Ref. No.: JV-ALDLP-BR-20- 249 Date: 31 December 2020

Mr. Md. Romzan Ali
Project Director
Bangladesh Railway, Rail Bhaban (17th Floor)
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: **Draft Semi-Annual (July-December 2020) Environmental Management Plan Implementation Report.**

Dear Sir,

In conformity with Schedule 5 of the Project Loan Agreement on regular progress report submissions to the ADB, we are forwarding herewith the Semi-Annual (July-December 2020) Environmental Management Plan Implementation Report.

During the reporting months of July - December 2020, Project Environmental Safeguard Activities include the implementation of the Environmental Management Plan (EMP) by the Contractor CTM JV, Compensation Tree Plantation activities by Subcontractor Gumti Nurseries, EMP compliance monitoring and Environmental Quality Monitoring by Subcontractor EQMS, and supervision work of ALDLP Environmental Subcontractors by CSC Environment team. Also during the period, senior Project officers attended the virtual Environmental Safeguards Seminar hosted by ADB.

Should you find the report acceptable, may we request that it be forwarded to ADB for their information and approval for posting at their website.

Sincerely yours,

31.12.2020

Md. Khairul Alam
Acting Team Leader
Construction Supervision of Akhaura-Laksam Double Track Project
E-mail: khairulalammd59@gmail.com

Attachment: Draft Semi-Annual (July-December 2020) Environmental Management Plan Implementation Report.

Semi-Annual Environmental Management Plan Implementation Status Report (July-December 2020)

December 2020

BAN 3170: SASEC Railway Connectivity: Akhaura-Laksam Double Track Project

Prepared by the ALDLP Construction Supervision Consultant for the Bangladesh Railway

Government of the People's Republic of Bangladesh

MINISTRY OF RAILWAYS

BANGLADESH RAILWAY

CONSTRUCTION OF DUAL GAUGE DOUBLE RAIL LINE AND CONVERSION OF EXISTING RAIL LINE INTO DUAL GAUGE BETWEEN AKHAURA AND LAKSAM

Semi Annual Environmental Monitoring Report
July- December 2020

CONSULTING SERVICES CONTRACT FOR CONSTRUCTION

SUPERVISION OF AKHAURA-LAKSAM DOUBLE TRACK PROJECT

ADB Loan No.: 3170-BAN (SF)

Submitted To : ADB BRM, Dhaka

Submitted By : Project Director, ALDLP, Bangladesh Railway

Prepared By : Construction Supervision Consultant, ALDLP, Bangladesh Railway

1 EXECUTIVE SUMMARY

The Akhaura-Laksam Double Line Project, is part of Dhaka-Chittagong Railway corridor, that is a component of the Trans-Asian Railway Network, SASEC, SAARC & BIMSTEC corridors in Bangladesh. The project entails the double tracking of a 72 km rail line, construction of 2 major and 11 minor stations; and a few hundred meters of access roads in eastern Bangladesh.

The land use in the project area is mainly agricultural with no significant environmental features or protected areas. The Project is basically an expansion of an existing single track to double railway line, thereby increasing its current capacity to convey passengers and cargo not only along the Akhaura to Laksam track segment, but the whole Dhaka to Chittagoong network. In view of this site condition and nature of the Project, it has been categorized as ADB Environment Category B, where the environmental impacts are known, limited in scope to within the Project area and its adjacent environ, short-term, reversible, and can be mitigated with proper implementation of the prescribed Environmental Management Plan (EMP) contained in the Initial Environmental Examination (IEE) that was prepared for the Project During the Detailed Design Phase.

Other reportorial requirements complied by the Project was the Environmental Impact Assessment (EIA) report that was prepared incompliance to the European Investment Bank (EIB) Environmental and Social Handbook, (2013) as well as the EIA report in fulfillment of the requirements of the Department of Environment (DoE), Ministry of Environment and Forests, Government of Bangladesh for red category projects.

Protection of the Environment is one of the most important policy that ADB, EIB and the Bangladesh government subscribed to. ADB and EIB is seriously concerned about this issue and strictly ensure that any development project financed by them will not significantly affect the natural and social environment of the Project site and its adjacent environs. The Project Loan Agreement prescribes that the Bank's Safeguard Policy Statement (SPS-2009) through the EMP be complied with by the Executing Agency throughout the Project implementation.

The Project has instituted measures consistent with the guidelines prescribed by the World Health Organization (WHO) and Bangladesh Government Directorate, in order to help control the spread of Covid-19 virus. These prevention measures include extended holidays at the start of the pandemic in the country, inclusion of Covid-19 prevention lectures in the regular tool-kit meetings and HIV/AIDS STD prevention seminars that are attended by construction workers; distribution of face masks to construction workers, and installation of wash areas in the workplace, as well as disinfecting booths in Project offices. The body temperature of persons are taken for persons entering offices, to ensure no one with Covid-19 symptoms can spread the virus. An ambulance is on standy-by at the Project site 24/7 to ferry sick or injured persons to nearby medical facilities when necessary. Consequently, these health measures resulted in the slow down of construction progress, due to limited staff reporting for work at the initial stage of the pandemic, then observance of health protocols takes off part of the worker's productive time.

Project Status

As of 30 November 2020, the Project has achieved 73% cumulative progress and utilized 63.57% amounting to BDT 18.9 Billion, of its total contract sum. Embankment works is 88.054 km (79%) complete with 63.7km and 24.64 km upline and downline respectively built. About 77.38% Sub-Grade and 54.6% Sub-Ballast layers laid, and 271.39% of unsuitable materials removed and properly disposed. Bridge work is 98.58% (12 units) and 49.5% (4 units) complete for upline and downline respectively. Culverts are 93% (41 units) and 27.25% (11 units) completed for upline and downline respectively. Station buildings are 61% completed with physical progress ranging from 25% in Saldanadi Station to 94% in Alishahar Station. The

overall track linking is 36.76% complete with 67.3 km of new tracks laid, where 49.29Km and 17.43km for upline and downline respectively. Signaling works is about 20.23% complete.

The 7th version of the Contractor's Work program (WP-G), had been endorsed by CSC, and subsequently approved by BR which resulted in the awarding of a time extension to the Contractor's handing over of Section 1 from 1 September 2020 to 16 June 2021 which is equivalent to 264 days. Correspondingly, the handing over of the other Sections is adjusted accordingly. Section 2 will be given a 412 days extension ending in 12 November 2022, while Section 3 will have a 400 days extension ending in December 2022.

Environmental Monitoring

All anticipated negative environmental impacts, appropriate mitigation measures and monitoring requirements have been defined in Environment Management Plan (EMP). There are two types of Environmental Monitoring works being conducted in the Project, the first of which is the Compliance monitoring of EMP implementation and the second is the Environmental Quality Monitoring. A third party had been hired through the Contractor, to perform both monitoring works. The organization EQMS conducts periodic site inspection, focusing on the contractor's work areas, construction waste disposal sites, vegetative rehabilitation of embankments and opened areas, restoration of local access used as haul roads, clean-up of completed works such as station buildings, Engineer's accommodations, site offices, bridges, culverts and others. A checklist had been developed to guide the inspectors in the evaluation of the Contractor performance in the implementation of the EMP.

Similarly, the Environmental Quality Monitoring is done by conducting sampling in preselected sites within the Project area. Every month, EQMS conducts air quality monitoring and ground water sampling in 2 of 13 major and minor stations; as well as surface water sampling in 2 nearby wet lands preselected sites. Monitoring will be shifted to 2 other stations and 2 nearby surface water bodies in the following month and so on.

During the reporting period that covers both rainy season (July-October) and dry months (November & December), on-site measurement of air quality and noise level were done using portable analyzers; while surface and ground water quality from preselected water bodies/sources is performed by securing grab water samples, and transporting them in suitable containers, preserved in ice and analyzed in government registered laboratories using standard methods for specific analytical parameters set by the Government environment agency. The results of the analysis were compared to the government set standards to determine compliance. A brief description is provided to explain the test results and provide recommendation when necessary. The EQM is conducted on a monthly basis.

Water Quality Monitoring

Surface water quality monitoring had been performed on a monthly basis during reporting period between the months of July to December 2020 which are both in the rainy and dry seasons. Samples taken during the rainy months exhibit relatively higher total dissolved solids (TDS) levels as compared to those taken during the dry months. Dissolved oxygen levels in the samples slightly above and below the prescribed threshold level of 5 mg/l, which may be due to domestic waste from upstream residential areas as well as agricultural waste or chemical or brick factor located upstream of the sampling area.

Groundwater samples taken from various sites indicate that the test results for all samples that were compared to government set standards, revealed that most test results are compliant to government standards with the exception of the heavy metals manganese and iron. However, it is most unlikely that these contaminants originated from the Project since no major excavation has been done, save for the concrete pilings for the building foundation having a depth of 16-25 meters, where as existing tube wells have lengths at about 220 m, and so the groundwater at this level would be unlikely to be contaminated by construction waste materials.

Air Quality Monitoring

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, PM**10** and PM**2.5**), Sulfur Dioxide (SO2), Oxides of Nitrogen (NOx), and Carbon Monoxide (CO) have been assessed by monitoring air quality. All parameters of air quality are found within the acceptable limits specified by the DoE. Previously air sample was collected for 2 hours but at present they are taking the sample for about 8 hours.

Noise Level Monitoring

Ambient noise levels have been monitored from Railway Stations of the ALDLP project. Potential noise intensity vary and dependent on the distance from the source, site land use, topography, presence of obstructions and meteorological factors. From the noise level measured from twenty-four sampling locations, five had slightly exceed the government prescribed threshold for institutional area of 50 db(A) for rail station mosques. Noise attenuation measure is suggested for mitigation.

Tree Plantation

About 47,800 saplings have been planted during the reporting period, of which 37,297 have survived that is composed of 6,978 saplings in TOMA side and 30,319 saplings in MAX side which yield an overall plantation survival rate of 75%. About 6,100 samplings were planted in place of the dead saplings. The subcontractor Gumti Nursery was unable to hit its target due to the government imposed lockdown to help prevent the spread of Covid-19, which resulted in the delayed site preparation, and disruption of the plantation establishment sequence thereby limiting the area ready for out planting. Plantation maintenance and protection were likewise affected by the inadequate manpower available resulting in a 25% sapling mortality rate. It is hoped that the remaining plantation establishment target will be met in the next planting season

Results of Environmental Monitoring and Compliance Measures

The EMP compliance monitoring results revealed, that most of the mitigation measures identified in the EMP are fully and partially complied with by the Contractor. Corrective actions have been prescribed by the third party monitor for the appropriate action of the Contractor, while good practices are also encouraged to be continued. There are however, a few prescribe measures that have not been complied with by the contractor and as such their immediate attention to address these short comings at the soonest possible time. Among these non-compliance is the provision of adequate Personal Protective Equipment (PPE) and enforcement on their use.

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 worker's 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

Substantial construction activities will occur in the next 5 months 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 on-going construction works;

(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 controlled noise level complying with prescribed thresholds based on zonal classification;
(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.

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 Pro-forma/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 Over bridge
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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I. INTRODUCTION

I.1 Project Background

1. The Akhaura-Laksam Double Line Project seeks to convert the existing 72 km track from Laksam Station to Akhaura Station to double track, as well as upgrade the existing 2 major and 11 minor stations along this route; install state of the art signaling and communications facilities within these stations; and upgrade existing level crossings and provide new ones in other critical road crossings. Residential buildings are likewise to be provided to most of these stations for use as accommodations of BR personnel that are assigned to these areas.

2. The upgraded rail facilities will complete the double tracking of the route from Dhaka to Chitagoong, thereby providing an environment friendly alternative to other modes such as road based transport. The Initial Environmental Examination (IEE) prepared for the Project had identified 3 main benefits which includes traffic diversion and fuel savings. Once the 44 train sets are in operations, it estimated that about 64.4 million liters of fuel would be saved, a reduction of the country's carbon footprint by 145,000 tons/year, and installation of upgraded rail buildings following international design.

3. The implementation of the Project is expected to yield adverse environmental impacts during construction and operation phase. The IEE identified these adverse impact as: a) deterioration of existing local roads by construction hauling trucks; b) blockage of waterways by construction materials spillage or erosion of embankments; c) air and noise pollution affecting sensitive receptors; and d) poor housekeeping of construction camps and work places leading to water pollution of nearby water bodies.

4. An environmental management plan (EMP) had been developed and approved for execution in order to mitigate the negative effects of Project implementation. To ensure that the Project implementation is compliant to the approved EMP, monthly environmental monitoring is being conducted by a third party Contractor, under the supervision of the Consultant and the Employer BR PIU. This Semi-Annual report covers the progress of the EMP implementation during the period of July – December 2020. This report also provides information on corrective actions done for non-compliant works, as well as the progress of the tree planting program that seeks to replace the trees that had been removed as a result of Project implementation.

1.2 Rationale

5. The Preparation and Submission of the Semi-Annual Report on EMP Implementation Status is among the Project Loan Agreement conditions [Schedule 5, Number 12, item (a)] that was entered into by and between the Government of Bangladesh and the Asian Development Bank (ADB). The report is also a means ADB, EIB and GoB can help ensure that another Loan Agreement condition [Schedule 5, paragraph 6] is met where "*the Borrower and BR shall ensure that the preparation, design, construction, implementation, operation and decommissioning of the Project and all Project facilities comply with (a) all applicable laws and regulations of the Borrower relating to environment, health and safety; (b) the Environment Safeguards; and (c) all measures and requirements set forth in the IEE, the EMP, and any corrective or preventive actions set forth in a Safeguards Monitoring Report.*"[1]

1.3 Environmental Monitoring

6. The Project is engaged in two types of monitoring, the first is the Environmental Management Plan (EMP) compliance monitoring to record and assess the performance of the Contractor CTM JV in the implementation of the EMP which is part of its Scope of Work; and secondly the Environmental Quality Monitoring of key environments such as air, land and water using government prescribed analytical parameters in order to determine if the approved EMP is effective in mitigating the identified negative impacts that the Project implementation will create. The conduct of the environmental monitoring is through a third party that had been

[1] ADB Loan Number 3170 – BAN, Schedule 5 (Execution of Project: Financial Matters), paragraph 6 (Environment).

selected through the Contractor CTM JV. The environmental monitor called EQMS performs both EMP compliance monitoring as well as the Environmental Quality Monitoring works. The Contract Supervision Consultant (CSC) Environmental team supervises the work of EQMS; while the overall supervision work is performed by the Executing Agency BR that has a Project Implementing Unit (PIU) who has designated one of its Deputy Directors as the environment Focal Person. The contents of this Semi-Annual (July-December 2020) EMP Implementation Status Report contains the progress attained by the Project in complying with the EMP and verification of its effectivity in mitigating the negative impacts to the environment during the 6 months monitoring period. Lessons learned and recommendations are likewise provided for consideration of BR decision makers and planners for future projects.

1.4 Brief Project Description

7. The ALDLP has 3 outputs under the Design and Monitoring Framework, namely a) upgraded railway infrastructure; b) improved capacity of BR in Project Management and Implementation; and c) Improved Project Implementation unit in BR.

8. Under Output 1 (upgraded railway infrastructure), the following are the major Project components:

i. Construction of a second track in dual gauge;
ii. Reconstruction 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; and
vii. Construction of 11 new stations and upgrading of 2 major stations.

9. Likewise, a modern computer-based interlocking signaling system will be installed; this will be integrated with the Centralized Traffic Control system. Table 1.1 below provides details of the Project components.

Table 1.1. Project Major Components

Project Component	Quantity
Major Bridges	12 bridges
Minor Bridges	49 bridges
New Station	11 minor stations
Upgraded Station	2 major station
Route km	72 km
Track	180.29 km
Level crossing	23

10. 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.

11. Output 3 on the other hand, entails the establishment and strengthening of a Project Implementation Unit (PIU) within the Executing Agency BR, that will oversee the ALDLP implementation. Currently, a BR PIU had been established for the implementation of the Project, which is manned by senior permanent officers of BR headed by a career Project Director, and supported by a Chief Engineer, an Additional Chief Engineer, and 4 Deputy Directors for Headquarters, Resettlement, Works and Ways, and Signal & Telecommunications. Two Additional Directors have likewise been assigned to the PIU to provide on-site support to the PIU's activities. The Deputy Director for Headquarters has been

designated as the Environment Focal Person while the Deputy Director for Resettlement had been designated as Focal Person for Gender concerns, both on concurrent capacity.

12. Output 2 involves the holding of capacity-building activities for BR officials and staff to enable them to more effectively carryout their respective tasks in the Project and in other BR operating units. Several BR officials and staff had attended various trainings abroad covering various topics which includes among others project management and procurement. During this reporting period, the Project Director, Chief Engineer and DD HQ (Environment Focal Person) had participated in a virtual training on Environmental Safeguards and Safety, that was sponsored by ADB. Other members of the ALDP family which includes CSC Team Leader and Environment and Health & Safety staff; as well as the Contractor's Managers and Environmental Staff also attended the activity.

1.5 Project Location

13. The Project is located within the Division of Chottogram found east of the capital city of Dhaka. Two Districts exercise jurisdiction over the Project site namely Cumilla and Brahmanbaria. Similarly, under the Cumilla District, there are 3 upuzillas that are traversed by the Project which includes Bhramanpara, Burichang, Cumulla Saar, Daksmin and laksam; while the upazilla that cover the Project site in the Brahmanbaria Districts include Akhaura and Quasba. **Figure 1.1** contains the location map of the Project, while **Table 1.2** contains details of the administrative subdivision that exercise jurisdiction over the Project site.

Table 1.2. Location of the Akhaura-Laksam Double Line Project

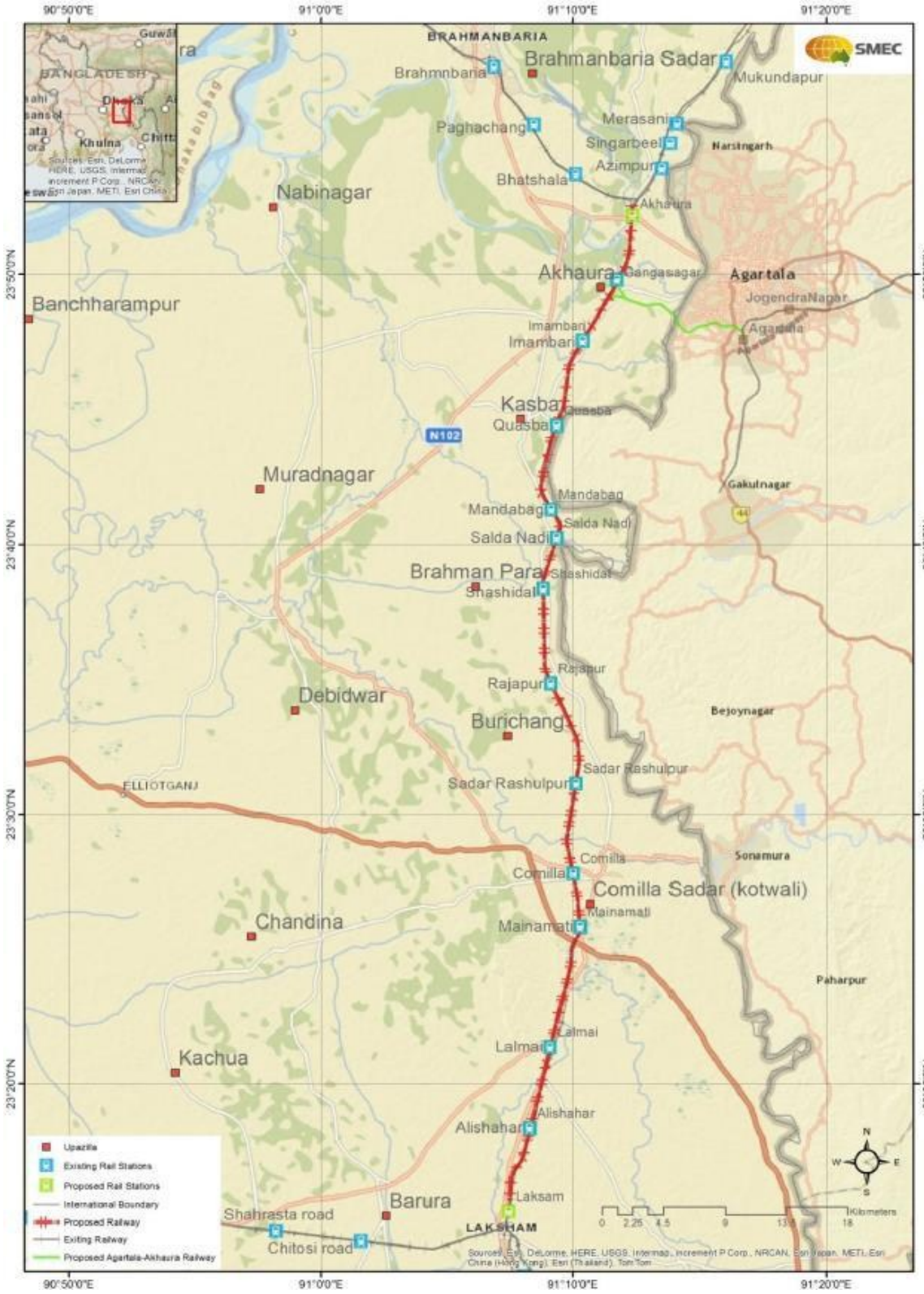
Division	District	Upazila
Chottogram	Brahmanbaria	Akhaura, Quasba
	Cumilla	Bhramanpara, Burichang, Cumilla Sadar, Cumilla Sadar Daksmin, Laksam.

1.6 Progress in Project Implementation

14. As of 30 November 2020, the Project has achieved 73% cumulative progress and utilized 63.57% of its contracts budget amounting to BDT 18.9 Billion. Embankment works is at 88.054 km (79%) complete with 63.7km and 24.64 km upline and downline respectively built. About 77.38% Sub-Grade and 54.6% Sub-Ballast layers already laid, and 271.39% of unsuitable materials removed and properly disposed. Bridge work is 98.58% (12 units) and 49.5% (4 units) complete for upline and downline respectively. Whereas culverts construction are 93% (41 units) and 27.25% (11 units) completed for upline and downline respectively. Station buildings are 61% completed with physical progress ranging from 25% in Saldanadi Station to 94% in Alishahar Station. It is expected that Alishahar station will be completed by the early part of January 2021. The overall track linking is 36.76% complete with 67.3 km of new tracks laid, where 49.29Km and 17.43km are for upline and downline respectively. Signaling works is about 20.23% complete.

15. The 7th version of the Contractor's Work program (WP-G), had been endorsed by CSC, and subsequently approved by BR which resulted in the awarding of a time extension to the Contractor's handing over of Section 1 from 1 September 2020 to 16 June 2021 which is equivalent to 264 days. Correspondingly, the handing over of the other Sections is adjusted accordingly. Section 2 had been given a 412 days extension ending in 12 November 2022, while Section 3 have a 400 days extension that will end in December 2022.

Figure 1.1. Akhauara-Laksam Double Line Project Location Plan



1.7 Environmental Classification of the project

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. The project only entails the construction of tracks alongside an already existing railway line. Hence an Initial Environmental Examination (IEE) was required to comply with ADB safeguard reportorial requirements.

23. The European Investment Bank (EIB), a co-financier for this project on the other hand, 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. Moreover, 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. This is due to the Project's estimated total cost of more than 1 million taka and its component bridges having spans longer than 100 m, which puts the ALDLP under the red category following the Environmental Conservation Rules 1997.

1.8 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) need to obtain an Environmental Clearance Certificate (ECC) from the Department of Environment, Government of Bangladesh; before commencement of the construction works.

So on the 2nd of May 2016, an Environmental Clearance Certificate (ECC) was secured by BR from the Department of Environment (DOE) for the project that is valid for one year, by virtue of their memo no. DOE/Clearance/ 5209/2013/188, dated 02 May 2016. Subsequently yearly renewals of the ECC has been obtained by BR by lodging renewal applications of the environmental clearance to the environment agency. For the reporting period, the ECC renewal was obtained from the DOE branch in Cumilla Distrct at the end of June 2020

1.9 Institutional Arrangements

Bangladesh Railway

27. The Executing Agency is the Bangladesh Railway that is the overall responsible to the Bangladesh Government and to ADB and EIB for the smooth implementation of the Project. A Project Implementing Unit (BR-PIU) has been established and assigned senior permanent BR officers and staff to manage the Project. The PIU is headed by a career Project Director, who is assisted by a Chief Engineer (CE), Additional Chief Engineer (ACE), 4 Deputy Directors for Headquarters, Resettlement, Works and Ways, and Signal & Telecommunications. Two Additional Directors have likewise been assigned to the PIU to provide on-site support to the PIU's activities. The Deputy Director for Headquarters has been designated as the Environment Focal Person.

Environment and Social Safeguards Unit (ESSU)

28. Within the BR-PIU, an Environment and Social Safeguards Unit (ESSU) will be created that is tasked of overseeing the implementation of various Safeguard program such as the Environmental management Plan (EMP), the Resettlement Plan (RP) and the Gender Action Plan (GAP). The establishment of the ESSU within the BR-PIU is the first step towards its full institutionalization after the completion of the Project.

29. 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.

26. There are other operating entities under the Project which includes the Construction Supervision Consultant (CSC) or "Consultant" task to supervising the day to day activities of the Construction Contractor CTM JV, which includes the implementation of the approved EMP, Health and Safety Program among others. The CSC has mobilized an international Resident Engineer for Environment, a Senior and 2 Junior Environment Specialist to oversee the Contractor's EMP implementation. The CSC prepares the Semi-Annual EMP Implementation Report covering the progress of the contractor in complying with the EMP as well as the Environmental Quality Report that is intended to confirm the effectiveness of the EMP in mitigating adverse environmental impacts. During this reporting period, the RE Environment had already demobilized and the Sr. Environmental Specialist had been relieved of his duty by the Employer. Only 2 Jr. Environmental Specialist are left to carryout the task of overseeing the EMP implementation.

Construction Supervision Consultant (CSC)

27. The Contractor CTM JV is the main implementor of the EMP. At the start of their contract period, CTM JV was required to submit their own EMP, that was duly approved by the Engineer, and was the basis for their environmental implementation activities and served as the performance indicator for the monitoring work. The EMP is part of the Contractor's scope of works, and payment is obtained by CTM JV for the fulfillment of their environmental protection work.

EQMS

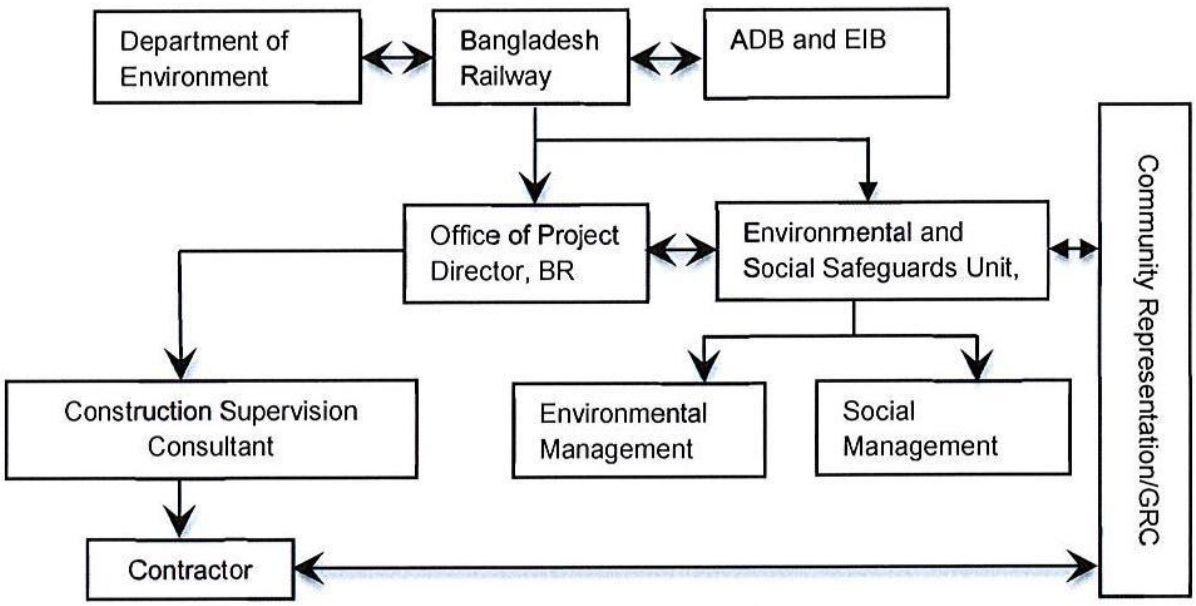
28. The environmental monitoring is done by the third party EQMS. Their services is availed of the Project as a subcontract of CTM JV. EQMS performs both EMP Compliance Monitoring as well as Environmental Quality Monitoring. Every month, a team from EQMS visits the Project site to perform their EMP compliance monitoring using a checklist intended to guide the evaluation of the Contractor's environmental performance. A report is submitted by EQMS to CSC, covering the result of their monthly activity. Similarly, EQMS also conducts on-site air quality and noise level monitoring in preselected stations using portable air quality and noise level measuring instruments ; as well as collect surface and ground grab water samples for analysis in their laboratory for parameters prescribed by the government environment agency. The results of the environmental quality sampling is compared to prescribe government environmental quality thresholds to determine compliance to set standards. Exceedance to government standards are provided with explanation and recommendations for action when necessary.

Compensation Tree Plantation Sub-Contractor

29. A last but not the least implementor is the Compensation Tree Plantation subcontractor named the Gumti Nursery. This organization is responsible for replacing the removed trees within the Project site, as a result of the construction works. Their scope of works include the production of quality planting materials such as tree seedlings (i.e timber, fruit-bearing, medicinal and fuel wood), site preparation, transport and out planting of seedlings, plantation protection and maintenance. Out planting is only done during the rainy months to help ensure adequate availability of moisture to the seedlings and less intense heat that can dry up the young plants. Dead out planted seedlings are promptly replaced by good quality ones. The CSC is responsible for monitoring the performance of the compensation tree planning due to the inability of EQMS to carry out this task.

30. The Asian Development Bank and the European Investment Bank, being the development partner of GoB, conducts periodic monitoring of the performance by the Executing Agency in implementing the Project as well as compliance to the approved Safeguard measures which includes the EMP. Bank technical staff review reports submitted by the Executing Agency and conducts field verification Missions to validate the information contained in the progress reports, which includes the EMP compliance reports and the Environmental Quality monitoring reports. Bank technical consultants review the progress of the Project's environmental work, sites issues that require rectification, and recommends corrective measures to resolve identified issues for rectification. **Figure 1.2** contains the Safeguards Implementation and Report Work Flow diagram.

Figure 1.2. Safeguards Implementation and Reporting Work Flow



1.10 Environmental Management Plan

31. 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.

32. 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 measured 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 program, which is described in the second of two EMP tables, and focuses on construction and operating period impacts.

33. 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

34. 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.

1.10.1 Environmental Management Implementation Works Schedule (EMWS)

35. 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.

36. 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 compliment 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.

37. 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.

38. 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.

39. Monthly and quarterly progress reports on EMP implementation are being prepared by the Contractor in cooperation with the Engineer appointed by BR. All reports are being submitted to BR via the Engineer. The quarterly reports are being included 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.

40. During the construction period (four years) the Engineer will prepare two semiannual 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.

1.11 Environmental Mitigation and Monitoring Requirements

1.10.2 The Environmental Management Plan in different Phases of the Project

41. 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.

42. 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.

43. 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 program.

a. 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.

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

c. To better track the air and noise pollution the contractor will be required to undertake a compliance monitoring program, 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.

d. 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 plant 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.

e. 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.

44. 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.

45. 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.

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

II. Environmental Quality Monitoring

2.1 Water Quality Monitoring

2.1.1 Surface and Ground Water Quality

46. 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, stored in a suitable plastic container, preserved using ice, and transported to the government accredited laboratory for analysis following standard methods.

47. The results of the surface water sample analysis were compared to the standards prescribed by government for Inland Surface Water, Environment Conservation Rules (ECR) and 1997-Schedule 3. Similarly, the groundwater test results were on the other hand, compared to the Drinking Water Standard ECR Schedule-3, 1997. The standards have been presented along with the monitoring test results of surface and groundwater samples for comparison. Considering that the beneficial use for humans of the waterways sampled, is mostly for fisheries, then the water quality standards set for this beneficial use was made the basis for the analysis of water quality compliance to standards.

Results of Sampling and Laboratory Analysis

48. The surface water sampling for 4 sites (Haora River, Gomti River, Sindai River and Goniajuri River) were done during in rainy months from July to October 2020; while the last two surface water sites (Salda River and Dakatia River) were sampled during the dry months of November and December. Water samples taken during the rainy months have a relatively higher total suspended solids (TDS) load as compared to those samples taken during the dry months, since the surface water run-off brought by the rains, have also carried with it sediments from upstream agricultural lands with relatively lose soil resulting from the cultivation work, as well possibly the excavated materials from Project construction sites.

49. It can be noted that the dissolved oxygen (DO) level on which local fisheries are dependent for their respiration, are compliant and slightly non-compliant to the minimum threshold concentration of 5 mg/l. Domestic waste water from upstream residences and agricultural waste from adjacent farm may have cause the uptake of the DO for their decomposition. However, the DO level at the Goniajuri river is very low between 1.4-1.7 mg/l. This can be explained by the presence of two big brick factories upstream of the sampling site which may have discharged their industrial waste to the nearby water way of Goniajuri river. TDS level of the Goniajuri river is at a high p150 mg/li which is doubled the TDS level of the next River with high TDS. With regards to the parameter of pH, it can be observed that the test results would indicate compliance to the set pH levels. The quality of surface water tested and analyzed in the project area is provided in the following **Table 2.1.**

Table 2.1. Surface Water Quality in the Study Area during July-December 2020

S/N	Sampling Code	Location	pH	Temperature (^{0}C)	Electric Conductivity, EC (mS)	Total Dissolved Solids, TDS (mg/L)	Dissolve Oxygen, DO (mg/L)	Biochemical Oxygen Demand, BOD_5 (mg/L)	Chemical Oxygen Demand, COD (mg/L)	Total Suspended Solid, TSS (mg/L)
July 2020										
1	SWQ-1	Haora River Water (Upstream)	6.86	29.8	0.12	60	4.8	1.8	21	44
2	SWQ-2	Haora River Water (Downstream)	6.85	29.8	0.12	60	4.7	1.9	18	38
August 2020										
1	SWQ-1	Gomti River Water (Upstream)	7.50	0.12	0.06	31.2	4.5	2.1	17	59
2	SWQ-2	Gomti River Water (Downstream)	7.39	0.13	0.06	31.3	4.8	1.8	19	68
September 2020										
1	SWQ-1	Sindai River Water (Upstream)	6.90	29.1	0.07	30	5.3	5.0	3.0	47
2	SWQ-2	Sindai River Water (Downstream)	7.05	28.9	0.07	40	5.2	6.0	3.0	49
October 2020										
1	SWQ-1	Goniajuri River Water (Upstream)	7.20	28.8	0.29	150	1.4	2.5	36	46
2	SWQ-2	Goniajuri River Water (Downstream)	7.17	29.3	0.30	150	1.7	3.0	39	45
November 2020										
1	SWQ-1	Salda River Water (Upstream)	7.30	27.1	0.10	50	5.0	0.2	96	21
2	SWQ-2	Salda River Water (Downstream)	7.21	26.6	0.10	50	5.1	0.2	93	30
December 2020										
1	SWQ-1	Dakatia River Water (Upstream)	6.99	23.9	0.53	270 ppm	3.4	1.0	36	28
2	SWQ-2	Dakatia River Water (Downstream)	6.92	23.9	0.53	270 ppm	3.4	1.0	40	32

Bangladesh Standard					
Source of drinking water supply only after disinfecting	6.5-8.5	-		6 or above	2 or less
Water usable for recreational activity	6.5-8.5	-		5 of more	3 or less
Source of drinking water supply after conventional treatment	6.5-8.5	-		6 or above	6 of less
Water usable by fisheries	6.5-8.5	-		5 of more	6 of less
Water usable by various process and cooling industries	6.5-8.5	-		5 of more	10 or less
Water usable for irrigation	6.5-8.5	-		5 of more	10 or less

*Note: BDL = Below Detection Limit; NR= Not Reported; Source: EQMS Field Survey and DPHE Central Laboratory LA= Lab analysis * Bangladesh Environment Conservation Rules, 1997- Schedule 3 (Standards for inland surface water).*

2.1.2 Ground Water Quality

50. The analysis of groundwater samples taken from the selected stations had indicate that most comply with Bangladesh Standards with the exception of the heavy metal manganese (5 out of 11 sampling stations) and iron for 1 station (Kasba station). However, it is unlikely that the contamination can be attributed to the Project due to the following: a) no deep excavations are performed in the Project with the exception of driving a few concrete piles (16-25m long) into the ground of some stations to strengthen their foundation; b) existing tube wells used to draw ground water is about 750 ft (228mm) deep; c) Manganese and iron are typical contaminants in "hard water" which can be found in the country; d) the absence of fecal coliform in the samples indicate that any seepage from surface excavations such as septic tanks are not able to reach the deep aquifer, in which the tube wells from where the samples are taken. A study published by IEB found that 78.9% sources of ground water in Chittagong division has higher Manganese concentration than Bangladesh standard. In view of this, it can be surmised that the heavy metal contaminants detected in the samples are background sources not associated with the Project construction. The quality of groundwater tested and analyzed in the project area is provided in the following **Table 2.2.**

Table 2.2. Ground Water Quality in the Study Area during July-December 2020

S/N	Sampling Code	Location	pH	Temperature (^{0}C)	Phosphate (mg/L)	Manganese, Mn (mg/L)	Arsenic, As (mg/L)	Iron, Fe (mg/L)	Fecal Coliform, FC (N/100mL)
July 2020									
1	GWQ-1	Rajapur Railway Station	6.61	27.6	1.1	0.09	<0.01	0.01	0
2	GWQ-2	Akhaura Railway Station	6.55	27.7	1.3	0.3	<0.01	0.32	0
August 2020									
1	GWQ-1	Sadar Rasulpur Railway Station	6.58	31.8	1.2	0.017	0.0	0.03	0
2	GWQ-2	Gangasagar Railway Station	6.69	28.0	0.9	0.312	0.0	0.25	0
September 2020									
1	GWQ-1	Cumilla Railway Station	7.35	28.6	0.6	0.1	0.01	0.19	0
2	GWQ-2	Kasba Railway Station	6.78	27.4	1.4	0.5	0.01	2.37	0
October 2020									
1	GWQ-1	Mainamati Railway Station	7.12	27.8	2.0	0.04	0.01	0.03	0
2	GWQ-2	Mandabag Railway Station	7.98	28.4	2.1	0.03	0.01	0.03	0
November 2020									
1	GWQ-1	Lalmai Railway Station	6.60	27.3	0.2	0.01	0.00	0.16	0
2	GWQ-2	Saldanodi Railway Station	6.70	28.0	0.6	0.40	0.00	0.54	0
December 2020									
2	GWQ-2	Shashidal Railway Station	6.82	25.9	0.1	1.3	<0.01	0.50	0
		Bangladesh Standard Error! Bookmark not defined.	**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 Laborator.

2.2 Air Quality Monitoring

51. A total of 10 sets of ambient air samples were collected from selected railway station areas of the Project rail corridor between Akhaura and Laksam. Six (6) sets of samples were taken during the rainy months of July to September; while five (5) sets of samples were taken during the dry months of November and December. The ambient status of major air pollutants such as Particulate Matter (SPM, PM10 and PM2.5), Sulfur Dioxide (SO2), Oxides of Nitrogen (NOx), and Carbon Monoxide (CO) have been covered in the monitoring work. Sampling time varies depending on the parameter, where $PM_{2.5,}$ PM_{10}, SO_2, NO_x were monitored for a period of 24 hours, while the parameters SPM and CO were measured for 8 hours. The air quality measurements were done using portable analyzers that were installed at the selected stations. The test results when compared to the Bangladesh air quality standards indicate that all of them are compliant at a level far below the set threshold. The test results would indicate that the EMP measures being implemented by the Contractor at the time of the air quality monitoring work, to minimize air pollution and dust control is working. Nevertheless, the contractor still needs to carry out the anti-pollution and dust control measures most especially that the next 6 months are dry months on which much dust are normally generated at the Project site. **Table 2.3** below contains the ambient air quality monitoring test results from selected stations for the period July-December 2020.

Table 2.3. Air Quality monitoring during July-December 2020

Sampling Code	Sampling Location	$PM_{2.5}$ µg/m³	PM_{10} µg/m³	SPM µg/m³	SO_2 µg/m³	NO_x µg/m³	CO^2 ppm
July 2020							
AAQ-2	Akhaura Railway Station	19.02	23.67	56.18	14.3	31.6	0.16
Baseline Status	Akhaura Railway Station	26.85	61.53	105.72	5.27	17.45	<2
AAQ-1	Rajapur Railway Station	17.94	21.13	52.71	20.1	23.3	0.07
Baseline Status	Rajapur Railway Station	12.47	26.81	63.21	2.91	10.43	<2
August 2020							
AAQ-2	Gangasagar Railway Station	14.16	26.37	47.16	2.71	6.08	0.04
Baseline Status	Gangasagar Railway Station	22.73	49.97	98.46	2.95	12.39	<2
AAQ-1	Sadar Rasulpur Railway Station	10.07	18.31	35.43	5.34	11.59	0.03
Baseline Status	Sadar Rasulpur Railway Station	11.32	27.76	48.57	2.41	12.57	<2
September 2020							
AAQ-2	Kasba Railway Station	14.08	16.47	41.13	4.87	10.97	0.03
Baseline Status	Kasba Railway Station	10.95	25.56	49.52	3.73	11.46	<2
AAQ-1	Cumilla Railway Station	11.57	17.74	39.52	5.96	16.78	0.02

Sampling Code	Sampling Location	$PM_{2.5}$ µg/m³	PM_{10} µg/m³	SPM µg/m³	SO_2 µg/m³	NO_x µg/m³	CO^2 ppm
Baseline Status	Cumilla Railway Station	24.87	56.98	96.79	4.95	14.86	<2
November 2020							
AAQ-2	Saldanodi Railway Station	10.74	22.36	45.92	3.13	24.28	0.03
Baseline Status	Saldanodi Railway Station	7.91	19.79	34.69	2.76	9.58	<2
AAQ-1	Lalmai Railway Station	18.10	26.43	67.42	5.24	20.34	0.05
Baseline Status	Lalmai Railway Station	13.45	29.87	53.98	3.79	11.23	<2
December 2020							
AAQ-2	Shashidal Railway Station	16.59	24.26	46.21	5.49	11.70	0.09
Baseline Status	Shashidal Railway Station	9.59	22.12	39.34	2.37	10.37	<2
AAQ-1	Alishahar Railway Station	21.81	37.25	64.12	11.73	9.17	0.06
Baseline Status	Alishahar Railway Station	15.29	36.65	65.82	2.56	13.59	<2
Bangladesh Standard**Error! Bookmark not defined.**		**65**	**150**	**200**	**365**	**100**Error! Bookmark not defined.	**9**
Duration (Hours)		**24**	**24**	**8**	**24**	**24**	**8**

[1] Carbon Monoxide (CO) concentrations and standards are 8-hourly only.

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

[3] The Bangladesh Standard for Oxides of Nitrogen (NO_X) is considered for annual measurement.

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 4*** are within the acceptable limits specified by the DoE.

2.3 Noise Level Monitoring

52. Ambient noise levels have been monitored from 13 railway stations of the ALDLP project during this reporting period. Noise meter with data logger (Digital Noise Meter: Model no. GM 1357) was used to record the ambient noise levels. Twenty-four (24) noise level sampling locations had been selected which are located near sensitive receptors of the stations. The Detail list of sampling location is shown in **Table 2.4.** Noise level measurement was done continuously for only 4 hours per monitoring site instead of the DOE prescribed 24 hours period. following DOE prescribed methodology. The average Leq was recorded and compared to the prescribed ambient noise threshold for the specific zone on which the monitoring site is located; to determine compliance to government noise level standards.

53. Potential noise intensity reaching a receptor vary and dependent on the distance from the source, site land-use, topography, presence of obstacles and meteorological factors. In this project key noise source are operating trains, back-up electric generators, moving vehicles, operating construction equipment and people (i.e. construction workers, commuters, pedestrians, vendors). The average noise levels measured at the monitoring sites are mostly compliant to the government noise threshold for the relevant zone category

with the exception of 5 (21%) out of 24 sites. These sites are BR station mosques that receive slightly higher noise levels than the prescribed 50 dB (A) threshold. However, it should be noted that the area on which these mosques are located are by nature noisy due to the presence of noisy operating locomotives and noisy commuters that patronize these trains. The baseline noise measurements at these areas are even higher than the average nouse values obtained during the reporting period. In the meantime that the DOE has not yet revised its noise threshold standards, it may be essential that appropriate noise attenuation measures be the installation of anti-noise measures in the railway station mosques. Since compensation are given to the owners of these mosque, part of the amount they receive should be used in lining the walls of their future mosque with noise-absorbing materials. CSC structure engineers can be consulted as to the specifications of such noise-absorbing walls.

54. The methodology employed by EQMS does not comply with existing DOE prescribed methods specifically the duration of the continuous noise measurement. The correct duration should be 24 hours continuous and not the 4 hours as performed by the third-party monitor. Subsequent noise monitoring should comply with the prescribed regulation else they would not be compensated for their noise monitoring efforts. The results of noise level monitoring is given in **Table 2.4**.

Table 2.4. Results of noise level monitoring during July-December 2020

Month	Sampling Code	Location	Leq dB(A)[3]	Baseline Status	Zone[4]	Bangladesh Standard at day Time dB (A)	Remarks
Jul 20	ANL-1	Rajapur Railway Station	53.34	66.84	Mixed	60	Low
	ANL-2	Rajapur Railway Station Jame Mosque	57.81	60.98	Silent	50	High
	ANL-3	Akhaura Railway Station	59.33	66.23	Mixed	60	Low
	ANL-4	Akhaura Railway Station Jame Mosque	56.95	55.80	Silent	50	High
Aug 20	ANL-1	Sadar Rasulpur Railway Station	45.73	63.51	Mixed	60	Low
	ANL-2	Sadar Rasulpur Railway Station Jame Mosque	51.62	52.25	Silent	50	High
	ANL-3	Gangasagar Railway Station	54.28	55.06	Mixed	60	Low
	ANL-4	Gangasagar Railway Station Jame Mosque	46.88	55.51	Silent	50	Low
Sep 20	ANL-1	Cumilla Railway Station	59.22	72.68	Mixed	60	Low

Month	Sampling Code	Location	Leq dB(A)[3]	Baseline Status	Zone[4]	Bangladesh Standard at day Time dB (A)	Remarks
	ANL-2	Cumilla Railway Station Jame Mosque	58.19	66.10	Silent	50	High
	ANL-3	Kasba Railway Station	56.24	54.65	Mixed	60	Low
	ANL-4	Kasba Railway Station Jame Mosque	53.73	NR	Silent	50	High
Oct 20	ANL-1	Mainamati Railway Station	59.18	74.99	Mixed	60	Low
	ANL-2	Mainamati Railway Station Jame Mosque	58.47	65.20	Silent	50	High
	ANL-3	Mandabag Railway Station	44.95	54.64	Mixed	60	Low
	ANL-4	Mandabag Railway Station Jame Mosque	48.26	54.74	Silent	50	Low
Nov 20	ANL-1	Lalmai Railway Station	58.97	64.13	Mixed	60	Low
	ANL-2	Lalmai Railway Station Jame Mosque	51.22	59.12	Silent	50	High
	ANL-3	Saldanodi Railway Station	52.65	62.49	Mixed	60	Low
	ANL-4	Ganganagar Jame Mosque	47.68	55.82	Silent	50	Low
Dec 20	ANL-1	Alishahar Railway Station	51.13	66.23	Mixed	60	Low
	ANL-2	Alishahar Railway Station Jame Mosque	47.52	55.80	Silent	50	Low
	ANL-3	Shashidal Railway Station	50.75	62.22	Mixed	60	Low
	ANL-4	Shashidal Samata Shishu Niketon	47.95	NR	Silent	50	Low

[1] A-weighted decibel, abbreviated dB(A), is an expression of the relative loudness of sounds in air as perceived by the human ear. In the A-weighted system, the decibel values of sounds at low frequencies are reduced, as the ear is less sensitive to low audio frequencies, especially below 1000 Hz, than to high audio frequencies.
[2] Noise Pollution (Control) Rules, 2006.

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

III. Environmental Management Plan Compliance

3.1 Progress of EMP Compliance during Construction Period

55. The implementation of the approved EMP is one of the conditions for the effectivity of the Project Loan Agreement. To ensure the contractor's compliance to the EMP, the Loan Agreement prescribe that this measures be incorporated into the bid documents as among the scope of work by the contractor.
56. During the actual EMP implementation, by the Contractor, the monitoring of its compliance had been awarded to a third party that serves as an independent monitoring. The third party monitor called EQMS will also be tasked to conduct the Environmental Quality Monitoring to check if the EMP is effective in mitigating the projected negative environmental impacts. The CSC Environment team on the other hand, supervises the work of the third party monitor EQMS, and confirms their findings and recommendations for corrective action to be performed by the Contractor to remedy non-compliances to the EMP.

3.2 EMP Progress Status During July- December 2020

3.2.1 Noise Attenuation Measures

57. To help insure compliance to Clause 3.5 of the EMP that prescribes the implementation of noise attenuation measures, site monitoring work was performed by EQMS. The third-party monitor had indicated that 2 (40%) of prescribed measures had been fully complied, another 2 (40%) had been partially complied, and only one had not been complied. Complied measures include a) Siting of noisy construction activities (i.e. rock crushing) have been located far from noise sensitive areas; and regular noise monitoring had been performed by the EQMS. Partial compliance were on found on the use of modern construction equipment at the site and installation of nose abating gears. While the contractor was still unable to supply ear protection for workers exposed to noisy working conditions. In addition to the measures mentioned, it was also observed that the Contractor had instituted protection measures against the spread of Covid-19 virus through the supply of face mast to the workers, as well as provision of wash stations at site. The contractor was instructed to fully comply with the prescribed measure most especially the provision of ear protection for workers exposed to laud construction noises. The compliance by the contractor to the prescribed corrective measures will be monitored in the following month January 2021. **Table 3.1** contains details of compliance to the noise attenuation mitigation measures/

Table 3.1. Noise Attenuation Measures

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
Use of modern plant and equipment with appropriate muffling devices.	Partially Complied	During field visit in most of the sites modern plant and equipment with appropriate muffling device has been found.	Old machineries and equipment essential to be modified with appropriate muffling device.	CTM
All powered mechanical equipment and machinery to be fitted with noise abating gear such as mufflers for effective noise	Partially Complied	All powered mechanical equipment and machineries with noise abating gear such as mufflers for effective noise control also been made available in compliance	Most of the site have the old generators, and other machineries which need to be repaired in an emergency basis.	CTM

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
control, in compliance with DoE regulations.		with DoE regulations in most of the work stations.		
Locate rock crushing, concrete mixing and material shipment yards away from residential areas, schools, colleges and hospitals.	Complied	Rock crushing, concrete mixing and material shipment yards are located far away from schools, colleges, and hospitals.	Implemented, and need to be continued.	CTM
Install temporary noise barriers near sensitive locations such as schools, religious places and hospitals	Partially Complied	During field visit it has been found that, there are lacking of temporary noise barriers near sensitive locations.	Temporary noise barrier needs to be installed in some station building where sensitive locations are available.	CTM
Providing the construction workers with suitable hearing protection like ear cap, or earmuffs etc.	Not Complied	Workers were not provided with suitable hearing protection, Moreover, it has also been found that, face masks and hand washing facilities has been provided to the workers to prevent the spreading and infected of Corona virus.	Hearing protection device for workers exposed to laud noises need to be provided. Furthermore, the practicing of providing mask and sanitizer to the workers need to be continued for the prevention of covid-19 virus infection in the workplace.	CTM
Noise quality monitoring to be carried out as per the schedule in the environmental monitoring plan.	Complied	Noise monitoring has been carried out in an appropriate manner and its need to be continued. Proper precaution measure such as PPE (gloves, hairnet, safety shoes) has been used by the monitors, while collecting sample from site, in compliance with the prevention of covid-19 spreading.	Need to comply with the DOE prescribed 24 hours continuous measurement for noise monitoring.	CTM

3.2.2 Dust Control

58. In monitoring for the fulfillment of Clause 3.3 of the EMP which is dust suppression, EQMS had noted that only 1 (11%) of 9 measures prescribed had been fully complied, while the rest (8 or 89%) had only partially complied with by the Contractor. It is only the monthly air quality monitoring that had been fulfilled for selected stations. The other measures such as covering of materials being transported, proper maintenance of construction equipment, regular watering of material stock piles and/or open areas; and avoiding the use of spent petroleum products as dust suppressant had only partially complied with. For this coming dry season, it is essential that dust suppression measures be properly applied, most especially with the anticipated full blast construction work due to the favorable working condition. **Table 3.2** contains details of the dust mitigation measures, site observations made by the third party monitor and recommended action to ensure full compliance of the EMP prescribed measure.

Table 3.2. Dust Control Measures

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
Vehicles transporting construction material to be covered	Partially Complied	Most of the vehicles, which are used for transporting construction materials, are covered with suitable materials to avoid dust suspension while materials are being transported.	Contractor needs to assigned inspectors to ensure that all vehicles transporting materials are properly covered.	CTM
Construction equipment to be maintained to a good standard and idling of engines discouraged.	Partially Complied	During field observation, it has been found that most construction equipment at the sites are maintained properly.	Need to ensure the practice for every working site.	CTM
Machineries emitting visible smoke to be banned from construction sites.	Partially Complied	Machineries, emitting visible smoke, has already been banned in most of the construction site.	Proper initiative needs to be taken to ensure this good practice is done in every working site.	CTM
Contractor to prepare a dust suppression program detailing action to be taken to minimize dust generation (e.g. spraying of water), and the equipment to be used.	Partially Complied	During the dry season, the frequency of water spraying has already been increased three to four time a day in most of the working sites.	The frequency of water spraying needs to be revised according to the assessed need most especially dust sensitive working site that is frequently traversed by local people.	CTM
Dust masks to be provided to workers where dust hazards exist.	Partially Complied	Inadequate number of dust mask has been provided to the workers. Moreover, workers have been informed about Covid-19, pandemic and advised on how to prevent its spread. Most of the worker using face mask while working.	Adequate number of dust mask need to be provided to the workers who are exposed to dust hazard.	CTM
Air quality monitoring to be carried out as per the schedule in the environmental monitoring plan.	Complied	Air quality monitoring has been carried out as per the schedule in the environmental monitoring plan.	Air quality monitoring need to be properly continued.	CTM
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 dust suppression measures by watering, sweeping or	Partially Complied	During the dry season, the frequency of water spraying has already been increased three to four time a day in most of the working sites.	The frequency of water spraying needs to be revised according to the assessed need most especially dust sensitive working site that is frequently traversed by local people.	CTM

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
other measures approved or directed by 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, spillage, and or seepage.	Partially Complied	During site inspection, it was found that most of the working sites comply with the requirements.	The practice need to be continued in properly in all working sites.	CTM
Contractor shall take all reasonable measures to minimize dust suspension 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 minimize dust suspension at construction site as per his direction	Partially Complied	To minimize dust suspension by spraying water on stockpile, bare soil, haul road, un-surfaced traffic route or any other source of dust has been pursued in most of the sites.	The practice need to be continued properly in all working sites.	CTM

3.2.3 Watercourse Impacts in Wetlands/Ponds/Rivers/Canals

59. During the reporting period, it was observed that 2 (40%) of the 5 watercourse impact preventive measures had been fully complied with, while the rest (3 or 60%) had been partially followed by the Contractor. The measures fully achieved during the reporting period include the proper storage and disposal of construction materials and waste in order to prevent siltation of adjacent water bodies, as well as installation of measures to prevent the contamination of watercourses during the construction of cross drains. The partially complied measures includes: the implementation of appropriate measures to limit the negative impact of construction works to the adjacent water bodies; keeping earthmoving works adjacent to water bodies at a minimum possible, prevention of discharges of silt laden surface run-off to waterbodies adjacent to the construction site. The Contractor should ensure that these pollution preventive measures be followed in all sites, and the monitor will need to follow-up on this matter.

60. The issue of water course contamination by construction activities is expected to be reduced during the next 6 months since these will be conducted mostly during the dry season. Nevertheless, construction sites were there are adjacent permanent waterbodies such as rivers or ponds; should still experience pollution preventive measures from the Contractor during this period (January-June 2021). **Table 3.3** contains details of the compliance to watercourse impact mitigation measures.

Table 3.3 Watercourse Impact Mitigation Measures

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
Adequate mitigation measure shall be undertaken to limit the impact on all water bodies within the Project area	Partially Complied	Adequate mitigation measure has already been taken to limit the impact on all water bodies in most of the working sites.	Need to ensure this good practice is applied in every working sites.	CTM
Earth moving in the vicinity of watercourses shall be kept to a minimum distance to avoid sedimentation and contamination from spilled fuel and lubricants.	Partially Complied	During site inspection, it was found that the contractor had maintained their earth moving works at an adequate distance from watercourses as prescribed in the EMP.	Need to ensure this good practice is applied in every working sites	CTM
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.	Complied	Waste materials had been properly stored and disposed in approved deposit sites. No stream flow has been blocked by the waste bricks, cement, and steel reinforcement, that were discarded during the construction of bridges and culverts.	Need to ensure this good practice is continuously applied in the working sites.	CTM
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	Mitigation measure has been undertaken to ensure that sediment laden run off does not enter the adjoining watercourses.	Need to ensure this good practice is continuously applied in the working sites.	CTM
Construction materials and waste shall not be discharged in watercourse during construction of bridges/culverts by implementing appropriate mitigation measure.	Partially Complied	Construction materials and waste has been temporary stored in the designated sites that are not flood prone nor near water bodies. Waste materials were properly deposited in approved disposal facilities in most of the working sites.	Need to ensure this practice is followed in all work stations;	CTM

3.2.4 Borrow and Dredging Site Impacts

61. During the reporting period, there were no borrowing nor dredging activity performed by the Contractor. It is for this reason that this activity had not been covered in the monitoring work performed by EQMS.

3.2.5 Disposal of Construction Debris and other Waste Materials

62. Majority of the measures (3 or 60%) related to proper storage and disposal of construction waste has been complied during the reporting period. These measures include: adoption of appropriate measures to minimize the impact of temporary storage of waste materials to pedestrians/local communities; no burning at site; and no burying of waste in agricultural lands adjacent to the construction site. Mitigation measures partially complied with (2 or 40%) include proper disposal of waste materials and proper grading of disposal site to minimize the negative impact to the aesthetics of the surrounding areas. Proper implementation construction waste management is an important measure that needs to be fully complied with by the contractor. It is for this reason that close monitoring not only by EQMS but also CSC need to be done, and corrective measures need to be acted upon by the Contractor. **Table 3.4** contains details of the disposal measures for construction wastes.

Table 3.4 Disposal Measures for Construction Waste

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
Adequate mitigation measure shall be undertaken to limit the impact on pedestrians, local communities and water bodies within the Project area.	Complied	Proper mitigation measure has been undertaken to minimize the impact of construction waste temporary storage and final disposal on pedestrians, local communities and water bodies within the project area.	Need to ensure this practice is followed in all work stations;	CTM
No burning shall be allowed.	Complied	No burning was observed during the site inspection.	Need to ensure this practice is followed in all work stations;	CTM
No cleared construction debris shall be left lying on the surface of the ground or buried in any agricultural land	Complied	No agricultural land was used for temporary storage of construction debris, nor any waste materials buried there.	Need to ensure this practice is followed in all work stations;	CTM
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	Partially Complied	With the approval of Engineers, construction debris were deposited in specific disposal area.	Need to ensure this good practice is followed in all working sites.	CTM
All disposal areas shall be graded to a uniform and level condition, and maintained in a manner such that	Partially Complied	Most of the areas are not graded to a uniform and level condition.	All disposal areas need to be graded to a uniform level in every working sites.	CTM

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
these deteriorate the aesthetics of the surrounding areas.				

3.2.6 Servicing and Operating Equipment

63. Only half (3 measures) of the prescribed mitigation measures under Servicing of Construction Equipment had been complied with. These measures include avoidance of servicing equipment near water course; ensuring equipment hydraulic, fuel and lubricating systems are properly operating to avoid oil spillage; and non-condoning of spillages. The other half of the measures that were not fully complied with include: provision of proper equipment for transporting and/or filling fuel and other petroleum products; and securing first the approval of the Engineer prior to the deployment of equipment at the site. Construction equipment are important element that facilitates the construction work effectively and on a timely manner. However, their proper use and maintenance will ensure the machines longer service life, minimizes costly down time due to equipment brake down, and government imposed penalties due to pollution of adjacent environs. Table 3.5 contains the detailed mitigation measures for impacts due to servicing and operating equipment.

Table 3.5. Measures during Servicing and Operation of Equipment

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
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	Contamination of Water courses have been avoided during the servicing of machines or equipment.	-	-
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	Complied	All hydraulic systems, fuel systems, and lubricating systems are maintained in good working condition to avoid leakage of petroleum products.	-	-
Fuel spills will not be condoned and care shall be taken to	Complied	Proper measure has been taken to avoid fuel spills.	-	-

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
avoid overfilling machines with fuel.				
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.	Partially Complied	To prevent spillage of fuel, while transporting, proper fuel filling equipment has already been installed by the contractor in most of the construction yards.	Need to ensure this practice is followed in all working sites with fuel filling facilities.	CTM
The Contractor shall have oil spill abatement equipment on the Site at all times.	Partially Complied	Oil spill abatement equipment are available in most of the working sites.	Need to ensure this practice is followed in all working sites.	CTM
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.	Partially Complied	Disposal of used oil, lubricants and tires were not done properly in most of the working sites.	The proper disposal of used oil, lubricants and worn out tires must be followed in accordance with EMP. The contractor's attention to fully comply with this requirement is required.	CTM

3.2.7 Control of Petroleum Products

64. The storage of petroleum products in suitable places with proper impermeable bottom, located at a distance away from water bodies is an essential measure to help insure the prevention of any accidental spillage that may contaminate the soil and eventually ground water of which majority of rural people in the country are dependent on for their domestic water needs. During the reporting period, it has been observed that most of the construction sites and yards where petroleum products are stored, comply with the measure. There are however, still some areas that need to have adequate storage facility for their petroleum products. The Contractor needs to ensure that this measure is strictly followed at site, else arrangements will have to be made for sites with no adequate petroleum storage facility to store their fuel/lubricants/other petroleum products in other nearby sites with compliant storage facilities and carefully retrieve them when needed. Table 3.6 contains details on the measure for pollution control of petroleum products.

Table 3.6 Measures for Pollution Control of Petroleum Products

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
All petroleum products shall be kept in a designated storage location where any	Partially Complied	Petroleum products were observed to have been stored in suitable designated places in most	Need to ensure that this mitigation measure is followed in all working sites.	CTM

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
spillage can be safely contained without the risk of contaminating the surrounding areas. Storage of petroleum products shall not be permitted in the vicinity of rivers, canals or other water bodies. Impermeable liner shall be installed underneath the storage room to avoid any seepage that may contaminate groundwater.		construction sites and yards.		

3.2.8 Occupational Health and Safety

65. Majority of the prescribed occupational health and safety measures (4 out of 7 at 57%) were fully complied with by the contractor. This include observance of international core labor standards such as no hiring of child labor (age 14 years or younger) nor assigning workers age 17 years and younger to hazardous jobs; and non-discriminatory hiring nor working conditions for workers. The remaining measures (3 out of 7 at 43%) that had not been partially complied include the inadequate provision or use of PPEs in the workplace, inadequate training for workers on health & safety; and compliance to a number of provisions in the contract scope of work under health and safety. The contractor needs to pay more attention to the provision of PPEs to its workers or subcontractors; and strict enforcement of their use in the workplace. Disincentives may need to be imposed by the CSC on the Contractor for the habitual disregard of health and safety measures. Details on the occupational health and safety measures are found in Table 3.7.

Table 3.7 Occupational Health and Safety Measures

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
Supply of appropriate and adequate personal protection equipment, such as safety boots, helmets, gloves, protective clothing, goggles and ear protection for the workers and enforce its use.	Partially Complied	Due to Covid-19 awareness program, the rate of using mask remarkably increased. A poor usage of PPE has been observed during field inspection.	The use of appropriate and adequate PPE by every worker need to be ensured.	CTM
Follow the specification on construction safety as defined in civil works.	Partially Complied	Most of the items specified on the construction safety scope of work were not followed.	Need to implement all relevant items specified in the Contractor's scope of works under Health & Safety program in all working site.	CTM

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
Construction workers will be required to train in general health and safety matters and on specific hazards of their work.	Partially Complied	Limited training was observed to have been held for construction workers during site inspections; However, it has also been observed that, seminars on Covid-19 awareness and prevention had been held at the different work places including stations and bridge areas.	Adequate training on health and safety need to be pursued. While the Covid-19 awareness and prevention seminars to be continued in all working site.	CTM
In order to maintain the labor standards following four issues must be ensured throughout the Project period.	Complied	Core Labor standards have been followed by the contractor, and this practice has been observed during the field visits.	-	-
Must not hire child labor, age below 14	Complied	Core Labor standards have been followed by the contractor, and this practice has been observed during the field visits.	-	-
Must not hire bonded labor	Complied	Core Labor standards have been followed by the contractor, and this practice has been observed during the field visits.	-	-
Hire, use of benefit from child labor- Child labor (as defined by ILO Conventions 138 and 182) means that no workers under the age of 14 can be hired as general labors, and no workers under the age of 17 are to be hired for hazardous jobs	Complied	No worker under the age of 14 were seen during field inspections; nor any worker with age 17 and below hired by the Contractor for hazardous jobs.	-	-
Equal treatment, equal opportunity. No discrimination based on race,	Complied	Core Labor standards have been followed by the contractor, and this practice has been	-	-

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
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 Labor Act.		observed during the field visits.		

3.2.9 Protection of Topsoil and Soil Erosion

66. Only one of 4 measures were fully complied with by the Contractor, which is the vegetative rehabilitation of embankment slopes using grasses. In some cases where future expansion of the embankments are to be done, temporary protection such as geotextiles have been installed on the unprotected embankment slopes. The measures that had not been fully followed include: protection of topsoil storage areas from wind and rain; planting of selected embankments with appropriate tree seedlings; and maintenance and protection of the established plantations; and proper siting of disposable materials in areas located away from water bodies, flood prone and erodible slopes. The Contract should ensure that soil erosion be prevented most especially on unprotected embankment slopes which can be the source of weakness in the upgraded double track and may be the cause of future train accidents.

Table 3.8. Measures for the Protection of Topsoil and Prevention of Soil Erosion

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
Topsoil storage areas must be protected during the dry season from wind erosion by covering.	Partially Complied	Most of the storage areas are protected.	Need to maintain this obligation for all work sites	CTM
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.	Complied	During site inspections, it has been observed that vegetative rehabilitation of embankments had been practice in most areas. There were limited embankments were geotextiles were applied for soil erosion prevention.	-	-
Embankment site to be planted with trees to promote natural vegetation; as well as fast growing grasses.	Partially Complied	Most of the embankment slopes were planted with grasses for protection. While a few selected sites were planted with tree seedlings as part of the compensation tree planting program. Only about 30% of tree	The compensation tree planting need to be continued, as well as the protection and maintenance of the established plantations.	CTM

Item/Requirements	Status	Observation/Gap	Recommendations	Responsibility
		planting target had been achieved.		
The stockpiling and/or disposal of material shall not be done in areas that serve as natural drainage, are flood prone or have lose erodible soil that can be carried by surface runoff and silt downstream/downslope natural or man-made water bodies.	Partially Complied	The measure had been observed to have been followed by the contractor in most work areas.	Need to ensure that the measure is followed in all work places;	CTM

3.3 Compensatory Tree Plantation and Replacement Program

3.3.1 Objective of tree plantation

67. The objective of the tree plantation and replacement program is to compensate for the loss of trees due to the implementation of the Akhaura-Laksam double line railway Project. Other major objectives of the program are:

- To protect the affected cultural/sensitive areas located within 50 m from the RoW boundary;
- To enhance the health of the existing ecosystem;
- To reduce the impacts of air pollution and dust as trees are known to be natural sink for air pollutants; and
- To arrest soil erosion at the embankment slopes.

3.3.2 Scope of tree plantation

68. About 31,749 timber trees, 13,546 fruit trees, 188 medicinal trees, 4,166 banana clumps, and 5,693 bamboo poles of different sizes will be cut due to the implementation of Project at pre-construction and construction periods. Approximately, 55,000 trees will be removed from the study area. The proposed Tree Plantation and Replacement Program (TPRP) intends to plant at least three times the number of fallen trees and other forest products. These trees and other important forest products are to planted on both sides of the widened embankments, station building areas, and new station access road alignments and along affected cultural/sensitive areas within 50mm from the ROW boundaries. Therefore, a total of 165,000 trees and other forest products will be planted and maintained by the completion of this project.

3.3.3 Status of tree plantation

69. Under ALDLP, tree plantation establishment had commenced in the middle of the month of June 2020. Contractor has targeted to plant 108,000 saplings during the rainy months of June- to August 2020. Gomuti Nursery had been contacted by CTM JV to implement the program. The company's nursery was visited jointly by ADB, CSC and CTM JV in March 2020. Plantation site preparation (i.e. site clearing, hole digging, etc.) was supposed to commence before June 2020 starting from zero point at Laksam (Chainage 130+700). But due to COVID-19 pandemic lockdown, site preparation activities could not start on time. As a result, the set target could not be achieved. So it is planned that an accelerated plantation establishment will be pursued during the next monsoon season in 2021 where more manpower will be engaged to do the work.

Table 3.9 Status of Compensatory Tree Plantation Program

Sl No	Description	Units	CTM JV Toma	CTM JV Max	Total
1	Holes dug	Holes	11,300	38,400	49,700
2	Trees planted	seedlings	9,400	38,400	47,800

Sl No	Description	Units	CTM JV Toma	CTM JV Max	Total
3	Live Trees	Seedlings	6,978 (74.23%)	30,319 (78.96%)	37,297
4	Dead Trees	seedlings	2,422 (25.77%)	8,081 (21.04%)	10,503
5	Replacement Trees	Seedlings	1,000	5,100	6100
6	Fencing	km	9	40	49
7	Plantation Location		1. 195+300 to 192+300. 2. 191+400 to 186+200.	Up line (20.4km+); 130+800 to 148+600 and 156+600 to 159+200; Downline:(10.17–30.57 km) 130+830 to 141+00	
8	Manpower Engaged		Men: 15 / Women: 5	Men: 20 / Women: 5	
9	Activities		• Replacement of Dead Trees • Protection of plantation • Ring weeding • Fencing Maintenance • Watering	• Plantation protection • Ring weeding • Fencing Maintenance	

3.3.4 Field Observation

70. It was observed that the of the 9,400 seedlings planted at the CTM JV TCCL portion, a total of 6,978 have survived thus earning a tree plantation survival rate of 74.23%. Likewise in the CTM JV CTM part, of the total 38,400 seedlings planted, about 30,319 seedlings had survived, thus earning a tree plantation survival rate of 78.96% which is slightly higher than the Toma Part. The dead trees were replaced with 1,000 seedlings replanted at the TOMA side, while 5,100 seedlings were replanted at the MAX side. All seedlings planted are subject to maintenance and protection by the subcontractor Gumti Nursery.

71. The reasons seedling mortality include:
   a. Shallow depth for dug pits. The prescribed hole depth 2 meters was not followed in some areas;
   b. Inadequate plantation maintenace (i.e lack of watering, insufficient fertilization such as manure and insufficient manpower to do the job);
   c. Insufficient number of guards tasked to watch over the established tree plantations;
   d. Weak fencing.
   e. Plant damage caused by grazing livestock; and
   f. Short stick installed as support to the young seedlings planted.

72. Due to the extended holiday imposed by government to help prevent the spread of the Covid-19 virus, plantation site preparation activities could not start as scheduled, thus the sequence of events that would have help enabled the tree plantation to be stable was not achieved as planned. The Arhar plants that were supposed to be sown in April intended for creating vegetative hedge that will serve as protection of the tree seedlings from cattle, was planted only in June. Cattle do not eat Arhar and thus will avoid crossing the established hedge, and eventually prevent any damages to the other tree seedlings planted from the entruding cattle. However, since the Arhar were planted later almost at the same time as the other tree seedlings, then there was no established hedge that could have protected the main tree seedlings from the cattle.

73. The pit in which the seedlings are to be planted were also supposed to have been prepared during the month of May, before the start of seedling planting in June. This activity

was also delayed due to COVID-19 pandemic lockdown. As a result, there were not enough pits ready for the out planting of the targeted saplings.

74. One training was held that were participated in by the plantation personnel before the imposed government lock down. However 2 more training programs could not be held due to the COVID-19 pandemic. Though plantation activities were allowed to start right after the lifting of the government imposed lock down, however, the planned face-to-face training programs can not be pursued since there would be many persons gathering in one place which is not allowed following WHO and government set health protocols aimed at preventing the spread of the Covid-19 virus.

IV. Compliance to Environment Related Project Covenants

4.1 Compliance with National Environmental Laws

75. The environmental legislation of GoB emphasizes reducing the negative impacts of infrastructure development projects and enhancement of the positive effects. This conforms to the National Environmental Policy 1992 that was enacted by the government, based on the Agenda 21 of Rio de Jenero Conference, and subsequent enactments of the Bangladesh Environmental Conservation Act (ECA) 1995 and Bangladesh Environmental Conservation Rules (ECR) 1997. The DOE guidelines however do not specifically provide measures for railway tracks, station buildings and bridges.

4.2 Compliance with ADB SPS 2009 Guidelines

76. According to the ADB Social Policy Safeguards (SPS 2009), the project falls under Environment Category B and hence an IEE was sufficient to meet the Bank's environmental requirements. An IEE report was prepared by the Consultant engaged by ADB during appraisal in 2014. In addition, an updated Environmental Management Plan (EMP) was prepared during the detailed design stage in 2016. In view of these, the project had conformed with the ADB Safeguard Policy Statement (SPS 2009).

4.3 Contractor Compliance

Environmental Management Plan (EMP)

77. Overall compliance with key actions defined in the EMP, is indicated in the Compliance Monitoring Check List. This check-list is used by the EQMS to conduct is periodic monitoring of EMP compliance by the Contractor. At present all programed activities are on-going which includes: earthworks, track works, station buildings and associated facilities, signaling & telecommunications, land acquisition and resettlement and gender action plan implementation. All of these activities with the exception of the RP and GAP implementation, have their corresponding mitigation measures that the Contractor needs to comply with.

Compliance with Construction Contract Clauses

78. 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 most of the contract clauses. Operating period mitigative measures (not the responsibility of the Contract) after the Taking Over of the Works by BR should be implemented properly by the Employer, such as 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.

Environmental Monitoring Reports

79. 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 July 2020 to December 2020 prepared by the Subcontractor EQMS, this Semi-Annual EMP Implementation Report was prepared by CSC. The report contains among others, the tables of all monitoring results from the monthly reports for the period July to December 2020.

Landscaping and Site Restoration

80. 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.

V. Assessment of EMP Implementation

5.1 Time Allocation for CSC Environmental Specialists

81. The original consultants time allocated for this work is for 4 years for international specialist and for national counterpart. This level of effort only allowed for the preparation of two semi-annual monitoring reports every year, but did not provide enough time for the essential workshops and training at the start of the Contract and the time requirement for the international environmental specialist to be on site when the Contractor mobilized. Finally, the budget provided should be related to the size of the project, since larger projects take longer time to inspect and longer to report on.

5.2 Capacity Building

82. Bangladesh Railways has recognized the gap in their technical capacity and engaged Environment Consultant (CSC) to address safeguard issues and to supervise the implementation of EMPs. BR is committed to establishing an Environmental and Social Safeguards Unit (ESSU) to manage safeguards across the agency. The persons intended to be assigned to this unit will require capacity-building sessions to enable them to carry-out their assigned tasks. However this ESSU has not yet been consummated at the time of this report.

5.3 Adequacy of Institutional Arrangements for EMP Implementation

83. An annual workshop on EMP implementation and an annual performance review is required 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 the recent ADB mission. This situation may lead to future problems.

84. The Engineer needs to be in a better position to 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.

5.4 Results of Environmental Monitoring and Compliance Measures

85. The EMP compliance monitoring results revealed, that most of the mitigation measures identified in the EMP are fully and partially complied with by the Contractor. Corrective actions have been prescribed by the third party monitor for the appropriate action of the Contractor, while good practices are also encouraged to be continued. There are however, a few prescribe measures that have not been complied with by the contractor and as such their immediate attention to address these short comings at the soonest possible time. Among these non-compliance is the provision of adequate Personal Protective Equipment (PPE) and enforcement on their use.

86. For a more effective monitoring of these partial and non-compliance of EMP, information on the nature of non-compliance, location where these were committed, any corrective action prescribed and status of their compliance by the contractor should mention in future monitoring reports.

5.5 Action Plan of Environmental Mitigation and Monitoring

87. Substantial construction activities will occur in the next 5 months when many of the work sites will become accessible. The focus of environmental monitoring will be on the following aspects:

(e) Better implementation of environmental management plan and mitigative measures to minimize the negative environmental impact of the on-going construction works;

(f) 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 controlled noise level complying with prescribed thresholds based on zonal classification;

(g) Ensure soil erosion protection of the embankment and the bridge sites; and

(h) Strengthen the implementation of the Health and Safety aspects of the EMP for the entire workforce.

88. The Engineer intends to strictly enforce these above requirements and with the help of BR PIU will be able to effect a substantial improvement on the Contractor performance over the remaining period in 2021.

89. Continued enforcement of the prescribed Health and Safety will pursued, and attention will be drawn to the Contractor by the CSC for substandard performance in ensuring a safe working environment in the construction site. During the upcoming dry season, appropriate health and safety measures should be exercised by the contractor even during this period of rapid

Photographs

Plate 1.Ready pit for Plantation.

Plate 2.Safety inspectors are inspecting and supervising the pit work for planting trees..

Plate 3. Tool box meeting before plantation work.

Plate 4.Tool box meeting & safety awareness for plantation safety awareness for plantation & personal protection or safety inspection before plantation.

Plate 5. Fencing work after plantation sapling.

Plate 6. Photograph of Rail line Embankment after fencing to protect the tree.

Plate 7.Photograph of a vigorous and healthy plant.

Plate 8.Photograph of many vigorous and healthy plant.

Plate 9.Dead tree.

Plate 10 Dead tree.

5.6 Monitoring Plan for Tree Plantation & Replacement Program

90. Items listed below are required to be monitored according to the approved Tree Plantation and Replacement Plan. CSC`s environment specialists will monitor closely whether these items are in practice and implemented properly.

Monitoring before Plantation

a. Monitoring of Species Selection - Species selection is very crucial. Species selection is according to approved TPRP or not to be monitored.
b. Monitoring of Source of tree planting stocks - Sapling source that is selected nursery should be monitored. Availability of saplings, their size, nursery management status, and nursery workers experience, number of workers both male and female should be monitored.
c. Monitoring of Sapling Types - Sapling types, sapling health, and mentioned ratio need to be monitored.
d. Monitoring of Sapling Size - Preferable sapling size would be 4 to 6 feet height to adapt new environment and survive against threats.
e. Monitoring of Plantation Area **-** Trees must be planted in both sides of the embankment slopes, Back side of station yards and culturally affected and sensitive areas.

Monitoring during Plantation

a. Monitoring of Size of Pits - Size of excavated pit should be 1ft x 1ft x1ft
b. Monitoring of Gap between Pits - Gap between each pit must be 2 meter.
c. Monitoring of Soil Preparation - Soil preparation with compost or decomposed cow dung and mix properly. Debris and weeds need to be removed during soil preparation.
d. Monitoring of Support Stack - Support stack is essential for trees for survive. Support stack must be removed after the firm establishment of trees.

Monitoring during Post Plantation

e. **Monitoring of Watering and weeding -** Saplings must be watered daily until they are strongly rooted. Regular weeding and clearing the surface surrounding the planted saplings must be maintained.
f. **Monitoring of Fencing -** Proper fencing must be ensured to protect the saplings from goat and cattle.
g. **Monitoring of Watch Guard -** Deploy watch guard throughout the plantation area, divide their watching area and time. Provide adequate number of watch guard according to plantation area.
h. **Capacity Building training -** At least 3 trainings need to be arranged for watch guard and workers. One training has been performed.
i. **Status of Planted trees -** Condition of planted tress must be inspected. A rating system will be followed while counting. According to the condition of planted trees five scale rating will clearly describe the status of trees. The scale includes –Very Good, Good, Fair, Weak and Dead.

j. **Monitoring of Tree Replacement -** Dead trees will be detected and ensure new sapling plantation for each dead tree as replacement.

k. **Monitoring of Counting of Trees -** The physical count enabled estimation of the actual number of surviving trees out of many planted sites. Through this count, each tree (s) reported to have been planted at any site by each respondent was physically checked in order to ascertain that the said trees were really planted and thereby being able to record the reliable survival rate of trees on that site. Physical count also helps identify the real species of the planted trees since some respondents were not aware of tree species that were planted. Per each site, only five transects will randomly be selected for physical count, and per each selected transect, both the number of empty holes and the number of surviving trees were recorded. These records help in calculating the survival rate of trees per that site given that the total number of planted trees was known. Below figure is a sketch of how physical count will be carried out in the field. The Statistical Package for Social Sciences (SPSS) and Microsoft Excel will be used to process the data.

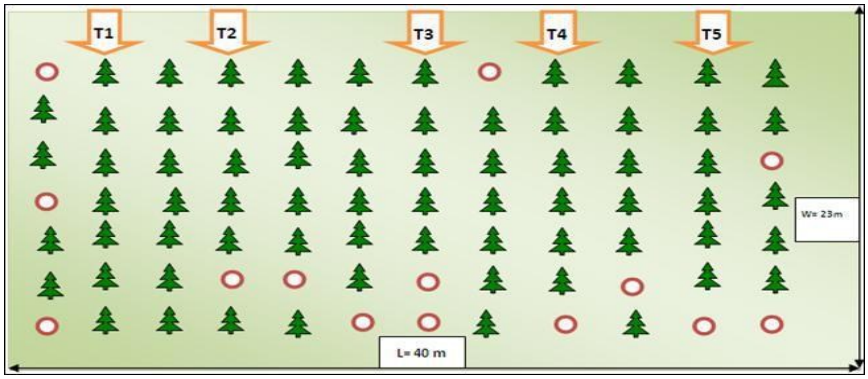


Figure 5.1 Graphical illustration of how physical count is carried out in the field

k. **Monitoring of post planting care conduction on newly planted trees -** Post-planting care to trees is important. One of the most important works are carrying out weeding, as weeding activity for tender trees is known to be the most important post-planting care for successful establishment of newly planted trees. The care taker should be instructed on proper tending techniques of young tree plantations. This is a great challenge that should really be addressed if higher survival rate and performance are to be achieved. Other important activities are watering, fencing/sheltering, low pruning, mulching, beating up etc.

5.7 Environmental safeguard activities are being monitored regularly

- Monitoring of Monthly Sample collection of Ground water, Surface Water, Air and Noise from construction site for testing is going on.
- Regular site monitoring by Environmental Specialists is going on. It's a continuous process.
- Currently no work is going on there in Black Cotton Zone (Hazardous Work site) and so there are no workers at site.
- Tree plantation and replacement program started on 16 June 2020. Currently no plantation is going on as monsoon is over. After care activities are going on.

5.8 Findings of Environmental Issues to be complied

- 55,000 trees had been cut down for project work. As a replacement 165,000 trees should be planted by contractor. During 2020 monsoon season only 47,800 trees have been planted. 117,200 more trees should be planted.
- There are likewise some activities that had been inadequately implemented, and will require rectification from the contractor such as maintaining proper sanitation at the workplace and workers' field accommodations; as well as the regular and proper use of Personal Protection Equipment (PPE) by workers in the workplace. It has been noted that PPEs have been provided by the contractor (i.e. helmet, safety vest, safety shoes, rain coats, etc.), however, there are some workers who do not use them, partly due to inconvenience on their (workers') part. The attention of the Contractor had been called to strictly implement the prescribed health and safety measures, including Covid-19 prevention.
- Contractor provide caution tape at risky work places. But after three or four days no barricading is found at most of the construction sites. Local people and children take away these caution tapes or any kind of barricading materials. Contractor need to emphasize on site security guard to look after this issue.
- Removal of Solid Construction Debris from work sites needs to be accelerated to ensure cleanliness of workplace and safety concerns.

VI. Occupational Health and Safety

6.1 Main Objective in Health and Safety

91. The main objectives of the health & safety program include:

- Identify hazards involved in the work
- Assess the risk of harm to health and safety arising from the hazards identified
- Eliminate or control any foreseeable risks
- Review risk assessment and control measures
- Provide instruction, training and information about safety
- procedures Provide reasonable supervision for employee
  Provide personal protective equipment (PPE) where
- required Provide emergency procedures for the
- workplace
- Provide and maintain amenities such as the facilities for toilets, drinking
- water Provide Appropriate First Aid facilities and trained personnel

6.2 H&S Management system principles

92. HSE main principle is “keep safe workplace, keep safe people”. So, if we want to ensure this principle, then we must need our employee are to know-what is safety and why it is necessary. So, contractors take a smart way for keep their all type of employee under the same roof.

93. CTM recognizes the inherent & operational hazards associated with construction projects and clearly belief that a strong, effective & employment driven HSE Management Systems with commitment, support and share responsibility from all project personnel are the basic requisites to achieve the injury & illness free construction work.

6.3 Managing Risk in the workplace

94. CTM persons are using “risk management” approach to address workplace health and safety issues. This involves:

- Identifying the hazards
- Assessment of risks
- Eliminate or control the risk
- Monitoring control measures

95. These are the elements of a risk management process and is being done in consultation with the people most likely to be affected, such as employees, sub-contractors of contractor, and vendors who may also be working on the same work site.

6.4 Providing of Safety Tools

96. The contractors have provided for their own staff, and the engineer, all appropriate protective clothing, including safety vests, helmets, and steel capped boots, and other equipment for the work to be done, and ensured proper use of the protective clothing. All safety and rescue equipment are always being fully maintained and made available at site.

6.5 Training, awareness and supervision

97. The contractor is taking all reasonable steps for training and promote safety awareness. The training includes the following:

- Training and record keeping
- General health and safety induction training
- Work activity-based health and safety induction training
- Site specific health and safety induction

98. CTM conducts every week general safety awareness training to their officers, engineers, supervisors and workers. They try to keep update their employees HSE knowledge.

6.6 Welfare facilities

99. Contractor is making available site welfare facilities for his people. Contractor people who shall work on any site shall have access to adequate toilet and washing facilities. The welfare facilities shall be made enough for everybody who is working in the site. Welfare facilities shall be made easily available to people working on the site.

6.7 Sanitary conveniences

100. Adequate numbers of toilets have been provided for people working on site. Toilet shall be flushed by water and connected to a mains drainage system. Men and women shall use the separate toilet. A washbasin with water, soap and towels shall be located close to the toilets.

6.8 Washing facilities

101. Contractor is being provided basins in all sites to allow people to wash their faces, hands and forearms. All basins shall have a supply of clean hot or cold or warm, running water.

6.9 Drinking water

102. Contractor has supplied of safe drinking water for the workers in the site. A tap direct from the mains shall be made available, and also bottles or tanks of water shall be used for storage. If water is stored, it shall be protected from possible contamination and changed often enough to prevent it from becoming stale or contaminated.

6.10 Precautions to prevent fires

103. All types of measures for precaution have been taken to prevent fires. The following precautions have been taken to prevent fires:

- Use less-easily ignited and fewer flammable materials
- Low-solvent adhesives and paint
- Keep the quantity of flammables at the workplace to a minimum
- Always keep and carry flammable e liquids in suitable closed containers
- To minimize the risk of gas leaks and fires involving gas-fired plant
- Store flammable solids, liquids and gases safety
- Have an extinguisher to hand when doing hot work such as welding or using a disc cutter that produces sparks

6.11 Precaution in case of fire

104. People shall be able to escape from fire if a fire shall break out. Where hot work is to be conducted in an area surrounding bush land or scrubland, extreme care shall be taken. Control shall be in place to prevent sparks and hot material contacting combustible material prior to the ignition source occurring.

6.12 First aid

105. First aid can save lives, reduce pain and help an injured person make a quicker recovery. First aid box for all sites has been provided with enough equipment to cope with the number of workers on site. An appointed person has taken charge of first-aid arrangements.

6.13. Site Security

106. The contractor is responsible for the security of the site and for maintaining it as a safe-working environment at all sites. The overall site boundary as well as the specific boundaries of the various site facilities is being identified by contractor and be submitted to the Engineer for approval, complete details of the contractor's proposed method or methods for maintaining the security of the various boundaries and for the security of the buildings, personnel, material and equipment contained therein.

6.14. Work in the Rail Corridor

107. The work site protection plan is in place which identifies any pedestrian, commuter, or traffic management issues. There remains watchman. It is the responsibility of the site supervisor to ensure controls documented in the worksite protection plan are implemented.

6.15 Safety measures during construction period

108. On behalf of the contractor a safety officer is supervising the safety arrangement at the site of work. From starting to completion of the embankment, bridge/culvert and track construction work, many safety measures are being taken by contractor. They are providing safety barricade for protect the public. CTM has installed safety caution signboards. They have installed heavy barricade by galvanizing sheets in bridge work site. They also have installed barricade for protect their sensitive works.

6.16 Safety Notice Board

109. The contractor has set up adequate safety notice board located within their workplace. Relevant safety information that has been displayed is:

- Caution of workplace
- Color post demarcation of Rail Track 3m apart
- Toe line demarcation
- Signs of level crossing
- Signs of work on-going
- First aid kit locations
- Emergency contact details
- Evacuation procedures
- Site maps
- Existing hazards in the workplace
- Meeting minutes Name of first aiders and the safety representative

6.17 PPE requirements and Training

110. The relevant mandatory safety equipment shall be issued to all employees. Minimum PPE requirements for projects include:

- Medium impact safety glasses
- Steel capped boots (with lace up ankle supports)
- Long pants
- Long sleeved safety orange shirt
- Safety orange vest
- Safety helmet with brim
- Stay safe booklets
- Water containers

6.18 Safety promotional event

111. Based on the HSE principle CTM organize safety promotional event and carry out other promotional activities. They are giving various HSE training and visual presentation for their employee by this event. The safety promotional events content elements such as – Awareness Training, Fire Fighting Training, Emergency Procedure Training, First Aid Training and Safety related heart touching video presentations. They have also installed many type of safety promotional poster in their workplace.

6.19 Orientation session on HIV/AIDS and STI Awareness Activities

- Managing, monitoring of HIV/AIDS prevention program
- Presentation of awareness orientation session on HIV/AIDS prevention program
- Provision of medical and counseling services.
- Condom and IEC materials distribution.
- Posters provided for all railway stations and work sites.

Description

112. Many workers are working in the ALDLP and adjacent to project area lot of community people are working. The workers and the community people are not aware of the HIV/AIDS. Orientation session on HIV/AIDS and STI Awareness/Prevention under ALDLP has been conducted in the construction sites and communities.

Table 6.1. Orientation session on HIV/AIDS and STI awareness/prevention

SI No	Location	Date
01	Near Kosba Railway Station for workers	20 August 2020
02	Near Cumilla Railway Station for community people	15 September 2020
03	Bridge 243 Site for Community people	28 September 2020
04	Shasidal Railway Station Site for workers	18 October 2020
05	Shasidal Railway Station site for Community people.	18 October 2020
06	Bridge 243 Site for workers	28 November 2020
07	Bridge 243 Site for Community	28 November 2020
08	Rajapur Railway Station for workers	9 December 2020
09	Imambari Railway Station for workers	28 December 2020

Figures 6.1 Orientation Session on HIV/AIDS and STI awarenes**s**

6.20 Status of implementation of the safety execution plan

113. CTM organize safety promotional event based on the safety execution plan and carry out other promotional activities. They are giving various training and visual presentation on safety for their employee by this event. The safety promotional events content elements such as –awareness training, firefighting training, emergency procedure training, first aid training and safety related heart touching video presentations. They have also installed many type of safety promotional poster in their workplace. They are also trying to ensure use of personal protective equipment for workers' safety.

6.21 COVID -19 Strategy

114. The coronavirus disease 2019 (COVID‐19) pandemic is exacting a huge toll on individuals, families, communities, and societies across the world. Daily lives have been profoundly changed, economies have fallen into recession, and many of the traditional social, economic, and public health safety nets that many people rely on in times of hardship have been put under unprecedented strain.

115. Speed, scale, and equity must be our guiding principles. Speed, because the explosive nature of the virus means every day lost in implementing effective response capacities and behaviors costs lives; scale, because everyone in society has a part to play in building the capacities required to control this pandemic; and equity, because everyone is at risk until the virus is controlled everywhere in the world: collective resources must be directed to where there is greatest risk. COVID-19 is a truly global crisis: the only way to overcome it is together, in global solidarity.

6.22. Action taken against the spreading of Covid-19

116. Several numbers of COVID-19 awareness program executed following WHO guideline. Distribution of masks and gloves, spraying of disinfectant at potential entry points, Installation of hand washing facilities and Disinfectant tunnels at several key points within project sites have been performed by the Contractor with direct supervision from CSC.

- Regular and thorough hand washing with soap and water or hand
- Hand hygiene stations, such as hand washing and hand rub dispensers are provided
- Face masks and paper tissues are provided
- Measures to keep a distance of at least 1 meter between people and avoid direct physical contact has been introduced
- Awareness program held on Covid-19 among workers and engineer several time
- Regular environmental cleaning and disinfection introduced
- WHO developed symptoms consistent with COVID-19 were kept self-isolated, and contacted a medical professional or the local COVID-19 information line for advice on testing and referral.
- Enhance cleaning and disinfection of objects and surfaces that are touched regularly, including all shared rooms, surfaces, floors, bathrooms, and changing rooms
- Provide PPE and training on its proper use—e.g., masks, disposable gowns, and disposable gloves or heavy-duty gloves that can be disinfected. Provide face or eye protection (medical mask) during cleaning procedures that generate splashes (e.g., washing surfaces)
- Enhance hand hygiene—regular hand washing with soap and water or use of alcohol-based hand rub— before entering and after leaving enclosed machinery, vehicles, confined spaces, and before putting on and after taking off PPE

- Provide posters, videos, and electronic message boards to increase awareness of COVID-19 among workers, and promote safe individual practices at the workplace and engage workers in providing feedback on the preventive measures and their effectiveness
- Provide regular information about the risk of COVID-19 using official sources such as government agencies and the World Health Organization, and emphasize the effectiveness of adopting protective measures and counteracting rumors and misinformation
- Body temperature checked by Thermal body temperature machine at potential entry points

VII. Overall Conclusion and Recommendations

7.1 Overall Progress with Implementation of Environmental Safeguard Measures

117. 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.

118. 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.

119. 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.

120. The monitoring of water and air quality, and noise levels had generally been compliant during this period. 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.

7.2 Recommendations for Improving Contractor's Compliance

121 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 7.1 Recommendations for Improving Contractor Compliance

SI. No	Recommendations	Time frame	Implemented by:	Supervised by"
1	The Contractor must ensure that the sampling of critical parameters for water quality, noise and air quality is carried out fully in line with the Sampling Program so that meaningful results can be determined and initiated if required	During project period	CTM	CSC
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 specialized personnel.	During project period	CTM	CSC
3	The overall management of camps and worksite must be further improved in line with the best practices on occupational health and safely so	During project period	CTM	CSC

SI. No	Recommendations	Time frame	Implemented by:	Supervised by"
	that these areas of the site can be made fully compliant.			
4	During project period 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 recognizing the importance of these matters to all stakeholders.	CTM	CSC	

7.3 Lessons Learned and Gaps.

122. The following are major lessons learned during July-December 2020 implementation period:

1) Prequalification of the Contractor

123. 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

124. 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

125. 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.

126. 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

127. 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.

128. 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.

Appendices

127.13.1

Appendix- A. Quantitative Environmental Monitoring Schedule for Year 2020

Factor of Monitoring	Stage	Point of Monitoring	Test Parameters	Method for Monitoring	Frequency of Monitoring	Test Month in year 2020
Air Quality	Construction	All construction locations along the line - 2 locations	PM 10, PM 2.5, SOx, NOx	High Volume Sampler	Once per Month	July, August, September October, November, December
Ambient noise	Construction	All construction locations along the line - 2 locations	Measurement of noise dB(A)	Filed Level Noise Meter	Once per Month	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	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	July, August, September October, November, December

Appendix - B. Environmental Sampling Photographs: July-December 2020

Sampling photo in the month of July-December 2020

Air Quality Monitoring at Lalmai Railway Station

Air Quality Monitoring at Lalmai Railway Station

Noise Level Monitoring at Mandabag Railway Station

Noise Level Monitoring at Shashidal Railway Station

Ground Water Monitoring at Saldanadi Railway Station

Surface water Sample Collection at Sindai River

Appendix-C. Monitoring Checklist July-December 2020

CONSTRUCTION CAMPS

Checklist Question	Yes	No	Remarks
1. Is the camp/yard located in a protected area, next to a community water source or any other ecologically or otherwise sensitive area?		✓	There are no such areas
If yes, comment on the adverse impacts on the environment:			
2. Is the camp/yard being properly maintained?	✓		Not up to the mark
If no, list what is not being done properly			
3. Is the wastewater being disposed of properly?	✓		
If no, comment on how it is being disposed and what are the impacts			
4. Have septic tanks been installed?	✓		
5. Are the septic tanks working correctly, that is not overflowing, or emitting smell?	✓		
6. Is the solid waste being disposed of properly?	✓		Partially
If no, comment on how it is being disposed and the impacts of such disposal:			
7. Is attention being paid to “Good housekeeping”?	✓		
If no, comment on what is not being done:			
8. Are contractor’s vehicles being maintained at the campsite/yard?	✓		
9. Is the waste from vehicle maintenance being disposed of property?	✓		
If no, comment on how it is being disposed:			
10. Is the fuel storage area properly surfaced?	✓		Partially
If no, comment on how the surrounding area is being affected:			
11. Are occupational health and hygiene precautions being taken?	✓		
If no, comment on where they are being neglected:			
12. Does the community have any issues with the camp?		✓	
If yes, what are the issues?			
13. Is the detail First Aid is available?	✓		
14. All necessary firefighting equipment is on site and in good working order.	✓		
15. Telephone numbers of emergency services are available on site	✓		

EROSION OF SLOPES

Checklist Question	Yes	No	Remarks
1. Is there any erosion/Landslides/Instability beside the road? If yes than what is the reason		✓	
(a) A combination of some of the reasons above			
(b) Improper drainage			
(c) Improper leveling after earth removal			
(d) Inadequate water channel diversion			
2. Is remedial action required?		✓	
If yes, comment:			
3. Did the erosion/landslide/instability cause any damage?		✓	
If yes, what was the nature of the damage?			
4. Was the erosion brought to the notice of appropriate authorities by the communities?	✓		
If no, was there any action taken?			

AIR POLLUTION

Checklist Question	Yes	No	Remarks
1. What is the nature of air pollution?			
(a) Dust from road/ rail	✓		
(b) Generator emissions	✓		
(c) Vehicular emissions	✓		
2. Is the problem significant enough to warrant attention?		✓	
If yes, did the contractor take appropriate measure to mitigate the problem?			
3. What is/are the measures taken?			
(a) Periodic water sprays on road surface /borrow pits	✓		
(b) Vehicles regularly maintained	✓		
(c) Equipment regularly maintained	✓		
4. Is air pollution creating problems for the surrounding communities?	✓		Minimum
If yes, what type of problems?			

WATER POLLUTION

Checklist Question	Yes	No	Remarks
1. What is the nature of water contamination?			
1.1 Surface water (stream, pond etc.)			
(a) Disposal of out spoil into water body or on slope leading to water body		✓	
(b) Discharge of wastewater from camp into fresh water body		✓	
1.2. Groundwater			
(a) Oil spillage		✓	
(b) Any other disposal over soil surface		✓	
2. Is the impact significant enough to warrant mitigatory measures?		✓	
If yes, provide necessary details:			
3. Is the impact long term?		✓	
If yes, comment:			
4. Can it be ratified by mitigatory measures?	✓		
If yes, what type of mitigatory measures should be taken?			Oil spillage protection
Any additional comments:			

CULTURAL HERITAGE

Checklist Question	Yes	No	Remarks
1. Does the project area have any cultural heritage, archaeological, historical or religious sites?		✓	
2. If yes, are they affected in any way by the project activities?			
If yes, how?			
3. Did the concerned authorities and the contractor take any appropriate measures to protect the site?		✓	N/A
If yes, what are the measures taken?			
4. Are the communities satisfied with the measures taken?	✓		
5. Is the community satisfied with the measures taken by the contractor to protect land?	✓		
If no, how and with what measures can it be improved?			
6. Is the local administration satisfied with the measures taken by the contractor to protect land?	✓		
If no, what is being suggested by the local administration?			

LAND CONTAMINATION (CAMP SITE)

Checklist Question	Yes	No	Remarks
1. What are the impacts of project activities on land?			
(a) Road/ rail run-off oil, grease and fuel contaminating land		✓	
(b) fuel oil/used oil/grease spill on land in equipment yards/camps sites	✓		
(c) indiscriminate discharge of waste on land		✓	
(d) indiscriminate disposal of solid waste		✓	
any other project activities resulting in land contamination			
2. Is the impact significant enough to warrant mitigatory measures?		✓	
If yes, provide necessary details:			
3. Is the impact permanent?		✓	
4. If permanent, could it have been avoided by taking appropriate mitigatory measures?		✓	
If yes, what type of mitigatory measures should have been taken?			
5. Is the impact temporary?	✓		
If yes, how could it be corrected?			Waste water, fuel oil, used oil, grease will be kept in drums which are properly surfaced.
6. Is the community satisfied with the measures taken by the contractor to protect agricultural activities?	✓		
If no, how and with what measures can it be improved?			
7. Is the local administration satisfied with the measures taken by the contractor to protect agricultural activities?	✓		
If no, what is being suggested by the local administration?			
8. Did the community allow the use of their land for borrow pit or any other purpose?		✓	
If yes, what was the motivation behind it?			
If no, did the contractor take permission from the land owner and local administration for the specific use?			

NOISE POLLUTION

Checklist Question	Yes	No	Remarks
1. What is the nature of noise pollution?			
(a) Vehicles on road/ railway	✓		
(b) Generators, construction plant	✓		
(c) Construction vehicles	✓		
2. Is the problem significant enough to warrant attention?		✓	
If yes, did the contractor/consultant take appropriate measure to mitigate the problem?			
3. What is / are the measures taken?			
(a) Vehicles regularly maintained and silencers checked	✓		
(b) Speed limit enforced on project vehicles	✓		
(c) Construction equipment maintained and silenced	✓		
(d) Awareness raising of staff over causing nuisance to local communities	✓		
4. Is noise pollution creating problems (health, aesthetic and nuisance) for the surrounding communities?		✓	
If yes, what type of problems?			

DRAINAGE AND FLOODING

Checklist Question	Yes	No	Remarks
1. Is the flooding extensive or not?		✓	
If yes, give details:			
2. Have contractors activities caused flooding or blocked drains?		✓	
If yes, give details:			
3. Have cross drainage structures been built in correct location as shown in contract?	✓		On going
If no, give details:			
4. Are cross drainage structures “as built” same as in “detailed design”?	✓		
If no, give details:			

CONSTRUCTION CAMPS CLOSURE

Checklist Question	Yes	No	Remarks
1. Is the camp/yard located in a protected area, next to a community water source or any other ecologically or otherwise sensitive area?		✓	
If yes, comment on the adverse impacts on the environment:			
2. Has the camp/yard been properly cleared of all debris and re-vegetated?	✓		
If no, list what was not done properly:			
3. Was the wastewater disposed of properly?	✓		
If no, comment on how it was being disposed and what were the impacts:			
4. Are septic tanks installed? Have they been removed?	✓		
If no, why not?			
5. Was solid waste disposed of properly?	✓		
If no, comment on how it was being disposed and the impacts of such disposal:			
6. Was attention being paid to housekeeping?	✓		
If no, comment on what was not being done:			
7. Have all the contractor equipment being removed from the campsite /yard?		✓	
8. Has the scrap metal from vehicle maintenance being disposed of properly?	✓		
If no, comment on how it is to be disposed:			
9. Has all fuel storage been removed from the site?	✓		
If no, comment on how the surrounding area is being affected:			
10. Have all general offices and staff dwellings been removed?	✓		
If no, comment on if they are to be handed over to new owner or other plans:			
11. Does the community have any issues with the camp closure?		✓	

Appendix-D. All Test Results Jul-Dec. 2020

FLORA AND FAUNA

Checklist Question	Yes	No	Remarks
1. Is any flora or fauna will be disturbed?		✓	
If yes, give details:			
2. Have contractor's activities caused any damage to fish habitat?		✓	
If yes, give details:			
3. Does any Plant species need to be cut down for construction?	√		Already cut
If yes, give details:			
4. Is re-vegetation going on	✓		
If not, why			

All Test Results | July 2020

SL No: 023030

Ref: EQMS/Air Quality/201907250110697

EQMS ENVIRONMENTAL LABORATORY

Test Results of Ambient Air Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Ambient Air Quality
Sampling Date : 13 July 2020 to 15 July 2020
Reporting Date : 6 August 2020
Monitoring Location : Rajapur and Akhaura Railway Station

Result of Ambient Air Quality Test

Sampling Code	Sampling Location	GPS Coordinate	$PM_{2.5}$ µg/m³	PM_{10} µg/m³	SPM µg/m³	SO_2 µg/m³	NO_X µg/m³	CO* ppm
AAQ-1	Rajapur Railway Station	23°34'50.0"N 91°09'08.0"E	17.94	21.13	52.71	20.1	23.3	0.07
AAQ-2	Akhaura Railway Station	23°52'08.7"N 91°12'21.3"E	19.02	23.67	56.18	14.3	31.6	0.16
Bangladesh Standard (ECR'97)**			65	150	200	365	100	9
Duration (Hours)			24	24	8	24	24	8

** 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 19 July 2005 vide S.R.O. No. 220-Law/2005.*

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SL No: 023033

Ref: EQMS/Noise Level/201907250110698

EQMS ENVIRONMENTAL LABORATORY

Test Results of Noise Level

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Ambient Noise Level
Sampling Date : 13 July 2020 to 15 July 2020
Reporting Date : 6 August 2020
Monitoring Location : Rajapur and Akhaura Railway Station, and sensitive receptor

Result of Noise (dB)

S/N	Sampling Code	Sampling Location	GPS Coordinate	Leq	Zone*	Bangladesh Standard at day Time dB (A)	Remarks
1	ANL-1	Rajapur Railway Station	23°34'49.8"N 91°09'08.2"E	53.34	Mixed	60	Low
2	ANL-2	Rajapur Railway Station Jame Mosque	23°34'51.5"N 91°09'10.7"E	57.81	Silent	50	Low
3	ANL-3	Akhaura Railway Station	23°52'10.7"N 91°12'21.4"E	59.33	Mixed	60	Low
4	ANL-4	Akhaura Samata Shishu Niketon	23°52'07.6"N 91°12'21.7"E	56.95	Silent	50	High
Standard*							
	Silent area					50	
	Residential area					55	
	Mixed area					60	
	Commercial area					70	
	Industrial area					75	

**Noise Pollution (Control) Rules, 2006*

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SL No: 023031

Ref: EQMS/Water Quality/201907250110699

EQMS WET LABORATORY

Test Results of Surface Water Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Surface Water Quality
Sampling Date : 15 July 2020
Reporting Date : 6 August 2020
Monitoring Location : Haora River

Result of Surface Water Quality

Sampling Code	Sampling Location	GPS Coordinate	pH	Temp (°C)	EC (mS)	TDS (ppm)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	TSS (mg/L)
SWQ-1	Haora River (Upstream)	23°50'01.3"N 91°11'54.1"E	6.86	29.8	0.12	60	4.8	1.8	21	44
SWQ-2	Haora River (Downstream)	23°50'03.3"N 91°11'51.8"E	6.85	29.8	0.12	60	4.7	1.9	18	38
Bangladesh Standard										
Source of drinking water for supply only after disinfecting			6.5-8.5	–	–	–	6 or above	–	–	–
Water usable for recreational activity			6.5-8.5	–	–	–	5 of more	–	–	–
Source of drinking water for supply after conventional treatment			6.5-8.5	–	–	–	6 or above	–	–	–
Water usable by fisheries			6.5-8.5	–	–	–	5 or more	–	–	–
Water usable by various process and cooling industries			6.5-8.5	–	–	–	5 or more	–	–	–
Water usable for irrigation			6.5-8.5	–	–	–	5 or more	–	–	–

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SL No: 023034

Ref: EQMS/Water Quality/201907250110700

EQMS WET LABORATORY

Test Results of Groundwater Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Groundwater Quality
Sampling Date : 13 July 2020 to 15 July 2020
Reporting Date : 6 August 2020
Monitoring Location : Rajapur and Akhaura Railway Station

Result of Groundwater Quality

Sampling Code	Sampling Location	GPS Coordinate	pH	Temp (°C)	Phosphate (mg/L)	Manganese (mg/L)	Arsenic (mg/L)	Iron (mg/L)	Fecal Coliform, FC (N/100mL)
GWQ-1	Rajapur Railway Station	23°34'49.7"N 91°09'07.5"E	6.61	27.6	1.1	0.09	<0.01	0.01	0
GWQ-2	Akhaura Railway Station	23°52'10.5"N 91°12'23.4"E	6.55	27.7	1.3	0.3	<0.01	0.32	0
Bangladesh Standard (ECR '97)			6.5-8.5	20-30	6.0	0.1	0.05	0.3-1	0

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All Test Results | August 2020

SL No: 023134

Ref: EQMS/Air Quality/201907250110786

EQMS ENVIRONMENTAL LABORATORY

Test Results of Ambient Air Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Ambient Air Quality
Sampling Date : 24 August 2020 to 26 August 2020
Reporting Date : 3 September 2020
Monitoring Location : Sadar Rasulpur and Gangasagar Railway Station

Result of Ambient Air Quality Test

Sampling Code	Sampling Location	GPS Coordinate	$PM_{2.5}$ µg/m³	PM_{10} µg/m³	SPM µg/m³	SO_2 µg/m³	NO_x µg/m³	CO* ppm
AAQ-1	Sadar Rasulpur Railway Station	23°31'09.4"N 91°10'07.3"E	10.07	24.31	41.33	5.34	11.59	0.03
AAQ-2	Gangasagar Railway Station	23°49'32.7"N 91°11'37.2"E	14.16	26.37	47.16	2.71	6.08	0.04
Bangladesh Standard (ECR '97)**			**65**	**150**	**200**	**365**	**100**	**9**
Duration (Hours)			**24**	**24**	**8**	**24**	**24**	**8**

** CO concentrations and standards are 8-hourly only.*

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

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SL No: 023135

Ref: EQMS/Noise Level/201907250110787

EQMS ENVIRONMENTAL LABORATORY

Test Results of Noise Level

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Ambient Noise Level
Sampling Date : 24 August 2020 to 26 August 2020
Reporting Date : 3 September 2020
Monitoring Location : Sadar Rasulpur and Gangasagar Railway Station, and sensitive receptor

Result of Noise (dB)

S/N	Sampling Code	Sampling Location	GPS Coordinate	Leq dB (A)	Zone*	Bangladesh Standard at day Time dB (A)	Remarks
1	ANL-1	Sadar Rasulpur Railway Station	23°34'49.8"N 91°09'08.2"E	45.73	Mixed	60	Low
2	ANL-2	Sadar Rasulpur Railway Station Jame Mosque	23°34'51.5"N 91°09'10.7"E	51.62	Silent	50	High
3	ANL-3	Gangasagar Railway Station	23°49'33.8"N 91°11'38.0"E	54.28	Mixed	60	Low
4	ANL-4	Gangasagar Railway Station Railway Station	23°49'49.1"N 91°11'44.7"E	46.88	Silent	50	Low
Bangladesh Standard*							
		Silent area				50	
		Residential area				55	
		Mixed area				60	
		Commercial area				70	
		Industrial area				75	

**Noise Pollution (Control) Rules, 2006*

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Ref: EQMS/Water Quality/201907250110788

EQMS WET LABORATORY

Test Results of Surface Water Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Surface Water Quality
Sampling Date : 24 August 2020
Reporting Date : 3 September 2020
Monitoring Location : Gomti River

Result of Surface Water Quality

Sampling Code	Sampling Location	GPS Coordinate	pH	Temp (°C)	EC (mS)	TDS (ppm)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	TSS (mg/L)
SWQ-1	Gomti River (Upstream)	23°29'08.9"N 91°09'47.3"E	7.50	0.12	0.06	31.2	4.5	2.1	17	59
SWQ-2	Gomti River (Downstream)	23°29'08.6"N 91°09'42.3"E	7.39	0.13	0.06	31.3	4.8	1.8	19	68
Bangladesh Standard (ECR '97)										
Source of drinking water for supply only after disinfecting			6.5-8.5	–	–	–	6 or above	–	–	–
Water usable for recreational activity			6.5-8.5	–	–	–	5 of more	–	–	–
Source of drinking water for supply after conventional treatment			6.5-8.5	–	–	–	6 or above	–	–	–
Water usable by fisheries			6.5-8.5	–	–	–	5 or more	–	–	–
Water usable by various process and cooling industries			6.5-8.5	–	–	–	5 or more	–	–	–
Water usable for irrigation			6.5-8.5	–	–	–	5 or more	–	–	–

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SL No: 023137

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EQMS WET LABORATORY

Test Results of Groundwater Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Groundwater Quality
Sampling Date : 24 August 2020 to 26 August 2020
Reporting Date : 3 September 2020
Monitoring Location : Sadar Rasulpur and Gangasagar Railway Station

Result of Groundwater Quality

Sampling Code	Sampling Location	GPS Coordinate	pH	Temp (°C)	Phosphate (mg/L)	Manganese (mg/L)	Arsenic (mg/L)	Iron (mg/L)	Fecal Coliform, FC (N/100mL)
GWQ-1	Sadar Rasulpur Railway Station	23°31'09.1"N 91°10'07.5"E	6.58	31.8	1.2	0.017	0.0	0.03	0
GWQ-2	Gangasagar Railway Station	23°49'30.8"N 91°11'36.2"E	6.69	28.0	0.9	0.312	0.0	0.25	0
Bangladesh Standard (ECR '97)			**6.5-8.5**	**20-30**	**6.0**	**0.1**	**0.05**	**0.3-1**	**0**

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All Test Results | September 2020

SL No: 023289

Ref: EQMS/Air Quality/201907250110895

EQMS ENVIRONMENTAL LABORATORY

Test Results of Ambient Air Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Ambient Air Quality
Sampling Date : 21 September 2020 to 23 September 2020
Reporting Date : 1 October 2020
Monitoring Location : Cumilla and Kasba Railway Station

Result of Ambient Air Quality Test

Sampling Code	Sampling Location	GPS Coordinate	$PM_{2.5}$ µg/m³	PM_{10} µg/m³	SPM µg/m³	SO_2 µg/m³	NO_x µg/m³	CO* ppm
AAQ-1	Cumilla Railway Station	23°27'48.5"N 91°10'00.1"E	11.57	17.74	39.52	5.96	16.78	0.02
AAQ-2	Kasba Railway Station	23°44'24.9"N 91°09'20.4"E	14.08	16.47	41.13	4.87	10.97	0.03
Bangladesh Standard (ECR '97)**			65	150	200	365	100	9
Duration (Hours)			24	24	8	24	24	8

** CO concentrations and standards are 8-hourly only.*

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SL No: 023290

Ref: EQMS/Noise Level/201907250110896

EQMS ENVIRONMENTAL LABORATORY

Test Results of Noise Level

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Ambient Noise Level
Sampling Date : 21 September 2020 to 23 September 2020
Reporting Date : 1 October 2020
Monitoring Location : Cumilla and Kasba Railway Station, and sensitive receptor

Result of Noise (dB)

S/N	Sampling Code	Sampling Location	GPS Coordinate	Leq dB (A)	Zone*	Bangladesh Standard at day Time dB (A)	Remarks
1	ANL-1	Cumilla Railway Station	23°27'49.9"N 91°09'59.9"E	59.22	Mixed	60	Low
2	ANL-2	Cumilla Railway Station Jame Mosque	23°27'48.6"N 91°10'02.4"E	58.19	Silent	50	High
3	ANL-3	Kasba Railway Station	23°44'23.9"N 91°09'19.9"E	56.24	Mixed	60	Low
4	ANL-4	Kasba Railway Station Railway Station	23°44'27.9"N 91°09'20.6"E	53.73	Silent	50	High
Bangladesh Standard*							
		Silent area				50	
		Residential area				55	
		Mixed area				60	
		Commercial area				70	
		Industrial area				75	

**Noise Pollution (Control) Rules, 2006*

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SL No: 023291

Ref: EQMS/Water Quality/201907250110897

EQMS WET LABORATORY

Test Results of Surface Water Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Surface Water Quality
Sampling Date : 23 September 2020
Reporting Date : 1 October 2020
Monitoring Location : Sindai River

Result of Surface Water Quality

Sampling Code	Sampling Location	GPS Coordinate	pH	Temp (°C)	EC (mS)	TDS (ppt)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	TSS (mg/L)
SWQ-1	Sindai River (Upstream)	23°46'51.3"N 91°09'58.7"E	6.90	29.1	0.07	0.03	5.3	5.0	3.0	47
SWQ-2	Sindai River (Downstream)	23°46'52.5"N 91°09'56.9"E	7.05	28.9	0.07	0.04	5.2	6.0	3.0	49
Bangladesh Standard (ECR '97)										
Source of drinking water for supply only after disinfecting			6.5-8.5	–	–	–	6 or above	–	–	–
Water usable for recreational activity			6.5-8.5	–	–	–	5 of more	–	–	–
Source of drinking water for supply after conventional treatment			6.5-8.5	–	–	–	6 or above	–	–	–
Water usable by fisheries			6.5-8.5	–	–	–	5 or more	–	–	–
Water usable by various process and cooling industries			6.5-8.5	–	–	–	5 or more	–	–	–
Water usable for irrigation			6.5-8.5	–	–	–	5 or more	–	–	–

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SL No: 023292

Ref: EQMS/Water Quality/201907250110898

EQMS WET LABORATORY

Test Results of Groundwater Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Groundwater Quality
Sampling Date : 21 September 2020 to 23 September 2020
Reporting Date : 1 October 2020
Monitoring Location : Cumilla and Kasba Railway Station

Result of Groundwater Quality

Sampling Code	Sampling Location	GPS Coordinate	pH	Temp (°C)	Phosphate (mg/L)	Manganese (mg/L)	Arsenic (mg/L)	Iron (mg/L)	Fecal Coliform, FC (N/100mL)
GWQ-1	Cumilla Railway Station	23°27'48.7"N 91°10'01.4"E	7.35	28.6	0.6	0.1	0.01	0.19	0
GWQ-2	Kasba Railway Station	23°44'26.4"N 91°09'19.7"E	6.78	27.4	1.4	0.5	0.01	2.37	0
Bangladesh Standard (ECR '97)			6.5-8.5	20-30	6.0	0.1	0.05	0.3-1	0

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All Test Results | October 2020

SL No: 6744

Ref: EQMS/Air Quality/201907250111204

EQMS ENVIRONMENTAL LABORATORY

Test Results of Ambient Air Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Ambient Air Quality
Sampling Date : 27 October 2020 to 28 October 2020
Reporting Date : 4 November 2020
Monitoring Location : Mainamati and Mandabag Railway Station

Result of Ambient Air Quality Test

Sampling Code	Sampling Location	GPS Coordinate	$PM_{2.5}$ µg/m³	PM_{10} µg/m³	SPM µg/m³	SO_2 µg/m³	NO_x µg/m³	CO* ppm
AAQ-1	Mainamati Railway Station	23°25'57.4"N 91°10'16.3"E	12.79	32.11	61.18	4.02	11.36	0.017
AAQ-2	Mandabag Railway Station	23°41'18.1"N 91°09'08.2"E	9.14	12.37	44.95	4.03	9.83	0.010
Bangladesh Standard**			65	150	200	365	100	9
Duration (Hours)			24	24	8	24	24	8

* CO concentrations and standards are 8-hourly only.

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

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SL No: 6745

Ref: EQMS/Noise Level/201907250111205

EQMS ENVIRONMENTAL LABORATORY

Test Results of Noise Level

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Ambient Noise Level
Sampling Date : 27 October 2020 to 28 October 2020
Reporting Date : 4 November 2020
Monitoring Location : Mainamati and Mandabag Railway Station, and sensitive receptor

Result of Noise (dB)

S/N	Sampling Code	Sampling Location	GPS Coordinate	Leq dB (A)	Zone*	Bangladesh Standard at day Time dB (A)	Remarks
1	ANL-1	Mainamati Railway Station	23°26'03.2"N 91°10'15.7"E	59.18	Mixed	60	Low
2	ANL-2	Mainamati Railway Station Jame Mosque	23°25'57.9"N 91°10'16.7"E	58.47	Silent	50	High
3	ANL-3	Mandabag Railway Station	23°41'17.8"N 91°09'08.4"E	44.95	Mixed	60	Low
4	ANL-4	Mandabag Railway Station Railway Station	23°41'19.3"N 91°09'06.7"E	48.26	Silent	50	Low
Bangladesh Standard*							
	Silent area					50	
	Residential area					55	
	Mixed area					60	
	Commercial area					70	
	Industrial area					75	

*Noise Pollution (Control) Rules, 2006

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SL No: 6746

Ref: EQMS/Water Quality/201907250111206

EQMS WET LABORATORY

Test Results of Surface Water Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Surface Water Quality
Sampling Date : 27 October 2020
Reporting Date : 4 November 2020
Monitoring Location : Goniajuri River

Result of Surface Water Quality

Sampling Code	Sampling Location	GPS Coordinate	pH	Temp (°C)	EC (mS)	TDS (mg/L)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	TSS (mg/L)
SWQ-1	Goniajuri River (Upstream)	23°22'50.0"N 91°09'28.5"E	7.20	28.8	0.29	150	1.4	2.5	36	46
SWQ-2	Goniajuri River (Downstream)	23°22'49.6"N 91°09'30.2"E	7.17	29.3	0.30	150	1.7	3.0	39	45
Bangladesh Standard*										
Source of drinking water for supply only after disinfecting			6.5-8.5	–	–	–	6 or above	–	–	–
Water usable for recreational activity			6.5-8.5	–	–	–	5 of more	–	–	–
Source of drinking water for supply after conventional treatment			6.5-8.5	–	–	–	6 or above	–	–	–
Water usable by fisheries			6.5-8.5	–	–	–	5 or more	–	–	–
Water usable by various process and cooling industries			6.5-8.5	–	–	–	5 or more	–	–	–
Water usable for irrigation			6.5-8.5	–	–	–	5 or more	–	–	–

* Bangladesh Environment Conservation Rules, 1997 - Schedule 3 (Standards for Inland Surface Water)

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Ref: EQMS/Water Quality/201907250111207

EQMS WET LABORATORY

Test Results of Groundwater Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Groundwater Quality
Sampling Date : 27 October 2020 to 28 October 2020
Reporting Date : 4 November 2020
Monitoring Location : Mainamati and Mandabag Railway Station

Result of Groundwater Quality

Sampling Code	Sampling Location	GPS Coordinate	pH	Temp (°C)	Phosphate (mg/L)	Manganese (mg/L)	Arsenic (mg/L)	Iron (mg/L)	Fecal Coliform, FC (N/100mL)
GWQ-1	Mainamati Railway Station	23°25'56.8"N 91°10'16.2"E	7.12	27.8	2.0	0.04	0.01	0.03	0
GWQ-2	Mandabag Railway Station	23°41'17.2"N 91°09'08.7"E	7.98	28.4	2.1	0.03	0.01	0.03	0
Bangladesh Standard*			6.5-8.5	20-30	6.0	0.1	0.05	0.3-1	0

* Bangladesh Environment Conservation Rules, 1997 - Schedule 3 (Standards for Drinking Water)

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All Test Results | November 2020

SL No: 023495

Ref: EQMS/Air Quality/2019072501101274

EQMS ENVIRONMENTAL LABORATORY

Test Results of Ambient Air Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Ambient Air Quality
Sampling Date : 8 November 2020 to 10 November 2020
Reporting Date : 26 November 2020
Monitoring Location : Lalmai and Saldanodi Railway Station

Result of Ambient Air Quality Test

Sampling Code	Sampling Location	GPS Coordinate	$PM_{2.5}$ µg/m³	PM_{10} µg/m³	SPM µg/m³	SO_2 µg/m³	NO_X µg/m³	CO ppm
AAQ-1	Lalmai Railway Station	23°21'23.2"N 91°09'06.0"E	18.10	26.43	67.42	5.24	20.34	0.05
AAQ-2	Saldanodi Railway Station	23°40'15.4"N 91°09'21.2"E	10.74	22.36	45.92	3.13	24.28	0.03
Bangladesh Standard**			**65**	**150**	**200**	**365**	**100***	**9**
Duration (Hours)			**24**	**24**	**8**	**24**	**24**	**8**

* The Bangladesh Standards for Oxides of Nitrogen (NO_x) is annually.
** The Bangladesh National Ambient Air Quality Standards have been taken from the Environment Conservation Rules, 1997 which was amended on 19 July 2005 vide S.R.O. No. 220-Law/2005.

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SL No: 023496

Ref: EQMS/Noise Level/2019072501101275

EQMS ENVIRONMENTAL LABORATORY

Test Results of Noise Level

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Ambient Noise Level
Sampling Date : 8 November 2020 to 10 November 2020
Reporting Date : 26 November 2020
Monitoring Location : Lalmai and Saldanodi Railway Station, and sensitive receptor

Result of Noise (dB)

S/N	Sampling Code	Sampling Location	GPS Coordinate	Leq dB (A)	Zone*	Bangladesh Standard at day Time dB (A)	Remarks
1	ANL-1	Lalmai Railway Station	23°21'22.7"N 91°09'05.8"E	58.97	Mixed	60	Low
2	ANL-2	Lalmai Railway Station Jame Mosque	23°21'23.1"N 91°09'03.5"E	51.22	Silent	50	High
3	ANL-3	Saldanodi Railway Station	23°40'14.9"N 91°09'21.0"E	52.65	Mixed	60	Low
4	ANL-4	Saldanodi Railway Station Railway Station	23°40'14.2"N 91°09'17.9"E	47.68	Silent	50	Low
Bangladesh Standard*							
		Silent area				50	
		Residential area				55	
		Mixed area				60	
		Commercial area				70	
		Industrial area				75	

*Noise Pollution (Control) Rules, 2006

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Ref: EQMS/Water Quality/2019072501101276

EQMS WET LABORATORY

Test Results of Surface Water Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Surface Water Quality
Sampling Date : 10 November 2020
Reporting Date : 26 November 2020
Monitoring Location : Salda River

Result of Surface Water Quality

Sampling Code	Sampling Location	GPS Coordinate	pH	Temp (°C)	EC (mS)	TDS (mg/L)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	TSS (mg/L)
SWQ-1	Salda River (Upstream)	23°40'17.3"N 91°09'24.4"E	7.30	27.1	0.10	50	5.0	0.2	96	21
SWQ-2	Salda River (Downstream)	23°40'18.6"N 91°09'21.3"E	7.21	26.6	0.10	50	5.1	0.2	93	30
Bangladesh Standard*										
Source of drinking water for supply only after disinfecting			6.5-8.5	–	–	–	6 or above	–	–	–
Water usable for recreational activity			6.5-8.5	–	–	–	5 of more	–	–	–
Source of drinking water for supply after conventional treatment			6.5-8.5	–	–	–	6 or above	–	–	–
Water usable by fisheries			6.5-8.5	–	–	–	5 or more	–	–	–
Water usable by various process and cooling industries			6.5-8.5	–	–	–	5 or more	–	–	–
Water usable for irrigation			6.5-8.5	–	–	–	5 or more	–	–	–

* Bangladesh Environment Conservation Rules, 1997 - Schedule 3 (Standards for Inland Surface Water)

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EQMS WET LABORATORY

Test Results of Groundwater Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Groundwater Quality
Sampling Date : 8 November 2020 to 10 November 2020
Reporting Date : 26 November 2020
Monitoring Location : Lalmai and Saldanodi Railway Station

Result of Groundwater Quality

Sampling Code	Sampling Location	GPS Coordinate	pH	Temp (°C)	Phosphate (mg/L)	Manganese (mg/L)	Arsenic (mg/L)	Iron (mg/L)	Fecal Coliform, FC (N/100mL)
GWQ-1	Lalmai Railway Station	23°21'23.0"N 91°09'05.9"E	6.60	27.3	0.2	0.01	0.00	0.16	0
GWQ-2	Saldanodi Railway Station	23°40'16.8"N 91°09'20.7"E	6.70	28.0	0.6	0.40	0.00	0.54	0
Bangladesh Standard*			**6.5-8.5**	**20-30**	**6.0**	**0.1**	**0.05**	**0.3-1**	**0**

* Bangladesh Environment Conservation Rules, 1997 - Schedule 3 (Standards for Drinking Water)

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All Test Results | December 2020

SL No: 6851

Ref: EQMS/Air Quality/20190725011013 67

EQMS ENVIRONMENTAL LABORATORY

Test Results of Ambient Air Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Ambient Air Quality
Sampling Date : 6 December 2020 to 8 December 2020
Reporting Date : 19 December 2020
Monitoring Location : Alishahar and Shashidal Railway Station

Result of Ambient Air Quality Test

Sampling Code	Sampling Location	GPS Coordinate	$PM_{2.5}$ µg/m³	PM_{10} µg/m³	SPM µg/m³	SO_2 µg/m³	NO_X µg/m³	CO ppm
AAQ-1	Alishahar Railway Station	23°18'22.5"N 91°08'17.8"E	21.81	37.25	64.12	11.73	9.17	0.06
AAQ-2	Shashidal Railway Station	23°38'21.1"N 91°08'49.0"E	16.59	24.26	46.21	5.49	11.70	0.09
Bangladesh Standard**			65	150	200	365	100*	9
Duration (Hours)			24	24	8	24	24	8

* The Bangladesh Standards for Oxides of Nitrogen (NO_2) is annually.
** The Bangladesh National Ambient Air Quality Standards have been taken from the Environment Conservation Rules, 1997 which was amended on 19 July 2005 vide S.R.O. No. 220-Law/2005.

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SL No: 6852

Ref: EQMS/Noise Level/20190725011013 68

EQMS ENVIRONMENTAL LABORATORY

Test Results of Noise Level

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Ambient Noise Level
Sampling Date : 6 December 2020 to 8 December 2020
Reporting Date : 19 December 2020
Monitoring Location : Alishahar and Shashidal Railway Station, and sensitive receptor

Result of Noise (dB)

S/N	Sampling Code	Sampling Location	GPS Coordinate	Leq dB(A)	Zone*	Bangladesh Standard at day Time dB(A)	Remarks
1	ANL-1	Alishahar Railway Station	23°18'21.5"N 91°08'17.5"E	51.13	Mixed	60	Low
2	ANL-2	Alishahar Railway Station Jame Mosque	23°18'24.4"N 91°08'20.9"E	47.52	Silent	50	Low
3	ANL-3	Shashidal Railway Station	23°38'22.7"N 91°08'48.8"E	50.75	Mixed	60	Low
4	ANL-4	Shashidal Samata Shishu Niketon	23°38'15.7"N 91°08'51.5"E	47.95	Silent	50	Low
Bangladesh Standard*							
		Silent area				50	
		Residential area				55	
		Mixed area				60	
		Commercial area				70	
		Industrial area				75	

*Noise Pollution (Control) Rules, 2006

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SL No: 6853

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EQMS WET LABORATORY

Test Results of Surface Water Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Surface Water Quality
Sampling Date : 6 November 2020
Reporting Date : 19 December 2020
Monitoring Location : Dakatia River

Result of Surface Water Quality

Sampling Code	Sampling Location	GPS Coordinate	pH	Temp (°C)	EC (mS)	TDS (mg/L)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	TSS (mg/L)
SWQ-1	Dakatia River (Upstream)	23°20'18.0"N 91°08'50.5"E	6.99	23.9	0.53	270	3.4	1.0	36	28
SWQ-2	Dakatia River (Downstream)	23°20'19.0"N 91°08'47.5"E	6.92	23.9	0.53	270	3.4	1.0	40	32
Bangladesh Standard*										
Source of drinking water for supply only after disinfecting			6.5-8.5	-	-	-	6 or above	-	-	-
Water usable for recreational activity			6.5-8.5	-	-	-	5 of more	-	-	-
Source of drinking water for supply after conventional treatment			6.5-8.5	-	-	-	6 or above	-	-	-
Water usable by fisheries			6.5-8.5	-	-	-	5 or more	-	-	-
Water usable by various process and cooling industries			6.5-8.5	-	-	-	5 or more	-	-	-
Water usable for irrigation			6.5-8.5	-	-	-	5 or more	-	-	-

* Bangladesh Environment Conservation Rules, 1997 - Schedule 3 (Standards for Inland Surface Water)

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SL No: 6854

Ref: EQMS/Water Quality/20190725011101370

EQMS WET LABORATORY

Test Results of Groundwater Quality

Name of Project : Akhaura-Laksam Double Line Project (ALDLP)
Description of Sample : Groundwater Quality
Sampling Date : 6 December 2020 to 8 December 2020
Reporting Date : 19 December 2020
Monitoring Location : Alishahar and Shashidal Railway Station

Result of Groundwater Quality

Sampling Code	Sampling Location	GPS Coordinate	pH	Temp (°C)	Phosphate (mg/L)	Manganese (mg/L)	Arsenic (mg/L)	Iron (mg/L)	Fecal Coliform, FC (N/100mL)
GWQ-1	Alishahar Railway Station	23°18'23.0"N 91°08'18.0"E	6.96	26.9	0.9	0.2	<0.01	0.48	0
GWQ-2	Shashidal Railway Station	23°38'21.7"N 91°08'49.1"E	6.82	25.9	0.1	1.3	<0.01	0.50	0
Bangladesh Standard*			6.5-8.5	20-30	6.0	0.1	0.05	0.3-1	0

* Bangladesh Environment Conservation Rules, 1997 - Schedule 3 (Standards for Drinking Water)

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