

DOHWA-KRNA-OCG-BARSYL-DDC Joint Venture
for Construction Supervision of Akhaura-Laksam Double Track Project

DOHWA
Dohwa Engineers Co., Ltd.

KR
KOREA RAIL
NETWORK AUTHORITY

OCG
ORIGINAL

BARSYL
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ddc

Ref. No.: JV-ALDLP-BR-17-085

Date : 18 July 2017

Mr. Md. Mozammel Hoque
General Manager/Project Director
Bangladesh Railway
Rail Bhaban
16 Abdul Ghani Road, Dhaka 1000, Bangladesh

Project: Contract No.: PD/ALDLP/ADB-EIB/2015: Construction of Dual Gauge Double Line and Conversion of Existing Railway into Dual Gauge between Akhaura-Laksam
Subject: Submission of Semi-annual Environmental Monitoring Report as per "Appendix A-Terms of Reference, Part 4, G(vii)" & "L. Reporting Requirement L.3.1"

Ref:

Dear Sir,

To meet above contractual requirement we do hereby submit Semi-annual Environmental Report (January 2017-June 2107) for your kind review/approval.

Sincerely yours,



Mohammad Abdullah
Acting Team Leader
Construction Supervision of Akhaura-Laksam Double Track Project
E-mail: Abdullah_Buet70@hotmail.com

Attachment:

1. Semi-annual Environmental Monitoring Report in 4 (four) copies



**CONSULTING SERVICES CONTRACT FOR CONSTRUCTION SUPERVISION OF
AKHAURA-LAKSAM DOUBLE TRACK PROJECT**

ADB Loan No.: 3170-BAN (SF)

ENVIRONMENTAL MONITORING REPORT



Semi-annual Report: January-June 2017

Prepared by:

DOHWA Engineering Co. Ltd., Korea

In Joint Venture with Korea Rail Network Authority, Korea;

Oriental Consultants Global Co. Ltd., Japan;

Balaji Railroad Systems Limited, India; and

Development Design Consultants Ltd., Bangladesh

EXECUTIVE SUMMARY

Akhaura-Laksam, being a part of Dhaka-Chittagong Railway corridor, is a part of Trans-Asian Railway Network, SASEC, SAARC & BIMSTEC corridors in Bangladesh.

Dhaka-Chittagong Railway corridor is the most important Railway corridor in Bangladesh. By the year 2018 total Dhaka-Chittagong corridor will be double tracked except Akhaura-Laksam section which will become the bottleneck of this corridor. The existing meter gauge track of Akhaura-Laksam section is in deplorable condition which needed to be up-graded to dual gauge line to be constructed, in parallel to the existing one to meet the increased traffic demand along the corridor.

Project Status

Contractor has submitted their Programme on 29th November 2016 as per SubClause 8.3.

The Programme was reviewed and returned for remaking with comments because the Programme does not comply with the Contract on 14 December 2016.

Engineer was able to issue Instruction only on 31st October, 2016 to commence from 1st November, 2016 as the commencement of the works were delayed.

physical works have been started. Contractor had prepared Mobilization for followings:

- (i) All construction plant and equipment as stated in the bid proposal: 229 nos, of Heavy Equipment from Plan 579 Nos. mobilized as of 30 November 2016 and continued more Equipments mobilization in March 2017.
- (ii) Construct and equip the site laboratory: Temporary Laboratory has been set up in Comilla.

Environmental Monitoring

All impacts, mitigation measures and monitoring requirements have been defined in Environment Management Plan (EMP), included in the EIA. Monitoring works focus on inspection of contractor work areas, their waste disposal sites, their rehabilitation/re-vegetation, proper landscaping, re-establishment of local access, debris clearance from reconstructed station buildings, culverts as well as the Engineers Main Office, etc. BR will implement an air and noise quality monitoring programme during four operating years to establish the noise and air quality degradation (if any) at sensitive sites, identified during the Environmental Impact Assessment and to implement proper noise and air quality attenuation measures. In this regard, the contractor will conduct a regular air, water and noise quality monitoring programme, specified in the Environmental Management Plan and submit reports on a monthly and quarterly basis.

Conclusions

Akhaura-Laksam Double Track project could generate a number of environmental impacts, such as those associated with the embankment construction, the river crossings or workers poor campsite housekeeping by the contractor. The EMP provides the specific guidelines which BR has put in place to prevent or mitigate these effects. BR is committed to implement these measures have fully endorsed into the EIA which is the basis for the EMP. BR will ensure that the work is carried out in an environmentally acceptable manner and the monitoring and reporting are completed in a compliant and timely fashion, acceptable to DoE, ADB and EIB.

Further Action Required

Bangladesh Railway needs to initiate a station cleaning protocol that addresses garbage and solid waste strewn around the station and on the tracks beside the platforms.

BR needs to fully address the mitigation and monitoring actions defined in the EMP, starting with the management of stations and the provision of clean toilet facilities and maintaining adequate separation of male and female toilet facilities.

BR needs to seriously consider installing sewage collection tanks on its trains, thereby stopping the present practice of dumping raw sewage onto the tracks.

Lessons Learned

The Engineer needs to be given authority through more workable provisions in the contract to act very quickly when non-compliance is observed whereby it is clear to the contractor that serious consequences including financial penalties are possible should the contractor decide to be non-responsive to Environmental Safeguard Issues.

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
ADF	Asian Development Fund
BDT	Bangladesh Taka
BOQ	Bill of Quantities
BR	Bangladesh Railway
BG	Broad Gauge
CSC	Construction Supervision Consultancy
DB	Dispute Board
DG	Dual Gauge
DPP	Development Project Proforma/Proposal
EIA	Environment Impact Assessment
EIB	European Investment Bank
GIBR	Government Inspector of Bangladesh Railway
GOB	Government of Bangladesh
INGO	Implementation Non-Government Organization
IPC	Interim Payment Certificate
MPR	Monthly Progress Report
INGO	Implementing Non-Government Organization
ITC	Instruction to Commence
LA	Land Acquisition
LAR	Land Acquisition and Resettlement
LC	Level Crossing
MG	Meter Gauge
MOF	Ministry of Finance
MOR	Ministry of Railways
OCR	Ordinary Capital Resource
PAM	Project Administrative Manual
PVD	Prefabricated Vertical Drain
RoB	Rail Overbridge
RoW	Right-of-Way
SAARC	South Asian Association for Regional Co-operation
SASEC	South Asia Sub-regional Economic Cooperation
TL	Team Leader of Dohwa Joint Venture
Dohwa JV	Dohwa Engineering Co.,Ltd. Korea In Joint Venture with Korea Rail Network Authority, Korea, Oriental Consultants Global Co. Ltd., Japan; Balaji Railroad Systems Limited, India; and Development Design Consultants Ltd., Bangladesh
ALDLP	Akhaura- Laksam Double Line Project
TOR	Terms of Reference

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1. PROJECT BACKGROUND

1.1 Purpose of the Report And Rationale

1. The Contract for implementation of Consulting Services between Bangladesh Railways (BR) and Dohwa Engineering Co., Ltd and 4 Joint partners mandates submission of “Semi-annual Environmental Report” in compliance with Sub-Clause 26.1 Reporting Obligation of the General Conditions of Contract and Appendix A.

Appendix –A, Item C – “Scope of Work” of the Terms of Reference(TOR) of the Consultancy Services Contract relates to the Construction Supervision Activities where in the Consultant, according to the Contract will work as “the Engineer” to provide the following major categories of services.

Part 1: Project Management, Administration and Planning

Part 2: Technical Support

Part 3: Construction Supervision, Testing and Inspection

Part 4: Environmental Aspects

Part 5: Gender and Other Social Aspect

Part 6 : Resettlement Aspects

Part 7: Defect Liability Period

2. Most important requirement for this phase is to submit semi-annual Environmental Reports with emphasis mainly on the details of construction activities and progress of the Works. Construction Contract has commenced according to the Instruction to Commence(ITC) issued by the Engineer on 31st October, 2016 for the Contractor to commence the Works from 1st November, 2016. However even if ITC was delayed due to non-payment of some part of Advance Payment since the Agreement of Construction Contract was made on 15th June, 2016 the Contractor actually has started mobilization in various provisional disciplines' area.

3. During this period Contractor had been busy performing their duties imposed on Contract for preparation and submission of required documentations and procurement of materials.

This report has been prepared by Project Team of Dohwa Engineering Co., Ltd and 4 Joint partners as the project implementation consultant.

1) Sector Objective

4. Government of the People's Republic of Bangladesh adopted the National Land Transport Policy (NLTP) in April 2004 following recommendations from DFID and other agencies, through which the Institutional and Operational Capacity of Bangladesh Railway are to be enhanced and improved. The Asian Development Bank (ADB) and European Investment Bank (EIB) is financing to achieve the targets set in the NLTP.

5. Bangladesh Railway (BR) needed both reform and investment before it can achieve the targets set for the railway sector, the GOB requested the ADB to help finance a Railway Sector Investment Program. This financial support is being extended through a multi-tranche financing facility (MFF). The Government committed to implement a Roadmap and Investment Program that consists of two components viz:

- The Reform Project to improve the performance of the railway sector through organizational, institutional strengthening & policy reforms;

- The Investment Project to finance implementation of priority investments (“Investment Subprojects”) to overcome capacity bottlenecks in areas of the railway network where such investments are both economically and financially viable (e.g. the Dhaka-Chittagong Corridor.)

2) Project Inception

6. Under ADB’s TA-Loan-2688-BAN (SF), the Sub regional Transport Project Preparatory Facility(STPPF), a design project is going on for feasibility study and detailed design for 7(seven) sub-projects. The feasibility study , detailed design and tendering services of the above sub-projects were carried out against STPPF.

7. The investment project will be funded by Asian Development(ADB), European Investment Bank(EIB) and Government of Bangladesh(GOB). Hence, the project will be guided by the guidelines of ADB, EIB and GOB.

3) Project Objectives:

8. To convert Dhaka-Chittagong Railway corridor from Meter Gauge (MG) to Broad Gauge (BG) by constructing Dual Gauge and to construct the Double Tracks of the whole project segment.

To improve the traffic capacity by constructing double track of 72km section and to improve of existing track so that more trains can be introduced. After the implementation of the Project, the current capacity of 23 pairs trains per day will be increased up to 72 pairs trains per day.

9. By improving the load bearing capacity of railway track new locomotives of heavier axle load can be operated in Dhaka-Chittagong corridor.

10. This project will contribute to improve connectivity for regional and International Freight (Container) traffic along the Trans Asian Railway from India North East to Chittagong and will improve the punctuality of train services by clear off the temporary speed restrictions. Moreover, double track and improved section of existing track will save 25 minutes off the present travel time.

11. The improvement of the financial performance through lowering operating costs will provide a better quality of service for the passengers.

To improve reliability for freight services by providing capacity that affords container block trains with equal priority to intercity passenger trains.

To reduce traffic congestion and air pollution through diversion of some road traffic to rail.

4) Project Implementation

12. For Consultancy Services for the Construction Supervision of Akhaura-Laksam Double Track Project an International Tender was called on 19th May,2015. Dohwa Engineering Co., Ltd in joint venture with 4 other companies(Dohwa JV) was resulted in the successful tenderer and a consultancy contract was signed on 28th February, 2016.

13. The detailed design of Construction of Akhaura-Laksam Double Track Project was completed in 2015. Based on the completed design, tender documents were prepared and issued to prequalified contractors in May, 2015. A contract for ALDLP was signed between BR and CTM JV(China Railway Group<CREC>,Toma Construction & CO. Ltd.<TCCL> and Max Infrastructure Limited.<MAX> on 15th June, 2016 for a Contract Amount of BDT 34,734,882,272.43(USD446,636,007 of which ADB will finance 68.3%, EIB,27.8% and GOB,3.9%).

14. After signing of the contract for construction works, Dohwa JV was appointed as the “Engineer” for the construction on 15th June, 2016.

15. Dohwa JV started mobilizing from 10th April, 2016 and CTM JV started mobilizing as from 15th June, formal Instruction to Commence of the Contract was given to CTM JV on 31st October, 2016 for their Commencement from 1st November, 2016 under the total construction period of 1,456days(48months).

16. The whole line is divided into 3 sections with different completion dates as intermediate milestone term schedule.

1.2 Project Location And Components

1.2.1 Project Location

17. The Rail network is divided into two zones: east and west, separated by the Jamuna River. The network includes 659.33km of broad gauge track with the west zone, i.e., 1.676 meter width track. In addition the west zone gauge track has 534.67 km track and 374.83 km of dual gauge track (catering for both broad and meter gauge trains). The east zone has 1,273.38 km of meter gauge track, 34.89 km of dual gauge track. Jamuna multipurpose bridge, which has a dual gauge rail link, provides the only east-west rail link.

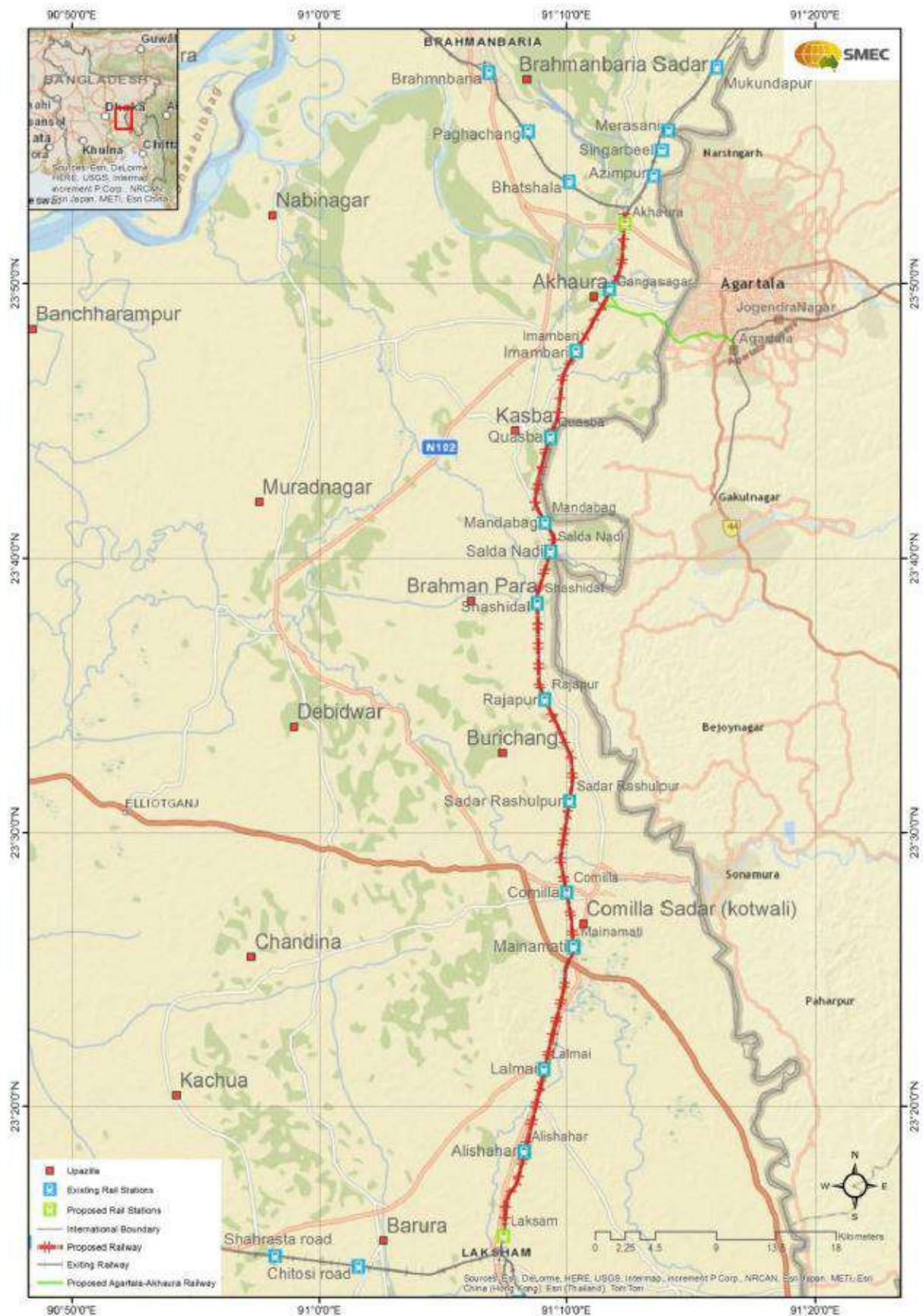
18. The project will support the Government of Bangladesh to upgrade about 72 km Akhaura-Laksam section of Dhaka Chittagong railway corridor to a double track railway line with modern signaling and telecommunication equipment. The section is part of a major sub-regional corridor and the Trans-Asia Railway network.

19. The rainy season in this area starts between April and July and ends between September and November. The track passes through low, flat and alluvial land and crosses several major rivers viz, Titas River, Howrah River, Bijni River, Sald River and Gumti River and many smaller rivers, streams and canals some of which become dry during the dry season.

Table 1. Location of the Laksam-Akhaura Double track Project

Division	District	Upazila
Chittagong	Brahmanbaria	Akhaura, Quasba
	Comilla	Bhramanpara, Burichang, Comilla Sadar, Comilla Sadar Daksmi, Laksam.

Figure I. Project Location Plan



1.2.2 Project Components

20. The scope of the Akhaura-Laksam Double Line Project(ALDLP) and major activities are summarized as follows:

- (i) Constructing a second track in dual gauge of 72 Km
- (ii) Reconstructing of the present track to dual gauge
- (iii) Lengthening passing loops
- (iv) Construction of new bridges
- (v) Reconstruction of existing bridges and culverts
- (vi) Modernization of signaling and telecommunication system
- (vii) Construction of 11 new stations

21. A modern computer-based interlocking signaling system will be installed; this will be integrated with the Centralized Traffic Control system.

Additional details are shown below.

Property	Qty	Properties	Qty
Major Bridge	12 Nos.	Level Crossing	23 Nos.
Minor Bridge (Culverts)	49 Nos.	Station to be modified In Signalling and Telecommunication	2 Nos.
New Station	11 Nos.	Station Building with Total plinth area and New station	11 Nos.
Route Km	72 Km	Other functional and Residential building	54 Nos.
Track Km	180 290m	With total plinth	

1.3 Environmental Classification of the project and Responsibilities

1.3.1 Environmental Category

22. This project was classified as environment Category B according to the ADB Safeguard Policy Statement (SPS) 2009 as there are no environmentally sensitive sites within the project area and the project includes construction of tracks alongside an already existing track. Hence an Initial Environmental Examination (IEE) has been prepared.

23. The European Investment Bank (EIB) a co-financier for this project requires the preparation of an Environmental Impact Assessment (EIA) in accordance with the requirements of EIB Environmental and Social Handbook, 2013-Version 9.0.

24. In accordance with the requirements of the Department of Environment (DoE), Ministry of Environment and Forests, Government of Bangladesh the project is classified as red category and requires a full EIA. The 69 types of projects listed a red category in the Environmental Conservation Rules 1997 includes engineering works where the capital investment is more than 1 million Taka and construction of bridges longer than 100 m. The project investment is more than 1 million taka and includes bridges longer than 100 m, and hence is red category project.

2) Environmental Clearances

25. According to the Environmental Conservation Rules, 1997, the project falls under Red category and thus under the provisions of the Bangladesh Environment Conservation Act, 1995, Bangladesh Railway (BR) needed to obtain Environmental Clearance Certificate (ECC) from the Department of Environment, Government of Bangladesh before commencement of the construction works.

26. The Environmental Clearance Certificate (ECC) for the project, valid for one year, was obtained by BR from the DOE on 2nd May 2016, according to their memo no. DOE/Clearance/ 5209/2013/188. Dated: 02/05/2016. Subsequently renewals of the ECC will be obtained before 02/05/2017 for the year 2017 (1 year). BR will have to lodge an application for a renewal of the environmental clearance certificate up to 30th Jun 2017. The current certificate is provided in Annex-D.

3) Institutional Setup and Responsibilities

27. During the preparation and construction of the Project, BR's Project Director is giving the final approval for all administrative and technical decisions at all times. The key agencies or units which are playing major roles in the implementation of the EMP are:

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

28. The implementation oversight of all safeguard items in the EMP and indeed the construction contract are with BR and its ESSU. When the Engineer is appointed BR's technical management of the work is being delegated to the Engineer, but with final approval always passing through BR (Figure 21 in the EIA report) with annual audit reports submitted to ADB and EIB, who may undertake periodic inspection trips to confirm that safeguards are being fully implemented.

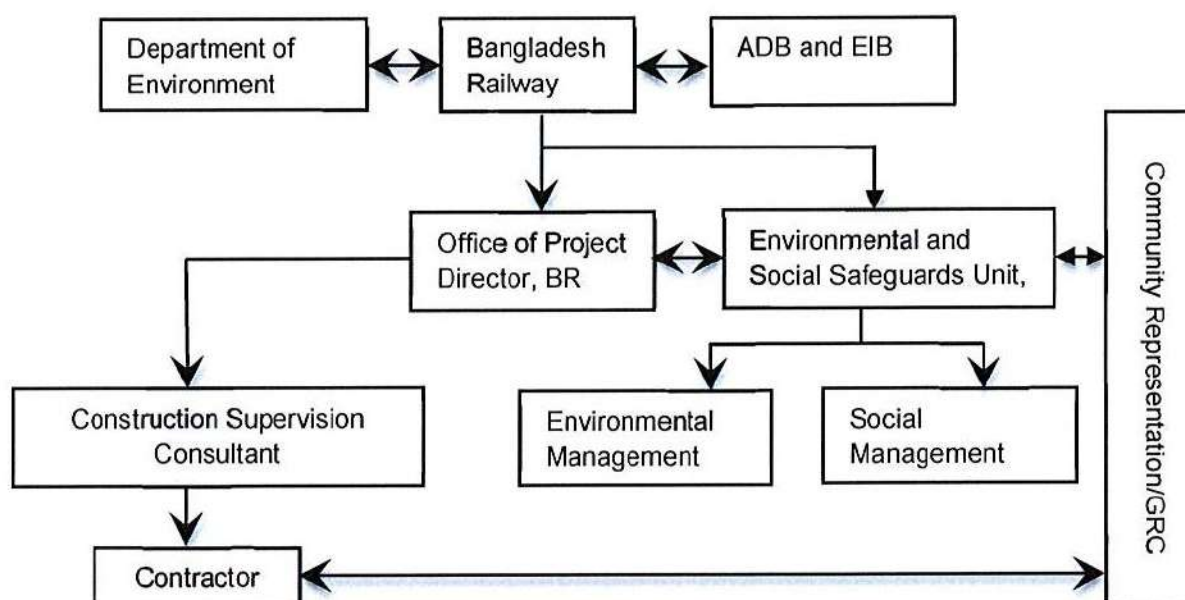


Figure 2. Safeguards Implementation and Reporting Work Flow

29. **BR's Environmental and Social Safeguards Unit (ESSU)** – The objective of an ESSU 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 Project activities, or community complaints. Secondly, the ESSU should be able to manage Consultant and oversee the Consultant's deliverables. Thirdly it will need to be able to fully address EIA requirements of the Project when the Engineer is no longer on the job. The ESSU will have to be able to assess environmental data, analyses it and define actions required to address non-compliant findings in a credible and timely manner. Finally the ESSU 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 ESSU's main tasks will be:

- Oversee the implementation of the LAP and RP;
- Implementing 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
- Providing training to contractors and BR staff.

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

31. **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 its Chief Engineer in charge. Therefore, the Engineer will work closely with the BR's Regional office.

32. **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 associated documents.

33. **Contractor(s)** – A contractor selected on the basis of international complete bidding shall carry out construction work based on a contract containing a set of environmental clauses, conditions and/or specifications (Section 6, Subsection H of contract technical specifications and **Annex 11**). 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 ESSU or its Consultant.

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

4) **Key Findings in the EIA report**

35. The conclusion and recommendations of the EMP of 2016 are as follows:
The project involves the doubling of an existing rail line; therefore new impacts are really the magnification of impacts taking place along the corridor for many decades given that it has been in operation since the late 19th Century.

36. Most of the impacts associated with the project will occur during the construction period since a large and high embankment, between 2-6 m, will be put in place and requiring millions of tons of fill

material. Much of that will be dredged from nearby rivers and pumped as slurry to the work sites. As much ballast, as possible will be hauled on roads. The problems arising when the contractor does not follow environmentally responsible operating procedures or does not provide proper housing or cleaning, hygienic quarters for the workers is also addressed in detail.

37. The EIA identified eight mitigative actions needing to be addressed during the pre-construction period, another 20 during the construction period and eight during the operating period of 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 carried through into the operating period for operating years 1, 3 and 5.

38. There is little chance that impacts will extend much beyond the 50 or 100 m wide corridor of impact centred over the rail line, given that all work will be strictly confined to the railways existing Right of Way.

39. Careful implementation of the pre-construction mitigative measure will make the likelihood or scale of the construction period impacts less.

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

41. The fuel saving, due to diversion of road use to rail travel during the first year of full operation, i.e. , 2020, will be 10,743,000 litre of fuel, with 6 additional train sets operating on the new track. However by 2023, with 44 train sets in operation, estimated fuel saving will be around 54 million litres/year (including the added fuel used by the larger number of train sets. After 2023 the diversion is expected to have peaked and no increase is predicted through 2044.

42. Based on these data, the diverted traffic in 2023, when 44 train sets are in operation an estimated 64.4 million litres of diesel fuel per year would be saved, with a net benefit, once train consumption is deducted, of 53.78 million litres/year. A net fuel saving of 53.78 million litres per year, translates into a saving of 145,000 metric tonnes of equivalent CO₂ per year. (using an equivalent CO₂ emissions factor of 2.69 kg CO₂ per litre of diesel fuel consumed).

43. The establishment of BR's Environmental and Social Management Unit will be essential and will make the job of implementing environmental safeguards much easier and more credible, since some expertise will reside in BR, overseeing the entire EIA procedure, instead of it being only with outside Consultant.

44. Social impacts especially associated with land acquisition and the need to relocate people and to use productive agricultural lands, will be significant and will affect thousands of people. The procedure for determining entitlement and compensation is defined in the LAP and RP documents which the Project must follow closely. The actions defined in these two documents are being implemented by BR.

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

46. 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. Should problems be noted with the data, BR will recommend 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 ADB that the natural environment is being protected while the rail line is built and the system becomes operational.

47. The potential impacts on the Gumti River Bridge 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.

48. The reconstruction of 11 stations and construction of other buildings will be managed through a programme of maximum recycling of materials and management of all wastes and dust suppression. The design of each station and building, to accommodate sewage, waste, water, lighting and universal design features has been completed as a separate report and will be verified as part of the pre-construction check by BR and its ESSU.

49. BR concludes that this EIA is complete and addresses all relevant likely impacts and proposes a full set of time-bounded mitigative and monitoring actions, including assignment of responsibility. The application of the detailed EMP will ensure that the nature and socio-cultural environment 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.

50. The recommendations of the EMP were incorporated into the detailed design and the tender documents and have then become a part of the civil works contract. The cost for the implementation of the EMP was included in the contract and the approved Revised Development Project Proforma /Proposal (RDPP).

1.4 Project Status

1) Project Status at 30 June 2017

64. Processing Status of Materials and Others:

- (i) **Rails:** Approved manufacturer of rails as to "Inner Mongolia Baotou Steel Union Co, China"
- (ii) **Third Party Inspector:** the Engineer approved NMCI for rails only, other track material not approved.
- (iii) **Ballast source:** Approved 4 suppliers.
- (iv) **Temporary Laboratory** has been set up in Comilla at the end of November 2016.
- (v) **Aggregate Source:** approved 4 suppliers
- (vi) **Cement suppliers:** Approved 4 suppliers
- (vii) **Rebar:** Approved 3 suppliers
- (viii) **PSC Sleepers:** GPT Infra-project Technologies/India will be acceptable, but TOMA and MAX plants shall be checked in legal aspects.
- (ix) **Embankment borrow source:** to submit the borrow source prior to any work commencement.

Initial submission was rejected.

- (x) **Dumping yard:** to be submitted soon.
- (xi) **Water purifiers** for Engineer's accommodation:

The Engineer concerned about the quality of ground water, so both planned to analyze the ground water quality to assure it to meet with the potable water criteria of user's country criteria.

2) Environmental Management Plan

65. For this project the EIA report included (Table 38, Table 39, Table 40 and Table 41 of the EIA report) the Environmental Management Plan (EMP). 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 sources of the impacts and the impacts were identified during the EIA study. The EMP is presented as two tables, defining not only impacts and mitigative and monitoring actions to be implemented, but also, where when and who will be responsible for implementing them. The EMP describes well known and best practice mitigative action to be taken to prevent negative impacts from taking place and if that is not possible to mitigate them to an acceptable level. In addition this EMP will:

- define measures to off-set or compensate irreversible negative impacts;
- specify the institutional arrangement for the implementation of the EMP; and
- identify means to enhance and maximize positive impacts.

66. The EMP (Table 38 and Table 39 of the EIA report) will be the main tool with which BR will manage environment impacts by applying both mitigative and monitoring measures in a technically credible and 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 requirement set by DoE. Mitigative measures are tracked via the monitoring programme, which is described in the second of two EMP tables, and focuses on construction and operating period impacts.

67. 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 its own mitigative and monitoring requirements. These details for the Gumti River Bridge are provided in Chapter VI and Chapter IX in the EIA report.

68. The Contractor shall be responsible for preparing detailed documentation related to implementing this EMP. This should include information regarding scheduling, personnel, reporting and auditing requirements, training and detailed procedures for implementing the EMP. The Contractor's EMP and associated documentation shall be approved by BR prior to construction commences.

3) Environmental Management Implementation Works Schedule (EMWS)

69. 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.

70. BR is committed to exploring the establishment of an ESSU and has included that as an action item in the Project's feasibility study. BR will address this internally, to establish if such a staff complement is available. The EMP has been integrated into the contract specifications, making it a mandatory set of task 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 ESSU is established BR will assign at least one safeguards specialist to deal with Project safeguard matters.

71. During the pre-construction period BR will be responsible for implementing the seven mitigative and monitoring measures, according 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.

72. The contractors will implement all 20 mitigative and monitoring actions (See EMP), 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-mobilization workshop BR or its Engineer will review all these requirements (which are all defined in the EIA and its EMP). Construction bid documents have been prepared with a specific environmental bill of quantity section, allowing for unambiguous calculation of environmental penalties.

73. Monthly and quarterly progress reports on EMP implementation shall be prepared by the Contractor in cooperation with the Engineer appointed by BR. All reports to be submitted to Br via the Engineer. The quarterly reports will include a compliance monitoring checklist reporting (Annex 12 of the EIA report) on the progress of all 20 constructions 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.

74. During the construction period (four years) 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 Chapter XI in the EIA report.

1.5 Environmental Mitigation and Monitoring Requirements

1) The Environmental Management Plan in different Phases of the Project

75. In pre-construction period BR identified eight impacts which if not properly addressed could lead to impact during the other two Project phases or totally eliminate the objective of completing an EIA. These included, having a tree replacement plan in place, minimizing land requirements by fine tuning where the new alignment is placed, and giving a process in place that protects the three identify PCRs and the 46 community-level sites (CPR) identified during consultations as needing protection.

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

77. During construction period BR identified 20 mitigative and monitoring actions that will need to be implemented if significant construction-related effects are to be minimized (see EMP **Table 32 33**). The following nine construction activities are likely to trigger negative effects which have been addressed in the EMP:

- Unrestricted movement of construction, machinery and vehicles;
- Railway embankments construction;
- Construction of station buildings and EMO building;
- Rail and loop/siding development;
- Station access road construction;
- Bridges crossing structures, culverts and any training works;
- Installation of signaling and interlocking system, platforms, foot over bridges at stations, platform sheds and level crossing safety facilities; and
- Poor good housekeeping practices by the contractor and failure to properly implement an occupational health and safety programme.

78. Of these, the most important will be the effects stemming from the placement of the two-six meter high embankment paralleling the existing rail line for around 70 km. the movement of around 56,000 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 fleet maintenance will be important. Insuring the trucks and

construction machinery do not idle for more than three minutes if not in use will markedly reduce the emissions and provide considerable fuel savings.

79. The embankment slopes will easily erode if not re-vegetated quickly. Therefore, the contractor will implement a rehabilitation programme as the work is completed

80. To better track the air and noise pollution the contractor will be required to undertake a compliance monitoring programme, testing the parameters defined in Chapter IV of the EIA report and at the same station as shown in the strip maps (Annex 2 in EIA report) Noise monitoring will be completed at the three PCRs and 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.

81. Another 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 plant⁵⁷ occupational health and safety (OHS) practices are 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 OHS training sessions at least once a year.

82. Construction of one large bridge, 11 medium bridges and 47 culverts could result in impacts on surface water quality and to that end the Gumti River crossing work will undertake water quality monitoring, according to the design used in this EIA. This is particularly true if bentonite drilling mud is used during the pile boring operations on the six larger rivers. Contractors will be required to provide a bentonite recovery plan, should this material be used.

83. Finally, the Project will require concrete since all piles; piers and large culverts will be cast at casting yards requiring the establishment of a mobile concrete batch plant, generating noise and dust. The contractor will be required to have dust and noise suppression features built into any concrete batch plant. The plant will need to be located at a DoE approved site, at least 500 m from the nearest occupied dwelling.

84. Since the existing line has been in operation for over 100 years, producing noise, dust and air pollution, there will be added impact from the operation of a second line, but the extent of this impact should be compared with the establishment of a new railway line. Eight mitigative and monitoring actions will need to be implemented during the operating period. Three important impacts that BR will address are:

- Possible inadequate clean up and rehabilitation of contractors camps and yards and borrow areas;
- Added noise and air pollution from a doubling of the rail traffic, 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.

85. These impacts, mitigative measures and monitoring requirements are listed in detail in the EMP.

2) Sampling Program

86. The extent of the impacts of environmental pollution related to surface water, ground water, air quality and noise level were determined in quantitative terms by sampling a range of related environmental parameters. The mitigative measures provided for in the EMP can be adjusted based on these results as well. The field sampling work was specified for the construction and operating period.

2. Environmental Monitoring

A. Pre-construction stage

87. Around 55,000 trees and saplings within 50m RoW of proposed alignment, workers camp setting, and station areas are being cut down during pre-construction period. Proper compensation to affected people is being provided with the house and property damage through resettlement activities of the project. The tree along the RoW were illegally planted and some are naturally grew. So no tree will be planted to compensate the tree loss but vegetation must be planted to protect erosion and potential ecological loss.

88. Based on preliminary topographical and social survey data of the project, the project involves land acquisition of around 37.38 hectares along the proposed alignment and station areas. A total of 2004 households will be affected. The detail guideline for land acquisition and compensation can be found in LAP and RP of this project.

89. Some utility lines such as electric transmission lines and water supply pipelines are being shifted or removed with proper agency approvals and permits. It will be confirmed that permits, Location and relocation site plans have been approved.

B. Construction Stage

90. Although to date many of the mitigation measures have been implemented there are some significant deficiencies that need to be addressed as the number and range construction activities has increased on site. One important area where deficiencies continue to exist and that needs further on-going action is the occupational health and safety practices. Further improvement of the general condition of the camps and work areas in relation to waste disposal, hygiene, medical facilities, etc. is still required and general cleanliness and tidiness needs attention. Personal safety including the provision and use of the range of Personal Protective Equipment (PPE) for the workforce is also an area that requires continual attention with frequent and regular training and awareness sessions for all staff. This in fact is now taking place, with the CSC taking a leading role.

91. Safety at the many work sites with the provision of signs and notices, warning flags, safety barriers and fences, shoring of excavations and general safe working practices is also an area that requires continual attention with regular maintenance and frequent replacement of many of the precautionary devices used. Until June 2017, the extent of the impacts on surface and ground water, air quality, noise and vibration from the various work activities could not be determined. The sampling requirements for surface water, ground water, air and noise have been maintained at the agreed frequency with the results up to 31 June 2017.

92. A number of impacts mentioned several times in the past have been left unaddressed, namely the completion of the clearing of all pond site debris and diversion material and the complete stabilization of embankments with vegetation, the provision of solid waste disposal facilities (garbage cans) at stations, and the removal of construction debris/equipment and materials from station platforms.

93. The clean-up and demobilization of the main subcontractor's construction yard has not started and the area is in serious non-compliance, i.e. there is waste oil spilled throughout the site as well as construction debris scattered in the open, creating ideal stagnant water pools and mosquito breeding areas. Finally, there remains the issue of filling in of large borrow areas and the arrangement with local residents to hand over these sites for other uses. This is mainly at the private land sites.

C. Sampling Program Results and Analysis

2.1 Water Quality Monitoring

2.2 Surface Water Quality

95. Surface water sampling was based on the identification of major surface water bodies which has crossed the Construction site. Groundwater sampling locations were selected to obtain a representative water sample from various zones within the study area. The samples were collected from existing tube wells of the railway stations. Detail of the sampling location is provided in **Table2**.

Table 2. Details of Surface and Ground Water Sampling Locations

Sl	Sampling location	Sampling water	Sampling Code	Geographic location	Type of Source
January 2017					
1.	Lalmai Railway Station near Mosjid Pond	Surface water	SW 1	23°21'39.0" N 91°9'5.7" E	Pond
2.	Gangasagar Railway Station near Hawra River	Surface water	SW 2	23°50'3.3" N 91°11'52.1" E	Hawra River
3.	Lalmai Railway Station	Ground water	GW1	23°50'6.0" N 91°11'53.6" E	Ground water
4.	Gangasagar Railway Station	Ground water	GW2	23°21'38.2"N 91°9'9.6"E	Ground water
February 2017					
5.	Kosba Railway Station Jame Mosque	Ground water	GW1	23°44'26.5" N 91°9'20.0" E	Tubewell
6.	Alishahar Railway Station	Surface water	SW 1	23°18'25.5" N 91°08'19.8" E	Pond
7.	Alishahar Railway Station	Ground water	GW2	23°18'23.4" N 91°08'17.8" E	Tubewell
March 2017					
8.	Dakatia River, Baghmara, Sayedpur (Cha 231)	Surface water	SW1	23°20'18.7" N 91°08'49.0" E	River
9.	Saldanadi River, (Cha 161)	Surface water	SW2	23°40'18.1" N 91°09'22.4" E	River
10.	Alishahar Railway Station Tubewell	Ground water	GW1	23°18'23.4" N 91°08'19.0" E	Tubewell
11.	Saldanadi Railway Station Site Tubewell	Ground water	GW2	23°40'16.9" N 91°09'20.9" E	Tubewell
April 2017					
12.	Saldanadi River	Surface water	SW1	23°40'17.7" N 91°09'22.4" E	River
13.	Dakatia River (Bridge No. 231)	Surface water	SW2	23°20'18.6" N 91°08'49.0" E	River
14.	Saldanadi Railway station construction area	Ground water	GW1	23°40'16.7" N 91°09'20.7" E	Tubewell
15.	Alishahar Railway Station	Ground Water	GW2	23°18'23.4" N 91°08'17.9" E	Tubewell

SI	Sampling location	Sampling water	Sampling Code	Geographic location	Type of Source
May 2017					
16.	Saldanadi River	Surface water	SW1	23°40'17.9" N 91°09'25.4" E	River
17.	Mandabag Railway Station Chandkhula Jame Mosque	Ground Water	GW1	23°20'18.6" N 91°08'49.0" E	Pump water
18.	Mainamoti Railway Station Jame Mosque	Ground Water	GW2	23°25'59.3" N 91°10'17.9" E	Tubewell
June 2017					
19.	Dakatia River Water (Up Stream)	Surface water	SW 1	23°20'18.5" N 91°08'52.7" E	River
20.	Dakatia River Water (Down Stream)	Surface water	SW 2	23°20'19.6" N 91°08'43.7" E	River
21.	Quasba Construction Camp Office	Ground water	GW 1	23°44'23.04" N 91°09'24.51" E	Pump water
22.	Mainamoti Railway Station Jame Mosque	Ground Water	GW2	23°25'59.3" N 91°10'17.9" E	Tube-well water

96. The samples were analyzed for parameters covering physicochemical characteristics which include certain heavy metals and trace elements.

Water samples were collected as grab water sample in a standard sampling bottle for complete physicochemical tests.

97. The samples were analyzed as per standard procedure/method given in Standard Method for Examination of Water and Wastewater Edition 20, published by APHA as well as using on site field test kit. Details of the analysis method and protocol are presented in **Table**

Table 3. Method for Water Analysis

SI.	Parameter	Test method (APHA)
1.	Temperature (°C)	Digital thermometer
2.	Total Dissolved Solids (TDS) (mg/l)	Digital TDS meter
3.	EC (µmhos/cm)	Digital EC meter
4.	DO (mg/l)	Digital DO meter
5.	pH	Digital pH meter
6.	BOD	5210.B
7.	COD	5210.B
8.	Fluoride (F) (mg/l)	4110.B
9.	Arsenic (As) (mg/l)	3114.C
10.	Manganese (Mn) (mg/l)	4110.B
11.	Phosphate(mg/l)	4110.B
12.	Faecal Coliform (mg/l)	Lab Analysis

98. The quality of surface water was compared with the standards for Inland Surface Water, Environment Conservation Rules (ECR) and 1997-Schedule 3 whereas the groundwater was compared with the Drinking Water Standard ECR Schedule-3, 1997. The standards have been presented along with the monitoring results of surface and groundwater for comparison.

Results of Sampling and Analysis

99. During January to June 2017 some minor works were being undertaken. There is a possibility to pollute the surface water during the construction and operation period from untreated sewage effluent discharged by passing trains, spillage of fuel and other chemicals from freight trains, accidental spillage of oil and other noxious chemicals. The quality of surface water tested and analyzed in the project area is provided in the following **Table 4**.

There is a possibility to pollute the surface water during the operating period from untreated sewage effluent discharged by passing trains, spillage of fuel and other chemicals from freight trains, accidental spillage of oil and other noxious chemicals. Following Table provides the quality of surface water in the study area.

Table 4. Surface Water Quality in the Study Area during January-June 2017

Sl#	Sampling Code	Location	pH	Temperature (°C)	Electric Conductivity (EC)	Total Dissolve Solids (TDS)	Dissolve Oxygen (DO) (mg/L)	Biochemical oxygen demand (BOD) (mg/L)	Chemical Oxygen Demand (COD) (mg/L)	Total Suspended Solid (TSS)	Sampling Time	Sampling Date	Sample Collector's name With Mobile no.
January 2017													
1.	SW 1	Lalmai Railway Station near Mosjid Pond	7.53	22.2	0.35	0.18	4.8	5	16	12	12.15 pm	02.01.2017	Md. Tanvinuzzaman Khan 01616941424
2.	EMP	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
3.	SW2	Hawra River	7.24	23.5	0.16	0.12	5.6	4	12	7	7.45 am	02.01.2017	Md. Tanvinuzzaman Khan 01616941424
4.	EMP	Hawra River	7.49	23.4	0.15	0.08	6.1	0.2	4.0	10	NR	NR	NR
February 2017													
5.	SW1	Alishahar Railway Station Pond	7.50	26.4	195	180	5.7	6	28	31	10.30 am	05.02.2017	Md. Tanvinuzzaman Khan 01616941424
6.	EMP	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
March 2017													
7.	SW1	Dakatia River , Baghmara, Syedpur (Chainage 131)	6.57	24.7	0.19	0.09	5.6	3.0	8.0	20.0	7.45 am	08.03.2017	Mustafizur Rahman 01734128665
8.	EMP	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
9.	SW2	Saldanadi River, Ganganagar, B.Par (Chainage 161)	6.70	25.5	0.13	0.7	5.2	2.0	8.0	26	11.15 am	08.03.2017	Mustafizur Rahman 01734128665
10.	EMP	Saldanadi River, Ganganagar, B.Par (Chainage 161)	7.5	23.8	0.09	0.05	5.6	6	24	18	NR	NR	NR
April 2017													
11.	SW 1	Saldanadi River	7.41	30.8	0.13	0.08	5.1	LA	LA	LA	7.00 am	10.04.17	Washim Uddin 01777654488
12.	EMP	Saldanadi River	7.5	23.8	0.09	0.05	5.6	6	24	18	NR	NR	NR

Sl#	Sampling Code	Location	pH	Temperature (°C)	Electric Conductivity (EC)	Total Dissolve Solids (TDS)	Dissolve Oxygen (DO) (mg/L)	Biochemical oxygen demand (BOD) (mg/L)	Chemical Oxygen Demand (COD) (mg/L)	Total Suspended Solid (TSS)	Sampling Time	Sampling Date	Sample Collector's name With Mobile no.
13.	SW 2	Dakatia River (Bridge 231)	6.97	29.4	0.14	0.07	5.7	LA	LA	LA	12.30 pm	10.04.17	Washim Uddin 01777654488
14.													
15.	EMP	Dakatia River (Bridge 231)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
May 2017													
16.	SW 1	Saldanadi River	7.75	26.2	0.12	0.09	5.2	4	12	22	7:30 am	07.05.17	Md. T. Zaman 01717164694
17.	EMP	Saldanadi River	7.5	23.8	0.09	0.05	5.6	6	24	18	NR	NR	NR
June 2017													
18.	SW 1	Dakatia River (Up-Stream)	6.89	28.6	0.07	0.04	5.3	3	12	16	12.05 am	05.06.17	Md. T. Zaman 01717164694
19.	EMP	Dakatia River (Up-Stream)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
20.	SW 2	Dakatia River (Down-Stream)	7.01	28.9	0.07	0.04	5.6	2	8	15	12.30 pm	05.06.17	Md. T. Zaman 01717164694
21.	EMP	Dakatia River (Down-Stream)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Bangladesh Standard													
	Source of drinking water for supply only after disinfecting		6.5-8.5	-	-	-	6 or above	2 or less	-	-			
	Water usable for recreational activity		6.5-8.5	-	-	-	5 or more	3 or less	-	-			
	Source of drinking water for supply after conventional treatment		6.5-8.5	-	-	-	6 or above	6 or less	-	-			
	Water usable by fisheries		6.5-8.5	-	-	-	5 or more	6 or less	-	-			
	Water usable by various process and cooling industries		6.5-8.5	-	-	-	5 or more	10 or less	-	-			
	Water usable for irrigation		6.5-8.5	-	-	-	5 or more	10 or less	-	-			

Note: BDL = Below Detection Limit; NR= Not Reported; Source: EQMS Field Survey and DPHE Central Laboratory

* Bangladesh Environment Conservation Rules, 1997- Schedule 3 (Standards for inland surface water).

2.3 Ground Water Quality

Results of Sampling and Analysis

100. Groundwater sources can be contaminated by the seepage of wastes from workers' camps through the soil profile into the GW aquifer when wells access the shallow aquifer. The contamination from train operations would be mostly bacteria, viruses and waste from the sewage-laden track runoff leaking into the well. The quality of groundwater tested and analyzed in the project area is provided in the following **Table 5**.

Table 5. Ground Water Quality in the Study Area during January-June 2017

Sl#	Sampling Code	Location	pH	Temperature (0C)	Phosphate	Manganese, Mn	Arsenic, As	Iron, Fe	Fecal Coliform, FC	Sampling Time	Sampling Date	Sample Collector's name With Mobile no.
January 2017												
1.	GW 1	Gangasagar Railway Station – Base Camp	6.40	27.6	0.47	0.06	0.002	0.62	0	12.35 pm	02.01.2017	Md. Tanvinuzzaman Khan 01616941424
2.	EMP	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
3.	GW 2	Lalmai Railway Station	6.35	26.5	0.53	0.10	0.002	0.06	0	8.10 am	02.01.2017	Md. Tanvinuzzaman Khan 01616941424
4.	EMP	Lalmai Railway Station	6.20	27.0	0.18	0.09	0.001	0.05	0	-	-	-
February 2017												
1.	GW 1	Kasba Railway Station Jame Mosque	6.8	25.0	0.52	4.08	0.004	2.73	0	7.30 am	05.02.2017	Md. Tanvinuzzaman Khan 01616941424
2.	EMP	Kasba Railway Station Jame Mosque	6.79	28.6	0.09	1.26	0.005	1.08	0	-	-	-
3.	GW 2	Alishahar Railway Station	6.4	27.8	0.08	0.66	0.002	0.13	0	10.30 am	05.02.2017	Md. Tanvinuzzaman Khan 01616941424
4.	EMP	Alishahar Railway Station	6.9	25.0	0.24	0.33	0.001	0.05	9	-	-	-
March 2017												
1.	GW 1	Lalmai Railway Station Tube well water	6.45	28.7	LA	LA	LA	LA	LA	7.30 am	08.03.2017	Md. Mustafizur Rahman 01734128665
2.	EMP	Lalmai Railway Station Tube well water	6.20	27.0	0.18	0.09	0.001	0.05	0	-	-	-
3.	GW 2	Saldanadi Railway Station, Ganganagar, B.Para	6.01	33.3	0.54	LA	0.016	LA	0	11.30 am	08.03.2017	Md. Mustafizur Rahman 01734128665

Sl#	Sampling Code	Location	pH	Temperature (OC)	Phosphate	Manganese, Mn	Arsenic, As	Iron, Fe	Fecal Coliform, FC	Sampling Time	Sampling Date	Sample Collector's name With Mobile no.
4.	EMP	Saldanadi Railway Station, Ganganagar, B.Para	6.84	27.6	0.10	0.63	0.003	0.34	2	-	-	-
April 2017												
1	GW 1	Saldanadi Railway Station	6.59	27.4	LA	LA	LA	LA	LA	7.00 am	10.04.2017	Washim Uddin 01777654488
2	EMP	Saldanadi Railway Station	6.84	27.6	0.10	0.63	0.003	0.34	2	-	-	-
3	GW 2	Alishahar Railway Station	7.06	28.2	LA	LA	LA	LA	LA	12.30 pm	10.04.2017	Washim Uddin 01777654488
4	EMP	Alishahar Railway Station	6.9	25.0	0.24	0.33	0.001	0.05	9	-	-	-
May 2017												
1	GW 1	Mandabag Railway Station Chandkhula Jame Mosque	7.10	29.7	0.34	0.54	0.001	0.09	0	7.00am	07.04.2017	Md. T. Zaman 01717164694
2	EMP	Mandabag Railway Station Chandkhula Jame Mosque	6.84	27.6	0.10	0.63	0.003	0.34	2	-	-	-
3	GW 2	Moinamoti Railway Station Jame Mosque	7.15	28.9	0.98	1.83	0.001	0.05	0	11.30	07.04.2017	Md. T. Zaman 01717164694
4	EMP	Moinamoti Railway Station Jame Mosque	6.9	25.0	0.24	0.33	0.001	0.05	9	-	-	-
June 2017												
1	GW 1	Quasba Construction Camp Office	6.35	28.2	0.73	0.80	0.006	0.05	0	7.00am	07.04.2017	Md. T. Zaman 01717164694
2	EMP	Quasba Construction Camp Office	NR	NR	NR	NR	NR	NR	NR	-	-	-
3	GW 2	Mainamati Railway Station	6.30	27.0	0.91	0.66	0.005	0.06	0	11.30 pm	07.04.2017	Md. T. Zaman 01717164694
4	EMP	Mainamati Railway Station	6.9	25.0	0.24	0.33	0.001	0.06	9	-	-	-
Bangladesh Standard (ECR'97)			6.5- 8.5	-	6.0	0.1	0.05	0.3-1	0	-	-	-

Note: BDL = Below Detection Limit; LA: Lab Analysis Still Going On; Source: EQMS Field Survey and DPHE Central Laboratory

(Source: Laboratory Analysis: DPHE Central Laboratory, Dhaka; Date: March 2017-month sampling date 07th March 2017 and analysis date:

2.4 Air Quality Monitoring

Results of monitoring and Analysis

101. A total of 12 ambient air samples were collected from the railway station areas of the Project rail corridor between Akhaura and Laksam. The ambient status of major air pollutants viz. Particulate Matter (SPM, PM₁₀ and PM_{2.5}), Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x), and Carbon Monoxide (CO) have been assessed by monitoring air quality at thirteen railway stations of the project.

102. Respirable Dust Sampler (Model-Lata Envirotech APM 250 combined PM₁₀ and PM_{2.5} sampler) has been used to collect the air sample. The particulate and gaseous samples collected during the monitoring have been analyzed as per the procedures specified in **Table 6**. All the samples were collected for 8 hour and using the simple power law principle (Schroeder and Jugloff, 2012) results was converted to 24-hour values. The results of the ambient air quality monitoring have been listed in **Table 8**.

Table 6. Methodology for Analysis of Ambient Air Quality

Sl.	Parameter	Analysis procedure
1.	SPM	Gravimetric method
2.	PM ₁₀	Gravimetric method
3.	PM _{2.5}	Gravimetric method
4.	SO ₂	Colorimetric method at 560nm using spectrophotometer (West-Gaeke method)
5.	NO _x	Colorimetric method at 540 nm using spectrophotometer (Jacob and Hochheiser method)
6.	CO	Digital CO meter

The geographical locations and setting of the ambient air quality monitoring locations have been listed in **Table 7**.

Table 7. Ambient Air Quality Sampling Locations during January 2017 to June 2017

Sl.	Sampling Station	Station Code	Geographic Location
January 2017			
1.	Alishahar railway station	AQ 1	23°18'22.8"N 91°08'18.3"E
2.	Kasba railway station	AQ 2	23°44'25.4"N 91°09'21.0"E
February 2017			
3.	Alishahar railway station	AQ 1	23°18'25.5"N 91°08'18.8"E
4.	Kasba railway station	AQ 2	23°44'24.6"N 91°09'19.6"E
March 2017			
5.	Alishahar railway station	AQ 1	23°18'23.1"N 91°08'17.9"E
6.	Saldanadi Railway Station	AQ 2	23°40'15.3"N 91°09'21.2"E
April 2017			
7.	Alishahar railway station	AQ 1	23°18'25.5"N 91°08'18.8"E
8.	Saldanadi Railway Station	AQ 2	23°40'15.4"N 91°09'21.2"E
May 2017			
9.	Mainamoti Railway Station	AQ1	23°25'57.2"N 91°10'16.4"E
10.	Mandabag Railway Station	AQ2	23°41'20.6"N 91°09'10.6"E
June 2017			
11.	Mandabag Railway Station	AQ 1	23°41'20.6"N 91°09'10.6"E
12.	Mainamoti Railway Station	AQ1	23°25'57.2"N 91°10'16.4"E

Table 8. Air Quality monitoring during January-June 2017

Sampling Code	Sampling Location	PM _{2.5} µg/m ³	PM ₁₀ µg/m ³	SPM µg/m ³	SO ₂ µg/m ³	NO _x µg/m ³	CO ppm
January 2017							
AQ 1	Alishahar Railway Station	25.49	43.78	89.86	3.70	14.18	<2
EMP	Alishahar Railway Station	15.29	36.65	65.82	2.56	13.59	<2
AQ 2	Kasba Railway Station	15.17	36.47	55.40	4.39	10.36	<2
EMP	Kasba Railway Station	10.95	25.56	49.52	3.73	11.46	<2
February 2017							
AQ 1	Alishahar Railway Station	21.19	97.65	148.86	6.33	12.80	<2
EMP	Alishahar Railway Station	15.29	36.65	65.82	2.56	13.59	<2
AQ 2	Kasba Railway Station	17.31	79.46	119.77	5.17	10.79	<2
EMP	Kasba Railway Station	10.95	25.56	49.52	3.73	11.46	<2
March 2017							
AQ 1	Alishahar Railway Station	17.41	92.32	135.57	5.79	14.54	<2
EMP	Alishahar Railway Station	15.29	36.65	65.82	2.56	13.59	<2
AQ 2	Saldanadi Railway Station	14.87	85.21	127.43	6.11	12.37	<2
EMP	Saldanadi Railway Station	7.91	19.79	34.69	2.76	9.58	<2
April 2017							
AQ 1	Alishahar Railway Station	19.34	42.67	87.82	4.85	8.34	<2
EMP	Alishahar Railway Station	15.29	36.65	65.82	2.56	13.59	<2
AQ 2	Saldanadi Railway Station	27.34	38.74	79.45	4.34	7.56	<2
EMP	Saldanadi Railway Station	7.91	19.79	34.69	2.76	9.58	<2
May 2017							
AQ 1	Mainamoti Railway Station	20.34	41.38	92.16	2.66	10.15	<2
EMP	Mainamoti Railway Station	18.75	42.45	78.48	3.63	14.78	<2
AQ 2	Mandabag Railway Station	28.41	39.74	77.45	3.64	6.52	<2
EMP	Mandabag Railway Station	14.43	33.93	59.18	3.11	12.83	<2
June 2017							
AQ 1	Mandabag Railway Station	16.43	36.46	78.24	3.56	5.16	<2
EMP	Mandabag Railway Station	14.43	33.93	59.18	3.11	12.83	<2
AQ 2	Mainamoti Railway Station	17.54	47.71	89.51	4.12	6.16	<2
EMP	Mainamoti Railway Station	18.75	42.45	78.48	3.63	14.78	<2
DOE standard (2006)		65	150	200	365	100	9

Source: Air quality analysis done by EQMS Consulting Limited, 2017

Date of sampling 04th – 08th April, 2017, Date of analysis: 9th – 20th April, 2017

Note:

* CO concentrations and standards are 8-hourly only.

** The Bangladesh National Ambient Air Quality Standards have been taken from the Environmental Conservation Rules, 1997 which was amended on 19th July 2005 vide S.R.O. No. 220-Law/2005.

All parameters shown in **Table 8** are within the acceptable limits specified by the DoE.

2.5 Noise Quality

103. Ambient noise levels have been monitored from railway stations of the ALDLP project. Noise data logger (Digital Noise Meter: Model no. GM 1357) has been used to monitor of ambient noise levels. Eleven (11) noise level sampling locations have been selected from the nearby sensitive receptor of the stations. The Detail list of sampling location has been shown in table 9. Noise level was measured for 1 hour at every location on different time.

Table 9. Sensitive Noise Location selected during January 2017-June 2017

Code	Location	Respective Railway station	Geographic location
January 2017			
NL1	Alishahar railway station	Alishahar railway station	23°18'23.0"N 91°08'18.1"E
NL2	Alishahar hafezia maddrasa zame masque	Alishahar hafezia maddrasa zame masque	23°18'24.0"N 91°08'20.1"E
NL3	Suzir Chandra das's House	Alishahar railway station	23°18'24.4"N 91°08'28.5"E
NL4	Amullo chandra singh shop	Alishahar railway station	23°18'23.5"N 91°08'17.4"E
NL5	Alishahsar Construction Area	Alishahar railway station	23°18'27.9"N 91°08'20.1"E
NL6	Lalmai Construction Camp	Lalmai railway station	23°21'24.2"N 91°08'05.6"E
NL7	Lalmai Railway station Jame masque	Lalmai railway station	23°21'23.3"N 91°09'03.5"E
NL8	Lalmai Railway station	Lalmai railway station	23°21'23.0"N 91°09'06.0"E
NL9	Kasba Railway station	Kasba railway station	23°44'23.9"N 91°09'20.1"E
NL10	Kasba Railway station Jame masque	Kasba railway station	23°44'26.1"N 91°09'20.1"E
NL11	Khurshid Miah Shop	Kasba railway station	23°44'27.1"N 91°09'21.4"E
NL12	Kasba Construction Camp	Kasba railway station	21°44'30.2"N 91°09'21.3"E
NL13	Gangasagar Construction Camp	Gangasagar railway station	23°50'04.1"N 91°11'53.5"E
NL14	Dhiruchandra sarkar's House	Gangasagar railway station	23°50'00.4"N 91°11'56.4"E
NL15	Gangasagar Railway Station	Gangasagar railway station	23°49'49.5"N 91°11'45.0"E
NL16	Gangasagar railway station Jame Masque	Gangasagar railway station	23°49'48.8"N 91°11'44.5"E
February 2017			
NL1	Lalmai Construction Camp Yard	Lalmai Construction Camp Yard	23°58'21.2"N 91°06'41.2"E
NL2	Lalmai Railway station	Lalmai Railway station	23°21'22.6"N 91°09'06.1"E
NL3	Lalmai Railway station Jame masque	Lalmai Railway station Jame masque	23°21'23.3"N 91°09'03.5"E
NL4	Alishahar railway station Jame Mosque	Alishahar railway station Jame Mosque	23°18'24.0"N 91°08'20.4"E
NL5	Alishahsar Railway Station Construction Camp	Alishahsar Railway Station Construction Camp	23°18'23.1"N 91°08'17.8"E
NL6	Alishahar Railway Station Shop (Corner)	Alishahar Railway Station Shop (Corner)	23°18'23.5"N 91°08'17.4"E
NL7	Kashba Railway station	Kashba Railway station	23°44'24.3"N 91°09'19.9"E
NL8	Kashba Railway station Jame masque	Kashba Railway station Jame masque	23°44'26.3"N 91°09'20.2"E
NL9	Kashba Railway station Construction Camp	Kashba Railway station Construction Camp	23°44'30.0"N 91°09'21.2"E

Code	Location	Respective Railway station	Geographic location
NL10	Gangasagar Railway Station	Gangasagar Railway Station	23°49'49.1"N 91°11'44.8"E
NL11	Gangasagar Railway Station Construction Base Camp	Gangasagar Railway Station Construction Base Camp	23°50'03.9"N 91°11'53.5"E

March 2017

NL1	Lalmai Construction Camp Yard	Lalmai Construction Camp Yard	23°58'21.2"N 91°06'41.2"E
NL2	Lalmai Railway Station	Lalmai Railway station	23°21'22.6"N 91°09'06.1"E
NL3	Lalmai Railway Station Jame Mosque	Lalmai Railway station Jame masque	23°21'23.3"N 91°09'03.5"E
NL4	Alishahar Railway Station Jame Mosque	Alishahar railway station Jame Mosque	23°18'24.1"N 91°08'19.9"E
NL5	Alisahar Railway Station Residential Area	Near Alishahar Railway Station	23°18'24.4"N 91°08'28.6"E
NL6	Alishahar Railway Station Construction area	Alishahar Railway Station	23°18'22.8"N 91°08'18.1"E
NL7	Kasba Railway Station	Kasba Railway station	23°44'24.0"N 91°09'19.6"E
NL8	Kasba Railway Station Construction area	Kasba Railway station	23°44'29.8"N 91°09'21.0"E
NL9	Kasba Railway Station Jame Masque	Kasba Railway station	23°44'26.1"N 91°09'20.1"E
NL10	Gangasagar Railway Station	Gangasagar Railway Station	23°44'49.1"N 91°11'44.8"E
NL11	Gangasagar Railway Station Construction Base Camp	Gangasagar Railway Station Construction Base Camp	23°50'03.9"N 91°11'53.5"E
NL12	Saldanadi Railway Station	Saldanadi Railway Station	23°40'15.2"N 91°09'21.2"E
NL13	Saldanadi Railway Station Abdul Alim Shop	Saldanadi Railway Station	23°40'15.6"N 91°09'21.9"E
NL14	Saldanadi Railway Station Construction Camp Yard	Saldanadi Railway Station	23°40'16.9"N 91°09'21.4"E

April 2017

NL1	Alishahar Railway Station Jame Mosque	Alishahar railway station	23°18'24.0" N 91°08'20.1"E
NL2	Alisahar Railway Station	Alishahar Railway Station	23°18'23.0" N 91°08'18.1"E
NL3	Bagmara, Bridge No. 231	Bagmara, Bridge No. 231	23°20'18.7" N 91°08'49.0"E
NL4	Lalmai Railway station site construction area	Lalmai Railway Station	23°21'24.0" N 91°09'05.4"E
NL5	Lalmai Railway station	Lalmai Railway Station	23°21'23.8" N 91°09'06.0"E
NL6	Lalmai Railway station Jame Mosque	Lalmai Railway Station	23°21'23.2" N 91°09'03.6"E
NL7	Quasba Railway Station	Quasba Railway Station	23°44'24.9"N 91°09'19.6"E
NL8	Quasba Railway Station construction area	Quasba Railway Station	23°44'29.8"N 91°09'21.2"E
NL9	Quasba Railway Jame mosque	Quasba Railway Station	23°44'25.9"N 91°09'20.3"E
NL10	Saldanadi Railway Station	Saldanadi Railway Station	23°40'15.4"N 91°09'21.3"E

May 2017

NL 1	Alishahar Railway Station Jame Mosque	Alishahar railway station	23°18'24.0" N 91°08'20.1"E
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Code	Location	Respective Railway station	Geographic location
NL 2	Lalmai Railway station	Lalmai Railway Station	23°21'23.8" N 91°09'06.0"E
NL 3	Mainamoti Railway Station	Mainamoti Railway Station	23°25'57.5" N 91°10'16.3"E
NL 4	Jangalia Station Jame Mosque	Jangalia Station Jame Mosque	23°25'58.0" N 91°10'17.2"E
NL 5	Mandabag Railway Station	Mandabag Railway Station	23°41'18.6" N 91°09'08.2"E
NL 6	Mamun Haircut Shop Mandabag Railway Station	Mandabag Railway Station	23°41'19.0" N 91°09'07.7"E
NL 7	Mandabag Railway Station Chankhula Jame Mosque	Mandabag Railway Station	23°41'19.5" N 91°09'06.7"E
NL 8	Saldanadi Railway Station	Saldanadi Railway Station	23°40'15.3" N 91°09'21.4"E
June 2017			
NL 1	Chankhula Jame Mosque	Mandabag Railway Station	23°41'19.5" N 91°09'06.7"E
NL 2	Roghurampur Northpara Jame Mosque	Mandabag Railway Station	23°41'17.69" N 91°09'05.4"E
NL 3	Jangalia Stand Jame Mosque	Mainamati Railway Station	23°25'58.0" N 91°10'17.2"E
NL 4	P.D.B Jame Mosque	Mainamati Railway Station	23°25'50.7" N 91°10'17.4"E

Potential noise impacts will be vary and are based on the noise amplitude, frequency, distance from receivers, site landscape features, topography, presence of obstacles and meteorological effects. In this project key project related noise source will be train traffic, generators, vehicles, construction equipment and people.

During the monitoring phase of the project, field measured value of noise quality is being given in monthly environmental inspection report. Results of noise level monitoring is given in **Table 10**.

Table 10. Results of noise level monitoring during January 2017-June 2017 monitoring results

SL#	Samplin g ID	Location	Noise Level dB (A)	EMP	Zone (according to DoE)	Bangladesh Standard at day Time dB (A)	Remarks
January 2017							
1.	NL1	Alishahar railway station	58.3	58.80	Commercial	70	Low
2.	NL2	Alishahar hafezia maddrasa zame masque	60.1	61.83	Silent	50	High
3.	NL3	Suzir Chandra das's House, Alishahar railway station	49.5	56.56	Residential	55	Low
4.	NL4	Amullo chandra singh shop	66.9	62.95	Commercial	70	Low
5.	NL5	Alishahsar Construction Area	69.7	NR	Commercial	70	Low
6.	NL6	Lalmai Construction Camp	57.6	NR	Commercial	70	Low
7.	NL7	Lalmai Railway station Jame masque	61.9	59.12	Silent	50	High
8.	NL8	Lalmai Railway station	61.4	60.34	Commercial	70	Low
9.	NL9	Kasba Railway station	63.2	54.65	Commercial	70	Low
10.	NL10	Kasba Railway station Jame masque	54.9	56.72	Silent	50	High
11.	NL11	Khurshid Miah Shop, Kasba Railway station	61.7	54.79	Commercial	70	Low

SL#	Sampling ID	Location	Noise Level dB (A)	EMP	Zone (according to DoE)	Bangladesh Standard at day Time dB (A)	Remarks
12.	NL12	Kasba Construction Camp	53.2	NR	Commercial	70	Low
13.	NL13	Gangasagar Construction Camp	61.6	NR	Commercial	70	Low
14.	NL14	Dhiruchandra sarkar's House, Gangasagar Railway Station	54.2	54.80	Residential	55	Low
15.	NL15	Gangasagar Railway Station	72.3	55.06	Commercial	70	High
16.	NL16	Gangasagar railway station Jame Masque	63.3	55.51	Silent	50	High
February 2017							
17.	NL1	Lalmai Construction Camp Yard	61.1	NR	Commercial	70	Low
18.	NL2	Lalmai Railway Station	54.3	60.34	Commercial	70	High
19.	NL3	Lalmai Railway Station Jame Mosque	50.4	59.12	Silent	50	Low
20.	NL4	Alishahar Railway Station Jame Mosque	53.4	61.83	Silent	50	Low
21.	NL5	Alishahar Railway Station Construction Camp	54.7	NR	Commercial	70	Low
22.	NL6	Alishahar Railway Station Shop	61.2	62.95	Commercial	70	Low
23.	NL7	Kasba Railway Station	64.5	54.65	Commercial	70	High
24.	NL9	Kasba Railway Station Construction Camp	65.1	NR	Commercial	70	Low
25.	NL10	Gangasagar Railway Station	60.9	55.06	Commercial	70	High
26.	NL11	Gangasagar Railway Station Construction Base Camp	55.6	NR	Commercial	70	Low
March 2017							
27.	NL1	Lalmai Construction Camp Yard	57.6	NR	Commercial	70	Low
28.	NL2	Lalmai Railway Station	50.4	60.34	Commercial	70	Low
29.	NL3	Lalmai Railway Station Jame Mosque	49.2	59.12	Silent	50	Low
30.	NL4	Alishahar Railway Station Jame Mosque	51.6	61.83	Silent	50	High
31.	NL5	Alisahar Railway Station Residential Area	52.3	56.56	Residential	55	Low
32.	NL6	Alishahar Railway Station Construction area	62.6	NR	Commercial	70	Low
33.	NL7	Kasba Railway Station	62.4	54.65	Commercial	70	Low
34.	NL8	Kasba Railway Station Construction area	66.3	NR	Commercial	70	Low
35.	NL9	Kasba Railway Station Jame Masque	54.8	56.72	Silent	50	High
36.	NL10	Gangasagar Railway Station	56.3	55.06	Commercial	70	Low
37.	NL11	Gangasagar Railway Station Construction Base Camp	54.6	NR	Commercial	70	Low
38.	NL12	Saldanadi Railway Station	56.2	54.64	Commercial	70	Low
39.	NL13	Saldanadi Railway Station Abdul Alim Shop	53.2	62.49	Commercial	70	Low

SL#	Sampling ID	Location	Noise Level dB (A)	EMP	Zone (according to DoE)	Bangladesh Standard at day Time dB (A)	Remarks
40.	NL14	Saldanadi Railway Station Construction Camp Yard	57.3	NR	Commercial	70	Low
April 2017							
41.	NL1	Alishahar Railway Station Jame Mosque	52.3	61.83	Silent	50	Low
42.	NL2	Alishahar Railway Station	57.5	58.80	Commercial	70	Low
43.	NL3	Bagmara Bridge No.-231	55.7	NR	Commercial	70	Low
44.	NL4	Lalmai Railway station site Construction Area	65.6	NR	Commercial	70	Low
45.	NL5	Lalmai Railway station	62.2	60.34	Commercial	70	Low
46.	NL6	Lalmai Railway station Jame Mosque	55.3	59.12	Silent	50	High
47.	NL7	Quasba Railway station	66.5	54.65	Commercial	70	Low
48.	NL8	Quasba Railway station Construction Area	63.4	NR	Commercial	70	Low
49.	NL9	Quasba Railway station Jame Mosque	54.6	NR	Silent	50	Low
50.	NL10	Saldanadi Railway Station	66.3	54.64	Commercial	70	Low
May 2017							
51.	NL 1	Alishar Railway Station Jame Mosque	53.2	61.83	Silent	50	High
52.	NL 2	Lalmai Railway Station	58.3	58.80	Commercial	70	Low
53.	NL 3	Mainamoti Railway Station	56.5	NR	Commercial	70	Low
54.	NL 4	Mainamoti Railway Station Jame Mosque	52.7	NR	Silent	50	High
55.	NL 5	Mandabag Railway Station	61.3	60.34	Commercial	70	Low
56.	NL 6	Mamun Haircut Shop Mandabag Railway Station	57.5	59.12	Commercial	70	Low
57.	NL 7	Mandabag Railway Station Chandkhula Jame Mosque	52.6	54.65	Silen	50	High
58.	NL 8	Saldanadi Railway Station	64.8	NR	Commercial	70	Low
June 2017							
59.	NL 1	Chankhula Jame Mosque	58.4	54.65	Silent	50	High
60.	NL 2	Roghurampur Northpara Jame Mosque	42.6	NR	Silent	50	Low
61.	NL 3	Jangalia Station Jame Mosque	51.7	65.2	Silent	50	High
62.	NL 4	P.D.B Jame Mosque	58.9	NR	Silent	50	High

Source: EQMS Survey Team; EMP: Environmental Management Plan; NR: Not Reported; *Environmental Conservation Rules, 1997 (Schedule 4) (subsequent amendment in 2006)

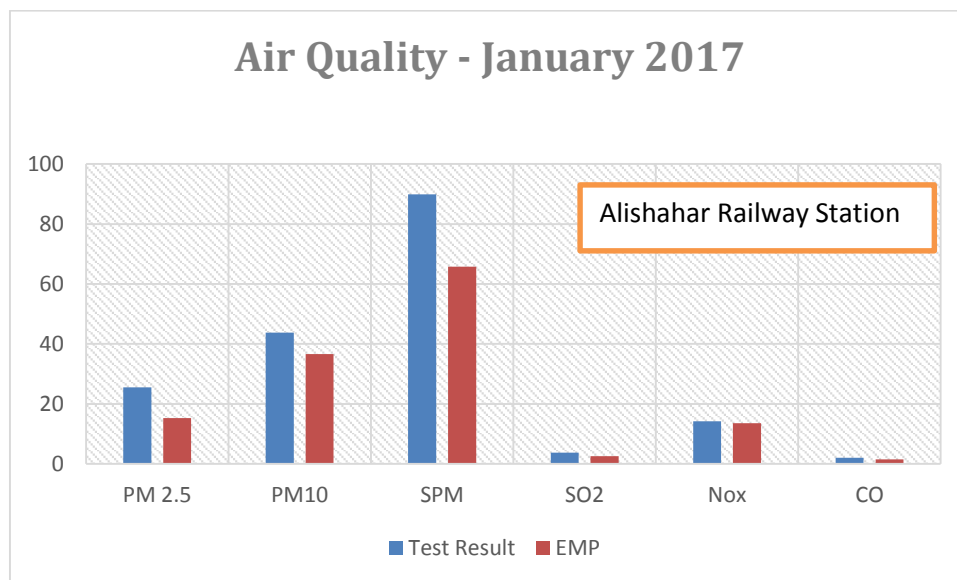


Fig.3. Air quality ($\mu\text{g}/\text{m}^3$) of January 2017 in Alishahar Railway Station

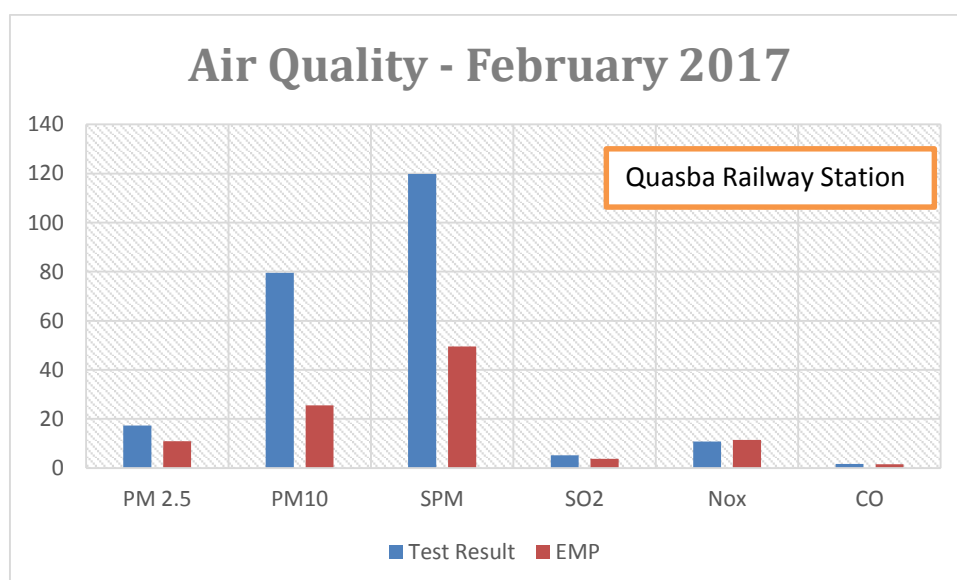


Fig.4. Air quality ($\mu\text{g}/\text{m}^3$) of February 2017 in Quasba Railway Station

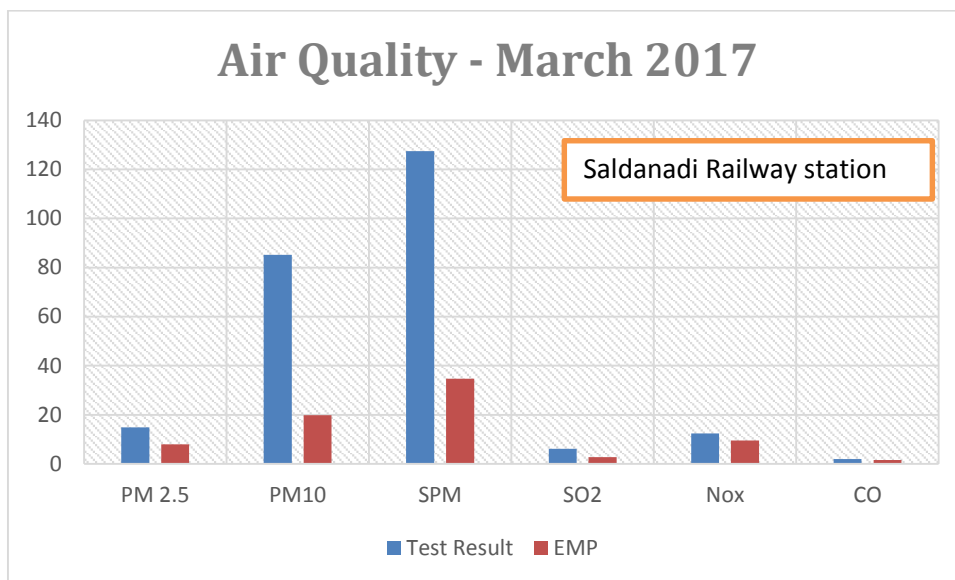


Fig.5. Air quality ($\mu\text{g}/\text{m}^3$) of March 2017 in Saldanadi Railway Station

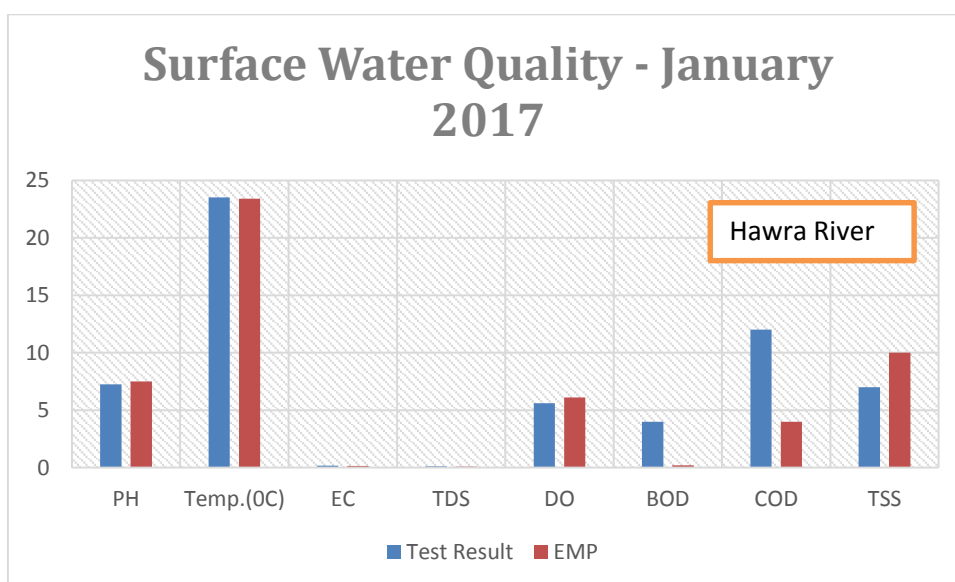


Fig.6. Surface water quality of January 2017 in Hawra River

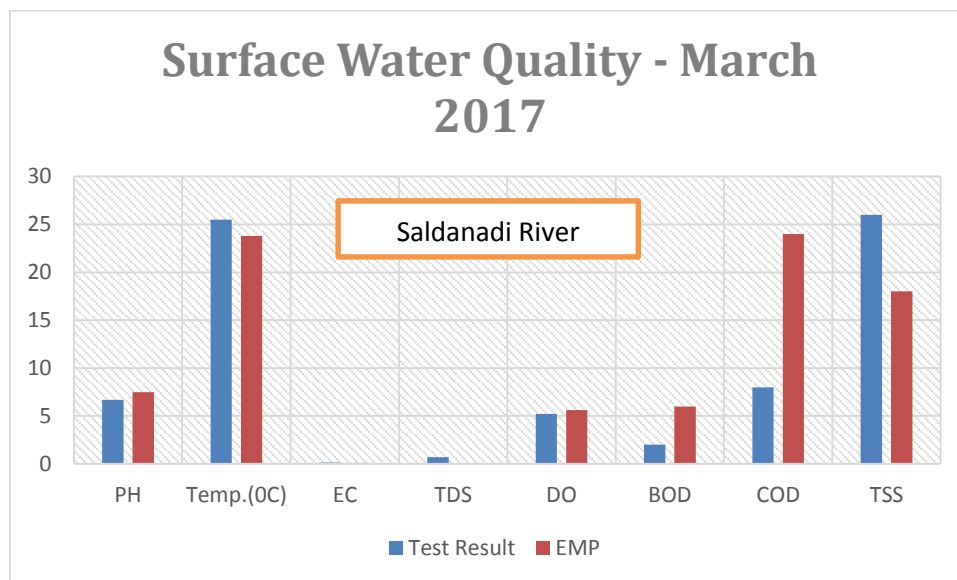


Fig.7. Surface water quality of March 2017 in Saldanadi River

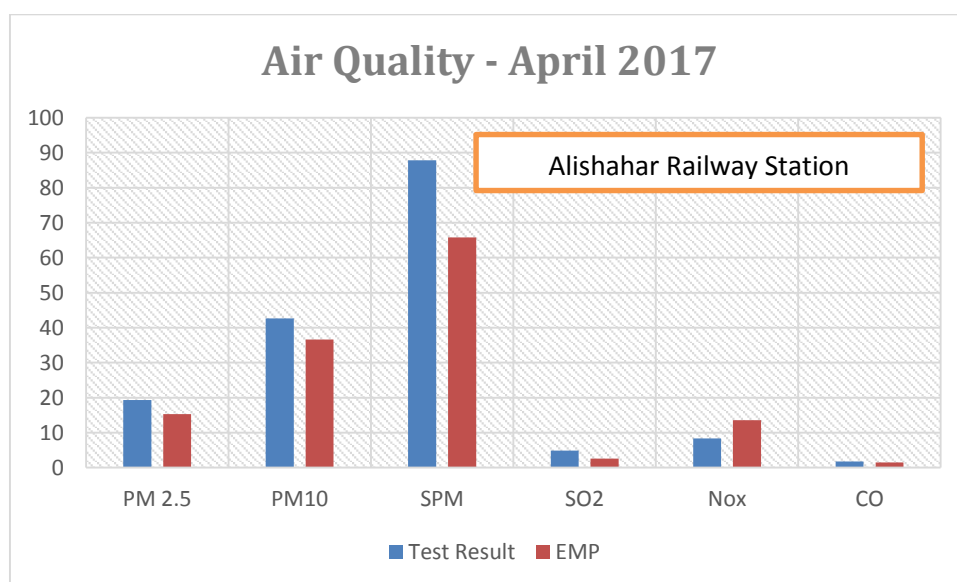


Fig.8. Air quality ($\mu\text{g}/\text{m}^3$) of March 2017 in Alishahar Railway Station

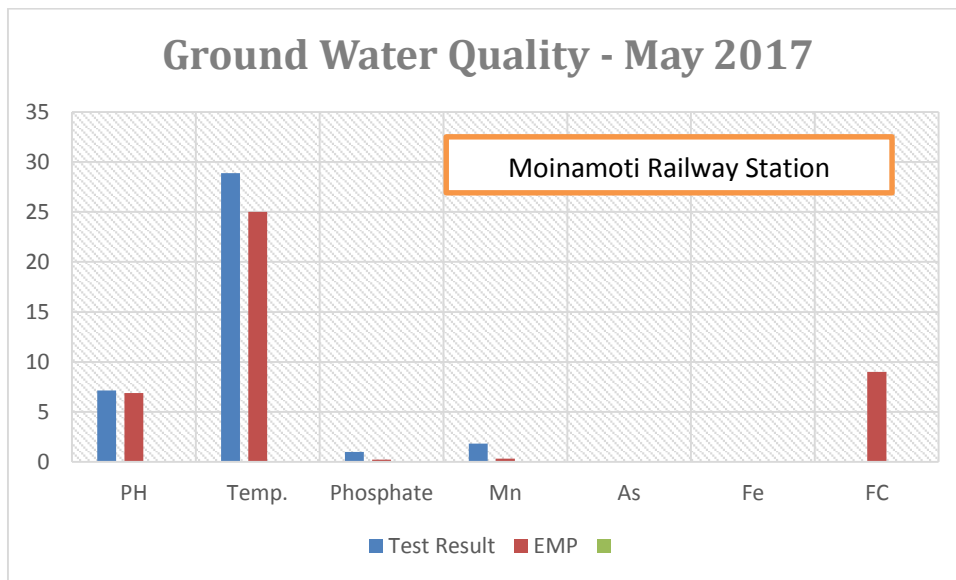


Fig.9. Ground water quality of May 2017 in Moinamoti Railway Jame Mosque

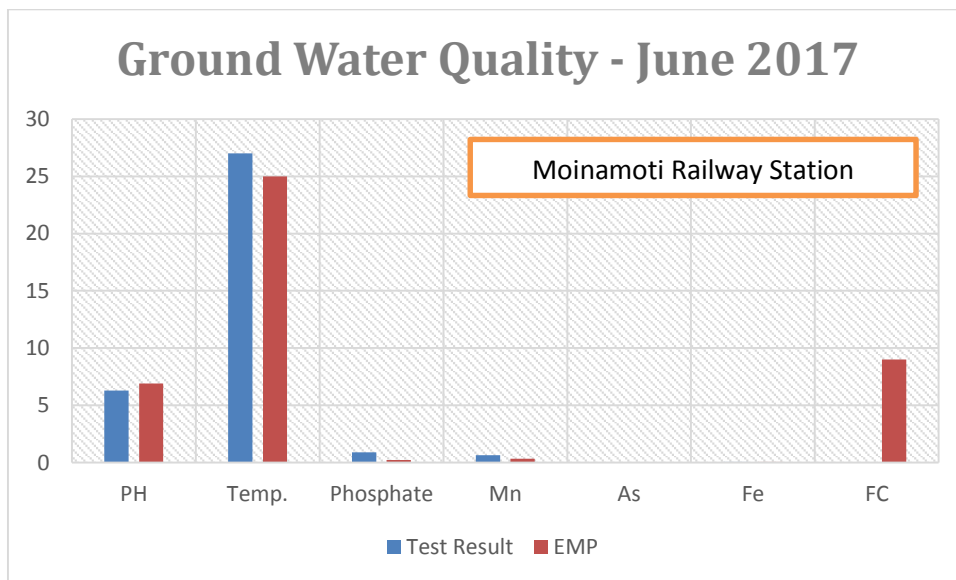


Fig.10. Ground water quality of June 2017 in Moinamoti Railway Jame Mosque

1) Fisheries Resource.

104. Bridges, culverts and existing railroad cross many waterways. Of them Gumti River is the main river which is crossed this rail line. There is no doubt that fish populations, their habitat and water quality in general are all seriously threatened due to land use changes and chemical pollution. The major rail crossing rivers are Dakatia, Goniajoori, Gumti River, Gumti Spill, Saldanadi, Bajni River, Sidai Khal, and Howrah. During breeding season of fishes, construction activities specially piling of bridge is being avoided.

2) Wildlife

105. Within the RoW and the areas where embankment is to be placed is all either paddy, pasture or water ditches specially ponds paralleling the tracks. Some of these ditches may be home to common amphibians, reptiles and aquatic birds. During the field inspection no wild mammals have been observed to be affected. Contractor is trying to keep minimum disturbance of these wildlife.

3. Compliance with Environment Related Project Covenants

1) Compliance with National Environmental Laws

106. The environmental legislation of GOB emphasizes reducing the negative impacts of infrastructure development projects and enhancement of the positive impacts. This conforms to the National Environmental Policy 1992 that was enacted based on the Agenda 21 of Rio Conference and subsequent enactments of the Bangladesh Environmental Conservation Act (ECA) 1995 and Bangladesh Environmental Conservation Rules (ECR) 1997. The DOE documents though do not mention about the provisions for railway tracks and railway bridges specifically.

2) Compliance with ADB Guidelines

107. According to the environmental guidelines of ADB the project falls under Category B and hence an IEE was sufficient to meet the environmental requirements. An IEE report was prepared by the Consultant engaged by the ADB during appraisal in 2014. However during the detailed design stage in 2016 an updated Environmental Management Plan (EMP) was prepared. The project is also in conformity with the latest Guideline of ADB i.e. Safeguard Policy Statement 2009.

3) Contractor Compliance

a) Environmental Management Plan (EMP)

108. Overall compliance with key actions defined in the EMP, as indicated in the Compliance Monitoring Check List. At present only clearing, earth work for embankment and some station ground preparation are going on.

b) Compliance with Construction Contract Clauses

109. Detailed assessment of compliance by the Contractor with applicable construction contract clauses addressing environmental matters are shown in contract agreement. The Contractor has been complying with more of the contract clauses. Operating period mitigative measures (not the responsibility of the Contractor) after the Taking Over of the Works by BR should be implemented properly, e.g. waste management and maintenance of station facilities. For garbage this is partially due to the failure of the Contractor to provide garbage bins as specified in the station specifications. The Engineer will work with BR during the defect period to try and rectify this condition.

c) **Environmental Monitoring Reports**

110. The contractor began submitting monthly environmental monitoring reports based on the approved template and Table of Contents from November 2016. Based on the environmental reports of January 2017 to June 2017 of contractor this Semiannual Environmental Report has been prepared by CSC of ALDLP. The report contains tables of all monitoring results those are being reported in the respective monthly reports.

d) **Landscaping and Site Restoration**

111. During site inspection it was found that, aside from the borrow areas which have been turned over to local operators for use as fishponds, landscaping had been very well executed. With the earthworks for embankment and bridges test piling, the majority of works remaining are located at the stations involving the station buildings, platforms and platform sheds, pedestrian foot over bridges and the signaling system. Cleaning up of surplus materials along the ongoing track and its tidy storage at the stations is required as well as the cleaning up of all the station yard areas and approaches of construction debris. Some clearing of channels and removal of construction debris is also required at some of the bridge sites, but this can only be done after the monsoon season when the river water levels have dropped.

4. Adequacy of Mitigation Measures

1) Budget and Timeline

112. The original budget allocated for this work is for 4 years for international specialist and for national counterpart. This budget allowed for the completion of two monitoring reports every year, but did not provide enough time for the essential workshop and training at the start of the Contract and the requirement for the international environmental specialist to be on site when the Contractor mobilized. Finally the budget provided should be related to the length/size of the project since larger projects take longer to inspect and longer to report on.

2) Capacity Building

113. Bangladesh Railways has recognized the gap in their technical capacity to address safeguard issues and to implement EMPs. BR has committed to establishing an Environmental and Social Safeguards Unit to manage safeguards across the agency.

5. Adequacy of Institutional Arrangements for EMP Implementation

114. An annual workshop on EMP implementation and an annual performance review is require, in which ADB should participate. To operate effectively the Engineer should have the direct authority to stop work and fine the contractor for not complying fully with the environmental contract clauses and EMP. The contractor should not be asked to provide presentations on project progress to the lender or BR without the involvement of the Engineer. It only stands to reason the self-reporting will not be impartial and likely miss many important issues, as was the case during at least one ADB mission. This situation led to multiple future problems.

115. The Engineer needs to better enforce the specific deliverables as defined in the EMP, e.g. the construction period EMP completion report and adherence to the reporting table of contents, and field survey requirements.

6. RESULTS OF ENVIRONMENTAL MONITORING AND COMPLIANCE MEASURES

6.1 Key Environmental Issues

1) Key Issues Identified

116. The monitoring results revealed that there were no major significant environmental issues that would be raised during the reporting period. But there are a number of working sites where more mitigation action is need to be taken by the contractor to meet up full compliance with the EMP, as many more activities have been started on site already.

7. Action Plan of Environmental Mitigation and Monitoring

117. Substantial construction activities will occur after the rainy season when many of the work sites will become accessible. The focus of environmental monitoring will be on the following aspects:

- (a) Better implementation of environmental management plan and mitigative measures to minimize the negative environmental impact of the work under construction;
- (b) Continue to improve water, air and noise quality sampling and analysis of the project by adhering to specific instructions provided by the Engineer. Pay close attention to the causes of non-compliance and remediation measures to secure safe water supply, air quality and acoustic environment;
- (c) Ensure soil erosion protection of the embankment and the bridge sites; and
- (d) Strengthen the implementation of the Health and Safety aspects of the EMP for the entire workforce.

118. The Engineer intends to strictly enforce these requirements and with the help of BR be able to demonstrate a substantial improvement by the Contractor over the remaining months of 2017. Of these the Health and Safety issues will need continued and on-going attention with all of the site activities including track laying and signaling works in progress where the safety of works adjacent to the operating line will be paramount, both for worker's safety and for the safe operations of the train services. The action plan is defined in Table 1, and will be expanded by the Contractor.

TABLE 11. ACTION PLAN AND STATUS OF ENVIRONMENTAL MITIGATION AND MONITORING

Environmental Parameter	Action Required	Implemented by	Super-vised by	Status Jan 2017	Status Feb. 2017	Status March 2017
Landscape and future visual intrusion	Cleaning up of various work areas along the site as embankment and bridge works proceed to enable channel and slope protection works and grassing, etc. to be installed and become stabilised and minimise visual intrusion	CTM	CSC	√	√	√
Tree Felling	Ensure trees felled are correctly recorded to enable compensation to be made if required. Initiate planting of trees along lower slope where completed to ensure sufficient time for their establishment.	CTM	CSC	√	√	√
Fisheries, Fish habitat and water courses	Initiate consultation with relevant government agencies to obtain details relating to fisheries in the major rivers. Make appropriate arrangements for restoration of borrow pits for use as fishponds wherever possible and where requested by local communities.	CTM	CSC/BR	√	√	√
Wildlife	Initiate consultation with relevant government agencies to obtain relevant details of wildlife in areas affected.	CTM	CSC/BR	√√	√√	√√
Surface Water				√	√	√
Ground Water				√√	√√	√√
Air Pollution	Execute sampling in line with sampling program specified the EMP and BR instructed CTM to undertaken; then present results with analysis indicating impacts (if any) and mitigative measures if needed.			√	√	√
Noise	Sampling should be carried out in the presence of ENGINEER staff with details of locations provided on plans and on the ground and at the times appropriate to ensure meaningful data can be obtained.	CTM	CSC	√√	√√	√√
Soil Contamination				Not sampled-not required by ADB	Not sampled-not required by ADB	Not sampled-not required by ADB

Environmental Parameter	Action Required	Implemented by	Super-vised by	Status Jan 2017	Status Feb. 2017	Status March 2017
	Ensure that once crossing structures are completed all obstructions are removed, natural channel restored	CTM	CSC	√	√	√
Workforce Camp Conditions	Ensure adequate waste bins are provided at camps with regular disposal to suitable locations. Initiate regular collections and disposal of garbage from around campsites and ensure the areas remain hygienic. Provide potable water supply at all times (e.g. arsenic found in camp tube-well)	CTM	CSC	✗	✗	✗
Construction Waste Management	Ensure all solid wastes at works sites and yards are contained and then correctly disposed of; and that oils, grease, etc. from servicing activities is properly collected, contained and recycled.	CTM	CSC	✗	✗	✗
Personal Health and Safety	Maintain effective operation and cleaning of sleeping, cooking, washing and toilet facilities in camps. Ensure water supplied is potable and conduct tests for verification. Ensure First Aid Equipment and Medical Facilities are readily available at all times. Initiate further training and awareness sessions on the use of PPE for staff and take steps to ensure these are used correctly	CTM	CSC	✗	√	√
Vector Borne Diseases	Initiate treatment of abandoned borrow pits and clean up areas where water is ponding to reduce risks for breeding of mosquitos. Record of regular inspections provided.	CTM	CSC	Could not be verified	Could not be verified	Could not be verified

√√ = compliant, √ = marginally compliant, ✗ = non-compliant

Environmental Parameter	Action Required	Implemented by	Super-vised by	Status April 2017	Status May 2017	Status June 2017
Landscape and future visual intrusion	Cleaning up of various work areas along the site as embankment and bridge works proceed to enable channel and slope protection works and grassing, etc. to be installed and become stabilised and minimise visual intrusion	CTM	CSC	√	√	√
Tree Felling	Ensure trees felled are correctly recorded to enable compensation to be made if required. Initiate planting of trees along lower slope where completed to ensure sufficient time for their establishment.	CTM	CSC	√	√	√
Fisheries, Fish habitat and water courses	Initiate consultation with relevant government agencies to obtain details relating to fisheries in the major rivers. Make appropriate arrangements for restoration of borrow pits for use as fishponds wherever possible and where requested by local communities.	CTM	CSC/BR	√	√	√
Wildlife	Initiate consultation with relevant government agencies to obtain relevant details of wildlife in areas affected.	CTM	CSC/BR	√√	√√	√√
Surface Water				√	√	√
Ground Water				√√	√√	√√
Air Pollution	Execute sampling in line with sampling program specified the EMP and BR instructed CTM to undertaken; then present results with analysis indicating impacts (if any) and mitigative measures if needed.			√	√	√
Noise	Sampling should be carried out in the presence of ENGINEER staff with details of locations provided on plans and on the ground and at the times appropriate to ensure meaningful data can be obtained.	CTM	CSC	√√	√√	√√
Soil Contamination				Not sampled-not required by ADB	Not sampled-not required by ADB	Not sampled-not required by ADB
	Ensure that once crossing structures are completed all obstructions are removed, natural channel restored	CTM	CSC	√	√	√

Environmental Parameter	Action Required	Implemented by	Super-vised by	Status April 2017	Status May 2017	Status June 2017
Workforce Camp Conditions	Ensure adequate waste bins are provided at camps with regular disposal to suitable locations. Initiate regular collections and disposal of garbage from around campsites and ensure the areas remain hygienic. Provide potable water supply at all times (e.g. arsenic found in camp tube-well)	CTM	CSC	✗	✗	✗
Construction Waste Management	Ensure all solid wastes at works sites and yards are contained and then correctly disposed of; and that oils, grease, etc. from servicing activities is properly collected, contained and recycled.	CTM	CSC	✗	✗	✗
Personal Health and Safety	Maintain effective operation and cleaning of sleeping, cooking, washing and toilet facilities in camps. Ensure water supplied is potable and conduct tests for verification. Ensure First Aid Equipment and Medical Facilities are readily available at all times. Initiate further training and awareness sessions on the use of PPE for staff and take steps to ensure these are used correctly	CTM	CSC	✗	√	√
Vector Borne Diseases	Initiate treatment of abandoned borrow pits and clean up areas where water is ponding to reduce risks for breeding of mosquitos. Record of regular inspections provided.	CTM	CSC	Could not be verified	Could not be verified	Could not be verified

√√ = compliant, √ = marginally compliant, ✗ = non-compliant

8. GAP ASSESSMENT TO THE APPLICABLE REFERENCE FRAMEWORK

APPLICABLE STANDARD

This section reviews the performance of the Project with respect to the Applicable Standards. In terms of IFC performance standard (PS) EQMS review the following PS standards.

- PS2: Labor and Working Conditions;

The findings are categorized as per the following definitions:

Table 12. IFC PS Alignment Definitions

Rating	Definition
Complied	Information available indicates that the Project fulfills the requirement and/or is aligned with intended outcome of the requirement.
Partially Complied	Information available indicates that the Project partially fulfills the requirement and/or is partially aligned with intended outcome of the requirement.
Not Complied	Information available indicates that the Project does not fulfill the requirement.
Insufficient Information for the assessment	There is insufficient information to make an assessment of the level of alignment.
Not Applicable	The requirements do not apply to the Project at the current time.

JANUARY- 2017

8.1 Noise and Attenuation Measures

Clause 3.5 of the EMP defines in detail the noise attenuation measures to be undertaken:

Item	Status	Corrective Action Plan
Use of modern plant and equipment with appropriate muffling devices.	Complied	<ul style="list-style-type: none"> • Max and Toma both are complied.
All powered mechanical equipment and machinery to be fitted with noise abating gear such as mufflers for effective noise control, in compliance with DoE regulations.	Complied	<ul style="list-style-type: none"> • Max and Toma both are complied.
Locate rock crushing, concrete mixing and material shipment yards away from residential areas, schools, colleges and hospitals.	Complied	<ul style="list-style-type: none"> • Max and Toma both are complied.
Install temporary noise barriers near sensitive locations such as schools, religious places and hospitals	Complied	<ul style="list-style-type: none"> • Max and Toma both are complied.
Providing the construction workers with suitable hearing protection like ear cap, or earmuffs etc.	Not Complied	<ul style="list-style-type: none"> • Both Max and Toma need to be provided the ear cap or earmuffs to the workers who are working near to the noise generating instruments.
Noise quality monitoring to be carried out as per the schedule in the environmental monitoring plan.	Complied	<ul style="list-style-type: none"> • Max and Toma both are complied.

8.2 Dust Control

Undertake dust suppression as defined in Clause 3.3 of the EMP:

Item	Status	Corrective Action Plan
Vehicles transporting construction material to be covered	Not Complied	<ul style="list-style-type: none"> Both Max and Toma should ensure that the construction material carrying vehicles are covered during the transportation.
Construction equipment to be maintained to a good standard and idling of engines discouraged.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Machinery emitting visible smoke to be banned from construction sites;	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Contractor to prepare a dust suppression program detailing action to be taken to minimize dust generation (e.g. spraying of roads with water), and the equipment to be used.	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma also spraying water in the dust generating area but insufficient.
Dust masks to be provided to workers where dust hazards exist.	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma have been provided all PPE item to the labours but they are not using properly.
Air quality monitoring to be carried out as per the schedule in the environmental monitoring plan.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All roads, permanent or temporary, pukka or katcha, that become dusty and all areas where construction related activities are carried out, shall be subject to necessary suppression measures by watering, sweeping or other measures approved or directed by the Engineer.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Contractor shall not allow waste oil, lubricant or other petroleum derivatives to be used as dust suppressants and shall take all reasonable precautions to prevent accidental spillage of petroleum products, contact of such materials with soil or water course through discharge, run-off, and or seepage.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Contractor shall take all reasonable measures to minimise dust-blowing from areas under his control by spraying water on stockpile, bare soil, haul road, un-surfaced traffic route and any other source of dust when conditions require dust suppression. If the Engineer considers that the dust suppression measures adopted by Contractor ineffective, Contractor shall in that case take further measure to minimise dust blowing at construction site as per his direction	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.3 Watercourse Impacts in Wetlands/Ponds/Rivers/Canals

Item	Status	Corrective Action Plan
Adequate mitigation measure shall be undertaken to limit the impact on all water bodies within the Project area	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Earth moving in the vicinity of watercourses shall	Partially	<ul style="list-style-type: none"> Max and Toma both are

Item	Status	Corrective Action Plan
be kept to a minimum to avoid sedimentation and contamination from fuel and lubricants.	Complied	using concrete surface for fuel storage but not appropriately managed
Proper disposal of bricks, cement, and steel reinforcement which will be removed as part of the reconstruction of bridges/ culverts shall be ensured not to block stream flow.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be ensure the sufficient stream flow of the water bodies during the bridge and culvert construction.
Temporary erosion and sedimentation control measures during rehabilitation of cross-drainage structures shall be undertaken to ensure that sediment laden run off does not enter the adjoining watercourses.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Construction materials and waste shall not be discharged in watercourse during construction of bridges/culverts by implementing appropriate mitigation measure.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.4 Borrow and Dredging Site Impacts

There is no dredging site.

8.5 Disposal of Construction Debris and other Waste Materials

Item	Status	Corrective Action Plan
Adequate mitigation measure shall be undertaken to limit the impact on pedestrians, local communities and water bodies within the Project area	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
No burning shall be allowed.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
No cleared debris shall be left lying on the surface of the ground or buried in any agricultural land	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Man-made construction debris shall be disposed of in disposal areas the location and nature of such disposal shall be subject to the approval of the Engineer; and	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All disposal areas shall be finally graded to a uniform and level condition and left such that they create a minimum impact on the surrounding area.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be ensured the minimum impact on the surrounding area due to waste disposal.

8.6 Servicing and Operating Equipment

Item	Status	Corrective Action Plan
Servicing of machines or equipment near rivers, streams or other bodies of water shall be carried out in such a manner as to avoid pollution with gasoline, diesel fuel, oil, grease, or surplus or disposable materials	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Without limiting the generality of the foregoing, the Contractor shall ensure that all hydraulic systems, fuel systems and lubricating systems are in good	Partially Complied	<ul style="list-style-type: none"> Max and Toma both should properly maintain.

Item	Status	Corrective Action Plan
condition to avoid leakage of petroleum products; and		
Fuel spills will not be condoned and care shall be taken to avoid overfilling machines.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be checked properly and avoid overfilling machines.
The Contractor shall have the proper equipment to transport fuel so that spillage will not occur. Automatic shut-off nozzles shall be installed on all fuel dispensing units.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
The Contractor shall have oil spill abatement equipment on the Site at all times.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
The type of equipment shall be subject to the approval of the Engineer, and the equipment shall be maintained in good working condition. Disposal of used oil, lubricants, tires, etc. shall be in accordance with the EMP or as directed by the Engineer.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.7 Control of Petroleum Products

Item	Status	Corrective Action Plan
All petroleum products shall be stored in a designated storage location where any spillage can be safely maintained without contamination of the surrounding area. Storage of petroleum products shall not be permitted in the vicinity of streams rivers or other bodies of water. Impermeable liner shall be placed on subsurface of the storage room to avoid groundwater contamination.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.8 Occupational Health and Safety

Item	Status	Corrective Action Plan
Supply of appropriate personal protection equipment, such as safety boots, helmets, gloves, protective clothing, goggles and ear protection among the workers and enforce its use.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Follow the specification on construction safety as defined in civil works	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Construction workers will be required to train in general health and safety matters and on specific hazards of their work.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
In order to maintain the labour standards following four issues must be ensured throughout the Project period	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Must not hire child labour, age below 14	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Must not hire bonded labour	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
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	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

Item	Status	Corrective Action Plan
Equal treatment, equal opportunity. No discrimination based on race, caste, origin, religion, disability, gender, sexual orientation, union or political affiliation, or age; no sexual harassment. Minimum wage- according to minimum wage standards as defined in the Bangladesh Labour Act.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.9 Protection of Topsoil and Soil Erosion

Item	Status	Corrective Action Plan
Topsoil storage areas must be protected during the dry season from wind erosion by covering.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Rapid revegetation and use of hydro-seeding and jute erosion protection mats will be applied in areas where erosion is noted during the regular monthly inspections.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to protect soil erosion and make embankment protection.
Embankment site to be planted with trees to promote natural vegetation; as well as fast growing grasses.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to protect soil erosion and make embankment protection.
The stockpiling and/or disposal of material as aforesaid shall be such that the material is not placed in any area where natural drainage or storm water could pond and become stagnant, or where could erode the material and cause silting of the adjacent area or of any natural or man-made water course.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.10 Noise and Attenuation Measures

Clause 3.5 of the EMP defines in detail the noise attenuation measures to be undertaken:

Item	Status	Corrective Action Plan
Use of modern plant and equipment with appropriate muffling devices.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All powered mechanical equipment and machinery to be fitted with noise abating gear such as mufflers for effective noise control, in compliance with DoE regulations.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Locate rock crushing, concrete mixing and material shipment yards away from residential areas, schools, colleges and hospitals.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Install temporary noise barriers near sensitive locations such as schools, religious places and hospitals	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Providing the construction workers with suitable hearing protection like ear cap, or earmuffs etc.	Not Complied	<ul style="list-style-type: none"> Both Max and Toma need to be provided the ear cap or earmuffs to the workers who are working near to the noise generating instruments.
Noise quality monitoring to be carried out as per the schedule in the environmental monitoring plan.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.11 Dust Control

Undertake dust suppression as defined in Clause 3.3 of the EMP:

Item	Status	Corrective Action Plan
Vehicles transporting construction material to be covered	Not Complied	<ul style="list-style-type: none"> Both Max and Toma should ensure that the construction material carrying vehicles are covered during the transportation.
Construction equipment to be maintained to a good standard and idling of engines discouraged.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Machinery emitting visible smoke to be banned from construction sites;	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Contractor to prepare a dust suppression program detailing action to be taken to minimize dust generation (e.g. spraying of roads with water), and the equipment to be used.	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma also spraying water in the dust generating area but insufficient
Air quality monitoring to be carried out as per the schedule in the environmental monitoring plan.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All roads, permanent or temporary, pukka or katcha, that become dusty and all areas where construction related activities are carried out, shall be subject to necessary suppression measures by watering, sweeping or other measures approved or directed by	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

Item	Status	Corrective Action Plan
the Engineer.		
Contractor shall not allow waste oil, lubricant or other petroleum derivatives to be used as dust suppressants and shall take all reasonable precautions to prevent accidental spillage of petroleum products, contact of such materials with soil or water course through discharge, run-off, and or seepage.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Contractor shall take all reasonable measures to minimise dust-blowing from areas under his control by spraying water on stockpile, bare soil, haul road, un-surfaced traffic route and any other source of dust when conditions require dust suppression. If the Engineer considers that the dust suppression measures adopted by Contractor ineffective, Contractor shall in that case take further measure to minimise dust blowing at construction site as per his direction	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.12 Watercourse Impacts in Wetlands/Ponds/Rivers/Canals

Item	Status	Corrective Action Plan
Adequate mitigation measure shall be undertaken to limit the impact on all water bodies within the Project area	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Earth moving in the vicinity of watercourses shall be kept to a minimum to avoid sedimentation and contamination from fuel and lubricants.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both are using concrete surface for fuel storage but not appropriately managed
Proper disposal of bricks, cement, and steel reinforcement which will be removed as part of the reconstruction of bridges/ culverts shall be ensured not to block stream flow.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be ensure the sufficient stream flow of the water bodies during the bridge and culvert construction.
Temporary erosion and sedimentation control measures during rehabilitation of cross-drainage structures shall be undertaken to ensure that sediment laden run off does not enter the adjoining watercourses.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Construction materials and waste shall not be discharged in watercourse during construction of bridges/culverts by implementing appropriate mitigation measure.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.13 Borrow and Dredging Site Impacts

There is no dredging site.

8.14 Disposal of Construction Debris and other Waste Materials

Item	Status	Corrective Action Plan
Adequate mitigation measure shall be undertaken to limit the impact on pedestrians, local communities and water bodies within the Project area	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

No burning shall be allowed.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
No cleared debris shall be left lying on the surface of the ground or buried in any agricultural land	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Man-made construction debris shall be disposed of in disposal areas the location and nature of such disposal shall be subject to the approval of the Engineer; and	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All disposal areas shall be finally graded to a uniform and level condition and left such that they create a minimum impact on the surrounding area.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be ensured the minimum impact on the surrounding area due to waste disposal.

8.15 Servicing and Operating Equipment

Item	Status	Corrective Action Plan
Servicing of machines or equipment near rivers, streams or other bodies of water shall be carried out in such a manner as to avoid pollution with gasoline, diesel fuel, oil, grease, or surplus or disposable materials	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Without limiting the generality of the foregoing, the Contractor shall ensure that all hydraulic systems, fuel systems and lubricating systems are in good condition to avoid leakage of petroleum products; and	Partially Complied	<ul style="list-style-type: none"> Max and Toma both should properly maintain.
Fuel spills will not be condoned and care shall be taken to avoid overfilling machines.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be checked properly and avoid overfilling machines.
The Contractor shall have the proper equipment to transport fuel so that spillage will not occur. Automatic shut-off nozzles shall be installed on all fuel dispensing units.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
The Contractor shall have oil spill abatement equipment on the Site at all times.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
The type of equipment shall be subject to the approval of the Engineer, and the equipment shall be maintained in good working condition. Disposal of used oil, lubricants, tires, etc. shall be in accordance with the EMP or as directed by the Engineer.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.16 Control of Petroleum Products

Item	Status	Corrective Action Plan
All petroleum products shall be stored in a designated storage location where any spillage can be safely maintained without contamination of the surrounding area. Storage of petroleum products shall not be permitted in the vicinity of streams rivers or other bodies of water. Impermeable liner shall be placed on subsurface of the storage room to avoid groundwater contamination.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.17 Occupational Health and Safety

Item	Status	Corrective Action Plan
Supply of appropriate personal protection equipment, such as safety boots, helmets, gloves, protective clothing, goggles and ear protection among the workers and enforce its use.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Follow the specification on construction safety as defined in civil works	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma need to follow the civil worker.
Construction workers will be required to train in general health and safety matters and on specific hazards of their work.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
In order to maintain the labour standards following four issues must be ensured throughout the Project period	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Must not hire child labour, age below 14	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Must not hire bonded labour	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
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	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Equal treatment, equal opportunity. No discrimination based on race, caste, origin, religion, disability, gender, sexual orientation, union or political affiliation, or age; no sexual harassment. Minimum wage- according to minimum wage standards as defined in the Bangladesh Labour Act.	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma need to follow the labour site.

8.18 Protection of Topsoil and Soil Erosion

Item	Status	Corrective Action Plan
Topsoil storage areas must be protected during the dry season from wind erosion by covering.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Rapid revegetation and use of hydro-seeding and jute erosion protection mats will be applied in areas where erosion is noted during the regular monthly inspections.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to protect soil erosion and make embankment protection.
Embankment site to be planted with trees to promote natural vegetation; as well as fast growing grasses.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to protect soil erosion and make embankment protection.
The stockpiling and/or disposal of material as aforesaid shall be such that the material is not placed in any area where natural drainage or storm water could pond and become stagnant, or where could erode the material and cause silting of the adjacent area or of any natural or man-made water course.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.19 Noise and Attenuation Measures

Clause 3.5 of the EMP defines in detail the noise attenuation measures to be undertaken:

Item	Status	Corrective Action Plan
Use of modern plant and equipment with appropriate muffling devices.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All powered mechanical equipment and machinery to be fitted with noise abating gear such as mufflers for effective noise control, in compliance with DoE regulations.	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma need to be install mufflers for combating noise generation from the machineries to comply the national regulation
Locate rock crushing, concrete mixing and material shipment yards away from residential areas, schools, colleges and hospitals.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Install temporary noise barriers near sensitive locations such as schools, religious places and hospitals	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Providing the construction workers with suitable hearing protection like ear cap, or earmuffs etc.	Not Complied	<ul style="list-style-type: none"> Both Max and Toma need to be provided the ear cap or earmuffs to the workers who are working near to the noise generating instruments.
Noise quality monitoring to be carried out as per the schedule in the environmental monitoring plan.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.20 Dust Control

Undertake dust suppression as defined in Clause 3.3 of the EMP:

Item	Status	Corrective Action Plan
Vehicles transporting construction material to be covered	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma should ensure that the construction material carrying vehicles are covered during the transportation.
Construction equipment to be maintained to a good standard and idling of engines discouraged.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Machinery emitting visible smoke to be banned from construction sites;	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Contractor to prepare a dust suppression program detailing action to be taken to minimize dust generation (e.g. spraying of roads with water), and the equipment to be used.	Partially Complied	<ul style="list-style-type: none"> Toma is spraying water properly in the dust generating area Max also spraying water in the dust generating area but insufficient

Item	Status	Corrective Action Plan
Dust masks to be provided to workers where dust hazards exist.	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma have been provided all PPE item to the labours but they are not using properly.
Air quality monitoring to be carried out as per the schedule in the environmental monitoring plan.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All roads, permanent or temporary, pukka or katcha, that become dusty and all areas where construction related activities are carried out, shall be subject to necessary suppression measures by watering, sweeping or other measures approved or directed by the Engineer.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both are spraying water for dust suppression, but not sufficient.
Contractor shall not allow waste oil, lubricant or other petroleum derivatives to be used as dust suppressants and shall take all reasonable precautions to prevent accidental spillage of petroleum products, contact of such materials with soil or water course through discharge, run-off, and or seepage.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Contractor shall take all reasonable measures to minimise dust-blowing from areas under his control by spraying water on stockpile, bare soil, haul road, un-surfaced traffic route and any other source of dust when conditions require dust suppression. If the Engineer considers that the dust suppression measures adopted by Contractor ineffective, Contractor shall in that case take further measure to minimise dust blowing at construction site as per his direction	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.21 Watercourse Impacts in Wetlands/Ponds/Rivers/Canals

Item	Status	Corrective Action Plan
Adequate mitigation measure shall be undertaken to limit the impact on all water bodies within the Project area	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Earth moving in the vicinity of watercourses shall be kept to a minimum to avoid sedimentation and contamination from fuel and lubricants.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both are using concrete surface for fuel storage but not appropriately managed
Proper disposal of bricks, cement, and steel reinforcement which will be removed as part of the reconstruction of bridges/ culverts shall be ensured not to block stream flow.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be ensure the sufficient stream flow of the water bodies during the bridge and culvert construction.
Temporary erosion and sedimentation control measures during rehabilitation of cross-drainage structures shall be undertaken to ensure that sediment laden run off does not enter the adjoining watercourses.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Construction materials and waste shall not be discharged in watercourse during construction of	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

Item	Status	Corrective Action Plan
bridges/culverts by implementing appropriate mitigation measure.		

8.22 Borrow and Dredging Site Impacts

There is no dredging site.

8.23 Disposal of Construction Debris and other Waste Materials

Item	Status	Corrective Action Plan
Adequate mitigation measure shall be undertaken to limit the impact on pedestrians, local communities and water bodies within the Project area	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
No burning shall be allowed.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
No cleared debris shall be left lying on the surface of the ground or buried in any agricultural land	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Man-made construction debris shall be disposed of in disposal areas the location and nature of such disposal shall be subject to the approval of the Engineer; and	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All disposal areas shall be finally graded to a uniform and level condition and left such that they create a minimum impact on the surrounding area.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be ensured the minimum impact on the surrounding area due to waste disposal.

8.24 Servicing and Operating Equipment

Item	Status	Corrective Action Plan
Servicing of machines or equipment near rivers, streams or other bodies of water shall be carried out in such a manner as to avoid pollution with gasoline, diesel fuel, oil, grease, or surplus or disposable materials	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Without limiting the generality of the foregoing, the Contractor shall ensure that all hydraulic systems, fuel systems and lubricating systems are in good condition to avoid leakage of petroleum products; and	Partially Complied	<ul style="list-style-type: none"> Max and Toma both should properly maintain.
Fuel spills will not be condoned and care shall be taken to avoid overfilling machines.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be checked properly and avoid overfilling machines.
The Contractor shall have the proper equipment to transport fuel so that spillage will not occur. Automatic shut-off nozzles shall be installed on all fuel dispensing units.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
The Contractor shall have oil spill abatement equipment on the Site at all times.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
The type of equipment shall be subject to the approval of the Engineer, and the equipment shall be maintained in good working condition. Disposal of used oil, lubricants, tires, etc. shall be in accordance with the EMP or as directed by the Engineer.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.25 Control of Petroleum Products

Item	Status	Corrective Action Plan
All petroleum products shall be stored in a designated storage location where any spillage can be safely maintained without contamination of the surrounding area. Storage of petroleum products shall not be permitted in the vicinity of streams rivers or other bodies of water. Impermeable liner shall be placed on subsurface of the storage room to avoid groundwater contamination.	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma should properly maintain and monitor the fuel spillage.

8.26 Occupational Health and Safety

Item	Status	Corrective Action Plan
Supply of appropriate personal protection equipment, such as safety boots, helmets, gloves, protective clothing, goggles and ear protection among the workers and enforce its use.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Follow the specification on construction safety as defined in civil works	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Construction workers will be required to train in general health and safety matters and on specific hazards of their work.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
In order to maintain the labour standards following four issues must be ensured throughout the Project period	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Must not hire child labour, age below 14	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Must not hire bonded labour	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
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	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Equal treatment, equal opportunity. No discrimination based on race, caste, origin, religion, disability, gender, sexual orientation, union or political affiliation, or age; no sexual harassment. Minimum wage- according to minimum wage standards as defined in the Bangladesh Labour Act.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.27 Protection of Topsoil and Soil Erosion

Item	Status	Corrective Action Plan
Topsoil storage areas must be protected during the dry season from wind erosion by covering.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
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.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to protect soil erosion and make embankment protection.
Embankment site to be planted with trees to promote natural vegetation; as well as fast growing grasses.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to protect soil erosion and make embankment protection.
The stockpiling and/or disposal of material as aforesaid shall be such that the material is not placed in any area where natural drainage or storm water could pond and become stagnant, or where could erode the material and cause silting of the adjacent area or of any natural or man-made water course.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.28 Noise and Attention Measures

Clause 3.5 of the EMP defines in detail the noise attenuation measures to be undertaken:

Item	Status	Corrective Action Plan
Use of modern plant and equipment with appropriate muffling devices.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All powered mechanical equipment and machinery to be fitted with noise abating gear such as mufflers for effective noise control, in compliance with DoE regulations.	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma need to be install mufflers for combating noise generation from the machineries to comply the national regulation
Locate rock crushing, concrete mixing and material shipment yards away from residential areas, schools, colleges and hospitals.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Install temporary noise barriers near sensitive locations such as schools, religious places and hospitals	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Providing the construction workers with suitable hearing protection like ear cap, or earmuffs etc.	Not Complied	<ul style="list-style-type: none"> Both Max and Toma need to be provided the ear cap or earmuffs to the workers who are working near to the noise generating instruments.
Noise quality monitoring to be carried out as per the schedule in the environmental monitoring plan.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.29 Dust Control

Undertake dust suppression as defined in Clause 3.3 of the EMP:

Item	Status	Corrective Action Plan
Vehicles transporting construction material to be covered	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma should ensure that the construction material carrying vehicles are covered during the transportation.
Construction equipment to be maintained to a good standard and idling of engines discouraged.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Machinery emitting visible smoke to be banned from construction sites;	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Contractor to prepare a dust suppression program detailing action to be taken to minimize dust generation (e.g. spraying of roads with water), and the equipment to be used.	Partially Complied	<ul style="list-style-type: none"> Toma is spraying water properly in the dust generating area Max also spraying water in the dust generating area but insufficient

Item	Status	Corrective Action Plan
Dust masks to be provided to workers where dust hazards exist.	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma have been provided all PPE item to the labours but they are not using properly.
Air quality monitoring to be carried out as per the schedule in the environmental monitoring plan.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All roads, permanent or temporary, pukka or katcha, that become dusty and all areas where construction related activities are carried out, shall be subject to necessary suppression measures by watering, sweeping or other measures approved or directed by the Engineer.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both are spraying water for dust suppression, but not sufficient.
Contractor shall not allow waste oil, lubricant or other petroleum derivatives to be used as dust suppressants and shall take all reasonable precautions to prevent accidental spillage of petroleum products, contact of such materials with soil or water course through discharge, run-off, and or seepage.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Contractor shall take all reasonable measures to minimise dust-blowing from areas under his control by spraying water on stockpile, bare soil, haul road, un-surfaced traffic route and any other source of dust when conditions require dust suppression. If the Engineer considers that the dust suppression measures adopted by Contractor ineffective, Contractor shall in that case take further measure to minimise dust blowing at construction site as per his direction	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.30 Watercourse Impacts in Wetlands/Ponds/Rivers/Canals

Item	Status	Corrective Action Plan
Adequate mitigation measure shall be undertaken to limit the impact on all water bodies within the Project area	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Earth moving in the vicinity of watercourses shall be kept to a minimum to avoid sedimentation and contamination from fuel and lubricants.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both are using concrete surface for fuel storage but not appropriately managed
Proper disposal of bricks, cement, and steel reinforcement which will be removed as part of the reconstruction of bridges/ culverts shall be ensured not to block stream flow.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be ensure the sufficient stream flow of the water bodies during the bridge and culvert construction.
Temporary erosion and sedimentation control measures during rehabilitation of cross-drainage structures shall be undertaken to ensure that sediment laden run off does not enter the adjoining watercourses.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Construction materials and waste shall not be discharged in watercourse during construction of	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

Item	Status	Corrective Action Plan
bridges/culverts by implementing appropriate mitigation measure.		

8.31 Borrow and Dredging Site Impacts

There is no dredging site.

8.32 Disposal of Construction Debris and other Waste Materials

Item	Status	Corrective Action Plan
Adequate mitigation measure shall be undertaken to limit the impact on pedestrians, local communities and water bodies within the Project area	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
No burning shall be allowed.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
No cleared debris shall be left lying on the surface of the ground or buried in any agricultural land	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Man-made construction debris shall be disposed of in disposal areas the location and nature of such disposal shall be subject to the approval of the Engineer; and	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All disposal areas shall be finally graded to a uniform and level condition and left such that they create a minimum impact on the surrounding area.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be ensured the minimum impact on the surrounding area due to waste disposal.

8.33 Servicing and Operating Equipment

Item	Status	Corrective Action Plan
Servicing of machines or equipment near rivers, streams or other bodies of water shall be carried out in such a manner as to avoid pollution with gasoline, diesel fuel, oil, grease, or surplus or disposable materials	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Without limiting the generality of the foregoing, the Contractor shall ensure that all hydraulic systems, fuel systems and lubricating systems are in good condition to avoid leakage of petroleum products; and	Partially Complied	<ul style="list-style-type: none"> Max and Toma both should properly maintain.
Fuel spills will not be condoned and care shall be taken to avoid overfilling machines.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be Checked properly and avoid overfilling machines.
The Contractor shall have the proper equipment to transport fuel so that spillage will not occur. Automatic shut-off nozzles shall be installed on all fuel dispensing units.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
The Contractor shall have oil spill abatement equipment on the Site at all times.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
The type of equipment shall be subject to the approval of the Engineer, and the equipment shall be maintained in good working condition. Disposal of used oil, lubricants, tires, etc. shall be in	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

Item	Status	Corrective Action Plan
accordance with the EMP or as directed by the Engineer.		

8.34 Control of Petroleum Products

Item	Status	Corrective Action Plan
All petroleum products shall be stored in a designated storage location where any spillage can be safely maintained without contamination of the surrounding area. Storage of petroleum products shall not be permitted in the vicinity of streams rivers or other bodies of water. Impermeable liner shall be placed on subsurface of the storage room to avoid groundwater contamination.	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma should properly maintain and monitor the fuel spillage.

8.35 Occupational Health and Safety

Item	Status	Corrective Action Plan
Supply of appropriate personal protection equipment, such as safety boots, helmets, gloves, protective clothing, goggles and ear protection among the workers and enforce its use.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Follow the specification on construction safety as defined in civil works	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Construction workers will be required to train in general health and safety matters and on specific hazards of their work.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
In order to maintain the labour standards following four issues must be ensured throughout the Project period	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Must not hire child labour, age below 14	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Must not hire bonded labour	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
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	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Equal treatment, equal opportunity. No discrimination based on race, caste, origin, religion, disability, gender, sexual orientation, union or political affiliation, or age; no sexual harassment. Minimum wage- according to minimum wage standards as defined in the Bangladesh Labour Act.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.36 Protection of Topsoil and Soil Erosion

Item	Status	Corrective Action Plan
Topsoil storage areas must be protected during the dry season from wind erosion by covering.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

Item	Status	Corrective Action Plan
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.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to protect soil erosion and make embankment protection.
Embankment site to be planted with trees to promote natural vegetation; as well as fast growing grasses.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to protect soil erosion and make embankment protection.
The stockpiling and/or disposal of material as aforesaid shall be such that the material is not placed in any area where natural drainage or storm water could pond and become stagnant, or where could erode the material and cause silting of the adjacent area or of any natural or man-made water course.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.37 Noise and Attenuation Measures

Clause 3.5 of the EMP defines in detail the noise attenuation measures to be undertaken:

Item	Status	Corrective Action Plan
Use of modern plant and equipment with appropriate muffling devices.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All powered mechanical equipment and machinery to be fitted with noise abating gear such as mufflers for effective noise control, in compliance with DoE regulations.	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma need to be install mufflers for combating noise generation from the machineries to comply the national regulation
Locate rock crushing, concrete mixing and material shipment yards away from residential areas, schools, colleges and hospitals.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Install temporary noise barriers near sensitive locations such as schools, religious places and hospitals	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Providing the construction workers with suitable hearing protection like ear cap, or earmuffs etc.	Not Complied	<ul style="list-style-type: none"> Both Max and Toma need to be provided the ear cap or earmuffs to the workers who are working near to the noise generating instruments.
Noise quality monitoring to be carried out as per the schedule in the environmental monitoring plan.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.38 Dust Control

Undertake dust suppression as defined in Clause 3.3 of the EMP:

Item	Status	Corrective Action Plan
Vehicles transporting construction material to be covered	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma should ensure that the construction material carrying vehicles are covered during the transportation.
Construction equipment to be maintained to a good standard and idling of engines discouraged.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Machinery emitting visible smoke to be banned from construction sites.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Contractor to prepare a dust suppression program detailing action to be taken to minimize dust generation (e.g. spraying of roads with water), and the equipment to be used.	Partially Complied	<ul style="list-style-type: none"> Toma is spraying water properly in the dust generating area. Max also spraying water in the dust generating area but insufficient.

Item	Status	Corrective Action Plan
Dust masks to be provided to workers where dust hazards exist.	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma have been provided all PPE item to the labours but they are not using properly.
Air quality monitoring to be carried out as per the schedule in the environmental monitoring plan.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All roads, permanent or temporary, pukka or katcha, that become dusty and all areas where construction related activities are carried out, shall be subject to necessary suppression measures by watering, sweeping or other measures approved or directed by the Engineer.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both are spraying water for dust suppression, but not sufficient.
Contractor shall not allow waste oil, lubricant or other petroleum derivatives to be used as dust suppressants and shall take all reasonable precautions to prevent accidental spillage of petroleum products, contact of such materials with soil or water course through discharge, run-off, and or seepage.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Contractor shall take all reasonable measures to minimise dust-blowing from areas under his control by spraying water on stockpile, bare soil, haul road, un-surfaced traffic route and any other source of dust when conditions require dust suppression. If the Engineer considers that the dust suppression measures adopted by Contractor ineffective, Contractor shall in that case take further measure to minimise dust blowing at construction site as per his direction	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.39 Watercourse Impacts in Wetlands/Ponds/Rivers/Canals

Item	Status	Corrective Action Plan
Adequate mitigation measure shall be undertaken to limit the impact on all water bodies within the Project area	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Earth moving in the vicinity of watercourses shall be kept to a minimum to avoid sedimentation and contamination from fuel and lubricants.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both are using concrete surface for fuel storage but not appropriately managed
Proper disposal of bricks, cement, and steel reinforcement which will be removed as part of the reconstruction of bridges/ culverts shall be ensured not to block stream flow.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be ensure the sufficient stream flow of the water bodies during the bridge and culvert construction.
Temporary erosion and sedimentation control measures during rehabilitation of cross-drainage structures shall be undertaken to ensure that sediment laden run off does not enter the adjoining watercourses.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Construction materials and waste shall not be discharged in watercourse during construction of	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

Item	Status	Corrective Action Plan
bridges/culverts by implementing appropriate mitigation measure.		

8.40 Borrow and Dredging Site Impacts

There is no dredging site.

8.41 Disposal of Construction Debris and other Waste Materials

Item	Status	Corrective Action Plan
Adequate mitigation measure shall be undertaken to limit the impact on pedestrians, local communities and water bodies within the Project area	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
No burning shall be allowed.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
No cleared debris shall be left lying on the surface of the ground or buried in any agricultural land	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Man-made construction debris shall be disposed of in disposal areas the location and nature of such disposal shall be subject to the approval of the Engineer; and	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All disposal areas shall be finally graded to a uniform and level condition and left such that they create a minimum impact on the surrounding area.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be ensured the minimum impact on the surrounding area due to waste disposal.

8.42 Servicing and Operating Equipment

Item	Status	Corrective Action Plan
Servicing of machines or equipment near rivers, streams or other bodies of water shall be carried out in such a manner as to avoid pollution with gasoline, diesel fuel, oil, grease, or surplus or disposable materials	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Without limiting the generality of the foregoing, the Contractor shall ensure that all hydraulic systems, fuel systems and lubricating systems are in good condition to avoid leakage of petroleum products; and	Partially Complied	<ul style="list-style-type: none"> Max and Toma both should properly maintain.
Fuel spills will not be condoned and care shall be taken to avoid overfilling machines.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be checked properly and avoid overfilling machines.
The Contractor shall have the proper equipment to transport fuel so that spillage will not occur. Automatic shut-off nozzles shall be installed on all fuel dispensing units.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
The Contractor shall have oil spill abatement equipment on the Site at all times.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
The type of equipment shall be subject to the approval of the Engineer, and the equipment shall be maintained in good working condition. Disposal of used oil, lubricants, tires, etc. shall be in	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

Item	Status	Corrective Action Plan
accordance with the EMP or as directed by the Engineer.		

8.43 Control of Petroleum Products

Item	Status	Corrective Action Plan
All petroleum products shall be stored in a designated storage location where any spillage can be safely maintained without contamination of the surrounding area. Storage of petroleum products shall not be permitted in the vicinity of streams rivers or other bodies of water. Impermeable liner shall be placed on subsurface of the storage room to avoid groundwater contamination.	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma should properly maintain and monitor the fuel spillage.

8.44 Occupational Health and Safety

Item	Status	Corrective Action Plan
Supply of appropriate personal protection equipment, such as safety boots, helmets, gloves, protective clothing, goggles and ear protection among the workers and enforce its use.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Follow the specification on construction safety as defined in civil works	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Construction workers will be required to train in general health and safety matters and on specific hazards of their work.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
In order to maintain the labour standards following four issues must be ensured throughout the Project period	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Must not hire child labour, age below 14	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Must not hire bonded labour	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
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	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Equal treatment, equal opportunity. No discrimination based on race, caste, origin, religion, disability, gender, sexual orientation, union or political affiliation, or age; no sexual harassment. Minimum wage- according to minimum wage standards as defined in the Bangladesh Labour Act.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.45 Protection of Topsoil and Soil Erosion

Item	Status	Corrective Action Plan
Topsoil storage areas must be protected during the dry season from wind erosion by covering.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Rapid revegetation and use of hydro-seeding and jute erosion protection mats will be applied in areas where erosion is noted during the regular monthly inspections.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to protect soil erosion and make embankment protection.
Embankment site to be planted with trees to promote natural vegetation; as well as fast growing grasses.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to protect soil erosion and make embankment protection.
The stockpiling and/or disposal of material as aforesaid shall be such that the material is not placed in any area where natural drainage or storm water could pond and become stagnant, or where could erode the material and cause silting of the adjacent area or of any natural or man-made water course.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.46 Noise and Attention Measures

Clause 3.5 of the EMP defines in detail the noise attenuation measures to be undertaken:

Item	Status	Corrective Action Plan
Use of modern plant and equipment with appropriate muffling devices.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All powered mechanical equipment and machinery to be fitted with noise abating gear such as mufflers for effective noise control, in compliance with DoE regulations.	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma need to be install mufflers for combating noise generation from the machineries to comply the national regulation
Locate rock crushing, concrete mixing and material shipment yards away from residential areas, schools, colleges and hospitals.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Install temporary noise barriers near sensitive locations such as schools, religious places and hospitals	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Providing the construction workers with suitable hearing protection like ear cap, or earmuffs etc.	Not Complied	<ul style="list-style-type: none"> Both Max and Toma need to be provided the ear cap or earmuffs to the workers who are working near to the noise generating instruments.
Noise quality monitoring to be carried out as per the schedule in the environmental monitoring plan.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.47 Dust Control

Undertake dust suppression as defined in Clause 3.3 of the EMP:

Item	Status	Corrective Action Plan
Vehicles transporting construction material to be covered	Complied	<ul style="list-style-type: none"> Both Max and Toma are complied.
Construction equipment to be maintained to a good standard and idling of engines discouraged.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Machinery emitting visible smoke to be banned from construction sites.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Contractor to prepare a dust suppression program detailing action to be taken to minimize dust generation (e.g. spraying of roads with water), and the equipment to be used.	Partially Complied	<ul style="list-style-type: none"> Toma is spraying water properly in the dust generating area. Max also spraying water in the dust generating area but insufficient.
Dust masks to be provided to workers where dust hazards exist.	Partially Complied	<ul style="list-style-type: none"> Both Max and Toma have been provided all PPE item to the labours but they are not using properly.
Air quality monitoring to be carried out as per the schedule in the environmental monitoring	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

Item	Status	Corrective Action Plan
plan.		
All roads, permanent or temporary, pukka or katcha, that become dusty and all areas where construction related activities are carried out, shall be subject to necessary suppression measures by watering, sweeping or other measures approved or directed by the Engineer.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both are spraying water for dust suppression, but not sufficient.
Contractor shall not allow waste oil, lubricant or other petroleum derivatives to be used as dust suppressants and shall take all reasonable precautions to prevent accidental spillage of petroleum products, contact of such materials with soil or water course through discharge, run-off, and or seepage.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Contractor shall take all reasonable measures to minimise dust-blowing from areas under his control by spraying water on stockpile, bare soil, haul road, un-surfaced traffic route and any other source of dust when conditions require dust suppression. If the Engineer considers that the dust suppression measures adopted by Contractor ineffective, Contractor shall in that case take further measure to minimise dust blowing at construction site as per his direction	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.48 Watercourse Impacts in Wetlands/Ponds/Rivers/Canals

Item	Status	Corrective Action Plan
Adequate mitigation measure shall be undertaken to limit the impact on all water bodies within the Project area	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Earth moving in the vicinity of watercourses shall be kept to a minimum to avoid sedimentation and contamination from fuel and lubricants.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both are using concrete surface for fuel storage but not appropriately managed
Proper disposal of bricks, cement, and steel reinforcement which will be removed as part of the reconstruction of bridges/ culverts shall be ensured not to block stream flow.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be ensure the sufficient stream flow of the water bodies during the bridge and culvert construction.
Temporary erosion and sedimentation control measures during rehabilitation of cross-drainage structures shall be undertaken to ensure that sediment laden run off does not enter the adjoining watercourses.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Construction materials and waste shall not be discharged in watercourse during construction of bridges/culverts by implementing appropriate mitigation measure.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.49 Borrow and Dredging Site Impacts

There is no dredging site.

8.50 Disposal of Construction Debris and other Waste Materials

Item	Status	Corrective Action Plan
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Adequate mitigation measure shall be undertaken to limit the impact on pedestrians, local communities and water bodies within the Project area	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
No burning shall be allowed.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
No cleared debris shall be left lying on the surface of the ground or buried in any agricultural land	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Man-made construction debris shall be disposed of in disposal areas the location and nature of such disposal shall be subject to the approval of the Engineer; and	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
All disposal areas shall be finally graded to a uniform and level condition and left such that they create a minimum impact on the surrounding area.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be ensured the minimum impact on the surrounding area due to waste disposal.

8.51 Servicing and Operating Equipment

Item	Status	Corrective Action Plan
Servicing of machines or equipment near rivers, streams or other bodies of water shall be carried out in such a manner as to avoid pollution with gasoline, diesel fuel, oil, grease, or surplus or disposable materials	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Without limiting the generality of the foregoing, the Contractor shall ensure that all hydraulic systems, fuel systems and lubricating systems are in good condition to avoid leakage of petroleum products; and	Partially Complied	<ul style="list-style-type: none"> Max and Toma both should properly maintain.
Fuel spills will not be condoned and care shall be taken to avoid overfilling machines.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to be checked properly and avoid overfilling machines.
The Contractor shall have the proper equipment to transport fuel so that spillage will not occur. Automatic shut-off nozzles shall be installed on all fuel dispensing units.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
The Contractor shall have oil spill abatement equipment on the Site at all times.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
The type of equipment shall be subject to the approval of the Engineer, and the equipment shall be maintained in good working condition. Disposal of used oil, lubricants, tires, etc. shall be in accordance with the EMP or as directed by the Engineer.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.52 Control of Petroleum Products

Item	Status	Corrective Action Plan
All petroleum products shall be stored in a designated storage location where any spillage can be safely maintained without contamination of the surrounding area. Storage of petroleum products shall not be permitted in the vicinity of	Partially Complied	<ul style="list-style-type: none"> Toma should properly maintain and monitor the fuel spillage.

Item	Status	Corrective Action Plan
streams rivers or other bodies of water. Impermeable liner shall be placed on subsurface of the storage room to avoid groundwater contamination.		<ul style="list-style-type: none"> Max fuel storage maintenance properly well.

8.53 Occupational Health and Safety

Item	Status	Corrective Action Plan
Supply of appropriate personal protection equipment, such as safety boots, helmets, gloves, protective clothing, goggles and ear protection among the workers and enforce its use.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Follow the specification on construction safety as defined in civil works	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Construction workers will be required to train in general health and safety matters and on specific hazards of their work.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
In order to maintain the labour standards following four issues must be ensured throughout the Project period	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Must not hire child labour, age below 14	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Must not hire bonded labour	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
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	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Equal treatment, equal opportunity. No discrimination based on race, caste, origin, religion, disability, gender, sexual orientation, union or political affiliation, or age; no sexual harassment. Minimum wage- according to minimum wage standards as defined in the Bangladesh Labour Act.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

8.54 Protection of Topsoil and Soil Erosion

Item	Status	Corrective Action Plan
Topsoil storage areas must be protected during the dry season from wind erosion by covering.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.
Rapid revegetation and use of hydro-seeding and jute erosion protection mats will be applied in areas where erosion is noted during the regular monthly inspections.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to protect soil erosion and make embankment protection.
Embankment site to be planted with trees to promote natural vegetation; as well as fast growing grasses.	Partially Complied	<ul style="list-style-type: none"> Max and Toma both need to protect soil erosion and make embankment protection.

Item	Status	Corrective Action Plan
The stockpiling and/or disposal of material as aforesaid shall be such that the material is not placed in any area where natural drainage or storm water could pond and become stagnant, or where could erode the material and cause silting of the adjacent area or of any natural or man-made water course.	Complied	<ul style="list-style-type: none"> Max and Toma both are complied.

9. CONCLUSION AND RECOMMENDATIONS

9.1 Overall Progress with Implementation of Environmental Safeguard Measures

119. According to the monitoring and supervision by the Engineer of the environmental activities on the ALDLP it is found that the Contractor, CTM is now credibly undertaking most of the environmental mitigative measures specified in the EMP although there are areas where further action and improvement need to be made.

120. The Contractor's compliance with contract clauses and EMP tasks has increased since the mobilization of CTM's environmental engineer, which is a very positive sign.

121. The potential adverse impact of the ongoing works on the major watercourses and overall drainage of the area is being minimized by ensuring the design and construction of the new embankment and structures generally match the embankment and structures of the existing track alignment. The potential adverse impact of dust from the transport of large quantities of embankment materials is being minimized by spraying water to the worksites.

122. The monitoring of water and air quality, and noise levels has generally been fully compliant since January 2017. The implementation of the occupational health and safety issues has been greatly improving with the Contractor and Engineer holding regular briefings related to the various campsites and work sites.

9.2 Recommendations for Improving Contractor's Compliance

123. Based on the site inspection and monitoring of the execution of the Environmental Safeguards program the accomplishments in response to the relevant recommendations are given in the following table.

Table 13. Recommendations for Improving Contractor Compliance

Sl. No.	Recommendation	Timeframe	Implemented by	Supervision by
1	The Contractor must ensure that the sampling of the critical parameters for water quality, noise and air quality is carried out <u>fully</u> in line with the Sampling Program so that meaningful results can be obtained enabling further mitigative measures to be determined and initiated if required.	During project period	CTM	CSC Engineer

Sl. No.	Recommendation	Timeframe	Implemented by	Supervision by
2	The on-site construction supervision and management of the Contractor should be strengthened so that actions taken to improve health and safety issues are maintained and not lost over time. It will be necessary to arrange the training and awareness in the health and safety issues for the construction workers with regular and repeated sessions presented & delivered by specialised personnel.	During project period	CTM	CSC Engineer
3	The overall management of camps and worksite must be further improved in line with the best practices on occupational health and safety so that these areas of the site can be made fully compliant.	During project period	CTM	CSC Engineer
4	The staffing provided to address the environmental safeguards program should be enhanced to ensure that all the requirements of the program can be correctly actioned and reports can be provided in a timely manner recognising the importance of these matters to all stakeholders.	During project period	CTM	CSC Engineer

9.3 Overall Environmental Safeguards Compliance

1) Contractor

124. The environmental awareness creation, particularly regarding the direct construction impacts and especially for health, pollution and safety issues are important. The need to develop self-regulation of the contractors will have to be emphasized, with the consultant's supervisory role that to be in conformity the relevant Environmental Clauses (Section 6, Subsection H of contract technical specification) incorporated in the construction contracts and national legislation.

2) Bangladesh Railway

125. Bangladesh Railway has recognized the need to improve its safeguards technical capacity and to that end in planning to establish an Environmental and Social Safeguards Unit within the agency.

3) Construction Supervision Consultant (Engineer)

126. The engineer need addressing all safeguard issues and recognizing the lack of technical capacity of the contractor through preparing and delivering workshop on EMP implementation, field monitoring and reporting, including templates of all required tables and reports.

4) Asian Development Bank (ADB)

127. For loan implementation work the ADB's active participation is very important and periodic discussion with BR about the need for the Contractor to comply (based on the Engineer's input) is essential if the EMP actions need to be effective. This action reinforces the seriousness of safeguard implementation with both the Contractor and BR, while underscoring the value of the Engineer's oversight. With the absence of suitable staff engaged from the commencement of the Project by the Contractor this did not happen at the start of the works, but the situation will be resolved after the first year.

9.4 Lessons Learned and Gaps.

The following are major lessons learned during January 2017 to June 2017 implementation period

1) Prequalification of the Contractor

128. Contractor's pre-qualification in environmental and social safeguards needed to specify in the bid documents and then follow through commitments by the contractor to provide safeguard expertise from the start of the construction period need to be constantly enforced.

2) Preparation of Environmental Clauses Section of Contracts

129. Contracts should have environmental sections where all measures are defined, including cross referencing the EMP, prepared as part of the environmental assessment, and with financial effects provided for non-compliance.

3) Prepare Environmental BOQ section

130. In order to effectively hold back payment for safeguard work not completed or inadequately addressed, costs should be linked to each major mitigative task or task group. To address this an environmental safeguards section of the construction contract's Bill of Quantities was prepared, thereby attaching costs to each task. In this way the Engineer can easily link payment hold-backs with incomplete work.

4) Engineer's Environmental Specialist on the Job while the Contractor was mobilizing.

131. Having the Engineer's (CSC) designated environmental specialist on the job when the Contractor mobilized was essential to set the tone and significance of environmental safeguards. Most EMPs have, as an important pre-construction activity, information on EMP implementation and reporting to the Contractor, and assisting with the preparation of the contractor's Environmental Mitigation or Management Work Schedule (EMWS). These contracts should therefore have a provision for the early involvement of the project environmental specialist.

5) Presentation on safeguard by contractor for all of the ADB missions and involvement of CSC

132. Contractor should make presentations on the work being undertaken without the knowledge or oversight of the Engineer is essentially the same as taking away all responsibility and authority of the Engineer to direct the Contractor and to decide on performance. This occurred twice during the constructions stage and resulted in a very significant loss of authority for the Engineer. The Contractor took this to mean that the Engineer and environmental safeguards were items to ignored, with few if any consequences.

133. ADB needs to insist that the Engineer be involved in all matters that require regular the Engineer oversight. This is especially true for safeguard matters, which tend to slip "under the radar". It is important to have both EIB and ADB HQ involved on large and long duration projects and to make sure that the Engineer is kept in the information loop as much as possible.

10.APPENDICES

10.1 Annex- A. Quantitative Environmental Monitoring Schedule for Year 2017

Factor of Monitoring	Stage	Point of Monitoring	Test Parameters	Method for Monitoring	Frequency of Monitoring	Test Month in year 2017
Air Quality	Construction	All construction locations along the line - 2 locations	PM 10, PM 2.5, SOx, NOx	High Volume Sampler	Once per Month	January, February, March, April, May, June, July, August, September, October, November, December
Ambient noise and vibration	Construction	All construction locations along the line - 2 locations	Measurement of noise dB(A)	Filed Level Noise Meter	Once per Month	January, February, March, April, May, June, July, August, September, October, November, December
Surface Water Environment	Construction	All construction locations along the line - 2 locations	Temperature, pH, TDS, EC, TSS, DO, COD, BOD5	In situ and Laboratory analysis	Once per Month	January, February, March, April, May, June, July, August, September, October, November, December
Ground Water Environment	Construction	All construction locations along the line - 2 locations	Temperature, pH, Phosphate, Mn, Fe, As, Fecal Coliform	In situ and Laboratory analysis	Once per Month	January, February, March, April, May, June, July, August, September, October, November, December

10.2 Annex - B. Environmental monitoring Photographs: January-June 2017

Sampling photo in the month of January 2017



Air Quality Monitoring at Alishohor Railway Station



Air Quality Monitoring at Quasba Railway



Noise Level Monitoring at Lalmai Railway Station Mosque



Noise Level Monitoring at Alishohor Jame Mosque



Surface Water sample collection at Gangasagar



Ground water sample collection at Gangasagar

Sampling photo in the month of February 2017



Air Quality Monitoring at Alishahar Railway Station



Noise Level Monitoring at Lalmai Railway Station Construction Site



Air Quality Monitoring at Quasba Railway Station



Noise Level Monitoring at Lalmai Railway Station Construction Site



Surface water sample collection at In front of Alishahar Railway station Mosque site Pond



Ground water sample collection at Alishahar Railway Station SiteTubwell

Sampling photo in the month of March 2017



Air Quality Monitoring at Alishahar Railway Station



Air Quality Monitoring at Saldanadi Railway Station



Noise Level Monitoring at Kasba Railway Station Construction Area



Noise Level Monitoring at Gangasagar Railway Station



Surface water sample collection at Dakatia River



Ground water sample collection at Alishahar Railway Station

Sampling photo in the month of April 2017



Air Quality Monitoring at Alishahar Railway Station



Noise Level Monitoring at Alishahar Railway Station Jame Mosque



Surface water sample collection at In front Dakatia River (Bagmara, Bridge No – 231)



Surface water sample collection at In front of Saldanadi River



Ground water sample collection at Saldanadi Railway Station Tubwell



Ground water sample collection at Alishahar Railway Station Tubwell

Sampling photo in the month of May 2017



Air Quality Monitoring at Mandabag Railway Station



Noise Level Monitoring at Alishahar Railway Station Jame Mosque



Noise Level Monitoring at Mainamoti Railway Station



Noise Level Monitoring at Mandabag Railway Station



Surface water sample collection at In front Saldanadi River



Ground water sample collection at Mainamoti Railway Station Jame Mosque Tubwell

Sampling photo in the month of June 2017



Noise Level Monitoring at Roghurampur Northpara Jame Mosque



Noise Level Monitoring at Jangalia Station Jame Mosque



Ground Water Collection at Kasba Construction Camp Pump Water



Ground Water Collection at Mainamoti Railway Station Tub-well Water



Surface Water Collection at Dakatia River (Up-Stream) Water



Surface Water Collection at Dakatia River (Down-Stream) Water

10.3 Annex- C. Site visit Report during January-June 2017

Site visit Report-Environmental Safeguards

Date of visit: 27-02-2017

Site: Laboratory at Labiba Tower

Project activities

- **Laboratory under preparation**

Description

Contractors have set up a laboratory on the ground floor and first floor at Labiba tower, Comilla. The first floor laboratory is well spacious and well equipped. It is still under development. The ground floor laboratory is also well equipped and functioning well.



Comments

Though both the laboratories are well equipped, and has been set up nicely, care should be taken in context of environment. Unused lubricants, oil, petroleum products and waste management system is not observed.

Recommendation

Laboratory should be kept neat and clean. Oily and petroleum products and other waste materials should kept in designated places to control pollution and health hazards of the workers.

Date of visit: 27-02-2017

Site: Qusba Railway station area



Project activities

- Material stake yard is under construction
- Workshop is also under construction

Observations:

Senior Environment Specialist visited temporary workshop and main workshop is under construction. He also visited Material staking yard (which is under construction), bed preparation for station building which includes earth works. He also observed the labour shed, worker kitchen, toilet and drinking water facility.



Comments:

- 1) Dust is being produced from workshop ground preparation and material stake ground.
- 2) The kitchen is situated very near to the labour shed and possibility of fire accident.
- 3) The kitchen has no roof and it is under open sky.
- 4) The cook is suffering from heat stress and sweating much.
- 5) The Toilet condition is not good. The toilet is unhygienic and has no roof. Frequently flies are moving there.
- 6) Drinking water facility is present near station.
- 7) Water is being spread over dust by water spraying car along site.
- 8) Workers are using PPE(Personal Protection Equipment)



Recommendations

The Kitchen roof should be covered with shed. The Toilet should also be roofed. Water spreading should be increased.

Date of visit: 28-02-2017,

Site: bridge No. 261

Chainage:177+618

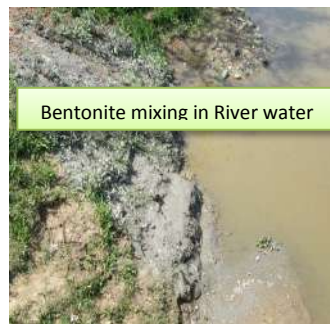
Project activities

- Test piling of Bridge No. 261 over Bajni River

Environmental Issue

➤ Construction site

During piling excavated material like bentonite slurry was not removed from the site. These are still in the mud tank near the piling site. The excavated material keeping tank has been established at the very close to the river bank. Excavated material or bentonite slurry dumping place was not observed. During heavy rain there is a chance of mixing these material into river water.



➤ Workers camp site

Senior Environment Specialist observed the workers camp site. The sleeping/resting place for the workers is good. There a sanitary latrine for the workers. The condition of the toilet is good. Toilet is situated beside the living place. It has covered roof. There is a good kitchen at the camp site. The kitchen is in open place and has shed. No kitchen waste dump is observed. They use tube well water for drinking purpose.



Environmental Impact/Pollution

+ Surface Water Pollution

➤ Pollution from oil and oily water

Surface water may be polluted by machinery oil and oily water. Servicing of machine or equipment near rivers, streams or other water bodies is being carried out in such a manner that it may create pollution with gasoline, diesel fuel, oil, grease, or surplus or disposal materials. No pollution control measure is observed.

➤ Pollution from bentonite and slurry

Contractor decided the used bentonite will be re-used in another piling works. So they preserved bentonite fluid in the bentonite tank. Bentonite slurry is also deposited into slurry tank. Due not to removal of bentonite slurry from the site, there is a great chance of polluting water.

+ Ground Water pollution

• Sanitary waste

Ground water may be polluted by sanitary waste. Sanitary latrine has been set up at the very close to the river bank that may cause water pollution.

 **Solid waste**

Both construction solid waste and excavated material can pollute surface water as well as ground water. No waste dumping area was observed. Solid waste burning is not allowed.

 **Kitchen waste**

Kitchen waste can also pollute surface water as some times they are very close to the water course. It also may cause food poisoning. No kitchen rubbish dumping pit was seen

 **Air Pollution**

- **Dust**

Limited dust pollution is observed. No water is being sprayed over the dust to suppress.

- **Emission from vehicle and equipment**

 **Noise Pollution**

 **Personal safety**

 **Occupational Health and Safety**

As the latrine condition is good health hazard may not be happened.

Mitigation measures taken/is being taken

Mitigation measure to avoid mixing of bentonite slurry into water is not taken yet.

Mitigation status

Mitigation status is medium.

Comments

The contractor's workers removed some of the excavated materials into nearby river to save time and money and that is why some degradation may be happened in the environmental quality leading to water pollution. If water becomes polluted, severe harmful effects may be caused on fish and other aquatic organisms. Aquatic fauna even flora can loss their habitat due to pollution. Sound pollution is not felt. Respiratory disturbance happens if dust pollution is not minimized.

Recommendations

For dumping of excavated material immediately a slurry dumping area should be selected and approved. Cleaning activity to latrine should be maintain. Kitchen rubbish dumping place should be selected. Water should be spread on the dust to minimize air pollution.

Date of visit: 01.03. 2017

Place of visit: bridge No. 262

Chainage: 177+985

Project activities

- Boring of Bridge no. 262



Environmental Issue

➤ Construction site

Test piling boring at bridge No. 262 was going on. During boring the contractor was using bentonite as boring fluid. They were pouring bentonite in one tank and slurry in another tank. Both the tanks are situated near the depression of water course.



➤ Workers camp site

Workers camp site was found at the site. The sleeping /resting camp is built with bamboo and corrugated tin. Toilet is not so good and close to water depression. Bad smell was coming from the toilet. Possibility of health hazard. There is no kitchen rubbish dumping place and the kitchen area is dirty and unhygienic. Food may be contaminated by kitchen waste. One kitchen has roof another has no roof. No fence of kitchen was observed.



Environmental Impact



Air Pollution

Medium stage of air pollution is occurring due to dust.



Occupational Health and Safety

As the latrine is not hygienic, severe health hazard may be happened. Fly will carry disease causing agent to food and contaminate them causing food borne diseases.

Mitigation measures taken/is being taken

Mitigation measure is medium. Water is not being spread much at the site to suppress the dust. Health hazard mitigation initiatives are not seen.

Mitigation status

Mitigation status is poor to medium.

Comments

There is a tube-well at site for safe drinking water. Bentonite slurry may cause water pollution if the slurry is not dumped in the dumping area. Contamination in food from latrine may also cause health hazard like diarrhea. Dust pollution may cause respiratory disease and people may suffer from suffocation problems. No noise pollution is felt.

Recommendations

Bentonite slurry should be dumped as soon as possible in the designated dumping place. Dust should be kept suppressed by spraying water as much as need in regular basis Kitchen rubbish dumping area should be selected. Toilet should be built in hygienic condition so that no contamination is occurred.

Date of visit: 02.03. 2017

Place of visit: Quasba Area

Project activities

- Earth work for embankment
- Excavation of earth from borrow pit
- Sub-grading and grading of embankment bed



Environmental Issue

- Construction site

Protection of Topsoil and Soil Erosion

Top soil should be reserved for use in later and needs to be protected. Though the excavated area will be used as fish pond.



Environmental Impact/Pollution

✚ Borrow and Dredging site impacts

Borrow area and dredging sites may be impacted by erosion and dust pollution.

✚ Surface Water Pollution

➤ Pollution from oil and oily water

Surface water may be polluted with machinery oil and oily water. Servicing of machine or equipment near rivers, streams or other water bodies is being carried out in such a manner that it may create pollution with gasoline, diesel fuel, oil, grease, or surplus or disposal materials. No pollution control measure is observed.

✚ Solid waste

Both construction solid waste and excavated material can pollute surface water as well as ground water. No waste dumping area was observed. Solid waste burning is prohibited as specified in contract document.

✚ Air Pollution

• Dust

More dust pollution is observed. No water is being sprayed over the dust to suppress in Quasba embankment working area.

• Emission from vehicle and equipment

Emission from vehicles may pollute air. Oily products from vehicles and equipment can pollute water.

✚ Noise Pollution

Machinery is being produced noise which is sometimes within tolerable limit and sometimes intolerable limit.

✚ Personal safety

For safety, workers are using PPE (Personal Protection Equipment).

Mitigation measures taken/is being taken

More mitigation measures to be taken to avoid or minimize dust pollution.

Mitigation status

Mitigation status is medium.

Comments

Embankment fill materials are being excavated from BR land and in some area from private land. But in both the cases big hole or ditches are being produced and those ditches are formed like fish culture pond. The owner of the land which turns into pond would like to culture fish commercially or for family purpose. The land of BR which is created as pond will also be used as fish culture by local people with discussion with BR.

Recommendations

Borrow pit should be maintain properly as not to damage the slope of embankment. Cleaning activity to latrine should be maintain. Kitchen rubbish dumping place should be selected. Water should be spread on the dust to minimize air pollution. Noise should be kept at minimum level. Working schedule should be in such a manner that some noise producing works should be done at day time and less sound producing works should be performed at night time.

Date of visit: 02.03. 2017

Place of visit: Moinpur area

Project activities

- Earth work for embankment
- Excavation of earth from borrow pit
- Sub-grading and grading of embankment bed



Environmental Issue

✚ Construction site

- **Protection of Topsoil and Soil Erosion**

Superficial or organic material removed during the excavation shall be stockpiled for subsequent use. But if surplus to the contract requirement, shall be disposed of in designated disposal areas.

- **Disposal of construction debris and other Waste Materials**

Man-made construction debris may be produced at working site.

Environmental Impact/Pollution

✚ Borrow and Dredging site impacts

The stock piling and /or disposal of surplus material should not be placed in any area where natural drainage or storm water could pond and become stagnant, or where could erode the material and cause silting of the adjacent area or of any natural or man-made water course.

No burning of waste materials shall be allowed. No cleared debris shall be left lying on the surface of the ground or buried in any agricultural land.

Surface Water Pollution

➤ **Pollution from oil and oily water**

Surface water may be polluted by machinery oil and oily water. Servicing of machine or equipment near rivers, streams or other water bodies is being carried out in such a manner that it may create pollution with gasoline, diesel fuel, oil, grease, or surplus or disposal materials. No pollution control measure is observed.

Solid waste

Both construction solid waste and excavated material can pollute surface water as well as ground water. Excavated materials are using in embankment piling work. So no extra waste materials are created.

Air Pollution

• **Dust**

More dust pollution is observed. No water is being sprayed over the dust for suppressing.

• **Emission from vehicle and equipment**

Different machines, vehicle and equipment are producing emissions. Contractor should use less emission producing vehicles and equipment.



Noise Pollution

Different machines like sub-grading, grading, roller etc. are producing some noise.

Personal safety

The workers are using personal protection equipment (PPE) during works. They are wearing safety boots, helmets etc.

Mitigation measures taken/is being taken

The contractor is following the plans to protect the borrowing and dredging site impacts as defined in EMP. They are securing and restoring borrow sites to control erosion or any further pollution.

Mitigation status

Mitigation status is medium.

Comments

Embankment fill materials are being collected by excavating borrow pit area which is within RoW along railway land and some time from private land. The borrow pit becoming very deep leading to pond size. These will be used for fish culture. The private land owner is giving the land for excavation as they wish to use this depression as fish culture pond. Embankment bed preparation by different machines and equipment are going and hence some noise is being produced which is minimum within tolerable level. Respiratory disturbance may be happened if dust pollution occurs.

Recommendations

As excavated borrow pit will be used as pond for fish culture, care should be taken to protect the pond bank from erosion. Embankment slopes should also be protected from erosion.

Date of visit: 5 March 2017

Place of visit: Bridge No. 231

Chainage: 139+597

Project activities

Test piling of Railway Bridge at Bagmara near bridge no. 231 had been completed on 24 February 2017.

Environmental Issue

➤ Construction site

Disposal of Excavated material: Excavated material should be removed from the site without any delay. Excavated material that is discarded bentonite slurry is still in the mud tank near the piling site. Bentonite tank and slurry tank is situated at the very close to the river. No excavated material or bentonite slurry dumping place is observed. There is a chance of mixing these material into river water. Dust is observed though not due to project activities.

➤ Workers camp site

Workers camp site was observed. Though the sleeping/resting place is good, the toilet facility is not good. Toilet is situated inside the river bank. It can contaminate river water. There is no good kitchen at the camp site. The kitchen is in open place and no shed is found. No kitchen rubbish dump is observed.



Environmental Impact

✚ Water Pollution

Due not to removal of bentonite slurry from the site, there is a great chance of water pollution. Water pollution may be happened due to contamination from the latrine.

✚ Air Pollution

Low to medium stage of air pollution is occurring due to dust.

✚ Health hazards

As the latrine condition is not good health hazard may happen by effecting with diseases where the vector is fly.

Mitigation measures taken/is being taken

Mitigation measure is not taken yet. Water is not being spread at the site to suppress the dust.

Mitigation status

Mitigation status is poor.

Comments

If water pollution occurs due to slurry mixing in the river, severe harmful or fatal effects may cause on fish and other aquatic organisms. Contamination in water from latrine will also cause pollution and health hazard like diarrhea. Dust pollution may cause respiratory problems. No noise pollution is felt.

Recommendations

Immediately a slurry dumping area should be selected and approved for dumping of excavated material. Latrine should be removed from river bank at least 30 feet away from water source including tube-well. Kitchen shed should be prepared and kitchen rubbish dumping place should be selected. Water should be spread on the dust to minimize air pollution.

Date of visit: 5 March 2017

Place of visit: Alishahar Station area

Project activities

Earth mainly sub-grading and contractor's material staking yard at Alishahar station area.



Environmental Issue

➤ Construction site

Earth is excavated from the RoW and sub-grading work is going on. Material staking yard is being also prepared adjacent to station building place. Dust is major concern of air pollution. Contractor is not spraying water as much as need to suppress dust.

➤ Workers camp site

Workers camp site was observed. The sleeping camp is built with bamboo and tent. About 36 persons sleep at this place which is very congested. Toilet is not good and very unsanitary in condition. Bad smell is coming from the toilet. Possibility of health hazard. There is no kitchen rubbish dumping place and the kitchen area is dirty and unhygienic. Food may be contaminated by kitchen waste.



Environmental Impact

✚ Air Pollution

Medium stage of air pollution is occurring due to dust.

✚ Health hazards

As the latrine is quite unhygienic severe health hazard may be happened. Fly will carry disease agent to food and contaminate them causing food borne diseases.

Mitigation measures taken/is being taken

Mitigation measure is medium. Water is not being spread much at the site to suppress the dust. Health hazard mitigation initiatives are absent.

Mitigation status

Mitigation status is poor to medium.

Comments

Safe drinking water is collected from station tube-well. Nothing is found to cause water pollution. Contamination in food from latrine will also cause health hazard like diarrhea. Dust pollution may cause respiratory problems. No noise pollution is felt.

Recommendations

Water should be sprayed as much as need in regular basis and dust should be kept suppressed. Kitchen rubbish dumping area should be selected. Latrine should be built in sanitary condition at least no contamination is occurred.

Date of visit: 5 March 2017

Place of visit: Lalmai Station

Project activities

Earth work for embankment construction, specially sub-grading and bed preparation work is going on. Preparation of station building ground and contractor's material staking place at Lalmai station area is also going on.

Environmental Issue

➤ Construction site

Due to earth work near station for preparation of material staking ground dust is generating much more causing air pollution. Contractor is spraying water as much as need to suppress dust. Many people frequently moving to station and there is a chance to attack by respiratory problems.

➤ Workers camp site

Labour camp site was observed. According to the one of the labour, about 40 persons sleep in this place which is very congested. Possibility of health hazard. There is no kitchen rubbish dumping place and the kitchen area is dirty and unhygienic. Food may be contaminated by kitchen waste. The kitchen built is somehow good. Good drinking water is being usually collected from station.



Environmental Impact

✚ Air Pollution

Low level of air pollution is occurring due to dust and it is sometimes.

✚ Health hazards

Food contamination may be occur due to unhygienic condition of kitchen area and may cause food born disease. Health hazard is a chance among the workers.

Mitigation measures taken/is being taken

Mitigation measure is optimum. Water is being spread at the site to suppress the dust. Much water is being used to control dust but spreading is not properly done due to some problems of water vehicle. Labour camp site should be improved.

Mitigation status

Mitigation status is medium.

Comments

No noise pollution is felt except train moving. Nothing is found to cause water pollution. Light dust pollution is often occurs. Safe drinking water is collected from station tape. Contamination in food from unclean kitchen area which will also cause health hazard like diarrhea. Dust pollution may cause respiratory problems. No kitchen rubbish dumping area is seen.

Recommendations

Always dust should be kept suppressed spreading water in work site and station area along the traffic movement. Kitchen rubbish dumping area should be selected. Sleeping or resting place of workers should be improved.



Date of visit: 5 March 2017

Place of visit: Gumti Bridge, No. 243

Project activities

Test piling of both sides of the Bridge is completed. One side is waiting for load testing. Preparation of load testing is nearly completed just waiting starting test. Another side is waiting for preparation of load test. Workers living house is under construction.



Environmental Issue

➤ Construction site

Dumping of Excavated material: Excavated material like bentonite slurry should be removed from the site without any delay. One dumping site is observed and situated near about 100 m away from the water course. Excavated material is still in the mud tank at both sides near the piling sites. Bentonite tank and slurry tank is situated at the very close to the river. There is a chance of mixing these material into river water.



➤ **Workers camp site**

Workers camp site was observed. Workers house is being prepared well. Roofless toilet is built inside the river bank. It can contaminate river water. There is good kitchen at the camp site. The kitchen is not dirty and shed is under roof. No kitchen rubbish is observed near kitchen.



Environmental Impact

✚ **Water Pollution**

As bentonite slurry is not removed from the sites, there is a great chance to pollute water. Water pollution may be happened due to contamination from the latrine also.

✚ **Air Pollution**

No air pollution is occurring at the site.

✚ **Health hazards**

As the latrine condition is environment friendly, health hazard may be happened after affecting with vector borne diseases. The usual vector is fly which carry disease causing agent.

Mitigation measures taken/is being taken

Mitigation measure is not taken yet to minimize water contamination from the latrine situated at the river bank.

Mitigation status

Mitigation is absent regarding contamination from latrine.

Comments

Severe harmful or fatal effects may cause on fish and other aquatic organisms if water pollution occurs due to slurry mixing into the river. Contamination in water from latrine will also cause pollution and health hazard like diarrhea. Dust pollution is low and noise pollution is not felt.

Recommendations

Immediately a slurry dumping area at other side should be selected and approved for dumping of excavated material. Bentonite slurry from both the sources should be removed as soon as possible. Latrine should be removed from the river bank far away from water source including tube-well.

Date: 21/3/2017

Location: Chainage: 131+350 – 131+450,

Activities:

1st layer earth work for embankment (one part) and preparation for 2nd layer for the embankment



Environmental degradation/Pollutions

- Air Pollution: Dust is less found and so dust pollution is very few. For this reason Air pollution is not observed.
- Pollution from oil and oily products: All oil and oily products shall be stored in a designated storage location where any spillage can be safely maintained without contamination of the surrounded area. But in most cases contractor is not following the specification.
- Water Pollution: No such materials are found that create water pollution. Machineries and equipment maintain and repair at designated area. So water pollution is not found.
- Noise pollution: No machinery was seen to run and so no noise pollution is felt.

Worker's Health and safety

No labour shed, toilet and drinking water facilities were observed. Contractor's person told that these are all in Laksam area. The workers are using personal protection equipment (PPE).

Date of visit: 21/3/2017

Location: Chainage: 132+080 – 132+110 (Right side)

Activities:

Grading and Field Dry Density Test (FDDT) by sand replacement method.



Environmental degradation/Pollutions

- Air Pollution: Natural rain has suppressed the dust but as some work is being run, some dust pollution has been observed though contractor's worker is suppressing dust through spraying water. So dust pollution is very minimum. On the other hand no air polluting agent was observed.
- Pollution from oil and oily products: All oil and oily products shall be stored in a designated storage location where any spillage can be safely maintained without contamination of the surrounded area. But in most cases contractor is not following the specification.
- Water Pollution: No water pollution has been found.
- Noise pollution: As Dozer and Grader machines were seen to run and so they were producing noise pollution. From Dozer machine (source) average noise level measured was **91dBA**. At the 10 meter distance from the source average noise level measured was **70 dBA**. The machine was running in interval. All the measures were taken during day time.



Worker's Health and safety

At very project site no labour shed, toilet and drinking water facilities were observed. Contractor's person told that these are all in Laksam area. The workers are using personal protection equipment (PPE) like helmet, safety boot etc. during work.



Date of visit: 21/3/2017 Location: Baghmara, Bridge No. 231, Contractor: MAX

Activities:

- Preparation for load testing
- Excavation for bentonite and mud tank
- Working piling ground preparation



Environmental degradation/Pollutions

- Air Pollution: Minimum dust was observed though water is not being sprayed over the dust. Natural rain water has suppressed the dust to some extent. However, air pollution is also minimum. Emission from some machine produce some air pollution.
- Water Pollution: Workers latrine which is situated at the river bank, is not removed yet. So, there is a chance of polluting water with human faeces. Bentonite and slurry tanks are filled

with mud. The place has been heightened at least 1.50 meters from the tank bottom. During filling of tanks, bentonite might be overtopped and enter into the river.

On the other hand the new slurry tank is being prepared very close to the drainage where possibility of bentonite mixing into water course.

- Noise pollution: Contractor is using excavator which is producing sound. At the source the noise level is 91-92 dBA. And from 10 meter distance the noise level is 75-77 dBA. The Excavator driver Mr. Mofizul Haque told that he had 20 years of experience of driving such type of excavator. He told that he habituated to hear such noise. During operation of this machine he does not get sounder as he became surrounded by glass. He feels less sound from his seat. So sound /noise pollution is minimum.



Worker's Health and safety

Labour shed for living, drinking water, kitchen house was found. Kitchen and latrine condition is still in previous condition. For personal safety, the workers are using personal protection equipment (PPE).

Date of visit :21/3/2017

Location: Moinamoti Station area

Activities:

- Alignment clearing through tree cutting
- Earth works for sub-grading



Environmental degradation/Pollutions

- Air Pollution: Emission from machine and equipment is minimum. So air pollution is minimum. No dust pollution was observed.
- Pollution from oil and oily products: All oil and oily products shall be stored in a designated storage location where any spillage can be safely maintained without contamination of the surrounded area. But in most cases contractor is not following the specification.
- Water Pollution: Water pollution is not observed.
- Noise pollution: Contractor is using excavator which is producing sound. But the sound is within the tolerable limit.

Worker's Health and safety

Drinking water source was found but workers living place and toilet facility was not found. Workers are using personal protection equipment (PPE) for safety.

Date: 22/3/2017 Chainage 190+430, Bridge No. 272 Chainage: 190+403

Activities:

- Load test of pilot piling is going on

Equipment using: Pressure gauge, Hydraulic Jack, Dial gauge



Environmental degradation/Pollutions

- Air Pollution: No air pollution is observed.
- Pollution from oil and oily products: All oil and oily products shall be stored in a designated storage location where any spillage can be safely maintained without contamination of the surrounded area. But in most cases contractor is not following the specification.
- Water Pollution: No water pollution found.
- Noise pollution: No air pollution is observed.



Worker's Health and safety

Labour shed for living, kitchen house was found. Kitchen and latrine condition is still in previous condition. For personal safety, the workers are using personal protection equipment (PPE)



Date of visit: 22/3/2017

Location: Chainage 194+9 to 195+0

Activities:

- Earth work for embankment (There is an archeological remnant at chainage 193+0)

Equipment: Excavator (920D LIU GONG, Drum Truck)



Environmental degradation/Pollutions

- Air Pollution: No gaseous pollutant was observed that can make air pollution. Only emission from machine can produce some air pollution. Minimum dust was observed and that is moisturized. So dust pollution is very minimum though water is not being sprayed over the dust. Wet weather has suppressed the dust to some extent.
- Pollution from oil and oily products: All oil and oily products shall be stored in a designated storage location where any spillage can be safely maintained without contamination of the surrounded area. But in most cases contractor is not following the specification.
- Water Pollution: No water pollution is observed at this site.
- Noise pollution: Contractor is using excavator and dump truck which is producing sound. At the source the noise level is 90-91 dBA. And from 10 meter distance the noise level is 73-75 dBA.

Worker's Health and safety

Labour shed for living, drinking water, kitchen house was not found. For personal safety, the workers are using personal protection equipment (PPE).

Date of visit: 22/3/2017

Location: Chainage 199+9

Activities:

- Earth work for embankment

Equipment: Payloader which heap the stone (uses diesel)

Sensitive receptor: Health complex, Mosque, Madrasa, Historical house of an ancient king



Environmental degradation/Pollutions

- Air Pollution: Air and dust pollution is very minimum as at present no activities are going on.
- Pollution from oil and oily products: All oil and oily products shall be stored in a designated storage location where any spillage can be safely maintained without contamination of the surrounded area. But in most cases contractor is not following the specification.
- Water Pollution: A big pond like Gangasagar is situated at the very close to the Gangasagar railway station. Any earth work can pollute the water if mud is mixed with the pond water.
- Noise pollution: No noise pollution is observed except train passing noise. Train noise is acceptable according to the noise rule of DoE.



Worker's Health and safety

In Gangasagar area I found no Labour shed. Safe drinking water source is seen. Kitchen house was also not found. The workers are using personal protection equipment (PPE) for personal safety.

Date of visit: 22/3/2017

Location: Chainage 197+100

Bridge No. 276

Activities:

- Bridge under test piling



The big material dumping area is being prepared by contractor. There is a machine named payloader which heaps the stone. Temporary workshop is working on. But according to the site engineer very soon they are going to build a permanent workshop for them. The extra oil or lubricant, they get from working machine they use them for cleaning purpose.

Environmental degradation/Pollutions

- Air Pollution: Natural rain water has suppressed the dust to some extent. Minimum dust was observed and water is not being sprayed over the dust. However, air pollution is also minimum. Emission from some machine produce some air pollution.
- Pollution from oil and oily products: All oil and oily products shall be stored in a designated storage location where any spillage can be safely maintained without contamination of the surrounded area. But in most cases contractor is not following the specification.
- Water Pollution: No water pollution was observed except that the workers latrine which is situated at the river bank. So, there is a chance of polluting water with human faeces.
- Noise pollution: Contractor is using different machine and equipment which is producing sound. At the source the noise level is about 90 dBA. And from 10 meter distance the noise level is 76 dBA.



Worker's Health and safety

Labour shed for living, drinking water, kitchen house was found. Latrine condition is no hygienic. The latrine is at the very close to the bank of river. Which can pollute water. For personal safety, the workers are using personal protection equipment (PPE).



Visiting date: 26.04. 2017

Place of visit: Quasba site office

Contractor: Toma

Drinking water quality test at Quasba site office

In consultation with Team Leader Senior Environmental Specialist visited Quasba site office to observe the water purification or water quality status on 26 April 2017.

Observation

Four tube-wells have been installed at Quasba office premises, all of which is 160 feet/100 meter depth. According to the opinion of Assistant Engineer, Department of Public Health and Engineering (DPHE) of Quasba Upazila these are shallow tube-well. So water should be tested only for Arsenic and Iron but if these were deep tube-well it needed test chloride also.



Initiative Taken

Regarding these test Senior Environmental Specialist (SES) discussed with the Assistant Engineer, Md. Abdul Motin, DPHE at his office where Toma staff Mozibur Rahman, Accident Prevention Office was present. We also shared the discussion with Anil Chandra Banik, Sr, Embankment Engineer, Toma. These tube-well installation contractor has tested only Arsenic from Quasba DPHE office and found the water arsenic free but as the test was performed using simple test kit box, doubt remains about accuracy. More than arsenic test is performed in DPHE Comilla laboratory. So SES has requested to

perform Arsenic, Iron and Chloride test in Comilla lab. Toma has started procedure of testing and test will be performed in this week and will send the test result. SES requested the DPHE Engineer to help performing the test of water quality parameter such as Arsenic, Iron and Chloride. Before test the water will not be used for drinking purpose.

Date of visit: 26 April 2017

Place of visit: Bridge No.263

Chainage: 178+698

Project activities

Piling completed and waiting for load test at site, bridge No. 263.

Observation

Pile cap, bentonite tank and slurry tank are under water. Water pollution has been happened by excavated material. No air pollution and noise pollution have been observed. No kitchen rubbish dumping area is seen.





Comments

The bentonite slurry tank should be clean and the material should be dumped in a designated dumping area.

Date: 27 April 2017 Place: Shashidal Ch. 180+000-Ch.186+000, Ch.173+000-Ch.174+000

Activities

Dewatering of embankment bed at the above mentioned chainage. No other work is going on due rainy day. All of the embankment beds at these chainages are under water. So dewatering work is going on.

Observation

Water pollution has been occurred due to turbidity at the pond near the embankment bed under water. Dewatering activities also eroding the soil which in turn making the water body turbid. No noise pollution is felt except train moving. No dust pollution is being happened.





Comments

Embankment bed slope should be protected from erosion to prevent turbidity in water body specially embankment side ponds.

Visiting date: 16.05. 2017

Place of visit: Gumti Bridge site

Chainage: 156+354

Senior Environment Specialist visited Gumti Bridge site on 16.05.2017 at noon. One side there is earthwork is going on. That is embankment bed preparation is going on. At this stage PVD is being gone on. Earth stacking is running. The stacked soil will be used in embankment preparation.





No noise pollution, no water pollution, no air pollution because of rainy days. Construction workers' house, camp is not found. Bentonite slurry tank is observed in a protective manner. At present still no chance of polluting water. Test piling on this side with load testing had been completed few days ago. Now they are waiting starting service piling on this side.

Another side of the bridge is busy with service piling. Pile no. 1, 3 and 4 have been completed including casting. During piling some photographs and videos had been taken. During service pile boring, they are using bentonite for stability of the boring hole. Workers camp and sanitary latrines were found at this side.

Bentonite is found in one tank and bentonite slurry is observed into another tank. Settled down bentonite from slurry tank is being re-used and thus they are minimizing bentonite cost. When contractor does casting the pile, the slurry with mud pass to another tank which is big and far from pile and little bit near the river but protected from mixing into river water.

There is no electricity in this area. So, during boring they are using generator for energy and producing noise. The noise exposure time is more than 8 hours which is hazard to health. But as it is very temporary, so no chance to damage any person in hear follicle. The boring machine is mechanized rotary machine made in China.



It is also producing noise. But still it is very temporary and will be used only one day at a time. So impact will be minimum due to this noise pollution. He also visited labour camp.

Contractor is sifting sanitary latrine from existing place (River bank) to another place. These are being installed more than 30 feet distance from the water level in the river. There will be no chance to pollute water by these latrines. But the old ones are not been destroyed yet and that is why bad smell is coming from the old latrines. He has requested them to destroy these old ones as early as possible. They promised to do so.

Visiting date: 17.05. 2017

Place of visit: Laksam area

Sr. Environment Specialist attended daily morning meeting at Labiba Tower in Comilla. There he expressed his Gumti Bridge site visiting experience to share with contractor. Then after meeting he started for Laksam to inspect the sites. He visited Alishahar where no work is going on except some station building work due to rainy days. After then he went to the Bridge no. 231 site at Bagmara. There pier -1, pile no. 7, 9, 10, 12 have been completed and abatement-1, pile no. 5 was being installed. Then he visited Lalmai area where ballast stacking was being performed only. He visited at the site of bridge no. 234 where they were waiting for load testing of test pile. At last Senior Environment Specialist visited at Moinamoti station area where no work was being done.



Visited and prepared by Senior Environment Specialist

Visiting date: 30.05. 2017 Place of visit: Gumti Bridge site (243 no.) Chainage: 156+354

ALDLP Senior Environment Specialist visited Gumti Bridge site on 30.05.2017. No work was going on except piling work of pile no. 6. Two pier piles and 5 abatement piles had been completed. Cage setting, welding and installation was completed from 10 am -1 PM. No earthwork was going on. No work was going on at the other side of the bridge as it was rainy day. Only one worker was using eye protecting device to protect the eye from high intensity of light producing during welding. Other workers engaged in that work were not using protecting device.



Welding-not all workers using eye protecting device



Cage installing-workers are in safe distance

Due to rainy day no dust pollution was observed at the site. There is no electricity in this site. So, during boring they are using generator for energy and creating noise. If the noise exposure time is more than 8 hours it will be hazard to health. But as it is very temporary, so no chance to damage any person in hear follicle. One generator was producing noise and it was annoying but there was little chance to create hearing problem. On the other hand one worker was cutting tiles with a device which was producing high noise may be more than 110 dB. He was not using ear muffle or ear plug to protect the ear from such high noise.



Generator-producing noise



Tiles cutting device-producing high noise

Bentonite slurry tank is observed in a protective manner. At present still no chance to pollute water. But if it rains heavily overtopping of slurry into river water is a chance. Slurry during casting is dumping in a designated place at Gumti site where there is no chance to mix into river water.



Oil, petroleum or lubricants are not being handled carefully as some of them are mixing into nearby water.



Health hygiene and sanitation condition is as same as was previous. Latrine has not been shifted from the river bank to other places nor destroyed. That is why bad smell was coming from the latrine. It is very unhygienic to health for the workers. Senior Environment Specialist is requesting contractor to destroy the bad latrine and complete the new good one as early as possible. Though workers house and kitchen is somehow good, no kitchen rubbish dumping place was found at the site



Workers' house-somehow good



Workers' Kitchen- no rubbish dumping place



Unhygienic latrine- spreading bad smell

Visiting date: 31.05. 2017 Place of visit: Laksam (Bridge-231) Chainage: 139+597

This morning Sr. Environment Specialist visited to the Bridge no. 231 site at Bagmara. In this site 11 piles have been completed and 1 is ongoing. Cage preparation work is going on for rest of the piles. No dust pollution was observed due to rainy day. Sometimes workers are not using personal protective equipment like helmet.



Bentonite slurry is being mixed into nearby river water. Thus it is polluting water. This pollution can be harmful for fish and other aquatic living organisms. Slurry should be protected from entering into water.



There is no electricity, so they are using generator for power and energy. But this generator is producing noise. Sometimes train is passing and producing noise. So noise pollution is felt and should be minimize.



Generator is producing noise



Train is producing noise

One latrine is surrounded by bush where there snake may live. So during using this latrine snake bite may be happened. So this latrine side should be cleaned to prevent snake biting. Another latrine is surrounded by bentonite slurry which made the latrine unusable.



Chance of snake bite from



Latrine surrounded by slurry

Visiting date: 31.05. 2017 Place of visit: Laksam (Bridge-232) Chainage: 140+335

In one side casting of 6 piles has been completed. Casting of 5 piles at another side has also been completed. Workers are preparing for rest of the pilings.



Casting of piles



Preparation for pile boring

Bentonite tank and slurry tank are separately built. But when slurry tank become full with slurry, the contractor empty this tank through dumping the slurry into the nearby water body. Contractor should prevent the slurry from entering into the water.



Bentonite slurry tanks



Slurry is entering into water body

Workers living house is observed and it was somehow no so bad. The kitchen is also found not bad. But no kitchen rubbish dumping place is observed.



Visiting date: 31.05. 2017 Place of visit: Saldanadi (Bridge-262) Chainage: 177+985

Embankment bed is damaged by the heavy rain fall. Rain cut created due to rain fall and not protected. This created turbidity into the nearby pond and it is harmful for fish in the pond.



Bentonite slurry is still into the slurry tank. River side of the tank is very low and chance of overtopping into the water if there is heavy rain fall happen. They told me that they will dump the slurry into the steel cage but when I do not know. At present at this site there is no work. Workers are preparing for service piles.



Steel Cage



Bentonite slurry

10.4 Annex- D. Environmental Clearance Certificate

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

Memo No: DOE/Clearance/5209/2013/188

Date: 02/05/2016

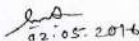
Subject: Environmental Clearance for Construction of Dual Gauge Double Rail Line and Conversion of Existing Rail Line into Dual Gauge between Akhaura and Laksam under Regional Co-operation and Integration Project : Rail Component.

Ref: Your application dated 27/01/2015, 01/04/2015 and 08/03/2016.

Dear Sir,

Please refer to your letter on the captioned subject, I have the pleasure to convey the approval of Environmental Clearance for Construction of Dual Gauge Double Rail Line and Conversion of Existing Rail Line into Dual Gauge between Akhaura and Laksam under Regional Co-operation and Integration Project : Rail Component.

A copy of the said Environmental Clearance Certificate is attached herewith for your kind information and necessary action at your end.


(Syed Nazmul Ahsan)
Director (Environment Clearance, c.c.)
Phone # 02-8181673

Project Director
Regional Co-operation and Integration
Project : Rail Component
Bangladesh Railway, Rail Bhaban
16, Abdul Gani Road, Dhaka.

Copy Forwarded to :

- 1) PS to the Secretary, Ministry of Environment and Forests, Bangladesh Secretariat, Dhaka.
- 2) Director, Department of Environment, Chittagong Regional Office, Chittagong.
- 3) Deputy Director/Officer in-charge, Department of Environment, Brahmanbaria /Comilla District Office, Brahmanbaria/Comilla.
- 4) Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

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

Environmental Clearance Certificate
Section 12 of the Environment Conservation Act, 1995 (Amended 2010)

Clearance Certificate Number: 188
File number: DOE/Clearance/5209/2013
Clearance Certificate Issue Date: 02/05/2016
Renewal date not later than: 01/05/2017

A. Clearance Certificate Type Environmental Clearance Certificate
B. Clearance Certificate Holder Project Director Regional Co-operation and Integration Project : Rail Component Bangladesh Railway, Rail Bhavan 16, Abdul Gani Road, Dhaka.
C. Premises to which this Clearance Certificate Applies Construction of Dual Gauge Double Rail Line and Conversion of Existing Rail Line into Dual Gauge between Akhaura and Laksam under Regional Co-operation and Integration Project : Rail Component.
D. Activities for which this Clearance Certificate Authorizes and Regulates The following components will be implemented by the Regional Co-operation and Integration Project : Rail Component authority - <ul style="list-style-type: none">• Track and Alignment.• Earthworks.• Stations and Buildings.• Rail and Loop/Siding Development.• Station Access Roads.• Hydrology and River Training Works.• Bridges and Culverts.

E. Terms and Conditions for Environmental Clearance Certificate

1. **Limit Condition for Discharges to Air and Water:** The Environmental Clearance Certificate must comply with schedule 2 and 10, rule 12 of the Environment Conservation Rules, 1997.
2. **Noise Limit:** The Environmental Clearance Certificate must comply with the Noise Pollution (Control) Rules, 2006.

4. Monitoring and Recording conditions:

4.1.1 The results of any monitoring required to be conducted by this Clearance Certificate must be recorded.

4.1.2 The following records must be kept in respect of any samples required to be collected for the purposes of this Clearance Certificate:
(a) the date(s) on which the sample was taken;
(b) the time(s) at which the sample was collected;
(c) the point at which the sample was taken; and
(d) the name of the person who collected the sample.

4.2. Requirement to monitor concentration of pollutants discharged

For each monitoring, the Clearance Certificate holder must monitor (by sampling and obtaining results by analysis) the following parameter: air quality, water quality and Noise.

5. Reporting Conditions: Environmental Monitoring Reports shall be made available simultaneously to Head quarters of DoE and Chittagong Regional office of DoE on a quarterly basis during the whole period of the project.

6. Notification of environmental harm: The Clearance Certificate holder or its employees must notify the Department of Environment of incidents causing or threatening material harm to the environment as soon as practicable after the person becomes aware of the incident.

F. Recording of pollution complaints

The certificate holder must keep a legible record of all complaints made to the certificate holder or any employee or agent of the certificate holder in relation to pollution arising from any activity to which this Environmental certificate applies. The record must include details of the following:

- (a) the date and time of the complaint;
- (b) the method by which the complaint was made;
- (c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
- (d) the nature of the complaint;
- (e) the action taken by the certificate holder in relation to the complaint, including any follow-up contact with the complainant; and
- (f) if no action was taken by the certificate holder, the reasons why no action was taken.

The record of a complaint must be kept for at least 4 years after the complaint was made. The record must be produced to any authorized officer of the DOE who asks to see them.

G. Validity of the Clearance Certificate: This Environmental Clearance is valid for one year from the date of issuance and Project Director shall apply for renewal to the Chittagong Regional office of DOE with a copy to Head Office of DOE at least 30 days ahead of expiry.

Violation of any of the above conditions shall render this clearance void.

This Environmental Clearance Certificate has been issued with the approval of the appropriate authority.

(Signature)
02.05.2016
(Syed Nazmul Ahsan)
Director (Environment Clearance, c.c.)
Phone // 02-8181673

10.5 Annex-E Environmental Management Plan: Monitoring Checklist

ENVIRONMENTAL MANAGEMENT PLAN: MONITORING CHECKLIST (January-June 2017)

Date:

Location:

Name of Monitor:

Implementation Stages/ Environmental Parameters	A	B	C	D	E	F
	Project Impact	Mitigation Measures	Details of Monitoring Action to be Undertaken	Location	Timing/ Duration	Who Undertook the Work
Construction Stage						
Natural Environment						
Hydrology and flood pattern	Construction of embankment, culvert and bridge would create minimal impact on hydrology at bridges sites.	The bridges and culverts are to be designed properly in line with existing bridges.	Site inspection	Near and around water bodies adjacent to alignment	Weekly during construction period at all drilling sites	CTM JV
Drainage congestion	Earthwork activities during construction of embankment may not induce drainage congestion except at culvert and bridge sites.	To deal carefully at bridges design and planning stages based on hydrological data.	Inspect the culvert/bridges just after heavy rainfall during monsoon and find the causes of drainage congestion if any.	Throughout alignment earthworks	Inspect weekly to ensure that drainage is properly maintained at earthworks	CTM JV
Erosion and silt deposition	The erosion risk at bridge sites and embankment slopes is either nil or minimal. However, gully erosion along the exposed track slope during rainy season may damage adjacent field crops during the construction stage.	Regular watering, grass turfing and planting Vetiver/Napier grasses in rows along the track slopes and bridge approaches will reduce the soil erosion risk.	Site inspection/ erosion at culvert and bridges sites prevent runoff into the rivers	At outlets of cross drainage structure with erosion potential	Inspect weekly to ensure that drainage is properly maintained at earthworks	CTM JV
Landscape: future visual intrusion	Earth carrying activities and at places, requiring access railway alignment will affect the landscape beauty.	A Landscape Specialist/Architect can help ameliorating the landscape beauty.	Inspection/ consultation with adjacent household and railway authority.	Throughout the railway alignment	Twice part way through construction of bridges and sites requiring temporary access roads	CTM JV
Ecological Environment						

Implementation Stages/ Environmental Parameters	A	B	C	D	E	F
	Project Impact	Mitigation Measures	Details of Monitoring Action to be Undertaken	Location	Timing/ Duration	Who Undertook the Work
Tree felling	The project involved felling of 55,000 trees and saplings from the BR track and from the homesteads.	Due compensation be paid for felled trees and planting trees at new sites as per the MOEF and BR rules. Large trees should be planted on berms and in lower slopes.	Monitoring of paying for Compensation and tree planting activities	At all project sites, particular new rail embankments, rebuilt stations and at temporary subgrade storage areas	Throughout the construction period as work is completed	CTM JV
Fisheries, Fish habitat and water courses	Bridges construction activities might hinder fish movement temporarily affecting the capture fisheries. Filling of the wetlands due to embankment construction might affect aquaculture and captive fisheries.	The bridge construction sites across the rivers need to be carefully monitored as these are migratory waters supporting important local fisheries. Blockages and pollution must not take place. The borrow pits /ponds dug for fill materials collection may be used for aquaculture or fish stocking to compensate the loss.	Site inspection/the culverts/bridges slope should be minimize to ensure that flow velocities are low enough to permit fish passage.	All the large bridges and smaller ones measurable flows exist	Once a month during the construction period	CTM JV
Wildlife	The terrestrial wildlife species might be disturbed due to noise and vibration at construction sites and tree felling to cause dislocation of habitats. No report was available regarding the presence of threatened or endangered wildlife species at sample project site.	Environmental manager to record any wildlife sightings and ensure that removal of natural trees areas and vegetation is kept to within the RoW	Site inspection	Along the project corridor of impact	Throughout the construction period at least	CTM JV
Environmental Pollution						

Implementation Stages/ Environmental Parameters	A	B	C	D	E	F
	Project Impact	Mitigation Measures	Details of Monitoring Action to be Undertaken	Location	Timing/ Duration	Who Undertook the Work
Surface water	<p>The surface water along the project site polluted due to faecal, organic and other contamination. Disposed wastes and effluents from the construction sites may cause further degradation of surface water.</p> <p>Pollution of surface water may be caused due to disposal of junk, used up bentonite from piling sites, cement refuse and effluents in open water bodies during the construction of bridges.</p>	<p>Wastes, effluents and other contaminant materials at camp/work sites to be stored, handled, transported and disposed in planned manners.</p> <p>Garbage, concrete refuses, slurry mud used as lubricant during pile driving and the effluents not to be disposed directly into natural waters, but via settling basins to extract some of the TSS.</p> <p>WQ sampling at all major bridges, stations two samples, 2X/month TSS, TP, BOD5, Oil and Grease</p>	<p>Inspection at all work camps and major construction sites such as bridges and earthworks.</p> <p>Sampling at all bridges-upstream and downstream</p>	All work camp, major construction sites and earthworks sites	Regularly throughout the construction period	CTM JV
Ground water	<p>The only potential for impacts to this water source would be the result of seepage of wastes from workers' camps through the soil profile.</p>	<p>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 the wastewater and solid wastes from entering into well and groundwater recharge areas.</p>	<p>Periodic inspection throughout the alignment, especially where the pile drilling to 30m depth is conducted, and where any new wells were dug</p>	Throughout the alignment, especially where the pile drilling to 30m depth is conducted, and where any new wells were dug.	If new wells are dug and toilet facilities built near wells.	CTM JV

Implementation Stages/ Environmental Parameters	A	B	C	D	E	F
	Project Impact	Mitigation Measures	Details of Monitoring Action to be Undertaken	Location	Timing/ Duration	Who Undertook the Work
Air pollution	The air pollution level is highest during the months November-February. Hence, the ambient air pollution by SO _x , NO _x and PM at busy stations requires testing. Dust and other emissions from the construction sites might be the cause of air pollution during the construction stage.	Regular watering and grass turving at the exposed sites needed to control dust blowing. Monitor of the air pollution levels at different construction sites needed. During dry season check for dust and undertake air quality testing for SO ₂ , NO ₂ and TPM at major bridge & station construction sites	Inspection at Each work site—certainly 4 large bridges, rock crushing and aggregate plants and major station reconstruction sites	Each work site—certainly large bridges, rock crushing and aggregate plants and major station reconstruction sites	Regularly throughout the construction period	CTM JV
Noise and vibration	Work sites will be noisy due to vibration during pile driving, operation of power generator, rock crushing/ ballasting plants and movement of construction vehicles.	The noise pollution beyond 60 dB (Bangladesh standard) levels at mosque, school, populated area and other sensitive sites need controlling. Contractor to use only well maintained functioning equipment Take noise readings at sensitive receptors 2X/day during full work activities, 2X/month	Sample Sensitive sites within 20m of rail RoW in the vicinity of the sensitive receptors.	Sensitive sites within 20m of rail RoW in the vicinity of the sensitive receptors.	Throughout the construction period	CTM JV
Soil contamination	Contamination of soils at camp and work sites due to accidental spillage of noxious chemical, petroleum derivatives and bituminous material may happen.	The chemicals, cement, petroleum derivatives and bituminous materials to be handled, operate and stored cautiously.	Use of Compliance checklist	At all work camps and construction sites	Bi-monthly during the construction period	CTM JV
Health and Safety						

Implementation Stages/ Environmental Parameters	A	B	C	D	E	F
	Project Impact	Mitigation Measures	Details of Monitoring Action to be Undertaken	Location	Timing/ Duration	Who Undertook the Work
Loss of navigation route	No permanent disruption of navigation route anticipated. Temporary disruptions caused at bridge sites are manageable with little attempt.	Movements of the navigational traffic will be maintained through alternative arrangement.	Visual inspection	All bridge construction sites	Monthly specific inspection	CTM JV
Waste Management	The vast majority of waste products associated with the project are generated by field camp activities during the construction period.	Contain all solid wastes at designated location within construction sites. Service machinery and vehicles strictly at designated maintenance workshops where waste oils and lubricants can be collected and recycled.	Undertake good housekeeping practices regularly and in a timely manner	All construction camp areas	Complete monthly and submit to Engineer	CTM JV
Health and safety	Personal and occupational health issues and diseases contamination are common in labour camps that might even spread in the adjacent villages during the construction stage.	Provision of safe water, sanitary toilet facility and hygienic accommodation for workers at camp sites. In addition, ensure provision of PSEs and First-Aid facility for them. Insure that these facilities are cleaned and disinfected and include in weekly inspection	Undertake check and cleaning at all sites and areas where clean conditions should exist.	All work sites and particularly at construction camps	At least 2 times/week	CTM JV
Vector-borne diseases	The sample project will create temporary employments for the skilled, semi-skilled and non-skilled workers.	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	Complete check for ponding water at each work site and camp	All work areas and camps	Regular construction site inspection and complete 3-4 days after every rain	CTM JV
Rail traffic disruption	The sample project activities like the construction of station, platform and platform shed may temporarily disrupt the rail traffic. The public safety causing death and injury may affect due to rail accident at construction sites.	Construct fences separating the construction sites at rail stations from public access, and to manage train movements in close collaboration with BR dispatch staff.	Conduct inspection as part of regular inspections	Station, platform areas and track-work in the project corridor	At least every two months	CTM JV