



GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF WATER RESOURCES

BANGLADESH WATER DEVELOPMENT BOARD
COASTAL EMBANKMENT IMPROVEMENT PROJECT PHASE-I (CEIP-I)

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Annual Environmental Audit Report
for 01 January – 31 December 2016

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in association with BETS Consulting Services, Ltd.
Third Party M&E Consultants for Overall Project Implementation
(CONTRACT PACKAGE NO.CEIP-1/ C2/S3)



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Acronyms

BOD	Bio-chemical Oxygen Demand
BWDB	Bangladesh Water Development Board
C/S	Country Side
CC	Concrete Cement
CEGIS	Center for Environmental and Geographical Information Services
CEIP-1	Coastal Embankment Improvement Project Phase-1
CHWE	First Engineering Bureau of Henan Water Conservancy
CRTS	Consultancy for Research and Training Services
CSE	Construction Site Engineer
DDCS & PMSC	Detailed Design and Construction Supervision and Project Management Support Consultant
DPM	Deputy Project Manager
DRE	Deputy Resident Engineer
DS	Drainage Sluice
DTL	Deputy Team Leader
EMP	Environmental Mitigation Plan
ES	Environmental Specialist
ESMF	Environmental and Social Management Framework
FGD	Focus Group Discussion
FS	Flushing Sluice
GoB	Government of Bangladesh
GPS	Global Positioning System
HSE	Health, Safety and Environment
IPOE	Independent Panel of Experts
JD	Job Description
KUET	Khulna University of Engineering and Technology
M&E	Monitoring and Evaluation
MTR	Mid-Term Review
NCR	Non-Compliance Register
PM	Project Manager
PMU	Project Management Unit
PPE	Personal Protective Equipment
PSC	Project Steering Committee
PSF	Pond Sand Filter
QC	Quality Control
RE	Resident Engineer
R/S	River Side
SECU	Social, Environmental and Communications Unit
SES	Senior Environmental Specialist
ToR	Terms of Reference
WATSAN	Water and Sanitation
WB	World Bank
XEN	Executive Engineer

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1. Introduction

1.1 Background

The Coastal Embankment Improvement Project – Phase 1 (CEIP-1) is a 7-year \$400 million project being implemented by the Bangladesh Water Development Board in partnership with the World Bank and the Pilot Programme for Climate Resilience of the Climate Investment Fund. The Project started in 2013 and will close in 2020. It covers 17 polders in three packages of four, six and seven polders respectively. The Detailed Design, Construction Supervision and Project Management Consultants (DDCS&PMSC) commenced their design work for the first of three packages in January 2015 and the Package 01 Contractor commenced their services on 26 January 2016. Package 02 designs were completed in 2016 and the Package 02 Contract received their Notice of Award on 15 December 2016, but has not yet mobilized. The Third Party M&E Consultants joined the project on 01 November 2015 so this is the first Annual Environmental Audit.

Institutional arrangements for safeguarding the environment of each polder in the Coastal Embankment Improvement Project include:

- The Project Management Unit (PMU) with its Social, Environmental and Communications Unit (SECU) and Independent Panel of Experts (IPOE) who are responsible for oversight and guidance on environmental matters as well as coordination with GoB agencies. SECU monitors the Contractors' compliance with EAPs and the Project's compliance with the environmental regulations of GoB and World Bank environmental safeguards. PMU is to coordinate the preparation of the Bi-Annual Environmental Monitoring Reports with the assistance of the DDCC&PMSC and M&E Consultants. PMU reports to BWDB, the Project Steering Committee (PSC) and the World Bank.
- The DDCC&PMS Consultants who are responsible for developing the EIAs and EMPs consistent with World Bank and GoB guidelines and ensuring the EMPs are implemented satisfactorily. These Consultants review and approve the Contractor's Environmental Action Plans (EAP) and monitor their implementation on an ongoing basis. The DDCC&PMS Consultants develop the bidding documents and make sure that the Contract and its specifications include the necessary clauses and elements governing environmental safeguards. These Consultants also must carry out monthly field-based monitoring of EMP compliance and report their findings in their monthly progress reports.
- The Contractors (The First Engineering Bureau of Henan Water Conservancy in the case of Package 01) are required to develop and implement polder-specific EAPs with site-specific actions and monitor their implementation on an ongoing basis. The EAPs must be fully consistent with the EMPs (and the Contract and Specifications) and elaborate on those elements for which the Contractor is responsible so that implementation details are spelled out and actionable.
- World Bank reviews and provides comments and no objection to the various safeguard documents and undertakes Implementation Support Missions, Mid-Term Review Missions and special Environmental Safeguards Missions as needed.
- Community participation, consultation and feedback through the EIA process and Grievance Redress Mechanism.

- Third Party M&E Consultants who audit, monitor and evaluate the project overall. Specifically, with respect to environmental safeguards, the M&E Consultants review and comment on environmental documents prepared under CEIP, spot check compliance, report their findings and prepare recommendations. They also undertake the Annual Environmental Audit and prepare the corresponding report. The M&E Consultants report to the PSC and their contract is administered by the Project Director.

Each polder has its own EIA which includes an EMP which is meant to ensure that the environmental and social management practices are integrated in the design, construction, operation and maintenance of the polder.

Among others, the specific objectives of the EIA are to:

- Comply with national regulatory and WB policy framework (further discussed later on in the document);
- Determine and describe the existing environmental and social setting of the Project Area (the project area is defined as the entire area inside the polder, project influence area outside the polder i.e. the embankment, borrow pits and spoil disposal area if located outside the polder and access route to the polder);
- Identify and assess the potential environmental and social impacts of the project;
- Identify mitigation measures to minimize the negative impacts and enhancement measures to enhance the positive impacts; and
- Detail an Environmental Monitoring Plan.

1.2 Audit Objective

The overall objective of the Annual Environmental Audit of CEIP-1 is to assess the extent to which the plans for safeguarding the environment are in place, are being implemented and are effective based on the institutional and contractual arrangements applicable to the Project.

1.3 Scope of the Audit

In summary, the audit examined: (1) the status of preparation of required safeguards documents; (2) whether the systems, tools and protocols are in place for environmental monitoring; (3) staff and funding resources; and (4) compliance with WB safeguards, including consultation, communication, grievance mechanisms and disclosure, and country legal framework.

The audit covered the Contractor, the DDCS&PMSC and Project Management Unit (BWDB).

Fieldwork was centered on the four polders of Package 01 (Polders 32, 33, 35/1 and 35/3), but the audit examined CEIP-1 overall whenever appropriate. It is forward-looking to draw lessons and make recommendations on areas of improvement for Package 01 and for broader application to Packages 02 and 03.

Specifically, the audit assessed:

- Status of EIA and EAP implementation
- Whether the project involves labor influx. The rapid migration to and settlement of workers and followers in the project area is called labor influx, and under certain conditions, it can affect

project areas negatively in terms of public infrastructure, utilities, housing, sustainable resource management and social dynamics.

- Extent to which the Environmental Monitoring Plans and environmental mitigation measures outlined in the EIAs are being followed and whether they are effective.
- Existence and quality of monitoring tools, formats and protocols.
- Processes and procedures for compliance monitoring.
- Degree to which qualified staff resources are in place.
- Necessary environmental testing equipment is in place or hired when needed.
- Staff awareness and training.

The Environmental Audit presents findings and observations followed by a section on conclusions and recommendations aimed at improving the effective implementation of environmental safeguards.

1.4 Methodology

The M&E Consultants have undertaken a review of documents, reports, site records and lab results, conducted interviews in offices and in the field, and made direct observations during a one week period and then wrote up their findings. Specific work sites, which were visited on a given polder were selected randomly without advance notice to the Contractor and DDSC&PMSC.

Document Review: Existing base documents were reviewed such as the Environmental and Social Management Framework (ESMF), approved EIAs of Package 01 and draft EIAs of Package 02 with their EMPs, Contractor draft EAPs, contractor's contract of package 01 and bid document of Package 02, Quality Assurance plan_V1.0- August 2016. World Bank Aide Memoires (1. Aide Memoire of November 20 to 23, 2016 and 2. Aide Memoire of June 12 to 16, 2016) corresponding to the period were reviewed with respect to environmental aspects.

Key Informant Interviews and FGDs: PMU and DDSC&PMSC environmental personnel were interviewed on January 29 in DDSC & PMSC's Dhaka office. Contractor's staff were interviewed in their Khulna office and at the polder level in each of the 4 polders areas of Package 01 during the period of 22 to 25, January, 2017. Four FGDs were conducted with local communities in four polder areas and workers in all visited sites were also interviewed during the mentioned period above to know on how well the project is implementing EMPs.

Site Records: Test results for air quality, water quality, soil quality, pH, salinity, etc. were reviewed. Non-compliance report logs, de-watering plan, NCR clearance records and procedures were planned to be examined. But NCR logs and records were not found anywhere with contractor and DDSC&PMSC.

Direct observation: Level of compliance with the EMP/EAP and practices of project and Contractor staff was observed in the field. Demonstration of water and soil quality, pH, salinity, biological, chemical and physical sampling technique, etc. by Contractor staff were requested to observe the level of skill and knowledge and whether the technique is appropriate, but the Contractor did not perform any sampling demonstration. It was learned that the Contractor has employed Khulna University to analyze the samples, so KUET's environmental testing laboratory was also visited by the audit team.

Some of the embankment construction worksites and drainage/flushing sluice gate sites were visited in each polder (details in Section 2.7.2) to examine field level application of the environmental safeguards on a random sampling basis. The team also visited the campsites, site offices and main offices of both Contractor and DDCS&PMSC to discuss systems, strength of the environment staff and documents.

1.5. Team Composition and Duration

The audit was accomplished by the Environmental Team (1 Environmental Specialist-International and 1 Environmental Specialist -National)) of Third Party M&E Consultants with the support of the Team Leader. The audit was conducted within a short timeline through fieldwork for one week in Khulna and polder areas of Package 01, followed by one week of report writing in Dhaka.

2. Audit Findings

This section summarizes the audit findings focusing on:

- existence of appropriate base documents;
- systems- tools, formats, institutional arrangements, protocols, quality assurance;
- environmental staff resources;
- staff awareness and training;
- necessary equipment and arrangements for environmental monitoring testing; and
- actual implementation/ practice level.

2.1 Existence and appropriateness of base documents

Existing base documents or reports were reviewed such as EIAs and EMPs, Contractor EAPs, Quality Assurance Plan, Contract/Bidding documents.

2.1.1 EIA and EMP

According to Environmental Conservation Rules (ECR) 1997 of DoE, the project is categorized as “Red”, requiring that EIA and RAP have to be submitted for obtaining and Environmental Clearance Certificate (ECC). The ECC was obtained and thus the Project has complied with the regulatory requirement. According to WB safeguard policy, the Project is classified as Category “A” involving significant environmental adverse impact. To satisfy compliance of GoB and WB, CEIP-1 has already prepared EIAs for each of the four polders of Package 01 and these contain polder-specific EMPs. These EIAs have been approved by WB and CEIP-1 and have spelled out the required actions needed comply with Government regulations and WB safeguards. During the WB Mid-Term Review Mission it was agreed by PMU that the six EIAs for Package 02 would be submitted by February 05, 2017 and the seven EIAs for Package 03 by June 30, 2017. The EIAs for Package 02 were in fact submitted to the WB in the agreed timeframe and will be uploaded on the website of CEIP-1.

The EIAs of CEIP-1 have been following the standard methodology that is in practice in the country, compliant with both the national regulatory and WB policy framework. The EIAs determine and describe the existing environmental and social setting of the Project Area, identify and assess the potential environmental and social impacts of the project, identify mitigation measures to minimize the negative impacts and enhancement measures to enhance the positive impacts and detail an Environmental Monitoring Plan.

The audit team feels that the Package 03 EIAs should incorporate the analysis of National Water Act 2013, National River Commission Act 2013 and the Participatory Water Management Guidelines 2014,

which are not covered in the EIAs of Packages 01 and 02, though they are mentioned in Package 02. Furthermore, the checklist for FGD/Consultation with local people could be annexed. It is important that in the future a brief synthesis of the comments received during the field-level, regional and national consultations be included and whether and how these concerns have been addressed in the final EIA. The Team also feels that the EIAs are too voluminous and EIA authors could look for scope to lessen the volume of the EIAs covering all required sections with adequate information. As a possible approach, long sections of descriptive information may be considered to be annexed, making the main body of the document more focused.

2.1.2 Environmental Action Plan (EAP)

The Contractor for Package 01 has given emphasis over the last several months on developing their EAP so that they can implement the project in compliance with the EMP. Four polder-specific EAPs for the four polders of Package 01 are under process and are to be finalized and submitted to WB by February 07, 2017 for approval as was agreed during WB Mid Term Review (MTR) mission. The draft EAP for polder 32 was reviewed by the Audit Team; it follows the guidance provided and addresses many of the comments provided by the WB on the first draft EAP that had been submitted in October 2016. The three remaining polder-specific EAPs are being prepared by following the same guidance and comments. Audit review found the EAP for polder 32 covered site-specific environmental actions to be done by the contractor for fulfilling the requirements of the EMP. It also contains an environmental action checklist for monitoring the implementation of EMP compliance. The audit team concluded that the prepared EAP would be able to serve the purpose to ensure EMP compliances. Field-testing will lead to its progressive improvement.

2.1.3 Contract document of Package 01 and bid document of Package 02

The contract of Package 01 covered the EMP's clauses partially. Penalty clauses suggested in the EMPs have not been incorporated into the contract of Package 01. The Contractor's contractual obligations in general and specifically (around 20 items) covers mostly matters of Environmental Health and Safety (EHS). The bid document for Package 02 also lacks all the suggested EMP clauses but the bid documents comprise more elaborated environmental measure budget lines than the contract of Package 01. The bid documents and contract for Package 03 should give emphasis and care to ensure all the required clauses are incorporated to fully address the relevant elements of the EMPs.

2.1.4 Quality Assurance plan_V1.0- August 2016

Audit team reviewed the quality assurance plan in DDCS & PMS office in Khulna. The document covers the quality assurance for all aspects of the activities of CEIP-1. This document covered two sub-sections related to environmental issues – (1) the major tasks to be done by Environmental Specialist of DDCS&PMS of CEIP-1 and (2) Health and Safety (mostly focused on how Health and Safety Personnel will ensure Health and Safety Issues of the project). It was adequate in these two respects, but could be strengthened in its treatment of how EMP compliance will be monitored and achieved.

2.2 Systems- Tools, formats, institutional arrangements, protocols, and quality assurance

This section covers the audit findings on Environmental Monitoring tools and guidelines, twice-monthly environmental and field visit reports, and Contractor's Emergency Response Plan.

2.2.1 Environmental monitoring tools and guidelines

Contractor has been following the monitoring checklist, which is annexed to the Contractor's draft EAP as a set of monitoring tools. There are no separate guidelines to ensure compliance with the EMP. DDSC&PMSC and PMU environmental personnel have also been monitoring the implementation of EMP through the indicators of the monitoring checklist that has become part of the EAP. The EAP for Polder 32 of Package 01 has been drafted and will be submitted along with the three other EAPS to WB by February 07, 2017 for approval.

2.2.2 Twice- monthly environmental and field reports

The Contractor has been submitting twice-monthly environmental reports to DDSC&PMSC since November, 2016. They have been giving the reports on the monitoring checklist formats of EAP giving remarks for the notable findings. The report also includes a section of pictures on findings in an annex. The Environmental Specialist of DDSC&PMSC prepares field visit reports and brings these reports with him during next field visit to see the status of compliances. It could accelerate the implementation of EAP by contractor, if the field report of the Environmental Specialist is also shared with the Contractor.

2.2.3 Compliance Performance

However, no "Non Compliance Report" or "Non-Compliance Register" was found to exist or to be maintained by CHWE Contractors and DDSC&PMSC. The presence of systematic Compliance Records were not found nor kept by any agencies. It is recommend that both "Compliance Records" based on compliance checklists and "Non-Compliance Registers" should be kept by CHWE Contractors for every Polder. The issues related to any non-compliance should be mitigated and once the issues are resolved, the items should be noted as complied in the "Non-Compliance Register" by the CHWE Contractors, DDSC&PMSC and PMU. The remaining issues should be mitigated as soon as possible and reported to DDSC&PMSC on a routine basis.

The DDSC&PMSC also was not found to maintain any specific register of environmental non-compliance, nor a separate log of environmentally-related correspondence or instructions to the Contractor. Only the twice-monthly environmental reports mentioned above serve to allow follow-up of prior instructions.

The grievance redress mechanism should also be monitored for any environmental issues and can also be used by the CHWE Contractors and Site Manager to resolve the issues of non-payment for acquired lands and felling of fruit trees and banana trees, etc. by contractors. Proper payments of money would be given at reasonable period and record should be kept accordingly.

2.2.4 Monitoring Testing results

Audit team reviewed the results of test for surface water (24 number of samples tested) and drinking water (4 number of samples tested) conducted by contractor through CRTS of KUET. The Audit Team found that Global Positioning System (GPS) coordinates have been taken only for the place of sample collected for test of drinking water parameters. GPS coordinates have not been taken for the collected surface water samples rather keeping the chainage location with the result sheets. Audit recommends to take GPS location for all the samples.

The test results for drinking water were within permissible limits for Arsenic (actual results were 0.00 mg/l), Iron, Chloride, total coliform and fecal coliform bacteria.

For surface water, of the 26 samples drawn on 28 December 2016, all the samples were within

permissible range for the measured parameters (pH, Turbidity, TDS, Chloride, EC, DO, BOD) except for the electrical conductivity of all six samples taken in Polder 32. These were above the limit for irrigation water which is 2250 micro-mhos/cm. The actual values obtained in these six samples ranged from 3380-5600. As mentioned, pH, DO and BOD were within acceptable limits for fisheries and irrigation for all the samples.

This was the first time the tests were conducted by KUET after signing their contract with Contractor. The KUET team mentioned that they have been appointed to do tests for mentioned samples once in this year. They are taking surface water samples from the river and the khals (drainage canals). For drinking water, only four samples were tested for all four polders. The Audit team recommends to conduct test for surface water at least twice a year (one in dry season and another in rainy season) and once a year for drinking water, or more frequently if so indicated in the EMPs. The number of tests sites for drinking water every year should be increased to ensure that each of the drinking water sources in all work sites are safe to drink. Furthermore, analysis should be done on NO₃-N for surface, ground water and soil as routine part of monitoring; this is not been covering by current tests.

No test has been conducted yet for air quality. The audit recommends to conduct test for air quality from a variety of locations around work sites like close to school, madrasha, hospital and villages in every half year. The audit found that noise level of some places have been measured but those are not sufficient and the results have not been reported. Hence, the audit recommends to measure noise level from various places nearby the work sites on weekly basis and maintaining a proper reporting system.

2.2.5 Contractor's Emergency Response Plan

The Contractor has prepared its emergency response plan to ensure the implementation of the occupation health, safety standards of the Project and as stipulated in the company's environment, occupation health and safety policy. These standards aim to form a safe, healthy, civilized, clean and tidy cultural environment in the entire Project, and to continuously improve the management level of engineering construction. It is designed to guide rapid response to the potential EHS emergencies (natural and accidental) that might occur due to project activities or natural disasters. At the same time, it will minimize the damage and loss to the personnel, local inhabitants and the company. This plan cites emergency resources, emergency plans in case of accidents, prevention of casualties, emergency response procedures and site emergency and rescue procedures for fire emergency, height falls, mechanical injury, lifting damage, and electric shock accident, emergency measures for a collapse accident, traffic accident and heat stroke. It also covers environmental management and control measures for dust control, noise control, solid waste control, control of water and air pollution. The plan also reveals how the Contractor will improve its emergency rescue ability and strengthening safety education of project staffs. The Audit Team finds that the plan is a helpful document, which will reduce the EHS risks. On the other hand, the Team also recommends that the Contractor facilitate training for its staff on the emergency response plan so they are conversant with its contents.

2.3 Environmental staff resources

For implementation, supervision and monitoring of EMP compliance, the following staff resources have been deployed:

On Contractor's part -

1. HSE officer (1 Chinese staff)
2. Quality Assurance and HSE in charge (1 Chinese staff, part-time for environmental issues)

3. Each of Polder Managers (4 Chinese staff, part-time for environmental issues)

Contractor has given sub-contract to Center for Research, Training and Consultancy Services (CRTS) of Khulna University of Engineering Technology, which is responsible for conducting environmental quality monitoring laboratory testing and monitoring of environmental issues in the field to some extent. The composition of the team of CRTS is:

4. Professors and Associates professor (4 teachers- each person carries out one field visit in a month, total field visit is 4 by them in a month in 4 polder areas)
5. One Student (MS student- with no work experience- visits each of 4 polders in week)

On DDCS&PMSC's part -

6. Two national Environmental Specialists
7. Two intermittent International Environmental Specialists with limited level of effort

On PMU's part –

8. One Senior Environmental Specialist
9. Vacancy exists for one Environmental Specialist (field)

The Audit Team assesses the number of staff with environmental skills and responsibilities as follows:

For the Contractor—

Number of staff: sizable, but there is a potential diffusion of responsibility with the part- time team of four professors

Number of dedicated staff: inadequate, only one (HSE Officer)

For the DDCS&PMSC –

Number of staff: adequate

Number of dedicated staff: two national staff, which appears adequate for the time being

For the PMU –

Number of staff: inadequate as only 1 of 2 specialists in place; recruitment about to get underway for the second specialist.

Number of dedicated staff: as above

2.4 Necessary equipment and arrangements for environmental monitoring and testing

The Audit Team offered the Contractor the opportunity to demonstrate their sample collection techniques for the testing since the beginning of the audit but they were reluctant to show it. Audit found the sample is collected and sent to Consultancy for Research and Training Services (CRTS) by the Contractor and the actual tests are being conducted by CRTS. Therefore, CRTS is not also aware either if the samples are being collected following standard procedures or not. The Audit Team visited CRTS and its laboratory which conduct environmental monitoring laboratory tests for the Contractor of Package 01. The required equipment for the parameters to be tested are present and were found to be functioning with the exception of the air quality monitoring equipment which was not in working order.

The CRTS team mentioned that they are going to repair this equipment and will have it functioning as soon as possible. During the audit, CRTS of Khulna University declined to show any records, reports/ results of CEIP-1 samples, though it was requested by the audit team, since their contractual arrangement is with the Package 01 Contractor. Subsequently, the test results were provided to the audit team via the DDCS&PMSC.

2.5 Staff awareness and training

The DDCS&PMS Consultant has conducted two rounds of training for the Contractor on EMP implementation and EAP. The Audit Team found the Contractor has conducted 10 batches of trainings on environmental issues covering: Safety Operation and Quality control of plant batching, Health, Safety and Environment. These trainings were conducted during November and December, 2106 for its Chinese workers. Subsequently, the trained Chinese workers have been disseminating the learnings to local workers. Around 50% of the polder staff have been covered by the Contractor via such cascaded training and it is planned to be continued.

2.6 Funding resources

As part of the implementation of EMP approximately BDT 6 crore (about \$750,000) is earmarked for each Package W-01 and Package W-02, though many more items for environmental monitoring and mitigation are included in Package W-02. Expenditures are being incurred for:

- Emergency works for breach of embankment and damaged structures;
- Crop compensation to the direct loser, land owner/share croppers of construction site/ damaged due to dredge spoils;
- Waste disposal arrangement at construction site;
- Water quality monitoring;
- Air and noise quality monitoring analysis;
- Soil and water salinity monitoring cost;
- Conservation and stocking of threatened fish species;
- Management of soil health by replacing back in agricultural land;
- Reducing erosion through proper compaction, turfing;
- Afforestation along the dyke side to reduce erosion and threat of climatic events.

2.7 Actual implementation/ practice level

2.7.1 Review of achievement status of Action Items from the Aide Memoires

The following tables represent the achievement status of specific action items raised in Aide Memories of World Bank missions during the audit period:

Findings of Aide Memoires	Status during audit
Aide Memoire of November 20 to 23, 2016	
In Polder 32: Electrical connections to construction camp that are exposed to workers as well as communities	Resolved
In Polder 32: No adequate fuel storage. Storage facilities found in the construction camp are not demarcated and protected	Resolved

Findings of Aide Memoires	Status during audit
In Polder 32: Empty bags stored next to fuel drums	Not resolved
In Polder 32: Potential risk of water pollution and health and safety for workers if a fuel tank is used for drinking water purpose	Resolved
Polder 33: No PPE for local workers. Boots and helmets were provided to supervisor only	Resolved
Polder 33: Potential Risk of accident in evacuation and spreading areas of the embankment (workers and local pedestrians)	Resolved
Polder 33: Borrow pits represents a risk for local inhabitants (mainly children) and workers. These areas need to be demarcated with signboards	Resolved
Polder 33: Np pre-cautionary signboard found	Resolved
Polder 33: No construction camp is available in the site visited	Resolved
Polder 33: One of the sections for afforestation was visited. The mission recommends to have a detailed plan of afforestation including map	Resolved
Polder 33: No evidence of solid waste management was observed	Partial. Final fate of the wastes need to be ascertained and managed
Polder 35/3: Manual CC block production plant Basic PPE elements such workers were wearing hand gloves and helmets but no boots and masks, No adequate fuel storage. Storage facilities are not demarcated and protected in the open yard, Workers involved with excavation activities not using protective boots and masks, No precautionary sign board found, no camp facilities for workers found	Resolved
Automated CC block manufacturing plan: Level of Noise in the facility needs to be carefully monitored to ensure compliance with acceptable levels following the DOE criteria, Use PPEs and fuel storage with demarcated and protected inside the warehouse and in the open yard	Noise level monitoring is being continued Other issues also resolved
Aide Memoire of June 12 to 16, 2016	
EHS management measures are being carried out as per the agreed EMPs for each polder	Continuing
Contractor staffing on EHS management, training and oversight also appears deficient	1 full time HSE staff has been recruited; others appointed on less than full-time basis.
EAP to be submitted to PMU by mid-July, 2016	Draft EAP was submitted in Oct 2016. Now, a separate EAP for each polder is under process and expected to be submitted to WB by 07 February 2017.
PMU's first bi-annual environmental report will be submitted by July 31, 2016	Submitted on 31 July 2016
First comprehensive report to PMU on EMP by DDCS & PMSC as soon as possible no later than mid-July	Submitted

Findings of Aide Memoires	Status during audit
It was agreed that one field- based environmental specialist shall be appointed by the PMU no later than August 1, 2016	Not yet done, though TOR and draft EOI notice was submitted for WB approval in December 2016, which was granted on 28 December 2016.
It was agreed that first bi-annual monitoring report, due in mid-July, shall include a detailed proposed environmental training plan for PMU staff, as well as the details of the proposed environmental monitoring and management system for the project	Included
Submission of EIAs for Package 02 no later than mid-August 2016	Submitted in draft multiple times during 2016. Final EIAs, cleared by IPOE, were submitted 05 February 2017 based on revised target date agreed with WB.
PMU to submit first complete drafts of EIAs for Package 03 by September, 2016	Not yet. The target date for this has been revised to 30 June 2017.

2.7.2 Polder-specific field observations

Polder 33

The audit team audited the practice level of EMP implementation with the works of CC block production center, drainage sluice (DS) 9 and camp office of polder 33. The audit findings from the polder are as follows:

- The use of Personal Protective Equipment (PPE) found satisfactory in CC block production center.
- The living place for the local workers found inadequate and unhygienic. Ten workers have been sleeping in a room of 15X11 square feet and eight workers have been sleeping in a room of 15X11 square feet in the temporary camp of the CC block production center.
- Drinking water supply was satisfactory on all key parameters and safe for drinking, but toilet used by the local workers was not found hygienic and adequate, as around 20 of workers have been using one toilet.
- There were safety signs and symbols in most of the required places but there was no danger sign and door with the room having high voltage electric equipment in the CC block production center.
- Audit found work for DS-9 has been started but temporary camp including latrine for worksite have not been constructed yet. The workers involved in the work were found to be using required PPE but there was not any first aid kit in the worksite. During the work, electric wires were found on the ground haphazardly. The contractor provisioned alternative roads for the pedestrians. There were some signs, symbols and fencing but there is scope to improve. During discussion with the people in the nearby community, it was found that they do not have any issues with the ongoing works and they welcome it for their sustainability but they were claiming the work required removal of some of trees of mosque.
- In the camp of Polder 33, provision of safe drinking water and appropriate latrines conditions were observed to be in place. Signboards, safety signs, danger signs, wall mounted fire extinguisher, first aid box and doctor's cell number for emergency on wall were all in place. There were separate waste bins for recyclable and non-recyclable wastes in the camp, but ultimate fate of the waste was not found defined as Contractor personnel explained that sometimes community people come to

collect the plastic wastes, which are recycled, and sometimes they burn those in a pit. Audit found fuel containers are kept near GI bags and inside toilet facilities.

Polder 35/1

During the audit the places visited under polder 35/1 were camp office, CC block pre-casting yard, embankment work including borrow pit, DS-7 and DS-8. The findings from the audit are:

- It was found there are PPEs like gumboots, safety helmets, gloves, life vests, etc. and safe drinking water and sanitation facilities in the camp office. There was a fire extinguisher in the camp on the floor of the office which would be better mounted on the wall. There was no signboard for the camp office.
- Re-sectioning work in chainage 19 was audited. Work had been started at this location a few days prior to the day of the audit. There were no safety signs or symbols, fencing, or alternative roads for the pedestrians. It was found that the work was creating huge amount of dust which could be very harmful to pedestrians and nearby community people. Since the beginning of work no water was sprinkled to control dusts. The borrow pit for the work located about 300 m from the toe of embankment. Contractor has been digging a pond there as land owner requested. Community people expressed their opinion that they are happy with the payment amount for the soil from their land. They also mentioned that ponds will increase their agricultural production, carps and shrimp (Golda- fresh water shrimp) and extend the access to drinking water because the ground water in their areas is not drinkable. The borrow pit areas were not demarcated with flags and fencing which could pose risk to children and community people. Proper documentation (location, volume, photo etc.) is not being maintained on the borrow pit.
- During the visit to the CC block Pre-Casting Yard of Polder 35/1, the Audit Team found that workers were using PPEs (helmets, gloves, safety boots, hand gloves, masks, ear plugs, etc.). Also, workers were sprinkling water to control the dust. Safety signs, fire extinguisher, separate bins for recyclable and non-recyclable wastes, first aid box, doctor's cell number on signboard and numbers to call in case of emergency were found. During the visit, safe drinking water was found to be available (water cans bought by contractor) and sanitation facilities were also available for the workers. From the discussion with workers it was revealed that they only have the canned water when any visit is carried out, at other times they don't have adequate drinkable water. They also mentioned that the latrine they are using is clean but it is creating bad odor inside the latrines and surrounded places of latrine because there is no gas pipe with the septic tank. The worksite was established on private land which was agricultural land and the Contractor plans to decommission the site after the work is done considering the wishes of land owner. If the land owner wants the structure, the Contractor will be ready to hand it over or if they want the land reverted to the previous condition, they will also do that.
- In DS 7, signboard, safety signs, danger signs where applicable, demarcation fencing, and approved de-watering plan were found. Workers were not working during the visit time. A latrine has been installed for workers on the bank of river and tidal water reaches within 2-3 feet of the latrine.
- In DS 8, signboard, safety signs, danger signs, fire extinguisher, first aid box, and posted cell number of doctor for emergency were present in the work sites. During field visit of M&E team with WB (World Bank) mission of 4-6 January, 2017, there was no separate latrine for the workers (normally 7-9 workers work in the site as per Contractor personnel) and they have been using a nearby latrine of a house hold. But in audit period it was found that the Contractor is rehabilitating one communal

latrine and has also installed a latrine very near to river bank. Contractor personnel showed the approved de-watering plan for the work at this site.

- Re-sectioning work between chainage 7 to 9 were audited. The audit found no safety signs, safety fencing, precautionary messages, demarcation of borrow pit, alternative ways (the community people use the embankment as road) for pedestrians. Soil was being collected from the river side and the distance between borrow pit and embankment toe was 20 meters. During the consultation with the community people of the areas, it was found that embankment work required the acquisition of many of the small ponds inside the polder areas that they had been using for bathing, cooking and drinking purpose. The people of these communities were demanding the provision of replacement drinking water (e.g. ponds and Pond Sand Filter (PSF)) by CEIP-1, which may be covered by environmental mitigation costs. The borrow pit for the work was found to lie in agricultural land, but a pond is being excavated there as requested by the landowners. From the discussion with the landowner and community people, it was revealed that they would be more benefited with the pond, which will extend their opportunity to culture carp and other fresh water fish, increase agriculture production because of fresh water availability. This will also give them access to drinking water as those areas are not viable for tube-well installation due to salinity, iron and arsenic contamination.

Polder 32

The Audit Team visited the camp office of Polder 32, DS 8, DS 1, DS 16, automated CC block production center, re-sectioning work between chainage 7-9, a few borrow pits adjacent to toe of embankment in river side. The findings are as below:

- In the automated CC block manufacturing center, signboard, fencing with precautionary messages, danger sign, and fire extinguisher were present. During the audit time work was temporarily halted as a part needed to be replaced. Proper water and sanitation facilities existed in the worksite. Discussion with the people of surrounding households revealed that construction work is not disturbing their regular life (e.g., noise level is acceptable to them, no exposure of pollution).
- In the camp office, there were provisions of safe drinking water and sanitation in the camp, signboard, safety signs, danger signs, wall mounted fire extinguisher, first aid box and doctor's cell number for emergency on wall and there were separate waste bins for recyclable and non-recyclable wastes in the camp.
- During audit in DS 1, there were signboard, fencing with precautionary messages, PPEs in use by workers, danger signs, fire extinguisher in the work site, and separate bins for recyclable and non-recyclable wastes. Drinking water is provided by the contractor when the staff and laborers are working. The audit found the latrine installed for the workers is adjacent to the river; no water seal (syphon) was found with the slab of the latrine. The approved de-watering plan was found in worksite during the audit. Electric wires were found on the ground which is risky for the workers.
- Work for DS16 also started but there were no sufficient signs, symbols, or pre-cautionary messages. There was a first aid box in the work site. Sanitation facilities were not hygienic and canned water is provided by the contractor. In the sleeping place of workers, water cans, fuel drum and other items that could be flammable were found together.
- Some of the borrow pits which are to the riverside were audited. All of them were adjacent to the embankment and maximum distance of the borrow pits to toe of the embankment did not exceed 20 meters whereas the specifications require a minimum distance of 50 meters. There is no

documentation on borrow pits. The model section on Chainage 14.720 to 14.790 km has had its turfing completed (done during the prior construction season). Except for the model section, the audit found no turfing in any of the other completed embankment work.

- In the re-sectioning work being continued in chainage 22.300 km, the Audit Team found no demarcation of the construction site, adequate safety signboards and symbols, pre-cautionary messages, security fencing, flags, or alternative road for pedestrians. This situation could put children, other people of the area, and workers at risk.

Polder 35/3

Camp office for polder 35/3, manual CC block manufacturing center (automated plant is being installed and about to be commissioned), embankment work including borrow pits, FS 9 and DS 2 were visited during the audit period. The audit captured the follow findings from the work of polder 35/3:

- The camp office has provided safe drinking water and hygienic sanitation facilities, first aid boxes, storage of PPEs, fire extinguishers kept on the floor which could be better to mount on the wall. There is good security for the staffs of the camp as police is always on duty for security of staff. During the visit of the M&E Consultants during 17 to 21 July 2106, it was observed that the office is positioned adjacent to the road and the road is very busy with vehicles like motorbikes, auto-rickshaws, etc. running in high speed and there was no speed breaker. Presently, the audit found that a speed breaker exists.
- The audit found workers are using required PPEs, presence of signboard, danger signs, symbols, pre-cautionary messages, first aid box and fire extinguishers. The sanitation facilities for the workers was found adequate. But during the discussion with local workers, they indicated that Jar water (bought by Contractor) is only provided when visit is arranged and they normally drink water from the GoB water supply line. They don't know either whether this water is safe for them or not. Water sprinkling was being done to control the dust in the work site. Discussion with local people indicated that work is not disturbing their daily life.
- Starting from the chainage 19, embankment work site was visited. Audit found a few borrow pit to River Side (R/S) areas are around 10 m away from the toe of the embankment. Audit team visited some of the borrow pits in country site, from where top soil was preserved with demarcation with flag and it was planned to replace the top soil on the agricultural land after collection of lower strata material.
- In FS 9 worksite, there were safety signs, pre-cautionary messages, PPEs in use by the workers, approved de-watering plan, first aid box, fire extinguisher, WATSAN facility for the workers. There was no temporary work camp and it was found that the abandoned school building which can be collapsed any time being used as store room by the contractor. According to the teachers of Sardardanga Government Primary School, the FS work has taken about 40 percent of the school's playground. They also mentioned that the work required 70-80 numbers of fruit trees of their school. Currently, there is no demarcated and separated space for the children to play and move around safely as many of the work-related items are kept randomly in their territory. Teachers claimed that they don't know where to complain and everybody related to the work in the working site replied to the teachers that they are not responsible for taking complaints. In DS 2 work site, there were required PPEs in use, required signs, symbols, messages, first aid box, fire extinguisher and drinking water supply. The latrine in the worksite for the workers was found to be unhygienic. The sleeping place for the workers found to be unhygienic with storage of fuel drums, gas cylinder and other items that could be flammable.

A few common findings from the works in the polder areas are as:

- Some of the latrines in the worksites were found to have no water seal without which a latrine could not fulfill the criteria of a hygienic latrine.
- Audit team did not find any Non-Compliance Register in any worksite, Contractor office or DDCS&PMSC office in Khulna or Dhaka.
- It is appreciated that non-recyclable and recyclable wastes are being collected in separate bins. But ultimate fate of the wastes is not known by the Contractor.

2.8 Labor influx

In most of the work sites and camp sites, there is a limited influx of labor. The laborers are predominantly from the vicinity and they prefer to return to their homes after finishing their works. In a few work sites, sleeping facilities have been put in place for a few laborers. They are reasonably furnished with cooking facility and toilets. However, in the same living facility they have stored petrol and other combustible materials. Contractor should give more care on safety and security of the laborers and enforcement of environmental and occupational safety standards.

3. Conclusions and recommendations

The audit was conducted as per the TOR. It found some level of progress in environmental compliance implementation. It also found some areas which need to be improved. The audit recommends as follows:

1. The audit team recommends that the Package 03 EIAs should incorporate the analysis of National Water Act 2013, National River Commission Act 2013 and the Participatory Water Management Guidelines 2014, which are not covered in the EIAs of Packages 01 and 02. Furthermore, the checklist for FGD/Consultation with local people could be annexed. It is important that in the future a brief synthesis of the comments received during the field-level, regional and national consultations be included and whether and how these concerns have been addressed in the final EIA. The Team also feels that the EIAs are too voluminous and EIA authors could look for scope to lessen the volume of the EIAs covering all required sections with adequate information. As a possible approach, long sections of descriptive information may be considered to be annexed, making the main body of the document more focused.
2. The bid documents and contract for Package 03 should give emphasis and care to ensure all the required clauses are incorporated to fully address the relevant elements of the EMPs.
3. The DDCS&PMSC Quality Assurance Plan could be strengthened in its treatment of how EMP compliance will be monitored and achieved.
4. The EMP includes environmental management and mitigation measures that are outside the Contractor's and Consultant's responsibilities. Some actions require the input of various government agencies. At present, there seems to be little movement to coordinate the actions of these agencies and ensure their intervention at the appropriate time. The PMU, with the guidance of the DDCS&PMSC, must notify these agencies of the nature and timing of their required intervention. The DDCS&PMSC in their project management support role, should outline the timeline for each agencies' input. The agencies concerned include the

SHELADIA (USA) / BETS (Bangladesh)

Department of Agricultural Extension, Department of Fisheries, Department of Forestry, and others as well as local government entities.

5. The Contractor's international and senior national team must be retrained on Environmental Action Plan (EAP). All of these staff need training and not just the Contractor's five staff who have environmental responsibilities. Their duties must be outlined in very simple terms, and a monitoring and reporting process spelled out. Mr. Henk Blok (DDCD&PMSC) who worked closely with the Contractor to develop their EAP and Dr. Ashadul Alam Senior Environmental Specialist of PMU would be instrumental in developing and delivering training of trainers for the Contractor's senior staff. Close supervision is required to be undertaken by DDCS&PMSC to observe their compliance to the EAP document and as a means of practical training.
6. For close supervision, especially in the early stages of the formal launch of the EAP, it is recommended that DDCS&PMSC Environmental Specialists spend more time in the field. These Specialists and Khulna University of Environmental (KUET) training representative must be there more intensively over the next few months to ensure the Contractor adopts all actions outlined in the EAP.
7. Records of compliance and especially non-compliance must be kept by the CHWE Contractors and the DDCS&PMSC on EAP activities. The Contractor would use these to monitor and improve compliance and for reporting to the Engineer. For those matters raised by the Engineer, non-compliance reports should be issued and given a serial number and target date for compliance. The date the NCR is cleared should be noted. Delinquency in clearing up NCRs should draw a response from the DDCS&PMSC.
8. The DDCS&PMSC reported that they have issued several letters to the Contractor giving guidance and instructions concerning environmental issues, but were not able to readily provide these to the Audit Team or inform them of the particulars. Such correspondence is "buried" in a general chronological file of many letters to the Contractor. It is suggested that a separate book (or register containing the relevant reference number of the correspondence) on environmental (and other) non-compliance must be maintained on an ongoing basis checked every week for status of compliance. If the items are mitigated, they should be checked as "Complied". Items that continue to be non-compliant should be followed and mitigated within a reasonable time. A report should be sent monthly to PMU and the Third Party M&E Consultants on the non-compliance issues. Such report can be included in the monthly progress report.
9. With respect to sample testing, the Audit team recommends:
 - a. surface water testing at least twice a year (one in dry season and another in rainy season)
 - b. drinking water testing at least once per year, or more frequently if so indicated in the EMPs. The number of tests sites for drinking water every year should be increased to ensure that each of the drinking water sources in all work sites are safe to drink.
 - c. including analysis for NO₃-N for surface, ground water and soil as routine part of monitoring as specified in the EMP
 - d. testing for air quality two times per year from a variety of locations around work sites – close to school, madrasha, hospital and villages
 - e. improving noise level testing approach (to be taken from various places nearby the work sites on weekly basis) and maintaining a proper reporting system.

10. The Audit also recommends that the collection of water, soil and air quality samples should be done by the same competent entity who is responsible to conduct the test. Alternatively, it is essential that the M&E Consultants or PMU's Senior Environmental Specialist observe firsthand the sampling and sample handling technique of the Contractor's staff.
11. Contractor to ensure that flora and fauna baseline information is provided at the beginning of construction for each polder and endline information at the conclusion of construction.
12. In development of EIA and EMP process M&E consultant's participation should be ensured.

4. Annexes

4.1 Terms of Reference

Annual Environmental Audit of CEIP-1 Project

Background:

The Coastal Embankment Improvement Project – Phase 1 (CEIP-1) is a 7-year \$400 million project being implemented by the Bangladesh Water Development Board in partnership with the World Bank and the Pilot Programme for Climate Resilience of the Climate Investment Fund. The Project started in 2013 and will close in 2020. It covers 17 polders in three packages of 4, 6 and 7 polders respectively. The Detailed Design and Construction Supervision Consultants (DDCS&PMSC) commenced their design work for the first of three packages in January 2015 and the Package 01 Contractor commenced services on 26 January 2016. The Third Party M&E Consultants joined the project on 01 November 2015 so this is the first Annual Environmental Audit.

Institutional arrangements for safeguarding the environment include:

1. Project Management Unit, with its Social and Environmental Coordination Unit, who are responsible for oversight and guidance on environmental matters as well as coordination with GoB agencies. PMU also reports to BWDB, the Project Steering Committee (PSC) and the World Bank.
2. DDCS&PMS Consultants who are responsible for developing the EIAs and EMPs consistent with World Bank and GoB guidelines and ensuring the EMPs are implemented satisfactorily. These Consultants review and approve the Contractor's EAPs and monitor their implementation on an ongoing basis. The DDCS&PMS Consultants develop the bidding documents and make sure that the Contract and its specifications include the necessary clauses and elements governing environmental safeguards.
3. Civil Works Contractors who must develop and implement Environmental Action Plans.
4. World Bank reviews and provides comments and no objection to the various safeguard documents.
5. Community participation, consultation and feedback through the EIA process and Grievance Redress Mechanism.
6. Third Party M&E Consultants who audit, monitor and evaluate the project overall. Specifically, with respect to environmental safeguards, the M&E Consultants review and comment on environmental documents prepared under CEIP, spot check compliance, report their findings and prepare recommendations. The M&E Consultants report to the PSC and their contract is administered by the Project Director.

Each polder has its own EIA which includes an EMP which is meant to ensure that the environmental and social management practices are integrated in the design, construction, operation and maintenance of the polder.

Among others, the specific objectives of the EIA are to:

- Comply with national regulatory and WB policy framework (further discussed later on in the document),
- Determine and describe the existing environmental and social setting of the Project Area (the project area defined as is defined as the entire area inside the polder, project influence area outside the polder i.e. the embankment, borrow pits and spoil disposal are if located outside the polder and access route to the polder),
- Identify and assess the potential environmental and social impacts of the project, including health and safety issues,
- Identify mitigation measures to minimize the negative impacts and enhancement measures to enhance the positive impacts ; and
- Detail an Environmental Monitoring Plan

As is the case for the EIAs and EMPs, each polder is also to have an Environmental Action Plan (EAP) which is prepared by the Contractor. The EAP is to elaborate upon the aspects of the EMP for which the Contractor is responsible. It details in a site-specific manner the mitigation and environmental compliance requirements and provides a monitoring plan outlining the protocols, frequency of monitoring, person(s) responsible, etc.

Audit Objective:

The overall objective of the Annual Environmental Audit of CEIP-1 is to assess the extent to which the plans for safeguarding the environment are in place, are being implemented and are effective based on the institutional and contractual arrangements applicable to the Project.

Scope of the Audit:

In summary, the audit will examine: (1) the status of preparation of required safeguards documents; (2) whether the systems, tools and protocols are in place for environmental monitoring; (3) staff and funding resources; and (4) compliance with WB safeguards, including consultation, communication, grievance mechanisms and disclosure, and country legal framework.

The audit will cover the Contractor, the DDCCS&PMSC and Project Management Unit (BWDB).

Field work will be centered on the four polders of Package 01 (Polders 32, 33, 35/1 and 35/3), but the audit will examine CEIP-1 overall whenever appropriate. It will be forward-looking to draw lessons and make recommendations on areas of improvement for Package 01 and for broader application to Packages 02 and 03.

Specifically, the audit will assess:

- Status of EIA and EAP implementation
- Whether the project involves labor influx. The rapid migration to and settlement of workers and followers in the project area is called labor influx, and under certain conditions, it can affect project areas negatively in terms of public infrastructure, utilities, housing, sustainable resource management and social dynamics.
- Extent to which the Environmental Monitoring Plans and environmental mitigation measures outlined in the EIAs are being followed and whether they are effective.
- Existence and quality of monitoring tools, formats and protocols.
- Processes and procedures for compliance monitoring.
- Degree to which qualified staff resources are in place.
- Necessary environmental testing equipment is in place or hired when needed.
- Staff awareness and training.

The Environmental Audit will present findings and observations followed by a section on conclusions and recommendations aimed at improving the effective implementation of environmental safeguards.

The Environmental Audit will examine documents and lab test results records, undertake field observation on compliance status and require field staff to demonstrate their knowledge of Environmental Measurements of soil, water, salinity, biological, physical, and chemical sampling techniques. Also reliability of any lab testing will be carried out randomly. The Contractor and DDSC&PMSC Consultants will be informed of the scope of the Environmental Audit in advance but will not be informed in advance as to which particular work sites will be visited. Both Contractor staff capability and Construction Supervision team staff capability in the area of environmental safeguards will be assessed

Methodology:

The M&E Consultants will undertake a review of documents, reports, site records and lab results, conduct interviews in offices and in the field, and make direct observations during a one week period and then write up their findings. Specific work sites to be visited on a given polder will be selected randomly without advance notice to the Contractor and DDSC&PMSC.

Document Review: Existing base documents or reports will be reviewed such as the Environmental and Social Management Framework, EIAs, EMPs, Contractor EAPs, works contract, consultant contract, guidelines, standard procedure manuals, etc. World Bank Aide Memoires corresponding to the period will also be reviewed with respect to environmental aspects.

Key Informant Interviews: PMU, DDSC&PMSC, Contractor staff and beneficiaries will be interviewed. Perspectives of communities living near the works, workers, and others will be obtained on how well the project is implementing EMPs.

Site Records: Test results for air quality, water quality, soil quality, pH, salinity, etc. will be reviewed. Non-compliance report logs, NCR clearance records and procedures will be examined.

Direct observation: Level of compliance with the EMP/EAP and practices of project and Contractor staff will be observed in the field. Demonstration of water and soil quality, pH, salinity, biological, chemical and physical sampling technique, etc. by Contractor staff may be requested to observe the level of skill and knowledge and whether the technique is appropriate.

Three to four embankment construction worksites and 3-4 drainage/flushing sluice gate sites per polder sites will be visited to examine field level application of the environmental safeguards on a random sampling basis. The team will also visit the campsites, site offices and main offices of both Contractor and DDCS&PMSC to discuss systems, strength of the environment staff and documents.

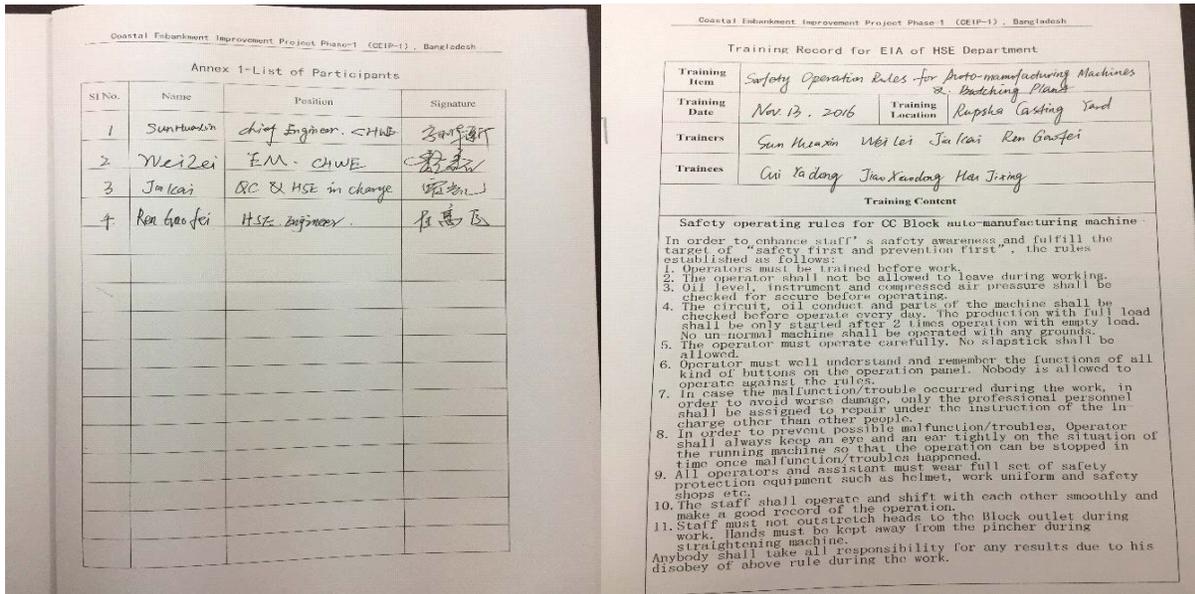
Team Composition and Duration:

The audit will be accomplished by the Environmental Team (1 Environmental Specialist-International and 1 Environmental Specialist -National)) of Third Party M&E Consultants with the support of the Team Leader. The audit will be conducted within a short timeline through fieldwork for one week in Khulna and polder areas of Package 01, followed by ten days of report writing in Dhaka.

4.2 Persons met during the audit

Sl	Name	Position	Organization	Cell Number
1	Mr. Abdul Hannan	XEN	BWDB	01712101250
2	Anwar Hossain	SAE	BWDB	01711309008
3	Asad Ullah	SAE	BWDB	017110829425
4	Zakir Hossain	SAE	BWDB	01716014915
5	Dr. Ashadul Alam	SES	PMU	01747215770
5	Mokhlesur Rahman	CSE	DDSC & PMSC	01924711704
6	Mr. Shamol	CSE	DDSC & PMSC	01732708192
7	Gulzar Hossain	DRE	DDSC & PMSC	01766212118
8	Mr. Paul Zwetsloot	RE	DDSC & PMSC	01736097763
9	Abu Bakr Siddique	ES	DDSC & PMSC	01795095607
10	Habibur Rahman	DTL	DDSC & PMSC	
11	Gerard Pichel	TL	DDSC & PMSC	
12	Xue Yingke	DPM	CHWE Contractor	01992177661
13	Jia Kai	QC & HSE in charge	CHWE Contractor	01876298227
14	Hasibur Rahman	Field Engineer- 33	DDSC & PMSC	01711065400
15	SM Nur-e- Alam	Field Engineer-35/3	DDSC & PMSC	01718135747
16	Mr. Kader	CSE	DDSC & PMSC	01727332980
17	Mr. Shamsul Alam	Field Engineer 32	DDSC & PMSC	01714786945
18	Meng Ging Hua	Quality Environment Engineer	CHWE Contractor	019992177659
19	Zhang	Surveyor Engineer	CHWE Contractor	01743960975
20	Dai Peihao	Surveyor Engineer	CHWE Contractor	01936022994
21	Atiqur Rahman	PE	Subcontractor- BFEW Ltd.	01715717726
22	Ms. Nana	Translator- 35/3	Contractor	
23	Liu Pailiang	Site manager	Contractor	01768783959
24	Dr. Saiful Islam	Professor, CE	KUET	01918868499
25	Dr. Quazi Hamidul Bari	Professor, CE	KUET	01714087299
26	SM Moniruzzaman	Professor, CE	KUET	01919646696
27	Dr. Kazi ABM Mohiuddin	Associate Professor, CSE	KUET	01776296820
28	Mohammad Shah Alam	Graduate Engineer, Civil	KUET	01724047588

4.3 Training attendance for training conducted by contractor



4.4 JD of Environmental Specialist of DDCCS&PMSC as per Quality Assurance Plan

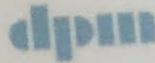
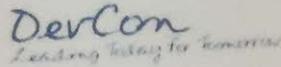
8.1.7 Environmental Specialist

His/her major tasks include but not limited to the following:

- (1) Assess the baseline environmental condition
- (2) Assess the potential impacts of the project activity on surrounding environment
- (3) Implementation of EIA for each package of works under the project.
- (4) Assist in preparation of different reports as required by the team leader.
- (5) Monitor the implementation of Contractor's Environmental Action Plan.

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Quality Assurance Plan_V1.0 – August 2016



4.5 Some pictures of the audit



Worker using PPE



Latrine facility for local worker



Worker sprinkling water in worksite to control dust



Preserving top soil with demarcation



Police in camp office to ensure security



Consultation of audit team with local people



Inadequate living space in worksite for worker



Electric equipment with no danger sign or door



Electric wire on ground in worksite of DS



Fuel driven machine and fuel drum kept near Geo bags



Soil collection from borrow pit,
no demarcation fencing



Latrine with no water seal in worksite

4.6 Drinking and surface water quality monitoring testing result



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পুরকৌশল বিভাগ
খুলনা প্রকৌশল ও প্রযুক্তি বিশ্ববিদ্যালয়
খুলনা-৯২০৩, বাংলাদেশ
<http://www.kuet.ac.bd>

Test Report on Drinking Water Quality and Surface Water Quality under the Project of Coastal Embankment Improvement Project Phase-1 (CEIP-1)

Client

**Mr. Jia Kai
QC & HSE In Charge
CHWE, CEIP-1**

January 23, 2017



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খুলনা-৯২০৩, বাংলাদেশ
http://www.kuet.ac.bd

TEST REPORT ON DRINKING WATER QUALITY ANALYSIS

CRTS No. : CRTS/CE/R-62 Date : 23-01-2017
Ref. No. : ----- Date : 28-12-2016
Client : Mr. Jia Kai, QC & HSE In Charge, CHWE, CEIP-1
Name of the Project: Monitoring of Drinking Water Quality under the project of Coastal Embankment Improvement Project Phase-1 (CEIP-1)
Sample Description : Drinking water (As per letter)
Test No. : T-1337 Date of Testing : 11-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Drinking Water (ECR 97)
1.	Polder 32 Camp	Chainage: K21 + 300 Coordinate: 49532.42, 448382.43	Arsenic (As)	mg/l	0.00	0.05
			Iron (Fe)	mg/l	0.01	0.3 ~ 1.0
			Chloride (Cl)	mg/l	15	150 ~ 600
			Total Coliform (TC)	Nos/100 ml	0	0
			Fecal Coliform (FC)	Nos/100 ml	0	0

Samples were received in sealed condition

Countersigned by



Test Performed by


Chairman
CRTS

Department of Civil Engineering
Khulna University of Engineering & Technology



Dr. Kazi ABM Mohiuddin
Associate Professor
Department of Civil Engineering
Khulna University of Engineering & Technology

Notes:

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কনসাল্টেঙ্গি রিসার্চ এন্ড টেস্টিং সার্ভিসেস (সিআরটিএস)

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CRTS No. : CRTS/CE/R-62

Date : 23-01-2017

Ref. No. : -----

Date : 28-12-2016

Client : Mr. Jia Kai, QC & HSE In Charge, CHWE, CEIP-1

Name of the Project: Monitoring of Drinking Water Quality under the project of Coastal Embankment
Improvement Project Phase-1 (CEIP-1)

Sample Description : Drinking water (As per letter)

Test No. : T-1337

Date of Testing : 11-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Drinking Water (ECR 97)
1.	Polder 33 Camp	Chainage: K36 + 500 Coordinate: 454886.7106, 494720.5259	Arsenic (As)	mg/l	0.00	0.05
			Iron (Fe)	mg/l	0.01	0.3 ~ 1.0
			Chloride (Cl ⁻)	mg/l	5	150 ~ 600
			Total Coliform (TC)	Nos/100 ml	0	0
			Fecal Coliform (FC)	Nos/100 ml	0	0

Samples were received in sealed condition

Countersigned by

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Name of the Project: Monitoring of Drinking Water Quality under the project of Coastal Embankment
Improvement Project Phase-1 (CEIP-1)

Sample Description : Drinking water (As per letter)

Test No. : T-1337

Date of Testing : 11-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Drinking Water (ECR 97)
1.	Polder 35/1 Rayenda Camp	Chainage: K14 + 000 Coordinate: 484645.49, 466942.09	Arsenic (As)	mg/l	0.00	0.05
			Iron (Fe)	mg/l	0.01	0.3 ~ 1.0
			Chloride (Cl ⁻)	mg/l	7.5	150 ~ 600
			Total Coliform (TC)	Nos/100 ml	0	0
			Fecal Coliform (FC)	Nos/100 ml	0	0

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Sample Description : Drinking water (As per letter)
Test No. : T-1337 Date of Testing : 11-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Drinking Water (ECR 97)
1.	Polder 35/3 Casting Yard	Chainage: K29 + 300 Coordinate: 471077.10, 498113.77	Arsenic (As)	mg/l	0.00	0.05
			Iron (Fe)	mg/l	0.01	0.3 ~ 1.0
			Chloride (Cl ⁻)	mg/l	5	150 ~ 600
			Total Coliform (TC)	Nos/100 ml	0	0
			Fecal Coliform (FC)	Nos/100 ml	0	0

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TEST REPORT ON SURFACE WATER QUALITY ANALYSIS

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Ref. No. : ----- Date : 28-12-2016
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Name of the Project: Monitoring of Surface Water Quality under the project of Coastal Embankment Improvement Project Phase-1 (CEIP-1)
Sample Description : Surface water (As per letter)
Test No. : T-1337 Date of Testing : 11-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 1 Polder 32 Joynagar	P-32 Chainage: K12 + 500	pH	--	7.68	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	214	~
			Total Dissolved Solids (TDS)	mg/l	3340	~
			Chloride (Cl ⁻)	mg/l	1800	~
			Electrical Conductivity (EC)	µmhos/cm	4950	2250 (for irrigation)
			DO	mg/l	7.9	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	1.1	<= 6 (for fisheries) <= 10 (for irrigation)

Samples were received in sealed condition

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Sample Description : Surface water (As per letter)

Test No. : T-1337

Date of Testing : 11-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 2 Polder 32 Berakhal	P-32 Chainage: K11 + 500	pH	--	7.36	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	78	~
			Total Dissolved Solids (TDS)	mg/l	3090	~
			Chloride (Cl ⁻)	mg/l	1900	~
			Electrical Conductivity (EC)	µmhos/cm	4270	2250 (for irrigation)
			DO	mg/l	5.7	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	4.6	<= 6 (for fisheries) <= 10 (for irrigation)

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Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 3 Polder 32 Kalinagar Khal	P-32 Chainage: K25 + 000	pH	--	7.58	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	205	~
			Total Dissolved Solids (TDS)	mg/l	2600	~
			Chloride (Cl ⁻)	mg/l	1250	~
			Electrical Conductivity (EC)	µmhos/cm	3380	2250 (for irrigation)
			DO	mg/l	7.4	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	1.2	<= 6 (for fisheries) <= 10 (for irrigation)

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Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 4 Polder 32 Downstream of Nalian	P-32 Chainage: K26 + 500	pH	--	7.63	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	257	~
			Total Dissolved Solids (TDS)	mg/l	3930	~
			Chloride (Cl ⁻)	mg/l	2010	~
			Electrical Conductivity (EC)	µmhos/cm	5600	2250 (for irrigation)
			DO	mg/l	7.9	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.85	<= 6 (for fisheries) <= 10 (for irrigation)

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Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 5 Polder 32 Kayratoli Khal	P-32 Chainage: K35 + 000	pH	--	7.69	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	146	~
			Total Dissolved Solids (TDS)	mg/l	2620	~
			Chloride (Cl ⁻)	mg/l	1250	~
			Electrical Conductivity (EC)	µmhos/cm	4500	2250 (for irrigation)
			DO	mg/l	7.8	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.65	<= 6 (for fisheries) <= 10 (for irrigation)

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Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 6 Polder 32 Closer Khal	P-32 Chainage: K47 + 500	pH	--	7.69	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	146	~
			Total Dissolved Solids (TDS)	mg/l	2620	~
			Chloride (Cl ⁻)	mg/l	1250	~
			Electrical Conductivity (EC)	µmhos/cm	4750	2250 (for irrigation)
			DO	mg/l	7.8	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.65	<= 6 (for fisheries) <= 10 (for irrigation)

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TEST REPORT ON SURFACE WATER QUALITY ANALYSIS

CRTS No. : CRTS/CE/R-62

Date : 23-01-2017

Ref. No. : -----

Date : 28-12-2016

Client : Mr. Jia Kai, QC & HSE In Charge, CHWE, CEIP-1

Name of the Project: Monitoring of Surface Water Quality under the project of Coastal Embankment
Improvement Project Phase-1 (CEIP-1)

Sample Description : Surface water (As per letter)

Test No. : T-1337

Date of Testing : 11-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 1 Polder 33 Bojan Khal	P-33 Chainage: K3 + 500	pH	--	7.62	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	111	~
			Total Dissolved Solids (TDS)	mg/l	1680	~
			Chloride (Cl ⁻)	mg/l	900	~
			Electrical Conductivity (EC)	µmhos/cm	1726	2250 (for irrigation)
			DO	mg/l	7.6	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.8	<= 6 (for fisheries) <= 10 (for irrigation)

Samples were received in sealed condition

Countersigned by

Test Performed by

Chairman
CRTS
Department of Civil Engineering
Khulna University of Engineering & Technology



Dr. Kazi ABM Mohiuddin
Associate Professor
Department of Civil Engineering
Khulna University of Engineering & Technology

Notes:

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Date of Testing : 11-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 2 Polder 33 Borobag Khal	P-33 Chainage: K11 + 050	pH	--	7.30	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	58	~
			Total Dissolved Solids (TDS)	mg/l	2030	~
			Chloride (Cl ⁻)	mg/l	1350	~
			Electrical Conductivity (EC)	µmhos/cm	2230	2250 (for irrigation)
			DO	mg/l	7.1	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	4.1	<= 6 (for fisheries) <= 10 (for irrigation)

Samples were received in sealed condition

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Test No. : T-1337 Date of Testing : 11-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 3 Polder 33 Dhopad Khal	P-33 Chainage: K20 + 550	pH	--	6.85	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	95	~
			Total Dissolved Solids (TDS)	mg/l	1620	~
			Chloride (Cl ⁻)	mg/l	750	~
			Electrical Conductivity (EC)	µmhos/cm	1715	2250 (for irrigation)
			DO	mg/l	8.1	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.4	<= 6 (for fisheries) <= 10 (for irrigation)

Samples were received in sealed condition

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Sample Description : Surface water (As per letter)

Test No. : T-1337

Date of Testing : 11-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 4 Polder 33 Dacope Khal	P-33 Chainage: K25 + 330	pH	--	7.55	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	74	~
			Total Dissolved Solids (TDS)	mg/l	1330	~
			Chloride (Cl ⁻)	mg/l	750	~
			Electrical Conductivity (EC)	µmhos/cm	1456	2250 (for irrigation)
			DO	mg/l	8.4	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.14	<= 6 (for fisheries) <= 10 (for irrigation)

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Test No. : T-1337

Date of Testing : 11-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 5 Polder 33 Borobanker Khal	P-33 Chainage: K44 + 030	pH	--	7.30	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	168	~
			Total Dissolved Solids (TDS)	mg/l	1690	~
			Chloride (Cl ⁻)	mg/l	1100	~
			Electrical Conductivity (EC)	µmhos/cm	1852	2250 (for irrigation)
			DO	mg/l	7.15	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.71	<= 6 (for fisheries) <= 10 (for irrigation)

Samples were received in sealed condition

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Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 6 Polder 33 Dacope Khal	P-33 Chainage: K27 + 350	pH	--	6.48	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	120	~
			Total Dissolved Solids (TDS)	mg/l	1820	~
			Chloride (Cl ⁻)	mg/l	950	~
			Electrical Conductivity (EC)	µmhos/cm	2098	2250 (for irrigation)
			DO	mg/l	8.20	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.83	<= 6 (for fisheries) <= 10 (for irrigation)

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Sl. No.	Sampling location	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 1 Polder 35/1 Sanyasi Khal	P-35.1 Chainage: K0 + 000	pH	--	7.30	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	18	~
			Total Dissolved Solids (TDS)	mg/l	300	~
			Chloride (Cl ⁻)	mg/l	38	~
			Electrical Conductivity (EC)	µmhos/cm	450	2250 (for irrigation)
			DO	mg/l	8.67	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.27	<= 6 (for fisheries) <= 10 (for irrigation)

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Sl. No.	Sampling location	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 2 Polder 35/1 Biddyasagor Khal	P-35/1 Chainage: K6 + 326	pH	--	7.07	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	12	~
			Total Dissolved Solids (TDS)	mg/l	320	~
			Chloride (Cl ⁻)	mg/l	145	~
			Electrical Conductivity (EC)	µmhos/cm	540	2250 (for irrigation)
			DO	mg/l	8.15	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.15	<= 6 (for fisheries) <= 10 (for irrigation)

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1.	Location 3 Polder 35/1 Amragchhia Khal	P-35/1 Chainage: K12 + 100	pH	--	7.38	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	11	~
			Total Dissolved Solids (TDS)	mg/l	480	~
			Chloride (Cl ⁻)	mg/l	160	~
			Electrical Conductivity (EC)	µmhos/cm	848	2250 (for irrigation)
			DO	mg/l	8.81	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.60	<= 6 (for fisheries) <= 10 (for irrigation)

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Sl. No.	Sampling location	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 4 Polder 35/1 Rajapur Khal	P-35/1 Chainage: K14 + 850	pH	--	7.85	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	12	~
			Total Dissolved Solids (TDS)	mg/l	330	~
			Chloride (Cl ⁻)	mg/l	140	~
			Electrical Conductivity (EC)	µmhos/cm	430	2250 (for irrigation)
			DO	mg/l	7.22	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	1.0	<= 6 (for fisheries) <= 10 (for irrigation)

Samples were received in sealed condition

Countersigned by

Chairman
CRTS
Department of Civil Engineering
Khulna University of Engineering & Technology



Test Performed by

Dr. Kazi ABM Mohiuddin
Associate Professor
Department of Civil Engineering
Khulna University of Engineering & Technology

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TEST REPORT ON SURFACE WATER QUALITY ANALYSIS

CRTS No. : CRTS/CE/R-62 Date : 23-01-2017
Ref. No. : ----- Date : 28-12-2016
Client : Mr. Jia Kai, QC & HSE In Charge, CHWE, CEIP-1
Name of the Project: Monitoring of Surface Water Quality under the project of Coastal Embankment Improvement Project Phase-1 (CEIP-1)
Sample Description : Surface water
Test No. : T-1337 Date of Testing : 12-01-2017

Sl. No.	Sampling location	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 5 Polder 35/1 Sonatala Sluice	P-35/1 Chainage: K35 + 750	pH	--	8.14	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	19	~
			Total Dissolved Solids (TDS)	mg/l	890	~
			Chloride (Cl ⁻)	mg/l	227	~
			Electrical Conductivity (EC)	µmhos/cm	1135	2250 (for irrigation)
			DO	mg/l	8.7	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.66	<= 6 (for fisheries) <= 10 (for irrigation)

Samples were received in sealed condition

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Client : Mr. Jia Kai, QC & HSE In Charge, CHWE, CEIP-1

Name of the Project: Monitoring of Surface Water Quality under the project of Coastal Embankment
Improvement Project Phase-1 (CEIP-1)

Sample Description : Surface water

Test No. : T-1337

Date of Testing : 12-01-2017

Sl. No.	Sampling location	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 6 Polder 35/1 Sonatala Gate	P-35/1 Chainage: K35 + 750	pH	--	7.35	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	14	~
			Total Dissolved Solids (TDS)	mg/l	330	~
			Chloride (Cl ⁻)	mg/l	130	~
			Electrical Conductivity (EC)	µmhos/cm	490	2250 (for irrigation)
			DO	mg/l	8.7	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.58	<= 6 (for fisheries) <= 10 (for irrigation)

Samples were received in sealed condition

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Client : Mr. Jia Kai, QC & HSE In Charge, CHWE, CEIP-1

Name of the Project: Monitoring of Surface Water Quality under the project of Coastal Embankment
Improvement Project Phase-1 (CEIP-1)

Sample Description : Surface water

Test No. : T-1337

Date of Testing : 12-01-2017

Sl. No.	Sampling location	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 7 Polder 35/1 Reyenda Site Office	P-35/1 Pond water	pH	--	7.36	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	8	~
			Total Dissolved Solids (TDS)	mg/l	230	~
			Chloride (Cl ⁻)	mg/l	50	~
			Electrical Conductivity (EC)	µmhos/cm	270	2250 (for irrigation)
			DO	mg/l	8.4	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.44	<= 6 (for fisheries) <= 10 (for irrigation)

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Sample Description : Surface water
Test No. : T-1337 Date of Testing : 12-01-2017

Sl. No.	Sampling location	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 8 Polder 35/1 Baleshar River	P-35/1 Chainage: K19 + 000	pH	--	7.74	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	14	~
			Total Dissolved Solids (TDS)	mg/l	150	~
			Chloride (Cl ⁻)	mg/l	83	~
			Electrical Conductivity (EC)	μmhos/cm	224	2250 (for irrigation)
			DO	mg/l	8.24	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	1.18	<= 6 (for fisheries) <= 10 (for irrigation)

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Name of the Project: Monitoring of Surface Water Quality under the project of Coastal Embankment
Improvement Project Phase-1 (CEIP-1)

Sample Description : Surface water (As per letter)

Test No. : T-1337

Date of Testing : 12-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 1 Polder 35/3 Botobunia Khal	P-35/3 Chainage: K35 + 750	pH	--	7.52	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	25	~
			Total Dissolved Solids (TDS)	mg/l	790	~
			Chloride (Cl)	mg/l	750	~
			Electrical Conductivity (EC)	µmhos/cm	1373	2250 (for irrigation)
			DO	mg/l	8.45	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	1.30	<= 6 (for fisheries) <= 10 (for irrigation)

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Name of the Project: Monitoring of Surface Water Quality under the project of Coastal Embankment
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Sample Description : Surface water (As per letter)

Test No. : T-1337

Date of Testing : 12-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 2 Polder 35/3 Araibari Khal	P-35/3 Chainage: K5 + 500	pH	--	7.55	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	26	~
			Total Dissolved Solids (TDS)	mg/l	810	~
			Chloride (Cl ⁻)	mg/l	250	~
			Electrical Conductivity (EC)	µmhos/cm	1434	2250 (for irrigation)
			DO	mg/l	8.34	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	1.40	<= 6 (for fisheries) <= 10 (for irrigation)

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Sample Description : Surface water (As per letter)
Test No. : T-1337 Date of Testing : 12-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 3 Polder 35/3 Banshbaria Khal	P-35/3 Chainage: K5 + 000	pH	--	7.74	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	11	~
			Total Dissolved Solids (TDS)	mg/l	760	~
			Chloride (Cl ⁻)	mg/l	240	~
			Electrical Conductivity (EC)	µmhos/cm	1140	2250 (for irrigation)
			DO	mg/l	8.7	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.58	<= 6 (for fisheries) <= 10 (for irrigation)

Samples were received in sealed condition

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Sample Description : Surface water (As per letter)

Test No. : T-1337

Date of Testing : 12-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 4 Polder 35/3 Rastar Mathar Bazar	P-35/3 Chainage: K21 + 500	pH	--	7.68	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	21	~
			Total Dissolved Solids (TDS)	mg/l	710	~
			Chloride (Cl ⁻)	mg/l	810	~
			Electrical Conductivity (EC)	µmhos/cm	1284	2250 (for irrigation)
			DO	mg/l	8.50	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	1.10	<= 6 (for fisheries) <= 10 (for irrigation)

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Test No. : T-1337 Date of Testing : 12-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 5 Polder 35/3 Mollikerber	P-35/3 Chainage: K36 + 500	pH	--	7.83	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	22	~
			Total Dissolved Solids (TDS)	mg/l	930	~
			Chloride (Cl ⁻)	mg/l	750	~
			Electrical Conductivity (EC)	µmhos/cm	2000	2250 (for irrigation)
			DO	mg/l	8.25	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	1.35	<= 6 (for fisheries) <= 10 (for irrigation)

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খুলনা প্রকৌশল ও প্রযুক্তি বিশ্ববিদ্যালয়
খুলনা-৯২০৩, বাংলাদেশ
<http://www.kuet.ac.bd>

TEST REPORT ON SURFACE WATER QUALITY ANALYSIS

CRTS No. : CRTS/CE/R-62 Date : 23-01-2017
Ref. No. : ----- Date : 28-12-2016
Client : Mr. Jia Kai, QC & HSE In Charge, CHWE, CEIP-1
Name of the Project: Monitoring of Surface Water Quality under the project of Coastal Embankment Improvement Project Phase-1 (CEIP-1)
Sample Description : Surface water (As per letter)
Test No. : T-1337 Date of Testing : 12-01-2017

Sl. No.	Sampling location (As per letter)	Sampling ID	Testing parameter	Units	Test results	Bangladesh Standard for Inland Surface Water (ECR 97)
1.	Location 6 Polder 35/3 Kashempur Bazar	P-35/3 Chainage: K26 + 500	pH	--	7.75	6.5 ~ 8.5 (for fisheries and irrigation)
			Turbidity	NTU	9	~
			Total Dissolved Solids (TDS)	mg/l	550	~
			Chloride (Cl ⁻)	mg/l	400	~
			Electrical Conductivity (EC)	µmhos/cm	1145	2250 (for irrigation)
			DO	mg/l	8.6	=> 5 (for fisheries and irrigation)
			BOD ₅	mg/l	0.32	<= 6 (for fisheries) <= 10 (for irrigation)

Samples were received in sealed condition

Countersigned by

Chairman
CRTS
Department of Civil Engineering
Khulna University of Engineering & Technology



Test Performed by

Dr. Kazi ABM Mohiuddin
Associate Professor
Department of Civil Engineering
Khulna University of Engineering & Technology

Notes:

- CRTS (Civil) does not have any responsibility regarding the representative character of the samples supplied by the client. It is recommended that samples be sent in a secure and sealed cover/packet/container under signature of the competent authority.
- In order to avoid fraudulent fabrication of test results, it is recommended that all test reports should be collected by person duly authorized.
- For any query, please contact with Chairman, CRTS (Civil), Department of Civil Engineering, KUET.