuels storage areas; • waste dump sites; and • construct access roads. If not undertaken this would lead to chronic environmental problems due to lack of proper clean-up.	Undertake detailed inspections of construction areas after decommissioning to verify compliance with environmental standards.	The entire length of the line.	Within the first quarter of operations and before final payment made to contractor.	Contractor BR or its EU if in place	BR
2.13 Environmental Monitoring and Completion Reporting	Contractor fails to prepare a summary report defining the mitigation and monitoring actions completed and what needs to be continued during the Operating period. The result is a failed or weakened environmental safeguards programme.	Prepare a completion report and deliver to the Engineer.	N/A	Complete within the last four months of the Project.	Contractor and The Engineer	Engineer
3. OPERATING PERIOD						
3.1 The Construction Period Environmental Completion Report	Failure to adopt measures and continue mitigation actions defined in the Construction Period Environmental Completion report.	Assign environmental expertise to obtain, examine and take necessary actions defined in the Construction Period Environmental Completion Report.	All construction areas.	Prior to the final payment to the Contractor.	Contractor BR or its EU if in place	BR

Project Phase and Environmental Parameters	Project Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
3.2 Air Quality and Dust	Degradation of local air quality due to increased train traffic.	Maintain locomotives according to factory specifications and accelerate decommissioning of >20 year old locomotives.	N/A	Semi-annual air quality monitoring and if regular exceedances are found remedial actions to improve air quality will be implemented.	BR or its EU if in place.	BR
3.3 Spill Contingency Planning	Contamination of soil due to operational or accident spillage of petroleum derivatives and other chemicals.	Rail accidents and spills will be managed through a spill contingency protocol.	Applicable to all rail line operations, not just this Project.	To be developed during the preconstruction period and implemented as soon as it is completed-used as a spill protection handbook	BR or its EU if in place.	BR
3.4 Noise	Noise monitoring has identified a number of sensitive sites where noise is already exceeding accepted levels and as such creating more discomfort for local people.	Include in design appropriate noise attenuation features such as berms. Plantings and noise barriers.	To be determined, based on construction period measurements, but generally around schools, residences, hospitals and shops.	Regular monitoring to be undertaken based on the sample design defined in this EIA.	BR or its EU if in place.	BR
3.5 Employment and Livelihood	The area along the rail line will attract settlements and undesired structures including commercial facilities, particularly near railway stations.	Since this is very difficult to control, BR will as a minimum post the area as private property and permit only agricultural activities and no structures.	Along the entire corridor.	Posting at start of operating period in all areas were line passes through urban areas.	BR or its EU if in place.	BR

Project Phase and Environmental Parameters	Project Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
3.6 Level crossings	Inadequate safety at level crossings and stations leading to more frequent accidents with vehicles, people and livestock. Also see Item 1.6 in this table.	Reduce accident risks by implementing awareness programmes, identify known hotspots and improve signage and crossing structures /signalling. Installation of modern railway crossing	At authorised and unauthorised level crossing areas.	Based on ongoing BR studies and consultation with local authorities.	BR or its EU if in place.	BR
		and gate systems. Pedestrian foot bridges will be built to better access stations Training to crossing guards will be enhanced.				
3.7 Waste Management	Garbage and sewage from trains can lead to contamination of the corridor and nearby drainage areas.	Provide adequate waste bins and waste biodegradable waste bags on trains. Establish strict fines for garbage throwing and provide abundant bins on trains and signs. Initiate a programme of retrofitting trains with sewage collection tanks to be pumped out at collection stations for delivery to STPs.	Along the entire operating rail line.	At all times.	BR or its EU if in place.	BR
3.8 Station Operations	New or upgraded stations will attract more passengers and poor management could result in unacceptable pollution of surrounding areas.	Stations will have janitorial staff and BR will undertake weekly inspections to ensure sanitary operations. Problems identified will be immediately rectified by providing additional resources and upgraded waste management systems.	At all stations.	Weekly station inspections.	BR or its EU if in place, and dedicated janitorial service at each station.	BR

Table 38: Environmental Management Plan: Monitoring Measures (EMoT)

Project Period and Environmental Parameters	Details of Monitoring Action to be Undertaken	When/ Frequency/ Duration	Output to be Provided	Who Implements	Who Supervises
1. PRE-CONSTRUCTION PERIOD					
1.1 Trees and Landscape	Confirm that a tree cutting and replanting programme is fully ready to implement during the preconstruction period. Confirm that the planting plan is in agreement with affected people.	During the pre-construction and construction periods.	Tree replanting plan and record of plantation and compensation.	BR, Local NGOs/ CBOs and BR's EU if available.	BR
1.2 Land Acquisition		During the design phase when final alignment is fixed.	Revised alignment drawings at sensitive areas, as defined by local communities.	BR, Local NGOs and BR's EU if available.	BR
1.3 Employment and Livelihood		During the design phase when final alignment is fixed.		BR, Local NGOs and BR's EU if available.	BR
1.4 Heritage and Culture	Inspect relocation and protection activities during this period and obtain written agreement from local communities.	Inspect at least twice during relocation activities.	Record of inspection on file.	LNGO and BR's ESU. See Details in LAP and RP.	BR
1.5 Infrastructure - Utility Relocation	Confirm that permits and relocation site plans have been approved.	Prior to construction starting.	Inspection report including copies of permits or records on file.	BR, utility agencies and possibly the EU.	BR
1.6 Safety and Level Crossings	Ongoing monitoring of level crossing operations and maintaining accident register.	Ongoing during pre-construction.	Accident register and 6 monthly reporting on level crossing functions.	BR	BR
1.7 Station Design	Monitor current station passenger/user throughput and check that sewage, garbage and water systems are adequate.	Ongoing during pre-construction.	A register of stations showing daily passenger loads, waste production and waste management capacity.	The Engineer	BR
1.8 Labour Standards	Confirm that labour standards are specifically	During preparation of	Incorporation of	BR. The Engineer	BR and its

Project Period and Environmental Parameters	Details of Monitoring Action to be Undertaken	When/ Frequency/ Duration	Output to be Provided	Who Implements	Who Supervises
	incorporated into the contract documents by clauses and by appending this EMP to the contract.	contract documentation.	labour standards in contract.	and Contractor.	EU-if in place
2. CONSTRUCTION PERIOD					
2.1 The Environmental Management Implementation Work Schedule (EMWS)	Confirm that an EMWS has been prepared.	Within one month of Contractor mobilisation.	EMWS documentation	Contractor, with help from Engineer.	Engineer
2.2 Air Quality and Dust	During dry season undertake air quality testing for CO, SO_2, NO_2, PM2.5, and PM10 at major bridge and station construction sites.	At 10 construction sites, quarterly for four years.	Completed data table and analysis.	Contractor	Engineer
2.3 Topography, Landscape and Soils					
2.3.1 Erosion	Inspect and take photos of storage and embankment construction areas. Report on level of erosion and on-site dust. Inspect embankment construction areas for erosion	As part of regular construction inspection, and at least weekly.	Description of status of erosion control measures being implemented.	Contractor	Engineer
2.3.2 Topography and Landscape changes	Inspection/ consultation with adjacent households and railway authority to get opinion on work being completed.	As part of regular construction inspection, and at least weekly.	Include as part of inspection report or checklist.	Contractor	Engineer
2.4 Water Resources					
2.4.1 Hydrology and Surface Water Quality	Site inspections Inspect waste and field management at camps and record actions taken when non-compliance recorded. Conduct surface water quality testing for pH, Turbidity, Temperature, DO, BOD5, COD, TSS, TDS, oil and grease.	As part of regular construction inspection programme. Complete WQ testing at stations as defined in this EIA, quarterly for four years for the nine parameters listed:	Include as part of inspection report or checklist Test data, presented in tabular/organised format.	Contractor	Engineer
2.4.2 Groundwater	Where the pile drilling to 30 m depth is conducted and/or where any new wells are dug or a well becomes a camp potable water supply , testing to be undertaken for pH, TP, Mn, Fe, As, Oil and Grease and E. Coli,.	Every 6 months or until difference over 1 years does not vary significantly. Reduced to once a year.	Completed data table and short analysis	Contractor	Engineer
2.5 Waste Management					

Project Period and Environmental Parameters	Details of Monitoring Action to be Undertaken	When/ Frequency/ Duration	Output to be Provided	Who Implements	Who Supervises
2.5.1 Waste Management	Conduct regular inspections and reporting of waste	At all times	Weekly compliance	Contractor	Engineer
	management facilities.		checklist		
2.5.2 Train Station Demolition Waste Materials	Complete monitoring check for each station demolition operation, comment on dust.	Prior to start and during demolition of any station.	Checklist report showing proper demolition waste management and control of hazardous Materials.	Contractor	Engineer
2.6 Noise	Sample at least 12 sensitive sites within 50 m of rail RoW and or in the vicinity of sensitive receptors.	Take noise readings at sensitive receptors twice per day during full work activities.	Data summarised in to monthly data summary table.	Contractor	Engineer
2.7 Terrestrial and Aquatic Flora and Fauna	As part of the monthly site inspection, examine embankments, new stations, subgrade storage areas, to confirm construction activities are not contributing to environmental degradation.	Monthly throughout the construction period.	Checklist as part of the monthly reporting.	Contractor	Engineer
2.8 Land Use	No action needed since this is being thoroughly monitored and completed by the social safeguards team and local NGOs.	Prior to start of clearing work at any proposed construction area where land acquisition is involved.	Copy of reporting from social safeguards team.	Local NGO and BR's EU if available and Engineer	BR
2.9 Heritage and Culture	For PCRs, discuss actions taken with local officials and get agreement that this is appropriate.	Prior to the start of construction.	Inspection report or checklist.	Contractor Engineer	BR
2.10 Health, Safety and Contractor Camp					
2.10.1 Health and vector borne diseases	Undertake checks at all sites and instruct Contractors to take immediate action if non-compliance identified.	Weekly inspection	Compliance checklist.	Contractor Engineers BR's EU if operational	BR
2.10.2 Worksite safety management	Conduct regular inspections.	Once a month	Record compliance for inclusion in audit report.	Contractor Engineers BR's EU if operational	BR

Project Period and Environmental Parameters	Details of Monitoring Action to be Undertaken	When/ Frequency/ Duration	Output to be Provided	Who Implements	Who Supervises
2.10.3 HIV awareness	As part of monthly inspection review all OHS requirements and check for poor enforcement.	Every six months during the construction period.	Record of compliance for inclusion in audit report.	Contractor Engineers and health specialist	BR
2.11 Occupational Health and Safety					
2.11.1-Personal Safety Equipment (PSE)	Conduct regular checks to review PSE compliance.	Monthly at all work sites	Confirmation note in inspection reporting documentation.	Contractor Engineer	Engineer
2.11.2-Safety Training	Undertake safety inductions for all personnel.	Prior to commencing work onsite.	Maintain induction records	Contractor Engineer	Engineer
2.11.3-Labour Standards	Random check of 10% of the labour force, and check that labourers have contract letters and check age, working conditions and documentation.	At start of Construction period and complete every six months	Findings as a table of compliance-against the four 4 main factors	Contractor Engineer	Engineer
2.12 Construction Period Decommissioning	Inspect to be sure that work camps, fuel storage areas, waste dumps, toilet facilities and construction access roads have been properly decommissioned and no contamination is likely.	Prior to Contractor's final payment.	Decommissioning checklist.	Contractor/Engineer and BR's EU if available	BR
2.13 Environmental Monitoring and Completion Reporting	Collect monitoring and completion reports and confirm compliance.	Monitoring Report (every month and quarter) and Completion Report (Once at the end of construction period).	Report during and after completion of mitigation and monitoring actions specified in the EMP.	Contractor	Engineer
3.0 OPERATING PERIOD					
3.1 Air Quality and Dust	Undertake air quality monitoring at four stations and test for CO, SO_2, NO_2 and PM2.5 and PM10.	Sample twice per year and two samples per station (total of 16 samples per year).	Monitoring records and analysis. Annual reporting.	BR or BR's EU if available.	BR
3.2 Spill Contingency Planning	Prepare and implement Spill Contingency Plan.	Implement as soon as operations begin.	Spill Contingency Plan distributed to rail operational units.	BR or BR's EU if available.	BR

Project Period and Environmental Parameters	Details of Monitoring Action to be Undertaken	When/ Frequency/ Duration	Output to be Provided	Who Implements	Who Supervises
3.3 Noise	Noise measurements to be continued at noise sensitive sites as defined during pre-construction activities.	Two times per year at eight sites along the corridor.	Monitoring records and analysis. Annual reporting.	BR or BR's EU if available.	BR
3.4 Employment and Livelihood	Inspect to ensure that basic actions as defined have been taken and that removed signs are replaced Inspect to ensure appropriate sign posting and check for illegal activities within the corridor.	As part of operating inspection by BR.	Maintaining register of inspection findings and actions.	BR or its EU if in place.	BR
3.5 Level crossings	Inspection to check that level crossings are operation properly. and collect incident records	Quarterly	Monitoring records and analysis. Quarterly reporting.	BR or its EU if in place.	BR
3.6 Waste Management	Inspection of waste facilities including recording number and maintenance of trained bins. Record no of trains with Sewage tanks.	Annual inventory.	Monitoring records and analysis. Annual reporting.	BR or its EU if in place.	BR
3.7 Station Operations	Inspection of station operations and assessing adequacy of resources.	Bi-annual	Monitoring records and analysis. Bi-annual reporting.	BR or its EU if in place, and dedicated janitorial service at each station.	BR

E. The Bridges

386. There are 12 bridges having lengths of more than 100 m; seven on the Ishurdi-Sirajganj section and five on the Bangabandhu Setu East-Joydebpur section. These are shown in **Table 39** and described below. Location of these bridges are provide in Annex 13.

Table 39: Bridges Greater than 100 m

Bridge No. (Proposed)	Chainage (Km)	No. of Spans	Length of Bridge(m)	River/Beel
West Bank: Ishurdi-Sirajganj Section				
23	240.976	5	140.25	Boral River
24	245.400	6	144.20	Gumani River
25	247.251	15	208.40	Beel/Low land
26	249.352	6	116.30	Beel/Low land
26A	250.863	10	130.25	Beel/Low land
27	253.094	6	116.30	Gohala
35	264.768	8	229.45	Korotoya
East Bank: Bangabandhu Setu East-Joydebpur Section				
98	310.497	6	156.30	Pungli
75	326.985	4	104.20	Naligang
71	329.355	4	104.20	Habla/Moragang
42	351.340	4	104.20	Bongshai
14	368.416	4	124.20	Turag

387. New bridges will have a ballasted deck construction and be typically at 12 m from the centreline of the existing track (**Figure 34**) this centre-to-centre distance has been determined to ensure that construction is undertaken safely and minimises any rail disruptions. Bridge construction will require placement of bored piles, using drilling mud followed by the pile casings being filled with concrete. All other elements of the bridge, namely the pile caps and piers will be fixed in place on top of the pile cap. The bridge deck, consisting of precast concrete lengths as well as steel girders will be set in place from the bridge as it is built and from the water using special cranes on barges.

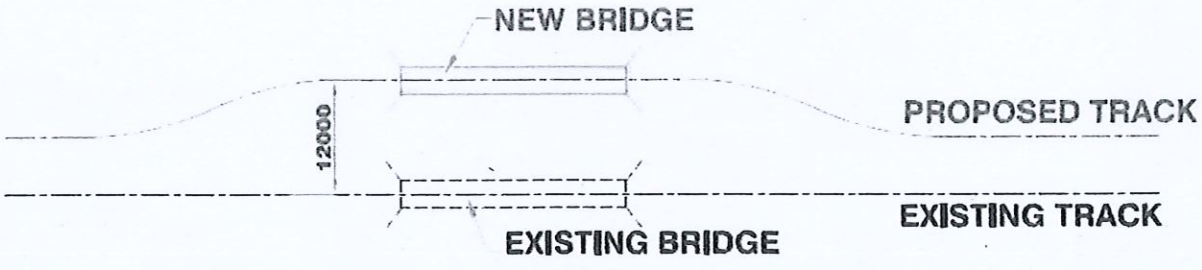


Figure 34: Plan of Proposed Alignment at Major Bridges

388. There is danger that this work could result in temporary water pollution, temporary diversion of fish away from the construction activity, increased erosion risk due to poorly designed shore line erosion control features and disruption of river vessel traffic during hours when bridge sections are being placed over the navigable section of the river.

389. The Bridge EMP (**Table 40** and **Table 41**) lists each of the potential problem areas in detail and presents a set of mitigative actions and monitoring requirements that BR will include as part of the construction period monitoring programme.

Table 40: Environmental Management Plan for Bridge Sites: Mitigative Measure

Project Period and Environmental Parameters	Project Impact	Mitigation Measures	Location	Timing/Duration	Who will Implement	Who will Supervise
1.0 PRE-CONSTRUCTION PERIOD						
1.1 Work camps and construction areas.	Inappropriate siting of work camps, concrete and steel fabrication areas and batch plants could result in unacceptable impacts on the surrounding environment and people.	BR will consult with relevant stakeholders and local communities to ensure that siting of work camps and construction areas minimise potential impacts.	At the 12 bridge construction locations.	Early during the feasibility Study work or detailed design.	BR	BR
1.2 Provision of Early Training	Contractor not sufficiently trained in ensuring environmental safeguards are in place when working in and over major water bodies. Consequences are potential impacts on water quality and river hydrology.	BR to provide bridge specific contractor training as part of the overall training programme to be delivered before construction begins.	Location to be confirmed.	Prior to the Contractor mobilizing to the field.	BR	BR
2.0 CONSTRUCTION PERIOD						
2.1 Navigation and channel disruption	Temporary disruptions and navigation danger at bridge sites.	Movements of vessels in navigation channels will be maintained through careful planning scheduling of works. The Contractor will place channel boundary buoys in the water to guide vessels around danger areas.	Navigation channels immediately up and downstream of proposed bridge sites.	Ongoing monitoring to ensure that navigability is properly maintained.	Contractor	Engineer
2.2 Surface water quality and Hydrology	Construction of piers, especially in the permanent water sections could result in temporary erosion and deposition actions, potentially impacting shoreline and causing water pollution.	The bridges are to be designed and built properly in line with existing bridges and latest hydrological model results. The water quality testing will focus on sampling both upstream and downstream of the bridge construction sites to establish any changes over time. Parameters to be tested are shown in the main EMP	Take samples upstream and downstream of the River Bridges	Monthly during the construction period at all pile drilling sites. After Yr. 1 the data will be assessed and if acceptable, the sampling will be reduced to quarterly, as for all other stations.	Contractor	Engineer

Project Period and Environmental Parameters	Project Impact	Mitigation Measures	Location	Timing/Duration	Who will Implement	Who will Supervise
3.0 OPERATING PERIOD						
3.1 River trainings works (RTW)	Drainage congestion, soil erosion and siltation	Undertake visual inspection of erosion on embankment of RTW slopes particularly any gully erosion. Formulate and implement erosion protection measures, such as appropriate. Regular monitoring of morphological changes of river at the bridge locations due to RTW, and formulate remedial bank protection work immediately for implementation, particularly during monsoon period.	At bridge sites	During and after construction of bridges.	BR	BR
3.2 Sewage disposal	Raw sewage disposed from trains	Install holding tanks and dispose of sewage at pump-out facilities to STPs. This is being examined by BR	All trains operating on this line.	At all times.	BR	BR

Table 41: Environmental Management Plan for Bridge Sites: Monitoring Measure (EMoT)

Monitoring Parameters	Details of Monitoring Action to be Undertaken	When/ Frequency/ Duration	Output to be Provided	Who Implements	Who Supervises
1. PRE-CONSTRUCTION PERIOD					
1.1 The Bridge siting	Examine site plans and establish if further protection of land and structures is possible.	See Project LAP for details.	See Project LAP for details.	NOG and BR	BR
1.2 Provision of Early Training	Obtain record of training sessions and component dealing with bridges	Immediately after the Prior to site works.	Training material package on file with BR.	BR	BR
2. CONSTRUCTION PERIOD					
2.1 Loss of navigation route	Visual inspection to confirm that alternative navigation channels are properly marked and maintained.	Monthly	Include as part of inspection report or checklist.	Contractor	Engineer
2.2 Surface water quality and Hydrology	Site inspection and water testing upstream and downstream of the bridges. Testing for pH, Turbidity, Temperature, DO, BOD5, COD, TSS, TDS, oil and grease	Construction stage according to survey schedule defined in EIA.	Monthly data tables and indication if any exceedances.	Contractor	Engineers
3. OPERATING PERIOD					
3.1 River training works (RTW)				BR's EU	BR
3.2 Sewage disposal	NA	NA	NA	BR	BR

F. EMP Implementation Cost

390. The Cost of implementing the EMP mitigation and monitoring measures, including the tree replanting programme was estimated at USD 5,133,674.00 including contingency costs (**Table 42**). The construction period with its tree planting programme will account for the majority of the cost, totalling USD 3,093.560.00.

391. Once all engineering costs and other normal expenditures associated with the construction work are better identified, a recalculation of the costs will be undertaken and a revised figure applied to the work.

392. The other major cost not defined here is the cost of the establishment and operation of BR's EU, which is estimated at around BDT 18 million the first year of operations and around BDT 8 million annual operating costs (**Table 42**).

393. Pre-construction will result in land disturbance and tree clearing, however this will be mitigated by minimising disturbed areas and implementing an extensive tree planning programme.

Table 42: Cost Estimate of an Environmental and Social Safeguards Unit within BR (USD)

		1st Year Monitoring with Cost Breakdown					Recouring Cost in Subsequent Years						
EMP No.	Mitigation and Monitoring Items As listed in the EMP	No. Cycles /yr	No. Month /cycle	No.P.BD	Unit cost/ mon	Total Cost for 1st Year	Total Cost for 2nd Year	Total Cost for 3rd Year	Total Cost for 4th Year	Total Cost for 5th Year	Total Cost for 6th Year	Total Cost for 7th Year	Total Costs for Mitigation and Monitoring
	Cost of Environmental Professionals	4	120	4	$1,050.00	$126,000.00	$126,000.00	$126,000.00	$126,000.00				$630,000.00
1	Pre-Construction Period												
1.1	Tree planting - see below	0	0	0	0	$0.00	$0.00	$0.00	$0.00				$0.00
1.2 - 1.6	Not applicable												
1.7	Contractor Training				320	$1,280.00							$1,280.00
	Pre-construction Period Total					$1,280.00							$1,280.00
2	Construction Period												
		N. Stn.	Samp. Size	No.Cycle/ yr	Unit cost								
2.2	Air quality monitoring	10	20	4	800	$64,000.00	$64,000.00	$64,000.00	$64,000.00				$256,000.00
2.6	Noise Quality Monitoring	10	20	4	120	$9,600.00	$9,600.00	$9,600.00	$9,600.00				$38,400.00
2.3	Top soil stripping, storage and reuse for landscaping	will include in engineering cost											
	Regular watering, grass turfing	will include in engineering cost											
2.4.1	Surface water monitoring	8	64		600	$38,400.00	$38,400.00	$38,400.00	$38,400.00				$153,600.00
2.4.2	Groundwater quality monitoring	23	23		600	$13,800.00	$13,800.00	$13,800.00	$13,800.00				$55,200.00
	Additional sampling		35		600								$21,000.00
2.5	Waste management	covered in 2.9											$0.00
2.7	Tree Replacement Program					$460,000.00	$570,000.00	$570,000.00	$570,000.00				$2,170,000.00
2.8	Contractor Training				320	$960.00	$640.00	$640.00	$640.00				$2,880.00
2.9	Construction Period Mitigative Measures ind waste mgt			12		$78,000.00	$78,000.00	$78,000.00	$78,000.00				$312,000.00
2.10	Construction Period Reporting												
2.10.1	Monthly Report			12	310	$3,720.00	$3,720.00	$3,720.00	$3,720.00				$14,880.00
2.10.2	Quarterly Report			16	800	$12,800.00	$12,800.00	$12,800.00	$12,800.00				$51,200.00
2.10.3	Annual Report			4	1150	$4,600.00	$4,600.00	$4,600.00	$4,600.00				$18,400.00
	Construction Period Total					$685,880.00	$795,560.00	$795,560.00	$795,560.00				$3,093,560.00
	Operating Period												
3.1	Ambient Air Quality Monitoring	4	8	2	800					$12,800.00	$12,800.00	$12,800.00	$38,400.00
3.3	Noise Level Monitoring	8	32	2	120					$3,840.00	$3,840.00	$3,840.00	$11,520.00
	Operation Period Total					$0.00				$16,640.00	$16,640.00	$16,640.00	$49,920.00
	ALL MITIGATION AND MONITORING		Totals										
	Cost of Env Professionals - Int+Ntl (Pre-Cons to Oper.)		$630,000										
	Pre-Construction Period		$1,280										
	Construction		$3,093,560										
	Operating Period		$49,920										
	Total		$3,774,760										
	Contingency Costs @ 36% of total		$1,358,914										
	Grand Total		$5,133,674										

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X. INSTITUTIONAL CAPACITY, NEEDS AND PROPOSED STRENGTHENING OF BANGLADESH RAILWAY

A. The Existing Conditions

394. Bangladesh Railway has at least ten large projects which will require the implementation of multi-year mitigative and monitoring actions, as defined in the Environmental Impact Assessments completed for each Project. BR will be responsible for insuring that pre-construction, construction and operating period mitigative and monitoring tasks defined the EIA's EMP are completed on time and in a technically sound manner. During pre-construction and construction a Consultant will assist, but during the operating period BR will be directly responsible. Operating period mitigation and monitoring will require field surveys, analyses and technical reporting to DOE and or DoE. Further, throughout the Project BR will be receiving environmental reports from the contractor as well as the Engineer, and will need to evaluate and comment on the technical content, etc. As of January 2014, BR had no such capability, and will fill this gap by upgrading of skills in all aspects of environmental management, environmental assessment, environmental sampling design, data collection, analysis, and reporting and EMP implementation.

B. BR's Environmental Unit (EU)

1. General

395. The Project loan has provision for the creation of an environmental safeguards unit within the Project's PIU to manage the safeguard issues arising from the seven projects now underway. Given that other projects are in the pipeline, the intent is to integrate this unit into the operations of BR, making environmental safeguards a business-as-usual task; not an add-on.

396. BR will create at least one environmental safeguards staff position and two if its mitigation and monitoring duties will not be given to Consultant. In addition to staff, the EU will also need basic equipment to undertaken monitoring as well as staff training. It will be the staff's duty to monitor the contractors environmental compliance, complete all the operating period EMP requirements and insure that reporting is technically robust and meets DOE and GoB standards.

397. In addition to basic equipment, a smoothly functioning EU will need a dedicated space/base within BR from which to undertake its work. To that end a set of tasks needs to be undertaken (Table 43) prior to the start of construction, to establish the EU with a view to having it operate for the duration of the project's construction period and well into the operating period.

Table 43: Action Plan – Establishing an EU

Task No.	Task and Deliverable
i	Prepare a ToR for the EU and staff; then obtain approval of BR
ii	Establish a budget, provide basic set of equipment and assign staff to the EU.
iii	Train EU staff and key BR managers (1-2 months) in environmental management and all EIA-related tasks.
iv	Prepare training materials for contractor training and deliver 2 day workshop

v	With assistance from the Construction Supervision Consultant (The Engineer), appointed by BR, the EU must undertake operating-period compliance monitoring and reporting according to EMP specifications. For the construction period this involves only compliance monitoring of the contractor (s).
vi	Prepare and deliver annual training programme for contractors
vii	Prepare semi-annual and annual monitoring reporting during the construction and operating periods to DOE

Source: Prepared by the Environment team of Rail

2. Estimated Costs

398. BR's present approach to loan implementation is to appoint an Engineer, (sometimes referred to as the Construction Supervision Engineer or Consultant) who handles all day-to day dealings with contractor(s), including enforcing the mitigative and monitoring tasks defined in the Project EMP and agreed to by the contractor in the contract specifications. The EU needs to be able to implement pre-construction period mitigative and monitoring measures as defined in the environmental documents and to guide the contractor(s) in preparing for the environmental work to be undertaken during the construction period. During the construction period the EU's would be required to participate in the compliance monitoring effort as the representative of the executing agency, albeit the majority of the work would be done by the Engineer and the Contractor.

399. An indicative budget for an EU, with environmental safeguards staff[25] of one, responsible for all Projects, and including the capital expenditures to provide the necessary gear, will be BDT 63.82 million for all seven projects and seven operating years (Table 44). The cost for an operating social safeguards cell within the EU has yet to be estimated.

Table 44: Establishment and Operation of EU for Seven Year (BDT)

Costs	Unit cost	The Unit	No Units	First Year Budget	Estimated 7 Years Input
Non-reoccurring, Entire EU					
Computers and software	79,000	BDT	3	237,000	79,000
Data storage system	31,600	BDT	1	31,600	
Laser Printer/scanner	47,400	BDT	1	47,400	94,800
Smart Phones with Digital camera, recording and GPS functions	52,350	BDT	3	157,050	
Other Technical Equipment	632,000	BDT	01-Jan	632,000	
SUBTOTAL				**1,105,050**	**173,800**
Reoccurring , (annual), all Projects					
EU Staff 1 (based on present payments staff costs)	150,000	Months	12	1,800,000	

[25] Single staff members are very risky since if anything should happen or the situation changes and that staff member leaves, the ESSU will be left without any staff.

Costs	Unit cost	The Unit	No Units	First Year Budget	Estimated 7 Years Input
Administrative support (annual)	-			Provided by BR	
EIA Field Survey and other assistance, Per Diem, etc. (all Projects)	100,000	trips	14	1,400,000	
Field audit trip; 4 /yr to 7 Project for one person and 5 days per Project	17,000	trips	196	3,332,000	
Per diems	1,975	Days	70	138,250	
Field Transportation Costs (Implementation)	47,400	Months	6	284,400	
Office Operation and consumables	125,000	No.	1	125,000	
Driver	300,000	yr	1	300,000	
Annual Training programme (without International involved)***	632,000	Lump sum all	1	632,000	
Vehicle rental/use (part time)	–	months	6	Provided by BR	
Annual Reoccurring Costs				8,011650	
First Year Total Budget				9,116,700	
Estimated TOTAL budget of 7 years for all Projects				63,817,900	

Source: Rail estimates
Note: costs for the social safeguards staffing and expenses need to be added

3. Functions

400. All rail projects require the EU to deliver operating period monitoring, data analysis and reporting, and be able to present information to senior staff, etc. During the construction period, the EU will function in an oversight mode, supervising and interacting with the Consultant, contractors, and donors. Over time the EU will become the environmental decision point for all BR projects and will be the lease/ communicate most closely with DoE. The staff assigned to the EU will have a background in environmental management and assessment and be required to receive intensive training, and once trained deliver workshops etc., to staff and contractors.

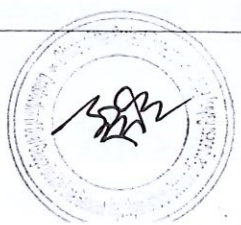
401. **Content and Delivery of Training** - The EU will focus on building environmental awareness among the BR engineering staff running specific projects, provide technical advice on environmental issues, prepare screenings of proposed undertakings, giving BR managers early warnings on a red-flag issues. Once the EU has a technical staff of two or more. It will be expected to deliver this sort of awareness raising and decision shaping advice to Regions and UPs. A parallel and essential task will be to confirm the environmental and social safeguards capability of contractors and to assist them with implement EMPs, LAPs and RPs and making sure that they have all key documentation before mobilisation and that they are aware of the safeguard clauses in the contract(s) they have signed.

402. Finally the EU will need to monitor delivery of environmental safeguard requirements in relation to BOQ payments and provide this record to the Project's Chief Engineer.

B. Involvement of Local Government in Environmental Issues

403. The Project which will take four years to construct and will have ten monitoring stations, possibly two in prefabrication yards and two in proposed EMO building area. Therefore, it is

essential to involve local government and other Divisional /District agencies to support Bangladesh Railway for implementation of environmental management and monitoring plan of the Project. It was understanding from the seven public consultation meetings that local government has limited capacity and knowledge on environmental issues. However, head of all local governments showed their interest to be involved in any environmental and social issues raised by local communities.



XI. IMPLEMENTATION ARRANGEMENTS

A. General

404. Environmental management involves highly specialized multidisciplinary and multi sectoral-activities from construction of bridges, embankments, railway tracks and associated components. Therefore, the implementation or execution of the mitigative and monitoring actions as defined in the environmental assessment's EMP needs to be well understood.

405. The EMP for this Project, a major deliverable of the EIA, has (**Section IX**) actions that must be undertaken starting during the pre-construction period through to the operating stage. The EMP indicates who is responsible for executing and overseeing each task but provides no specific implementation schedule. This section presents the implementation details. BR's Project Manager shall have the overall decision-making responsibility for EA studies, including the implementation of the EMP.

406. BR's Director General responsible for this Project will set the policies and strategies for all environmental issues, with most decisions delegated to the Project's General Manager. These managers will take advice from the TA (Technical Assistance) Consultant and work jointly to deliver the environmental safeguards. In **Section X**, BR proposed to establish an internal Environmental and Social Safeguards Unit (EU) at BR Head Office in Dhaka, consisting of environmental and social safeguard specialist and other required personnel, taken from the available manpower under the existing setup of BR. They would take over the monitoring role and deal directly with the Consultant and the Contractor.

B. Environmental Requirements and Implementation

407. During the construction period the work will be completed around the following steps including those addressing environmental safeguards shown in **bold**:

- Preparation of Tender Documents
- Completion of EIA and its EMP
- Insertion of Environmental Clauses in bid documents
- Invitation to bid using approved documentation
- Bid Evaluation, Clarifications and Contract Award
- Relocation of involuntary resettlement
- Environmental Safeguards Briefing and Training of Contractors
- Construction mobilisation work commences
- Contractor prepares Construction Environment Work Plan
- Work continues for 4 years until completed
- Monthly environmental compliance reporting by Contractor
- Contract Supervision Consultant-working with EU prepares construction period semi-annual monitoring summary
- Testing and Commissioning-end of construction
- Construction period Safeguards completion report/checklist

408. A typical construction programme is shown in **Annex 10**.

1. Preconstruction Period

409. During the pre-construction period BR's GM has the final say. This is when the pre-construction mitigative and monitoring actions defined in the EMP.

2. Construction Period

410. The Construction Supervision Consultant (The Engineer) takes over the role of the TA Consultant and administers all aspects of the construction contract. The Engineer's environmental safeguards specialist would work with the Contractor to insure full compliance and delivery of construction period mitigation and monitoring measures. It is at this point that the EU's work begins and staff work closely with the Engineer to learn the compliance monitoring tasks and oversee the data analysis and report delivery. It is during this stage that BR's staff become directly involved and works with the Engineer and the EU to address any Contractor non-compliance issues.

3. Operating period

411. Once the rail line becomes operational the BR retains the major responsibility for undertaking those tasks defined in the operating period section of the EMP. The day to day involvement of the Regional BR staff will be required at this stage. Environmental Specialist (Manager, EU) of the EU will be responsible for approvals and follow up of any documents, compliance issues and issues raised by local people.

C. Roles and Responsibilities

412. **BR's Environmental and Social Safeguards Unit (EU):** If staff can be provided BR, will establish the EU with the major function of overseeing the implementation of the EMP and the environmental clauses contained in the construction contract. The EU will be working alone during the preconstruction and operating periods and with the Engineer during the construction period.

413. **Construction Supervision Consultant (The Engineer):** The proposed framework for implementation of the Project shall utilize consultancy services from both international and national companies for the overall management and supervision of construction work and for preparation of the EA documents.

414. **Contractor(s):** International and national Contractors shall carry out construction of double line and upgrade of existing line under the specified contract agreements. Environmental awareness creation, particularly regarding direct construction impacts and specifically health, pollution, and safety issues will be needed. The need to develop self-regulation of the Contractors will have to be emphasized, with the Consultant's supervisory role to be in conformity with the relevant Environmental Clauses.

415. **Other GoB Organisations:** The organisations involved in implementing the Project are: The Department of Environment (DoE), the Bangladesh Water Development Board (BWDB), the Roads and Highways Department (RHD), the Department of Forests (DF), the Local Government Engineering Department (LGED), the Bangladesh Inland Water Transport Authority (BIWTA), and local administration (District. Upazila, Pourashava administration, Police, etc.). They will have supporting roles as required.

416. **DOE:** DOE's roles in relation to safeguards will be oversight, advisory, enforcement, periodic inspection and auditing. Development Partners will be expected to assist BR and the Engineer with underscoring the need for credible environmental management to GoB officials when effort to improve performance is needed.

D. Reporting

417. Three types of environmental reports shall be prepared in English, containing air, noise, and water quality data, maps, diagrams, plans, tables etc. The following reports have to be prepared and submitted by Contractor and Engineer.

- Monthly Environmental Inspection Report;
- Quarterly Environmental Inspections and Reports; and
- Semi-annual Monitoring Reports.

1. Monthly Environmental Inspection Report

418. During the construction period, environmental reporting will be required monthly, which will be prepared by the Contractor. The monthly reports will consist of a completed environmental compliance checklist developed using the EMP and approved by the Engineer such that actions necessary for each relevant mitigative action is identified and a summary of all actions recorded.

419. Where a monthly report is coincident with a quarterly and annual report, such monthly report shall be required but may be included with the respective quarterly and annual report.

2. Quarterly Environmental Inspections and Reports

420. During the construction period, environmental inspections and reporting will be required quarterly by the Contractor. The quarterly report shall consist of a completed environmental compliance checklist developed using the EMP and approved by the Engineer together with a summary of significant items from the current and previous two monthly reports with an indication of trends, either positively or negatively. This Project has six predefined stations for which environmental data have been collected during preconstruction and construction periods. The EIA contains mandatory sampling specifications that the Contractor will be required to adhere to. At the training workshop the Contractor will receive survey worksheets that will need to be completed for each sampling station and submitted to the Engineer.

421. Where a quarterly report is coincident with semi-annual report, the semiannual report will include both quarters.

422. The Engineer reserves the right to increase the frequency of sampling Subject to a review, which may be carried out at any time during the Construction period of the results as an additional work. If the additional sampling indicates that the Contractor's activities have caused the need for additional sampling, then there will be no additional payment to the Contractor. If it is determined by the Engineer that the Contractor is not responsible for the need for additional sampling, then payment will be made from EMP monitoring budget.

3. Quarterly Compliance Monitoring Checklist

423. This checklist consists of the slightly reworked EMoT table found with the EMP, with a couple of columns replaced requiring comment on actions taken, when and by whom and what the observable results have been during that quarter. A sample form is included as **Annex 9.**

4. Semi-annual Monitoring Reports

424. The Engineer shall prepare a semi-annual monitoring report to include details of all environment related activities together with a summary of all tests and monitoring activities and conclusions to include assessment of effectiveness of current monitoring activities, possible changes in construction methodologies and any other thing(s) which may contribute to a reduction in environmental impact. This is a mandatory requirement of the DOE and must be submitted after completion of each 6 months' period of the work.

425. In cases where the contractors' environmental compliance is poor, the DOE may require annual due diligence audits by the CSE (as is the case with the Tongi Bhairab Double Tracking construction work). This reporting will be determined, based in the outcome of the first semi-annual monitoring report.

XII. CONCLUSIONS AND RECOMMENDATIONS

426. Most of the impacts associated with the Project will occur during the construction period since a large and high embankment between 3.5 to 7 m, will be put in place requiring millions of tons of fill material. Much of that will be dredged from nearby rivers and pumped as slurry to the work sites. Much of the ballast will be shipped by rail and a lesser amount by road. The problems arising when the Contractor does not follow environmentally responsible operating procedures or does not provide proper housing, safe disposal of wastes and sanitation facilities for the workers is addressed in detail.

427. The EIA identified several specific mitigation actions needing to be addressed during the pre-construction, construction and operating period of the new rail line. To track the mitigation work, an air noise and surface water quality monitoring programme will be started during the construction period and air and noise monitoring continued through into the operating period for operating years 1, 3 and 5.

428. The construction of the double track will require approximately 26.973 hectares of land acquisition if judiciously designed. There is little chance that impacts will extend beyond the 50 m wide corridor of impact centred over the rail line, given that all work will be strictly confined to the railway's existing Right of Way.

429. Careful implementation of the pre-construction mitigation measure will reduce the scale of the construction period impacts. The impact from the removal of trees, physical and social infrastructure from the RoW; and relocation and compensation will be important mitigation measures to be implemented.

430. The climate risk associated with sea level rise and the need to adjust bridge deck clearances was found to be negligible given the distance of the bridges to a location where sea level rise can be measured.

431. Using 2025 as the first year of operation when about three additional train sets (total of 15 trains or 30 trips) are assumed to be in service there will be a net saving of more than 11.6 million litres of fuel a year due to diversion of road traffic to rail (via passenger km estimations. The diverted traffic in 2039, when 24 trains (48 trips) are in operation is projected to save an estimated 16.65 million litres of fuel per year.

432. Based on these data, by 2031, the fuel saving of 16.65 million l/year translates into a saving of 44,600 metric tons of CO -e/yr. (using a CO -e emissions factor of 2.68 kg CO -e/l of 222 diesel fuel consumed). By increasing locomotive efficiency or retiring the old locomotives for new ones, these already significant savings could be further increased.

433. The establishment of BR's Environmental Unit (EU) is very important and will make the job of implementing environmental safeguards much easier and more credible. With this capability BR can oversee the entire EIA procedure, instead of it being only with outside Consultant.

434. Social impacts especially associated with relocation of people from the establishments will be significant. The procedure for determining entitlement and compensation is defined in the land acquisition plan and resettlement plan documents, which the Project must follow closely. The actions defined in these two documents are being implemented by BR.

435. No red-flag environmental safeguard issues were identified and all likely impacts can be prevented or mitigated to an acceptable level[26].

436. BR will fully implement the EIA's environmental management plan and during the construction period semi-annual monitoring will be used to report progress and adjust the monitoring programme defined in the EIA. Should problems be noted with the data, BR will take immediate actions, and the annual reporting will be used to adjust mitigative actions. These activities, coupled with the timely reporting will provide the appropriate level of environmental oversight and demonstrate to the DOE that the natural environment is being protected while the rail line is built and the system becomes operational and sustainable.

437. BR will integrate EIA findings and the EMP items into the contract specifications and make provision for the estimation of environmental safeguard costs in an environmental section of the Bill of Quantities.

438. The potential impacts on the river bridges were examined, focusing on pile driving in water, use of drilling lubricants, work camp operation near the shore and work over a navigation channel. To address these issues a separate EMP, designed to deal with all possible effects that might endanger the river's aquatic environment, was prepared and will be implemented.

439. BR concludes that this EIA is complete and addresses all relevant likely impacts and proposes a full set of time-bound mitigative and monitoring actions, including assignment of responsibility. The application of the detailed EMP will insure that the natural and socio-cultural environmental are not unduly affected by the work or the operation of the second line. Therefore, BR recommends that an environmental approval be granted by DoE, and that no additional studies be required.

[26] The one issue that will be very difficult to mitigate will be noise associated with pile driving. The only action will be to restrict operations to daytime hours

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Contents

Annex 1: DoE Approval of the Project EIA Terms of Reference

Government of the People's Republic of Bangladesh
Department of Environment
www.doe-bd.org
Head Office, Paribesh Bhaban
E-16 Agargaon, Dhaka-1207

Memo No: DoE/Clearance/5262/2014 C-9 Date: 03/01/2014

Subject: Approval of Terms of Reference for Environmental Impact Assessment (EIA) in favour of Construction of Double Line between Joydebpur-Ishurdi Section of Bangladesh Railway (Sub-project-5).

Ref Your application received on 31 October 2013.

With reference to your letter dated 31.10.2013 for the subject mentioned above, the Department of Environment hereby gives approval of TOR for Environmental Impact Assessment (EIA) in favour of Construction of Double Line between Joydebpur-Ishurdi Section of Bangladesh Railway (Sub-project-5) subject to fulfilling the following terms and conditions.

i. Bangladesh Railway shall conduct a comprehensive Environmental Impact Assessment (EIA) study considering the overall activity of the said Project in accordance with the TOR submitted to the DOE and additional suggestions provided herein.

ii. The EIA report should be prepared in accordance with following indicative outlines:

1. Executive summary
2. Introduction: (Background, brief description, scope of study, methodology, limitation, EIA team, references)
3. Legislative, regulation and policy consideration (covering the potential legal, administrative, planning and policy framework within which the EIA will be prepared)

4a. Project activities: A list of the main project activities to be undertaken during site clearing, construction as well as operation.

4b. Project schedule: The phase and timing for development of the project.

4c. Resources and utilities demand: Resources required to develop the project, such as soil and construction material and demand for utilities (water, electricity, sewerage, waste disposal and others), as well as infrastructure (road, drains, and others) to support the project.

4d. Map and survey information
Location map, Cadastral map showing land plots (project and adjacent area), Geological map showing geological units, fault zone, and other natural features.

5. Baseline Environmental Condition should include, inter alia, following:
   - Physical Environment : Geology, Topology, Geomorphology, Soils, Meteorology, and Hydrology.
   - Biological Environment : Habitats, Aquatic life and fisheries, Terrestrial Habitats and Flora and Fauna
   - Environment Quality : Air, Water, Soil and Sediment Quality.

6. Socio-economic environment should include, inter alia, following:
   - Population: Demographic profile and ethnic composition
   - Settlement and housing
   - Traffic and transport
   - Public utilities: water supply, sanitation and solid waste
   - Economy and employment: employment structure and cultural issues in employment
   - Fisheries: fishing activities, fishing communities, commercial aquatic species, fishing resources, commercial facto

Regional Cooperation & Integration Project
Rail Component
Office of the General Manager/Project Director

CE	necessary action
Addl. CE	put-up
Addl. CSTE	this immediately
DD/HQ	n/a immediately
DD/R	Discuss
AD/T&W	Follow up
AD/Br.	File

No: 413
Date: 16-1-14

20.1.14

1/2

7. Identification, Prediction and Evaluation of Potential Impacts (identification, prediction and assessment of positive and negative impacts likely to result from the proposed project).

   In identification and analysis of potential impacts'-the Analysis' part shall include the analysis of relevant spatial and non-spatial data. The outcome of the analysis shall be presented with the scenarios, maps, graphics etc. for the cases of anticipated impacts on baseline. Description of the impacts of the project on air, water, land, hydrology, vegetation-man made or natural, wildlife, socio-economic aspect shall be incorporated in detail.

8. Management Plan/Procedures:

   For each significant major impact, proposed mitigation measures will be set out for incorporation into project design or procedures, impacts, which are not capable of mitigation, will be identified as residual impacts Both technical and financial plans shall be incorporated for proposed mitigation measures..
   An outline of the Environmental Management Plan shall be developed for the project.
   In Environmental Monitoring Plan, a detail technical and financial proposal shall be included for developing an in-house environmental monitoring system to be operated by the proponent's own resources (equipments and expertise).

9. Consultation with Stakeholders/Public Consultation (ensures that consultation with interested parties and the general public will take place and their views taken into account in the planning and execution of the project)

   Beneficial Impacts (summarize the benefits of the project to the Bangladesh nation, people and local community and the enhancement potentials)

10. Conclusion and Recommendations

iii. Without approval of EIA report by the Department of Environment, Bangladesh Railway shall not be able to open L/C in favor of importable machineries.

iv. Without obtaining Environmental Clearance, Bangladesh Railway shall not start operation of this project.

v. Bangladesh Railway shall submit the EIA along with a filled-in application for Environmental Clearance in prescribed form, the applicable fee in a treasury chalan, the no objection certificates (NOCs) from the local authority, NOC from forest department (if it is required in case of cutting any forested plant/trees-private or public), NOC in favor of Cutting/Dressing (if it is required) of Hill/Hillock from the concerned authority and NOC from other relevant agencies for operational activity etc. of this project to the Dhaka Regional Office of DOE with a copy to the Head office of DOE in Dhaka.

07.04.2019

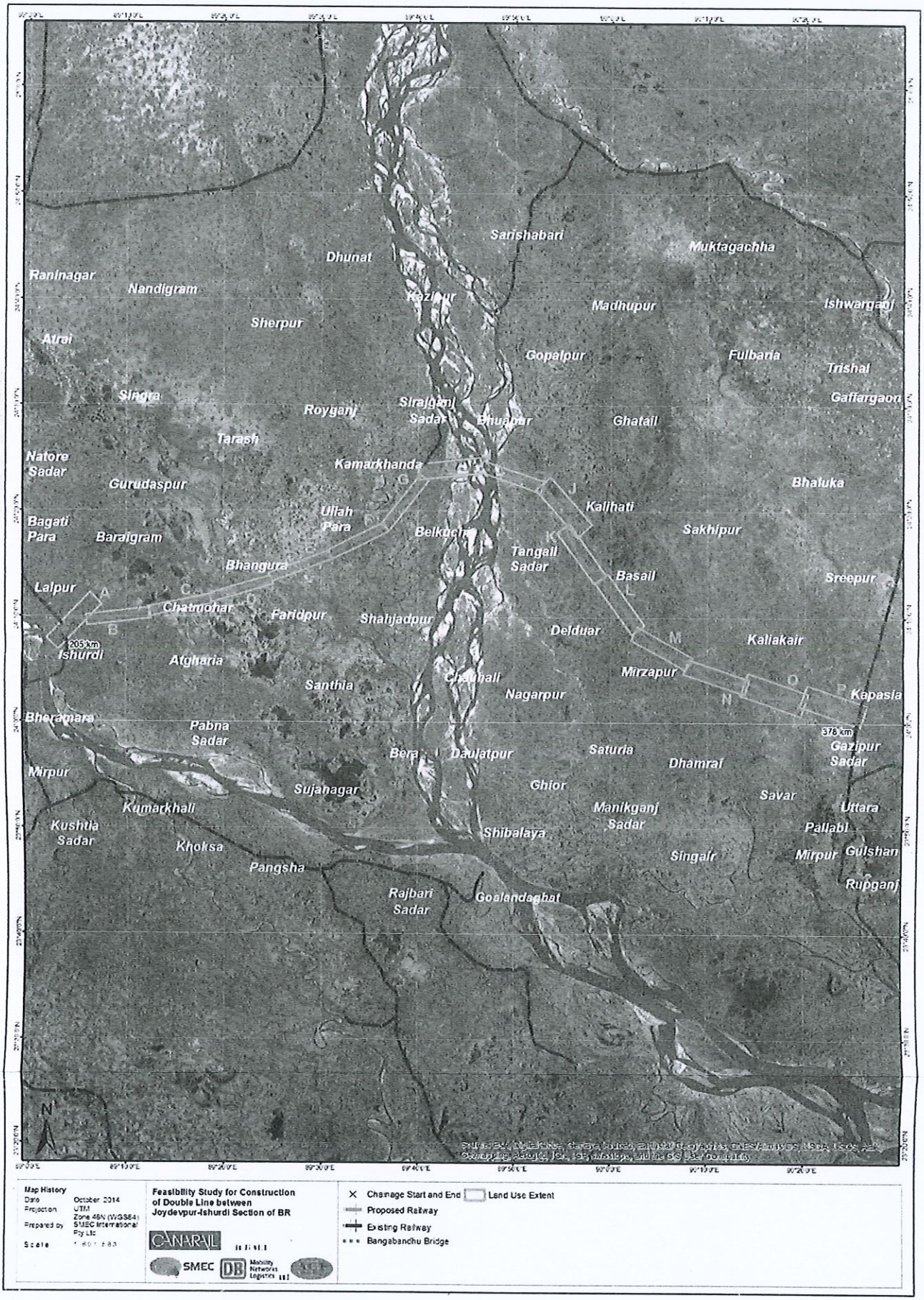
(Syed Nazmul Ahsan)
Deputy Director (Environmental Clearance)
and
Member Secretary
Environmental Clearance Committee
Phone # 8181778

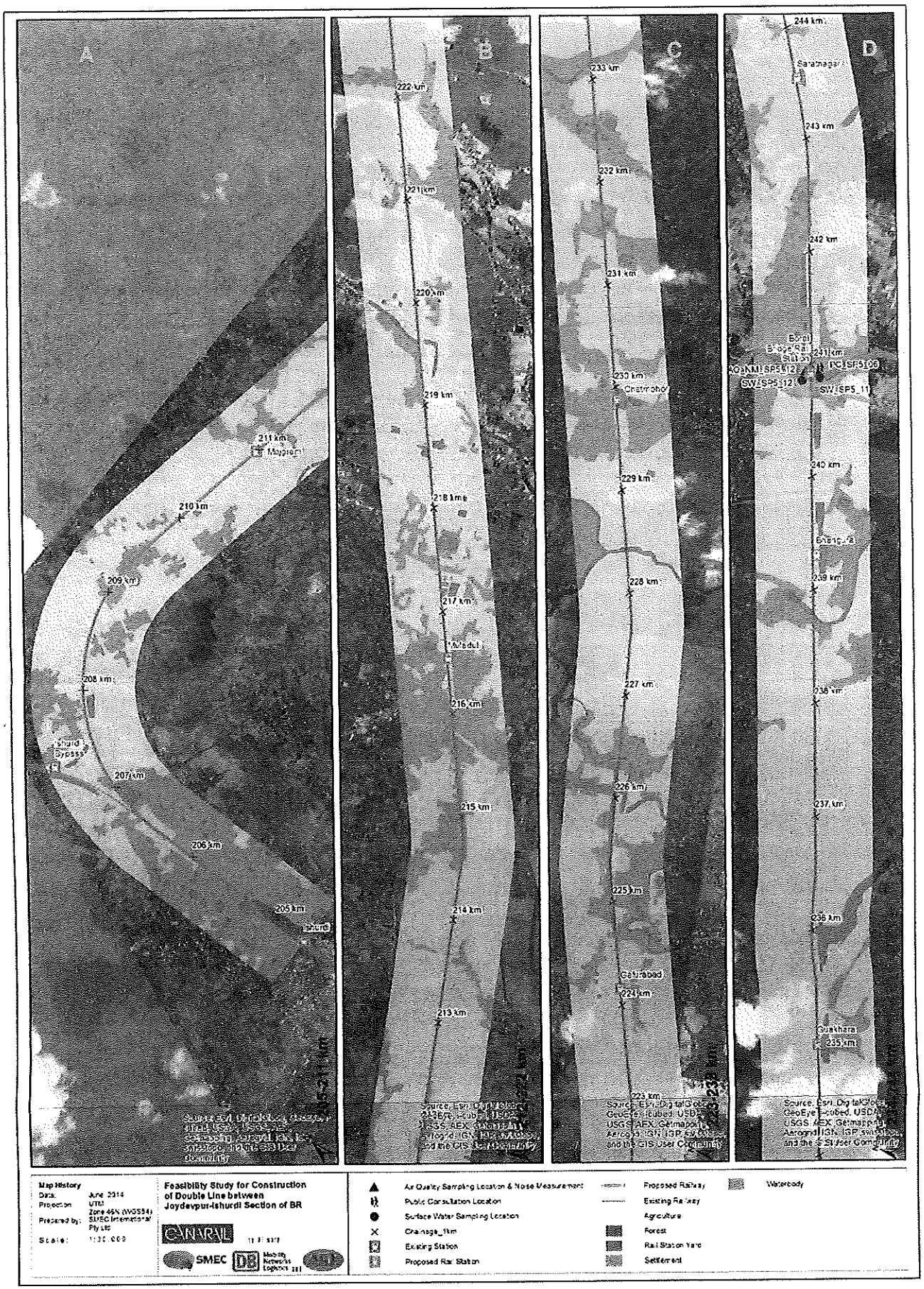
Mr. S. K. Chakraborty
Project Director & General Manage
Bangladesh Railway
Regional Cooperation and Integration Project (RCIP) : Rail Component
Rail Bhaba, 16, Abdul Gani Road, Dhaka.

Copy Forwarded to :

1) PS to Secretary, Ministry of Environment and Forest, Bangladesh Secretariat, Dhaka.
2) Director, Department of Environment, Dhaka Regional Office, Dhaka.
3) Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

Annex 2: Land Use Strip Map Including Locations of Environmental Sampling and Public Consultations

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Map History
Data: June 2014
Projection: UTM
Zone 46N (WGS84)
Prepared by: SMEC International Pty Ltd
Scale: 1:30,000
Feasibility Study for Construction of Double Line between Joydevpur-Ishurdi Section of BR
Air Quality Sampling Location & Noise Measurement
Public Consultation Location
Surface Water Sampling Location
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Existing Station
Proposed Rail Station
Proposed Railway
Existing Railway
Agriculture
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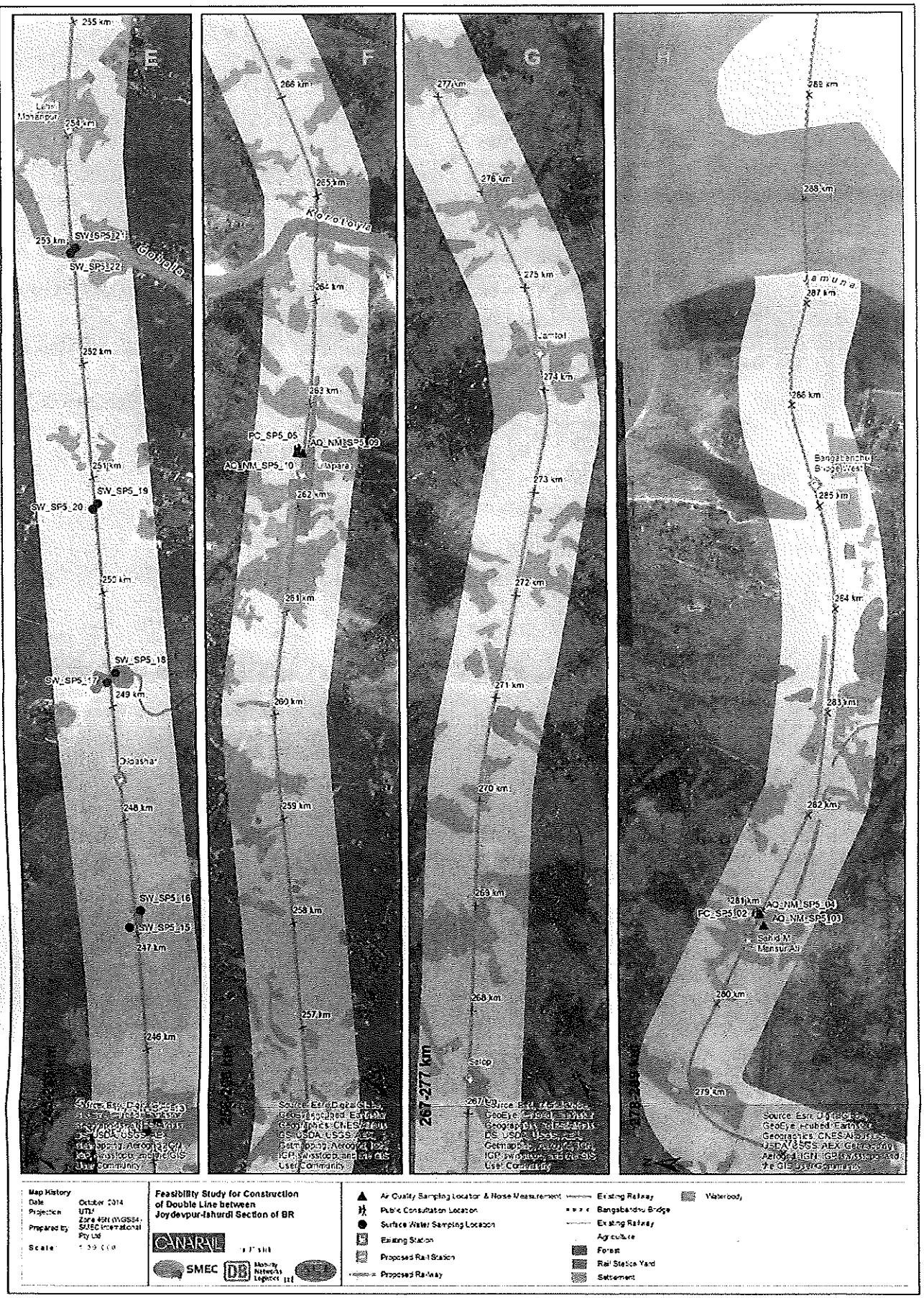
Rail Station Yard
Settlement
Waterbody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AQ_NM_SP5_03
Gotpola
Kolorotola
Lamtol
Jamuna
Bangabandhu Bridge West
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Map History
Date: October 2014
Projection: UTM
Prepared by: SMEC International Pty Ltd
Scale:
Feasibility Study for Construction of Double Line between Joydevpur-Tahurdi Section of BR
Air Quality Sampling Location & Noise Measurement
Public Consultation Location
Surface Water Sampling Location
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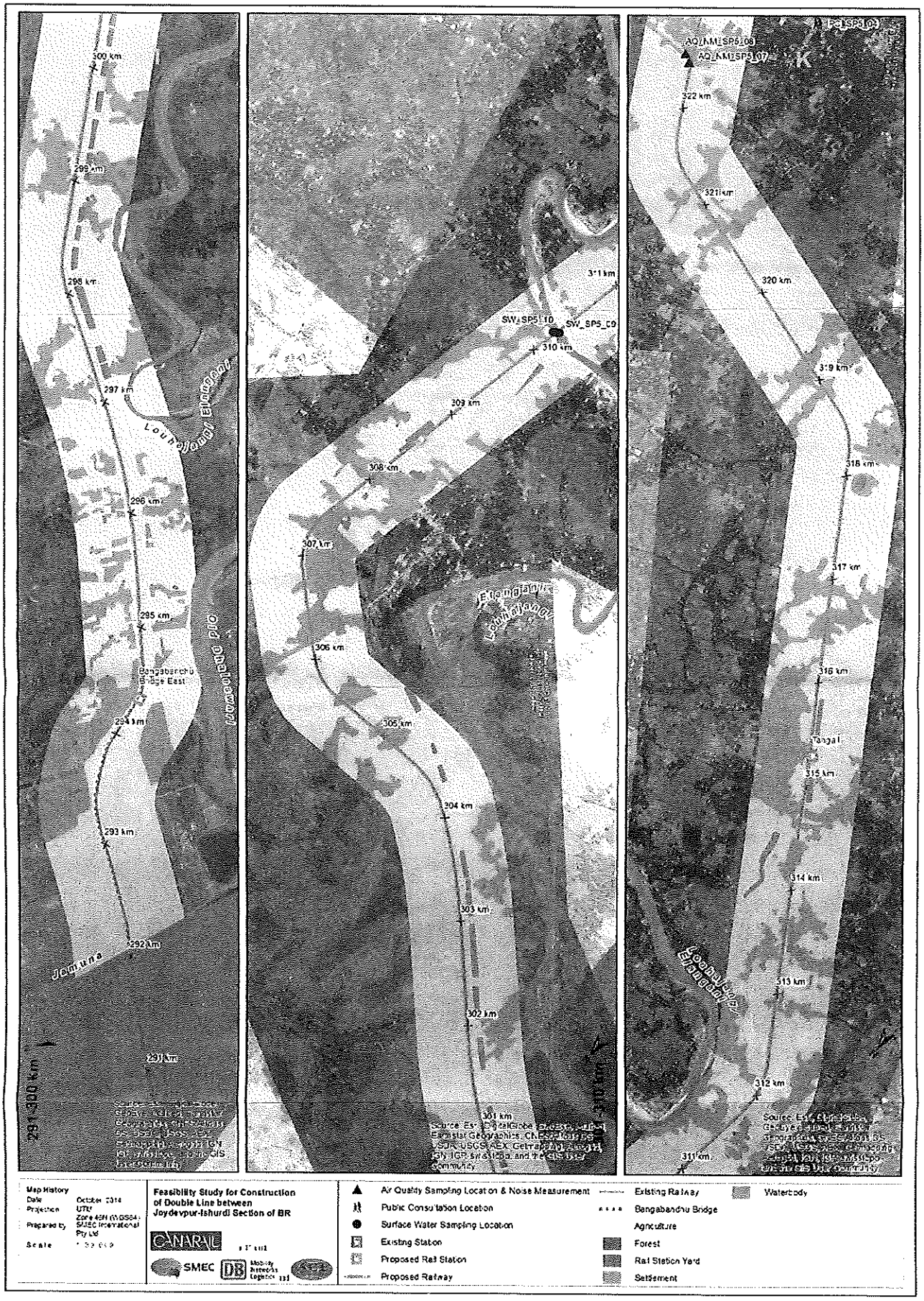
Bangabandhu Bridge
Existing Railway
Agriculture
Forest
Rail Station Yard
Settlement
Waterbody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Bangabandhu Bridge East
Jamuna
Tangail
Map History
Date October 2014
Projection UTM
Zone 45N (WGS84)
Prepared by SMEC International Pty Ltd
Scale
Feasibility Study for Construction of Double Line between Joydevpur-Ishurdi Section of BR
Air Quality Sampling Location & Noise Measurement
Public Consultation Location
Surface Water Sampling Location
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Proposed Railway
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Bangabandhu Bridge
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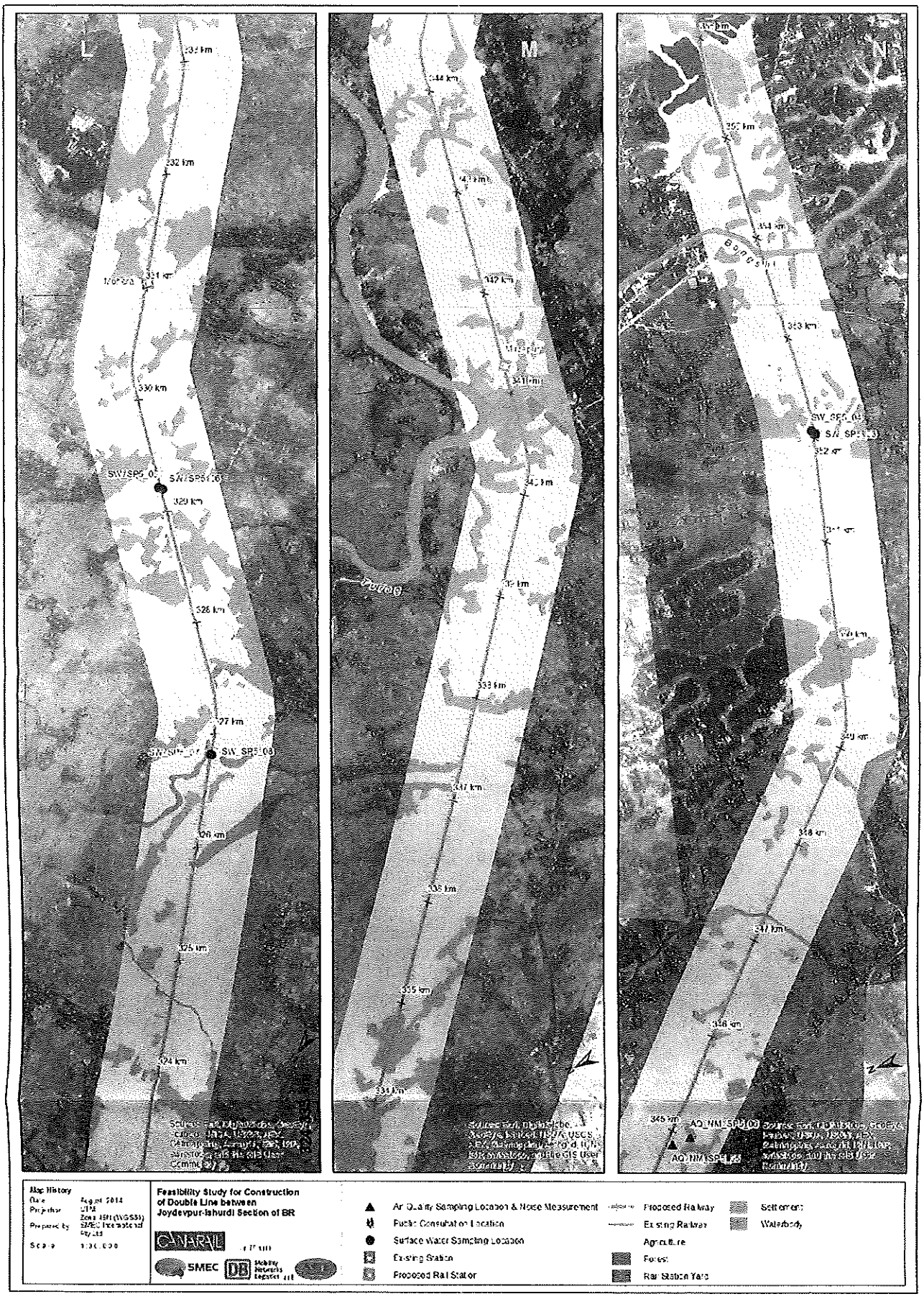
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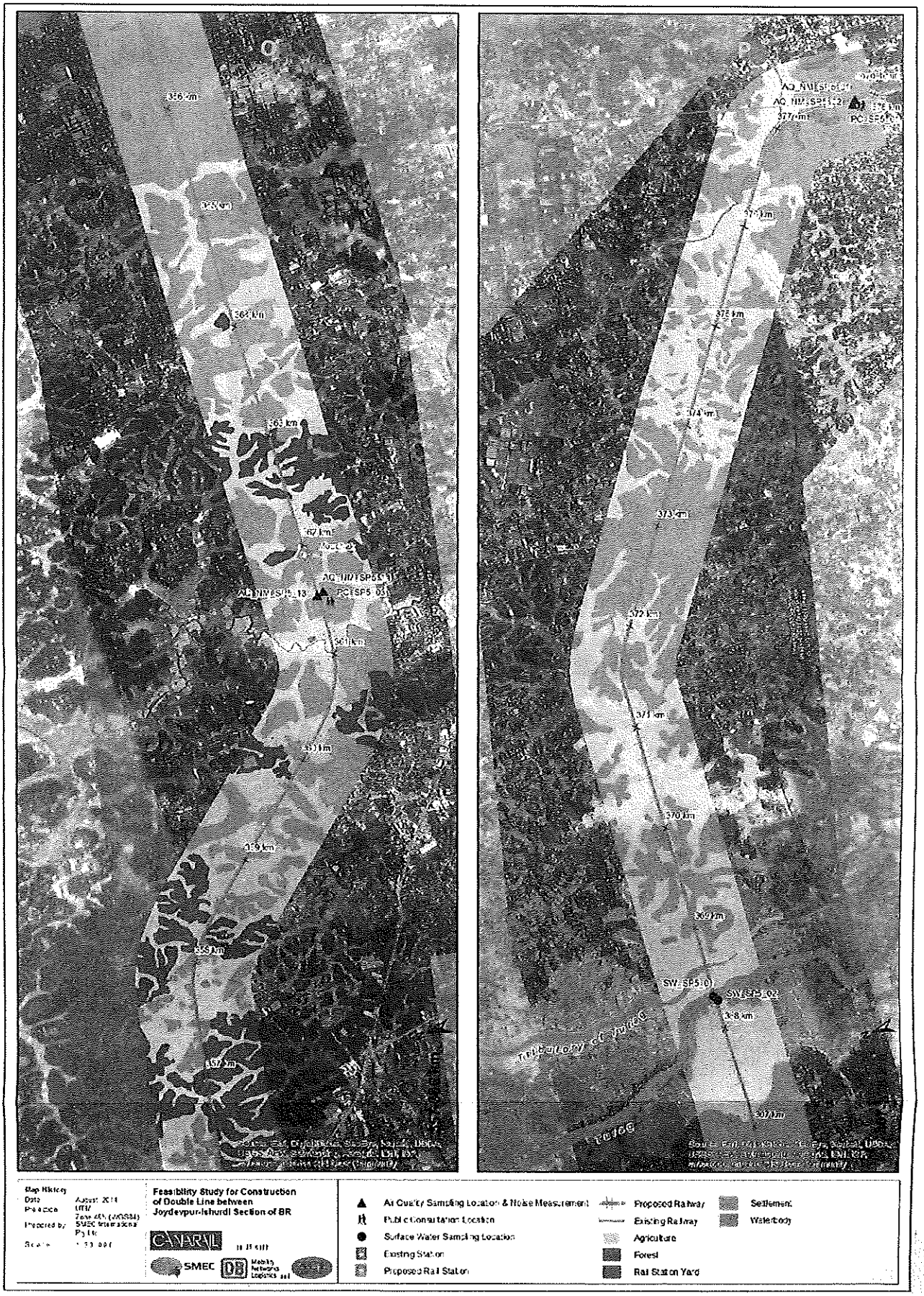
Bansloi
Pagla
Map History
Date August 2014
Projection UTM
Zone 45R (WGS84)
Prepared by SMEC International Pty Ltd
Scale 1:30,000
Feasibility Study for Construction of Double Line between Joydevpur-Ishurdi Section of BR
SMEC
Air Quality Sampling Location & Noise Measurement
Public Consultation Location
Surface Water Sampling Location
Existing Station
Proposed Rail Station
Proposed Railway
Existing Railway
Agriculture
Forest
Rail Station Yard
Settlement
Waterbody


Feasibility Study for Construction of Double Line between Joydevpur-Ishurdi Section of BR
AQ_NMS_SP5_13
PC_SP5_01
SW_SP5_01
SW_SP5_02
Air Quality Sampling Location & Noise Measurement
Public consultation Location
Surface Water Sampling Location
Existing Station
Proposed Rail Station
Proposed Railway
Existing Railway
Agriculture
Forest
Rail Station Yard
Settlement
Waterbody

Annex 3: Calibration Certificate of EPAS Air Quality Sampling Device

Certificate of Calibration

Certificate Number: EDCQP200-4.11.5

Environmental Devices Corporation certifies the EPAS is calibrated to publish specifications and NIST traceable.

Calibration Dust Specifications are NIST traceable using Coulter Mutisizer II e. ISO12103 –1 A2 Fine Test Dust.
Gas sensors are Calibrated against NIST/EPA traceable Calibration Gas using NIST primary Flow Standard: LFE774300.
Quality system standard to meet the requirements of ANSI/ASQC standard Q9000-1994 (ISO 9001), MIL-STD 45662A, and customer's specification if required.

Temperature = 22°C
Relative Humidity = 30%
Atmospheric Pressure = 760 mmHg
Measurement Uncertainty Estimated @ 95% Confidence Level (k=2)

Technician	Model	Serial Number	Date
Marc Blanchett	EPAS	913008	April 8, 2013
		Next Calibration Due Date	April 2014

Checked By
Manager: Mark L. Sullivan

Calibration Span Accessory K 14,600 ug/m3 Model: CS-105

Environmental Devices Corporation
4 Wilder Drive Building #15
Plaistow, NH 03865
ISO-9001 Certified

PARTICULATES NOT OTHERWISE REGULATED, RESPIRABLE 0600

DEFINITION: aerosol collected by sampler with 4-µm median cut point | CAS: None | RTECS: None

METHOD: 0600, Issue 3 | **EVALUATION:** FULL | **Issue 1:** 15 February 1984 **Issue 3:** 15 January 1998

OSHA: 5 mg/m³
NIOSH: no REL
ACGIH: 3 mg/m³

PROPERTIES: contains no asbestos and quartz less than 1%; penetrates non-ciliated portions of respiratory system

SYNONYMS: nuisance dusts, particulates not otherwise classified

SAMPLING

SAMPLER:	CYCLONE + FILTER (10-mm nylon cyclone, Higgins-Dewell (HD) cyclone, or Aluminum cyclone + tared 5 µm PVC membrane)
FLOW RATE:	nylon cyclone: 1.7 L/min HD cyclone: 2.2 L/min Al cyclone: 2.5 L/min
VOL-MIN:	20 L @ 5 mg/m³
-MAX:	400 L
SHIPMENT:	routine
SAMPLE STABILITY:	stable
BLANKS:	2 to 10 field blanks per set

ACCURACY

RANGE STUDIED:	0.5 to 10 mg/m³ (lab and field)
BIAS:	dependent on dust size distribution [1]
OVERALL PRECISION ($\hat{S}_{rT}$):	dependent on size distribution [1,2]
ACCURACY:	dependent on size distribution [1]

MEASUREMENT

TECHNIQUE:	GRAVIMETRIC (FILTER WEIGHT)
ANALYTE:	mass of respirable dust fraction
BALANCE:	0.001 mg sensitivity; use same balance before and after sample collection
CALIBRATION:	National Institute of Standards and Technology Class S-1.1 or ASTM Class 1 weights
RANGE:	0.1 to 2 mg per sample
ESTIMATED LOD:	0.03 mg per sample
PRECISION:	<10 µg with 0.001 mg sensitivity balance, <70 µg with 0.01 mg sensitivity balance [3]

APPLICABILITY: The working range is 0.5 to 10 mg/m³ for a 200-L air sample. The method measures the mass concentration of any non-volatile respirable dust. In addition to inert dusts [4], the method has been recommended for respirable coal dust. The method is biased in light of the recently adopted international definition of respirable dust, e.g., - +7% bias for non-diesel coal mine dust [5].

INTERFERENCES: Larger than respirable particles (over 10 µm) have been found in some cases by microscopic analysis of cyclone filters. Over sized particles in samples are known to be caused by inverting the cyclone assembly. Heavy dust loadings, fibers, and water-saturated dusts also interfere with the cyclone's size-selective properties. The use of conductive samplers is recommended to minimize particle charge effects.

OTHER METHODS: This method is based on and replaces Sampling Data Sheet #29 02 [6].

Annex 4: Raw Dataset of Air Quality, Noise Measurement, and SW and GW Quality

AMBIENT AIR (AA) QUALITY MONITORING AND TEST REPORT

COMPANY NAME: A Joint Venture of CANARAIL Consultants, SMEC International , DB International , ACE Consultants.
PROJECT NAME : Regional Cooperation and Integration Project (Rail Component)
ADDRESS: House 486, Lane 08 DOHS Baridhara, Dhaka, Bangladesh
HEADER/SAMPLE ID: 216363
SAMPLING AND TESTING DATE: 02/02/2014 (3:02 PM)
ANALYSIS AND REPORTING DATE: 18/02/2014

Ambient Air Quality Test Results of Subproject 5

Sampling ID and Location	Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters			DoE Standards
				Minimum	Maximum	Average	
SP5_AQ_01 _5m (Joydebpur Station) 23°59'50.5"N 90°25'12.3"E	Instrument was set on the station yard which was very busy and three trains passed through the sampling point during data acquisition. Vegetation was low	Carbon Monoxide (CO)	$\mu g/m^3$	93	1037	844.61	40,000
		Nitric Oxide (NO)	$\mu g/m^3$	62	831	612.08	100
		Nitrogen Dioxide (NO_2)	$\mu g/m^3$	54	775	591.22	100
		Sulphur Dioxide (SO_2)	$\mu g/m^3$	0	305	264.11	365
		Ozone (O_3)	$\mu g/m^3$	30	82	64.79	235
		Volatile Organic Compounds (VOC)	ppm	0	2.16	0.09	NSE*
		Particulate Matter (PM_{10})	$\mu g/m^3$	49	409	326.26	150
		Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	31	229	128.06	65
		Air Temperature	°C	28	32	29.47	

Noise Measurement Results

Sampling ID	Time	Noise Level (dB)			DoE Standards	
		Minimum	Maximum	L_{eq}	Res. Zone	Mix. Zone
SP5_NM_1_ 5m	Day	57.9	85.7	69.10	50	60
SP5_NM_3_ 5m	Night	57.1	84.2	68.2	40	50

* No standards established yet

Remarks: The amended schedule-2 of (Air Quality Standard) Environmental conservation Rules, 1997 has been adopted.

Remarks: The schedule-4 of (Noise Measurement Standard) Environmental conservation Rules, 1997 has been considered.

Report Reviewed and Approved by:
Mehedi Hasan
Environmental Specialist
RCI-Rail Component

AMBIENT AIR (AA) QUALITY MONITORING AND TEST REPORT

COMPANY NAME: A Joint Venture of CANARAIL Consultants, SMEC International , DB International , ACE Consultants

PROJECT NAME : Regional Cooperation and Integration Project (Rail Component)

ADDRESS: House 486, Lane 08 DOHS Baridhara, Dhaka, Bangladesh

HEADER/SAMPLE ID: 216367

SAMPLING AND TESTING DATE : 02/02/2014 (4:05 PM)

ANALYSIS AND REPORTING DATE: 18/02/2014

Ambient Air Quality Test Results of Subproject 5

Sampling ID and Location	Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters			DoE Standards
				Minimum	Maximum	Average	
SP5_AQ_02_50m (Jaydebpur Station) 23°59'55.5"N 90°25'13.0"E	Instrument was set about 50 m away from the Dhaka-Jaydebpur highway which was very busy and large number vehicles were passed through the sampling point during data acquisition. There were restaurants besides the sampling point which emited visible smoke.	Carbon Monoxide (CO)	$\mu g/m^3$	500	1744	1037.98	40,000
		Nitric Oxide (NO)	$\mu g/m^3$	102	995	761.44	100
		Nitrogen Dioxide (NO_2)	$\mu g/m^3$	73	835	622.13	100
		Sulphur Dioxide (SO_2)	$\mu g/m^3$	16	538	411.03	365
		Ozone (O_3)	$\mu g/m^3$	36	112	79.27	235
		Volatile Organic Compounds (VOC)	ppm	0	4.17	2.08	NSE*
		Particulate Matter (PM_{10})	$\mu g/m^3$	104	467	396.26	150
		Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	68	288	147.77	65
		Air Temperature	°C	27	31	28.67	

Noise Measurement Results

Sampling ID	Time	Noise Level (dB)			DoE Standards	
		Minimum	Maximum	L_{eq}	Res. Zone	Mix. Zone
SP5_NM_2_50m	Day	57.5	82.5	68.31	50	60
SP5_NM_4_50m	Night	58.6	81.9	67.2	40	50

* No standards established yet

Remarks: The amended schedule-2 of (Air Quality Standard) Environmental conservation Rules, 1997 has been adopted.

Remarks: The schedule-4 of (Noise Measurement Standard) Environmental conservation Rules, 1997 has been considered.

Report Reviewed and Approved by:
Mehedi Hasan
Environmental Specialist
RCI-Rail Component

AMBIENT AIR (AA) QUALITY MONITORING AND TEST REPORT

COMPANY NAME: A Joint Venture of CANARAIL Consultants, SMEC International , DB International , ACE Consultants

PROJECT NAME : Regional Cooperation and Integration Project (Rail Component)

ADDRESS: House 486, Lane 08 DOHS Baridhara, Dhaka, Bangladesh

HEADER/SAMPLE ID: 216343

SAMPLING AND TESTING DATE : 02/02/2014 (10:26 AM)

ANALYSIS AND REPORTING DATE: 18/02/2014

Ambient Air Quality Test Results of Subproject 5

Sampling ID and Location	Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters			DoE Standards
				Minimum	Maximum	Average	
SP5_AQ_03_3m (Ratanpur, Mouchak) 24°02'21.0"N 90°16'39.1"E	Instrument was set within 3m of the existing rail tracks.There was a train passed the instrument during data acquisition. There was also a road intersection which was 2m away from the sampling location. Besides this, there was a kitchen market and a garment factory.	Carbon Monoxide (CO)	$\mu g/m^3$	297	1667	1092.31	40,000
		Nitric Oxide (NO)	$\mu g/m^3$	88	938	761.89	100
		Nitrogen Dioxide (NO_2)	$\mu g/m^3$	62	671	417.21	100
		Sulphur Dioxide (SO_2)	$\mu g/m^3$	0	798	289.90	365
		Ozone (O_3)	$\mu g/m^3$	0	155	93.86	235
		Volatile Organic Compounds (VOC)	ppm	0	3.91	1.75	NSE*
		Particulate Matter (PM_{10})	$\mu g/m^3$	62	392	258.53	150
		Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	22	180	117.41	65
		Air Temperature	°C	25	27	25.80	

Noise Measurement Results

Sampling ID	Time	Noise Level (dB)			DoE Standards	
		Minimum	Maximum	L_{eq}	Res. Zone	Mix. Zone
SP5_NM_6_3m	Day	43.6	108.1	79.5	50	60
SP5_NM_7_3m	Night	44.6	84.2	67.21	40	50

* No standards established yet

Remarks: The amended schedule-2 of (Air Quality Standard) Environmental conservation Rules, 1997 has been adopted.

Remarks: The schedule-4 of (Noise Measurement Standard) Environmental conservation Rules, 1997 has been considered

Report Reviewed and Approved by:
Mehedi Hasan
Environmental Specialist
RCI-Rail Component

AMBIENT AIR (AA) QUALITY MONITORING AND TEST REPORT

COMPANY NAME: A Joint Venture of CANARAIL Consultants, SMEC International , DB International , ACE Consultants.
PROJECT NAME : Regional Cooperation and Integration Project (Rail Component)
ADDRESS: House 486, Lane 08 DOHS Baridhara, Dhaka, Bangladesh
HEADER/SAMPLE ID: 216349
SAMPLING AND TESTING DATE : 02/02/2014 (11:48 AM)
ANALYSIS AND REPORTING DATE: 18/02/2014

Ambient Air Quality Test Results of Subproject 5

Sampling ID and Location	Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters			DoE Standards
				Minimum	Maximum	Average	
SP5_AQ_04 _50m (Ratanpur, Mouchak) 24°02'18.2"N 90°16'37.4"E	Instrument was set 50m away from the existing rail alignment and 2m from the local road. Vegetation was low and high-rise building alongside the sampling point.	Carbon Monoxide (CO)	$\mu g/m^3$	213	1496	959.09	40,000
		Nitric Oxide (NO)	$\mu g/m^3$	96	986	701.37	100
		Nitrogen Dioxide (NO_2)	$\mu g/m^3$	54	702	331.87	100
		Sulphur Dioxide (SO_2)	$\mu g/m^3$	0	533	223.62	365
		Ozone (O_3)	$\mu g/m^3$	0	167	82.01	235
		Volatile Organic Compounds (VOC)	ppm	0	2.65	1.04	NSE*
		Particulate Matter (PM_{10})	$\mu g/m^3$	57	312	213.55	150
		Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	27	204	156.90	65
		Air Temperature	°C	28	32	29.61	

Noise Measurement Results

Sampling ID	Time	Noise Level (dB)			DoE Standards	
		Minimum	Maximum	L_{eq}	Res. Zone	Mix. Zone
SP5_NM_6_ 50m	Day	48.3	85.3	65.14	50	60
SP5_NM_8_ 50m	Night	43.2	75.7	62.31	40	50

* No standards established yet

Remarks: The amended schedule-2 of (Air Quality Standard) Environmental conservation Rules, 1997 has been adopted.

Remarks: The schedule-4 of (Noise Measurement Standard) Environmental conservation Rules, 1997 has been considered

Report Reviewed and Approved by:
Mehedi Hasan
Environmental Specialist
RCI-Rail Component

AMBIENT AIR (AA) QUALITY MONITORING AND TEST REPORT

COMPANY NAME: A Joint Venture of CANARAIL Consultants, SMEC International , DB International , ACE Consultants.

PROJECT NAME : Regional Cooperation and Integration Project (Rail Component)

ADDRESS: House 486, Lane 08 DOHS Baridhara, Dhaka, Bangladesh

HEADER/SAMPLE ID: 216436

SAMPLING AND TESTING DATE : 03/02/2014 (8:41 AM)

ANALYSIS AND REPORTING DATE: 18/02/2014

Ambient Air Quality Test Results of Subproject 5

Sampling ID and Location	Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters			DoE Standards
				Minimum	Maximum	Average	
SP5_AQ_05 _5m (Mirzapur rail crossing) 24°05'45.5"N 90°08'05.7"E	Instrument was set 5m north of the level crossing. It was a very busy road. However, there were two trains and different type vehicles passed through the sampling location during data acquisition process.	Carbon Monoxide (CO)	$\mu g/m^3$	487	1697	1136.11	40,000
		Nitric Oxide (NO)	$\mu g/m^3$	98	759	566.37	100
		Nitrogen Dioxide (NO_2)	$\mu g/m^3$	62	657	497.22	100
		Sulphur Dioxide (SO_2)	$\mu g/m^3$	0	521	311.09	365
		Ozone (O_3)	$\mu g/m^3$	23	236	131.23	235
		Volatile Organic Compounds (VOC)	ppm	0	5.85	2.33	NSE*
		Particulate Matter (PM_{10})	$\mu g/m^3$	138	413	363.03	150
		Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	64	228	189.95	65
		Air Temperature	°C	14	18	15.67	

Noise Measurement Results

Sampling ID	Time	Noise Level (dB)			DoE Standards	
		Minimum	Maximum	L_{eq}	Res. Zone	Mix. Zone
SP5_NM_9 _5m	Day	47.6	83.4	64.7	50	60
SP5_NM_11 _5m	Night	47	66.6	59.97	40	50

* No standards established yet

Remarks: The amended schedule-2 of (Air Quality Standard) Environmental conservation Rules, 1997 has been adopted.

Remarks: The schedule-4 of (Noise Measurement Standard) Environmental conservation Rules, 1997 has been considered.

Report Reviewed and Approved by:
Mehedi Hasan
Environmental Specialist
RCI-Rail Component

AMBIENT AIR (AA) QUALITY MONITORING AND TEST REPORT

COMPANY NAME: A Joint Venture of CANARAIL Consultants, SMEC International , DB International , ACE Consultants
PROJECT NAME : Regional Cooperation and Integration Project (Rail Component)
ADDRESS: House 486, Lane 08 DOHS Baridhara, Dhaka, Bangladesh
HEADER/SAMPLE ID: 216441
SAMPLING AND TESTING DATE : 03/02/2014 (9:45 AM)
ANALYSIS AND REPORTING DATE: 18/02/2014

Ambient Air Quality Test Results of Subproject 5

Sampling ID and Location	Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters			DoE Standards
				Minimum	Maximum	Average	
SP5_AQ_06 _50m (Mirzapur rail crossing) 24°05'47.5"N 90°08'06.8"E	Instrument was set 50m north of the level crossing and 45m away from the existing railway tracks. It was a low land and paddy field. However, Nasir glass factory was about 400m away from the sampling point.	Carbon Monoxide (CO)	$\mu g/m^3$	481	956	772.20	40,000
		Nitric Oxide (NO)	$\mu g/m^3$	43	601	344.97	100
		Nitrogen Dioxide (NO_2)	$\mu g/m^3$	26	516	239.55	100
		Sulphur Dioxide (SO_2)	$\mu g/m^3$	0	230	67.39	365
		Ozone (O_3)	$\mu g/m^3$	8	141	93.74	235
		Volatile Organic Compounds (VOC)	ppm	0	2.35	0.14	NSE*
		Particulate Matter (PM_{10})	$\mu g/m^3$	39	274	161.65	150
		Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	47	90	65.05	65
		Air Temperature	°C	18	24	20.40	

Noise Measurement Results

Sampling ID	Time	Noise Level (dB)			DoE Standards	
		Minimum	Maximum	L_{eq}	Res. Zone	Mix. Zone
SP5_NM_10_ 50m	Day	47.7	70.9	57.6	50	60
SP5_NM_12_5 0m	Night	46.3	63.8	53.91	40	50

* No standards established yet

Remarks: The amended schedule-2 of (Air Quality Standard) Environmental conservation Rules, 1997 has been adopted.

Remarks: The schedule-4 of (Noise Measurement Standard) Environmental conservation Rules, 1997 has been considered.

Report Reviewed and Approved by:
Mehedi Hasan
Environmental Specialist
RCI-Rail Component

AMBIENT AIR (AA) QUALITY MONITORING AND TEST REPORT

COMPANY NAME: A Joint Venture of CANARAIL Consultants, SMEC International , D8 International , ACE Consultants.

PROJECT NAME : Regional Cooperation and Integration Project (Rail Component)

ADDRESS: House 486, Lane 08 DOHS Baridhara, Dhaka, Bangladesh

HEADER/SAMPLE ID 216538

SAMPLING AND TESTING DATE : 04/02/2014 (9:04 AM)

ANALYSIS AND REPORTING DATE: 18/02/2014

Ambient Air Quality Test Results of Subproject 5

Sampling ID and Location	Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters			DoE Standards
				Minimum	Maximum	Average	
SP5_AQ_07 _5m (Sodanadapur rail Station) 24°23'49.0"N 89°41'29.7"E	Instrument was set at the station and 5m away from the existing railway tracks. In addition, level crossing was 50m west of the sample point. However, a train and different vehicles were passed through the sampling location during data acquisition process. Environment was foggy.	Carbon Monoxide (CO)	$\mu g/m^3$	219	924	747.47	40,000
		Nitric Oxide (NO)	$\mu g/m^3$	34	524	267.91	100
		Nitrogen Dioxide (NO_2)	$\mu g/m^3$	28	246	192.73	100
		Sulphur Dioxide (SO_2)	$\mu g/m^3$	2	115	36.90	365
		Ozone (O_3)	$\mu g/m^3$	11	223	25.42	235
		Volatile Organic Compounds (VOC)	ppm	0	2.37	0.35	NSE*
		Particulate Matter (PM_{10})	$\mu g/m^3$	69	362	208.73	150
		Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	46	174	104.02	65
		Air Temperature	°C	16	18	16.13	

Noise Measurement Results

Sampling ID	Time	Noise Level (dB)			DoE Standards	
		Minimum	Maximum	L_{eq}	Res. Zone	Mix. Zone
SP5_NM_13 _5m	Day	49.7	74.9	62.61	50	60
SP5_NM_15 _5m	Night	41.7	75.5	53.5	40	50

* No standards established yet

Remarks: The amended schedule-2 of (Air Quality Standard) Environmental conservation Rules, 1997 has been adopted.

Remarks: The schedule-4 of (Noise Measurement Standard) Environmental conservation Rules, 1997 has been considered.

Report Reviewed and Approved by:
Mehedi Hasan
Environmental Specialist
RCI-Rail Component

AMBIENT AIR (AA) QUALITY MONITORING AND TEST REPORT

COMPANY NAME: A Joint Venture of CANARAIL Consultants, SMEC International , DB International , ACE Consultants

PROJECT NAME : Regional Cooperation and Integration Project (Rail Component)

ADDRESS: House 486, Lane 08 DOHS Baridhara, Dhaka, Bangladesh

HEADER/SAMPLE ID: 216533

SAMPLING AND TESTING DATE : 04/02/2014 (8.00 AM)

ANALYSIS AND REPORTING DATE: 18/02/2014

Ambient Air Quality Test Results of Subproject 5

Sampling ID and Location	Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters			DoE Standards
				Minimum	Maximum	Average	
SP5_AQ_08_ 50m (Sodanadapur rail Station) 24°23'48.0"N 89°41'31.8"E	Instrument was set 50m east of the station and 5m west of the level crossing. However, a train and different vehicles were passed through the sampling location during data acquisition process. Environment was covered with fog	Carbon Monoxide (CO)	$\mu g/m^3$	431	1092	947.11	40,000
		Nitric Oxide (NO)	$\mu g/m^3$	76	723	446.60	100
		Nitrogen Dioxide (NO_2)	$\mu g/m^3$	42	577	237.08	100
		Sulphur Dioxide (SO_2)	$\mu g/m^3$	9	269	87.31	365
		Ozone (O_3)	$\mu g/m^3$	13	301	110.89	235
		Volatile Organic Compounds (VOC)	ppm	0	6.51	1.54	NSE*
		Particulate Matter (PM_{10})	$\mu g/m^3$	73	392	229.58	150
		Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	31	191	134.61	65
		Air Temperature	°C	15	16	15.06	

Noise Measurement Results

Sampling ID	Time	Noise Level (dB)			DoE Standards	
		Minimum	Maximum	L_{eq}	Res. Zone	Mix. Zone
SP5_NM_12 _50m	Day	50.5	66.5	57.91	50	60
SP2_NM2_12 _50m	Night	40.8	78	53.1	40	50

* No standards established yet

Remarks: The amended schedule-2 of (Air Quality Standard) Environmental conservation Rules, 1997 has been adopted.

Remarks: The schedule-4 of (Noise Measurement Standard) Environmental conservation Rules, 1997 has been considered.

Report Reviewed and Approved by:
Mehedi Hasan
Environmental Specialist
RCI-Rail Component

AMBIENT AIR (AA) QUALITY MONITORING AND TEST REPORT

COMPANY NAME: A Joint Venture of CANARAIL Consultants, SMEC International , DB International , ACE Consultants.
PROJECT NAME : Regional Cooperation and Integration Project (Rail Component)
ADDRESS House 486, Lane 08 DOHS Baridhara, Dhaka, Bangladesh
HEADER/SAMPLE ID 216573
SAMPLING AND TESTING DATE : 04/02/2014 (5:34 PM)
ANALYSIS AND REPORTING DATE: 18/02/2014

Ambient Air Quality Test Results of Subproject 5

Sampling ID and Location	Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters			DoE Standards
				Minimum	Maximum	Average	
SP5_AQ_09_5m (Ullapara rail Station) 24°17'25.0"N 89°34'13.9"E	Instrument was set at the station and 5m away from the existing railway tracks. In addition, level crossing was 250m east of the sample point. There was a storage for imported goods besides the station.	Carbon Monoxide (CO)	$\mu g/m^3$	716	1397	991.73	40,000
		Nitric Oxide (NO)	$\mu g/m^3$	47	687	379.19	100
		Nitrogen Dioxide (NO_2)	$\mu g/m^3$	29	612	237.24	100
		Sulphur Dioxide (SO_2)	$\mu g/m^3$	34	415	184.59	365
		Ozone (O_3)	$\mu g/m^3$	0	175	102.95	235
		Volatile Organic Compounds (VOC)	ppm	0	1.36	0.19	NSE*
		Particulate Matter (PM_{10})	$\mu g/m^3$	150	394	235.82	150
		Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	103	262	176.86	65
		Air Temperature	°C	17	19	18.24	

Noise Measurement Results

Sampling ID	Time	Noise Level (dB)			DoE Standards	
		Minimum	Maximum	L_{eq}	Res. Zone	Mix. Zone
SP5_NM_17_5m	Day	43.6	89.4	70.8	50	60
SP5_NM_19_5m	Night	51.4	61.9	53.49	40	50

* No standards established yet

Remarks: The amended schedule-2 of (Air Quality Standard) Environmental conservation Rules, 1997 has been adopted.

Remarks: The schedule-4 of (Noise Measurement Standard) Environmental conservation Rules, 1997 has been considered.

Report Reviewed and Approved by:
Mehedi Hasan
Environmental Specialist
RCI-Rail Component

AMBIENT AIR (AA) QUALITY MONITORING AND TEST REPORT

COMPANY NAME: A Joint Venture of CANARAIL Consultants, SMEC International , DB International , ACE Consultants

PROJECT NAME : Regional Cooperation and Integration Project (Rail Component)

ADDRESS: House 486, Lane 08 DOHS Baridhara, Dhaka, Bangladesh

HEADER/SAMPLE ID: 216569

SAMPLING AND TESTING DATE : 04/02/2014 (4:35 PM)

ANALYSIS AND REPORTING DATE: 18/02/2014

Ambient Air Quality Test Results of Subproject 5

Sampling ID and Location	Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters			DoE Standards
				Minimum	Maximum	Average	
SP5_AQ_10_50m (Ullapara rail Station) 24°17'25.8"N 89°34'16.4"E	Instrument was set at 50m away from the rail station. In addition, level crossing was 200m west of the sample point. There was high vehicle count for carring improted goods from the storage on the station yard	Carbon Monoxide (CO)	$\mu g/m^3$	74	1987	1060.48	40,000
		Nitric Oxide (NO)	$\mu g/m^3$	61	741	567.88	100
		Nitrogen Dioxide (NO_2)	$\mu g/m^3$	31	661	302.63	100
		Sulphur Dioxide (SO_2)	$\mu g/m^3$	13	334	218.02	365
		Ozone (O_3)	$\mu g/m^3$	20	256	142.37	235
		Volatile Organic Compounds (VOC)	ppm	0	5.18	1.21	NSE*
		Particulate Matter (PM_{10})	$\mu g/m^3$	84	463	359.16	150
		Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	39	282	188.43	65
		Air Temperature	°C	19	21	20.51	

Noise Measurement Results

Sampling ID	Time	Noise Level (dB)			DoE Standards	
		Minimum	Maximum	L_{eq}	Res. Zone	Mix. Zone
SP5_NM_18_50m	Day	49.9	96.2	78.48	50	60
SP5_NM_20_50m	Night	40.5	66.7	48.3	40	50

* No standards established yet

Remarks: The amended schedule-2 of (Air Quality Standard) Environmental conservation Rules, 1997 has been adopted.

Remarks: The schedule-4 of (Noise Measurement Standard) Environmental conservation Rules, 1997 has been considered

Report Reviewed and Approved by:
Mehedi Hasan
Environmental Specialist
RCI-Rail Component

AMBIENT AIR (AA) QUALITY MONITORING AND TEST REPORT

COMPANY NAME: A Joint Venture of CANARAIL Consultants, SMEC International , DB International , ACE Consultants

PROJECT NAME : Regional Cooperation and Integration Project (Rail Component)

ADDRESS: House 486, Lane 08 DOHS Baridhara, Dhaka, Bangladesh

HEADER/SAMPLE ID 216649

SAMPLING AND TESTING DATE 05/02/2014 (11:52 AM)

ANALYSIS AND REPORTING DATE: 18/02/2014

Ambient Air Quality Test Results of Subproject 5

Sampling ID and Location	Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters			DoE Standards
				Minimum	Maximum	Average	
SP5_AQ_11_2m (Boral rail Station) 24°12'53.6"N 89°22'49.7"E	Instrument was set at the station platform which was about 4m high. In addition, boral bridge was 200m west of the sample point.	Carbon Monoxide (CO)	$\mu g/m^3$	102	1057	822.79	40,000
		Nitric Oxide (NO)	$\mu g/m^3$	67	348	190.73	100
		Nitrogen Dioxide (NO_2)	$\mu g/m^3$	39	171	118.51	100
		Sulphur Dioxide (SO_2)	$\mu g/m^3$	5	143	104.67	365
		Ozone (O_3)	$\mu g/m^3$	59	88	79.39	235
		Volatile Organic Compounds (VOC)	ppm	0	0.26	0.01	NSE*
		Particulate Matter (PM_{10})	$\mu g/m^3$	114	249	180.69	150
		Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	62	225	113.93	65
		Air Temperature	°C	26	28	26.41	

Noise Measurement Results

Sampling ID	Time	Noise Level (dB)			DoE Standards	
		Minimum	Maximum	L_{eq}	Res. Zone	Mix. Zone
SP5_NM_21_2m	Day	49.9	81.2	61.7	50	60
SP5_NM_23_2m	Night	44.8	67.8	54.53	40	50

* No standards established yet

Remarks: The amended schedule-2 of (Air Quality Standard) Environmental conservation Rules, 1997 has been adopted.

Remarks: The schedule-4 of (Noise Measurement Standard) Environmental conservation Rules, 1997 has been considered

Report Reviewed and Approved by:
Mehedi Hasan
Environmental Specialist
RCI-Rail Component

AMBIENT AIR (AA) QUALITY MONITORING AND TEST REPORT

COMPANY NAME: A Joint Venture of CANARAIL Consultants, SMEC International , DB International , ACE Consultants
PROJECT NAME : Regional Cooperation and Integration Project (Rail Component)
ADDRESS: House 486, Lane 08 DOHS Baridhara, Dhaka, Bangladesh
HEADER/SAMPLE ID: 216645
SAMPLING AND TESTING DATE : 05/02/2014 (10.44 AM)
ANALYSIS AND REPORTING DATE: 18/02/2014

Ambient Air Quality Test Results of Subproject 5

Sampling ID and Location	Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters			DoE Standards
				Minimum	Maximum	Average	
SP5_AQ_12_50m (Boral rail Station) 24°12'54.1"N 89°22'53.4"E	Instrument was set at the pavement of the station road near the station platform which was about 4m lower than the station. In addition, boral bridge was 50m west of the sample point.	Carbon Monoxide (CO)	$\mu g/m^3$	124	1178	991.51	40,000
		Nitric Oxide (NO)	$\mu g/m^3$	93	617	324.18	100
		Nitrogen Dioxide (NO_2)	$\mu g/m^3$	71	421	231.01	100
		Sulphur Dioxide (SO_2)	$\mu g/m^3$	12	267	119.37	365
		Ozone (O_3)	$\mu g/m^3$	62	115	93.48	235
		Volatile Organic Compounds (VOC)	ppm	0	4.87	1.30	NSE*
		Particulate Matter (PM_{10})	$\mu g/m^3$	151	383	234.32	150
		Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	63	226	124.34	65
		Air Temperature	°C	23	26	25.66	

Noise Measurement Results

Sampling ID	Time	Noise Level (dB)			DoE Standards	
		Minimum	Maximum	L_{eq}	Res. Zone	Mix. Zone
SP5_NM_22_50m	Day	45.7	78.4	54.7	50	60
SP5_NM_24_50m	Night	45.5	67.3	54.34	40	50

* No standards established yet

Remarks: The amended schedule-2 of (Air Quality Standard) Environmental conservation Rules, 1997 has been adopted.

Remarks: The schedule-4 of (Noise Measurement Standard) Environmental conservation Rules, 1997 has been considered

Report Reviewed and Approved by:
Mehedi Hasan
Environmental Specialist
RCI-Rail Component

Environment and Resource Analysis Center Ltd. (ENRAC)

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Phone: +8802488810445, E-mail: info@enrac.com.bd

ENRAC REF : ENRAC/160/19

AMBIENT AIR QUALITY TESTING REPORT

COMPANY NAME : Bangladesh Railway
PROJECT NAME : Construction of Double Line between Joydebpur and Shurdi Section of Bangladesh Railway
CLIENT ADDRESS : Bangladesh Railway Bhaban, 16 Abdul Gani Rd, Dhaka 1000, Bangladesh
SAMPLE COUNT : Day: 01 hour (12.02 PM - 01:02 PM); Night: 01 hour (06:25 PM - 07.25 PM)

SAMPLING DATE : 21/01/2019
ANALYSIS DATE : 30/01/2019
SAMPLING ID : AAQ_1_Mouchak
GPS COORDINATES : 24° 2' 20.364" N 90° 16' 37.56" E

Ambient Air Quality (AAQ) Test Results

Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters		GoB Air Quality Standards*
			Average (Morning)	Average (Evening)	
• The Air Quality Measurement station was located near rail line and local bazar always remain busy with local people. • Nearby road with medium vehicles was within the 15 meter radious of the sampling site. • There were few household, shops, tea-stalls, hotels adjacent to the sampling site. • The environment of the sampling site was clear and sunny. • During sampling, three express trains, and two mail train passed the station	Carbon Monoxide (CO)	mg/m^3	0.10	0.00	10 (8 hour) 40 (1hour)
	Nitric Oxide (NO)	µg/m^3	26.31	23.11	100 (Annual)
	Nitrogen Dioxide (NO_2)	µg/m^3	31.36	21.70	
	Sulphur Dioxide (SO_2)	µg/m^3	94.44	72.65	365 (24 hour) 80 (Annual)
	Ozone (O_3)	µg/m^3	24.70	42.03	157 (8 hour) 235 (1 hour)
	Particulate Matter (PM_{10})	µg/m^3	224.33	181.84	150 (24 hour) 50 (Annual)
	Particulate Matter ($PM_{2.5}$)	µg/m^3	145.16	98.36	65 (24 hour) 15 (Annual)
	Volatile Organic Compounds (VOC)	ppm	0.21	0.00	NSE**
	Air Temperature	°C	26.23	21.57	NSE**
	Relative Humidity	%	46.30	59.29	NSE**
	Wind Speed	kph	0.07	0.03	NSE**
	Wind Direction	Degree	140.29 (blowing from SSE)	147.28 (blowing from SSE)	NSE**

* The amended Schedule-2, 2005, of (Air Quality Standard) Environmental Conservation Rules 1997
** NSE- No standards established yet

Prepared by
Md. Muhibbullah
Environmental Officer

Approved by
Mehedi Hasan
Environmental Specialist

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ENRAC REF: ENRAC/2019/19

AMBIENT AIR QUALITY TESTING REPORT

COMPANY NAME	: Bangladesh Railway
PROJECT NAME	: Construction of Double Line between Joydebpur and Ishurdi Section of Bangladesh Railway
CLIENT ADDRESS	: Bangladesh Railway Bhaban, 16 Abdul Gani Rd, Dhaka 1000, Bangladesh
SAMPLE COUNT	: Day: 01 hour (12.58 PM - 01.58 PM); Night: 01 hour (09.41 PM - 10.41 PM)
SAMPLING DATE	: 20/01/2019
ANALYSIS DATE	: 30/01/2019
SAMPLING ID	: AAQ_2_Elenga
GPS COORDINATES	: 24° 20' 4.344" N 89° 55' 45.84" E

Ambient Air Quality (AAQ) Test Results

Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters		GoB Air Quality Standards*
			Average (Morning)	Average (Evening)	
• The Air Perimeter Air Station (EPAS) was set 39 meters away from the the existing railway line. • Adjacent nearby local road was found with medium and light vehicles which was within the 24 meter radious from the sampling site. • During sampling three express trains, and two mail train passed the station. • There were few households, shops, wet-lands, poultry farms and sampling site was clear. • The environment of the sampling site was clear	Carbon Monoxide (CO)	mg/m³	0.06	0.00	10 (8 hour) 40 (1hour)
	Nitric Oxide (NO)	µg/m³	20.46	17.29	100 (Annual)
	Nitrogen Dioxide (NO_2)	µg/m³	18.36	16.25	
	Sulphur Dioxide (SO_2)	µg/m³	45.03	43.36	365 (24 hour) 80 (Annual)
	Ozone (O_3)	µg/m³	21.90	33.90	157 (8 hour) 235 (1 hour)
	Particulate Matter (PM_{10})	µg/m³	139.30	165.80	150 (24 hour) 50 (Annual)
	Particulate Matter ($PM_{2.5}$)	µg/m³	83.85	71.19	65 (24 hour) 15 (Annual)
	Volatile Organic Compounds (VOC)	ppm	0.19	0.00	NSE**
	Air Temperature	°C	26.67	17.55	NSE**
	Relative Humidity	%	49.43	77.11	NSE**
	Wind Speed	kph	0.00	0.00	NSE**
	Wind Direction	Degree	117.64 (blowing from ESE)	69.66 (blowing towards SSE)	NSE**

* The amended Schedule-2, 2005, of (Air Quality Standard) Environmental Conservation Rules, 1997
** NSE: No standards established yet

Prepared by
Muhibbullah
Md. Muhibbullah
Environmental Officer

Approved by
Hasan
Mehedi Hasan
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ENRAC REF : ENRAC-0192/19

AMBIENT AIR QUALITY TESTING REPORT

COMPANY NAME : Bangladesh Railway
PROJECT NAME : Construction of Double Line between Joydebpur and Ishurdi Section of Bangladesh Railway
CLIENT ADDRESS : Bangladesh Railway Bhaban, 16 Abdul Gani Rd, Dhaka 1000, Bangladesh
SAMPLE COUNT : Day: 01 hour (02:21 PM – 03:21 PM); Night: 01 hour (05:16 PM-06:16 PM)

SAMPLING DATE : 13/01/2019
ANALYSIS DATE : 30/01/2019
SAMPLING ID : NM_4_Muraduli
GPS COORDINATES : 24° 9' 48.706" N 89° 8' 19.528" E

Ambient Air Quality (AAQ) Test Results

Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters		GoB Air Quality Standards*
			Average (Morning)	Average (Evening)	
• The Air Quality Measurement station was located near rail line and local households. • The Air Perimeter Air Station (EPAS) was set 6 meters away from the the existing railway line. • Nearby road with medium vehicles was within the 21 meter radious of the sampling site. • The environment of the sampling site was clear. • During sampling, four train, and two train passed the sampling station in morning and evening respectively • Few shops, poultry-farm, wet-lands, ponds and agricultural land were found within the 100 meter radius.	Carbon Monoxide (CO)	mg/m^3	0.08	0.00	10 (8 hour) 40 (1hour)
	Nitric Oxide (NO)	$\mu g/m^3$	18.41	16.80	100 (Annual)
	Nitrogen Dioxide (NO_2)	$\mu g/m^3$	21.09	19.70	
	Sulphur Dioxide (SO_2)	$\mu g/m^3$	11.92	10.56	365 (24 hour) 80 (Annual)
	Ozone (O_3)	$\mu g/m^3$	20.28	31.85	157 (8 hour) 235 (1 hour)
	Particulate Matter (PM_{10})	$\mu g/m^3$	122.01	135.83	150 (24 hour) 50 (Annual)
	Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	54.91	75.45	65 (24 hour) 15 (Annual)
	Volatile Organic Compounds (VOC)	ppm	0.26	0.00	NSE**
	Air Temperature	°C	27.66	20.95	NSE**
	Relative Humidity	%	45.79	68.61	NSE**
	Wind Speed	kph	0.00	0.00	NSE**
	Wind Direction	Degree	74.52 (blowing towards ENE)	41.80 (blowing towards ENE)	NSE**

* The amended Schedule-2, 2005, of (Air Quality Standard) Environmental Conservation Rules, 1997
** NSE- No standards established yet

Prepared by
Md. Muhibbullah
Environmental Officer

Approved by
Mehedi Hasan
Environmental Specialist

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ENRAC REF : ENRAC 0182/19

AMBIENT AIR QUALITY TESTING REPORT

COMPANY NAME : Bangladesh Railway
PROJECT NAME : Construction of Double Line between Joydebpur and Ishurdi Section of Bangladesh Railway
CLIENT ADDRESS : Bangladesh Railway Bhaban, 16 Abdul Gani Rd, Dhaka 1000, Bangladesh
SAMPLE COUNT : Day: 01 hour (03:01 PM – 04:01 PM); Night: 01 hour (05:09 PM-06:09 PM)

SAMPLING DATE : 19/01/2019
ANALYSIS DATE : 30/01/2019
SAMPLING ID : AAQ_3 Sirajganj
GPS COORDINATES : 24° 23' 8.988" N 89° 40' 7.995" E

Ambient Air Quality (AAQ) Test Results

Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters		GoB Air Quality Standards*
			Average (Morning)	Average (Evening)	
• The Air Quality Measurement station was located near rail line and local bazar always remain busy with local people. • 20 meter away from the sampling station a road with light vehicles was found • The environment of the sampling site was clear. • During sampling two express train in morning, and two train in evening passed the station. • Few local house, shops and series of trees were found around the 100 meter radious from the sampling station	Carbon Monoxide (CO)	mg/m³	0.05	0.00	10 (8 hour) 40 (1hour)
	Nitric Oxide (NO)	µg/m³	15.29	14.84	100 (Annual)
	Nitrogen Dioxide (NO_2)	µg/m³	19.56	18.59	
	Sulphur Dioxide (SO_2)	µg/m³	8.16	9.80	365 (24 hour) 80 (Annual)
	Ozone (O_3)	µg/m³	22.18	30.41	157 (8 hour) 235 (1 hour)
	Particulate Matter (PM_{10})	µg/m³	150.67	136.84	150 (24 hour) 50 (Annual)
	Particulate Matter ($PM_{2.5}$)	µg/m³	78.85	80.70	65 (24 hour) 15 (Annual)
	Volatile Organic Compounds (VOC)	ppm	0.18	0.00	NSE**
	Air Temperature	°C	25.67	20.29	NSE**
	Relative Humidity	%	50.93	68.74	NSE**
	Wind Speed	kph	0.00	0.00	NSE**
	Wind Direction	Degree	176.95 (blowing from SSE)	150.21 (blowing from SSE)	NSE**

* The amended Schedule-2, 2005, of (Air Quality Standard) Environmental Conservation Rules, 1997
** NSE- No standards established yet

Prepared by
Md. Muhibbullah
Environmental Officer

Approved by
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CERTIFICATE OF ANALYSIS

DATE 20 February 2014

ALS REF. : ALSM92246

ALS SAMPLE ID. : ALSM92246405128

MS ISO/IEC 17025
TESTING
SAMM No. 147

COMPANY : SMEC (BANGLADESH) LTD
Lane 6, House 374,
Doh S Baridhara,
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Bangladesh.
Tel: +880(2) 8415330 Fax: +880(2) 8827545
(Attn.: Mr. Mehedi Hasan)

PROJECT 7060542

DATE SAMPLE RECEIVED : 11 February 2014

SAMPLE DESCRIPTION Sixty four samples were received with the following references:

SAMPLE I.D	MATRIX	DATE	TIME (hrs)	REMARKS
SW2_SP3_ExNS_DS_W_001	Water	4-Feb-14	-	-
SW2_SP3_ExNS_DS_W_002	Water	4-Feb-14	-	-
SW2_SP3_PrFs_US_W_003	Water	4-Feb-14	-	-
SW2_SP3_PrNs_US_W_004	Water	4-Feb-14	-	-
SW2_SP3_ExNS_DS_W_005	Water	7-Feb-14	-	-
SW2_SP3_ExNS_DS_W_006	Water	7-Feb-14	-	-
SW2_SP3_PrFs_DS_W_007	Water	7-Feb-14	-	-
SW2_SP3_PrNs_DS_W_008	Water	7-Feb-14	-	-
SW2_SP3_ExNS_DS_W_001	Water	4-Feb-14	-	-
SW2_SP3_ExFS_DS_W_002	Water	4-Feb-14	-	-
SW2_SP3_PrFS_US_W_003	Water	4-Feb-14	-	-
SW2_SP3_PrNS_US_W_004	Water	4-Feb-14	-	-
SW2_SP3_ExNS_DS_E_005	Water	7-Feb-14	-	-
SW2_SP3_ExFS_DS_E_006	Water	7-Feb-14	-	-
SW2_SP3_PrFS_US_E_007	Water	7-Feb-14	-	-
SW2_SP3_PrNS_US_E_008	Water	7-Feb-14	-	-
GW_SP3_Brg.W_001	Water	7-Feb-14	-	-
GW_SP3_Brg.E_002	Water	7-Feb-14	-	-
GW_SP3_Brg.W_001	Water	7-Feb-14	-	-
GW_SP3_Brg.E_002	Water	7-Feb-14	-	-
SW_SP5_UpS_001	Water	7-Feb-14	-	-
SW_SP5_DownS_002	Water	7-Feb-14	-	-
SW_SP5_UpS_003	Water	7-Feb-14	-	-
SW_SP5_DownS_004	Water	7-Feb-14	-	-
SW_SP5_UpS_005	Water	8-Feb-14	-	-
SW_SP5_DownS_006	Water	8-Feb-14	-	-

Note : Results apply to sample(s) as submitted. This report supersedes any previous reports of the same reference number

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CERTIFICATE OF ANALYSIS

DATE 20 February 2014

ALS REF. : ALSM92246

SAMPLE I.D	MATRIX	DATE	TIME (hrs)	REMARKS
SW_SP5_UpS_007	Water	7-Feb-14	-	-
SW_SP5_DownS_008	Water	7-Feb-14	-	-
SW_SP5_UpS_009	Water	4-Feb-14	-	-
SW_SP5_DownS_010	Water	4-Feb-14	-	-
SW_SP5_UpS_011	Water	6-Feb-14	-	-
SW_SP5_DownS_012	Water	6-Feb-14	-	-
SW_SP5_UpS_013	Water	5-Feb-14	-	-
SW_SP5_DownS_014	Water	5-Feb-14	-	-
SW_SP5_UpS_015	Water	5-Feb-14	-	-
SW_SP5_DownS_016	Water	5-Feb-14	-	-
SW_SP5_UpS_001	Water	7-Feb-14	-	-
SW_SP5_DownS_002	Water	7-Feb-14	-	-
SW_SP5_UpS_003	Water	7-Feb-14	-	-
SW_SP5_DownS_004	Water	7-Feb-14	-	-
SW_SP5_UpS_005	Water	8-Feb-14	-	-
SW_SP5_DownS_006	Water	8-Feb-14	-	-
SW_SP5_UpS_007	Water	7-Feb-14	-	-
SW_SP5_DownS_008	Water	7-Feb-14	-	-
SW_SP5_UpS_009	Water	4-Feb-14	-	-
SW_SP5_DownS_010	Water	4-Feb-14	-	-
SW_SP5_UpS_011	Water	6-Feb-14	-	-
SW_SP5_DownS_012	Water	6-Feb-14	-	-
SW_SP5_UpS_013	Water	5-Feb-14	-	-
SW_SP5_DownS_014	Water	5-Feb-14	-	-
SW_SP5_UpS_015	Water	5-Feb-14	-	-
SW_SP5_DownS_016	Water	5-Feb-14	-	-
GW_SP5_001	Water	7-Feb-14	-	-
GW_SP5_002	Water	8-Feb-14	-	-
GW_SP5_003	Water	7-Feb-14	-	-
GW_SP5_004	Water	4-Feb-14	-	-
GW_SP5_005	Water	4-Feb-14	-	-
GW_SP5_006	Water	5-Feb-14	-	-
GW_SP5_001	Water	7-Feb-14	-	-
GW_SP5_002	Water	8-Feb-14	-	-
GW_SP5_003	Water	7-Feb-14	-	-
GW_SP5_004	Water	4-Feb-14	-	-
GW_SP5_005	Water	6-Feb-14	-	-
GW_SP5_006	Water	5-Feb-14	-	-

Note : Results apply to sample(s) as submitted. This report supersedes any previous reports of the same reference number

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		Lab I D		405128	405129	405130	405131	405132
		Sample I D		SW2_SP3_ExNS_DS_W_001	SW2_SP3_ExNS_DS_W_002	SW2_SP3_PrFs_US_W_003	SW2_SP3_PrNs_US_W_004	SW2_SP3_ExNS_DS_W_005
		Units	LOR					
Method Reference	**Analysis Description**							
APHA 2540 D	Total Suspended Solid	mg/l	1	12	1	2	2	2
APHA 4500 P- B & F	Total Phosphorus	mg/l	0.01	0.04	0.05	0.07	0.04	0.06
APHA 4500 O G	Dissolved Oxygen	mg/l	0.01	7.11	6.22	7.28	7.68	6.27

		Lab I D		405133	405134	405135		
		Sample I D		SW2_SP3_ExNS_DS_W_006	SW2_SP3_PrFs_DS_W_007	SW2_SP3_PrNs_DS_W_008		
		Units	LOR					
Method Reference	**Analysis Description**							
APHA 2540 D	Total Suspended Solid	mg/l	1	1	2	2		
APHA 4500 P- B & F	Total Phosphorus	mg/l	0.01	0.08	0.07	0.11		
APHA 4500 O G	Dissolved Oxygen	mg/l	0.01	6.30	7.62	7.41		

		Lab I D		405136	405137	405138	405139	405140
		Sample I D		SW2_SP3_ExNS_DS_W_001	SW2_SP3_ExFS_DS_W_002	SW2_SP3_PrFS_US_W_003	SW2_SP3_PrNS_US_W_004	SW2_SP3_ExNS_DS_E_005
		Units	LOR					
Method Reference	**Analysis Description**							
APHA 5310 D	Total Organic Carbon	mg/l	0.1	0.9	0.9	0.8	0.8	1.0
APHA 5520 B	Oil & Grease	mg/l	1	<1	<1	<1	<1	<1

		Lab I D		405141	405142	405143		
		Sample I D		SW2_SP3_ExFS_DS_E_006	SW2_SP3_PrFS_US_E_007	SW2_SP3_PrNS_US_E_008		
		Units	LOR					
Method Reference	**Analysis Description**							
APHA 5310 D	Total Organic Carbon	mg/l	0.1	0.9	0.8	1.0		
APHA 5520 B	Oil & Grease	mg/l	1	<1	<1	<1		

		Lab I D		405144	405145			
		Sample I D		GW_SP3_Brg W_001	GW_SP3_Brg E_002			
		Units	LOR					
Method Reference	**Analysis Description**							
In-House Method (QW1-CH/17-12)	Total Dissolved Solids	mg/l	1	392	668			
APHA 4500-Cl E	Chloride	mg/l	1	29	58			

LOR: Level of Reporting

DATE :20 February 2014
ALS SAMPLE ID. : ALSM92246405128
PROJECT : 7060542
Sample Type : Water

		Lab I D		405146	405147			
		Sample I D		GW_SP3_	GW_SP3_			
		Units	LOR	Brg.W_001	Brg.E_002			
Method Reference	**Analysis Description**							
USEPA 6020 A	Arsenic	mg/l	0.001	<0.001	0.023			
USEPA 6020 A	Iron	mg/l	0.01	0.15	0.02			
USEPA 6020 A	Manganese	mg/l	0.001	0.623	2.90			
USEPA 6010 B	Sulfur	mg/l	1	<1	4			

		Lab I D		405148	405149	405150	405151	405152
		Sample I D		SW_SP5_	SW_SP5_ DownS_00	SW_SP5_	SW_SP5_ DownS_00	SW_SP5_
		Units	LOR	UpS_001	2	UpS_003	4	UpS_005
Method Reference	**Analysis Description**							
APHA 2540 D	Total Suspended Solid	mg/l	1	8	5	3	2	8
APHA 4500 P- B & F	Total Phosphorus	mg/l	0.01	0.89	0.88	0.05	0.06	0.08
APHA 4500 O G	Dissolved Oxygen	mg/l	0.01	7.32	6.57	6.55	6.73	7.22

		Lab I D		405153	405154	405155	405156	405157
		Sample I D		SW_SP5_ DownS_00	SW_SP5_	SW_SP5_ DownS_00	SW_SP5_	SW_SP5_ DownS_01
		Units	LOR	6	UpS_007	8	UpS_009	0
Method Reference	**Analysis Description**							
APHA 2540 D	Total Suspended Solid	mg/l	1	6	7	5	3	3
APHA 4500 P- B & F	Total Phosphorus	mg/l	0.01	0.07	0.16	0.17	0.12	0.12
APHA 4500 O G	Dissolved Oxygen	mg/l	0.01	5.27	6.31	7.28	7.71	7.73

		Lab I D		405158	405159	405160	405161	405162
		Sample I D		SW_SP5_	SW_SP5_ DownS_01	SW_SP5_	SW_SP5_ DownS_01	SW_SP5_
		Units	LOR	UpS_011	2	UpS_013	4	UpS_015
Method Reference	**Analysis Description**							
APHA 2540 D	Total Suspended Solid	mg/l	1	3	1	40	13	2
APHA 4500 P- B & F	Total Phosphorus	mg/l	0.01	0.10	0.10	0.16	0.13	0.06
APHA 4500 O G	Dissolved Oxygen	mg/l	0.01	6.82	7.14	6.22	7.31	6.47

		Lab I D		405163				
		Sample I D		SW_SP5_ DownS_01				
		Units	LOR	6				
Method Reference	**Analysis Description**							
APHA 2540 D	Total Suspended Solid	mg/l	1	4				
APHA 4500 P- B & F	Total Phosphorus	mg/l	0.01	0.13				
APHA 4500 O G	Dissolved Oxygen	mg/l	0.01	6.79				

LOR: Level of Reporting

DATE 20 February 2014
ALS SAMPLE ID ALSMQ2246405128
PROJECT 7060542
Sample Type Water

		Lab ID		405164	405165	405166	405167	405168
		Sample ID		SW_SP5_UpS_001	SW_SP5_DownS_002	SW_SP5_UpS_003	SW_SP5_DownS_004	SW_SP5_UpS_005
		Units	LOR					
Method Reference	**Analysis Description**							
APHA 5310 D	Total Organic Carbon	mg/l	0.1	10.6	10.2	7.7	8.1	7.8
APHA 5520 B	Oil & Grease	mg/l	1	<1	<1	<1	<1	<1

		Lab ID		405169	405170	405171	405172	405173
		Sample ID		SW_SP5_DownS_006	SW_SP5_UpS_007	SW_SP5_DownS_008	SW_SP5_UpS_009	SW_SP5_DownS_010
		Units	LOR					
Method Reference	**Analysis Description**							
APHA 5310 D	Total Organic Carbon	mg/l	0.1	7.7	2.0	2.8	1.6	1.5
APHA 5520 B	Oil & Grease	mg/l	1	<1	<1	<1	<1	<1

		Lab ID		405174	405175	405176	405177	405178
		Sample ID		SW_SP5_UpS_011	SW_SP5_DownS_012	SW_SP5_UpS_013	SW_SP5_DownS_014	SW_SP5_UpS_015
		Units	LOR					
Method Reference	**Analysis Description**							
APHA 5310 D	Total Organic Carbon	mg/l	0.1	1.1	1.1	1.7	1.4	3.4
APHA 5520 B	Oil & Grease	mg/l	1	<1	<1	<1	<1	<1

		Lab ID		405179
		Sample ID		SW_SP5_DownS_016
		Units	LOR	
Method Reference	**Analysis Description**			
APHA 5310 D	Total Organic Carbon	mg/l	0.1	3.6
APHA 5520 B	Oil & Grease	mg/l	1	<1

		Lab ID		405180	405181	405182	405183	405184
		Sample ID		GW_SP5_001	GW_SP5_002	GW_SP5_003	GW_SP5_004	GW_SP5_005
		Units	LOR					
Method Reference	**Analysis Description**							
In-House Method (QWI-CH/17-12)	Total Dissolved Solids	mg/l	1	172	181	273	103	211
APHA 4500-Cl E	Chloride	mg/l	1	2	7	21	1	5

LOR Level of Reporting

		Lab I D		405185				
		Sample I D		GW_SP5_				
		Units	LOR	006				
Method Reference	**Analysis Description**							
In House Method (QWT CH/17-12)	Total Dissolved Solids	mg/l	1	380				
APHA 4500-Cl E	Chloride	mg/l	1	6				

		Lab I D		405186	405187	405188	405189	405190
		Sample I D		GW_SP5_	GW_SP5_	GW_SP5_	GW_SP5_	GW_SP5_
		Units	LOR	001	002	003	004	005
Method Reference	**Analysis Description**							
USEPA 6020 A	Arsenic	mg/l	0.001	<0.001	0.002	0.033	0.024	0.020
USEPA 6020 A	Iron	mg/l	0.01	1.81	2.17	6.66	4.79	7.33
USEPA 6020 A	Manganese	mg/l	0.001	0.031	0.169	1.37	0.774	0.854
USEPA 6010 B	Sulfur	mg/l	1	<1	4	4	<1	2

		Lab I D		405191				
		Sample I D		GW_SP5_				
		Units	LOR	006				
Method Reference	**Analysis Description**							
USEPA 6020 A	Arsenic	mg/l	0.001	<0.001				
USEPA 6020 A	Iron	mg/l	0.01	0.11				
USEPA 6020 A	Manganese	mg/l	0.001	0.587				
USEPA 6010 B	Sulfur	mg/l	1	2				

LOR Level of Reporting

BATCH QUALITY CONTROL - LABORATORY CONTROL SAMPLE

ALS SAMPLE ID: ALSM92246405128 | Date of Digestion: -
Batch: INW140217(1) | Date of Analysis: 1/7/14
Matrix: Water

COMPOUND	Blank Conc	Spike Conc.	QC SPIKE RESULTS				Control Limits		
			SCS Conc	DCS Conc	Ave Rec	RPD	% Recovery		RPD
	mg/l	mg/l	mg/l	mg/l	%	%	Low	High	%
Arsenic	<LOR	0.0050	0.0051	0.0048	99	6	80	120	20
Iron	<LOR	0.0050	0.0049	0.0053	102	8	80	120	20
Manganese	<LOR	0.0050	0.0051	0.0051	102	0	80	120	20

COMMENTS :
1) LOR level of reporting
2) The control limits are based on ALS laboratory statistical data.
3) * Recovery or RPD fails outside of the recommended control limits

BATCH QUALITY CONTROL - MATRIX SPIKE SAMPLE

ALS SAMPLE ID: ALSM92246405128 | Date of Digestion: -
Batch: INW140217(1) | Date of Analysis: 1/7/14
Matrix: Water | Spiked Sample: 406268

COMPOUND	Sample Results	Spike Conc.	QC SPIKE RESULTS				Control Limits
			MS Conc	MSD Conc	Ave Rec	RPD	RPD
	mg/l	mg/l	mg/l	mg/l	%	%	%
Arsenic	<LOR	0.010	0.010	0.010	100	0	20
Iron	<LOR	0.01	0.01	0.01	105	10	20
Manganese	<LOR	0.010	0.010	0.010	100	0	20

COMMENTS :
1) LOR level of reporting
2) The control limits are based on ALS laboratory statistical data.
3) * Recovery or RPD fails outside of the recommended control limits.

BATCH QUALITY CONTROL - DUPLICATE SAMPLE

ALS SAMPLE ID	ALSM92246405128	Date of Digestion	
Batch	INW140217(1)	Date of Analysis	17/2/14
Matrix	Water	Duplicate sample	405191

COMPOUND	QC DUPLICATE RESULTS		
	Sample Conc	Check Sample Conc	RPD
	mg/l	mg/l	%
Arsenic	<LOR	<LOR	-
Iron	0.11	0.12	9
Manganese	0.587	0.608	4

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Lab Memo: 1395/ CC, DPHE, CL, Dhaka.

Date: 06-02-2019

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2019010161	Sample Receiving date: 22-01-2019
Ref. Memo No: ENRAC/2019/Nill & Dated: 22-01-2019	Sample Source: Suface Water
Sent by:Tahsin-Uz-Zaman ,Environmental Officer , ENRAC, Khilgaon, Dhaka.	Dist:Gazipur, Upa:
Care Taker: ENRAC (SW-01)	Union:, Vill.:Joydebpur & Ishurdi
Sample Collection date:	Date of Testing: 22/01/2019-04/02/2019

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Total Organic Carbon (TOC)	0	3.02	mg/L	TOC Analyzer	-
2	Dissolved Oxygen (DO)	6.0	2.46	mg/L	Multimeter	-
3	pH	6.5-8.5	6.7	-	pH Meter	-
4	Phosphate	6.0	2.67	mg/L	UVS	0.10
5	Total Suspended Solid (TSS)	10	18	mg/L	Gravimetric Method	-

Comments: Sample was collected & Supplied by client.
N.B: UVS- UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: Mahabuba Sabina Motin Designation: Sample Analyzer	06-02-19	1.) Name: Md. Biplab Hossain Designation: Chief Chemist	6/02/2019
2.) Name: Tasfima Akhter Designation: Sample Analyzer	06.02.19	2.) Name: Designation:	

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Lab Memo: 1395/ CC, DPHE, CL, Dhaka.

Date: 06-02-2019

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2019010162	Sample Receiving date: 22-01-2019
Ref. Memo No: ENRAC/2019/Nil & Dated: 22-01-2019	Sample Source: Suface Water
Sent by:Tahsin-Uz-Zaman ,Environmental Officer , ENRAC, Khilgaon, Dhaka.	Dist:Gazipur, Upa:
Care Taker: ENRAC (SW-02)	Union:, Vill.:Joydebpur & Ishurdi
Sample Collection date:	Date of Testing: 22/01/2019-04/02/2019

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Total Organic Carbon (TOC)	0	3.15	mg/L	TOC Analyzer	-
2	Dissolved Oxygen (DO)	6.0	1.92	mg/L	Multimeter	-
3	pH	6.5-8.5	6.8	-	pH Meter	-
4	Phosphate	6.0	2.53	mg/L	UVS	0.10
5	Total Suspended Solid (TSS)	10	26	mg/L	Gravimetric Method	-

Comments: Sample was collected & Supplied by client.
N.B: UVS- UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: Mahabuba Sabina Motin Designation: Sample Analyzer	06-02-19	1.) Name: Md. Biplab Hossain Designation: Chief Chemist	06/02/2019
2.) Name: Tasima Akhter Designation: Sample Analyzer	06.2.19	2.) Name: Designation:	

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Lab Memo: 1395/ CC, DPHE, CL, Dhaka. Date: 06-02-2019

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2019010163	Sample Receiving date: 22-01-2019
Ref Memo No: ENRAC/2019/Nil & Dated: 22-01-2019	Sample Source: Suface Water
Sent by:Tahsin-Uz-Zeman .Environmental Officer , ENRAC, Khilgaon, Dhaka.	Dist:Gazipur, Upa:
Care Taker: ENRAC (SW-03)	Union:, Vill.:Joydebpur & Ishurdi
Sample Collection date:	Date of Testing: 22/01/2019-04/02/2019

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Total Organic Carbon (TOC)	0	2.19	mg/L	TOC Analyzer	-
2	Dissolved Oxygen (DO)	6.0	6.57	mg/L	Multimeter	-
3	pH	6.5-8.5	6.7	-	pH Meter	-
4	Phoschate	6.0	0.29	mg/L	UVS	0.10
5	Total Suspended Solid (TSS)	10	15	mg/L	Gravimetric Method	-

Comments: Sample was collected & Supplied by client.
N.B: UVS- UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: Mahabuba Sabina Motin Designation: Sample Analyzer	06-02-19	1.) Name: Md. Biplab Hossain Designation: Chief Chemist	06/02/2019
2.) Name: Taslma Akhter Designation: Sample Analyzer	06.02.19	2.) Name: Designation:	

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Lab Memo: 1395/ CC, DPHE, CL, Dhaka. Date: 06-02-2019

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2019010164	Sample Receiving date: 22-01-2019
Ref. Memo No: ENRAC/2019/Nill & Dated: 22-01-2019	Sample Source: Suface Water
Sent by:Tahsin-Uz-Zaman ,Environmental Officer , ENRAC, Khilgaon. Dhaka.	Dist:Gazipur, Upa:
Care Taker: ENRAC (SW-04)	Union:, Vill.:Joydebpur & Ishurdi
Sample Collection date:	Date of Testing: 22/01/2019-04/02/2019

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Total Organic Carbon (TOC)	0	2.35	mg/L	TOC Analyzer	-
2	Dissolved Oxygen (DO)	6.0	5.75	mg/L	Multimeter	-
3	pH	6.5-8.5	6.8	-	pH Meter	-
4	Phosphate	6.0	0.37	mg/L	UVS	0.10
5	Total Suspended Solid (TSS)	10	21	mg/L	Gravimetric Method	-

Comments: Sample was collected & Supplied by client.
N.B: UVS- UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: Manabuba Sabina Motin Designation: Sample Analyzer	06-02-19	1.) Name: Md. Biplab Hossain Designation: Chief Chemist	06/02/2019
2.) Name: Taslima Akhter Designation: Sample Analyzer	06.02.19	2.) Name: Designation:	

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Lab Memo: 1395/ CC, DPHE, CL, Dhaka. Date: 06-02-2019

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2019010165	Sample Receiving date: 22-01-2019
Ref. Memo No: ENRAC/2019/Nill & Dated: 22-01-2019	Sample Source: Suface Water
Sent by:Tahs'n-Uz-Zaman ,Environmental Officer , ENRAC, Khilgaon, Dhaka.	Dist:Gazipur, Upa:
Care Taker: ENRAC (SW-05)	Union:, Vill.:Joydebpur & Ishurdi
Sample Collection date:	Date of Testing: 22/01/2019-04/02/2019

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Total Organic Carbon (TOC)	0	2.09	mg/L	TOC Analyzer	-
2	Dissolved Oxygen (DO)	6.0	5.90	mg/L	Multimeter	-
3	pH	6.5-8.5	6.9	-	pH Meter	-
4	Phosphate	6.0	0.83	mg/L	UVS	0.10
5	Total Suspended Solid (TSS)	10	18	mg/L	Gravimetric Method	-

Comments: Sample was collected & Supplied by client.
N.B: UVS- UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: Mahabuba Sabina Motin Designation: Sample Analyzer	06-02-19	1.) Name: Md. Biplab Hossain Designation: Chief Chemist	06/02/2019
2.) Name: Taslima Akhter Designation: Sample Analyzer	06.02.19	2.) Name: Designation:	

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Lab Memo: 1395/ CC. DPHE, CL, Dhaka. Date: 06-02-2019

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2019010166	Sample Receiving date: 22-01-2019
Ref. Memo No: ENRAC/2019/Nill & Dated: 22-01-2019	Sample Source: Suface Water
Sent by:Tahsin-Uz-Zaman ,Environmental Officer , ENRAC, Khilgaon, Dhaka.	Dist:Gazipur, Upa:
Care Taker: ENRAC (SW-06)	Union:, Vill.:Joydebpur & Ishurdi
Sample Co lection date:	Date of Testing: 22/01/2019-04/02/2019

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Total Organic Carbon (TOC)	0	2.41	mg/L	TOC Analyzer	-
2	Dissolved Oxygen (DO)	6.0	6.04	mg/L	Multimeter	-
3	pH	6.5-8.5	6.8	-	pH Meter	-
4	Phosphate	6.0	0.71	mg/L	UVS	0.10
5	Total Suspended Solid (TSS)	10	15	mg/L	Gravimetric Method	-

Comments: Sample was collected & Supplied by client.
N.B: UVS- UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: Mahabuba Sabina Motin Designation: Sample Analyzer	06-02-19	1.) Name: Md. Biplab Hossain Designation: Chief Chemist	06/02/2019
2.) Name: Taslima Akhter Designation: Sample Analyzer	06.02.19	2.) Name: Designation:	

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Lab Memo: 1395/ CC, DPHE, CL, Dhaka. Date: 06-02-2019

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2019010167	Sample Receiving date: 22-01-2019
Ref. Memo No: ENRAC/2019/Nill & Dated: 22-01-2019	Sample Source: Suface Water
Sent by Tahsin-Uz-Zaman ,Environmental Officer , ENRAC, Khilgaon, Dhaka	Dist:Gazipur, Upa:
Care Taker: ENRAC (SW-07)	Union:, Vill.:Joydebpur & Ishurdi
Sample Collection date:	Date of Testing: 22/01/2019-04/02/2019

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Total Organic Carbon (TOC)	0	2.95	mg/L	TOC Analyzer	-
2	Dissolved Oxygen (DO)	6.0	4.36	mg/L	Multimeter	-
3	pH	6.5-8.5	6.8	-	pH Meter	-
4	Phosphate	6.0	0.65	mg/L	UVS	0.10
5	Total Suspended Solid (TSS)	10	19	mg/L	Gravimetric Method	-

Comments: Sample was collected & Supplied by client.
N.B: UVS- UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: Mahabuba Sabina Motin Designation: Sample Analyzer	(6-02-19)	1.) Name: Md. Biplab Hossain Designation: Chief Chemist	06/02/2019
2.) Name: Taslima Akhter Designation: Sample Analyzer	06.2.19	2.) Name: Designation:	

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Lab Memo: 1395/ CC, DPHE, CL, Dhaka.

Date: 06-02-2019

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2019010168	Sample Receiving date: 22-01-2019
Ref. Memo No: ENRAC/2019/NIII & Dated: 22-01-2019	Sample Source: Suface Water
Sent by: Tahsin-Uz-Zaman Environmental Officer , ENRAC, Khilgaon, Dhaka.	Dist:Gazipur, Upa:
Care Taker: ENRAC (SW-08)	Union:, Vill.:Joydebpur & Ishurdi
Sample Collection date:	Date of Testing: 22/01/2019-04/02/2019

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Total Organic Carbon (TOC)	0	2.80	mg/L	TOC Analyzer	-
2	Dissolved Oxygen (DO)	6.0	2.44	mg/L	Multimeter	-
3	pH	6.5-8.5	6.7	-	pH Meter	-
4	Phosphate	6.0	0.87	mg/L	UVS	0.10
5	Total Suspended Solid (TSS)	10	34	mg/L	Gravimetric Method	-

Comments: Sample was collected & Supplied by client.
N.B: UVS- UV-Visicle Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: Mahabuba Sabina Motin Designation: Sample Analyzer	06-02-19	1.) Name: Md. Biplab Hossain Designation: Chief Chemist	06/02/2019
2.) Name: Taslima Akhter Designation: Sample Analyzer	06.02.19	2.) Name: Designation:	

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Lab Memo: 1395/ CC, DPHE. CL, Dhaka.

Date: 06-02-2019

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2019010169	Sample Receiving date: 22-01-2019
Ref. Memo No: ENRAC/2019/Nill & Dated: 22-01-2019	Sample Source: Ground Water
Sent by:Tahsin-Uz-Zaman ,Environmental Officer , ENRAC, Khilgaon, Dhaka.	Dist:Gazipur, Upa:
Care Taker: ENRAC (GW-01)	Union:, Vill.:Joydebpur & Ishurdi
Sample Collection date:	Date of Testing: 22/01/2019-04/02/2019

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chloride	150-600	16	mg/L	Titrimetic	-
3	Iron (Fe)	0.3-1	0.07	mg/L	AAS	0.05
4	Manganese (Mn)	0.1	0.03	mg/L	AAS	0.03
5	pH	6.5-8.5	6.5	-	pH Meter	-
6	Sulphate	400	1	mg/L	UVS	1.0
7	Total Dissolved Solid (TDS)	1000	71	mg/L	Multimeter	-

Comments: Sample was collected & Supplied by client.
N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: Mahabuba Sabina Motin Designation: Sample Analyzer	06-02-19	1.) Name: Md. Biplab Hossain Designation: Chief Chemist	06/02/2019
2.) Name: Taslima Akhter Designation: Sample Analyzer	06.2.19	2.) Name: Designation:	

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Lab Memo: 1395/ CC, DPHE. CL, Dhaka. Date: 06-02-2019

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2019010170	Sample Receiving date: 22-01-2019
Ref. Memo No: ENRAC/2019/Nill & Dated: 22-01-2019	Sample Source: Ground Water
Sent by:Tahsin-Uz-Zaman ,Environmental Officer , ENRAC. Khilgaon, Dhaka.	Dist:Gazipur, Upa:
Care Taker: ENRAC (GW-02)	Union:, Vill.:Joydebpur & Ishurdi
Sample Collection date:	Date of Testing: 22/01/2019-04/02/2019

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.023	mg/L	AAS	0.001
2	Chloride	150-600	13	mg/L	Titrimetic	-
3	Iron (Fe)	0.3-1	1.14	mg/L	AAS	0.05
4	Manganese (Mn)	0.1	1.41	mg/L	AAS	0.03
5	pH	6.5-8.5	6.4	-	pH Meter	-
6	Sulphate	400	1	mg/L	UVS	1.0
7	Total Dissolved Solid (TDS)	1000	130	mg/L	Multimeter	-

Comments: Sample was collected & Supplied by client.
N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: Mahabuba Sabina Motin Designation: Sample Analyzer	06-02-19	1.) Name: Md. Biplab Hossain Designation: Chief Chemist	06/02/2019
2.) Name: Taslima Akhter Designation: Sample Analyzer	06.02.19	2.) Name: Designation:	

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Lab Memo: 1395/ CC, DPHE, CL, Dhaka. Date: 06-02-2019

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2019010171	Sample Receiving date: 22-01-2019
Ref. Memo No: ENRAC/2019/Nill & Dated: 22-01-2019	Sample Source: Ground Water
Sent by:Tahsin-Uz-Zaman ,Environmental Officer , ENRAC, Khilgaon, Dhaka.	Dist:Gazipur, Upa:
Care Taker: ENRAC (GW-03)	Union:, Vill.:Joydebpur & Ishurdi
Sample Collection date:	Date of Testing: 22/01/2019-04/02/2019

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.003	mg/L	AAS	0.001
2	Chloride	150-600	83	mg/L	Titrimetic	-
3	Iron (Fe)	0.3-1	0.12	mg/L	AAS	0.05
4	Manganese (Mn)	0.1	0.03	mg/L	AAS	0.03
5	pH	6.5-8.5	6.6	-	pH Meter	-
6	Sulphate	400	44	mg/L	UVS	1.0
7	Total Dissolved Solid (TDS)	1000	316	mg/L	Multimeter	-

Comments: Sample was collected & Supplied by client.
N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: Mahabuba Sabina Motin Designation: Sample Analyzer	06-02-19	1.) Name: Md. Biplab Hossain Designation: Chief Chemist	06/02/2019
2.) Name: Taslima Akhter Designation: Sample Analyzer	06.02.19	2.) Name: Designation:	

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Lab Memo. 1395/ CC, DPHE, CL, Dhaka.

Date: 06-02-2019

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2019010172	Sample Receiving date: 22-01-2019
Ref. Memo No: ENRAC/2019/Nill & Dated: 22-01-2019	Sample Source: Ground Water
Sent by:Tahsin-Uz-Zaman ,Environmental Officer , ENRAC, Khilgaon, Dhaka.	Dist:Gazipur, Upa:
Care Taker: ENRAC (GW-04)	Union:, Vill.:Joydebpur & Ishurdi
Sample Collection date:	Date of Testing: 22/01/2019-04/02/2019

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.005	mg/L	AAS	0.001
2	Chloride	150-600	30	mg/L	Titrimetic	-
3	Iron (Fe)	0.3-1	0.09	mg/L	AAS	0.05
4	Manganese (Mn)	0.1	0.47	mg/L	AAS	0.03
5	pH	6.5-8.5	7.0	-	pH Meter	-
6	Sulphate	400	2	mg/L	UVS	1.0
7	Total Dissolved Solid (TDS)	1000	435	mg/L	Multimeter	-

Comments: Sample was collected & Supplied by client.
N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: Mahabuba Sabina Motin Designation: Sample Analyzer	06-02-19	1.) Name: Md. Biplab Hossain Designation: Chief Chemist	06/02/2019
2.) Name: Taslima Akhter Designation: Sample Analyzer	06.02.19	2.) Name: Designation:	

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ENRAC REF: ENRAC/184/19

ENRAC

NOISE LEVEL MEASUREMENT REPORT

COMPANY NAME	: Bangladesh Railway
PROJECT NAME	: Construction of Double Line between Joydebpur and Ishurdi Section of Bangladesh Railway
CLIENT ADDRESS	: Bangladesh Railway Bhaban, 16 Abdul Gani Rd, Dhaka 1000, Bangladesh
SAMPLE COUNT	: Day: 01 hour (12.32 PM - 01.02 PM); Night: 01 hour (06:25 PM - 07.25 PM)
SAMPLING DATE	: 21/01/2019
DATE OF ANALYSIS	: 29/01/2019
SAMPLING ID	: NM_1_Mouchak
GPS COORDINATES	: 24° 2' 20.364" N 90° 16' 37.53" E

Sampling Site Description

- The Noise Level Measurement NM_01 had been conducted 15 m east from the Safipur – Majukhan Road
- Noise monitoring point was located 3.5 Km west from Mouchak Rail Station
- The rail line passes by the radius of 6 meter.
- Around 2-3 train passes during the one-hour sampling period.
- The both side of the specific sample site is filled with human settlements e.g. Households, Industries, shops.
- A small scaled electrically powered spice grinding mill was located at a distance of 65 meters.
- With the existing setup, the location can be considered as mixed area.

Noise Measurement (NM) Results

Sampling ID	Time	Unit	Noise Measurement Data		
			Minimum	Maximum	LAeq
NM_01_Day	Day	dBA	47.4	68.6	60.3
NM_01_Night	Night	dBA	48.1	58.6	50.3

	Zone	Day	Night
GoB Noise Standard*	Silent Zone	50	40
	Residential Zone	55	45
	Mixed Area (Residential together with areas used for commercial and industrial purposes)	60	50
	Commercial Area	70	60
	Industrial Area	75	70

* The amended Schedule-4, 2006, of (Noise Level Measurement Standard) Environmental Conservation Rules, 1997

Analysed and Prepared by

Muhibbullah

Md. Muhibbullah
Environmental Officer

Approved by

Hasan

Mehedi Hasan
Environmental Specialist

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www.enrac.com.bd

ENRAC REF: ENRAC/018/19

NOISE LEVEL MEASUREMENT REPORT

COMPANY NAME	: Bangladesh Railway
PROJECT NAME	: Construction of Double Line between Joydebpur and Ishurdi Section of Bangladesh Railway
CLIENT ADDRESS	: Bangladesh Railway Bhaban, 16 Abdul Gani Rd, Dhaka 1000, Bangladesh
SAMPLE COUNT	: Day: 01 hour (12:58 PM - 01:58 PM); Night: 01 hour (09:41 PM - 10:41 PM)
SAMPLING DATE	: 20/01/2019
DATE OF ANALYSIS	: 29/01/2019
SAMPLING ID	: NM_2_Elenga
GPS COORDINATES	: 24° 20' 4.344" N 89° 55' 45.84" E

Sampling Site Description

- The Noise monitoring machine was set 39 meters away from the rail line.
- Sampling site was surrounded by different types of vegetations, households, ponds and shops within the radius of 100 meters
- The noise monitoring point was located 24 meters south from a local road with medium and light vehicles were passing at the time of sampling.
- A rail crossing was located at a distance of 36 meters from the sampling point.
- Around 2-3 train passed during the one-hour sampling point.

Noise Measurement (NM) Results

Sampling ID	Time	Unit	Noise Measurement Data		
			Minimum	Maximum	LAeq
NM_01_Day	Day	dBA	44.5	66.5	55.1
NM_01_Night	Night	dBA	39.1	62.3	44.8
GoB Noise Standard*	Zone		Day		Night
	Silent Zone		50		40
	Residential Zone		55		45
	Mixed Area (Residential together with areas used for commercial and industrial purposes)		60		50
	Commercial Area		70		60
	Industrial Area		75		70

* The amended Schedule-4, 2006, of (Noise Level Measurement Standard) Environmental Conservation Rules, 1997

Analysed and Prepared by

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Environmental Officer

Approved by

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NOISE LEVEL MEASUREMENT REPORT

COMPANY NAME	: Bangladesh Railway
PROJECT NAME	: Construction of Double Line between Joydebpur and Ishurdi Section of Bangladesh Railway
CLIENT ADDRESS	: Bangladesh Railway Bhaban, 16 Abdul Gani Rd, Dhaka 1000, Bangladesh
SAMPLE COUNT	: Day: 01 hour (03:01 PM – 04:01 PM); Night: 01 hour (05:09 PM - 06:09 PM)
SAMPLING DATE	: 19/01/2019
DATE OF ANALYSIS	: 29/01/2019
SAMPLING ID	: NM_ 3_Sirajgonj
GPS COORDINATES	: 24° 23' 8.986" N 89° 40' 7.696" E

Sampling Site Description

- The noise monitoring station was located in one side of local bazar named as Chala Bazar.
- The Noise monitoring instrument was set 9 meters away from the existing rail line
- 23 meters away from the sampling station a local road was found crossing the rail line
- Light vehicles were found passing at the time of sampling.
- Some curious people gathered around the noise sampling machine during the sampling time.
- Around 2 train passed during the one-hour sampling point in both day and night.
- Moderate human settlements, wet lands and various vegetations were found within the radius of 100 meters from the sampling site.

Noise Measurement (NM) Results

Sampling ID	Time	Unit	Noise Measurement Data		
			Minimum	Maximum	LAeq
NM_01_Day	Day	dBA	48.8	59.9	56.1
NM_01_Night	Night	dBA	36.3	57.1	43.1
GoB Noise Standard[1]	Zone		Day		Night
	Silent Zone		50		40
	Residential Zone		55		45
	Mixed Area (Residential together with areas used for commercial and industrial purposes)		60		50
	Commercial Area		70		60
	Industrial Area		75		70

[1] The amended Schedule-4, 2006, of (Noise Level Measurement Standard) Environmental Conservation Rules, 1997

Analysed and Prepared by

Muhibbullah

Md. Muhibbullah
Environmental Officer

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ENRAC REF: ENRAC 0167/19

ENRAC

NOISE LEVEL MEASUREMENT REPORT

COMPANY NAME	: Bangladesh Railway
PROJECT NAME	: Construction of Double Line between Joydebpur and Ishurdi Section of Bangladesh Railway
CLIENT ADDRESS	: Bangladesh Railway Bhaban 16 Abdul Gani Rd, Dhaka 1000, Bangladesh
SAMPLE COUNT	: Day: 01 hour (02:21 PM – 03:21 PM); Night: 01 hour (05:16 PM - 06:16 PM)
SAMPLING DATE	: 18/01/2019
DATE OF ANALYSIS	: 30/01/2019
SAMPLING ID	: NM_4_Muladuli
GPS COORDINATES	: 24° 9' 48.708" N 89° 8' 18.526" E

Sampling Site Description

- The noise monitoring instrument was set 6 meters away from the rail line. Returned we are made
- A small local road was located within the distance of 21 meters from the noise monitoring station.
- Medium and light vehicles were passing at the time of sampling.
- At the time of sampling around 3-4 train passed by with the one hour sampling period.
- Few households, shops, poultry farm, wetlands, ponds and agricultural land were found within the 100 meter radius.

Noise Measurement (NM) Results

Sampling ID	Time	Unit	Noise Measurement Data		
			Minimum	Maximum	LAeq
NM_01_Day	Day	dBA	44.5	68.4	55.6
NM_01_Night	Night	dBA	39.8	58.6	45.5

	Zone	Day	Night
GoB Noise Standard*	Silent Zone	50	40
	Residential Zone	55	45
	Mixed Area (Residential together with areas used for commercial and industrial purposes)	60	50
	Commercial Area	70	60
	Industrial Area	75	70

* The amended Schedule-4, 2006, of (Noise Level Measurement Standard) Environmental Conservation Rules, 1997

Analysed and Prepared by

Muhibbullah

Md. Muhibbullah
Environmental Officer

Approved by

Hasan

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Annex 5: Public Consultation Materials and Meeting Minutes

PROPOSED MITIGATION MEASURES AND MONITORING PLAN

An Environmental Management Plan or EMP will be prepared based analyses of impact assessment and comments received from the participants on the IEMP. The executing agency particularly the local officials will use the document to monitor the implementation of mitigation measures.

The EIA will include an Environmental Mitigation and Monitoring Plan (EMMP) that will define what actions are needed to be taken during construction and operation of the proposed double line between Joydebpur and Ishurdi to ensure that no significant negative environmental impacts occur.

EIA and EMP reports must be prepared and submitted to the ADB and GoB. These reports will be available to the public.

The complete EIA will be published on the ADB's website at www.adb.org and will be available at the following offices:

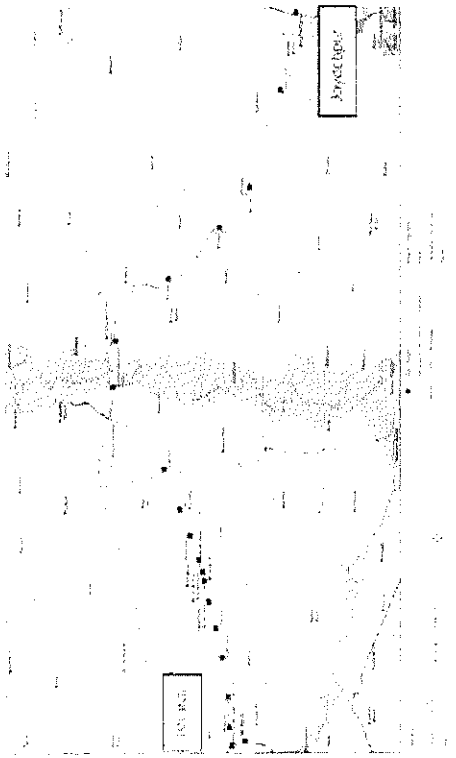
- Head office and Regional offices of Bangladesh Railway, Ministry of Railways
- Head office of Department of Environment, Dhaka

On behalf of the Bangladesh Railway, we invite all participants to give us your comments, concerns and suggestions in a letter form or visit to the local BR office.

Please contact the following office for further inquiry and/or comments.

Address:
16 Abdul Gani Road, Kali Bhaban, Dhaka - 1000

- **Telephone: (+880) 2 812 1793**
- ***Fax (+880) 2 911 8682***



PROPOSED DOUBLE LINE JOYDEBPUR TO ISHURDI

Environmental Impact Assessment (EIA): Railway Development Project

ENVIRONMENTAL INFORMATION AND PUBLIC CONSULTATION SESSION

The Executing Agency is the Bangladesh Railway under the Ministry of Railways of Government of Bangladesh in collaboration with Asian Development Bank and consultants of CANARAIL in association with SMEC, DB and ACE

October 2013

INTRODUCTION TO THE PROJECT

Government of Bangladesh has undertaken various steps to improve the transport logistics. These improvements should bring significant economic benefits to the countries of the region in general, and to Bangladesh in particular. Priority is being given to the railway sector since it is considered the best land transportation option for the country. It is a people friendly mode than long distance buses, is more cost effective for transporting bulk freight, and has overall lower adverse environmental impacts than other modes of transportation. It is considered the preferred solution to many of the country's land transport limitations.

The rail system in Bangladesh needs to be modernized and expanded to facilitate efficient transport linkages, and as such some investment projects have been approved. The Sixth Five-Year Plan, 2011-2015, assigned highest priority to increase the capacity of the railway corridors by completing double tracking on the selected sections of Bangladesh Railway. After signing of Joint Communiqué on the 12 January 2010 between Bangladesh and India, the Regional Cooperation and Integration Project (RCIP) for road, rail and waterways transport improvement was approved and seven rail projects were initiated. The focus of this environmental public consultation is Subproject-5 or the *Construction of Double Line between Joydebpur and Ishurdi*.

The work will double the capacity of the 185 km long existing stretch of BR's rail network. The double line will be constructed on the north side of the existing track while travelling from Joydebpur to Ishurdi within the existing right of way (RoW). New major and minor bridges will be required to meet the technical, social and environmental requirements of the intervention.

As a part of the project implementation requirements, environmental impacts stemming from the construction works as well as measures to prevent and/or mitigate these impacts/effects are being identified. An indicative environmental management plan (IEMP) based on assessment of possible negative impacts and for enhancement of environment has been proposed.

The participants are invited to provide their comments and suggestions on the project.

PROJECT ACTIVITIES AND POTENTIAL ENVIRONMENT ISSUES

The length of Sub-project 5 is 185 km. Rail works will include importing soil, excavation of existing earth, piling work, dredging, compacting, bridge improvements, station reconstruction and on-site facilities - water and sanitation and waste disposal. Several major and small bridges will be constructed. The proposed doouble line work will be almost entirely confined to the existing right of way (RoW) of around 50m.

Construction works will deal with organisation of proper management of contractors' work, implementing mitigation measures suggested on the findings of assessment of environmental effect/ impact based on relevant quantitative and quality of life indicators, careful control of construction-related dust, noise and truck traffic. All efforts will be made to so that there is minimum disturbance to the environment and sensitive receptors of the sub-project. Moreover, complete post-construction rehabilitation of work-sites will be undertaken. Details of the possible impacts with mitigation measures will be presented in the final EIA document which will be made available to all stakeholders.

EIA CONSULTATION MEETINGS

The consultation meeting are being conducted in October 2013 in 4 locations of Joydebpur, Mirzapur, Ullahpara and Ishurdi districts.

The Consultations will consist of a presentation on environmental issues, possible impacts and an indicative environmental management plan (IEMP) followed by discussions by the participants. Copies of the presentation will be available to all attendees.

EIA TIMETABLE

1. Initial Environmental Scoping Report (IESR) June to August 2013
2. Field survey and investigation for EIA September to October 2013
3. Information and Consultation Sessions: October 2013.
4. Comments and suggestions by the local stakeholders on an indicative EMP: November 2013
5. Completion of EIA Draft for Review by Government and ADB: January 2014
6. Translation of EIA Executive Summary to Bangla, February 2014
7. Submission of final EIA to BR and DoE: February 2014
8. Commencement of Construction: Any time after June 2014

PUBLIC CONSULTATION MEETING AGENDA

- Welcome to the participants and self introduction
- Purpose and objective of the consultation meeting
- Brief introduction to the project
- Presentation on probable environmental impacts of the subproject
- Mitigation measures and indicative environmental management plan
- Address by representative of Bangladesh Railway
- Views and comments from the participants and local stakeholders
- Address by the chief guest
- Closing speech by the session chairman

প্রস্তাবিত প্রস্তুতকার ও পরিবীক্ষন পরিচয়

ইআইএ প্রতিবেদনে একটি **পরিবেশ ব্যবস্থাপনা পরিকল্পনা (ইএমপি)** অন্তর্ভুক্ত থাকবে যাতে সংগৃহীত তথ্য বিশ্লেষণ করে প্রতিবেদনের ফলাফল অনুযায়ী বিভিন্ন প্রভাব সমূহের প্রতিকারের সুপারিশ ও নির্দেশনা থাকবে।

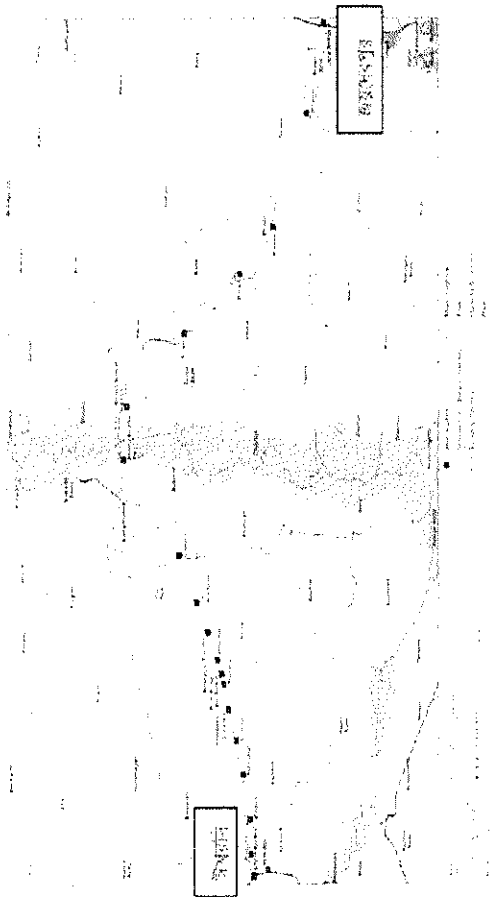
উপরোক্ত কার্যক্রমের একটি "পরিবেশ ব্যবস্থাপনা পরিকল্পনা" (ইএমপি) অন্তর্ভুক্ত থাকবে যাতে উপ-প্রকল্প নির্মাণ, পরিচালনা ও পরিবেশের পর্যায়ে সুনির্দিষ্ট ব্যবস্থাদির উল্লেখ থাকবে। এটি বাস্তবায়নকালে কোন সমস্যা হলে তাৎক্ষণিক ব্যবস্থা নেয়া হবে।

এই পরামর্শ সময়ে অংশ গ্রহণকারীদের অভিজ্ঞতার পোক্ষাপটে গৃহীত সুপারিশ সমূহ বিশ্লেষনের এবং উপযুক্ত চূড়ান্ত করা হবে এবং এর অনুমোদন সাপেক্ষে চূড়ান্ত করা হবে।

এই পরামর্শ বাস্তবায়নে **রেলওয়ে** ও রেলওয়ে প্রতিবেদনগুলো তৈরী, দাখিল ও অনুমোদন বাংলাদেশ সরকার ও এশিয়ান উন্নয়ন ব্যাংক (এডিবি) এর অবশ্য পালনীয় শর্ত। এই প্রতিবেদনগুলো জনসাধারণের জন্য উন্মুক্ত থাকবে। অনুমোদিত প্রতিবেদন এডিবির ওয়েব সাইটে প্রকাশ এবং বাংলাদেশ সরকারের প্রধান কার্যালয় ও উপ-প্রকল্প কার্যালয় সমূহ এবং পরিবেশ অধিদপ্তর এর প্রধান কার্যালয়ে প্রদান করা হবে।

আরো জানতে, মতামত দানে পরামর্শের জন্য নিম্নলিখিত ঠিকানায় যোগাযোগ করুন।

১৩, আব্দুল গণি রোড, ওল্ড ঢাকা, ঢাকা-১১০০।
মুঠোফোন: (+৮৮০)১৭১১৮৬৮৮২
ফ্যাক্স: (+৮৮০)২৯৫১৮৬৮২



প্রস্তাবিত রেল লাইন জয়দেবপুর হতে ঈশ্বরদি পর্যন্ত

পরিবেশ প্রভাব নিরূপন সমীক্ষা
(ইআইএ)

উপপ্রকল্প ৫: জয়দেবপুর হতে ঈশ্বরদি পর্যন্ত দ্বৈত রেল লাইন নির্মান

পরিবেশগত প্রভাব সম্প র্কে স্থানীয় জনগণের সাথে মত বিনিময় সভা

বাংলাদেশ সরকারের রেলপথ মন্ত্রণালয়ের অধীন বাংলাদেশ রেলওয়ের উদ্যোগে এবং বাংলাদেশ রেলওয়ের পক্ষে নিম্নোক্ত পরামর্শক কনসোর্টিয়াম (সহযোগিতায় এসএমহক্স, ডিবি এবং এসিহ) কর্তৃক বাস্তবায়িত।

অক্টোবর ২০১৩

প্রসঙ্গের ভূমিকা

বাংলাদেশ সরকার যোগাযোগ ব্যবস্থার উন্নতির লক্ষ্যে বিভিন্ন পদক্ষেপ গ্রহণ করেছে। বলা যায় এই পদক্ষেপগুলো বাস্তবায়ন তথা বাস্তবায়ন পর্যায়ে প্রভূত সম্ভাবনাময় উন্নতি করে আসছে। দেশের মূল পরিবহনের সংগঠনে যখনই রেলপথ দূর বাজারের বাসে ব্যবসার চেয়ে রেলপথ আরও সমৃদ্ধি, আরাম দায়ক ও পরিবেশ বান্ধব। খালামাল পরিবহনেও রেলপথ তুলনায় সাশ্রয়ী ও নিরাপদ। উপরোক্ত সুবিধাদি ও ভূমি পরিবহনে সীমাবদ্ধতার কারণে পরিবহন ব্যবস্থায় রেলপথকে প্রাধান্য দেয়া হয়েছে।

আন্তঃস্থানিক ও আন্তঃ দেশীয় যোগাযোগ ব্যবস্থা গতিশীল করতে হলে রেল যোগাযোগ ব্যবস্থার আধুনিকায়ন ও প্রসারণ প্রয়োজন। এ লক্ষ্যে বাংলাদেশ সরকার কয়েকটি পরিকল্পনা গ্রহণ করেছে। সাম্প্রতিক ৩টি পঞ্চ বার্ষিকী পরিকল্পনা ২০১১-১৫ তে নিম্নোক্ত বর্তমানটি রেলপথে ৬৩ রেল লাইন নির্মাণকে সর্বোচ্চ অগ্রাধিকার দেয়া হয়েছে এবং রেল যোগাযোগ খাতে ১৭ টি প্রকল্প হাতে নেয়া হয়েছে। আলোকের মত বিনিময় সভায় প্রস্তাবিত উপ-প্রকল্প-৫ অর্থাৎ জয়দেবপুর হতে ঈশ্বরদী পর্যন্ত দ্বৈত রেল লাইন নির্মাণে পরিবেশ উপর এর সম্ভাব্য প্রভাব সম্বন্ধে আলোচনা করা হবে।

প্রস্তাবিত জয়দেবপুর হতে ঈশ্বরদী পর্যন্ত রেল লাইনের উন্নয়নের ফলে ১৩৩ কিলোমিটার দীর্ঘ রেল পথের যাত্রী ও মালামাল পরিবহন ক্ষমতা দ্বিগুণ হবে। জয়দেবপুর হতে যাত্রা করলে প্রস্তাবিত নতুন লাইনটি বর্তমান লাইনের সমান্তরালে ডান পাশে স্থাপিত হবে, তবে নতুন লাইনটি বর্তমান রেলওয়ের আওতাধীন এলাকার মধ্যে সীমিত থাকবে। পারিপার্শ্বিক, সামাজিক ও পরিবেশ এর বিবেচনায় প্রয়োজনীয় ব্যবস্থাগ্রহণ উন্নয়ন করা হবে।

প্রকল্প বাস্তবায়নের পর অনুমিত এই প্রকল্পের কারণে পরিবেশের উপর সম্ভাব্য বিরূপ প্রভাবগুলো চিহ্নিত করা ও এর প্রতিকারের উপায়গুলো বিবেচনা করা যথাযথ গুরুত্ব। এই উদ্দেশ্যে একটি ইনভায়রনমেন্ট ম্যানেজমেন্ট প্ল্যান (ইএমপি) প্রস্তুত করা হবে।

উপরোক্ত সবকিছু এই রেলপথ উন্নয়ন প্রকল্প সম্বন্ধে মতামত ও উপদেশ নেয়ার জন্য আয়োজন করা হয়েছে।

প্রকল্প কার্যক্রম এবং প্রধান পরিবেশগত বিষয় সমূহ

উপ-প্রকল্প ৫ এর দৈর্ঘ্য ১৩৩ কিলোমিটার। দ্বৈত রেলপথ নির্মাণ কার্যাবলীর মধ্যে রয়েছে মাটি পরিবহন, ভূমি খনন, সেতু ও কালভার্ট উন্নয়ন ও নির্মাণ, পাইল স্থাপন, রেল স্টেশন উন্নয়ন ও পুনঃ নির্মাণ ভূমি স্থিতি করণ, নির্মাণ স্থানে সুপেয় পানি সরবরাহ, বাসভবন অপসারণ ও পুনঃনির্মাণ ইত্যাদি। প্রস্তাবিত দ্বৈত লাইন বর্তমান লাইনের ৫০ মিটারের অর্থাৎ নতুন লাইনের মাঝা মাঝি হতে বাঁয়ে ২৫মিটার ও ডানে ২৫মিটার এর মধ্যে রেলওয়ের আওতাধীন এলাকাতে সম্পূর্ণারিত হবে।

নির্মানকালে ঠিকাদারের কাজের সঠিক ব্যবস্থাপনা ও শৃঙ্খলা, নির্মাণ কর্মযজ্ঞে উদ্ভূত ধুলাবালি, শব্দ ও ভারী যান বাহন চলাচলের ফলে সৃষ্ট সমস্যাদি নিরসনে সুষ্ঠু ব্যবস্থাপনা নিশ্চিত করা হবে। পরিবেশগত বিভিন্ন উপাদানের এবং উপ-প্রকল্পের বিরূপ প্রভাবাদির ক্ষতি সর্বনিম্ন পর্যায়ে সীমিত রাখার সম্ভাব্য সকল ব্যবস্থা গ্রহণ করা হবে।

চূড়ান্ত প্রতিবেদনে উপ-প্রকল্পের গৃহিতব্য সমস্ত প্রভাব এবং এর প্রতিকার পরিবেশিত করা হবে। এই রিপোর্ট সভার জন্য উন্মুক্ত থাকবে এবং যথাস্থানে প্রদর্শিত হবে।

ইআইএ মত বিনিময় সভার স্থান

উপ-প্রকল্প ৫ এর রেল পরিক্রমন পথে নিম্নোক্ত ৪টি স্থানে পাবলিকশপ্তে পরামর্শ সভা অনুষ্ঠিত হবে।

- নতুন বাজার (জয়দেবপুর স্টেশন সংলগ্ন)
- ভেরেয়া, দেওয়াড়া, নিত্যপুর
- আর, এস কলেজ, উনারাপাড়া স্টেশন সংলগ্নে
- ঈশ্বরদি স্টেশনের সন্নিকটে।

পরামর্শ সভায় উপ-প্রকল্প ৫ সম্ভাব্য পরিবেশগত বিভিন্ন প্রভাব উপস্থাপন করা হবে এবং উপস্থাপিত বিষয়ের উপর বিস্তারিত আলোচনা অনুষ্ঠিত হবে। উপস্থাপিতব্য বিষয়ের অনুলিপি সভায় সকল অংশ গ্রহণকারীকে সরবরাহ করা হবে।

ইআইএ সমীক্ষা সময় সূচী

১। ইনিশিয়াল এনভায়রনমেন্ট স্কোপিং রিপোর্ট (আই.ই.এস.আর) জুন আগষ্ট ২০১৩

২। ই.আই.এ এর জন্য মাঠ পর্যায়ে তথ্য সংগ্রহ ও অনুসন্ধান সেপ্টেম্বর অক্টোবর ২০১৩

৩। তথ্যাদি সংগ্রহ ও আলোচনা সভা অক্টোবর ২০১৩

৪। ই.এম.পি এর উপর কেস হোল্ডারের মতামত ও সুপারিশ: নভেম্বর ২০১৩।

৫। বাংলাদেশ সরকার ও এডিবি এর রিভিউ এর জন্য ড্রাফট রিপোর্ট ডিসেম্বর ২০১৩

৬। ই.আই.এ. এর বাংলা সার সংক্ষেপ ডিসেম্বর ২০১৩

৭। বাংলাদেশ রেলওয়ে ও এডিবিকে চূড়ান্ত প্রতিবেদন ফেব্রুয়ারী ২০১৪

৮। রেল লাইনের স্থাপনের কাজ শুরু: জুন ২০১৪(প্রত্যাশিত)

৯। ভায়াল লাইন স্থাপনের সময় কাল: ২০১৪ হতে ২০১৮

১০। কমপ্লায়েন্স পরিবীক্ষণ: নির্মাণ সময় ব্যাপী।

মত বিনিময় ও পরামর্শ গ্রহণ সভার এজেন্ডা

১। স্বাগত বক্তব্য এবং অংশ গ্রহণকারীগণের পরিচিতি।

২। অদ্যকার সভার উদ্দেশ্য

৩। প্রকল্পের সংক্ষিপ্ত বিবরণ

৪। উপ-প্রকল্প কার্যক্রম বাস্তবায়নে সম্ভাব্য পরিবেশগত প্রভাব উপস্থাপনা

৫। বিরূপ প্রভাবের প্রতিকার এবং পরিবেশ ব্যবস্থাপনা পরিবীক্ষণের প্রস্তাবনা।

৬। বাংলাদেশ রেলপথ প্রতিনিধির বক্তব্য।

৭। সভার অংশ গ্রহণকারী গণের সুপারিশ

৮। সভার প্রধান অতিথির ভাষন

৯। সভাপতির সমাপ্তি ভাষন।

Project and EMP Disclosure Meetings Minutes of Public Consultation: Meeting 01 (1st Round)

1. Meeting Location: Mooladuli Union (GPS: N 24° 9′ 43.25″, E 89° 8′ 26.23″)
2. Meeting Date: 26/05/2014
3. Project Name: Feasibility Study for Construction of Double Line between Joydebpur-Ishurdi sections
4. Presentation Given By: Mohibbur Rahman, Environment Specialist
5. Environmental Consultant's Presentation Content:
   - Project Description;
   - Project progress;
   - Construction Work;
   - Proposed alignment;
   - Probable Environmental Issues of the Project (Before, After and During the Construction); and
   - Contact information for further queries.
6. Comments of Participants:

Public Consultation 01 - Mooladuli

Sl. No.	Individual	Comments
1.	**Shah Jamal** Businessman	• He wanted to know about the land acquisition requirement of this Project.
2.	**Md. Anwar Hossain** Businessman	• He wanted to know how the compensation works for land acquisition affected people. Specially those who have authorised permission from Bangladesh Railway.
3.	**Hafizur Rahman Bablu** Journalist, Naya diganta	• We must create more canals beside the rail embankment to reduce pressure on underground water level. • Tree plantation is very much necessary to protect the people from increased noise and vibration • Proper utilisation of the Environmental Management Plan can reduce potential effect on environment.
4.	**Md. Siddikur Rahman** Service	• He wanted to know the possible starting date of the new railline construction. Consultant's reply: Project feasibility study is under processing. Construction implementation requires detail design and further study which is why it is totally uncertain when people can expect to see the construction begins.

7. Follow Up Actions Defined:
   - Draft EIA report will be shared with the Project affected people;
   - Detailed location map will be shared with Project land requirements;
   - Tree plantation to replace felled trees during alignment construction and toward protecting built embankment will be prescribed;
   - Issue of land acquisition and compensation will be referred to relevant team of experts (Social Safeguards); and
   - The issue of using the land already acquired during highway construction will be referred to the relevant team of experts of the Project.

8. Complete List of Attendees: See Attendance Sheet

Subproject No: 5

Meeting Location: Mubadhuli Union Complex **Date:** 26/5/14

GPS: 24° 09' 42" N 89° 08' 28" E

Sl. No	Name/ নাম	Mobile /মোবাইল নং	Village/গ্রাম	Occupation/পেশা	Sign/ স্বাক্ষর
1	মোঃ শহিদুল ইসলাম	০১৭১৮৬২৫৫৭	ফরিদপুর	কৃষি	শহিদুল
2	মোছাঃ কামরুন নাহার	০১৭২১৮৬৪৪৯৯	"	কৃষি	কামরুন
3	মোঃ মোস্তাফিজুর রহমান	০১৭৭৪৬৬৮-৫১০	নিজবাড়ী	ব্যবসা	মোস্তাফিজ
4	মোঃ কামরুজ্জামান	০১৭১৮৬৪৮৯৯	ফরিদপুর		কামরুজ্জামান
5	মোঃ মোস্তাফিজুর রহমান	ফরিদপুর	"	সেলস অফিসার	মোস্তাফিজুর
6	মোঃ মফিজুল হক	নিজবাড়ী	"	কৃষি	মফিজুল
7	মোঃ আব্দুল মান্নানের মেয়ে			"	
8	মোঃ লাবিবুল্লাহ	০১৭১৩৯৬৬০৭৬৩			লাবিবুল্লাহ
9	মোঃ আনিস	০১৭৬৫৬৯৮৫১	ফরিদপুর	শিক্ষক	আনিস
10	মোঃ মুরাদ হোসেন	০৩৭৯২-৭৬৬৫৭৭	মাইজপাড়া	ব্যবসা	মুরাদ
11	মৃত আমজাদ	০১৯২৮৪৫৯৯২০	"		
12	মৃত মনির হোসেন		মাইজপাড়া		
13	মোসাঃ মাঃ মাহফুজা	০১৭৬৮৯৯২৬৮২	নিজবাড়ী	গৃহিনী	মাহফুজা
14	মোঃ আবদুল হেকিম	০১৭৮৫৬৪৫৮৮৪	এ	ব্যবসা	আবদুল
15	মোঃ কামরুল হাসান	০১৭৫৯৮৭৭৭৫৫	মাইজপাড়া	"	কামরুল
16	মোসাঃ আমিনুন নাহার	০১৭২৩৭৫৮৮২৯	ফরিদপুর		আমিনুন
17	মোসাঃ মুকুল খোকন		"	গৃহিনী	মুকুল
18	মোঃ রফিকুল ইসলাম	০১৭৩৩-২৬০৩৩০	নিজবাড়ী	ব্যবসা	
19	মোঃ মোস্তাফিজুর রহমান	০১৭৩৭০০৭৯৮২	ফরিদপুর	ব্যবসায়ী	মোস্তাফিজ
20	মোঃ আবদুল মোতালেব		ফরিদপুর	সাধারণ সম্পাদক, ফরিদপুর ইউনিয়ন	মোতালেব
21	মোসাঃ তাসলিমা নাসরীন	০৩৭৬০০২৭৯৯০	ফরিদপুর	গৃহিনী	তাসলিমা
22	মোঃ মোস্তাফিজুর রহমান	০১৭৯০৬৭৪৯৭৭	ফরিদপুর	কৃষি	মোস্তাফিজুর
23	মোঃ তোফাজ্জেল হোসেন	০১৭১৮৭৪২৫৭৩	নিজবাড়ী	ব্যবসা	তোফাজ্জেল
24	স্বাঃ/বিঃ	০১৭২৬৪৯৬৭৪৪			স্বাঃ/বিঃ
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Subproject No: ৫

Meeting Location: Mudaduli Union Parishad **Date:** 24/3/2024

GPS: N E

Sl. No	Name/ নাম	Mobile /মোবাইল নং	Village/গ্রাম	Occupation/পেশা	Sign/ স্বাক্ষর
1	বেগম: বকুল আক্তার	০১৭৫৫৭৫৫২৫৫	নিজ গোবরা	গৃহিণী	
2	মো: রবিউল ইসলাম	০১৭৪৭ ৫৬২৪১০	দক্ষিণ চরপাড়া	কৃষক	
3	বেগম: সাহেদা ইয়াসমিন	০১৭৭০০০০৯৫৫৫	নিজ চরপাড়া	গৃহিণী	
4	বেগম: তাহমিনা ইয়াসমিন	০১৭২২২৪৪৫৫৫৬	চরপাড়া	গৃহিণী	
5	সুকুমার	০১৭৬০৬৬১৭৩২	"	ছেলে	সুকুমার
6	মো: মিনার হাওলাদার	০১৯২২১১৯৮৫৫	নিকট চরপাড়া	ব্যবসা	
7	মি: মেসবাহ উদ্দিন	-	"	কৃষক	
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Minutes of Public Consultation: Meeting 02 (1st Round)

1. Meeting Location: Saidabad Union (GPS: N 24° 23′ 46.23″, E 89° 41′ 30.23″)
2. Meeting Date: 26/05/2014
3. Project Name: Feasibility Study for Construction of Double Line between Joydebpur-Ishurdi sections
4. Presentation Given By: Mehedi Hasan, Environment Specialist
5. Environmental Consultant's Presentation Content:
   - Project description;
   - Project progress;
   - Construction Work of Project;
   - Proposed alignment of Project;
   - Probable Environmental Issues of the Project (Before, After and During the Construction); and
   - Contact information for further queries.
6. Comments of Participants:

Public Consultation 02 - Saidabad, Sirajganj

Sl. No.	Individual	Comments
1.	**S. M. Rafiqul Hasan** Krishnapur, Kodda	• Railway boundary pillars are not in accurate position in some places, in some cases exceeded the actual boundary. He asked what the people should do if the new acquisition takes more land than which was planned. • People throughout the country are benefitted by the rail transport, where the affected people got nothing. • Many people died by rail accident crossing the bridge, he expected a good solution for this problem **Consultant reply:** It is suggested to add footpath in the new rail bridge so people can pass the river without any risk.
2.	**Ali Akbor Khan** Businessman	• He mentioned that Bangabandhu Setu West station sells more ticket and he is expecting better service from the railway
3.	**Shahidul Islam** Affected person	• Authority promises a lot but affected people face the bitter reality. • Very few get the compensation and those people are likely to face unwanted harassment collecting the money. • Surveyors ask lot of annoying questions about the new structures while the people have full authority to build their house any time they want. • Surveyors consider any structure with its area not by the type or the partitions inside, therefore the owner gets compensation unmatched to what he or she had invested.

Sl. No.	Individual	Comments
4.	**Surot Zaman Sarkar** Affected person	• He thanked Bangladesh Railway for the compensation he got in the Bangabandhu Bridge project. • He mentioned tree plantation especially fruit trees should be planted on the both sides of the rail line.
5.	**Shonaban** Women participant	• She expressed her miseries due to land acquisition by the Bangabandhu Bridge Project.
6.	**Imdadul Haque Khan** Businessman	• Proper land survey should be done so the people do not suffer later on. • He appreciated that the Consultant mentioned that land acquisition will be minimised. • Bangladesh Railway can utilize its unused land to rehabilitate the affected people. • The affected people should get an ID card which will ensure some sort of recognition.
7.	**Souptik Ahmed Mithu** Chairman, Soydabad Union	• He mentioned the financial benefit of the existing Bangabandhu Bridge. • Mass people should not be harmed. • Affected people should get proper compensation. • Environmental issues are less significant where people had to suffer for their own land and habitat. • Affected people should be identified properly to avoid unwanted harassment and delay.

7. Follow Up Actions Defined:
   - Draft EIA report will be shared with the Project affected people;
   - Detailed location map will be shared with Project land requirements;
   - Tree plantation to replace felled trees during alignment construction and toward protecting built embankment will be prescribed;
   - Issue of land acquisition and compensation will be referred to relevant team of experts (Social Safeguards); and
   - The issue of using the land already acquired during highway construction will be referred to the relevant team of experts of Projects.

8. Complete List of Attendees: See Attendance Sheet

Subproject No: ০৩

Meeting Location: Saydabad **Date:** 26/5/14

GPS: N E

Sl. No	Name	Mobile No.	Occupation	Department	Sign
1	[illegible]	02936266588	[illegible]	[illegible]	
2	[illegible]	01710 87[illegible]	[illegible]	[illegible]	
3	[illegible]	02936000598	[illegible]	[illegible]	
4	Mahedi Hasan	01811446974	Env. Specialist	RCIP	
5	[illegible]	01714750016			
6	Md. Shahiduddin	01715295420	Env. professional	RCIP	
7	Mustakim Memon	01677900797	Env professional	RCIP	
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Subproject No: 03

Meeting Location: Sayla land Date: 26/5/2014

GPS: N E

Sl. No	Name/ নাম	Mobile /মোবাইল নং	Village/গ্রাম	Occupation/পেশা	Sign/ স্বাক্ষর
1	[illegible]	[illegible]	[illegible]	[illegible]	
2	[illegible]	[illegible]	[illegible]	[illegible]	
3	[illegible]	[illegible]	[illegible]	[illegible]	
4	[illegible]	01718993670	[illegible]	[illegible]	
5	[illegible]	01755551182	[illegible]	[illegible]	
6	[illegible]	1932993409	[illegible]	[illegible]	
7	[illegible]	01925915393	[illegible]	[illegible]	
8	[illegible]	01745-854585	[illegible]	[illegible]	
9	[illegible]	[illegible]	[illegible]	[illegible]	
10	[illegible]	[illegible]	[illegible]	[illegible]	
11	[illegible]	[illegible]	[illegible]	[illegible]	
12	[illegible]	01824364805	[illegible]	[illegible]	
13	[illegible]	01557 420575	[illegible]	[illegible]	
14	[illegible]	01736-268167	[illegible]	[illegible]	
15	[illegible]	[illegible]	[illegible]	[illegible]	
16	[illegible]	01765029098	[illegible]	[illegible]	
17	[illegible]	01748285646	[illegible]	[illegible]	
18	[illegible]	01716766844	[illegible]	[illegible]	
19	[illegible]	02925-208496	[illegible]	[illegible]	
20	[illegible]	[illegible]	[illegible]	[illegible]	
21	[illegible]	[illegible]	[illegible]	[illegible]	
22	[illegible]	[illegible]	[illegible]	[illegible]	
23	[illegible]	—	[illegible]	[illegible]	
24	[illegible]			[illegible]	
25	[illegible]	01757850071	[illegible]	[illegible]	

Subproject No: 03

Meeting Location: Saydabad **Date:** 26/5/14

GPS: N E

Sl. No	Name/ নাম	Mobile /মোবাইল নং	Village/গ্রাম	Occupation/পেশা	Sign/ স্বাক্ষর
1	মোঃ মহিউদ্দিন হাওলাদার	0171 8-4267 15	মদনদী পুর	ব্যবসা	
2	মোঃ আবুল কাশেম	0191 2-3024 95	সাহিনা	চাকুরী	
3	[illegible]	01923-541871	সাহাবাদপুর	কৃষিকার	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	সরিনাপুর	[illegible]	
6	মোছাঃ নুরুন্নাহার বেগম		আদাবপুর	গৃহিনী	
7	মোছাঃ নুরুন্না বেগম		আদাবপুর	গৃহিনী	
8	মোছাঃ তাজিনা বেগম		আদাবপুর	গৃহিনী	
9	মোছাঃ রোজিনা বেগম		আদাবপুর	গৃহিনী	
10	মোছাঃ রাজিয়া খাতুন		আদাবপুর	গৃহিনী	
11	মোছাঃ আছিয়া বেগম		আদাবপুর	গৃহিনী	
12	আঃ কাদের		"	কৃষি	
13	মোঃ নজরুল ইসলাম বেপারী	01795-681617	সাদাবদপুর	চাকুরি	
14	মোঃ আবুল কাশেম সিকদার	01711196884	সাদাবদপুর	চাকুরী	
15	গোপাল	01719-114613	কাউরা	কৃষি	
16	মোঃ আবুল হাসান	01762-440000	কাউরাবোড়	মুদি ব্যবসা	
17	স্বপন		কাউরাকান্দুরা	ব্যবসা	
18	[illegible]		ডেমুলিয়া	[illegible]	
19	মোঃ [illegible]		[illegible]	[illegible]	
20	মোঃ আঃ আজিজ (মোড়ল)	01772 448706	সাদাবদপুর	ব্যবসা	
21	মোঃ আঃ [illegible]	01191-890546	[illegible]	ব্যবসা	
22	[illegible]		সাদাবদপুর	[illegible]	
23	[illegible]		"	"	
24	মোঃ আঃ [illegible]	01738343404	[illegible]	ব্যাংকার	
25	[illegible]		কাউরা	[illegible]	

Subproject No: 03

Meeting Location: Saydabad **Date:** 22/5/14

GPS: N E

SL No	Name/ নাম	Mobile /মোবাইল নং	Village/গ্রাম	Occupation/পেশা	Sign/ স্বাক্ষর
1	মো: এ: সালাম	০১৭৫৩-২৯৬৮২৪	সদানন্দপুর	চাষ	সালাম
2	মো: মজিদ	০১৭৫৯৫৫৫৯৭৭	সদানন্দপুর	চাষি	মজিদ
3	মো: আজম ঢালী	০১৭৪৫-৪০৫৫২৪	সদানন্দপুর	ঢালি	আজম
4	ইসলাম আলী বিশ্বাস	—	পাকশাবা	বীমা	ইসলাম
5	মো: মোবারক শেখ	০১৭৬৩৪৫০৬১	সোহাগপুর	ব্যবসা	মোবারক
6	মো: আবু জাফর	০১৭৪৫৯৯১০৬৫৫	সদানন্দপুর	ছাত্র	জাফর
7	মো: মিজানুর রহমান	০১৯২৬৪৩৪৭৪৩	ঝুড়া	চাষ	মিজান
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Minutes of Public Consultation: Meeting 03 (1st Round)

1. Meeting Location: Gorai Union (GPS: N 24° 5′ 48′′, E 90° 7′ 4′′)
2. Meeting Date: 27/05/2014
3. Project Name: Feasibility Study for Construction of Double Line between Joydebpur-Ishurdi sections.
4. Presentation Given By: Mohibbur Rahman, Environment Specialist
5. Environmental Consultant's Presentation Content:
   - Project Description;
   - Project progress;
   - Construction Work;
   - Proposed alignment;
   - Probable Environmental Issues of the Project (Before, After and During the Construction); and
   - Contact information for further queries.
6. Comments of Participants:

Public Consultation 03 – Gorai Union

Sl. No.	Individual	Comments
1.	**Ashraf Khan** Chairman, BAL	• Affected people should get proper compensation. • Dhaka to Mirjapur local train from is required.
2.	**Abul Kashem** Councilor	• Farmers get serious trouble to get the compensation. • Concerned authority must be more careful about the sensitive structures near the rail line. Continuous sound and vibration has been the cause of physical damage to one of the local mosques. • Water logging problem due to rail embankment should be minimised. • Human waste on rail line is very common, very much unhygienic and annoying for the people who would prefer to walk through rail line for exercise recreation.
3.	**Kamruzzaman** MUP	• Rail vibration can crack nearby structures. • Proper utilisation of the Environmental Management Plan can reduce potential effect on environment.
4.	**Nasima Siddika** MUP	• People should not walk on rail line. • Proper compensation should be ensured.
5.	**Khorshed Alam** Head Master	• Farmers should not be harassed. • Proper utilisation of the Environmental Management Plan can reduce potential effect on environment.
6.	**Salauddin** General Editor Gorai Union	• Solid waste problem on rail line must be resolved. • Gorai Union station is required. • Passengers should buy tickets and help the railway authority to continue their best service.
7.	**Tarikul Islam** Chairman	• Appreciation to the Government and the Consultant. • People should be more careful on walking on the rail line.
8.	**Afroza Akhtar Chowdhury** UNO	• Appreciation to the Government and the Consultant. • She mentioned how the mass people will be benefitted after the projectimplemented. • Farmers face trouble to get the compensation. • Holistic approach will be the only means for the Project to succeed. • Instant recognition of affected people may spare trouble later on.

7. Follow Up Actions Defined:
   - Draft EIA report will be shared with the Project affected people;
   - Detailed location map will be shared with Project land requirements;
   - Tree plantation to replace felled trees during alignment construction and toward protecting built embankment will be prescribed;

- Issue of land acquisition and compensation will be referred to relevant team of experts (Social Safeguards); and
- The issue of using the land already acquired during highway construction will be referred to the relevant team of experts of the Project.

8. Complete List of Attendees:

Subproject No: 05

Meeting Location: Gorai Union Complex **Date:** 27/5/14

GPS: 24° 05' 48" N 90° 04' 04" E

Sl. No	Name	Mobile No.	Occupation	Department	Sign
1	Mirza Akhtar Chowdhury	01712508704	UNO, Kirtipur		
2	[illegible]	01819268389	[illegible]		
3	[illegible]	01819132086	[illegible]		
4	[illegible]	01923354629	[illegible]		
5	[illegible]	01710876876	ACE.		
6	[illegible]	01911600598	[illegible]		
7	Md. Shahidul Zaman	01715-295425	Env. professional	RCIP	
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Subproject No: 05

Meeting Location: Gorai Union Complex **Date:** 27/05/14

GPS: 24°05'48" N 90°07'04" E

Sl. No	Name/ নাম	Mobile /মোবাইল নং	Village/গ্রাম	Occupation/পেশা	Sign/ স্বাক্ষর
1	মোঃ মোস্তফা কামাল	01818-353539	তালিপাড়া	প্রধান শিক্ষক	
2	মোঃ সামসুদ্দোহা	01711542251			
3	আবদুল মতিন মন্ডল	01711842263			
4	শ্রী অজিত কুমার	01732504587	পশ্চিম দেউরটা ইউপি সদস্য		
5	মোঃ আশারাফুল				
6	মোঃ ওমর আলী	01910968209	পশ্চিমপাড়া ইউনিয়ন		
7	[illegible]	[illegible]	[illegible]	[illegible]	
8	সুবুদ্ধা আহম্মেদ পাইক	01764893466	দেউরটা	ইউপি সদস্য ও.০১৮ নং ওয়ার্ড	
9	নাসিমা সিদ্দিকা	01834394204	ইউপি সদস্য		
10	মোঃ কুদ্দুস সিকদার	01819-114291	দেউরটা		
11	মোঃ আবিদে [illegible]	01912-6[illegible]	গোড়াই	ব্যবসা	
12	মোঃ [illegible]	01819438845	গোপালপুর	কৃষি	
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14	মোঃ রায়হান সরকার রবিন	01710584814	নিজস্ব খবর	সাংবাদিক	
15	আবুল [illegible]	01900-900067	রশিদ পেট্রোল	ইউপি সদস্য	
16	[illegible]	01900 38-248-6	[illegible]	[illegible]	
17	মোঃ আঃ রহিম [illegible]	017-2503[illegible]	গোপালপাড়া	ইউপি সদস্য	
18	মোঃ ইসলাম [illegible]	[illegible]			
19	[illegible]	01813515829	[illegible]		
20	[illegible]	01933194111	[illegible]	[illegible]	
21	[illegible]	01819-059221	[illegible]	[illegible]	
22	মোঃ [illegible]	01728-474841	[illegible]	[illegible]	
23	মোঃ [illegible]	01714200405			
24	মোঃ [illegible]	01851 882583			
25	মোঃ আহসানুর [illegible]	01817023402			

Subproject No: 65

Meeting Location: Gorai Union Complex **Date:** 27/5/14

GPS: 24° 05' 48" N 90° 07' 04" E

Sl. No	Name/ নাম	Mobile /মোবাইল নং	Village/গ্রাম	Occupation/পেশা	Sign/ স্বাক্ষর
1	Nurmohammad	01936-860645	RASHID. Deohata	Business	
2	Bimal Barkali	01946257495	Deohata	student	
3	Amit Barkali	01931741822	Deohata	student	
4	Rahman	01943640232	Deohata	student	
5	Barkali	—	বারকালী		
6	মোঃ বারকালী	—	মোঃ বারকালী		
7	কারকোর রেজা	—	কারকোর রেজা		
8	ABU SAYED	01755268917	DEOHATA	Student	
9	হাসান	—	মোঃ	কৃষক	
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Minutes of Public Consultation: Meeting 04 (1st Round)

1. Meeting Location: Ullahpara City Corporation. (GPS: N 24° 18′ 55.30′′, E 89° 34′ 11.80′′)
2. Meeting Date: 27/05/2014
3. Project Name: Feasibility Study for Construction of Double Line between Joydebpur-Ishurdi sections
4. Presentation Given By: Mohibbur Rahman, Environment Specialist
5. Environmental Consultant's Presentation Content:
   - Project Description;
   - Project progress;
   - Construction Work;
   - Proposed alignment;
   - Probable Environmental Issues of the Project (Before, After and During the Construction); and
   - Contact information for further queries.
6. Comments of Participants:

Public Consultation 04 - Ullahpara

SL No.	Individual	Comments
1.	**Shahadat Hossain Khokon** Counselor	• Railway is the most reasonable and environment friendly transport. • He expects successful completion of the Project. • Trees are a good barrier of sound Overpass is required in Ullapara to reduce traffic jam at level crossing.
2.	**Sheikh Raisuzzaman Khan** Businessman	• New dedicated rail bridge over Jamuna River will ease the rail transport. • Social forestry should be implemented near the rail line.
3.	**Hafizur Rahman Bablu** Journalist, Naya diganta	• We must create more canals beside the rail embankment to reduce pressure on underground water level. • Tree plantation is very much necessary to protect the people from increased noise and vibration. • Proper utilisation of the Environmental Management Plan can reduce potential effect on environment.
4.	**Abdul Baten Hiru** Ex. Chairman, REB Sirajganj	• Appreciation to all those who are responsible to this project. • Consultant needs to think about the local people. • He assumed no more land will be acquired for the new rail line. • Dust problem during construction should be minimised. • Overpass needed in rail crossings. • Unauthorised rail crossings must be authorised to reduce road accidents.
5.	**Ashraful Islam Pramanic** MUP	• Railway signalling system should be improved.
6.	**Md. Belal Hossain** Ullahpara Municipality	• Railway has improved in recent times and people are getting more interested to railway transport. • Double line is the demand of the mass people. • Existing Roads to be improved and repaired to support rail line construction.

7. Follow Up Actions Defined:
   - Draft EIA report will be shared with the Project affected people;
   - Detailed location map will be shared with Project land requirements.

- Tree plantation to replace felled trees during alignment construction and toward protecting built embankment will be prescribed;
- Issue of land acquisition and compensation will be referred to relevant team of experts (Social Safeguards); and

- The issue of using the land already acquired during highway construction will be referred to the relevant team of experts of Project.

8. Complete List of Attendees: See Attendance Sheet

Subproject No: 05

Meeting Location: Ullapara Upazila Complex **Date:** 27/5/2014

GPS: 24°18'55" N 89°34'11" E

Sl. No	Name/ নাম	Mobile /মোবাইল নং	Village/গ্রাম	Occupation/পেশা	Sign/ স্বাক্ষর
1		01728386656			
2		01745804448			
3		01767775901			
4		01926-886726			
5		01725923844			
6		01718-341894			
7		01736821748			
8		01716028500			
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11		05922			
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13		01729112600			
14		01716-622747			
15		01763400776			
16		01712 507405			
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18		01911-458749			
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20		01926800			
21		01918-926848			
22		01911 834659			
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24		01717-257090			
25		01718876108			

Subproject No: 05

Meeting Location: Ullapara Upazila Complex **Date:** 27/5/14

GPS: 24° 18' 55" N 89° 34' 11" E

Sl. No	Name/ নাম	Mobile /মোবাইল নং	Village/গ্রাম	Occupation/পেশা	Sign/ স্বাক্ষর
1	মো: মোস্তফা কামাল	01733-289964	বিনাদিয়া	ব্যবসা	
2	Md Kamruzzaman	01717-137393	Ullapara	M	
3	MD. MARUF HOSSAIN	01712-826505	kawak	"	
4	MD. ALTAHMAD	01711-578754	Kawak	"	
5	মো: মুহসিন মোল্লা	01716507006			
6	Nikhil Chandra	01718-673132	Ullapara Pilot H.S.	Teacher	
7	মো: আবেদ হোসেন	01739386286			
8	মো: আবুল লতিফ	01852-320320			
9	মো: হাবিবুর রহমান	01727-862564			
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Minutes of Public Consultation: Meeting – 05 (1st Round)

1. Location: Nikrail Union (GPS: N 24° 24′ 4.3", E 89° 48′ 52.7"′)
2. Meeting Date: 29/05/2014
3. Project Name: Feasibility Study for Construction of Double Line between Joydebpur-Ishurdi sections.
4. Presentation Given By: Mehedi Hasan, Environment Specialist
5. Environmental Consultant's Presentation Content:
   - Project description;
   - Project progress;
   - Construction Work of Project;
   - Proposed alignment of Project;
   - Probable Environmental Issues of the Project (Before, After and During the Construction); and
   - Contact information for further queries.
6. Comments of Participants:

Public Consultation 05 – Nikrail Union

SL No.	Individual	Comments
1.	**Md. Omar Farouq** Freedom Fighter Security Stuff	• Affected people do not get proper compensation where the Government promises a lot before construction. • He expected that mass people will be benefitted and they will not be harmed by the new rail bridge project. • According to his previous experience, local people never get any priority to join the construction work. • Natural resources should be protected. • A committee must be formed to help the mass people to secure their rights.
2.	**Md. Nurul Amin**	• Vibration during piling works affects the local people. • People got very negligible amount of compensating on the previous Bangabandhu Bridge project. Moreover, compensation amount reduces with the time elapsed. • Rail Bridge is a great inspiration and people will always support the new rail line if they are not harmed. • Local people should be assigned to construction work. • There is no such medical facilities nearby which can be a vital issue during construction.
3.	**Saiful Islam** Advocate	• Consultant has considered most of the environmental issues. • Land acquisition issue is very significant in this area. • Only very few people got compensation during the Bangabandhu Bridge project. • Fishermen suffer the most as the bridge directly affects their livelihood.

Sl. No.	Individual	Comments
		Therefore, Government must think specially for the fishermen. • UNO should work with the Grievance Redress Committee proposed by the Consultant. • Contractors come from different places of the country who are not willing to help or listen any complaint. • New employment opportunity is much expected. • He wanted specific declaration of the Project promises so the affected people can refer later on. • Tree plantation programme should be handled carefully. How the affected people can be benefitted from the tree plantation.
4.	**Mainuddin Talukder** Businessman	• We should ensure no corruption during land acquisition.
5.	**Md. Jahangir** Chairman, Nikrail	• Local people were deceived endlessly in the Bangabandhu Bridge project • Land erosion problem is very vital. • Infrastructure under the rehabilitation programme are very weak and damaged; no further repair has been done. • He demanded more river training work to protect Char Pathailkandi. • Local people are badly in need of school, college, hospital, banking service.
6.	**Md. Helal Uzzaman Sarker** UNO	• Local people expect to get chance to work in bridge construction • People are enjoying better life style and transport facility after the Bangabandhu Bridge constructed. The new bridge will bring more development and opportunities. • Strong Grievance Redress Committee should be created. • Government must be helpful to those people who might be in need to shift their livelihood due to the new bridge project.

7. Follow up Actions Defined:
   - Draft EIA report will be shared with the Project affected people;
   - Detailed location map will be shared with Project land requirements;
   - Tree plantation to replace felled trees during alignment construction and toward protecting built embankment will be prescribed;
   - Issue of land acquisition and compensation will be referred to relevant team of experts (Social Safeguards); and
   - The issue of using the land already acquired during highway construction will be referred to the relevant team of experts of the Project.
8. Complete List of Attendees: See Attendance Sheet

Subproject No: 03

Meeting Location: Charpattaikandi (Nikrail Union) Date: 27/5/14

GPS: N E

Sl. No	Name/ নাম	Mobile /মোবাইল নং	Village/গ্রাম	Occupation/পেশা	Sign/ স্বাক্ষর
1	আসাদুজ্জামান	০১৯১৭৩১০৬১৭	পাথাইরকান্দী	কৃষি	
2	মো: বকুল আলুদার	০১৭৩৯৩৯৫৭৫০	— " —	ব্যবসা	
3	মো: আমিনুর রহমান	০১৭৫৩৯২৫৫৪৭	— " —	ব্যবসা	
4	মো: নাসিরুল ইসলাম	০১৭১০৭৯০৯০১	— " —	— " —	
5	মো: নুরুল আমিন	০১৬৮৪-৭৭৪৫৯২	"	"	
6	মো: ওমর ফারুক	০১৭২২৬২৩২০০	সাং পলাশিয়া, উপজেলা কলমাকান্দা, নেত্রকোনা		
7	তা: কুদ্দুছ	০১৭২৭৫৫৩৬১৩	" "		
8	মো: মোতালেব	০১৯৪৭৩১২৫১৪	"	কৃষক	
9	হালিম	—	"	"	
10	হুরুর আলী	০১৭৪৩৬৫৯৫৪৫	" "	ব্যবসা	
11	আবদুল	০১৭২৩৯৫৭০০২	পাথাইরকান্দী	ব্যবসা	
12	মো: কবির উদ্দিন	—	"	কৃষি	
13	সোহেল রানা	০১৮২৪৩১২৮৯৯	"	ছাত্র	
14	মো: বাক্কার	০১৬৪৬৩১৩৯৬৫	"	ছাত্র	
15	তাহেরুল ইসলাম	—	"	কৃষি	
16	মো: আলাল মেম্বার	—	"	কৃষি	
17	মোস্তফা	০১৭৫৭-৭৭১৯৬৫	"	ছাত্র	
18	হাফিজ আবুল কাশেম	০১৭২০-৩২১৯৪৫	সাং পলাশিয়া	কৃষি	
19	তাজুল ইসলাম	০১৭৬৫৪৮৬৩৭৭	"	"	
20	মো: রফিক	০১৭৪৯১৭৫৫৫৭	পাথাইরকান্দী	ব্যবসা	
21	মো: ফনিজ	—	"	দর্জি শিল্প	
22	মো: ইমাম আলী	—	"	ব্যবসা	
23	মো: জমির উদ্দিন ভূ	০১৮১২-৫৮৭৬৯০	সাং পলাশিয়া,	ব্যবসা	
24	মো: নাসিরুল ইসলাম	—	পাথাইরকান্দী	(মুদ্রী (BSA)	
25	হুমায়ুন আলী	—	"	কৃষি	

Subproject No: 03

Meeting Location: Charpattan Kandi (Nikrail Union) **Date:** 29/5/14

GPS: N E

Sl. No	Name/ নাম	Mobile /মোবাইল নং	Village/গ্রাম	Occupation/পেশা	Sign/ স্বাক্ষর
1	MD. Main Talukder	01737-072733	Bejoy	Business	
2	Md Jamal ud Ahmed	—	Bejoy	former	
3	মো: রফ	01763836	আমাই কান্দি	কলেজ কর্মী	
4	আজোমাতু হোসেন	—	"	কৃষি/ফেরা	
5	জাহানারা পারভিন	01725005216	সারপলাশিয়া	শিক্ষিকা	
6	মোঃ আঃ কাশেম	01751-202481	পায়াইলশনি	কৃষি কাজ	
7	মোঃ আবু দায়েম	01725 810 64	মাটিকাটা	ব্যবসা (ছোট)	
8	মোঃ মুক্তার	—	"	ছেলে	
9	মুকু মোহাম্মদ	—	পাথাইলকান্দি	কৃষি	
10	আবুল বশিদ	—	সন্ধ্যাসলিয়া	ঠিকা	
11	মোঃ বাদলমিয়া	01725 865918	সারপলাশিয়া	গ্রামপুলিশ	
12	মোছাঃ লতিফ	—	"	গৃহিণী	
13	মোঃ আঃ বাছেদ	01710170814	সারপলাশিয়া	ব্যবসা	
14	মোঃ মুহাম্মেদ	01861929	"	মসুরী(ইমাম)	
15	মোঃ হাসান জেলুকদার	01725-360594	সারপলাশিয়া	ব্যবসা	
16	ফরিদুল হুসেনার	—	"	ব্যবসা	
17	কবির হুসেন	01737-072842	"	কৃষক	
18	মোঃ ইউসুফ	01730880	"	ব্যবসা	
19	মো: আলিয়ার	01942165300	"	ড্রাইভার	
20	মো: মিনহাজ	—	"	ছাত্র	
21	মোঃ আলমগীর হোসেন	—	"	কৃষি	
22	বাবুল	01739-305520	"	কৃষক	
23	বাবুল	—	"	ছাত্র	
24	মোঃ আলম	—	"	ছেলে	
25	মোঃ আলমগীর	—	"	ছেলে	

Subproject No: 03

Meeting Location: Char pathalkandi (Dikshail Union) **Date:** 29/5/14

GPS: N E

Sl. No	Name/ নাম	Mobile /মোবাইল নং	Village/গ্রাম	Occupation/পেশা	Sign/ স্বাক্ষর
1	মোহাম্মদ নোমান	01796-826848	চর পাথালকান্দি	ছাত্র	মোহাম্মদ নোমান
2	মোছা: জেবেদা	01756-077[illegible]	চর পাথালকান্দি	গৃহিণী	মোছা: জেবেদা
3	মোছা: আমেনা	01720-497126	চর পাথালকান্দি	গৃহিণী	আমেনা
4	মোছা: নারগিস	0173[illegible]-534819	চর পাথালকান্দি	গৃহিণী	নারগিস
5	ময়নুল	01757-992812	চর পাথালকান্দি	কৃষক	ময়নুল
6	চায়না	01766-044236	চর পাথালকান্দি	গৃহিণী	চায়না
7	কামরুন্নাহার	01782-830492	চর পাথালকান্দি	গৃহিণী	কামরুন্নাহার
8	মালেকা	01767617180	চর পাথালকান্দি	গৃহিণী	মালেকা
9	জহুরা	01836179092	চর পাথালকান্দি	গৃহিণী	জহুরা
10	চানবানু	←	চর পাথালকান্দি	গৃহিণী	চানবানু
11	নুরজাহান	01[illegible]7613436	চর পাথালকান্দি	গৃহিণী	নুরজাহান
12	হালেমা	—	চর পাথালকান্দি	গৃহিণী	হালেমা
13	জহুরা	01763605024	চর পাথালকান্দি	গৃহিণী	জহুরা
14	সুফিয়া বানু	01763603024	চর পাথালকান্দি	গৃহিণী	সুফিয়া বানু
15	নাছিমা	ঐ	চর পাথালকান্দি	গৃহিণী	নাছিমা
16	জমিনা	01[illegible]56-361[illegible]08	চর পাথালকান্দি	গৃহিণী	জমিনা
17	চায়না	01948-629865	চর পাথালকান্দি	গৃহিণী	চায়না
18	মোনেয়ারা	01[illegible]5403[illegible]60	চর পাথালকান্দি	গৃহিণী	মোনেয়ারা
19	পারবিন	—	চর পাথালকান্দি	গৃহিণী	পারবিন
20	নাসিমা	—	চর পাথালকান্দি	গৃহিণী	নাসিমা
21	খাদিজা	01[illegible]56-361[illegible]08	চর পাথালকান্দি বাজার	গৃহিণী	খাদিজা
22	ফজিলা	—	চর পাথালকান্দি	গৃহিণী	ফজিলা
23	মো: আমিনুল	01729837458	U.N-O অফিস	চাকুরী	আমিনুল
24	মো: বাচ্চু	←	চেয়ারম্যান অফিস	ড্রাইভার	বাচ্চু
25	কাজী মোসলেম	—	পাথালকান্দি	ব্যবসা	মোসলেম

Subproject No: 03

Meeting Location: Charpathailkandi (Nikaril Union) **Date:** 29/5/14

GPS: N E

Sl. No	Name	Mobile No.	Occupation	Department	Sign
1	Md. Helal Uddin Sarkar	01722229057	UNO.		
2	Md. Sirajul Islam	01711532871	RCIP	RTP Consultant	
3	md. Sahanaz	01718-229725	Chairman	Nikrail	
4	Md. Abdul Razzak	01716864661	Journalist	Kalerkantha	
5	Md. Shahed Zaman	01715-295420	Consultant RCIP	SMEC	
6	Mustakim Masum	01677900747	Consultant RCIP	SMEC	
7	Saiful Islam Talukder	01712-908034	Advocate	Targaid	
8	Mahedi Hasan	01814646974	Env. Specialist	RCIP	
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Subproject No: 03

Meeting Location: Char-Pathairkandi (Pikrail Union) Date: 29/5/2024

GPS: N E

Sl. No	Name/ নাম	Mobile /মোবাইল নং	Village/গ্রাম	Occupation/পেশা	Sign/ স্বাক্ষর
1	মো: জনি	01757916512	সাবপলাশিয়া	ছাত্র	
2	মো: কফিল উদ্দিন	01727621637	চরপাথাইলকান্দি	ব্যবসা	
3	মোঃ সুলতান শান্তিল	—	"	কৃষক	সুলতান
4					
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Minutes of Public Consultation: Meeting – 6 (2nd Round)

1. *Meeting Location*: Muladuli Union Parishad Office, Ishwardy, Pabna
2. *Meeting Date & Time:* 13/ 06 /2019, 10:00 AM -12:00 PM
3. Project Name: Construction of double line between Joydebpur- Ishwardi section of Bangladesh railway.
4. List of Names and Positions of Government Participants and Experts: **See attachment.**
5. Power- Point Presentation Given By : **Md. Rashed- Un- Nabi, Environmental Specialist, ENRAC**
6. Environmental Consultant's Presentation Content:
   - Brief Overview of the Project and objectives of the meeting
   - Project progress
   - Probable environmental issues of the Project (before, after and during construction period)
   - Environmental Management Plan – mitigative and monitoring measures
   - Project benefits and enhancements
   - Grievance redress mechanism Grievance Redress Mechanism (GRM)

7. *Comments of Participants*:

Sl.	Individual	Profession	Comments & Suggestions
1.	Md. Selim Saleh	Ward Member	• The project will be beneficial for the local people • He thanked the Consultants for the mitigative measures shared on the meeting. • Ensure proper compensation for private land acquisition • Local government and local leaders should be involved directly to motivate the mass people.
2.	Jahangir Alam	Businessman	• Construct side road along the rail route for human passing to avoid accident. • Proper tree plantation must be done on the slope of the embankment. • Ensure adequate drainage system to avoid water congestion.
3.	Md. Sobuj Hossain	Service holder	• Assurance of proper compensation for private land acquisition and resettlement • Regarding waste management take necessary measures to keep the environment clean. • Give priority the local and poor people to get opportunities of work during construction • Enough culverts needed to maintain proper drainage system.
4.	Md. Nur Islam	Gov. Employe	• How to control excessive noise and dust due to the proposed project. • We have to protect the rivers and other water bodies. • Take special measure near level crossing as many students crossing the road. • To protect environment plant trees instead of one tree which will be cut during construction.
5	Samanta Bithi	Housewife	• She requested to avoid agricultural land as some people is completely dependent on the land. • Many people are completely dependent on project site land. She requested to take care of the concern that their job and property is not hampered.

Sl.	Individual	Profession	Comments & Suggestions
6.	Md. Saddam Hossain	Businessman	• Road capacity must be increased to support rail line construction. We must not harm other resources to improve rail transport. • He requested to keep the construction material away from the agricultural land. • Fast construction is required to reduce the miseries of the mass people during the Project implementation phase. • He requested to calculate and provide adequate compensation for the people whose land will be acquired by the government.
7.	Md. Ataur	Farmer	• He said that the noise of train is very high. Is it possible to take any precaution for the railway noise protection? • He asked how the agricultural land will be paid in terms of compensation for different crops.
8.	Md. Zahangir Alam	Gov. Employe	• He mentioned that he road which will be harmed due to heavy vehicle movement during construction should be repaired after the construction is done. • He suggested that the safety system at all level crossings must be ensured. • He asked that both side of the rail routes covered with agricultural land so is there any impact of construction on the agricultural land.
9.	Aiub	Farmer	• He wanted to know the rules for paying the compensation that how many times compensation will be paid than the market price? • He suggested to plant more tree after the construction is over.

Stakeholder Attendance (male/female) in the Public Consultations PC-06

Participants Attendance by Group	Muladuli Union	
Gender	M	F
Pourashava Mayor /Union Chairman	1	0
Commissioner	0	0
UP personnel	1	0
Project Affected People (include both rural and urban)	8	2
Farmer	11	0
Businessman	13	0
Teacher	0	0
Doctor	0	0
NGO representative	0	0
Student	3	0
Local government official	6	0
Bangladesh Railway Representative	0	
Others	4	0
Total	49	

8. Complete List of Attendees PC-06

পরিবেশগত মতবিনিময় সভা

প্রকল্পের নামঃ জয়দেবপুর থেকে ঈশ্বরদী পর্যন্ত ডুয়েল গেজ ডাবল লাইন নির্মান

উপস্থিতি তালিকা

সভার স্থানঃ ধুলাউরি ইউনিয়ন পরিষদ তারিখঃ ২৬/০৬/২০১৯

ইউনিয়নঃ ধুলাউরি উপজেলাঃ ঈশ্বরদী জেলাঃ পাবনা

ক্রমিক নং	অংশগ্রহণকারীর নাম	পেশা	মোবাইল নং	স্বাক্ষর
১	মোঃ মোনায় সাহানী	চেয়ারম্যান	01712064730	
২	মোছা: শুভ্রা খাতুন	সদস্য	01736-407010	
৩	মো: ক্বারুদ্দীন সরকার	চাকরী	০১৭১২৩৪৪৮৫২	
৪	মোঃ সফিকুল ইসলাম	চাকরী	01990-246666	
৫	মো: ফজলুল করিম	ব্যবসা	01722-540733	
৬	মোঃ জেমসের হোসেন	ব্যবসা		
৭	মো: মা: মোস্তাফেজ	ব্যবসা	০১৯৬০৪৬৭৪৯৬	
৮	তোবদেল	কৃষি	০১৭৭০৫৭৬৩৪২	
৯	মোঃ নাছির উদ্দিনসরদার	ব্যাপারী	01712-922661	
১০	মোঃ মঃ কবির সরদার	ব্যবসা	০১৭১৬ ২১২৫৩	
১১	মোঃ জোবুল্লাহ জোবায়ের	ব্যবসা	০১৭২৫-৭৪৪১০৯	
১২	মো: হাজেরা খাতুন	ব্যাবসায়ী	01718-022564	
১৩	মো: বাদশা মন্ডল	ব্যাবসায়ী	01712550-216406	
১৪	মোঃ জোহারুল ইসলাম	চাকুরীজীবি	০১৭২৪৭৭৬১৫৩	
১৫	মোঃ ওমর ফারুক	সাধারণ সম্পাদক	০১৬৮০-৭১০৭৭০	
১৬	আলহাজ্ব আবদুল মোঃ	ঐ	01725-621216	
১৭	মোঃ জেলি মিয়া	ঐ	০১৭১৫-৬৮৫৪২৬	
১৮	ঐ মকবুল হোসেন	ঐ		
১৯	মোঃ ফরহাদ	ঐ	01796091676	
২০	মো: হেমায়েত মন্ডল	ঐ	01812007447	
২১	মো: ইদ্রিস সরকার	ঐ	ঐ	
২২	মোছা: ফাতেমা খাতুন	ঐ	01786454554	
২৩	মোঃ আবেদ	ঐ	01730044444	

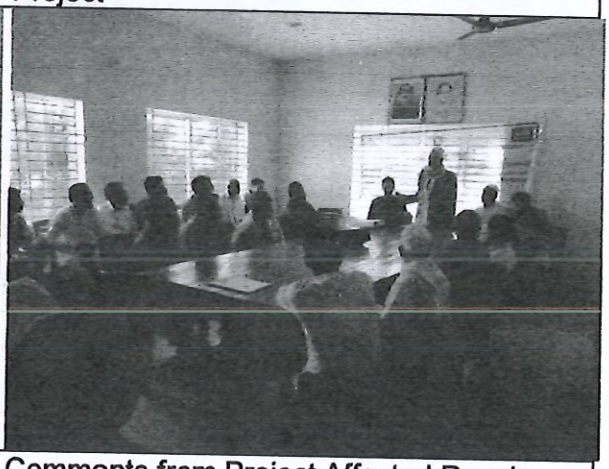
ক্রমিক নং	অংশগ্রহণকারীর নাম	পেশা	মোবাইল নং	স্বাক্ষর
২৪	মোঃ জাকির হোসেন	ব্যবসা	০১৭৩৯১৪৪৯১৪	
২৫	মোঃ জোবায়ের আহমেদ	[illegible]	[illegible]	[illegible]
২৬	তাসলিমা	[illegible]	[illegible]	[illegible]
২৭	মোঃ আতাউর	[illegible]	[illegible]	[illegible]
২৮	[illegible]	[illegible]	[illegible]	[illegible]
২৯	আরমান	[illegible]	০১৫৩৫ ৬১০৭১	আরমান
৩০	[illegible]	[illegible]	[illegible]	[illegible]
৩১	[illegible]	[illegible]	[illegible]	[illegible]
৩২	মোঃ [illegible]	[illegible]	[illegible]	[illegible]
৩৩	মোঃ ফিরোজুল হক	ব্যবসায়	০১৭১৪-২৬০৯১	[illegible]
৩৪	মোঃ সরওয়ার হোসেন	[illegible]	০১৭১২-২৬৬৫২	[illegible]
৩৫	মোঃ নুর ই হোসেন	ছাত্র	০১৮৭৫৫১৫৩৫	হোসেন
৩৬	আয়েশা বিবি	গৃহিণী	০১৭৩১২৭৪৭৭৭	বিবি
৩৭	[illegible]	[illegible]	০১৭৯৪৮১৩২৩৫	[illegible]
৩৮	মোঃ আলতাফ	কৃষি	০১৭৮৭৪৯৯৭৩১	[illegible]
৩৯	[illegible]	ব্যবসায়	০১৭১৪-২১০০৪২	[illegible]
৪০	[illegible]	[illegible]		[illegible]
৪১	[illegible]	চাকরী	[illegible]	[illegible]
৪২	[illegible]	[illegible]		[illegible]
৪৩	[illegible]	[illegible]	০১৭৩২-০৬৪০৬১	[illegible]
৪৪	[illegible]	[illegible]		[illegible]
৪৫	[illegible]	[illegible]	০১৭৭১৮৬০৪০৪	[illegible]
৪৬	মোঃ [illegible]	[illegible]	০১৭৫৭৪৭৬১৫	[illegible]
৪৭	[illegible]	[illegible]	০১৪৬০৫৪৩২৪৫	[illegible]
৪৮	[illegible]	[illegible]	০১৯২৪৩৫৭৫৫	[illegible]
৪৯	Mohammad Rashedun Nabi	Env. specialist	০১৭১৭০৬৭৬৪৪	Rashedun Nabi.
৫০				

9. Photographs of Public Consultation PC-06

Introduction of the Project by Environmental Specialist of ENRAC

Discussion on Technical Details of the Project

Discussion on Environmental Impact and Mitigations with Project Affected People



Comments from Project Affected People

Minutes of Public Consultation: Meeting – 7 (2nd Round)

1. *Meeting Location*: Jamtoil Union Parishad Office, Kamarkhando, Sirajganj.
2. *Meeting Date & Time:* 13/ 06 /2019, 3:30 PM -5:30 PM
3. Project Name: Construction of double line between Joydebpur- Ishwardi section of Bangladesh railway.
4. List of Names and Positions of Government Participants and Experts: **See attachment.**
5. Power- Point Presentation Given By: **Md. Rashed- Un- Nabi, Environmental Specialist, ENRAC**
6. Environmental Consultant's Presentation Content:

- Brief Overview of the Project and objectives of the meeting
- Project progress
- Probable environmental issues of the Project (before, after and during construction period)
- Environmental Management Plan – mitigative and monitoring measures
- Project benefits and enhancements
- Grievance redress mechanism Grievance Redress Mechanism (GRM)

7. *Comments of Participants*:

Sl.	Individual	Profession	Comments & Suggestions
1.	Md. Anwar Hossain	Chairman	• Ensure proper compensation for affected person. • He requested to avoid agricultural land as some people is completely dependent on the land. • Waste generated during the project period should be disposed of properly
2.	Md. Tofazzal	UP Members	• Involve more local people during the construction to avoid conflict • Take necessary measures to implement the project as soon as possible. • Is it possible to take any precaution for the railway noise protection?
3.	Sopon Kumar	Freedom fighter	• Long term construction period will generate excessive dust, noise and water pollution, how it will be control. • Often accident happens in-order to minimise its number proper overpass and underpass is needed. • Give priority the local and poor people to get opportunities of work during construction.
4.	Md. Juwel Rana	Businessman	• Construct satisfactory number of overpass to avoid accident. • Ensure proper barrier and guard system at the level crossing. • How to control excessive noise and dust due to proposed project. • We have to protect the rivers and other water bodies during construction activities. • Enough culverts needed to maintain proper drainage system.
5	Mrs Buity	UP member	• She requested to avoid agricultural land as some people is completely dependent on the land. • Construct side road along the rail route for human passing to avoid accidents.

Sl.	Individual	Profession	Comments & Suggestions
6.	Md. Aminul Islam	Businessman	• Road capacity must be increased to support rail line construction. We must not harm other resources to improve rail transport. • She requested to calculate and provide adequate compensation for the people whose land will be acquired by the government. • He suggested that the project activities should not create water logging situation. • Proper tree plantation must be done on the slope of the embankment. • He requested to keep the construction material away from the agricultural land.
7.	Md. Sohidul Islam	Farmer	• He asked how the agricultural land will be paid in terms of compensation for different crops. • To save land and properties of local residence take special attention.

Stakeholder Attendance (male/female) in the Public Consultations PC-07

Participants Attendance by Group	Jamtoil Union	
Gender	M	F
Pourashava Mayor /Union Chairman	1	0
Commissioner	0	0
UP personnel	11	0
Project Affected People (include both rural and urban)	3	1
Farmer	4	0
Businessman	12	0
Teacher	0	0
Doctor	0	0
NGO representative	1	0
Student	1	0
Local government official	2	0
Bangladesh Railway Representative	0	0
Others	1	0
Total	37	

8. Complete List of Attendees PC-07

পরিবেশগত মতবিনিময় সভা

প্রকল্পের নামঃ জয়দেবপুর থেকে ঈশ্বরদী পর্যন্ত ডুয়েল গেজ ডাবল লাইন নির্মান

উপস্থিতি তালিকা

সভার স্থানঃ ভাদামতৈল ইউনিয়ন পরিষদ তারিখঃ ২৬/০৬/২০২২

ইউনিয়নঃ ভাদামতৈল উপজেলাঃ কাশার খন্দ জেলাঃ সিরাজগঞ্জ

ক্রমিক নং	অংশগ্রহণকারীর নাম	পেশা	মোবাইল নং	স্বাক্ষর
১	মোঃ আলমগীর হোসেন (মেম্বার)	ইউ, পি, মেম্বার	01711-467509	
২	মোঃ মাহবুবুর রহমান	ইউ, পি, মেম্বার	01916751674	
৩	মোঃ- তোফাজ্জল -	,, ,,	01918083437	
৪	,, নজরুল ইসলাম	,, ,,	01719-795767	
৫	,, সাদেক হোসেন	,, ,,	01788-651269	
৬	,, ওবায়দুর রহমান -	,, ,,	01798-760966	
৭	,, সুবল কুমার	ইউ, পি, সচিব	01718-749864	
৮	,, মিজানুর রহমান	ইউপি সদস্য		
৯	,, জুয়েল রানা	ব্যবসা	01763343105	
১০	মোঃ আমিনুল ইসলাম	ব্যবসা	01739033456	
১১	মোঃ মধু মিয়া	ব্যবসা	01200982548	
১২	মোঃ আবুবক্কর ছিদ্দিকী	কৃষক	01911-[illegible]	
১৩	সুবাস	চাকরী	01929931975	
১৪	মোঃ [illegible]	[illegible]	01712[illegible]	
১৫	মোঃ মুকছিদ আহমদ	চাকুরী	01917960082	
১৬	মোঃ রফিকুল	কৃষক	01765599917	
১৭	মোঃ [illegible]	,,	,,	
১৮	মোঃ মুকাদ্দস	কৃষক	01739019[illegible]	
১৯	মোঃ সালাউদ্দিন সানি	ব্যবসা	01515[illegible]	
২০	মোঃ তোফাজ্জল হোসেন	ব্যবসা	01628367676	
২১	মোঃ [illegible]	ছাত্র	01777601924	
২২	মোসাঃ [illegible]	সদস্য ইউপি	01797434764	
২৩	মোসাঃ [illegible]	সদস্য ইউপি	01759025139	

ক্রমিক নং	অংশগ্রহণকারীর নাম	পেশা	মোবাইল নং	স্বাক্ষর
২৪	মোসা: মুক্তারমা	ইউপি সদস্য		মুক্তারমা
২৫	মো: ফিজার রহমান	ব্যবসায়ী		ফিজার
২৬	মো: আক্কাছ আলী	ইউপি সদস্য	01774888329	আক্কাছ
২৭	মো: ইমামুল হাসান	ব্যবসায়ী		ইমামুল
২৮	মো: হুমায়ুন কবির	ইউপি সদস্য		হুমায়ুন
২৯	মো: নুরুন্নবী	ব্যবসায়ী		নুরুন্নবী
৩০	মো: ফিরোজ আলী	ব্যবসায়ী	01718-722740	ফিরোজ
৩১	Md. Rasheduz Nabi	Env. Specialist	01717064668	Rasheduz
৩২	মো: ওসমান আলী	ব্যবসায়ী	01767033392	Osman
৩৩	মো: হাফিজুর	দোকানদার	01839276556	হাফিজ
৩৪	তোফাজ্জেল মিয়া	ব্যবসায়ী	01940-346258	তোফাজ্জেল
৩৫	হামিদুর রহমান	কৃষি	01835647293	হামিদুর
৩৬	মো: কবিরুল কিবরিয়া	কৃষক	01675587712	কবিরুল
৩৭	রহমান মিয়া	মুদি দোকানদার	01721434055	রহমান
৩৮				
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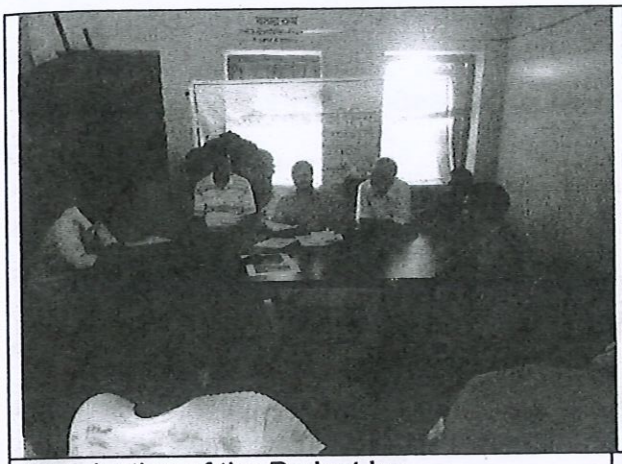
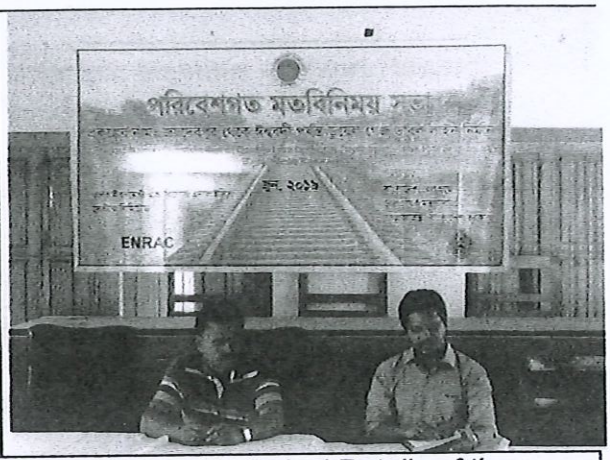
9. Photographs of Public Consultation PC-07

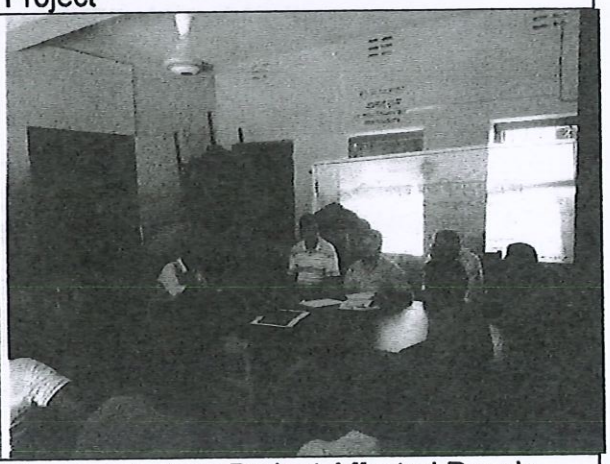


Introduction of the Project by Environmental Specialist of ENRAC



Discussion on Technical Details of the Project

Discussion on Environmental Impact and Mitigations with Project Affected People



Comments from Project Affected People

Minutes of Public Consultation: Meeting – 8 (2nd Round)

1. Meeting Location: Ellenga Pourashava, Kalihati Upozila, Tanggail District.
2. Meeting Date: 20/06/2019; 03:30PM-05:30 PM
3. Project Name: Construction of double line between Joydebpur-Ishwardi section of Bangladesh Railway.
4. List of Names and Positions of Government Participants and Experts: **See Participants attachment List.**

5. Power- Point Presentation Given By: **Md. Rashed- Un- Nabi, Environmental Specialist, ENRAC**
6. Environmental Consultant's Presentation Content:

- Brief Overview of the Project and objectives of the meeting
- Project progress
- Probable environmental issues of the Project (before, after and during construction period)
- Environmental Management Plan – mitigative and monitoring measures
- Project benefits and enhancements
- Grievance redress mechanism Grievance Redress Mechanism (GRM)

5. Comments of Participants of Public Consultation PC-8

Sl.	Individual	Professio n	Comments & Suggestions
1.	Md. Nur-A-Alam Siddique	Mayor	• Is it possible to take any precaution for the railway noise protection? He claimed that the noise of train is very high. • He said that, pollution is a big problem in Ellenga. The construction should be done keeping the adequate pollution prevention measures in mind. • He assured that NGO is ready to help in any situation during and after the railway construction process.
3.	Salma Akter	Teacher	• She suggested that, the road which will be harmed due to heavy vehicle movement during construction should be repaired after the construction is done. • Take necessary step to protect forestation especially the trees in the project areas. • She emphasized on fish and poultry farm, which shall be protected. • Take necessary step to keep environment clean
4.	Mst. Rozina Begum	Housewife	• She requested to avoid agricultural land as some people is completely dependent on the land. • She requested to calculate and provide adequate compensation for the people whose land will be acquired by the government.
5.	Md Sultan Mahmud	Farmer	• Ensure appropriate compensation for the affected person. • He asked how the agricultural land will be paid in terms of compensation for different crops. • He suggested to plant more tree after the construction is over
6.	Zohora Begum	Word Councillor	• She requested to construct an overpass or underpass for the railway crossing as many accidents are taking place during rail crossing. • She moreover stated that the trees which are cut during the construction is not planted later. • To save land and properties of local residence, take special attention to change the proposed alignment

Sl.	Individual	Profession	Comments & Suggestions
7.	Riaz Rahman	Student	• Ensure proper compensation for affected person • Ensure adequate drainage system to avoid water congestion • Plant more trees to protect environment and vegetation cover • He requested to put a cover on the railway station.
8.	Tanvir Rahman	Service	• Ensure satisfactory number of underpass and overpass for local residence. • He also opined that local people should get priority in case of employment in the project. • Regarding waste management take necessary measures.
9.	Abdul Gafur	Businessman	• Take necessary measures to implement the project as soon as possible. • Ensure proper compensation for land acquisition.

Stakeholder Attendance (male/female) in the Public Consultations PC-8

Participants Attendance by Group	Ellenga	
Gender	**M**	**F**
Pourashava Mayor /Union Chairman	1	0
Ward commissioner / Counselor	3	1
Project Affected People (include both rural and urban)	8	2
Farmer	3	1
Businessman	4	0
Teacher	1	1
Doctor	2	0
NGO representative	2	1
Student	2	0
Local government official	0	0
Bangladesh Railway personnel	0	0
Others	3	0
Total	**35**	

6. Actual Attendance Sheet Public Consultation PC-8

পরিবেশগত মতবিনিময় সভা

প্রকল্পের নামঃ জয়দেবপুর থেকে ঈশ্বরদী পর্যন্ত ডুয়েল গেজ ডাবল লাইন নির্মান

উপস্থিতি তালিকা

সভার স্থানঃ এলেঙ্গা পৌরসভা, মতবিনিময় তারিখঃ 20/06/22

ইউনিয়নঃ এলেঙ্গা পৌরসভা উপজেলাঃ কালিহাতী জেলাঃ টাঙ্গাইল

ক্রমিক নং	অংশগ্রহণকারীর নাম	পেশা	মোবাইল নং	স্বাক্ষর
১	মোঃ নূর-ই-আলম সিদ্দিকী	ব্যবসা	01711-618372	
২	মোঃ সুলায়মান কবির	কাউন্সিলর	০১৭১৮, 433408	
৩	মোঃ সুবহে আলী	কাউন্সিলর	০১৭১৩৫৫৫৪৯৫	
৪	মোঃ ওবায়দুর আলী	কাউন্সিলর	০১৫২০০৭৪২০২	
৫	জোহুরা বেগম	কাউন্সিলর	01989235306	
৬	মোঃ আব্দুর রাজ্জাক	কৃষি	01715-884287	
৭	মিঃ সুলতান মাহমুদ	কৃষি	01744254910	
৮	মোঃ শামীমুল ইসলাম	স্বাস্থ্য	01717-786758	
৯	মোঃ ইমরুল হাসান	ব্যবসায়ী	01627171645	
১০	মোছাঃ রোজিনা বেগম	গৃহিনী	01760516344	
১১	[illegible]	[illegible]	01923-900781	
১২	আহসান হাবিব-আল-কবীর	শিক্ষক	01710-632184	
১৩	মোঃ শহিদুল্লাহ বাহাদুর	ব্যবসায়ী	01636146491	
১৪	ফুল মাসতুল	কৃষি	01632947634	
১৫	আবু হানিফ	কৃষি	01732318429	
১৬	মোঃ নজরুল ইসলাম	চাকুরী (স্বাস্থ্য)	01724-012388	
১৭	[illegible]	...	01746471610	
১৮	[illegible]		01720968[illegible]	
১৯	[illegible]		01[illegible]04042	
২০	[illegible]		01[illegible]898080	
২১	[illegible]		01718732461	
২২	[illegible]	[illegible]	016-21174083	
২৩	[illegible]	[illegible]	01317539959	

ক্রমিক নং	অংশগ্রহণকারীর নাম	পেশা	মোবাইল নং	স্বাক্ষর
২৪	মো: সোলায়মান সরকার	চাকুরী	01719-747074	
২৫	জীবন	গৃহিনী		
২৬	আবুল কালাম	এনজিও প্রতিনিধি	01719-759020	
২৭	আবু মোহাম্মদ আব্দুল্লাহ	অতিরিক্ত সচিব	0171-328463	
২৮	মো: সামুয	ব্যাবসায়	01722-118567	
২৯	সুলতান ফুলমায়	এনজিও	01523127658	Shompon
৩০	রিয়াজ	ছাত্র	01521478615	
৩১	এস এম ইমরান	চাকুরী	01721434055	
৩২	অনিক রায়	ব্যবসা	01763201302	
৩৩	মোস্তাফিজুর রহমান	সরকারি কর্মী	01736-652260	
৩৪	Md Rasheduzzaman	Env. specialist	01717064663	
৩৫	Md. Muhibbullah	Env Officer	01767910360	
৩৬				
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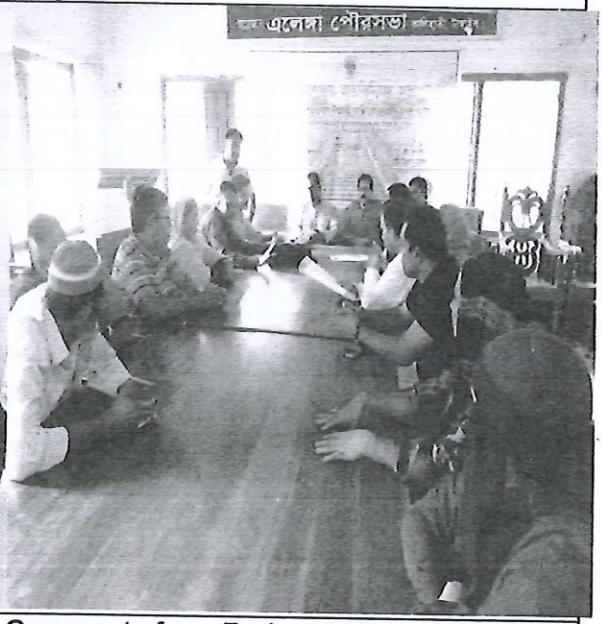
9. Photographs of Public Consultation PC -8

Introduction of the Project by ENRAC

Discussion on Technical Details of the Project

Discussion on Environmental Impact and Mitigations with Project Affected People



Comments from Project Affected People

Minutes of Public Consultation: Meeting – 9 (2nd Round)

1. *Meeting Location*: Mouchak Union Parishd, Kaliakoyir Upazila, Gazipur.
2. *Meeting Date & Time:* 20/06 /2019, 10:30 AM -12:30 PM
3. Project Name: Construction of double line between Joydebpur-Ishwardi sections of Bangladesh railway.
4. List of Names and Positions of Government Participants and Experts: **See attachment.**
5. Power- Point Presentation Given By: **Md. Rashed- Un- Nabi, Environmental Specialist, ENRAC**
6. Environmental Consultant's Presentation Content:
   - Brief Overview of the Project and objectives of the meeting
   - Project progress
   - Probable environmental issues of the Project (before, after and during construction period)
   - Environmental Management Plan – mitigative and monitoring measures
   - Project benefits and enhancements
   - Grievance redress mechanism Grievance Redress Mechanism (GRM)
7. *Comments of Participants*:

Sl.	Individual	Profession	Comments & Suggestions
1.	Labib Uddin	Ward Member	• He thanked the Consultants for the mitigative measures shared on the meeting. • The project will be beneficial for the local people • Vendara and Dhopjala level crossing need overpass as the place is accident prone. • New Railway station is needed in Ratanpur. • Local government and local leaders should be involved directly to motivate the mass people. • He expressed his optimism to the successful completion of the Project.
2.	Md Abdul Mazid	Service	• Proper fencing along the rail route to avoid accident as 3 km long rail route bounded by agricultural land • Proper tree plantation must be done on the slope of the embankment. • Road capacity must be increased to support rail line construction. We must not harm other resources to improve rail transport. • He asked that both side of the rail routes covered with agricultural land so is there any impact of construction on the agricultural land.
3.	Md Mofizul Islam Prince	Business man	• Enough culverts needed to maintain proper drainage system. • River dredging must be done carefully to protect the aquatic flora and fauna. • Regarding waste management take necessary step to keep the environment clean. • He mentioned that he road which will be harmed due to heavy vehicle movement during construction should be repaired after the construction is done.
4.	Mohammad Mahmudul Hasan	Doctor	• Ensure adequate drainage system to avoid water congestion • We have to protect the rivers and other water bodies. • To protect environment plant 5 tree instead of one tree which will be cut during construction • Take special measure near level crossing as many students

Sl.	Individual	Profession	Comments & Suggestions
			crossing the road
5	Salma Akter	Ward member	• Assurance of proper compensation for private land acquisition and resettlement • Many people are completely dependent on project site land. She requested to take care of the concern that their job and property is not hampered. • She requested to avoid agricultural land as some people is completely dependent on the land.
6.	Salam sikdar	Service	• How to control excessive noise and dust due to proposed project. • River dredging must be done carefully to protect the aquatic flora and fauna. • Construct side road along the rail route for human passing to avoid accident • He requested to keep the construction material away from the agricultural land.
7.	Abdul kuddus	Farmer	• He wanted to know the rules for paying the compensation that how many times compensation will be paid than the market price? • He said that the noise of train is very high. Is it possible to take any precaution for the railway noise protection? • He requested to calculate and provide adequate compensation for the people whose land will be acquired by the government.
8.	Kamrul HAsan	Student	• Fast construction is required to reduce miseries of the mass people during the Project implementation phase. • Water logging is biggest problem so adequate drainage need to construct • Give priority the local and poor people to get opportunities of work during construction
9.	Md Mizanur Rahman	Entrepreneur	• He asked how the agricultural land will be paid in terms of compensation for different crops. • He suggested to plant more tree after the construction is over. • Ensure proper compensation for private land acquisition.

Stakeholder Attendance (male/female) in the Public Consultations PC-09

Participants Attendance by Group	Mouchak union	
Gender	**M**	**F**
Pourashava Mayor /Union Chairman	6	2
Commissioner	0	0
UP personnel	2	2
Project Affected People (include both rural and urban)	0	0
Farmer	4	0
Businessman	6	0
Teacher	0	0
Doctor	1	0
NGO representative	0	0
Student	6	2
Local govemment official	0	0
Bangladesh Railway Representative	0	0
Others	6	2
Total	**39**	

8. Complete List of Attendees PC-09

পরিবেশগত মতবিনিময় সভা

প্রকল্পের নামঃ জয়দেবপুর থেকে ঈশ্বরদী পর্যন্ত ডুয়েল গেজ ডাবল লাইন নির্মান

উপস্থিতি তালিকা

সভার স্থানঃ সৌচাক ইউনিয়ন পরিষদ সভাকক্ষ তারিখঃ 20/06/2022

ইউনিয়নঃ সৌচাক উপজেলাঃ কালিয়াকৈর জেলাঃ গাজীপুর

ক্রমিক নং	অংশগ্রহণকারীর নাম	পেশা	মোবাইল নং	স্বাক্ষর
১	মাহিব চৌধুরী	ব্যবসা	01716043154	
২	মো: আব্দুল মতিন	চাকুরী	01712778453	
৩	[illegible]	ব্যবসা	01711287941	
৪	[illegible]	[illegible]	01739870161	
৫	মোঃ আরিফুজ্জামান	[illegible]	01716663316	
৬	আসমা	গৃহিণী	01713-695218	
৭	মো: নিক্কানির হোসেন	ব্যবসা	01923-993289	
৮	[illegible]		01479874748	
৯	[illegible]		01964021400	
১০	মোঃ জাহাঙ্গীর আলম		01924-456652	
১১	মোঃ শাহাদাত হোসেন		01711591216	
১২	মোঃ মোকলেছুর রহমান		01926-123383	
১৩	আলমগীর	কৃষি	01912654134	আলমগীর
১৪	মোঃ আমিরুল হক	কৃষি	01916810088	আমিরুল
১৫	মোসাঃ আম্বিকা			
১৬	আব্দুল কুদ্দুস	কৃষি	01992244770	
১৭	[illegible]	[illegible]		
১৮	মোঃ জাহাঙ্গীর [illegible]	[illegible]	0172-568302	
১৯	মোঃ মাহিবুল ইসলাম মিঠু	ব্যবসা	01914644217	
২০	[illegible]	চাকুরী	01741624942	
২১	[illegible]	চাকুরী	01911073492	
২২	মো: [illegible]	[illegible]	01748833257	
২৩	[illegible]	[illegible]	01737-223566	

ক্রমিক নং	অংশগ্রহণকারীর নাম	পেশা	মোবাইল নং	স্বাক্ষর
২৪	কারিমা আক্তার	ছাত্র	01863807406	কারিমা
২৫	মাহমুদা আক্তার মীম	ছাত্র	01710702125	মাহমুদা
২৬	মোঃ আব্দুল হাসান	ব্যবসা	01912675916	
২৭	শুভাশিস কিস্কু	কৃষি	01758935578	
২৮	মোঃ রুবেল আক্তার	চাকরী	01232-525223	
২৯	ইয়াকুব আলী	চাকুরী	01717346320	ইয়াকুব
৩০	মোঃ মাহমুদুর রহমান	শিক্ষক	01955660660	
৩১	তন্ময় বর্মন	চাকুরী	01818329045	তন্ময়
৩২	কামরুল হাসান	কৃষি	01751234592	কামরুল
৩৩	খাতির আলী	ব্যবসায়ী	01761243693	খাতির
৩৪	আমান	ছাত্র	01767039298	Aman
৩৫	আবির	ছাত্র	01710876391	Abir
৩৬	হাসান	ছাত্র	01675587712	হাসান
৩৭	ঋত্বিক মন্ডল	ব্যবসায়ী	01721434055	ঋত্বিক
৩৮	Md Rashedun Nabi	Env. Specialist	01717064108	
৩৯	Md. Mohiuddullah	Env Officer	01767916860	
৪০				
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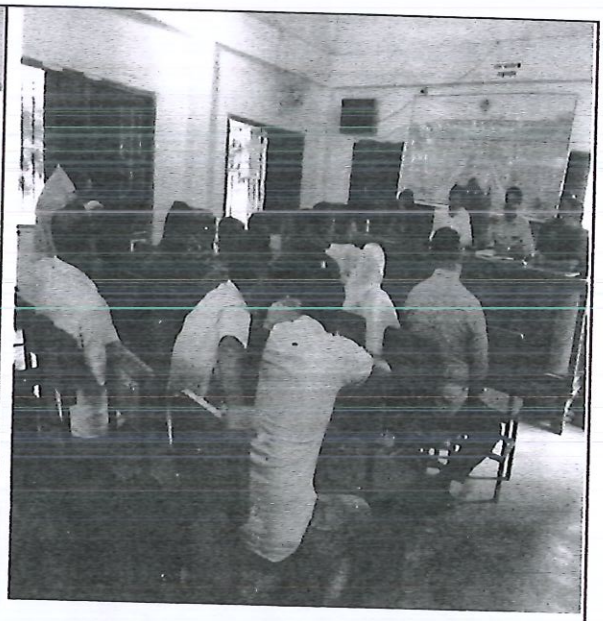
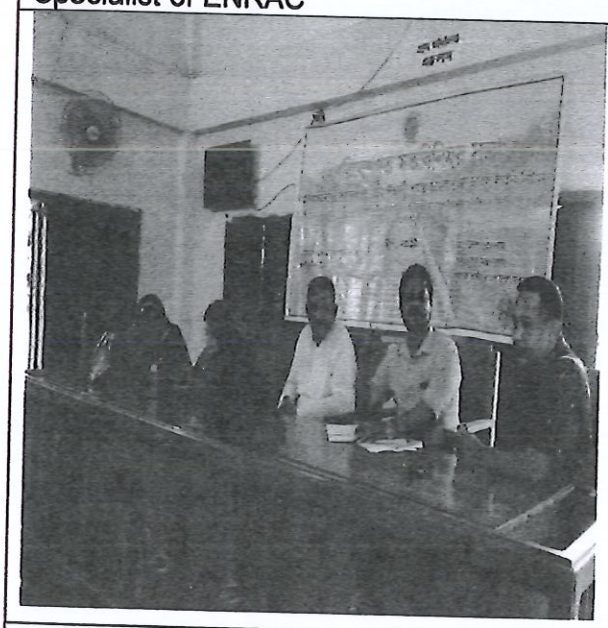
9. Photographs of Public Consultation PC-09

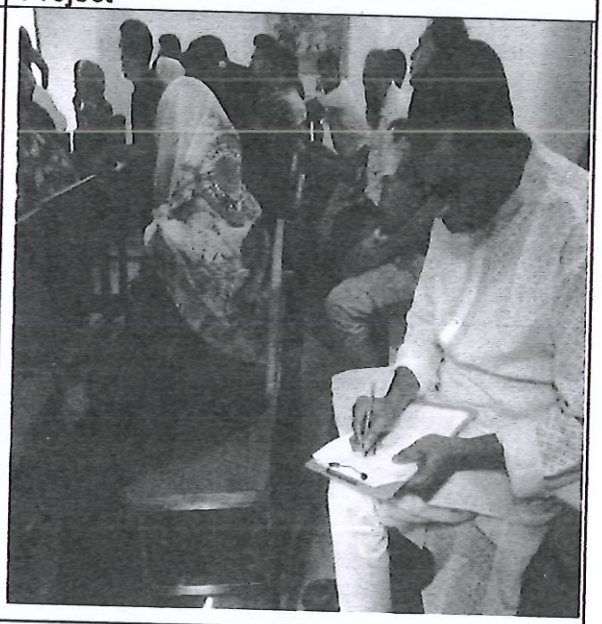
Introduction of the Project by Environmental Specialist of ENRAC



Discussion on Technical Details of the Project



Discussion on Environmental Impact and Mitigations with Project Affected People



Comments from Project Affected People

Annex 6: National Legal Instruments Related to the Project

Ordinance/Act/Rules	Responsible Agency/Ministry/Authority	Key Features/Potential Applicability
Environment Court Act, 2000 and subsequent amendments	Ministry of Environment and Forest, Department of Environment	Effective pursuance and completion of legal proceedings related to environmental crimes.
National Land Transport Policy, 2004	Ministry of Communication Railway Division, Bangladesh Railway	Encouraging greater private sector participation in the provision of services. Enhancing the operational capacity of railways. Obtaining a greater share of freight market. Pursuing management of railway assets more efficiently. Ensuring improved financial efficiency. Ensuring more effective provision of services for social needs. Fostering International railway links. Reducing involvement in non-rail activities. Ensuring improvement in railway safety. Ensuring improvement in institutional capacity of Bangladesh Railway.
The National Water Policy, 1999	Ministry of Water Resources and Bangladesh Water Development Board (BWDB)	Protection, restoration and enhancement of water resources; Protection of water quality, including strengthening regulations concerning agro-chemicals and industrial effluent; Sanitation and potable water; Fish and fisheries; and participation of local communities in all development activities in the water sector.
The Brick Burning (Control) Act, 1989 The Brick Burning (Control) Amendment Act, 1992 and 2001	Ministry of Environment and Forest; DoE	Control of brick burning requires a license from the MoEF for operation; Restricts brick burning with wood fuel.
The Removal of Wrecks and Obstructions in Inland Navigable Waterways Rules 1973	Bangladesh Inland Water Transport Authority (BIWTA)	Removal of wrecks and obstructions in inland navigable waterways.
The Ground Water Management Ordinance 1985	Upazila Parishad	Management of groundwater resources; Tube well shall not be installed in any place without the license granted by Upazila Parishad
The Forest Act, 1927 and subsequent amendments in 1982 and 1989	Ministry of Environment and Forest: Forest Department	Reserve Forests; Protected Forests; Village Forests
National Forest Policy, 1979 with amendment in 1994	Ministry of Environment and Forest; Forest Department	Afforestation of 20% land; Protection of bio-diversity of the existing degraded forests; Strengthening of agricultural sector; Control of Global warming, Desertification; Control of trade in wild birds and animals; Prevention illegal occupation of the forestlands, free felling and hunting of wild animals.

Ordinance/Act/Rules	Responsible Agency/Ministry/Authority	Key Features/Potential Applicability
The Private Forests Act, 1959	Forest Department; Regional Forest Officer.	Conservation of private forests; Afforestation on wastelands.
Bangladesh Wild Life (Preservation) Act, 1974	Ministry of Environment and Forest: Bangladesh Wildlife Advisory Board	Preservation of wildlife sanctuaries, parks and reserves.
National Biodiversity Strategy and Action Plan (2004)	Ministry of Environment and Forest; Bangladesh Wildlife Advisory Board	Conservation and restoration of the biodiversity of the country for well-being of the present and future generations; Maintaining and improving environmental stability of ecosystems; Ensuring preservation of the unique biological heritage of the nation for the benefit of the present and future generations; Guaranteeing safe passage and conservation of globally endangered migratory species, especially, birds and mammals in the country; Stopping introduction of invasive alien species, genetically modified organisms.
The Protection and Conservation of Fish Act, 1950 and subsequent amendments in 1982	Ministry of Fisheries and Livestock; Department of Fisheries	Protection and conservation of fishes in Government-owned water bodies.
National Fisheries Policy, 1998	Ministry of Fisheries and Livestock Department of Fisheries	Preservation, management and exploitation of fisheries resources in inland open water systems; Fish cultivation and management in inland closed water systems; Prawn and fish cultivation in coastal areas; Preservation, management and exploitation of sea fishery resources.
The Embankment and Drainage Act, 1952	Ministry of Water Resources Bangladesh Water Development Board (BWDB)	Consolidating the laws relating to embankment and drainage; Making better provision for construction, maintenance, Management, removal and control of embankments and water courses for better drainage of lands and protection from floods, erosion and other damage by water.
Antiquities Act, 1968	Ministry of Cultural Affairs	Preserving national cultural heritage; Protecting and controlling ancient monuments and any activity that might harm these sites.
The Acquisition and Requisition of Immovable Property Ordinance, 1982 (1994, 1995 and 2004)	Ministry of Land	Current GoB Act and guidelines relating to acquisition and requisition of land.
National Land use Policy, 2001	Ministry of Land	The policy outlines land uses and constraints for several purposes including agriculture (crop production, fishery and livestock), housing, forestry, industrialization, railways and roads, tea and rubber.
National Agriculture Policy, 1999	Ministry of Agriculture	The policy for national self-sufficient in food through increasing production of all crops, including cereals, and toward ensuring dependable food security system for all.

Annex 7: Tree Plantation and Replacement Programme

The objective of the tree plantation and replacement programme is to compensate for the loss of trees due to the proposed implementation of the Joydebpur-Ishurdi double line railway Project. Other major objectives of the programme are to protect the affected cultural/sensitive areas (within 50 m from the RoW boundary) and to enhance the health of the existing ecosystem.

About 173,153 timber trees, 96,867 fruit trees, 3,413 medicinal trees, 9,277 banana trees, 1,694 papaya trees and 50,748 bamboo trees of different sizes will be cut due to the implementation of Project at pre-construction and construction periods. An estimated 335,000 trees will be removed from the study area. The proposed Tree Plantation and Replacement Programme (TPRP) suggests to plant three times of the actual fallen trees. These trees are calculated on both side of the proposed new alignment, proposed station building areas, and new station access road areas (associated facilities). A total of 1,005,000 trees will be planted at post construction stage of the Project.

The following areas have been identified for development of plantation sites in the Project areas:

- Both side slopes of the constructed new railway embankment;
- Back side of the constructed new stations; and
- Along the affected cultural/sensitive areas (within 50 m from the RoW boundary).

1. Selection of Tree Species

The species for the proposed tree replacement have been selected based on the statistics of the lost vegetation and suitability for the intended purpose. This was done in consultation with retired railway officers of Bangladesh Railway, senior ecologist of and local communities. The main consideration for selection of species is to protect the railway embankment from erosion and habitat for biotic species, minimise visual impacts, improved aesthetics and ecological conservation as well as commercial benefits. Accordingly, the list of tree species proposed to be planted is as follows:

On the slope of Railway Embankment:

- Timber Trees: Garjan (Dipterocarpus turbinatus), Shal (Shorea robusta), Shilkoroi (Albzia procera), Akasmoni (Acacia auricoliformis), Kat badam (Terminalia calappa), and mehogani (Swietenia mahagoni);
- Fruit Trees: Date Tree (Phoenix sylvestris) and Date Palm;
- Medicinal Trees: Neem (Azarlira chlaindica) and Bohera (Terminalia belliricha), Horitoki, and Amloki; and
- Fuel Trees: Epil-epil (Leucaena leucocephala), Rain tree (Samania saman) and Koroi.

The list of tree species proposed for the plantation on the back side of railway station and along the affected cultural/sensitive areas are as follows:

- Timber Trees: Arjun (Terminalia arjuna), Garjan (Dipterocarpus turbinatus), Shal (Shorea robusta), Shilkoroi (Albzia procera), Akasmoni (Acacia auricoliformis), Kat badam (Terminalia calappa), mehogani (Swietenia mahagoni), Epil–epil (Leucaena leucocephala) and Rain tree (Samania saman);
- Fruit Trees: Date palm (Phonix syslvestries), Olive (Elaeocarpus floribundus), Palm tree (Borossus flabelliformis);

- Medicine Trees: Neem (Azarlira chlaindica), Arjun (Teominalia arjunna), Bel (Aegle marmelos) and Bohera (Terminalia belliricha);
- Fuel Wood Trees: Koromcha, Radhachura and Krishnochura (Delonix regia); and
- Guidelines of Tree Replacement.

According to the prevailing practice in Bangladesh, Forest Department generally recommends to plant minimum 2 trees for each tree felled for any development Project. However, in consultation with BR, Consultant recommends to plant 3 saplings for each tree felled in order to implement Project. Total available space for the tree replacement on the side slopes of railway embankment and stations and cultural/sensitive areas is approximately 87 km, which is 50% of total length of 174 km alignment.

Under the proposed tree replacement programme:

- timber tree species will cover 50% of the total area;
- fruit tree species will cover 30% of the total area;
- medicine tree species will cover 10% of the total area; and
- fuel tree species will cover the rest 10% of the total area.

The estimated land area under each category of trees and the number of trees are given in **Table A7.1.**

Table A7.1: Estimated Land Area and Quantities of Trees to be Planted

Name of the Tree	Distance between Tree	Total Number of Tree
On the Slope of Railway Embankment – 75%		
Timber (50%)	2.0	376,875
Fruit (30%)	2.0	226,125
Medicine (10%)	2.0	75,375
Fuel (10%)	2.0	75,375
Sub-Total		**753,750**
Along the Stations and Affected Cultural/Sensitive Areas – 25%		
Timber (50%)	2.0	125,625
Fruit (30%)	2.0	75,375
Medicine (10%)	2.0	25,125
Fuel (10%)	2.0	25,125
Sub-Total		**251,250**

All saplings will be planted at least 2 m away from the new railway track with minimum distance between saplings is 2 m.

2. Implementation Agreement

The Forest Department (FD) is generally responsible for plantation of all government owned sites. It is a common practice in Bangladesh that the Forest Department performs the task by themselves. However, the FD will be encouraged to involve BR, PAPs, especially vulnerable poor and women, in the plant replacement programme. The Forest Department will provide all technical and other supports in planning and developing the plantations. However, the implementation arrangement for the Project is unique than any other tree replacement programme in country that was agreed in consultation with DOE, BR and Consultant. It was decided that BR will be responsible

for the successful implementation of tree plantation and replacement programme without involving PAPs and FD.

The tasks of the BR are as follows:

- Training of the local BR staff on tree maintenance;
- Preparation of the tree replacement programmes in accordance with this plan and get them approved by the Forest Department if necessary;
- Coordination of sapling procurement process of approved species prescribed above; and
- Supervision of nurseries for raising saplings.

3. Responsibility

It was decided that the Contractor will be responsible for tree plantation throughout the alignment and other areas as prescribed above. The Contractor will be responsible to procure and raise saplings until they survive. They can set up nurseries in consultation with BR and Engineer at the early stage of the Project. Alternatively, the Contractor can purchase saplings from the local nursery.

The Environmental Officer of BR/Engineer will be responsible for overall coordination with the FD, PAPs, and destitute women (if necessary), and supervision of the programme. It is recommended that BR should start dialogue with the Forest Department if required for the tree replacement programme in the pre-construction stage, so that setting up of nurseries can be done in the early stages of the Project.

4. Budget and Payment Method

The budget for the proposed tree replacement programme is provided in Table A7.
2. The budget also includes maintenance for first two years from the date of plantation to ensure that all planted saplings will survive and provision for an additional plantation. The plantation on the slopes of railway embankment, in the stations and along the affected cultural/sensitive areas will be taken up after completion of construction work. The budget also includes procurement and development of all facilities required to establish a nursery such as, collection of suitable soils, decomposing cow dung, procurement of fertilizers, etc. The budget also includes measure required for maintenance of plantation, such as watering, weeding, fertiliser application, replacing of dead saplings (if any) etc., for first two years. Total estimated budget for tree replacement is USD 2,170,750.

Table A7.2: Cost Estimates for the Tree Replacement Plan

Tree Replacement Area	Unit	Rate (USD)	Quantity	Amount (USD)
Slope of the embankment	No.	2.15	753,750	1,620,562.50
Stations area and Cultural/sensitive areas	No.	2.15	251,250	540,187
Misc.	LS			10,000
			Total	**2,170,750**

Contractor will be paid for the tree replacement programme after survival of each sapling at a rate mentioned in **Table 2**.

Annex 8: Request Letter to Local Government for Arrangement of Public Consultation Meeting

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GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
OFFICE OF THE GENERAL MANAGER/PROJECT DIRECTOR
TA FOR SUB-REGIONAL RAIL TRANSPORT PROJECT PREPARATORY FACILITY
REGIONAL COOPERATION AND INTEGRATION: RAIL COMPNENT
BANGLADESH RAILWAY, RAIL BHABAN
16 ABDUL GANI ROAD, DHAKA, BANGLADESH

No. PD/RCI Project/Joydebpur-Ishurdi/13(Part-1) –288 Dated: 22 April 2014

Upazila Nirbahi Officer (UNO)
Ullahpara Upazila
Sirajganj

Subject: Public Consultation Meeting

We are pleased to inform you that CANARAIL Consultants Inc. (CANARAIL), Canada, in Joint Venture with DB International GmbH (DBI), Germany, SMEC International Pty Ltd (SMEC), Australia, ACE Consultants Ltd. (ACE), Bangladesh (hereinafter called the Consultant), has been awarded Consultancy Services for "Feasibility Study and Detailed Design for Regional Cooperation and Integration Project: Rail Component" against Sub-regional Rail Transport Project Preparatory Study of the Construction of Double Line between Joydebpur to Ishurdi."

The Consultant needs to hold public consultation meetings at different locations of the study area. Stakeholders comprising project-affected persons (PAPs), local NGOs, related professional and expert groups, local administration, local government bodies, local leaders, women's groups, representatives of professional groups and other stakeholders like farmers, businessmen, doctors, teachers, students etc. need to be present in the consultation.

The Consultant has prepared a program for consultation meeting at DurganagarUnion Complexunder your Upazila on 6 May 2014.For the successful organization of this public consultation, we request your cooperation in all respects as necessary.

Mr. Mohibbur Rahman, Environment Specialist has been authorised for this purpose on behalf of the Consultant. Your cooperation will be highly appreciated.

Yours faithfully

22.4.14

S.K. Chakraborty
General Manager/Project Director
Regional Cooperation and Integration Project- Rail Component
Bangladesh Railway

Copy: 1) Deputy Commissioner, Serajganjfor information.
2) Jerome Fernandez, Team Leader, RCIP-Rail Component.

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Mohibur Rahman

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
OFFICE OF THE GENERAL MANAGER/PROJECT DIRECTOR
TA FOR SUB-REGIONAL RAIL TRANSPORT PROJECT PREPARATORY FACILITY
REGIONAL COOPERATION AND INTEGRATION: RAIL COMPNENT
BANGLADESH RAILWAY, RAIL BHABAN
16 ABDUL GANI ROAD, DHAKA, BANGLADESH

No PD/RCI Project/Joydebpur-Ishurdi/13(Part-1)– 288 Dated: 22 April 2014

Upazila Nirbahi Officer (UNO)
Ishurdi Upazila
Pabna

Subject: Public Consultation Meeting

We are pleased to inform you that CANARAIL Consultants Inc. (CANARAIL), Canada, in Joint Venture with DB International GmbH (DBI), Germany, SMEC International Pty Ltd (SMEC), Australia, ACE Consultants Ltd. (ACE), Bangladesh (hereinafter called the Consultant), has been awarded Consultancy Services for "Feasibility Study and Detailed Design for Regional Cooperation and Integration Project: Rail Component" against Sub-regional Rail Transport Project Preparatory Study of the Construction of Double Line between Joydebpur to Ishurdi."

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The Consultant has prepared a program for consultation meeting at IshurdiPaurashavaunder your Upazilaon 6 May 2014. For the successful organization of this public consultation, we request your cooperation in all respects as necessary.

Mr. Mohibbur Rahman, Environment Specialist has been authorised for this purpose on behalf of the Consultant. Your cooperation will be highly appreciated.

Yours faithfully

22.4.14

S.K. Chakraborty
General Manager/Project Director
Regional Cooperation and Integration Project- Rail Component
Bangladesh Railway

Copy: 1) Deputy Commissioner, Pabna for information.
2) Jerome Fernandez, Team Leader, RCIP-Rail Component.

(716)

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
OFFICE OF THE GENERAL MANAGER/PROJECT DIRECTOR
TA FOR SUB-REGIONAL RAIL TRANSPORT PROJECT PREPARATORY FACILITY
REGIONAL COOPERATION AND INTEGRATION: RAIL COMPNENT
BANGLADESH RAILWAY, RAIL BHABAN
16 ABDUL GANI ROAD, DHAKA, BANGLADESH

No. PD/RCI Project/Parallel Bangabandhu Bridge/2012 - 291 Dated: 22 April 2014

Upazila Nirbahi Officer (UNO)
Sirajganj Sadar Upazila
Sirajganj

Subject: Environmental Management Plan (EMP) Disclosure Meeting regarding Construction of Railway Bridge Parallel to Existing Bangabandhu Bridge with Provision of Dual Gauge Double Track over the Jamuna River.

Thank you for supporting us in organizing the environmental public consultation meeting at Saydabad Union Complex, Sirajganj Sadar Upazila (our letter ref. no PD/RCI Project/10 (Part-2)-40, dated on 28 April 2013).

During the consultations, local stakeholders provided valuable comments and suggestions on environment and safety issues and the Consultant prepared an Environmental Management Plan accordingly. In this connection the Consultant needs to organize public consultation meeting on Environmental Management Plan (EMP) disclosure at Saydabad Union Complex under Sirajganj Sadar Upazila to disseminate the implementation of their comments and suggestions provided to us in the consultation meeting. Therefore, the Consultant would appreciate your assistance to organize EMP disclosure meeting at Saydabad Union Complex, under your Upazila on 21 May 2014.

For the successful organization of this public consultation, we request your kind cooperation in all respects as necessary. The chairman, Saydabad Union may kindly be requested to cooperate with the Consultant toward making the meeting a success.

Mr. Mehedi Hasan, Environmental Specialist has been authorised for this purpose on behalf of the Consultant. Your cooperation will be highly appreciated.

Yours faithfully

22.4.14

S.K. Chakraborty
General Manager/Project Director
Regional Cooperation and Integration Project-Rail Component
Bangladesh Railway.

716 29/9/19 02.3.21
TL. DTL. Mehedi Hasan ✓ DM Sirajganj ✓

Copy: 1) Deputy Commissioner, Sirajganj for information.
2) Jerome Fernandez, Team Leader, RCIP-Rail Component.

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GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
OFFICE OF THE GENERAL MANAGER/PROJECT DIRECTOR
TA FOR SUB-REGIONAL RAIL TRANSPORT PROJECT PREPARATORY FACILITY
REGIONAL COOPERATION AND INTEGRATION: RAIL COMPNENT
BANGLADESH RAILWAY, RAIL BHABAN
16 ABDUL GANI ROAD, DHAKA, BANGLADESH

No.PD/RCI Project/Joydebpur-Ishurdi/13(Part-1) -290 Dated: 22 April 2014

Upazila Nirbahi Officer (UNO)
Bhuapur Upazila
Tangail

Subject: Environmental Management Plan (EMP) Disclosure Meeting regarding Construction of Railway Bridge Parallel to Existing Bangabandhu Bridge with Provision of Dual Gauge Double Track over the Jamuna River.

Thank you for supporting us in organizing the environmental public consultation meeting at Char Pathailkandi, Bhuapur (our letter ref. no PD/RCI Project/10 (Part-2)-41, dated on 28 April 2013).

During the consultations, local stakeholders provided valuable comments and suggestions on environment and safety issues and the Consultant prepared an Environmental Management Plan accordingly. In this connection the Consultant needs to organize public consultation meeting on Environmental Management Plan (EMP) disclosure at Char Pathailkandi to disseminate the implementation of their comments and suggestions provided to us in the consultation meeting. Therefore, the Consultant would appreciate your assistance to organize EMP disclosure meeting at Char Pathailkandi under your Upazila on 21 May 2014.

For the successful organization of this public consultation, we request your kind cooperation in all respects as necessary. The chairman, Bhuapur Upazila may kindly be requested to cooperate with the Consultant toward making the meeting a success.

Mr. Mehedi Hasan, Environmental Specialist has been authorised for this purpose on behalf of the Consultant. Your cooperation will be highly appreciated.

Yours faithfully

S.K. Chakrabortty
General Manager/Project Director
Regional Cooperation and Integration Project-Rail Component
Bangladesh Railway.

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24/9/14

Copy: 1) Deputy Commissioner, Tangail for information.
2) Jerome Fernandez, Team Leader, RCIP-Rail Component.

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
OFFICE OF THE GENERAL MANAGER/PROJECT DIRECTOR
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BANGLADESH RAILWAY, RAIL BHABAN
16 ABDUL GANI ROAD, DHAKA, BANGLADESH

No. PD/RCI Project/Joydebpur-Ishurdi/13(Part-1) - 288 Dated: 22 April 2014

Upazila Nirbahi Officer (UNO)
GazipurSadar Upazila
Gazipur

Subject: Public Consultation Meeting

We are pleased to inform you that CANARAIL Consultants Inc. (CANARAIL), Canada, in Joint Venture with DB International GmbH (DBI), Germany, SMEC International Pty Ltd (SMEC), Australia, ACE Consultants Ltd. (ACE), Bangladesh (hereinafter called the Consultant), has been awarded Consultancy Services for "Feasibility Study and Detailed Design for Regional Cooperation and Integration Project: Rail Component" against Sub-regional Rail Transport Project Preparatory Study of the Construction of Double Line between Joydebpur to Ishurdi."

The Consultant needs to hold public consultation meetings at different locations of the study area. Stakeholders comprising project-affected persons (PAPs), local NGOs, related professional and expert groups, local administration, local government bodies, local leaders, women's groups, representatives of professional groups and other stakeholders like farmers, businessmen, doctors, teachers, students etc.need to be present in the consultation.

The Consultant has prepared aprogram for consultation meetingatGazipurPaurashavaunder your Upazilaon 5 May 2014. For the successful organization of this public consultation, we request your cooperation in all respects as necessary.

Mr. Mohibbur Rahman, Environment Specialist has been authorised for this purpose on behalf of the Consultant. Your cooperation will be highly appreciated.

Yours faithfully

22.4.14

S.K. Chakraborty
General Manager/Project Director
Regional Cooperation and Integration Project- Rail Component
Bangladesh Railway

Copy: 1) DeputyCommissioner, Gazipurfor information.
2) Jerome Fernandez, Team Leader, RCIP-Rail Component.

Annex 9: Compliance Monitoring Checklist Template

Project Period and Environmental Parameters	Project Impact	Mitigation Measures	D: Details of Monitoring Action to be Undertaken	What Work was Undertaken/ and Where	Specific Date(s) Matching "D"	Who Undertook the Work
2.0 CONSTRUCTION PERIOD						
2.1 The Environmental Management Implementation Work Schedule (EMWS)	Contractor does not prepare a work plan defining details on when mitigation and monitoring actions are to take place, and consequently the EMP requirements may not be fully implemented.	The Engineer will assist contractor prepare the EMWS before the commencement of construction works and monitor compliance with the schedule during construction.	Confirm that a EMWS has been prepared			
2.2 Air Quality and Dust	The ambient levels of COx, NOx, SOx, $PM_{2.5}$, and PM_{10} may increase at busy stations and construction areas leading to temporary localised air pollution.	A dust suppression programme will be used at all times during construction of stations, embankment, and placement of ballast. Dust suppression will include watering on active construction areas installing dust suppression equipment on batch plants, restricting vehicle speeds to ≤35 km/h., and rapid re-vegetation including grass seeding. Ambient air quality monitoring for SO_2, NO_2 and $PM_{2.5}$, PM_{10} at busy stations and construction sites will be conducted quarterly, throughout the construction period at sensitive receptors, and immediate remedial actions taken.	Throughout the construction period: During dry season check for dust and undertake air quality testing for CO, SO_2, NO_2, PM 2.5, and PM 10 at major bridge and station construction sites.			
2.3 Topography, Landscape and Soils						
2.3.1 Erosion	Clearing topsoil can lead to increased erosion and dust from unprotected sites. Erosion risk is greatest at embankment slopes and gully erosion during the rainy	Topsoil storage areas must be protected during the dry season from wind erosion by covering. Rapid re-vegetation and use of hydro-seeding and jute erosion protection mats	Visual inspection			

Project Period and Environmental Parameters	Project Impact	Mitigation Measures	D: Details of Monitoring Action to be Undertaken	What Work was Undertaken/ and Where	Specific Date(s) Matching "D"	Who Undertook the Work
	season may damage field crops in adjacent areas.	will be applied in areas where erosion is noted during the regular monthly inspections				
2.3.2 Topography and Landscape changes	Visual intrusion due to construction activities, including exposed areas and soil and ballast stockpiles.	Rehabilitation will commence as soon as possible after construction, which will include removal of stockpiles and other construction materials, establishment of fast growing grasses such as Vetiver/Napitar, tree planting and promoting natural vegetation.	Inspection/consultation with adjacent households and railway authority.			
2.4 Water Resources						
2.4.1 Hydrology and Surface Water Quality	Earthwork activities during embankment construction may result in changes to current drainage patterns. Water bodies and receiving waters near workers' camps and Project site areas may become polluted due to faecal, organic and other contamination.	Ensure all earthworks are constructed according to design and specifications. Wastes, effluents and other contaminant materials to be appropriately stored, handled, and transported. A quarterly surface water quality testing programme will be undertaken during the construction period.	Site inspection Inspect the culvert/bridges just after heavy rainfall during monsoon and find the causes of drainage congestion if any. Monitoring of pH, Turbidity, Temperature, DO, BOD5, COD, TSS, TDS, oil and grease			
2.4.2 Groundwater	The potential exists for drinking water sources to be contaminated by the seepage of wastes from workers' camps through the soil profile into the GW aquifer (particularly if wells access the shallow aquifer).	Workforce camps will be located away from water resources. All practical measures such as provision of septic tanks, garbage bags, and other sanitation facilities will be implemented at the construction camps to prevent wastewater and solid wastes from	Throughout the alignment, especially where the pile drilling to 30 m depth is conducted, and where any new wells are dug. At new well sites test for pH, TP, Mn, Fe, As, Oil and Grease			

Project Period and Environmental Parameters	Project Impact	Mitigation Measures	D: Details of Monitoring Action to be Undertaken	What Work was Undertaken/ and Where	Specific Date(s) Matching "D"	Who Undertook the Work
		entering wells and groundwater. Wells used for drinking will be regularly tested to ensure portability.	and E. Coli, when use begins and 6 months later, replicate sample.			
2.5 Waste Management						
2.5.1 Waste Management	Construction camp wastes are often poorly managed and can lead to chronic pollution of surface and groundwater.	Contain all solid wastes at designated locations within construction sites. Service machinery and vehicles at designated maintenance workshops where waste oils and lubricants can be collected and recycled. The monthly monitoring report will provide compliance update.	Undertake good housekeeping practices regularly and in a timely manner			
2.5.2 Station Demolition Waste Materials	Two stations will need to be demolished and reconstructed and other stations will be upgraded as required. This will result in waste requiring management and disposal.	Waste materials will be recycled/reused where possible and sold if remaining waste cannot use. A record of waste types and quantities will be maintained.	Conduct monitoring check is station demolition operation and complete monitoring checklist			
2.6 Noise	Construction noise will result from plant and equipment operations, pile driving, power generators, rock crushing, batch plants and movement of construction vehicles, as well as the constant movement of trains along the existing line.	Controls will be put in place to maintain noise levels at ≤60 dB (Bangladesh standard) at sensitive receptors such as mosques, schools, populated areas. Controls will include erection of temporary baffle walls, changing work schedules, installing noise mitigation controls on noisy plant and equipment, and properly maintaining plant and equipment.	Sample Sensitive sites within 20 m of rail RoW in the vicinity of the sensitive receptors. Take noise readings at sensitive receptors 2X/day during full work activities, 2X/month			

Project Period and Environmental Parameters	Project Impact	Mitigation Measures	D: Details of Monitoring Action to be Undertaken	What Work was Undertaken/ and Where	Specific Date(s) Matching "D"	Who Undertook the Work
2.7 Terrestrial and Aquatic Flora and Fauna	Most of the required vegetation clearing will be undertaken during pre-construction activities (see 1.1) During construction there may be potential impacts on adjoining flora and fauna due to poorly managed access to construction areas, dust generated by construction activities, surface water runoff containing elevated sediment and pollutants, and poorly controlled waste management. The proposal will require widening the existing railway embankment through approximately 32 km of the Chalan Beel from Ullahpara to Chatmohor of these approximately 13 kilometres from Chatmohar to Dipasher will require river training works to protect bank stability due to monsoonal wave action. The area of Chalan Beel directly impacted by the proposal will be approximately 64 hectares. The section of Chalan Beel affected by the proposal is water logged during the monsoon season, however during the dry season it is used for agricultural activities. The proposal will not significantly change current drainage, which is controlled by culverts under the existing railway.	During construction measures will be implemented to protect surrounding terrestrial and aquatic flora and fauna. This will include protecting sensitive areas from unnecessary access, minimising sediment and waste discharges and ongoing monitoring of the surrounding area. Details are provided in the EMP (Annex 4).	As part of the monthly site inspection, examine embankments, new stations, subgrade storage areas, to confirm these facilities are not contributing to environmental degradation			
2.8 Land use, Population and Culture						

Project Period and Environmental Parameters	Project Impact	Mitigation Measures	D: Details of Monitoring Action to be Undertaken	What Work was Undertaken/ and Where	Specific Date(s) Matching "D"	Who Undertook the Work
2.8.1 Land Use	The most significant potential impacts on land use in the project area will be the removal out of production of approximately 30 ha of agricultural land (primarily rice paddy) for the construction of the proposed rail embankment, station access roads and associated facilities.	Land acquisition/requisition will be in accordance with the laws of Bangladesh and as defined in the Project LAP and RP, which specifies a grievance mechanism and timetable for implementation.	Inspection of land acquisition paperwork and compensation being completed in a timely fashion, and confirm this with PAPs			
2.9 Heritage and Culture	CPRs potentially affected by the proposal will be relocated prior to construction (see 1.4). However they may be impacts associated with discovery of additional PCRs and CPRs during construction.	BR has defined a plan to prevent undue damage to these sites and the Contractor must follow this plan closely (see Item 1.4 above)	Discuss actions taken with local officials and get agreement that this is appropriate. For other sites visit each to establish that appropriate actions are being taken or planned			
2.10 Health, Safety and Contractor Camp						
2.10.1 Health and vector borne diseases	Personal and occupational health issues stemming from unsanitary toilet facilities, lack of potable water and sanitary washing areas can lead to common disease outbreaks in work camps. Construction work also creates areas for water to form stagnant puddles, which are ideal breeding areas for malaria and dengue mosquitoes.	Undertake regular checks and cleaning at all work areas and ensure clean conditions. Provision of safe potable water, sanitary toilet facilities and hygienic accommodation for workers at camp sites. Provision of First-Aid facilities for workers. Ensure that these facilities are cleaned and disinfected regularly. Inspect for stagnant water and puddles every 3-days, including stored construction materials such as tires and old oil drums-empty to prevent water	Undertake checks at all sites and instruct contractors to take immediate action if non-compliance identified			

Project Period and Environmental Parameters	Project Impact	Mitigation Measures	D: Details of Monitoring Action to be Undertaken	What Work was Undertaken/ and Where	Specific Date(s) Matching "D"	Who Undertook the Work
		ponding.				
2.10.2 Worksite safety management	Poor safety and management of worksites by the Contractor can lead to accidents and unsafe working conditions.	Construct fences to separate construction sites at rail stations from public access, and manage train movements collaborating with BR dispatch staff. Contractors must at all times insure that people can move effectively and without undue delay.	Undertake checks at all sites and instruct contractors to take immediate action if non-compliance identified			
2.10.3 HIV awareness	Due to influx of workers in the Project area, AIDS/HIV may spread in the local community	A worker health training programme will be implemented during the construction period. Training will be provided by a health specialist.	Verify training records			
2.11 Occupational Health and Safety						
2.11.1 Personal Safety Equipment (PSE)	Contractor does not provide adequate PSE or properly enforce its use, leading to accidents.	Workers will be provided with appropriate personal protection equipment, such as safety boots, helmets, gloves, protective clothing, goggles and ear protection. The Contractor will enforce its use.	As part of monthly inspection review all OHS requirement looking for poor enforcement as well distribution of proper safety equipment			
2.11.2 Disease	See 2.10.1 above					
2.11.3 Safety Training	Lack of safety training by contractor can lead to accidents and lost productivity.	Construction workers will be trained in general health and safety matters and on specific hazards of their work.	Verify training records			
2.11.4 Labour Standards	Labour standards ignored or not complied with leading to infractions of basic labour standards as defined by ILO conventions as	*Hire, use of benefit from child labour-* Child labour (as defined by ILO Conventions 138 and 182) means that no workers under the age of 14 may be	Undertake checks at all sites and instruct contractors to take immediate action if non-			

Project Period and Environmental Parameters	Project Impact	Mitigation Measures	D: Details of Monitoring Action to be Undertaken	What Work was Undertaken/ and Where	Specific Date(s) Matching "D"	Who Undertook the Work
	listed in Item 1.8 above.	hired as general labours, and no workers under the age of 17 are to be hired for hazardous jobs such work on scaffolding, on structures elevated above the ground, etc. *Bonded labour*-All forms of bonded labour and forced labour, as defined by ILO Conventions 29 and 105 will not be permitted. Forced labour, including prison or debt bondage labour; lending of money (debt slavery) or withholding of remuneration or identity papers by employers or outside recruiters, will be not be permitted on any work sites. *Equal treatment, equal opportunity*-BR expects the contractors to hire workers on the basis of skill and ability to work. There must be equal treatment and equal opportunity (ILO Conventions 100 and 111, and ILO Code of Practice for HIV/AIDS 85) for all who seek employment. No discrimination based on race, caste, origin, religion, disability, gender, sexual orientation, union or political affiliation, or age; no sexual harassment Minimum wage-BR expects the contractor to pay all labourers and employees according to minimum wage standards as defined in Public Works Department.	compliance identified			
2.12 Construction Period	Inspection of sites to be	Undertake detailed inspections of	Verify inspection			

Project Period and Environmental Parameters	Project Impact	Mitigation Measures	D: Details of Monitoring Action to be Undertaken	What Work was Undertaken/ and Where	Specific Date(s) Matching "D"	Who Undertook the Work
Decommissioning	decommissioned by contractor, are: • work camps; fuels storage areas; • waste dump sites; construct access roads If not undertaken this would lead to chronic environmental problems due to lack of proper clean-up.	construction areas after decommissioning to verify compliance with environmental standards.	records/reports			
2.13 Environmental Monitoring and Completion Reporting	Contractor fails to prepare a summary report defining the mitigation and monitoring actions completed and what needs to be continued during the Operating period. The result is a failed or weakened environmental safeguards programme.	Prepare a completion report and deliver to the Engineer.	Verify monitoring and completion reports			

Annex 10: Construction Programme of Double Line between Joydebpur-Ishurdi Section

Time-bound Action Plan for "Construction of Dual Gauge Double Line Between Joydebpur- Ishurdi Section of Bangladesh Railway ".

Sl. No.	Description of Activities	2018	2019	2020	2021	2022	2023	2024	2025
1	DPP Approval								
2	Tender approval of WD1								
3	Signing of Commercial Contract								
4	Submission of Loan application								
5	Environmental clearance								
7	CSC services								
8	Firm for LA services								
9	Land Acquisition								
10	Signing of Loan Agreement								
11	Commencement of Contractor								
12	Construction Works								
13	Defect Notification period								
14	Final Measurement								
15	Final payment to Contractor and Consultant								
16	Completion of the Project								

Annex 11: List of Community Property Resources by Category within the Study Area between Joydebpur-Ishurdi Section

Sl. No.	Name of CPRs	Chainage	Village	Union	Upazila	District
1	Mosque	106+325-35	Salina	Tangail Sadar	Gala	Tangail
2	Lalone Academy	11+170	Mooladuli	Ishurdi	Mooladuli	Pabna
3	Mooladuli Co-operative society	11+310	Mooladuli	Ishurdi	Mooladuli	Pabna
4	Sonalia Mosque	117+800/90	Sonalia	Basail	Habla	Tangail
5	Graveyard	118+00/100	Sonalia	Basail	Habla	Tangail
6	Somobay Somiti	125+550-50	Gabra	Mirzapur	Mohera	Tangail
7	Mosque	128+350-40	Karail	Mirzapur	Jamurki	Tangail
8	Eid Gah Field	128+500-55	Karail	Mirzapur	Jamurki	Tangail
9	Karail Primary School	129+600/65	Karail	Mirzapur	Jamurki	Tangail
10	Musuriaghona Primary School	133+200-25	Musuriaghona	Mirzapur	Fatehpur	Tangail
11	Mosque	135+800-85	Pusto Kamuri	Mirzapur	Mirzapur	Tangail
12	Mosque	137+700-75	Bhaora Kumarjani	Mirzapur	Mirzapur	Tangail
13	Mosque	152+250	Panch Lakshmi	Kaliakair	Mouchat	Gazipur
14	Mosque	172+800	Saha Para	Gazipur Sadar	Ward -28	Gazipur
15	Kendriyo Shohid Minar	35+900	North Menda	Bhangura	Bhangura	Pabna
16	Bus Stand Jame Mosjid	36+100	Bus Stand	Bhangura	Bhangura	Pabna
17	Tarnga Sangskrit Natto Goste	36+200	Bhangura Boral Bridge	Bhangura	Bhangura	Pabna
18	Boral Bridge Jame Mosjid	36+200	Boral Bridge Bazar	Bhangura	Bhangura	Pabna
19	KG School	37+500	Upazila Bhangura	Bhangura	Bhangura	Pabna
20	Mosque	43+500	Dil Pasar Station	Bhangura	Dil Pasar	Pabna
21	Madrasha	49+00/100	Lahirimohanpur	Ullahpara	Mohanpur	Sirajganj
22	Mosque	49+000	Lahirimohanpur	Ullahpara	Mohanpur	Sirajganj
23	Labour Union office	49+200/300	Lahirimohanpur	Ullahpara	Mohanpur	Sirajganj
24	Shromik Somiti	49+300-400	Mohanpur Station	Ullahpara	Mohanpur	Sirajganj
25	Mosque	49+600/700	Dakshin Mohanpur	Ullahpara	Mohanpur	Sirajganj
26	Mosque	51+200-300	Bardhangachha	Ullahpara	Mohanpur	Sirajganj
27	Mosque	6+275	Majhgram	Chatmohar	Mulgram	Pabna
28	Mosque	63600/700	Saokola	Ullahpara	Pancha Krushi	Sirajganj
29	Mosque	66/400	Koalganti	Kamarkhanda	Roy Daulatpur	Sirajganj
30	Dharmio Protishthan	75+275	Kadda Krishnapur	Sirajganj Sadar	Saidabad	Sirajganj
31	Eid Gah Field	75+280	Kadda Krishnapur	Sirajganj Sadar	Saidabad	Sirajganj
32	Mosque	92+150	Gohaliabar	Kalihati	Durgapur	Tangail
33	Mosque	92+600	Mir Hamjani	Kalihati	Salla	Tangail

Source: Census Survey, 2013-2014

Annex 12: No Objection Certificate

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
জেলা প্রশাসকের কার্যালয়, গাজীপুর
সাধারণ শাখা-১
www.gazipur.gov.bd

স্মারক নম্বর: ০৫.৪১.৩৩০০.০০৫.২৮.৩১৯.১৮.১০০৮

তারিখ: ১৪ অগ্রহায়ণ ১৪২৫
২৮ নভেম্বর ২০১৮

বিষয়: অবস্থানগত/পরিবেশগত ছাড়াপত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তিপত্রের ছক।

সূত্র: বাংলাদেশ রেলওয়ে, প্রকৌশল শাখার স্মারক নং-৫৪.০১.২৬০০.০০১.০৫.০০৩. ১৭(অংশ-১)-৪৪১, তাং-১১/১১/২০১৮

অবস্থানগত/পরিবেশগত ছাড়াপত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তিপত্রের ছক

১। আবেদনকারীর নাম : বাংলাদেশ রেলওয়ে
২। পিতা/স্বামী/স্ত্রীর নাম : প্রযোজ্য নয়
৩। আবেদনকারীর ঠিকানা : রেলভবন, ১৬ আব্দুল গণি রোড, ঢাকা।
৪। প্রকল্পের অবস্থানগত ঠিকানা : "বাংলাদেশ রেলওয়ের জয়দেবপুর –ঈশ্বরদী সেকশনে ডুয়েলগেজ ডাবল রেললাইন নির্মাণ" শীর্ষক প্রকল্পের নির্মাণ কাজের জন্য বিদ্যমান জয়দেবপুর ঈশ্বরদী সেকশন রেলপথের সমান্তরাল গাজীপুর জেলার সদর ও কালিয়াকৈর উপজেলার অংশ চেইনেজ কিমি ৩৪৮+৯৯৭ হতে কিমি ৩৭৮+১২০ পর্যন্ত)
৫। প্রকল্পের তফসিল : প্রকল্পভুক্ত বিদ্যমান জয়দেবপুর- ঈশ্বরদী সেকশন রেলপথের সমান্তরাল গাজীপুর জেলার সদর ও কালিয়াকৈর উপজেলার অংশ (চেইনেজ কিমি ৩৪৮ +৯৯৭ হতে কিমি ৩৭৮+১২০ পর্যন্ত)
৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম : প্রযোজ্য নয়।

উপরোক্ত তথ্যাদির আলোকে প্রস্তাবিত "বাংলাদেশ রেলওয়ের জয়দেবপুর- ঈশ্বরদী সেকশনে ডুয়েলগেজ ডাবল রেললাইন নির্মাণ শীর্ষক প্রকল্প এলাকা (জয়দেবপুর-ঈশ্বরদী সেকশন রেলপথের সমান্তরাল গাজীপুর জেলার সদর ও কালিয়াকৈর উপজেলার অংশ (চেইনেজ কিমি ৩৪৮+৯৯৭ হতে কিমি ৩৭৮+১২০ পর্যন্ত) কে নিম্নবর্ণিত শর্তসাপেক্ষে অনাপত্তিপত্র প্রদান করা হলো।

শর্তাবলীঃ

১। প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২। পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে
৩। কর্মরত শ্রমিকের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪। উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরি নির্গমন ব্যবস্থা থাকতে হবে।
৫। বায়ু ও শব্দ দূষণ করা যাবে না।
৬। প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমন করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

২৮-১১-১৮
ড. দেওয়ান মুহাম্মদ হুমায়ুন কবীর
জেলা প্রশাসক
ফোন: +৮৮-০২-৪৯২৭৩০৭০
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ইমেইল: dcgazipur@mopa.gov.bd

মহাপরিচালক,
বাংলাদেশ রেলওয়ে, রেলভবন, ১৬ আব্দুল গণি রোড, ঢাকা।

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
জেলা প্রশাসকের কার্যালয়, টাঙ্গাইল
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স্মারকনং-০৫.৩০.৯৩০০.০১৪.০৪.০০৮.১৮- ৮৯৪ তারিখ ঃ ১৯ অগ্রহায়ণ ১৪২৫ / ০৩ ডিসেম্বর ২০১৮

বিষয় ঃ অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্র।

১। আবেদনকারীর নাম	:	বাংলাদেশ রেলওয়ের পক্ষে জনাব মোঃ সুলতান আলী উপ-পরিচালক (প্রকৌশল) (অঃ দাঃ)।
২। পিতা/স্বামী/স্ত্রীর নাম	:	প্রযোজ্য নয়।
৩। আবেদনকারীর ঠিকানা	:	রেলভবন, ১৬ আব্দুলগনি রোড, ঢাকা।
৪। প্রকল্পের অবস্থানগত ঠিকানা	:	"বাংলাদেশ রেলওয়ের জয়দেবপুর-ঈশ্বরদী সেকশনে ডুয়েল গেজ ডাবল লাইন নির্মাণ" শীর্ষক প্রকল্পের নির্মাণ কাজের জন্য বিদ্যমান জয়দেবপুর-ঈশ্বরদী সেকশন রেলপথের সমান্তরাল টাঙ্গাইল জেলার সদর, মির্জাপুর ও কালিহাতী উপজেলার অংশ (চেইনেজ কিমি ৩৪৮+৯৯৭ হতে কিমি ২৯৫+৫৭৭ পর্যন্ত)
৫। প্রকল্পের তফসিল	:	প্রকল্পভুক্ত বিদ্যমান জয়দেবপুর-ঈশ্বরদী সেকশন রেলপথের সমান্তরাল সদর, মির্জাপুর ও কালিহাতী উপজেলার অংশ (চেইনেজ কিমি ৩৪৮+৯৯৭ হতে কিমি ২৯৫+৫৭৭ পর্যন্ত)

৬। প্রকল্পের উৎপাদিত/ উৎপাদিতব্য পণ্যের নাম ঃ প্রযোজ্য নয়।

উপরোক্ত তথ্যাদির আলোকে প্রস্তাবিত "বাংলাদেশ রেলওয়ের জয়দেবপুর-ঈশ্বরদী সেকশনে ডুয়েল গেজ ডাবল লাইন নির্মাণ" শীর্ষক প্রকল্প জয়দেবপুর-ঈশ্বরদী সেকশন রেলপথের সমান্তরাল টাঙ্গাইল জেলার সদর, মির্জাপুর ও কালিহাতী উপজেলার অংশ চেইনেজ কিমি ৩৪৮+৯৯৭ হতে কিমি ২৯৫+৫৭৭ পর্যন্ত এর অবস্থানগত ও পরিবেশগত ছাড়পত্রের জন্য নিম্নবর্ণিত শর্তসাপেক্ষে অনাপত্তিপত্র প্রদান করা হলো।

শর্তাবলীঃ

১। প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষন আইন ও বিধি বিধান যথাযথভাবে অনুসরণ করতে হবে।
২। পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহন করতে হবে।
৩। কর্মরত শ্রমিকের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪। উপযুক্ত অগ্নিনির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকাণ্ড কিংবা অন্য কোন দুর্ঘটনার সময় জরুরি নির্গমন ব্যবস্থা থাকতে হবে।
৫। বায়ু ও শব্দদূষণ করা যাবে না।
৬। প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমন করা যাবে না।

উল্লেখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

(মোঃ শহীবুল ইসলাম)
জেলা প্রশাসক
টাঙ্গাইল।
ফোন ০৯২১-৬২৩৯০ (অফিস)
ফ্যাক্স ০৯২১-৬২১০৮
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মহাপরিচালক
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রেলভবন, ১৬ আব্দুলগণি রোড, ঢাকা।

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
জেলা প্রশাসকের কার্যালয়, সিরাজগঞ্জ
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স্মারকনং- ০৫.৪৩.৬৮০০.০০৭.৭২.০০২.১৯. ১৭৬ তারিখঃ ১২/০২/২০১৯ খ্রি.

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১।আবেদনকারীর নাম	:	বাংলাদেশ রেলওয়ে
২। পিতা/স্বামী/স্ত্রীর নাম	:	প্রযোজ্য নয়।
৩। আবেদনকারীর ঠিকানা	:	রেলভবন, ১৬ আব্দুল গনি রোড, ঢাকা।
৪। প্রকল্পের অবস্থানগত ঠিকানা	:	"বাংলাদেশ রেলওয়ের জয়দেবপুর-ঈশ্বরদী সেকশনে ডুয়েলগেজ ডাবল রেললাইন নির্মাণ" শীর্ষক প্রকল্পের নির্মাণ কাজের জন্য বিদ্যমান জয়দেবপুর-ঈশ্বরদী সেকশন রেলপথের সমান্তরাল সিরাজগঞ্জ জেলার সদর, উল্লাপাড়া ও কামারখন্দ উপজেলার অংশ (চেইনেজ কিমি ২৬০+২৯৫ হতে কিমি ২৯৫+৫৭৭ পর্যন্ত)
৫। প্রকল্পের তফসিল	:	প্রকল্পভুক্ত বিদ্যমান জয়দেবপুর-ঈশ্বরদী সেকশন রেলপথের সমান্তরাল সদর, উল্লাপাড়া ও কামারখন্দ উপজেলার অংশ (চেইনেজ কিমি ২৬০+২৯৫ হতে কিমি ২৯৫+৫৭৭ পর্যন্ত)

৬। প্রকল্পের উৎপাদিত/ উৎপাদিতব্য পণ্যের নামঃ প্রযোজ্য নয়।

উপরোক্ত তথ্যাদির আলোকে প্রস্তাবিত "বাংলাদেশ রেলওয়ের জয়দেবপুর-ঈশ্বরদী সেকশনে ডুয়েলগেজ ডাবল রেললাইন নির্মাণ" শীর্ষক প্রকল্প এলাকা (জয়দেবপুর-ঈশ্বরদী সেকশন রেলপথের সমান্তরাল সিরাজগঞ্জ জেলার সদর, উল্লাপাড়া ও কামারখন্দ উপজেলার অংশ (চেইনেজ কিমি ২৬০+২৯৫ হতে কিমি ২৯৫+৫৭৭ পর্যন্ত)) কে নিম্নবর্ণিত শর্তসাপেক্ষে অনাপত্তিপত্র প্রদান করা হলো।

শর্তাবলীঃ

১। প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন, ১৯৯৫ ও পরিবেশ সংরক্ষণ বিধিমালা, ১৯৯৭ যথাযথভাবে অনুসরণ করতে হবে।
২। পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩। কর্মরত শ্রমিকের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪। উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকাণ্ড কিংবা অন্য কোন দুর্ঘটনার সময় জরুরি নির্গমন ব্যবস্থা থাকতে হবে।
৫। বায়ু ও শব্দদূষণ করা যাবে না।
৬। প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমন করা যাবে না।

উল্লেখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেয়া যাবে।

(কামরুন নাহার সিদ্দীকা)
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অনুলিপি সদয় জ্ঞাতার্থে/কার্যার্থে:

১। বিভাগীয় কমিশনার, রাজশাহী বিভাগ, রাজশাহী।
২। উপজেলা নির্বাহী অফিসার, সিরাজগঞ্জ সদর/কামারখন্দ/উল্লাপাড়া, সিরাজগঞ্জ।

D:\All Works\Bibid Letter 17.docx

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
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স্মারক সংখ্যা : ০৫.৪৩.৬৯০০.০০৬.৯৯.০০১.১৬-১৮৪

তারিখ : ২২ মাঘ, ১৪২৫ বঙ্গাব্দ
০৫ ফেব্রুয়ারি, ২০১৯ খ্রিঃ

বিষয় : 'চীনা জি টু জি অর্থায়নে বাস্তবায়িত "বাংলাদেশ রেলওয়ের জয়দেবপুর-ঈশ্বরদী সেকশনে ডুয়েল গেজ ডাবল লাইন নির্মাণ" শীর্ষক প্রকল্প এর অবস্থানগত ও পরিবেশগতক ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক অনাপত্তিপত্র প্রদান।

সূত্র : মহাপরিচালক এর কার্যালয়, বাংলাদেশ রেলওয়ে প্রকৌশল শাখা ঢাকার ১১/১১/১৮ তারিখের ৫৪.০১.২৬০০.০০১.০৫.০০৩. .১৭(অংশ-১)-৪৩৮ সংখ্যক স্মারক।

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১।আবেদনকারীর নাম	:	মোঃ সুলতান আলী, উপ-পরিচালক, প্রকৌশল শাখা, বাংলাদেশ রেলওয়ে, ঢাকা।
২। পিতা/ স্বামী/ স্ত্রীর নাম	:	প্রযোজ্য নয়।
৩। আবেদনকারীর ঠিকানা	:	রেলভবন, ১৬ আব্দুল গনি রোড, ঢাকা।
৪। প্রকল্পের অবস্থানগত ঠিকানা	:	"বাংলাদেশ রেলওয়ের জয়দেবপুর-ঈশ্বরদী সেকশনে ডুয়েলগেজ ডাবল রেললাইন নির্মাণ" শীর্ষক প্রকল্পের নির্মাণ কাজের জন্য বিদ্যমান জয়দেবপুর-ঈশ্বরদী সেকশন রেলপথের সমান্তরাল নাটোর জেলার লালপুর উপজেলার অংশ (চেইনেজ কি.মি. ২১৬+০৯৭ হতে কি.মি. ২২২+০৯৭ পর্যন্ত)
৫। প্রকল্পের তফসিল	:	প্রকল্পভুক্ত বিদ্যমান জয়দেবপুর-ঈশ্বরদী সেকশন রেলপথের সমান্তরাল লালপুর উপজেলার অংশ (চেইনেজ কিমি ২১৬+০৯৭ হতে কিমি ২২২+০৯৭ পর্যন্ত)
৬। প্রকল্পের উৎপাদিত/ উৎপাদিতব্য পণ্যের নাম	:	প্রযোজ্য নয়।

উপরোক্ত তথ্যাদির আলোকে প্রস্তাবিত "বাংলাদেশ রেলওয়ের জয়দেবপুর-ঈশ্বরদী সেকশনে ডুয়েলগেজ ডাবল রেললাইন নির্মাণ" শীর্ষক প্রকল্পএলাকা (জয়দেবপুর-ঈশ্বরদী সেকশন রেলপথের সমান্তরাল নাটোর জেলার লালপুর উপজেলার অংশ [চেইনেজ কিমি ২১৬+০৯৭ হতে কিমি ২২২+০৯৭ পর্যন্ত] কে নিম্নবর্ণিত শর্তসাপেক্ষে অনাপত্তিপত্র প্রদান করা হলো।

শর্তাবলীঃ

১। প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষন আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২। পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহন করতে হবে।
৩। কর্মরত শ্রমিকের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪। উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকাণ্ড কিংবা অন্য কোন দুর্ঘটনার সময় জরুরি নির্গমন ব্যবস্থা থাকতে হবে।
৫। বায়ু ও শব্দদূষণ করা যাবে না।
৬। প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমন করা যাবে না।

উল্লেখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

১৩.০২.১৯
(মোঃ শাহরিয়াজ)
জেলা প্রশাসক
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মহাপরিচালক
বাংলাদেশ রেলওয়ে
রেলভবন, ১৬ আব্দুলগণি রোড, ঢাকা।

অনুলিপি সদয় জ্ঞাতার্থে/কার্যার্থে:
১। বিভাগীয় কমিশনার, রাজশাহী বিভাগ, রাজশাহী।
২। উপজেলা নির্বাহী অফিসার, লালপুর, নাটোর।
৩। অফিস নথি।

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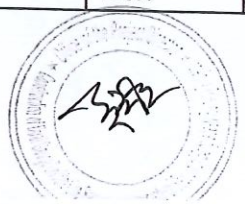
Annex 13: Proposed Minor Bridges on New Line

Sl. No.	Existing Bridge No.	Chainage (Km)	Chainage as per Pocket Book (Km)	In between Stations	Type of Proposed Structure	Proposed Span Arrangement	Proposed Span Arrangement (m)	Total Length of Proposed Bridge (m)
1	1	206+695	206/6-7	Ishurdi - Majhgram	Box Culvert	1x4.5 m	1x4.5 m	5.50
2	2	210+702	210/8-9	,,	Box Culvert	1x4.0 m	1x4.0 m	5.00
3	3	213+021	212/11-12	,,	Box Culvert	2x4.0 m	2x4.0 m	9.50
4	4	214+243	214/3-4	,,	Box Culvert	1x4.0 m	1x4.0 m	5.00
5	5	215+908	215/11-12	,,	Box Culvert	2x4.0 m	2x4.0 m	9.50
6	6	217+467	217/3-4	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
7	7	218+686	218/6-7	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
8	8	219+709	219/6-7	,,	Box Culvert	2x4.0 m	2x4.0 m	9.50
9	9	220+975	220/9-10	,,	Box Culvert	2x4.0 m	2x4.0 m	9.50
10	10	221+707	221/6-7	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
11	11	223+606	223/5-6	,,	Box Culvert	2x4.0 m	2x4.0 m	9.50
12	12	226+494	226/4-5	,,	STPG	1x15.0 m	1x15.0 m	16.05
13	14	229+452	229/4-5	,,	Box Culvert	1x4.0 m	1x4.0 m	6.10
14	15	230+791	230/8-9	,,	Box Culvert	1x1.0 m	1x1.0 m	1.90
15	16	231+519	231/4-5	,,	Box Culvert	3x5.0 m	3x5.0 m	17.40
16	17	232+694	232/7-8	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
17	18	233+277	233/2-3	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
18	19	234+457	234/4-5	,,	Box Culvert	1x4.0 m	1x4.0 m	5.00
19	21	237+077	236/11-237/1	,,	Box Culvert	2x4.0 m	2x4.0 m	9.50
20	22	240+078	240/1-2	Bhangura – Baral Bridge	Box Culvert	1x5.0 m	1x5.0 m	6.10
21	28	255+427	255/4-5	,,	STPG	1x15.0 m	1x15.0 m	16.05
22	29	257+267	257/2-3	,,	Box Culvert	2x4.0 m	2x4.0 m	9.50
23	31	259+856	259/8-9	,,	Box Culvert	2x4.0 m	2x4.0 m	9.50

Sl. No.	Existing Bridge No.	Chainage (Km)	Chainage as per Pocket Book (Km)	In between Stations	Type of Proposed Structure	Proposed Span Arrangement	Proposed Span Arrangement (m)	Total Length of Proposed Bridge (m)
24	32	260+452	260/4-5	,,	Box Culvert	3x5.0 m	3x5.0 m	17.40
25	34	262+946	262/12-13	,,	Box Culvert	2x4.0 m	2x4.0 m	9.50
26	36	268+021	267/14-15	,,	Box Culvert	1x4.0 m	1x4.0 m	5.00
27	37	269+028	268/15-16	,,	STPG	1x15.0 m	1x15.0 m	16.05
28	37A	269+633	269.549	,,	STPG	1x15.0 m	1x15.0 m	16.05
29	39	272+935	272/12-13	,,	STPG	1x15.0 m	1x15.0 m	16.05
30	41	276+526	276/5-6	,,	Box Culvert	2x4.0 m	2x4.0 m	9.50
31	41A	278+441	278/4-5	,,	Box Culvert	1x6.0 m	1x6.0 m	7.20
32	124	278+565	278.82	,,	Box Culvert	1x5.0 m	1x5.0 m	6.10
33	123-2	278+926	279.157	,,	Box Culvert	1X1.0 m	1X1.0 m	1.90
34	123	279+943	279.975	,,	Box Culvert	1x5.0 m	1x5.0 m	6.10
35	122	280+207	280.425	,,	Box Culvert	1x5.0 m	1x5.0 m	6.10
36	121-2	280+410	280.615	,,	Box Culvert	1x5.0 m	1x5.0 m	6.10
37	120	282+075	282.315	,,	Box Culvert	2x5.0 m	2x5.0 m	11.65
38	119-24	282+635	282.875	,,	Box Culvert	1x1.0 m	1x1.0 m	1.90
39	119-23	283+035	283.275	,,	Box Culvert	1x1.0 m	1x1.0 m	1.90
40	119-22	283+435	283.675	,,	Box Culvert	1x1.0 m	1x1.0 m	1.90
41	119-21	283+835	284.075	,,	Box Culvert	1x1.0 m	1x1.0 m	1.90
42	119-20	284+234	284.475	,,	Box Culvert	1x1.0 m	1x1.0 m	1.90
43	119/4	295+754	295.8	,,	Box Culvert	1X1.0 m	1X1.0 m	1.90
44	119/3	296+253	296.3	,,	Box Culvert	1X1.0 m	1X1.0 m	1.90
45	119/2	296+752	296.8	,,	Box Culvert	1X1.0 m	1X1.0 m	1.90
46	118	298+325	298.371	,,	Box Culvert	2x5.0 m	2x5.0 m	11.65
47	117	298+650	298.692	,,	Box Culvert	2x5.0 m	2x5.0 m	11.65
48	115	299+776	299.819	,,	Box	2x5.0 m	2x5.0 m	11.65



Sl. No.	Existing Bridge No.	Chainage (Km)	Chainage as per Pocket Book (Km)	In between Stations	Type of Proposed Structure	Proposed Span Arrangement	Proposed Span Arrangement (m)	Total Length of Proposed Bridge (m)
					Culvert			
49	114	300+363	300.407	,,	Box Culvert	2x5.0 m	2x5.0 m	11.65
50	111	302+050	302.09	,,	Box Culvert	2x5.0 m	2x5.0 m	11.65
51	110	302+605	302.646	,,	Box Culvert	2x5.0 m	2x5.0 m	11.65
52	109	303+188	303.227	,,	Box Culvert	2x5.0 m	2x5.0 m	11.65
53	107	303+897	303.94	,,	Box Culvert	2x5.0 m	2x5.0 m	11.65
54	103	306+206	306.25	,,	Box Culvert	2x5.0 m	2x5.0 m	11.65
55	102	306+777	306.82	,,	Box Culvert	2x5.0 m	2x5.0 m	11.65
56	101	307+360	307.4	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
57	100	307+975	308.01	,,	Box Culvert	3x5.0 m	3x5.0 m	17.40
58	97	311+414	311.45	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
59	95	313+437	313.48	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
60	94	313+647	313.688	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
61	93	314+067	314.11	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
62	92	314+687	314.73	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
63	90	315+097	315.14	,,	Box Culvert	1x4.0 m	1x4.0 m	5.00
64	89.2	316+023	316.04	Tangail - Mohera	Box Culvert	1X1.0 m	1X1.0 m	1.90
65	89	316+187	316.23	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
66	88	316+397	316.44	,,	Box Culvert	3x5.0 m	3x5.0 m	17.40
67	87.1	316+907	316.95	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
68	87	317+467	317.51	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
69	86	317+967	318.01	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
70	85.2	318+237	318.28	,,	Box Culvert	3x5.0 m	1x15.0 m	17.40
71	85	318+735	318.785	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
72	84.3	319+154	319.205	,,	Box	3x5.0 m	3x5.0 m	17.40

Sl. No.	Existing Bridge No.	Chainage (Km)	Chainage as per Pocket Book (Km)	In between Stations	Type of Proposed Structure	Proposed Span Arrangement	Proposed Span Arrangement (m)	Total Length of Proposed Bridge (m)
					Culvert			
73	84.2	319+749	319.8	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
74	82.3	320+449	320.5	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
75	82.2	321+189	321.24	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
76	82.1	321+550	321.6	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
77	82	322+075	322.12	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
78	81	322+543	322.588	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
79	80	322+727	322.78	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
80	79.3	322+940	322.985	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
81	79.2	323+445	323.49	,,	Box Culvert	3x5.0 m	3x5.0 m	17.40
82	79	324+045	324.09	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
83	77	325+495	325.54	,,	STPG	1x15.0 m	1x15.0 m	16.05
84	74	327+720	327.77	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
85	73	327+905	327.955	,,	Box Culvert	3x5.0 m	3x5.0 m	17.40
86	72	329+000	329.05	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
87	69.2	330+785	330.83	,,	Box Culvert	1X1.0 m	1X1.0 m	1.90
88	69	331+605	331.65	Mohera - Mirzapur	Box Culvert	1X1.0 m	1X1.0 m	1.90
89	65	334+350	334.4	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
90	64	335+082	335.132	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
91	57	339+870	339.92	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
92	55	341+102	341.19	,,	Box Culvert	1x1.0 m	1x1.0 m	1.90
93	54	341+513	341.6	Mirzapur - Mouchak	Box Culvert	1x1.0 m	1x1.0 m	1.90
94	52	342+552	342.61	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
95	51	342+847	342.905	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
96	48	345+055	345.108	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90

Sl. No.	Existing Bridge No.	Chainage (Km)	Chainage as per Pocket Book (Km)	In between Stations	Type of Proposed Structure	Proposed Span Arrangement	Proposed Span Arrangement (m)	Total Length of Proposed Bridge (m)
97	47	345+292	345.345	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
98	46.1	346+677	346.729	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
99	46	347+047	347.1	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
100	44.3	347+506	347.559	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
101	44.2	348+057	348.11	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
102	44.1A	348+267	348.32	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
103	44.1	348+502	348.555	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
104	43.4	349+120	349.173	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
105	43.3	349+390	349.447	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
106	43.2	349+421	349.48	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
107	42.1	350+049	350.11		Box Culvert	1x1.0 m	1x1.0 m	1.90
108	41.1	352+070	352.13	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
109	40.1	352+399	352.46	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
110	40	352+565	352.627	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
111	39	353+271	353.34	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
112	38	353+531	353	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
113	35	354+591	354.66	,,	Box Culvert	3x5.0 m	3x5.0 m	17.40
114	34	355+096	355.165	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
115	31	356+119	356.2	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
116	30	356+919	357.6	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
117	29	357+199	357.28	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
118	28	357+439	357.52	,,	Box Culvert	1x1.0 m	1x1.0 m	3.90
119	26.3	358+663	357.74	,,	Box Culvert	1x1.0 m	1x1.0 m	1.90
120	26.2	359+038	359.115	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90

Sl. No.	Existing Bridge No.	Chainage (Km)	Chainage as per Pocket Book (Km)	In between Stations	Type of Proposed Structure	Proposed Span Arrangement	Proposed Span Arrangement (m)	Total Length of Proposed Bridge (m)
121	26.1	359+303	359.38	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
122	24	362+805	362.892	Mouchak - Joydebpur	Box Culvert	2x3.0 m	2x3.0 m	7.35
123	22	363+156	363.243	,,	Box Culvert	2x3.0 m	2x3.0 m	7.35
124	21	363+453	363.54	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
125	20	363+712	363.8	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
126	19	364+303	364.39	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
127	17.1	364+843	364.93	,,	Box Culvert	1x1.0 m	1x1.0 m	3.90
128	16	367+593	367.68	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
129	11.1	369+764	369.85	,,	Box Culvert	1x1.0 m	1x1.0 m	1.90
130	8.1	371+917	372.01	,,	Box Culvert	1x1.0 m	1x1.0 m	1.90
131	8	372+090	372.172	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
132	7.1	372+818	372.90	,,	Box Culvert	1x1.0 m	1x1.0 m	1.90
133	7	374+468	374.55	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
134	6.2	374+958	375.04	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
135	6	375+658	375.74	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
136	5.2	376+059	376.133	,,	Box Culvert	3x5.0 m	3x5.0 m	17.40
137	5	376+378	376.466	,,	Box Culvert	3x5.0 m	3x5.0 m	17.40
138	2	377+442	377.53	,,	Box Culvert	1x3.0 m	1x3.0 m	3.90
139	11A	225+816	,,	,,	Steel Semi Through Plate Girder	2X12.90 m	STPG	2x15.0 m
140	13	228+529	,,	,,	Rolled Steel Joist Girder + Steel Semi Through Plate	1X6.32 + 1X18.52 + 1X6.32	STPG	1x35.0 m

Sl. No.	Existing Bridge No.	Chainage (Km)	Chainage as per Pocket Book (Km)	In between Stations	Type of Proposed Structure	Proposed Span Arrangement	Proposed Span Arrangement (m)	Total Length of Proposed Bridge (m)
					Girder			
141	20	236+092	Guakhara - Bhangura	Small channel	Steel Plate Girder	4X12.92 m	STPG	15 m+25 m+15 m
142	30	258+416	,,	Beel (low lying area)	Rolled Steel Joist Girder + Steel Semi Through Plate Girder	1X6.32 + 1X18.80 + 1X6.20	STPG	1x35.0 m
143	30A	259+588	,,	,,	Steel Semi Through Plate Girder	1X19.43 m	Box Culvert	3x6.0 m
144	33	261+598	,,	,,	Rolled SteelJoist Girder + Steel Semi Through Plate Girder	1X5.10 + 1X12.60 + 1X5.10	Box Culvert	4x6.0 m
145	38	270+885	,,	,,	Rolled Steel Joist Girder + Steel Plate Girder	1X6.32 + 1X12.27 + 1X12.55 + 1X6.7	STPG	2x20.0 m
146	40	275+459	,,	,,	Steel Plate Girder + Steel Semi Through Plate Girder	1X12.50 + 1X12.52 + 2X12.55 + 1X12.60	STPG	15 m+25 m+15 m
147	121	281+149	,,	Korotwa River	Steel Girder	3X20.0 m	STPG	3x20.0 m
148	119	297+152	,,	,,	Steel Girder	3X10.0 m	STPG	1x30.0 m
149	116	299+120	,,	,,	Steel Girder	3X10.0 m	STPG	1x30.0 m
150	113	300+970	,,	,,	Steel Girder	3X10.0 m	STPG	1x30.0 m

	Existing Bridge No.	Chainage (Km)	Chainage as per Pocket Book (Km)	In between Stations	Type of Proposed Structure	Proposed Span Arrangement	Proposed Span Arrangement (m)	Total Length of Proposed Bridge (m)
151	112	301+666	,,	,,	Steel Girder	3X10.0 m	STPG	1x30.0 m
152	108	303+557	,,	,,	Steel Girder	3X10.0 m	STPG	1x30.0 m
153	106	304+390	,,	,,	Steel Girder	3X10.0 m	STPG	1x30.0 m
154	105	304+721	,,	,,	Steel Girder	3X10.0 m	STPG	1x30.0 m
155	104	305+400	,,	,,	Steel Girder	3X10.0 m	STPG	1x30.0 m
156	99	309+479	,,	,,	Steel Girder	3X20.0 m	STPG	3x20.0 m
157	96	312+952	,,	,,	Steel Girder	4X20.0 m	STPG	4x20.0 m
158	91	314+847	,,	,,	Steel Girder	2X20.0 m	STPG	2x20.0 m
159	83	320+149	,,	,,	Steel Girder	1X25.0 m	STPG	1x25.0 m
160	78	324+825	,,	,,	Steel Girder	1X25.0 m	STPG	1x25.0 m
161	76	326+010	,,	,,	Steel Girder	3X20.0 m	STPG	3x20.0 m
162	70	330+111	,,	,,	Steel Girder	2X20.0 m	STPG	2x20.0 m
163	68	332+075	,,	,,	Steel Girder	1X20.0 m	Box Culvert	3x6.0 m
164	67	332+365	,,	,,	Steel Girder	1X20.0 m	STPG	1x20.0 m
165	66	333+325	,,	,,	Steel Girder	1X25.0 m	STPG	1x25.0 m
166	63	335+790	,,	,,	Steel Girder	1X25.0 m	STPG	1x25.0 m
167	62	336+465	,,	,,	Steel Girder	1X25.0 m	STPG	1x25.0 m
168	61	336+920	,,	,,	Steel Girder	1X25.0 m	STPG	1x25.0 m
169	60	337+355	,,	,,	Steel Girder	1X25.0 m	STPG	1x25.0 m
170	59	337+951	,,	,,	Steel Girder	2X20.0 m	STPG	2x20.0 m
171	58	339+130	,,	,,	Steel Girder	1X25.0 m	STPG	1x25.0 m
172	56	340+165	,,	,,	Steel Girder	3X20.0 m	STPG	3x20.0 m
173	53	342+167	,,	,,	Steel Girder	2X20.0 m	STPG	2x20.0 m
174	50	343+643	,,	,,	Steel Girder	3X20.0 m	STPG	3x20.0 m
175	49	344+762	,,	,,	Steel	4X20.0 m	STPG	4x20.0 m

Sl. No.	Existing Bridge No.	Chainage (Km)	Chainage as per Pocket Book (Km)	In between Stations	Type of Proposed Structure	Proposed Span Arrangement	Proposed Span Arrangement (m)	Total Length of Proposed Bridge (m)
					Girder			
176	46.3	345+567	,,	,,	Steel Girder	2X20.0 m	STPG	2x20.0 m
177	46.2	346+357	,,	,,	Steel Girder	2X20.0 m	STPG	2x20.0 m
178	45	347+382	,,	,,	Steel Girder	2X25.0 m	STPG	2x25.0 m
179	44	348+717	,,	,,	Steel Girder	2X20.0 m	STPG	2x20.0 m
180	43	349+674	,,	,,	Steel Girder	1X25.0 m	STPG	1x25.0 m
181	41	352+169	,,	,,	Steel Girder	2X25.0 m	STPG	2x25.0 m
182	37	353+945	,,	Bangshi	Steel Girder	4X20.0 m	STPG	4x20.0 m
183	26	361+124	,,	,,	Steel Girder	3X10.0 m	STPG	1x30.0 m
184	17	365+431	,,	,,	Steel Girder	2X25.0 m	STPG	2x25.0 m
185	15	367+774	,,	,,	Steel Girder	2X20.0 m	STPG	2x20.0 m
186	14.2	368+197	,,	,,	Steel Girder	1X30.0 m	STPG	1x30.0 m
187	13	368+732	,,	Turag Branch	Steel Girder	3X20.0 m	STPG	3x20.0 m
188	12	369+428	,,	,,	Steel Girder	1X25.0 m	STPG	1x25.0 m
189	11	370+538	,,	,,	Steel Girder	1X25.0 m	STPG	1x25.0 m
190	10	370+950	,,	,,	Steel Girder	1X25.0 m	STPG	1x25.0 m
191	9	371+383	,,	,,	Steel Girder	1X20.0 m	STPG	1x20.0 m
192	4	376+682	,,	,,	Steel Girder	1X20.0 m	Box Culvert	3x6.0 m

Annex 14: Proposed Major Bridges on New Line

There are 12 bridges having lengths of more than 100 m in Joydebpur and Ishurdi Section. Seven on the Ishurdi-Bangabandhu Setu West section and five on the Bangabandhu Setu East-Joydebpur section.

Sl. No.	Existing Bridge No./ Crossing No.	Chainage (Km)	In between Stations	River/ Canal Crossing	Type of Existing Structure	Existing Span (m)	Type of Proposed Structure	Proposed Span Arrangement (m)
1	23	240+976	,,	Boral	Steel Plate Girder + Steel Through Truss	1X12.50 + 3X32.00 + 1X12.55	STPG	15 m+3x35 m + 15 m
2	24	245+400	,,	Gumani	Steel Plate Girder + Steel Through Truss	1X12.57 + 1X18.52 + 2X32.00 + 1X18.54 + 1X12.55	STPG	4x35.0 m
3	25	247+251	,,	Beel	Steel Plate Girder	15X12.62 m	STPG	8x25.0 m
4	26	249+352	Dilpashar - Lahirimohanpur	Dilpasar Gounjandhoa Beel	Steel Plate Girder	1X12.50 + 3X18.47 + 1X17.98 + 1X12.50	STPG	15 m+4x20 m + 15 m
5	26A	250+863	,,		Steel Plate Girder	10X12.60 m	STPG	5x25.0 m
6	27	253+094	,,	Gohala	Steel Plate Girder + Steel Semi Through Plate Girder	1X12.50 + 3X18.50 + 1X18.80 + 1X12.50	STPG	15 m+4x20 m + 15 m
7	35	264+768	,,	Korotoya	Steel Plate Girder + Steel U.Slung Truss + Steel Through Truss	1X8.70 + 1X18.52 + 2X32.00 + 1X63.10 + 1X32.00 + 1X18.52 + 1X8.61	STPG	15 m+20 m + 5x30 m + 20 m+15 m
8	98	310+497	,,	Pungli River	Steel Girder	6X25.0 m	STPG	6x25.0 m
9	75	326+985	,,		Steel Girder	4X25.0 m	STPG	4x25.0 m
10	71	329+355	,,		Steel Girder	4X25.0 m	STPG	4x25.0 m
11	42	351+340	,,		Steel Girder	4X25.0 m	STPG	4x25.0 m
12	14	368+416	,,	Turag	Steel Girder	4X30.0 m	STPG	4x30.0 m

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
OFFICE OF THE PROJECT DIRECTOR
'CONSTRUCTION OF DUAL GAUGE DOUBLE LINE BETWEEN JOYDEBPUR -ISHURDI SECTION OF BANGLADESH RAILWAY' PROJECT
BANGLADESH RAILWAY, RAILBHABAN
16, ABDULGANI ROAD, DHAKA.

No. 54.01.0000.688.99.003.19-09 Dated: 06/05/2019

Chief Engineer
Engineering Department
Bangladesh Inland Water Transport Authority (BIWTA)
BIWTA Bhaban, 141-143, Motijheel Commercial Area, Dhaka-1000

Subject: Request for No Objection Certificate (NOC) for "Construction of Dual Gauge Double Line between Joydebpur-Ishurdi Section of Bangladesh Railway".

Dear Sir,
Bangladesh Railway is undertaking the planning and design work for "Construction of DualGauge Double Line between Joydebpur - Ishurdi Section of BangladeshRailway".

As per requirement of the Department of Environment (DoE), Government of Bangladesh, the proposed Project requires an Environmental Impact Assessment Report to obtain environmental clearance certificate allowing the construction to commence. This project will involve widening the rail embankment and rebuilding all bridges and culverts within the 174 km long corridor, allowing for heavier and longer trains to pass.

As a part of DoE clearance requirement, it is necessary to obtain a 'No Objection Certificate' from Bangladesh Inland Water Transport Authority (BIWTA) since this project will involve the construction of bridges confirming that you have no objections/concerns with this project as described in the summary document and that it can move ahead.There will be 12 major bridges (>100 m span) and these will be constructed parallel to the existing bridges as second bridges. At the end a summary of this project in Attachment 1, major water crossing map in Attachment 2 are attached to this letter, for your use. The proposed vertical and horizontal clearance of the proposed railway bridges are provided in Attachment 3 and thedrawings of proposed railway bridge is provided in Attachment 4.

It is, therefore, requested that you kindly review the attached documents, maps, and drawings and issue a 'No Objection Certificate' for the construction of the subject mentioned project at your earliest convenience.

Your co-operation in this respect would be highly appreciated.

Yours Sincerely,
06/05/19
Md. Arifuzzaman
Project Director,
Contact Tel: +8801711691675;
e-mail: mak_arif@yahoo.com

Encl:
1. Attachment 1 -Brief Summary of the Project
2. Attachment 2 - Major Water Crossing Location Map
3. Attachment 3 –List of bridges with number, chainage, span size and total length, Vertical, and Horizontal Clearance of the Proposed Bridges in project area
4. Attachment 4 - Proposed Drawings of Rail Bridge of the Project

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
OFFICE OF THE PROJECT DIRECTOR
CONSTRUCTION OF DUAL GAUGE DOUBLE LINE BETWEEN JOYDEBPUR AND ISHURDI SECTION OF BANGLADESH RAILWAY
BANGLADESH RAILWAY, RAILBHABAN
16 ABDUL GANI ROAD, DHAKA, BANGLADESH

No. 54.01.0000.688.22.06.19-198 Dated: 16/02/2020

To
Chief Conservator of Forests
Bangladesh Forest Department
Government of People's Republic of Bangladesh

Subject: Request for No Objection Certificate (NOC) for "Construction of Double Line Between Joydebpur and Ishurdi Section of Bangladesh Railway"

Dear Sir,

Bangladesh Railway is undertaking the construction work for Dual Gauge Double Line between Joydebpur and Ishurdi Section. As per requirement of the Department of Environment, (DoE), Government of Bangladesh, the proposed project requires an Environmental Impact Assessment Report to obtain Environmental Clearance Certificate allowing the construction to commence. This Project will involve widening the rail embankment and building new bridges and culverts beside existing 174 km railway line.

As a part of DoE clearance requirement, it is necessary to obtain a 'No Objection Certificate' from your office, confirming that you have no objections/concerns with the Project as described in the summary document and that it can move ahead. To that end a Project summary in Attachment-1, administrative maps in Attachment-2 are attached to this letter, for your use.

It is identified from Social Assessment that a total of 97,000 fruit trees, 173,000 timber trees and 3,400 medicinal trees will be affected. In addition, 9,200 banana trees, 1,700 papaya trees and 51,000 bamboos will also be required to be removed from the proposed construction area. These trees are enumerated on one side of the proposed alignment, proposed station building areas, and new station access roads. Please note none of Bangladesh's endangered species and indeed much wildlife beyond the pests found near populated were seen in the Project construction corridor during several field surveys. The details ecological impacts and proposed mitigative measures in relation to the tree management have been defined in detail in Attachment 3.

It is, therefore, requested to kindly accord a no objection certificate to the construction of the double line rail Project.

Please review the attached documents, maps and provide your conclusion and hopefully a 'No Objection Certificate' for the construction of the Project to proceed.

We look forward to your positive response and are ready to answer any questions you may have.

Yours Sincerely,

16/02/2020

(Md. Monirul Islam Firoji)
Project Director
Contact Tel: +8801711564575
Email: pdjidlp@railway.gov.bd

Enclosed:
1. Attachment 1 - Summary of the Project
2. Attachment 2 – Project location map
3. Attachment 3 - Possible Ecological Impacts and Proposed Mitigation Measures