

Semiannual Environmental Monitoring Report

Loan No. 3350- BAN

December 2018

**Power System Expansion and Efficiency Improvement Investment
Program-Tranche-3**

**ASHUGANJ 400 MW (EAST) COMBINED CYCLE POWER PLANT
PROJECT**

Ashuganj, Brahmanbaria

Prepared by Ashuganj Power Station Company Limited (APSCL) for the Asian Development Bank.

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Environmental Monitoring Report

6th Semi-Annual (July – December 2018) Report



ASHUGANJ 400 MW (EAST) COMBINED CYCLE POWER PLANT PROJECT

Ashuganj, Brahmanbaria



Ashuganj Power Station Company Limited (APSCL)

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Semi-Annual Monitoring Report
For Ashuganj 400 MW (East) Combined Cycle Power Plant (CCPP)
Project
(Ashuganj, Brahmanbaria)

Period: 6th Semi-Annual (July – December 2018)
Monitoring: Ambient Air, Water & Noise Quality

EXECUTIVE SUMMARY

During the period from July to December 2018, the EPC Contractor has carried out mainly the demolition schedule, demolition of existing GT-1, ST, and GT-2 units (146 MW CCPP), test pilling and site preparation activity. In order to demolition works, they mobilize the equipment's, workers and materials. In this period there is no discharge and for this, there is no impact on the living things in the water body. Air Pollution caused by dust emission during construction traffic activities is controlled by good management practices like continuous water spray over the unpaved or bare surfaces, covering soil materials pile. Soil and water pollutions are also prevented by proper management like spill prevention and well drainage system. Solid waste is managed by the waste management plan. Noise pollution is also a regarding issue during Steel Structure Erection activities for using of demolition equipment's and also for traffic and transport. Noise level is reduced by using of fine-tuned low noise level construction equipment's and by the proper traffic management system. Every personnel uses personal protective equipment to ensure own safety. The remarkable achievement in this period is that till now there is no record of accident or injury. APSCL is committed to keeping the accident level in Zero by implementing its proper occupational health and safety management system. This project also has a positive effect on the socio-economic condition. Local skilled and semi-skilled peoples are engaged in different levels of construction activities and they are very happy about getting employment opportunities.

1.0 INTRODUCTION

The objective of the environmental safeguard management and monitoring is to record environmental impacts resulting from the project activities and to ensure implementation of the “mitigation measures” identified earlier in order to reduce adverse impacts and enhance positive impacts from specific project activities. Besides, it would also address any unexpected or unforeseen environmental impacts that may arise during construction and operation phases of the project.

The EMP clearly layout: (a) the measures to be taken during both construction and operation phases of the project to eliminate or offset adverse environmental impacts, or reduce them to acceptable levels; (b) the actions needed to implement these measures; and (c) a monitoring plan to assess the effectiveness of the mitigation measures employed. Environmental management and monitoring activities for the under-construction power plant project could be divided into management and monitoring: (a) during the construction phase, and (b) during the operation phase.

The application of this plan involved an environmental control and monitoring of the work by a technical team to verify compliance with all the indications, limitations or environmental restrictions set forth in the Environmental Management Plan (EMP), EIA and the Project, with the minimal damage caused by work on the environment.

The information obtained by the implementation of the Environmental Action Plan is required to define preventive measures or define corrective actions.

The information generated as a result of implementing the Environmental Action Plan must be duly forwarded to the Department of Environment (DoE).

1.1 Brief Project Description

A Combined Cycle Power Plant of Total net 400±5% MW capacity at site condition (35 °C, 1.013 bars, 98% R.H.) is intended to be set by Ashuganj Power Station Company Limited inside the existing premises. The Power Station will be connected with the Ashuganj 400 KV Gas Insulated Switchgear (GIS) Grid Sub-Station with necessary electrical equipment. The basic concept for the Ashuganj 400 MW CCGP (East) project shall be a CCGT Plant based on one Gas Turbine Generator unit (GTG), one Unfired Heat Recovery Steam Generator and one Steam Turbine Generator unit (STG). Water-steam cycle will be three pressure levels (HP, IP and LP) with reheat. The Ashuganj 400 MW (East) Combined Cycle Power Plant Project complex is located on the Southern bank of Meghna river, just outside and to the East of Bhairab Bridge. The power plant is located in Ashuganj Upazilla. The entire power plant is completely enclosed, covers an area of about 4.50 acres and is owned by the Ashuganj Power Station Company Limited (APSCL).

1.2 Project Progress Status and Implementation Schedule

The basic concept for the Ashuganj East project shall be a CCGT Plant based on one Gas Turbine Generator unit (GTG), one Unfired Heat Recovery Steam Generator and one Steam Turbine Generator unit (STG). Water-steam cycle will be three pressure levels (HP, IP and LP) with reheat.

General components of the proposed CCGT project include the following: (i) 400±5% MW CCGT unit complete with necessary auxiliaries including air intake filtration facilities, inlet and exhaust silencers, control systems, main stack with delivery damper, gas fuel treatment system, (ii) Power generator for the gas turbine unit with all auxiliaries including cooling system, control system, excitation system; (iii) one Steam turbine unit complete with necessary auxiliaries including heater, pumps, steam turbine bypass, control systems; (iv) Power generator for the steam turbine unit with all auxiliaries including cooling system, control system; (v) Heat Recovery Steam Generating system with auxiliaries including deaerators, pumps, exhaust stack, control system; (vi) Gas booster compressor system with all auxiliaries and control system; (vii) Di-mineralized water system complete with pumps, tanks, control system (viii) Effluent treatment system with all auxiliaries including, chemical dosing systems, settling units, control system, pumps; (ix) Other essential plant equipment including air compressor, natural gas supply system with 2200 m gas pipeline, circulating water system, cooling water pond, raw water intake structure, condensate system; (x) Construction of internal roads. (xi) Switch room (xii) Emergency generator and transformer.

A. Project Progress Status

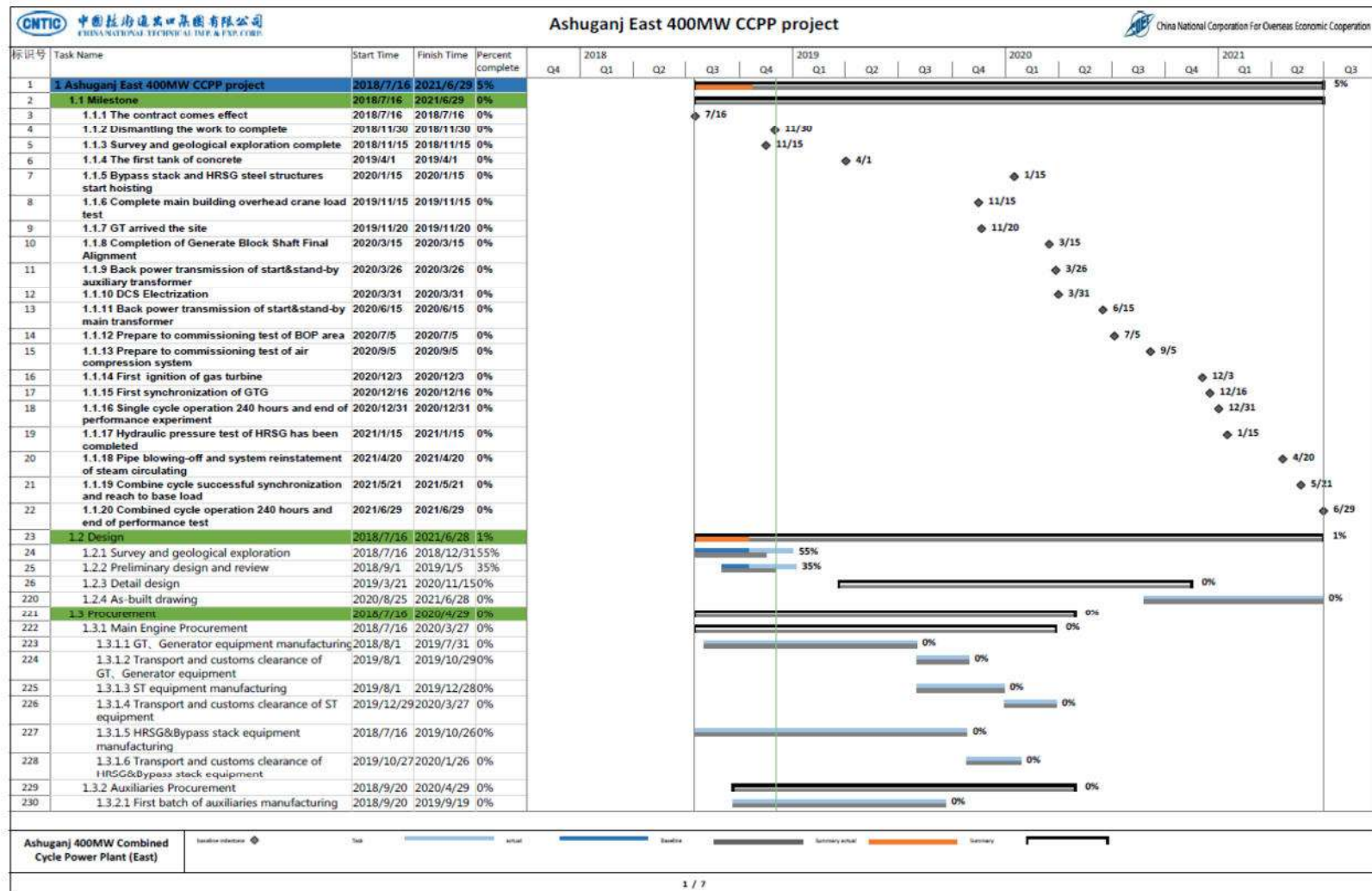
The updated status of Ashuganj 400 Mw (East) Combined Cycle Power Plant Project (CCPP) from July 2018 to December 2018 is given below in Table:

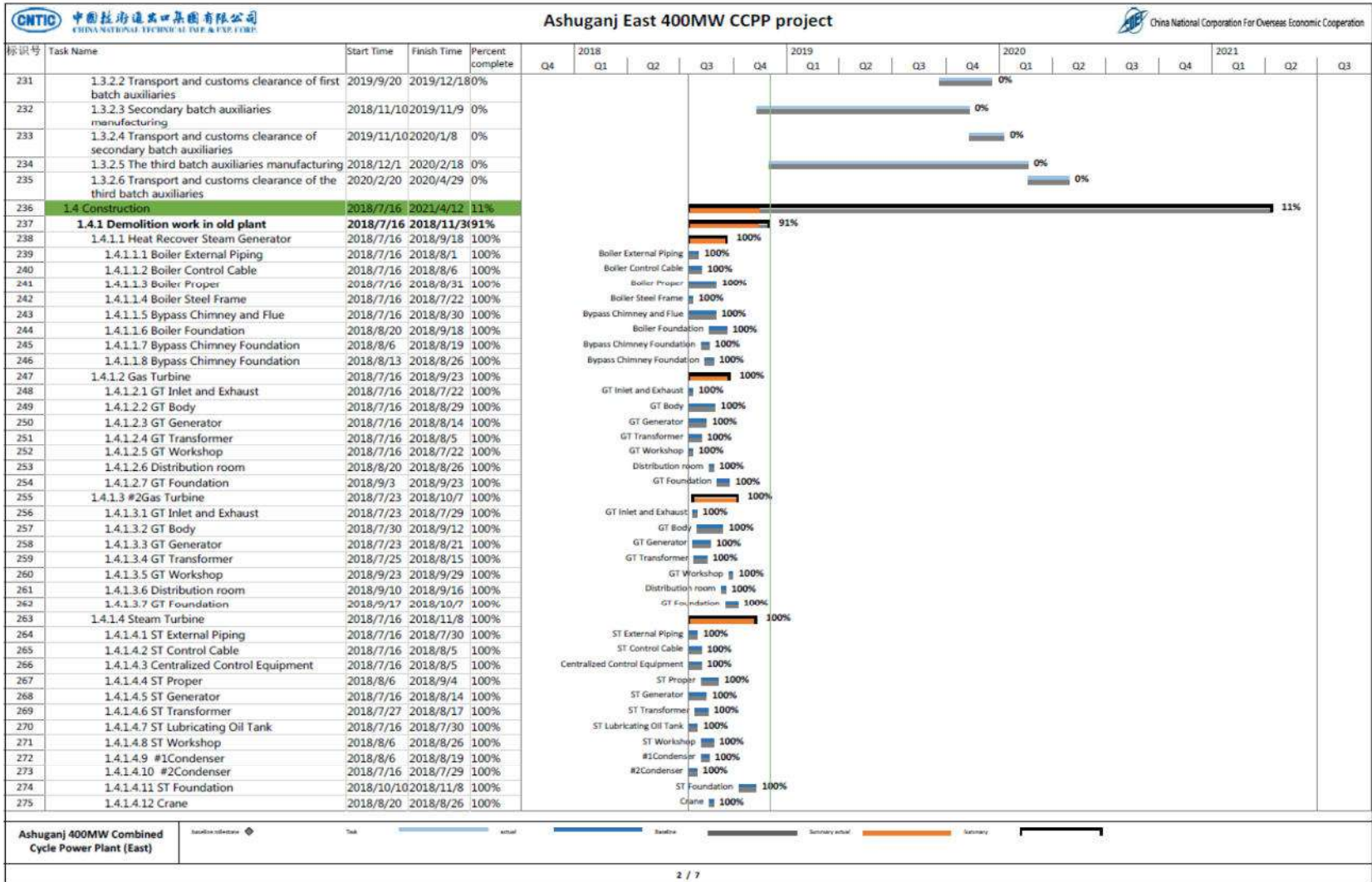
Sl. No.	Work Description	Status
1.	Demolition Schedule Demolition Schedule for old power plant	Completed 100%
2.	Demolition of Existing Power Plant The old power plant will be demolished	Completed 100%
3.	Civil Works: Piling works and superstructure/foundation works for all structures.	Test pilling completed
4.	Mechanical and Electrical Facilities Consist of -Erection of HRSG, Steam Turbine, Generator, Cooling Tower, CW Pump House and all other BOP Equipment/Components of Power Plant. -Electrical and I&C works with commissioning	Not yet started

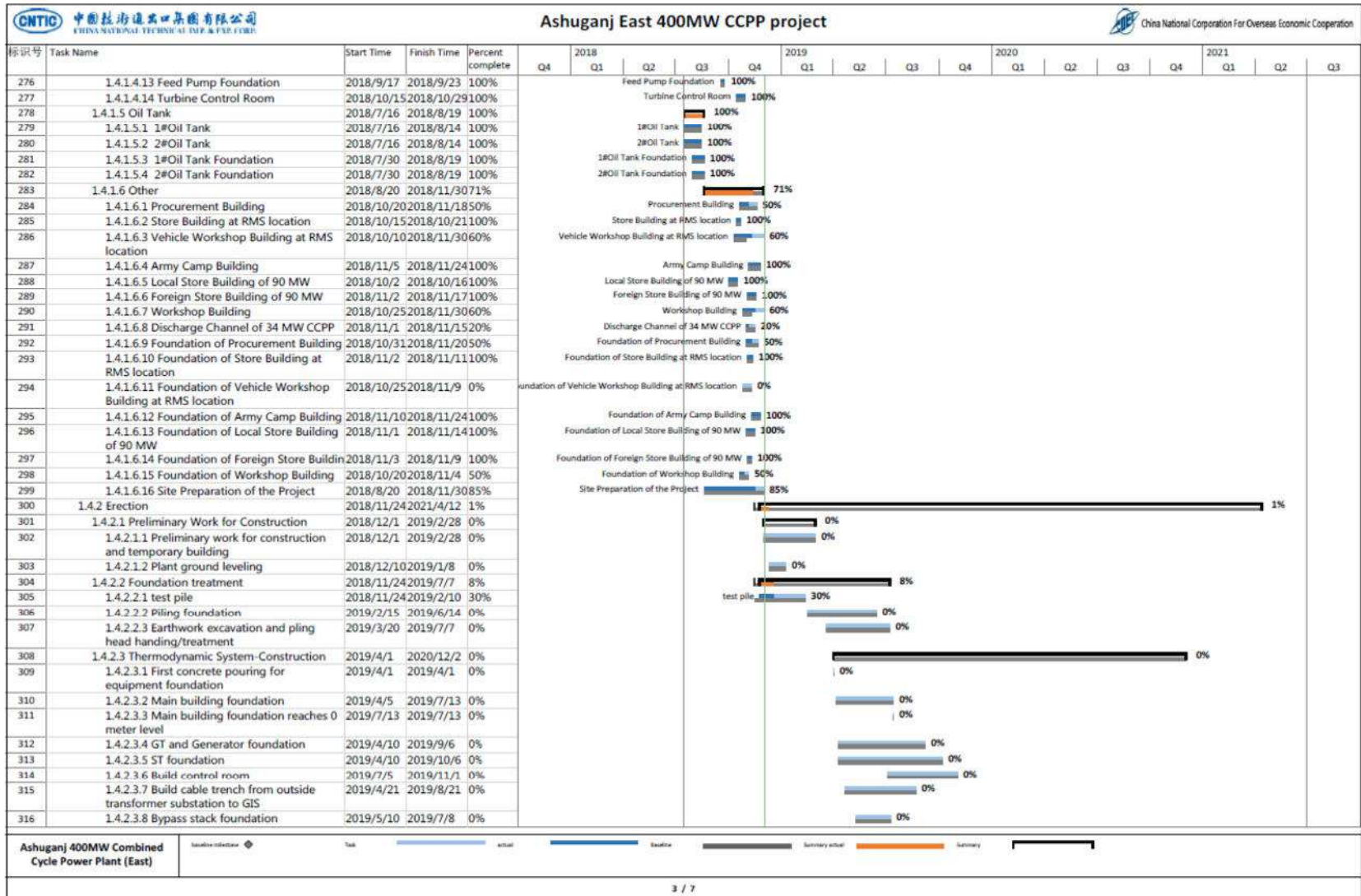
B. Implementation Schedule for the project :

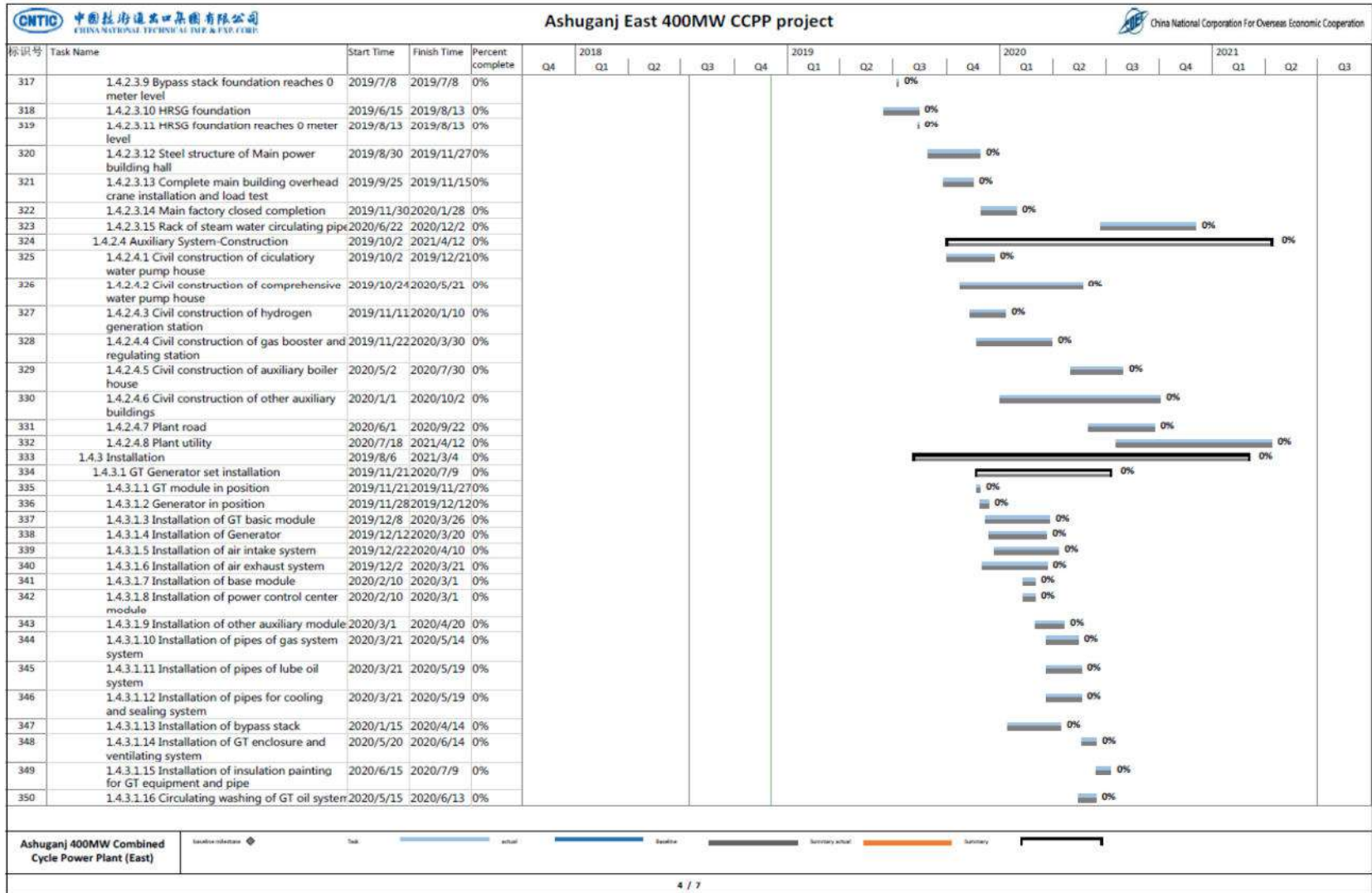
The tentative implementation schedule of Ashuganj 400 Mw (East) Combined Cycle Power Plant Project (CCPP) is given below:

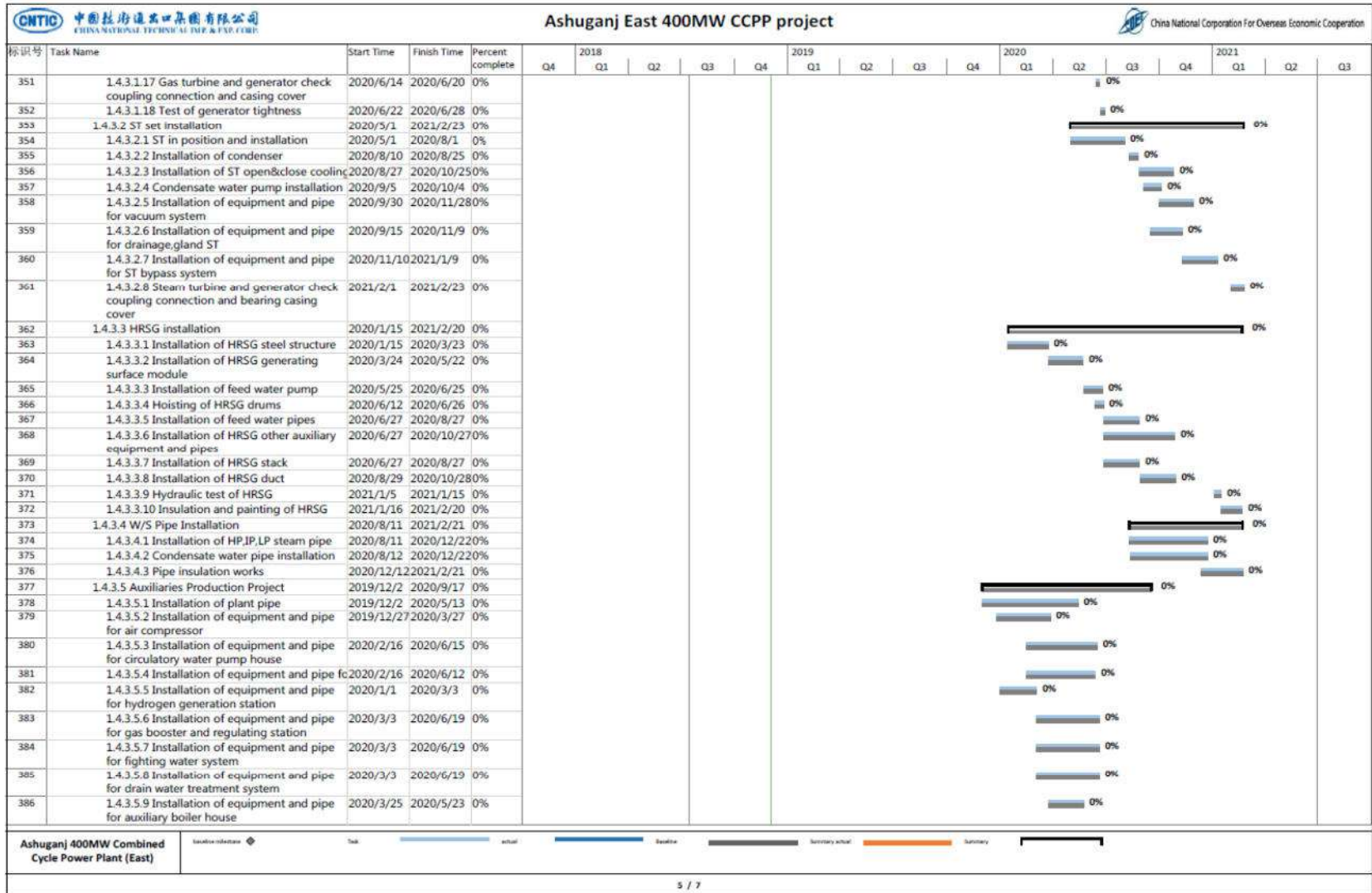
Implementation Schedule (Tentative):

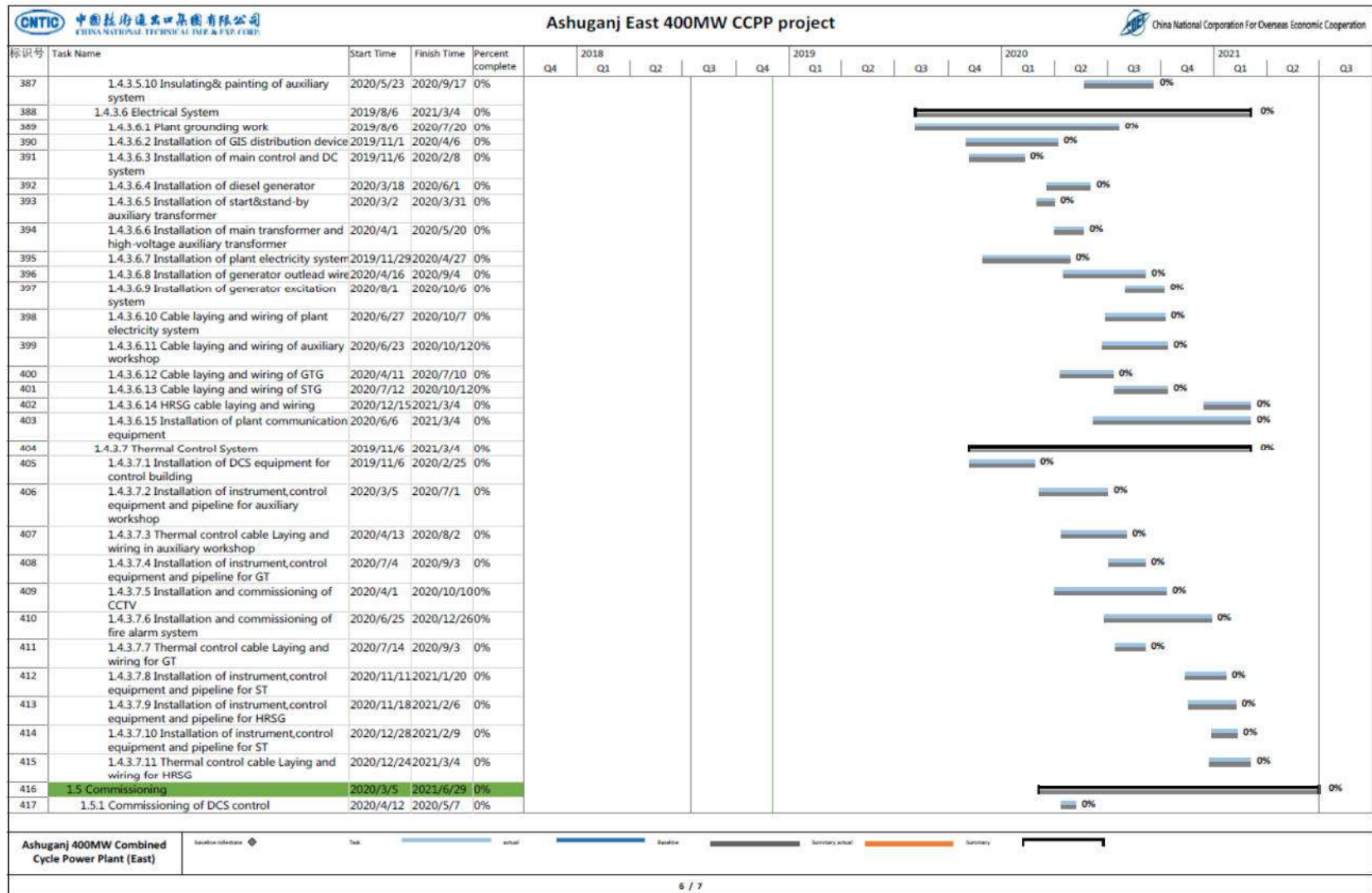


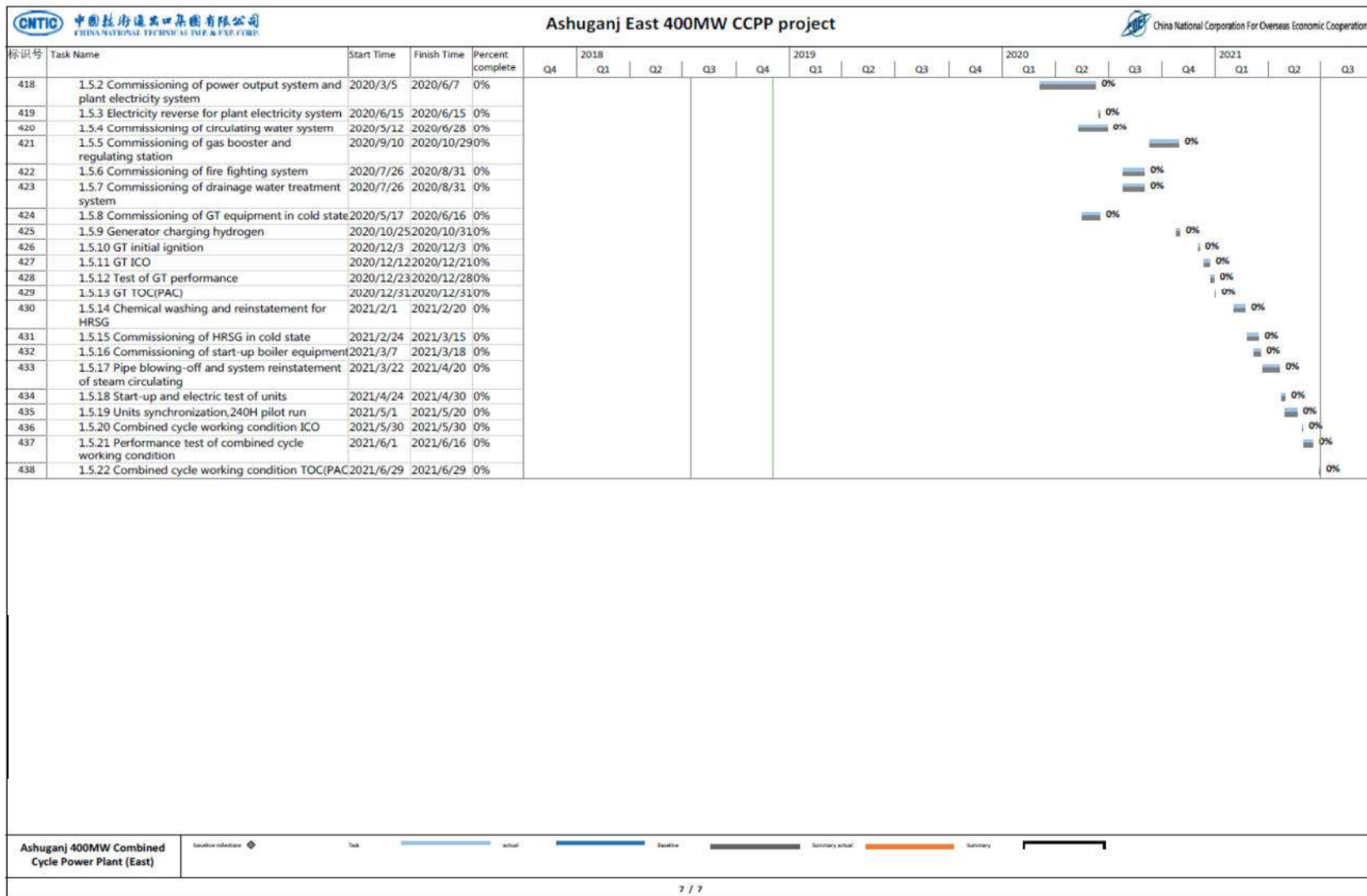












A Synopsis of Work Needs to Be Undertaken During the Construction Period

According to environmental monitoring, during the construction phase and assignment, the main work will be to collect the ambient air samples to measure air pollutants and noise level data from the project area. For river water analysis the water sample will also be collected from the nearby Meghna River and for groundwater analysis the water sample will be collected from the project area.

Description of Work	6th Semiannually (July-December, 2018)	Frequency
Ambient Air Quality	Done With Measurement	Monthly
Noise Level	Done With Measurement	Monthly
Drinking Water Level	Done With Measurement	Monthly
River Water	Done With Measurement	Monthly
Groundwater Level	Done With Measurement	Quarterly
Soil Quality	Done With Measurement	Annually
Process Waste	Done With Measurement	Quarterly
Health Checkup	No need to measure	Daily

Project Environmental Key Personnel, Contact Names and Telephone numbers

Sl. No.	Project Key personnel	Name of Key personnel	Telephone No.
01	Manager (HS&E), APSCL	Md. Atiqur Rahman	01717462670
02	Executive Engineer (Electrical.)	Md. Imrose Islam	01711100873
03	Executive Engineer (Civil.)	Mohammad Asadujjaman	01712238642
04	Manager(Chemical)	Md. Ashraful Islam	01717650871
05	Assistant Manager(HS&E)	A.K.M. Humayan Kabir Dewan	01730025431
06	Assistant Engineer (Electrical)	Aminul Islam	01739653761
07	Assistant Manager(Chemical)	Md. Yasin Molla	01923606305
08	Operator (3 Nos.)	1. Milon Kanti Das 2. Md. Wasi Uddin 3. Ashiq Hasan	
09	Environmental Specialist	Md. Arifur Rahman	01711128593

2.0 COMPLIANCE OF NATIONAL REGULATIONS

2.1 Environmental Conservation Rules 1997

2.1.1 Regulatory Compliance progress:

Government of Bangladesh (GoB) Guidelines for Air and Noise Quality

For carrying out the production, the standard for air and noise quality of the environment shall be determined in accordance with the standard specified in Schedule 2 and Schedule 4 in the Environment Conservation Rules 1997, compiled by DoE, Ministry of Environment and Forest, GoB. Schedule 2 and 4 are presented in Table 5.1 and Table 5.2 respectively. The revised National Ambient Air Quality Standards Published in the Bangladesh Gazette (19 July 2005) and Noise Level Standard Published in the Bangladesh Gazette (7 September 2006) is shown in Table 2.1 and Table 2.2 respectively.

The guidelines for acceptable noise level, especially outside plant boundary have been considered as levels recommended by internationally acclaimed standards. Bangladesh has categorized the noise by the following levels.

Table 2.1: Bangladesh Standards for Ambient Air

Location	Unit	SPM (Suspended Particulate matters)	SO ₂ (Sulphur dioxide)	NO _x (Oxide of Nitrogen)
Industrial and mixed area	mg/m ³	500	120	100
Commercial and mixed area	mg/m ³	400	100	100
Residential and Rural area	mg/m ³	200	80	80
Sensitive area	mg/m ³	100	30	30

*Source: (Schedule-2, Rule 12, Environment Conservation Rules 1997)

Notes:

- The sensitive area includes national monuments, health resorts, hospital, archaeological sites, educational institutions and other government-designated areas (If any).
- Any industrial unit located not in a designated industrial area will not discharge such pollutants, which may contribute exceed the ambient air quality above in the surrounding areas of residential and sensitive areas.
- Suspended particulate matters mean airborne particles of diameters of 10 microns or less.

Table 2.2: Bangladesh Standards for Noise

Location Category	Standards determined at dB(A) unit	
	Day	Night
Silent Zone	45	35
Residential Area	50	40
Mixed Area (Basically residential and together used for commercial and Industrial purposes)	60	50
Commercial area	70	60
Industrial area	75	70

*Source: ECR Schedule 4, *A Compilation of Environmental Laws, DoE*

Notes:

- Limits presented are one-hour energy equivalent sound exposure limits;
- 'Daytime' is 06.00 AM to 09.00 PM, 'Nighttime' is 09.00 PM to 06.00 AM; and
- Sound exposure at a receptor resulting solely from the facility, irrespective of ambient sound levels, should not exceed the presented limits.

Table 2.3: Bangladesh Standards for Ambient Air (Revised 19th July in 2005)

Pollutant	Objective	Averaging Time
PM _{2.5}	15 µg /m ³	Annual (f)
	65 µg /m ³	24-hour (h)
PM ₁₀	50 µg /m ³	Annual (b)
	150 µg /m ³	24-hours(g)
SPM	200 µg /m ³	8-hours
SO ₂	80 µg / m ³ ; (0.03 ppm)	Annual
	365 µg / m ³ ; (0.14 ppm)	24-hour (a)
NO _x	100 µg /m ³ ; (0.053 ppm)	Annual
CO	10mg/m ³ ; (9 ppm) (a)	8-hours (a)
	40mg/m ³ ; (35 ppm) (a)	1-hour (a)
Lead	0.5 µg/m ³	Annual (i)
Ozone	157 µg /m ³ ; (0.08 ppm)	8-hour (e)
	235 µg /m ³ ; (0.12 ppm)	1-hour(d)

Notes:

- Not to be exceeded more than once per year
- The objective is attained when the annual arithmetic mean is less than or equal to 50µg/m³.
- The objective is attained when the expected number of days per the calendar year with a 24-hour average of 150µg/m³ is equal to or than 1.
- The objective is attained when the expected number of days per the calendar year with the maximum hourly average of 0.12 ppm is equal to or less than 1.
- 3-year average of annual 4th highest concentration
- Spatially averaged over designated monitors
- From the 99th percentile.
- From the 98th percentile,
- Annual arithmetic average based on lead analysis of TSP samples operated on an every 6th-day schedule.

Table 2.4: Bangladesh Standards for Noise (Revised 7th September in 2006)

Schedule -I Rules 5(2) (Area Based Noise level value)

Location Category	Standards determined at dB(A) Leq unit	
	Day	Night
Silent Zone	50	40
Residential Area	55	45

Mixed Area (basically residential and together used for commercial and Industrial purposes)	60	50
Commercial area	70	60
Industrial area	75	70

*Source: ECR Schedule 1 (Revised 7th September 2006), A Compilation of Environmental Laws, DoE

3.0 COMPLIANCE OF ENVIRONMENTAL COVENANTS FROM THE ADB LOAN AGREEMENT

3.1 Covenants from the ADB Loan Agreement

Covenants	Reference	Compliance status
Environment		
<p>The borrower shall ensure or cause APSCL to ensure, that the preparation, design, construction implementation, operation and decommissioning of the project and all project facilities comply with</p> <p>(a) All applicable laws and regulations of the Borrower relating to the environment, health, and safety;</p> <p>(b) The environmental safeguards;</p> <p>(c) The EARF; and</p> <p>(d) All measures and requirement set forth in the respective EIA, IEE and EMP, and any corrective or preventive actions set forth in a safeguards monitoring report</p>	LA, Schedule 5, Para 2	The environmental monitoring will have been carried out in all three phase i.e. pre-construction, during construction and post-construction phase or operation phase
<p>Land Acquisition and Involuntary Resettlement</p> <p>The borrower shall ensure, or cause APSCL to ensure, that all land and all rights-of-way required for the project, and all project facilities are made available to the works contractor in accordance with the schedule agrees under the related works contract and all land acquisition and resettlement activities are implemented in compliance with</p> <p>(a) all applicable laws and regulations of the borrower relating to land acquisition and involuntary resettlement;</p>	LA, Schedule 5, Para 3	In the case of APSCL, this type of issues does not arise due to the project location. The project location is inside the premises of APSCL own land. So, There is no requirements of Land Acquisition and Involuntary Resettlement

<p>(b)the involuntary resettlement safeguards;</p> <p>(c)the RF; and</p> <p>(d) All measures and requirement set forth in the respective RP, and any corrective or preventive actions set forth in a safeguards monitoring report.</p>		
Safeguards – Related provisions in bidding documents and works contracts		
<p>The borrower shall ensure, or cause each projects executing agency to ensure, that all bidding documents and contracts for works contain provisions that require the contractor to:</p> <ul style="list-style-type: none"> (a) Comply with the measures and requirements relevant to the contractor set forth in the EIA, IEE, the EMP, the RP and any small ethnic community peoples plan(to the extent they concern impacts on affected people during construction), and any corrective or preventive actions set out in a safeguards monitoring report; (b) Make available a budget for all such environmental and social measures; (c) Provide the borrower with a written notice of any unanticipated environmental, resettlement or small ethnic community people risks or impacts that arise during construction, implementation or operation of the project that were not considered in the EIA, the IEE, the EMP, the RP or any small ethnic community peoples plan; (d) Adequately record the condition of roads, agricultural and other infrastructure prior to starting to transport materials and construction; (e) Fully reinstate pathways, other local infrastructure, and agricultural land to at least their pre-project condition upon the completion of construction. 	LA, Schedule 5, Para 7	The safeguards- related provisions in bidding documents and work contracts have been followed strictly and update time to time for further requirements.
Safeguards- Monitoring and Reporting		
<p>The borrower shall do the following or shall cause APSCL to do the following:</p>	LA, Schedule 5,	The Safeguards monitoring will have been carried out in all

<p>(a) Submit semiannual safeguards monitoring reports to ADB and disclose relevant information from such reports to affected persons promptly upon submission;</p> <p>(b) If any unanticipated environmental and or social risks and impacts arise during construction, implementation or operation of the project that were not considered in the EIA, the IEE, the EMP or the RP, promptly inform ADB of the occurrence of such risks or impacts, with detailed description of the event and proposed corrective action plan;</p> <p>(c) No later than the mobilization of the turnkey contractor for APSCL's power plant, engage qualified and experienced external experts or qualified non-governmental organizations under a selection process and terms of reference acceptable to ADB, to verify information produced through the project monitoring process, and facilitated the carrying out of any verification by such external experts; and</p> <p>(d) Report any actual or potential breach of compliance with the measures and requirements set forth in the EMP or the RP promptly after becoming aware of the breach.</p>	Para 7	three phase i.e. pre-construction, during construction and post-construction phase or operation phase
Labor standards		
<p>The borrower shall ensure that all works contract documents to be prepared under the project incorporate provisions and budget to the effect that contractors</p> <p>(a) Comply with all applicable labor laws and related international treaty obligations of the borrower and do not employ child labor as defined under Bangladesh law;</p> <p>(b) Provide safe working conditions for male and female workers;</p> <p>(c) Carry out HIV/ AIDS and human trafficking prevention and awareness campaigns in the campsites and corridors of influence;</p>	LA, Schedule 5, Para 10	The labor standards will have been followed strictly.

(d) Engage women worker as wage laborers depending on their skill; and (e) Provide equal wages for equal work between men and women		
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4.0 COMPLIANCE TO ENVIRONMENTAL MANAGEMENT PLAN

4.1 Major environmental activities of the project

Major Environmental Activities of the project which will be during the construction period are given below:

- Influx of workers
- Transportation of equipment, materials and personnel; storage of materials
- Construction activities, including the operation of construction equipment.

4.1.1 Site-Specific Environmental Management Plan

Table 4.0: HSE and Social Mitigation and Management Plan for Pre-construction and Construction Phase

Mitigation No.	Issue/Impact	Receptor	Mitigation	Responsibility		Key Performance Indicators
				Implementation	Supervision	
1	<ul style="list-style-type: none"> Dust emissions caused by construction activities, construction vehicle movements, transport of construction materials. Exhaust emissions from vehicles being used for transportation/operation of construction, materials/supplies and workforce. 	Air Quality	<ul style="list-style-type: none"> Appropriate sitting and maintenance of stockpiles of materials so as to minimize dust blow (seek to achieve a distance of at least 500m from nearest sensitive receptors); The design of stockpiles will be optimized to retain a low profile with no sharp changes in shape; Minimizing drop heights for material transfer activities such as unloading of materials; All chutes, conveyors and skips will be covered at all times. Site access and roads will be regularly kept damp via a water browser; Wheel wash for all vehicles leaving the Project site will be provided; Open burning on the project site will be prohibited; Roads will be compacted and gravelled if necessary; Site roads will be maintained in good order; 	CNTIC (EPC Contractor)	<ul style="list-style-type: none"> APSCL; OE E&S Safeguard Consultants; Independent Local Environmental and Social Monitoring Consultant. 	<ul style="list-style-type: none"> SPM, PM_{2.5}, PM₁₀, NO₂, SO₂ and CO monitoring at sensitive receptors in accordance with the requirements specified in Table 3; Vehicle, equipment and machinery checklists observed; Annual maintenance records observed. Community grievance mechanism implemented and records documented.

Mitigation No.	Issue/Impact	Receptor	Mitigation	Responsibility		Key Performance Indicators
				Implementation	Supervision	
			<ul style="list-style-type: none"> • Lorries transporting construction materials and soil will be covered appropriately to avoid soil dispersion; • Enforcement of vehicle speed limits within the APSCL site to not exceed 10 km/h; • All sand and aggregates will be stored in bounded areas and will not be allowed to dry out unless specifically required; • On-site and off-site haul roads will be inspected for integrity and necessary repairs to the surfaces will be undertaken as soon as reasonably practicable; • All vehicles, equipment and machinery will undergo a pre-use inspection prior to use; • All vehicles will undergo periodic maintenance inspections; • Implement community grievance mechanism shown in the stakeholder engagement plan in Annex D. • Monitoring of Suspended Particulate Matter (SPM), Particulate Matter 2.5 (PM_{2.5}) and Particulate Matter 10 (PM₁₀), Nitrogen Dioxide (NO₂), Sulphur Dioxide (SO₂) and Carbon Monoxide (CO) by a third-party consultant. 			

Mitigation No.	Issue/Impact	Receptor	Mitigation	Responsibility		Key Performance Indicators
				Implementation	Supervision	
2	Increased noise in the Project area and at sensitive receptors a result of the use of construction activities, machinery and increased vehicle movements.	Noise	<ul style="list-style-type: none"> • Provision of a noise barrier around the project site to reduce off-site noise levels; • Enforcement of vehicle speed limits which will not exceed 10 km/h within the APSCL site; • Strict controls of vehicle routing; • Diesel engine construction equipment will be fitted with silencers; • Noisy construction activities will be limited at night; • Light vehicle movements will be prohibited at night; • Piling activities will be carried out during the daytime hours (i.e. 7 AM to 6 PM); • Where possible the CCGT construction works and activities will conclude at 6 PM daily; • Implementation of a community grievance mechanism shown in the stakeholder engagement plan in Annex D; • Monitoring of noise by a third party consultant. 	CNTIC (EPC Contractor)	<ul style="list-style-type: none"> • APSCL; • OE E&S Safeguard Consultants; • Independent Local Environmental and Social Monitoring Consultant. 	<ul style="list-style-type: none"> • Noise monitoring at sensitive receptors in accordance with the requirements specified in Table 3; • Community grievance mechanism implemented and records documented.

Mitigation No.	Issue/Impact	Receptor	Mitigation	Responsibility		Key Performance Indicators
				Implementation	Supervision	
3	Site Clearance-Vegetation removal and Habitat disturbance	Terrestrial Biodiversity	<ul style="list-style-type: none"> Hunting and poaching will be prohibited for staff, workers, all contractors and personnel engaged in or associated with the Project, with penalties levied, including fines and dismissal, and prosecution under the relevant laws for clearing vegetation; Training to staff and workers on all rules, regulations and information concerning restrictions related to hunting and poaching will be provided, as well as the punishment that can be expected if any staff or workers or other person associated with the Project violates rules and regulations; All vehicles are to maintain a speed of a maximum of 10km/hr within the APSCL site to reduce the risk of fauna strike; The planned vegetation clearance area for the construction works shall be clearly identified and marked/fenced to avoid accidental clearing. 	CNTIC (EPC Contractor)	<ul style="list-style-type: none"> APSCL; OE E&S Safeguard Consultants; Independent Local Environmental and Social Monitoring Consultant. 	<ul style="list-style-type: none"> Vegetation clearance areas marked/fenced; No. of floral species conserved or planted recorded, if any; Workers Training Records showing appropriate training.
4	Site clearance, excavation and disposal of material activities resulting in exposure to potentially	Soils and Groundwater	<ul style="list-style-type: none"> Development of an effective site drainage systems designed to include an allowance for climate change; Restrict site access only to construction site areas; 	CNTIC (EPC Contractor)	<ul style="list-style-type: none"> APSCL; OE E&S Safeguard Consultants; 	<ul style="list-style-type: none"> Groundwater Monitoring in accordance with the requirements specified in Table 3.

Mitigation No.	Issue/Impact	Receptor	Mitigation	Responsibility		Key Performance Indicators
				Implementation	Supervision	
	contaminated soils and impacting groundwater. Spillage or leakage of substances on land, movement of equipment and vehicles on site resulting in contamination of soils and groundwater.		<ul style="list-style-type: none"> • Disposal of waste materials unsuitable for reuse on-site, (e.g. for landfilling) at appropriately licensed sites; • Installation of oil and suspended solid interceptors; • Management of excavations during construction to avoid the generation of drainage pathways to underlying aquifers; • Provision of impermeable bases in operational areas to prevent absorption of spillages. • Scheduling clearance activities to avoid extreme weather events such as heavy rainfall, extremely dry and high winds. • Demarcate routes for the movement of heavy vehicles to minimize disturbance of exposed soils and compaction of sub-surface layers. • Reuse topsoil within rehabilitation activities. • Control erosion through diversion drains, sediment fences, and sediment retention basins. 		<ul style="list-style-type: none"> • Independent Local Environmental and Social Monitoring Consultant. 	<ul style="list-style-type: none"> • Soil Quality Monitoring in accordance with the requirements specified in Table 3.

Mitigation No.	Issue/Impact	Receptor	Mitigation	Responsibility		Key Performance Indicators
				Implementation	Supervision	
			<ul style="list-style-type: none"> • Stockpiles are to be located in areas surrounded by natural wind barriers to minimize the potential for wind erosion. • No septic tanks will be installed within 500m of a deep or shallow tube well used by the community for drinking water. • Septic tanks will be installed in well-drained and permeable soils well above high groundwater level and where sufficient soil percolation exists for design wastewater loading rate. It will be appropriately designed to prevent hazards to human health or the contamination of land or water. Regular maintenance will be undertaken. No overflow of the septic tank is permitted. • Quarterly monitoring of groundwater wells within 1 km of septic tanks by the third-party consultant; • Annual soil quality sampling by a third-party consultant. 			
5	Increased suspended sediment and pollutant loads, permanent loss and disturbance to aquatic flora and fauna due to the construction of the intake	Aquatic Environment and River Water Quality	<ul style="list-style-type: none"> • Construction Method Statement to be produced by the CNTIC; • Cofferdam to be used during in-channel works to minimize downstream sediment release; 	CNTIC (EPC Contractor)	<ul style="list-style-type: none"> • APSCL; • OE E&S Safeguard Consultants; 	<ul style="list-style-type: none"> • Construction Method Statement by CNTIC • River water sampling in accordance with the

Mitigation No.	Issue/Impact	Receptor	Mitigation	Responsibility		Key Performance Indicators
				Implementation	Supervision	
	structure and water discharge structure.		<ul style="list-style-type: none"> Inlet structure construction in the river will be undertaken outside the breeding season of fishes; Dredged areas will be limited to the minimum area required; Disposal of dredged sediments to an agreed site only; All works will be made clearly visible using flags, beacons and/or signals; Bank area will be reinstated following construction; River water sampling during dredging and in river works by a third-party consultant. 		<ul style="list-style-type: none"> Independent Local Environmental and Social Monitoring Consultant. 	requirements specified in Table 3.
6	Contamination of the aquatic environment as a result of construction activities on land e.g. spillages, disposal of liquid wastes; surface run-off, exposure of contaminated soils.	Aquatic Environment and River Water Quality	<ul style="list-style-type: none"> No discharge of effluents into the river. All effluents shall be collected and removed off-site for treatment by approved firms or disposed of after appropriate treatment at the site (records of effluent transfers to be maintained); No discharge of surface water runoff directly into the river; Development of a temporary site drainage plan which reduces flow velocity and sediment load bypassing discharge through a sediment pond; 	CNTIC (EPC Contractor)	<ul style="list-style-type: none"> APSCL; OE E&S Safeguard Consultants; Independent Local Environmental and Social Monitoring Consultant. 	<ul style="list-style-type: none"> Waste transfer note system to document transport of waste; Temporary Site Drainage Plan; Workers Training Records showing appropriate training; River water sampling in accordance with the

Mitigation No.	Issue/Impact	Receptor	Mitigation	Responsibility		Key Performance Indicators
				Implementation	Supervision	
			<ul style="list-style-type: none"> • Protection of temporary stockpiles of soil from erosion by using a reduced slope angle where practical, sheeting and by incorporating sediment traps in drainage ditches; • Stockpiles will be located at least 100 m from water bodies; • All fuel, oil and chemicals will be stored in a bounded area to accommodate 110% volume; • Impermeable surfaces will be used for refuelling; • Regular training of all workers in spill response; • Provision of spill equipment at easily accessible locations around the site; • River water sampling by a third-party consultant. 			requirements specified in Table 3.
7	Generation, handling, treatment and disposal of solid and liquid hazardous and non- hazardous wastes.	Environmental Quality	<ul style="list-style-type: none"> • All waste taken off-site will be undertaken by a licensed contractor and the CNTIC will audit the disposal procedure; • Collection and segregation of wastes and safe storage onsite will be undertaken; 	CNTIC (EPC Contractor)	<ul style="list-style-type: none"> • APSCL; • OE E&S Safeguard Consultants; • Independent Local Environmental and Social 	<ul style="list-style-type: none"> • Waste Inventory (hazardous and non-hazardous) implemented. • Waste transfer note system to document transport of waste.

Mitigation No.	Issue/Impact	Receptor	Mitigation	Responsibility		Key Performance Indicators
				Implementation	Supervision	
			<ul style="list-style-type: none"> • Prior agreement of standards for storage, management and disposal with relevant authorities will be obtained. • Construction of sanitary latrine and septic tank system (one latrine for 20 persons); • Erecting “no litter” sign, provision of waste bins/cans, where appropriate; • Waste minimization, recycle and reuse will be undertaken; • Appropriate disposal of solid waste (in designated waste bins); • Development of a Waste Inventory (hazardous and non-hazardous) detailing waste name, waste classification, waste type, the source of waste, waste storage area, storage quality, delivery quality, balance quality, agreement information with disposal company. • A system for documenting waste movements to be created. A trip ticket or waste transfer note system to be used to document all waste types leaving the Project area, their haulier, source, proposed disposal site etc. These tickets should be produced as a counterfoil to create a full audit trail. 		Monitoring Consultant.	

Mitigation No.	Issue/Impact	Receptor	Mitigation	Responsibility		Key Performance Indicators
				Implementation	Supervision	
8	Health and Safety impacts due to construction traffic.	Local communities and workers.	<ul style="list-style-type: none"> • Traffic Management Plan is shown in Annex E to be implemented and updated as required; • Adherence of abnormal load movements to prescribed routes, outside peak hours and advance publication of movements to communities, if required; • Construction shifts will be staggered; • Scheduling of traffic to avoid peak hours on local roads; • Routing of transport to avoid residential areas; • Provision of adequate signage and flagmen along transport route and at site entrance; • Transportation of construction workers by contract bus; • Ensure all roads and bridges used by construction traffic are maintained in at least their current state during construction with any damage immediately repaired; • Condition survey of roads and bridges to be undertaken by the third-party consultant prior to the start of works to provide a baseline for monitoring compliance; 	CNTIC (EPC Contractor)	<ul style="list-style-type: none"> • APSCL; • OE E&S Safeguard Consultants; • Independent Local Environmental and Social Monitoring Consultant. 	<ul style="list-style-type: none"> • Traffic Management Plan implemented and updated; • Survey of roads and bridges prior to the start of works for safety; • Vehicle checklists observed; • Annual maintenance vehicle records observed; • Driver training records observed; • Speed test monitoring results (onsite and offsite) observed; • Community grievance mechanism implemented and records documented.

Mitigation No.	Issue/Impact	Receptor	Mitigation	Responsibility		Key Performance Indicators
				Implementation	Supervision	
			<ul style="list-style-type: none"> • Installation of appropriate traffic sign and warnings; • Enforce speed limit regulations on off-site access roads; • A speed limit of 10 km per hour within APSCL site; • Vehicles will be kept in good condition, with regular checks of vehicle condition undertaken to ensure compliance with national standards; • Ensure all Project drivers are trained in safety awareness; • Implement a grievance mechanism for communities. 			
9	Health and Safety impacts due to unauthorized persons accessing the site.	Local Communities.	<ul style="list-style-type: none"> • Public access to the site will be restricted; • Site security procedures to be established. 	CNTIC (EPC Contractor)	<ul style="list-style-type: none"> • APSCL; • OE E&S Safeguard Consultants; • Independent Local Environmental and Social Monitoring Consultant. 	<ul style="list-style-type: none"> • Site Security Procedures established and implemented.

Mitigation No.	Issue/Impact	Receptor	Mitigation	Responsibility		Key Performance Indicators
				Implementation	Supervision	
10	Health and Safety impacts due to the influx of workers.	Local Communities.	<ul style="list-style-type: none"> Regular talks on communicable diseases including HIV to be held for all workers; Compulsory medical examinations for construction workers; Liaison with the local police and healthcare providers to ensure no additional pressure has been placed on them due to construction worker influx; Implement community grievance mechanism shown in the stakeholder engagement plan in Annex D. 	CNTIC (EPC Contractor)	<ul style="list-style-type: none"> APSCL; OE E&S Safeguard Consultants; Independent Local Environmental and Social Monitoring Consultant. 	<ul style="list-style-type: none"> Workers Health and Education Procedures established and implemented; Workers Training Records showing appropriate training. Medical Examination Records observed; Records of engagement with local police and healthcare providers Community grievance mechanism implemented and records documented.
11	Potential chance finds of archaeological remains during Construction.	Cultural Heritage and Archaeology	<p>If remains are found, the following actions will be undertaken:</p> <ul style="list-style-type: none"> Cease activities and consult the archaeological department and DOE; Protection in situ if possible; 	CNTIC (EPC Contractor)	<ul style="list-style-type: none"> APSCL; OE E&S Safeguard Consultants; 	<ul style="list-style-type: none"> Cultural Heritage and Archaeology Site Find Records (if remains are found).

Mitigation No.	Issue/Impact	Receptor	Mitigation	Responsibility		Key Performance Indicators
				Implementation	Supervision	
			<ul style="list-style-type: none"> Excavation of areas where protection not feasible following discussion and agreement of archaeological department and DOE. 		<ul style="list-style-type: none"> Independent Local Environmental and Social Monitoring Consultant 	
12	Occupational Health and Safety	Workers Health and Safety	<ul style="list-style-type: none"> Sufficient and qualified HSE staff to ensure safe working practices. Pre-construction and continued assessment of the HSE and social risks and hazards by implementing an HSE and social Risk Register; Implementation of contractors HSE Plan which will consider the requirements of the WBG HSE Guidelines for Occupational, Health Safety; Method Statement and Permit to Work procedures to be implemented. Implementation of Fire Safety Plan prior to commissioning any part of the plant; Implementation of Emergency Response and Disaster Management Plan is shown in Annex F. Provision of appropriate training on HSE issues for all workers; Provision of health and safety information; 	CNTIC (EPC Contractor)	<ul style="list-style-type: none"> APSCL; OE E&S Safeguard Consultants; Independent Local Environmental and Social Monitoring Consultant 	<ul style="list-style-type: none"> HSE capacity and competency observed to be appropriate; HSE and Social Risk Register established and reviewed; Contractors HSE Plan established and implemented; Method Statement and Permit to Work Procedures implemented appropriately. Fire Safety Plan; Emergency Response and Disaster Management Plan

Mitigation No.	Issue/Impact	Receptor	Mitigation	Responsibility		Key Performance Indicators
				Implementation	Supervision	
			<ul style="list-style-type: none"> Regular inspection, review and recording of HSE performance; Appointment of site nurse and provision of free on-site medical care for all construction staff; Pest and vector-borne disease control procedures established and are implemented; Maintenance of a high standard of housekeeping at all times. Provision of first aid equipment at easily No employee should be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. And no unprotected ear should be exposed to a peak sound pressure level of more than 140 dB(C). The use of hearing protection should be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound levels reach 140 dB(C), or the average maximum sound level reaches 110 dB(A). Hearing protective devices provided should be capable of reducing sound levels at the ear to at least 85dB(A); 			<p>established and implemented;</p> <ul style="list-style-type: none"> HSE Training Plan established and implemented; HSE Training Records showing appropriate training; Pest and vector-borne disease control procedures established and implemented Incident Reporting Procedure (records of fatalities, incidents, accidents, near misses and corrective actions) established and implemented. Drinking water quality monitoring in accordance with requirements shown in Table 4.0.1.

Mitigation No.	Issue/Impact	Receptor	Mitigation	Responsibility		Key Performance Indicators
				Implementation	Supervision	
			<ul style="list-style-type: none"> Monthly monitoring of the quality of workers drinking water by a third-party consultant. 			

Table 4.0.1: HSE and Social Monitoring Plan for Construction

Mitigation No. Ref.	Environmental and Social Parameter	Aspect	Monitoring Activities	Duration and Frequency	Responsibility	Monitoring Locations	Methods	Reporting	Applicable Standards
1	Air Quality	Dust generation and exhaust emissions.	Implementation of mitigation measures and the assessment of performance indicators.	Daily	CNTIC	Dust generation activities onsite and offsite.	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB 	<ul style="list-style-type: none"> Bangladesh Environmental Conservation Rules, 1997. WBG General EHS Guidelines for Construction and Decommissioning, 2007.
			Monitoring and supervision to ensure the implementation of mitigation measures by all contractors.	Weekly	APSCL	Dust generation activities onsite and offsite.	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual 	<ul style="list-style-type: none"> Bangladesh Environmental Conservation Rules, 1997. WBG General EHS Guidelines for Construction

Mitigation No. Ref.	Environmental and Social Parameter	Aspect	Monitoring Activities	Duration and Frequency	Responsibility	Monitoring Locations	Methods	Reporting	Applicable Standards
								Environmental Report for ADB.	and Decommissioning, 2007.
			SPM, PM _{2.5} , PM ₁₀ , NO ₂ , SO ₂ and CO monitoring by third-party consultant.	Once per month for a 24 hour period.	CNTIC	<ul style="list-style-type: none"> South-West side of Project area near APSCL Admin building. Location: 24°02'38.5'' N and 91°1'0.0'' E The settlement, near south-east corner of the project – Location: 24°02'34.7'' N and 91°01'8.7'' E PDB High School – Location: 24°02'30.5'' N and 91°0'42.2'' E Hazzi Jolli High School – Location: 24°02'31.7'' N 	<u>Particulates</u> Respirable Dust Sampler (Model-Envirotech India APM-460BL) and Fine Particulate Sampler (Model-Envirotech India AAS-127BL). <u>Nitrogen Dioxide</u> Gravimetric <u>Sulphur Dioxide</u> Gravimetric <u>Carbon Monoxide</u> Gravimetric	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB 	<ul style="list-style-type: none"> Bangladesh National Ambient Air Quality Standards – Environmental Conservation Rules – Schedule 2 (Amended in 2005) by S.R.O. No: 220-Law/2005. Refer to Annex G.

Mitigation No. Ref.	Environmental and Social Parameter	Aspect	Monitoring Activities	Duration and Frequency	Responsibility	Monitoring Locations	Methods	Reporting	Applicable Standards
						and 91°0'30.3'' E • APSCL Dormitory – Location: 24°02'58.5'' N and 91°01'23.9'' E.			
			Community Grievance Records	As received.	CNTIC	Not applicable	Visual observation	<ul style="list-style-type: none"> • CNTIC Monthly HSE Monitoring Report for APSCL and DOE. • APSCL Semi-Annual Environmental Report for ADB 	<ul style="list-style-type: none"> • ADB Safeguards Policy Statement: Environmental Safeguards, 2009.
2	Noise	Construction noise from machinery and vehicle movements	Implementation of mitigation measures and the assessment of performance indicators.	Daily	CNTIC	Noise generation activities onsite and offsite.	Visual observation	<ul style="list-style-type: none"> • CNTIC Monthly HSE Monitoring Report for APSCL and DOE. • APSCL Semi-Annual Environmental Report for ADB 	<ul style="list-style-type: none"> • Bangladesh Environmental Conservation Rules, 1997. • WBG General EHS Guidelines for Construction and Decommissioning, 2007.

Mitigation No. Ref.	Environmental and Social Parameter	Aspect	Monitoring Activities	Duration and Frequency	Responsibility	Monitoring Locations	Methods	Reporting	Applicable Standards
			Monitoring and supervision to ensure the implementation of the mitigation measures.	Weekly	APSCL	Noise generation activities onsite and offsite.	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB. 	<ul style="list-style-type: none"> Bangladesh Environmental Conservation Rules, 1997. WBG General EHS Guidelines for Construction and Decommissioning, 2007.
			Noise monitoring of LAeq, one 1-hour noise levels by third-party consultant.	Once per month for a 24 hour period.	CNTIC	<ul style="list-style-type: none"> South-West side of Project area near APSCL Admin building. Location: 24°02'38.5'' N and 91°1'0.0'' E The settlement, near south-east corner of the project – Location: 24°02'34.7'' N and 91°01'8.7'' E PDB High School – Location: 	Noise quality is being measured instantly on the site by CEM Sound level meter (Model DT8850. Continuous monitoring observed at each location.	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB. 	<ul style="list-style-type: none"> Bangladesh Standard for Sound – Environmental Conservation Rules – Schedule 4. Refer to Annex G. WBG General EHS Guidelines for Construction and Decommissioning, 2007.

Mitigation No. Ref.	Environmental and Social Parameter	Aspect	Monitoring Activities	Duration and Frequency	Responsibility	Monitoring Locations	Methods	Reporting	Applicable Standards
						24°02'30.5'' N and 91°0'42.2'' E • Hazzi Jolli High School – Location: 24°02'31.7'' N and 91°0'30.3'' E • APSCL Dormitory – Location: 24°02'58.5'' N and 91°01'23.9'' E.			
			Community Grievance Records	As received.	CNTIC	Not applicable	Visual observation	• CNTIC Monthly HSE Monitoring Report for APSCL and DOE. • APSCL Semi-Annual Environmental Report for ADB	• ADB Safeguards Policy Statement: Environmental Safeguards, 2009.
3	Terrestrial Biodiversity	Site Clearance - Vegetation removal and Habitat	Implementation of mitigation measures and the assessment	Daily	CNTIC	Construction Site	Visual observation	• CNTIC Monthly HSE Monitoring Report for APSCL and DOE.	• ADB Safeguard Policy Statement: Environmental

Mitigation No. Ref.	Environmental and Social Parameter	Aspect	Monitoring Activities	Duration and Frequency	Responsibility	Monitoring Locations	Methods	Reporting	Applicable Standards
		disturbance .	of performance indicators.					<ul style="list-style-type: none"> APSCL Semi-Annual Environmental Report for ADB 	Safeguards, 2009.
			Monitoring and supervision to ensure the implementation of the mitigation measures.	Weekly	APSCL	Construction Site	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB. 	<ul style="list-style-type: none"> ADB Safeguard Policy Statement: Environmental Safeguards, 2009.
4	Soils and Groundwater	Site clearance, excavation and disposal of material, exposure of potentially contaminated soils, spillage or leakage of substances on land, movement	Implementation of mitigation measures and the assessment of performance indicators.	Daily	CNTIC	Construction Site	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB 	<ul style="list-style-type: none"> WBG General EHS Guidelines for Construction and Decommissioning, 2007.
			Monitoring and supervision to ensure the implementation of the	Weekly	APSCL	Construction Site	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. 	<ul style="list-style-type: none"> WBG General EHS Guidelines for Construction and

Mitigation No. Ref.	Environmental and Social Parameter	Aspect	Monitoring Activities	Duration and Frequency	Responsibility	Monitoring Locations	Methods	Reporting	Applicable Standards
		of equipment and vehicles on site.	mitigation measures.					<ul style="list-style-type: none"> APSCL Semi-Annual Environmental Report for ADB. 	Decommissioning, 2007.
			Groundwater monitoring for Groundwater level, pH, TDS, Ammonia, Nitrate, Phosphate, Arsenic (As), Iron (Fe), Manganese (Mn) and Coliforms by third-party consultant.	Quarterly (every 3 months)	CNTIC	i. Inside the project area. Location: 24° 02'38.1''N and 91° 0'58.0''E ii. South-west side of Project area near PDB High School. Location: 24° 2'30.5"N and 91°00'42.2"E. iii. South-East side of the project. Location: 24° 02'34.1''N and 91° 1' 9.3''E iv. North-East side of the project area. Location: 24° 02' 47.2''N and 91° 1'12.3''E	pH – pH meter; TDS – TDS meter Ammonia – Photometric. Nitrate – Potentiometric. Phosphate – Photometric. As – Atomic Absorption Spectroscopy. Fe – Spectrophotometer. Mn – Atomic Absorption Spectroscopy.	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB. 	<ul style="list-style-type: none"> Bangladesh Standard for Drinking Water – Environmental Conservation Rules – Schedule 3. Refer to Annex G.

Mitigation No. Ref.	Environmental and Social Parameter	Aspect	Monitoring Activities	Duration and Frequency	Responsibility	Monitoring Locations	Methods	Reporting	Applicable Standards
							Coliforms – Membrane Filter Techniques.		
			Soil quality monitoring for Chromium (Cr), Cadmium (Cd), Lead (Pb) and Oil & Grease.	Annual	CNTIC	One location on the construction site.	Cr - Acid digestion and AAS; Cd - Acid digestion and AAS; Pb - Acid digestion and AAS; Oil & Grease - EPA 9071 B (Oil & Grease) in soil.	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB. 	
5, 6	Aquatic Environment and River Water Quality	Increased suspended sediment and pollutant loads, permanent loss and disturbance to aquatic flora and fauna due to constructio	Implementatio n of mitigation measures and the assessment of performance indicators.	Daily during dredging and in river works.	CNTIC	Dredging area and in river works.	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB 	<ul style="list-style-type: none"> WBG General EHS Guidelines for Construction and Decommission ing, 2007.
			Monitoring and supervision to ensure the implementatio	Weekly during dredging and in river works.	APSCL	Dredging area and in river works.	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. 	<ul style="list-style-type: none"> WBG General EHS Guidelines for Construction and

Mitigation No. Ref.	Environmental and Social Parameter	Aspect	Monitoring Activities	Duration and Frequency	Responsibility	Monitoring Locations	Methods	Reporting	Applicable Standards
		n of the intake structure and water discharge structure.	n of the mitigation measures.					<ul style="list-style-type: none"> APSCL Semi-Annual Environmental Report for ADB. 	Decommissioning, 2007.
			River water sampling during dredging and in river works for Temperature, pH, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand 5 (BOD5), Dissolved Oxygen (DO), oil & grease, Chromium (Cr), Cadmium (Cd) and Lead (Pb) by third-party consultant.	Weekly during dredging and in river works.	CNTIC	i. North-West side of Project area near the project location (Upstream) Location: 24°02'53.1'' N and 91°01' 3.1'' E ii. North-West side of Project area and near Ashuganj Chor Sonarampur (Downstream) Location: 24°02'44.0'' N and 91°00' 33.2'' E iii. North-East side of Project area near APSCL power plant area (outfall) Location: 24°02'40.3'' N and 91°01' 10.8'' E	Temperature – Mercury Filled Thermometer; pH – pH meter; COD – Open Reflux; BOD – 5-day BOD test; DO – DO meter. Oil & Grease – APHA – 5520. B Cr – Atomic Absorption Spectroscopy Cd- Atomic Absorption Spectroscopy Lead - Atomic Absorption Spectroscopy	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB 	<ul style="list-style-type: none"> Bangladesh Standard for Inland Surface Water – Environmental Conservation Rules – Schedule 3. Refer to Annex G.

Mitigation No. Ref.	Environmental and Social Parameter	Aspect	Monitoring Activities	Duration and Frequency	Responsibility	Monitoring Locations	Methods	Reporting	Applicable Standards
		Contamination of the aquatic environment as a result of construction activities on land e.g. spillages, disposal of liquid wastes; surface run-off, exposure of contaminated soils.	Implementation of mitigation measures and the assessment of performance indicators.	Daily	CNTIC	Construction Site	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB 	<ul style="list-style-type: none"> WBG General EHS Guidelines for Construction and Decommissioning, 2007.
			Monitoring and supervision to ensure the implementation of the mitigation measures.	Weekly	APSCL	Construction Site	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB. 	<ul style="list-style-type: none"> WBG General EHS Guidelines for Construction and Decommissioning, 2007.
			River water sampling for Temperature, pH, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand 5	Monthly	CNTIC	i. North-West side of Project area near the project location (Upstream) Location: 24°02'53.1'' N and 91°01'3.1'' E ii. North-West side of Project area and near Ashuganj Chor	Temperature – Mercury Filled Thermometer; pH – pH meter; COD – Open Reflux; BOD – 5-day BOD test; DO – DO meter. Oil & Grease – APHA – 5520. B	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB 	<ul style="list-style-type: none"> Bangladesh Standard for Inland Surface Water – Environmental Conservation Rules – Schedule 3. Refer to Annex G.

Mitigation No. Ref.	Environmental and Social Parameter	Aspect	Monitoring Activities	Duration and Frequency	Responsibility	Monitoring Locations	Methods	Reporting	Applicable Standards
			(BOD5), Dissolved Oxygen (DO), oil & grease, Chromium (Cr), Cadmium (Cd) and Lead (Pb) by third-party consultant.			Sonarampur (Downstream) Location: 24°02'44.0'' N and 91°00' 33.2'' E iii. North-East side of Project area near APSCL power plant area (outfall) Location: 24°02'40.3'' N and 91°01' 10.8'' E	Cr – Atomic Absorption Spectroscopy Cd- Atomic Absorption Spectroscopy Lead - Atomic Absorption Spectroscopy		
7	Waste Management	Generation, handling, treatment and disposal of solid and liquid hazardous and non-hazardous wastes.	Implementation of mitigation measures and the assessment of performance indicators.	Daily	CNTIC	Construction Site	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB 	<ul style="list-style-type: none"> WBG General EHS Guidelines for Construction and Decommissioning, 2007.
			Monitoring and supervision to ensure the implementation of the	Weekly	APSCL	Construction Site	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual 	<ul style="list-style-type: none"> WBG General EHS Guidelines for Construction and Decommissioning, 2007.

Mitigation No. Ref.	Environmental and Social Parameter	Aspect	Monitoring Activities	Duration and Frequency	Responsibility	Monitoring Locations	Methods	Reporting	Applicable Standards
			mitigation measures.					Environmental Report for ADB.	
8, 9, 10	Community Health and Safety	Construction Traffic; Health and safety impacts due to the influx of workers;	Implementation of mitigation measures and the assessment of performance indicators.	Daily	CNTIC	Construction Site and Offsite	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB 	<ul style="list-style-type: none"> WBG General EHS Guidelines for Construction and Decommissioning, 2007.
		Health and safety impacts due to unauthorized persons accessing the site.	Monitoring and supervision to ensure the implementation of the mitigation measures.	Weekly	APSCL	Construction Site and Offsite	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB. 	<ul style="list-style-type: none"> WBG General EHS Guidelines for Construction and Decommissioning, 2007.
11	Cultural Heritage and Archaeology	Chance finds of archaeological remains.	Implementation of mitigation measures and assessment of performance indicators if archaeological	During the period when archaeological remains are found.	CNTIC and APSCL	Location of archaeological remains.	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. 	<ul style="list-style-type: none"> WBG General EHS Guidelines for Construction and Decommissioning, 2007.

Mitigation No. Ref.	Environmental and Social Parameter	Aspect	Monitoring Activities	Duration and Frequency	Responsibility	Monitoring Locations	Methods	Reporting	Applicable Standards
			remains discovered.					<ul style="list-style-type: none"> APSCL Semi-Annual Environmental Report for ADB 	
12	Occupational Health and Safety	Workers Health and Safety	Implementation of mitigation measures and the assessment of performance indicators.	Daily	CNTIC	Construction Site	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB 	<ul style="list-style-type: none"> WBG General EHS Guidelines for Construction and Decommissioning, 2007.
			Monitoring and supervision to ensure the implementation of the mitigation measures.	Weekly	APSCL	Construction Site	Visual observation	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB. 	<ul style="list-style-type: none"> WBG General EHS Guidelines for Construction and Decommissioning, 2007.
			Drinking water sampling for pH, Ammonia, Nitrate, Phosphate, Arsenic (As),	Monthly	CNTIC	Drinking water stations of the Project	pH – pH Meter; Ammonia – Photometric; Nitrate – Potentiometric;	<ul style="list-style-type: none"> CNTIC Monthly HSE Monitoring Report for APSCL and DOE. 	<ul style="list-style-type: none"> Bangladesh Standard for Drinking Water – Environmental Conservation

Mitigation No. Ref.	Environmental and Social Parameter	Aspect	Monitoring Activities	Duration and Frequency	Responsibility	Monitoring Locations	Methods	Reporting	Applicable Standards
			Iron (Fe), Manganese (Mn) and Coliforms by third-party consultant.				Phosphate – Photometric; As - Atomic Absorption Spectroscopy; Fe – Spectrophotometer; Mn - Atomic Absorption Spectroscopy; Coliforms - Membrane Filter Technique.	<ul style="list-style-type: none"> APSCL Semi-Annual Environmental Report for ADB. 	Rules – Schedule 3. Refer to Annex G.
13	Plantation	Act as a noise buffer, carbon sink,	Visual inspection to observe the growth of saplings as per provided green belt design	Monthly	CNTIC	Project site	Visual monitoring	CNTIC Monthly HSE Monitoring Report for APSCL and DOE. APSCL Semi-Annual Environmental Report for ADB.	No standard.

4.2 Methodology

4.2.1 Methodology for Air Quality Assessment

During the operation phase of this power plant project, the important sources of emissions would include those from the operations of equipment and machinery, vehicles carrying materials to the site and taking debris out of the site and stack emission for electricity generation.

Particulate monitoring is usually accomplished with a **Respirable Dust sampler**, which is a vacuum type device that draws air with particulate matter through a filter paper. This sampling filter paper is dried up in the laboratory and the weight difference is the amount of SPM, PM₁₀ or PM_{2.5}, content measured in micrograms per cubic meter of air collected over a period of 24 hours. Sulfur dioxide (SO₂) and Oxide of Nitrogen (NO_x) sampling are conducted by using 20 ml absorbing reagent. Ambient Air Quality monitoring was done from five different places at Ashuganj 400 MW East Combined Cycle power plant project described in Table 4.1 and illustrated in Figure 4.1. Test Results of Ambient Air Quality from these different places are presented in Table 4.5.

Table 4.1: Measuring Points of Ambient Air Quality

SN	Location	Latitude	Longitude	Description of the Location
1.	Location 1	24°02'30.5"N	91°0'42.2" E	South-west side of Project area near PDB High School
2.	Location 2	24°02'31.7"N	91 °0'30.3" E	South-West side of Project area near Haji Abdul Jalil High School
3.	Location 3	24°02'58.5"N	91°01'23.9"E	North-East side of Project area near APSCL dormitory.
4.	Location 4	24°02'34.7"N	91°01'8.7"E	South-East side of Project area near APSCL power plant
5.	Location 5	24°02'31.1"N	91°0'3.8"E	South-West side of Project area near APSCL Admin building.

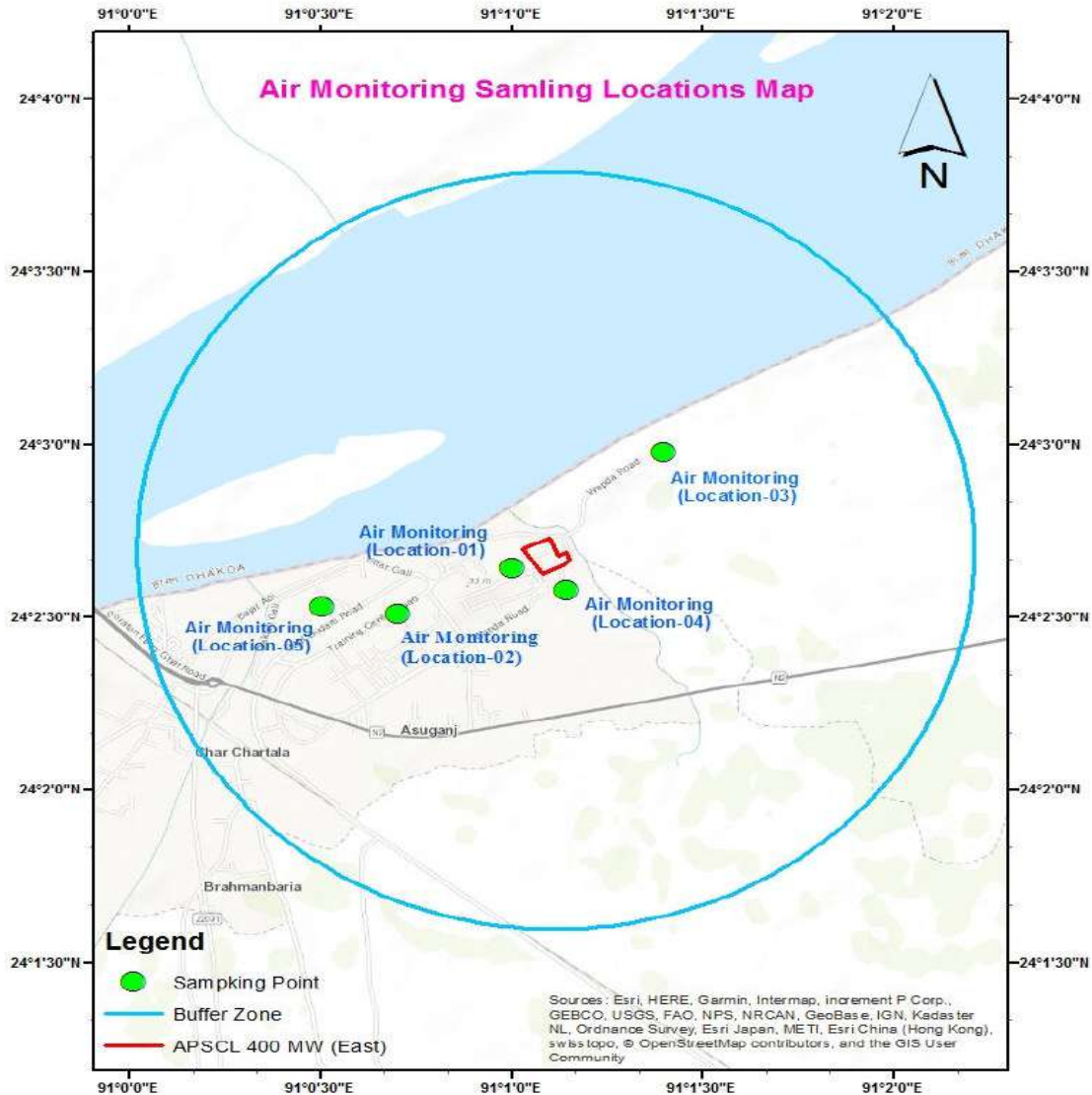


Figure 4.1: Sampling Points for Ambient Air Quality Measurement

4.2.2 Methodology for Ambient Noise Measurement

To assess the noise generated by different activities it is essential to identify the equipment to be used at various stages of the operation work. Therefore, an inventory of the probable equipment to be used and their reference noise generation data are of utmost importance. The noise level in the control room was tried to measure in the maximum silent condition. The noise was measured at different points of the project area at receptor levels; Table 4.2 and described in Figure 4.2; like a control room, turbine building, Water Treatment Area, Transformer area, GIS area and other outdoor places to determine the impact of noise generated from plant operational activities.

The noise measurement was carried out with CEM Digital Sound Level Meter (Model No: DT 8850). Five noise reading was taken for each point placing the noise meter 1 meter above from the ground and 1 meter away from the source. The measured noise level in the operational sites is summarized in table 4.6.

Table 4.2: Measurement Points of Ambient Noise

SN	Latitude	Longitude	Description of the Location
1.	24°02'30.5"N	91°0'42.2"E	South-west side of Project area near PDB High School
2.	24°02'31.7"N	91°0'30.3"E	South-West side of Project area near Haji Abdul Jalil High School
3.	24°02'58.5"N	91°01'23.9"E	North-East side of Project area near APSCL dormitory
4.	24°02'34.7"N	91°01'8.7"E	South-East side of Project area near APSCL power plant
5.	24°02'31.1"N	91°0'3.8"E	South-West side of Project area near APSCL Admin building.

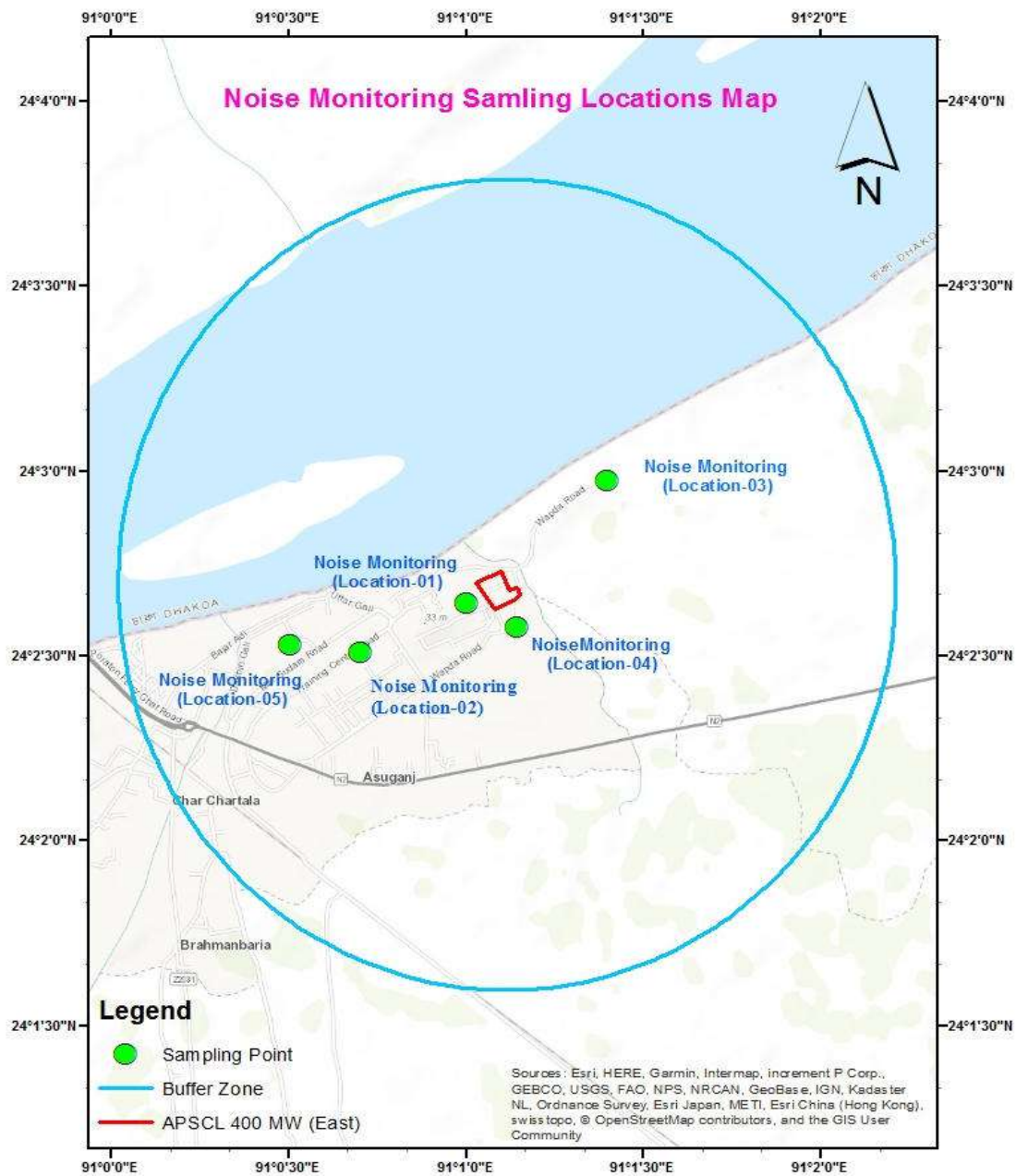


Figure 4.2: Noise Measuring Points in Project Area

4.2.3 Methodology for Water Quality Measurement

The drinking water, groundwater and a river water sample was collected from the tube well & supplied water, Tube Well & Pump and Meghna River (Table 4.3 & Figure 4.3, 4.4 and 4.5) respectively. After sampling, temperature, P^H , Total Dissolved solid and Dissolved Oxygen

was measured on the field and transferred immediately to Environmental Lab for further analytical experiment maintaining sampling protocol. The following Table 4.4, show here the parameters tested along with their method for drinking water, surface water and groundwater respectively. The tested results are presented in Table 4.7, 4.8 and 4.9 separately for drinking water, river and groundwater.

Table 4.3: Measuring points of Drinking water, Groundwater and River water

Location	Latitude	Longitude	Description of the Location
Drinking water			
Location-1 (D1)	24°02' 43.22'' N	91°1' 3.52'' E	Inside the project area
Location-2 (D2)	24° 2'38.61"N	91° 1'4.99"E	South-West side of the project at PDB High School
Location-3 (D3)	24°02' 34.1'' N	91°1' 9.3'' E	South-East side of the project at Local Settlement
Location-4 (D4)	24°02' 57.9'' N	91°1' 24.3'' E	North-East side of Project area near APSCL dormitory.
Groundwater			
Location 1: G1	24°02'38.1''N	91°0'58.0''E	Inside the project area
Location 2: G2	24° 2'30.5"N	91°00'42.2"E	South-west side of Project area near PDB High School
Location 3: G3	24°02'34.1''N	91°1' 9.3''E	South-East side of the project
Location 4: G4	24°02' 47.2''N	91°1'12.3''E	North-East side of the project area
River water			
Upstream	24°02'53.1'' N	91°01' 3.1'' E	North-West side of Project area near the project location
Downstream	24°02'44.0'' N	91°00' 33.2'' E	North-West side of Project area and near Ashuganj Chor Sonarampur
Outfall	24°02'40.3'' N	91°01' 10.8'' E	North-East side of Project area near APSCL power plant area

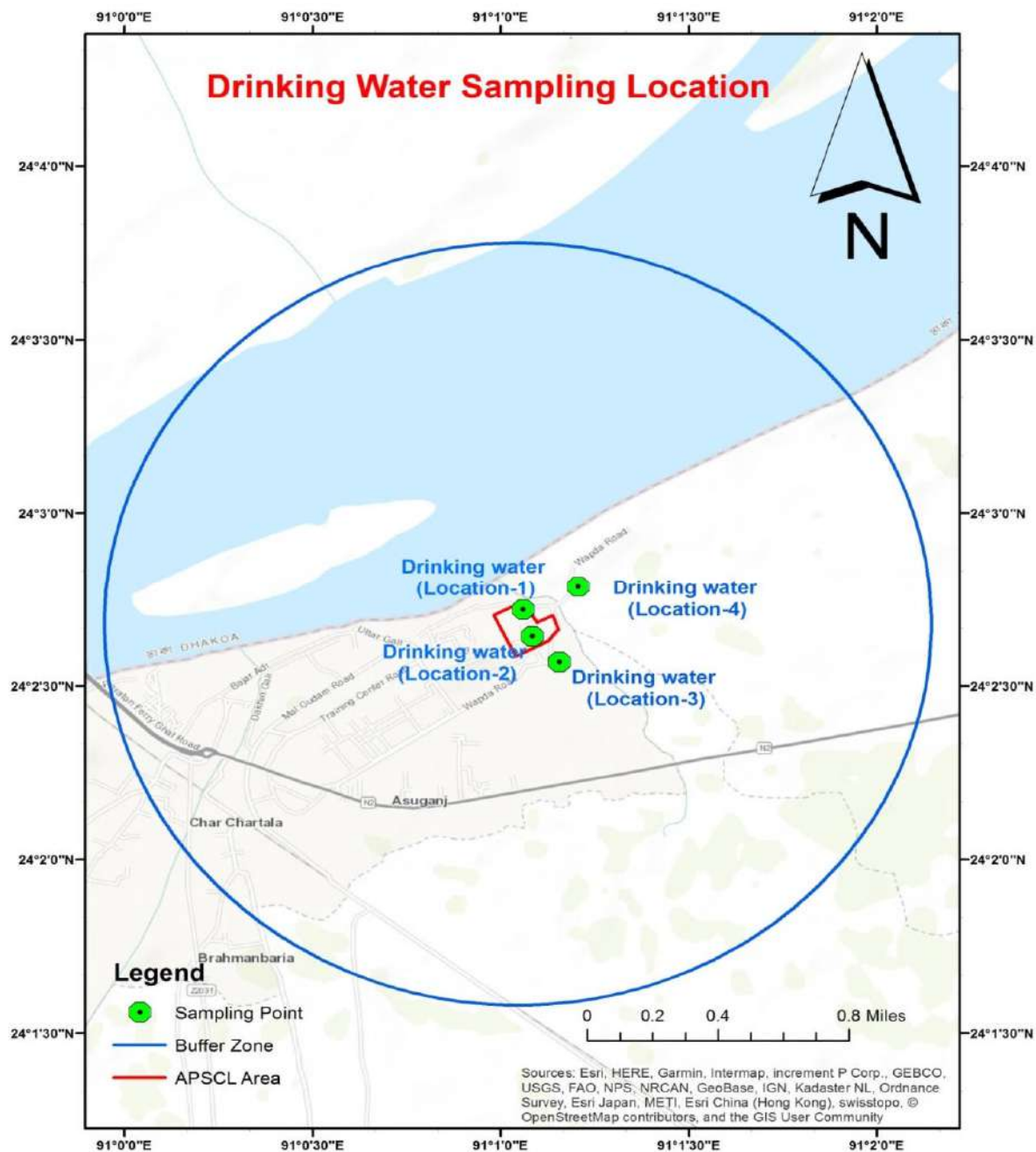


Figure 4.3: Drinking water Measuring Points in Project Area

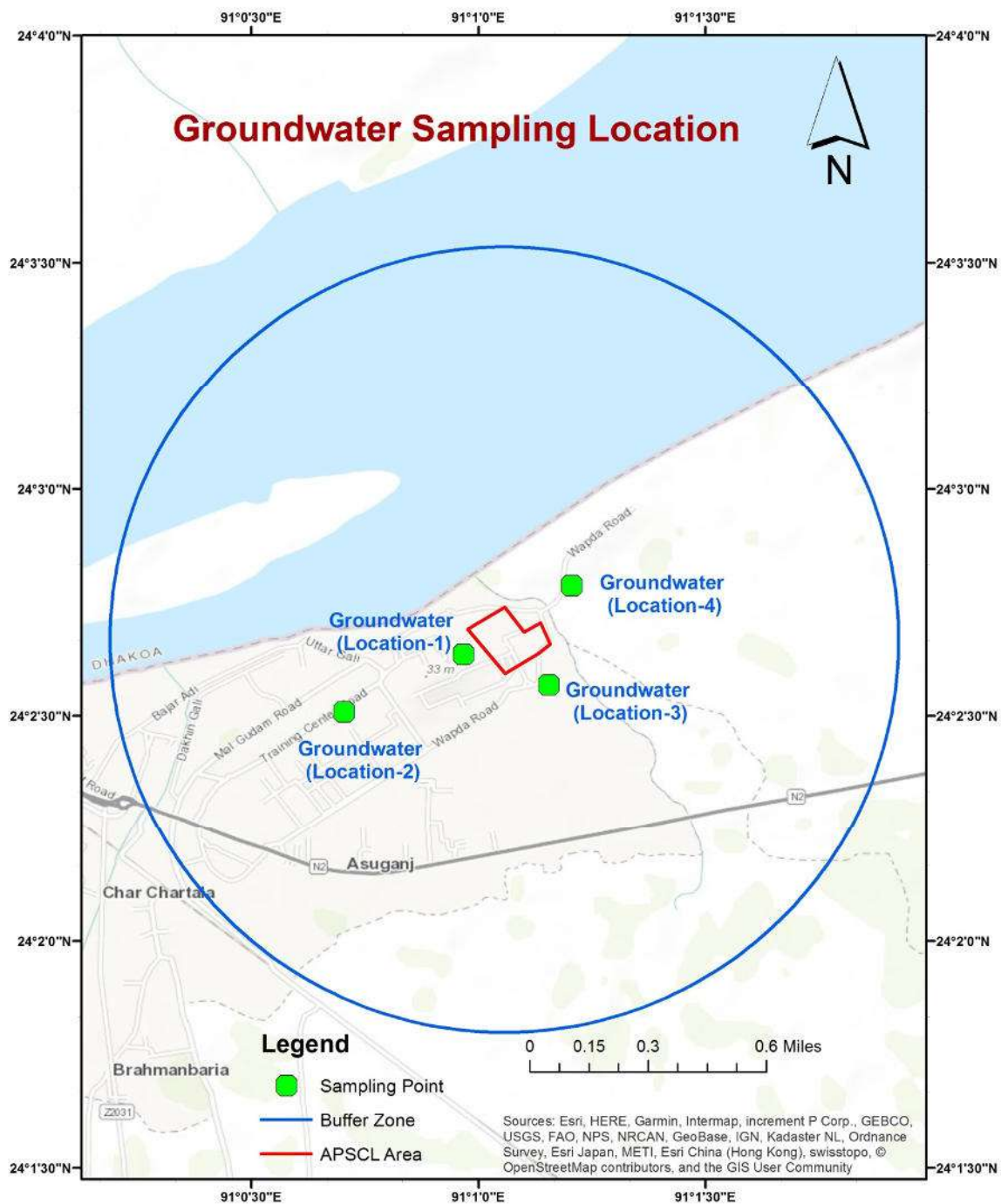


Figure 4.4: Groundwater Measuring Points in Project Area

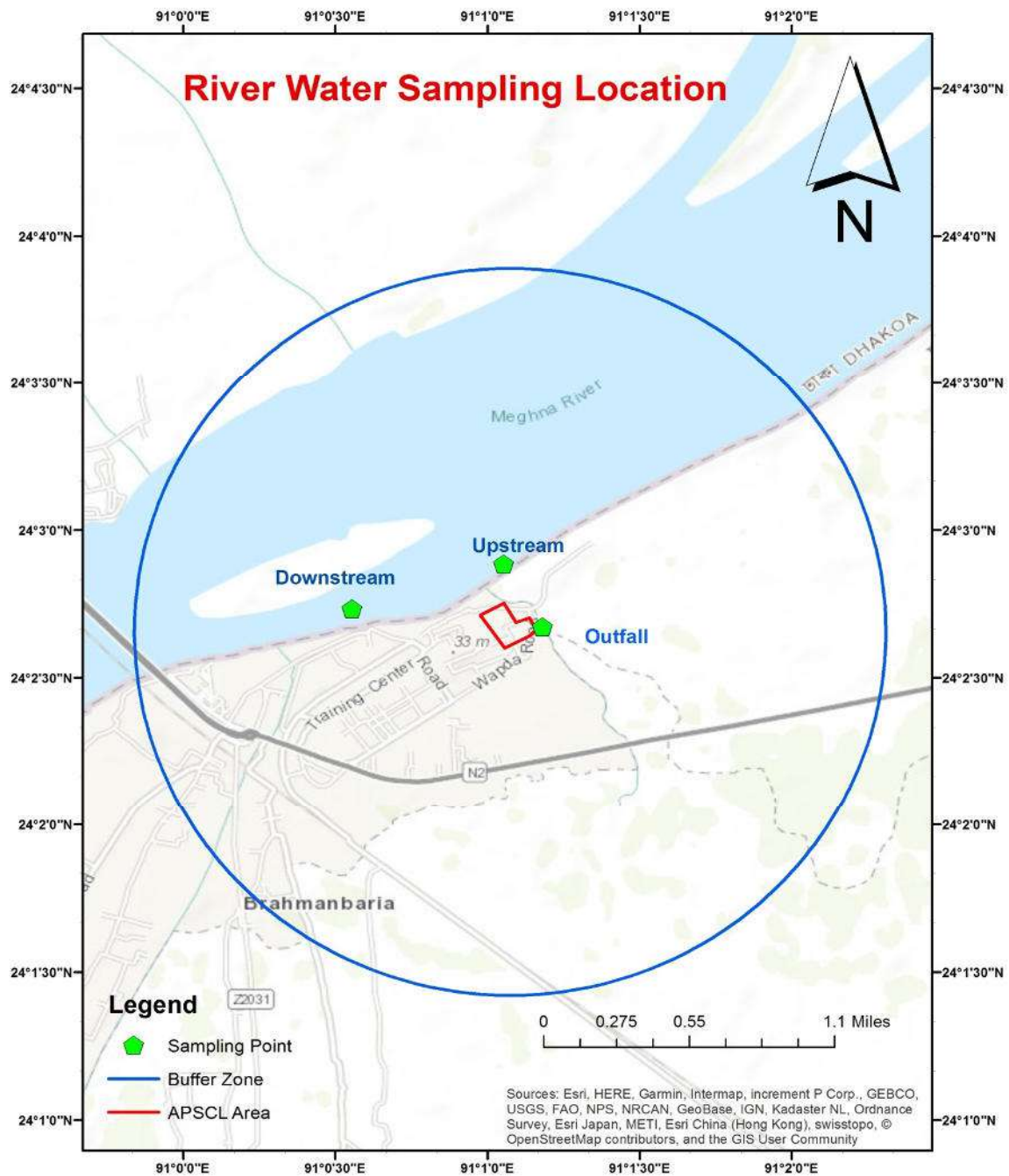


Figure 4.5: River water Measuring Points in Project Area

4.3 Semiannually Assessment of Construction Impact on Air, Water, Noise, Construction Waste and Labor Camp Management

4.3.1 Impact on Air Quality

During the construction phase of the proposed power plant project, the important sources of emissions would include those from the operations of construction equipment and machinery, vehicles carrying construction materials to the site and taking construction debris out of the site. If construction equipment, such as stone (aggregate) crusher is used at the site, this may result in significant emission of particulate matter during its operation. But to control it, the batching plant is situated in an isolated place outside of project area which has no impacts on the project and also its adjacent places.

Since the construction of the proposed power plant project would most likely involve significant earthworks, increase in particulate matter in the air from wind-blown dust is also a concern, to the project site. Ambient Air Quality was monitoring from four different places at Ashuganj 400 MW (East) Combined Cycle power plant project such as Northside and south side of the plant. Test Results of Ambient Air Quality from these different places are presented in Table 4.5.

The result for ambient air quality monitoring shows the SPM, PM₁₀, PM_{2.5}, concentrations of the ambient air. From the analysis it is observed that the concentration of SPM, PM₁₀, and PM_{2.5} is within the allowable limit, as in the proposed project area the different constructions activities, highway traffic movements were being done. So, the SPM and PM₁₀ are found higher level during movement of the vehicle but after spraying of water the dust level is reduced remarkably low. Having construction activities many diesel vehicles were moving around and three to four cranes were also under operation, so it can be thought that the NO_x level would be higher level. PM_{2.5} is composed of a mixture of primary and secondary particles, Primary particles are emitted directly into the atmosphere and include soil-related particles and carbon particles from fossil fuel combustion, and secondary particles are sulphate, nitrate, organic and elemental carbon, trace elements and ammonium. The under constructed project is at Ashuganj in Brahmanbaria district which is an unplanned urban and planned industrial area, so the cumulative air pollution is high in this area during the construction period.

4.3.2 Impact on Noise

During construction stage, major source of noise is expected to stem from transport vehicles which include barges and trucks. Also, noise is expected to be produced from plant construction activities. The construction phase may be broadly classified into two different groups:

- General Site and Plant Construction,
- Water and Effluent Treatment Plant construction, and
- Access Road Construction.

To assess the noise generated by different activities it is essential to identify the equipment

to be used at various stages of construction work. Therefore, an inventory of the probable equipment to be used and their reference noise generation data are of utmost importance. The measured noise level in the construction site is summarized in table 4.6.

4.3.3 Impact on Water Quality

The drinking, surface and groundwater sample were collected from the supplied water, Meghna River and groundwater. The Meghna River passes through from East to West direction near the project area and there are few industries at the right bank of this river. So the water of this river is less polluted that was also found from environmental monitoring. The DO level of this water is more than 6.5 mg/L which is within DoE standard level. The BOD₅ is also in a lower level than DoE standards.

Table 4.4: Monitoring parameters and Methods of Monitoring

Issue	Parameter Tested	Test Method
Ambient Air	PM _{2.5} , PM ₁₀ , SPM, SO ₂ , NO _x , CO	Gravimetric
Ambient Noise	Noise Level Assessment	Leq Value in dB (A)
Drinking & Ground Water	p ^H	p ^H Meter
	Ammonia	Photometric
	Nitrate	Potentiometry
	Phosphate	Photometric
	As	Atomic Absorption Spectroscopy
	Fe	Spectrophotometer
	Mn	Atomic Absorption Spectroscopy
	Coliforms	Membrane Filter Technique
River Water	Water temp.	Mercury filled thermometer
	DO	DO meter
	BOD ₅	5-day BOD test
	COD	Open Reflux
	Oil and Grease	APHA 5520.B
	Cr	Atomic Absorption Spectroscopy
	Cd	Atomic Absorption Spectroscopy
	Pb	Atomic Absorption Spectroscopy

The Meghna River passes through from East to West direction near the project area and there are few industries at the right bank of this river. So the water of this river is less polluted that was also found from environmental monitoring. The DO level of this water is more than 6.5 mg/L which is within DoE standard level. The BOD₅ is also in a lower level than DoE standards.

Table: 4.5 Test Result of Ambient Air Quality

JULY 2018								
<div>Comments</div> <p>In the month of July 2018, no HSE monitoring ensued for this project. EPC contractor engaged the 3rd party in the very beginning of August 2018. In July 2018, the demolition schedule and draft demolition plan were prepared by the EPC contractor.</p>								
PARTICULATE MATERIAL	LIMITS		AUGUST 2018					
PARAMETER	DoE (Bangladesh) Standard *	IFC/World Bank Standard	L1	L2	L3	L4	AVERAGE AUGUST	
PM 2.5	65 µg/m³	75 µg/m3	38	35	18	25	29	
PM 10	150 µg/m³	150 µg/m3	103	66	46	52	66.75	
SPM	200 µg/m³	NF	213	164	131	148	164	
<div>Comments</div> <p>From the result, it is observed that the concentrations of all these parameters are within the allowable limit except SPM at location # 1. SPM values increase at location # 1 because the wind was blowing from north-west to south-east direction and monitoring location was near the roadside. So, the transport running through the road was contributing some SPM.</p>								
PARTICULATE MATERIAL	LIMITS		SEPTEMBER 2018					
PARAMETER	DoE (Bangladesh) Standard *	IFC/World Bank Standard	L1	L2	L3	L4	AVERAGE SEPTEMBER	
PM 2.5	65 µg/m³	75 µg/m3	33	29	15	32	27.25	
PM 10	150 µg/m³	150 µg/m3	109	77	43	88	79.25	
SPM	200 µg/m³	NF	156	140	123	179	149.5	
<div>Comments</div> <p>From the analysis, it is observed that the concentrations of all these parameters are within the allowable limit according to DoE and IFC/ World Bank Standard.</p>								
PARTICULATE MATERIAL	LIMITS		OCTOBER 2018					
PARAMETER	DoE (Bangladesh) Standard *	IFC/World Bank Standard	L1	L2	L3	L4	L5	AVERAGE OCTOBER
PM 2.5	65 µg/m³	75 µg/m3	21.1	18.7	17.1	14.8	15.1	17.36
PM 10	150 µg/m³	150 µg/m3	63.4	76.2	69.3	54.3	58.6	64.36
SPM	200 µg/m³	NF	83.7	130.5	100.9	74.7	88.9	95.74
SO ₂	365 µg/m³	125 µg/m³	9.2	11.5	10.3	8.7	10.5	10.04
NO _x	NF	200 µg/m³	10.7	13.5	12.9	9.6	11.8	11.7
CO	9 ppm	NF	0	0	0	0	0	0

Comments								
From the result, it is observed that the concentrations of all these parameters are within the allowable limit according to DoE and IFC/ World Bank Standard.								
PARTICULATE MATERIAL	LIMITS		NOVEMBER 2018					
PARAMETER	DoE (Bangladesh) Standard *	IFC/World Bank Standard	L1	L2	L3	L4	L5	AVERAGE NOVEMBER
PM 2.5	65 µg/m ³	75 µg/m ³	30.9	26.0	29.5	25.3	30.6	28.46
PM 10	150 µg/m ³	150 µg/m ³	120.9	102.4	108.8	101.9	103.6	107.52
SPM	200 µg/m ³	NF	167	130.4	153.8	125.9	147.3	144.88
SO ₂	365 µg/m ³	125 µg/m ³	13.0	8.8	10.3	9.3	10.6	10.4
NO _x	NF	200 µg/m ³	14.1	11.4	12.9	10.7	11.7	12.16
CO	9 ppm	NF	0	0	0	0	0	0
Comments								
From the result, it is observed that the concentrations of all these parameters are within the allowable limit of DoE, Bangladesh & IFC Standard.								
PARTICULATE MATERIAL	LIMITS		DECEMBER 2018					
PARAMETER	DoE (Bangladesh) Standard *	IFC/World Bank Standard	L1	L2	L3	L4	L5	AVERAGE DECEMBER
PM 2.5	65 µg/m ³	75 µg/m ³	31.2	21.4	31.6	21.9	34.8	28.18
PM 10	150 µg/m ³	150 µg/m ³	136.5	127.2	139.6	70.3	122.7	119.26
SPM	200 µg/m ³	NF	173.1	161.7	189.5	101.6	173.1	159.8
SO ₂	365 µg/m ³	125 µg/m ³	13.0	10.4	12.0	7.6	11.1	10.82
NO _x	NF	200 µg/m ³	14.4	11.6	13.4	8.3	13.8	12.3
CO	9 ppm	NF	0	0	0	0	0	0
Comments								
From the analysis, it is observed that the concentrations of all these parameters are within the allowable limit of DoE, Bangladesh & IFC Standard.								

Table: 4.6 Test Result of Noise Quality

JULY 2018							
Comments							
In the month of July 2018, no HS&E monitoring ensued for this project. EPC contractor engaged the 3 rd party in the very beginning of August 2018. In July 2018, the demolition schedule and draft demolition plan were prepared by the EPC contractor.							
NOISE	LIMITS		AUGUST 2018				
(LAeq) dBA	DoE (Bangladesh) Standard *	IFC/World Bank Standard	L1	L2	L3	L4	AVERAGE AUGUST

DAY	75	70	65.3	69.5	66.5	67.9	67.3	
NIGHT	70	70	62.4	65.4	61.45	65.1	63.59	
<u>Comments</u>								
From these studies, it was found that the ambient noise qualities of the Project area were found within the limit of DoE, Bangladesh & IFC Standard.								
NOISE	LIMITS		SEPTEMBER 2018					
(LAeq) dBA	DoE (Bangladesh) Standard *	IFC/World Bank Standard	L1	L2	L3	L4	L5	AVERAGE SEPTEMBER
DAY	75	70	65.3	69.5	66.5	67.9	65.8	67
NIGHT	70	70	62.4	65.4	61.5	65.1	63.6	63.6
<u>Comments</u>								
From these studies, it was found that the ambient noise qualities of the Project area were found within the allowable limit of DoE, Bangladesh & IFC Standard.								
NOISE	LIMITS		OCTOBER 2018					
(LAeq) dBA	DoE (Bangladesh) Standard *	IFC/World Bank Standard	L1	L2	L3	L4	L5	AVERAGE OCTOBER
DAY	75	70	65.3	69.5	66.5	67.9	65.8	67
NIGHT	70	70	62.4	65.4	61.5	65.1	63.6	63.6
<u>Comments</u>								
From these studies, it was found that the ambient noise qualities of the Project area were found within the allowable limit of DoE, Bangladesh & IFC Standard.								
NOISE	LIMITS		NOVEMBER 2018					
(LAeq) dBA	DoE (Bangladesh) Standard *	IFC/World Bank Standard	L1	L2	L3	L4		AVERAGE NOVEMBER
DAY	75	70	68.3	69.7	61.6	67.9	67.9	67.08
NIGHT	70	70	64.4	65.9	53.3	66.8	64.3	62.94
<u>Comments</u>								
From these studies, it was found that the ambient noise qualities of the Project area were found within the allowable limit of DoE, Bangladesh & IFC Standard.								
NOISE	LIMITS		DECEMBER 2018					
(LAeq) dBA	DoE (Bangladesh) Standard *	IFC/World Bank Standard	L1	L2	L3	L4	L5	AVERAGE DECEMBER
DAY	75	70	67.1	64.2	64.4	65.9	67.9	65.9
NIGHT	70	70	63.2	59.9	57.3	62.8	64.3	61.5
<u>Comments</u>								
From these studies, it was found that the ambient noise qualities of the Project area were found within the allowable limit of DoE, Bangladesh & IFC Standard.								

Table: 4.7 Drinking Water Quality

DRINKING WATER	LIMITS		AUGUST 2018
PARAMETER	DoE (Bangladesh) Standard *	IFC/World Bank Standard	D1
pH	6.5 -8.5	6.5 -8.5	6.41
Ammonia	0.5 mg/l	---	0.1
Nitrate	10 mg/l	50 mg/l	<1
Phosphate	6 mg/l	---	0.08
As	0.05 mg/l	0.01 mg/l	0.07
Fe	0.3 -1 mg/l	0.3 mg/l	0.48
Mn	0.1 mg/l	0.5 mg/l	<0.1
Total Coliform	0/100 ml	0/100 ml	4
Faecal Coliform	0/100 ml	0/100 ml	0
Comments From the analysis, all parameters of drinking water were found within the acceptable limit, except total coliform which is according to the Department of Environment (DoE) and WHO drinking water quality standard. Total coliforms include bacteria that are found in the water that has been influenced by surface water, and in human or animal waste. There are different kinds of defects which can allow the Total Coliforms contaminations that are described below: A missing or defective good cap - seals around wires, pipes, and where the cap meets the casing may be cracked, letting in contaminants.			
DRINKING WATER	LIMITS		SEPTEMBER 2018
PARAMETER	DoE (Bangladesh) Standard *	IFC/World Bank Standard	D1
pH	6.5 -8.5	6.5 -8.5	6.43
Ammonia	0.5 mg/l	---	0.07
Nitrate	10 mg/l	50 mg/l	<1
Phosphate	6 mg/l	---	0.1
As	0.05 mg/l	0.01 mg/l	0.04
Fe	0.3 -1 mg/l	0.3 mg/l	0.54
Mn	0.1 mg/l	0.5 mg/l	<0.1
Total Coliform	0/100 ml	0/100 ml	0
Faecal Coliform	0/100 ml	0/100 ml	0
Comments From the analysis of all parameters of drinking water were found within acceptable except Arsenic which is below the Bangladesh standard and but above the WHO drinking water quality standard.			

DRINKING WATER	LIMITS		OCTOBER 2018				
PARAMETER	DoE (Bangladesh) Standard *	IFC/World Bank Standard	D1	D2	D3	D4	AVERAGE OCTOBER
pH	6.5 -8.5	6.5 -8.5	7.01	7.52	6.59	6.96	7.02
Ammonia	0.5 mg/l	---	<0.01	<0.01	0.08	0.06	
Nitrate	10 mg/l	50 mg/l	2	<1	<1	5.5	
Phosphate	6 mg/l	---	<0.07	<0.07	<0.07	0.25	
As	0.05 mg/l	0.01 mg/l	<0.003	<0.003	<0.003	0.04	
Fe	0.3 -1 mg/l	0.3 mg/l	1.26	1.46	1.93	5.75	2.6
Mn	0.1 mg/l	0.5 mg/l	<0.1	<0.1	0.2	0.2	
Total Coliform	0/100 ml	0/100 ml	0	2	0	0	0
Faecal Coliform	0/100 ml	0/100 ml	0	0	0	0	0

Comments

From the analysis of all parameters of drinking water were found within the standard limit of DoE, Bangladesh & WHO except:

The concentration of Fe at all points exceeds the limit to some extent.

The concentration of Mn at two points (South-East & North-East side of the project) exceed the limit to some extent.

The concentration of Total Coliform is within the limit at 3 points and the samples inside the project area exceed the limit to some extent.

The occurrence of high concentration of iron (Fe) in groundwater is very common particularly in areas of tropical climate. In groundwater, Fe generally occurs in the oxidation state - reduced soluble divalent ferrous iron (Fe²⁺). When groundwater comes in contact with the oxygen of the atmosphere, the Fe is oxidized to the ferric state and is precipitated as Fe-mineral. The subsurface reducing conditions have a significant influence on the high Fe content of groundwater.

Manganese (Mn) is a metal that occurs naturally in soils, rocks and minerals. In the aquifer, groundwater comes in contact with these solid materials dissolving them, releasing their constituents to the water.

DRINKING WATER	LIMITS		NOVEMBER 2018				
PARAMETER	DoE (Bangladesh) Standard *	IFC/World Bank Standard	D1	D2	D3	D4	AVERAGE NOVEMBER
pH	6.5 -8.5	6.5 -8.5	7.01	7.52	6.59	6.96	7.02
Ammonia	0.5 mg/l	---	<0.01	<0.01	0.02	0.05	
Nitrate	10 mg/l	50 mg/l	<1	<1	2.3	3.5	
Phosphate	6 mg/l	---	<0.07	0.08	0.08	0.1	
As	0.05 mg/l	0.01 mg/l	0.003	0.004	0.004	0.008	0.005
Fe	0.3 -1 mg/l	0.3 mg/l	0.48	0.86	1.11	2.61	1.27
Mn	0.1 mg/l	0.5 mg/l	<0.1	<0.1	<0.1	<0.1	<0.1
Total Coliform	0/100 ml	0/100 ml	0	8	4	2	3.5
Faecal Coliform	0/100 ml	0/100 ml	0	0	0	0	0

Comments

From the analysis most of the parameters of drinking water were found within the standard limit of DoE, Bangladesh [References -9&8] & WHO except:

The concentration of Fe at two points (South-East & North-East side of the project) exceed the limit to some extent.

The concentration of Total Coliform is within the limit at 1 point and the samples except inside the project area exceed the limit to some extent.

The occurrence of high concentration of iron (Fe) in groundwater is very common particularly in areas of tropical climate. In groundwater, Fe generally occurs in the oxidation state - reduced soluble divalent ferrous iron (Fe²⁺). When groundwater comes in contact with the oxygen of the atmosphere, the Fe is oxidized to the ferric state and is precipitated as Fe-mineral. The subsurface reducing conditions have a significant influence on the high Fe content of groundwater.

Total coliforms include bacteria that are found in the water that has been influenced by surface water, and in human or animal waste. The presence of these bacteria indicates that drinking water is contaminated with faeces or sewage, and it has the potential to cause disease.

In addition, there are different kinds of defects which can allow the Total Coliforms contaminations that are described below:

A missing or defective well cap - seals around wires, pipes, and where the cap meets the casing may be cracked, letting in contaminants.

Contaminant seepage through the well casing - cracks or holes in the well casing allow water that has not been filtered through the soil to enter the well. This seepage is common in the wells made of concrete, clay tile, or brick.

DRINKING WATER	LIMITS		DECEMBER 2018				
PARAMETER	DoE (Bangladesh) Standard *	IFC/World Bank Standard	D1	D2	D3	D4	AVERAGE DECEMBER
pH	6.5 -8.5	6.5 -8.5	6.92	7.48	6.52	6.74	6.91
Ammonia	0.5 mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrate	10 mg/l	50 mg/l	<1	<1	8.8	3	3
Phosphate	6 mg/l	---	<0.07	0.08	<0.07	0.08	0.08
As	0.05 mg/l	0.01 mg/l	<0.003	<0.003	<0.003	<0.003	<0.003
Fe	0.3 -1 mg/l	0.3 mg/l	0.15	0.13	5.55	2.78	2.15
Mn	0.1 mg/l	0.5 mg/l	<0.1	<0.1	<0.1	<0.1	<0.1
Total Coliform	0/100 ml	0/100 ml	0	0	0	0	0
Faecal Coliform	0/100 ml	0/100 ml	0	0	0	0	0

Comments

From the analysis, most of the parameters of drinking water were found within the standard limit of DoE, Bangladesh & WHO except:

The concentration of Fe at two points (South-East & North-East side of the project) exceed the limit to some extent.

The occurrence of high concentration of iron (Fe) in groundwater is very common particularly in areas of tropical climate. In groundwater, Fe generally occurs in the oxidation state - reduced soluble divalent ferrous iron (Fe²⁺). When groundwater comes in contact with the oxygen of the atmosphere, the Fe is oxidized to the ferric state and is precipitated as Fe-mineral. The subsurface reducing conditions have a significant influence on the high Fe content of groundwater.

Table: 4.8 River Water Quality

RIVER WATER	LIMITS		AUGUST 2018		
PARAMETER	DoE (Bangladesh) Standard *	IFC/World Bank Standard	Upstream	Downstream	AVERAGE AUGUST
Temperature	40°C	---	29.5	29.7	29.6
Dissolved Oxygen (DO)	4.5 -8 mg/l	---	7.1	6.2	6.65
BOD5	50 mg/l	50 mg/l	1.2	0.8	1
COD	200 mg/l	250 mg/l	3.3	2.5	2.9
Oil & Grease	10 mg/l	10 mg/l	<5	<5	<5
Chromium (Total)	0.5 mg/l	0.5 mg/l	<0.02	<0.02	<0.02
Cadmium	0.5 mg/l	0.1 mg/l	<0.002	<0.002	<0.002
Lead (Pb)	0.1 mg/l	0.1 mg/l	<0.05	<0.05	<0.05
<h3 style="text-align: center;"><u>Comments</u></h3> <p>From the analysis, it has been observed that all parameters were found within the acceptable limit. These indicate that the project is not posing any detrimental effect to the surrounding environment by surface water pollution.</p>					
RIVER WATER	LIMITS		SEPTEMBER 2018		
PARAMETER	DoE (Bangladesh) Standard *	IFC/World Bank Standard	Upstream	Downstream	AVERAGE SEPTEMBER
Temperature	40°C	---	28.1	28.2	28.15
Dissolved Oxygen (DO)	4.5 -8 mg/l	---	7.5	7.1	7.3
BOD5	50 mg/l	50 mg/l	0.9	0.3	0.6
COD	200 mg/l	250 mg/l	1.8	1.0	1.4
Oil & Grease	10 mg/l	10 mg/l	<1.0	<1.0	<1.0
Chromium (Total)	0.5 mg/l	0.5 mg/l	<0.02	<0.02	<0.02
Cadmium	0.5 mg/l	0.1 mg/l	<0.002	<0.002	<0.002
Lead (Pb)	0.1 mg/l	0.1 mg/l	<0.05	<0.05	<0.05

<p align="center"><u>Comments</u></p> <p>From the analysis, it has been observed that all parameters were found within the acceptable limit DoE and IFC. These indicate that the project is not posing any detrimental effect to the surrounding environment by surface water pollution.</p>						
RIVER WATER	LIMITS		OCTOBER 2018			
PARAMETER	DoE (Bangladesh) Standard *	IFC/W orld Bank Standar	Upstream	Downstream	Outfall	AVERAGE OCTOBER
Temperature	40°C	---	27.5	27.8	32.2	29.16
Dissolved Oxygen (DO) (DO)	4.5 -8 mg/l	---	5.7	6.2	3.4	5.1
BOD5	50 mg/l	50 mg/l	0.4	0.2	<0.2	0.3
COD	200 mg/l	250 mg/l	1.2	1.8	1.5	1.5
Oil & Grease	10 mg/l	10 mg/l	<2.0	<2.0	<2.0	<2.0
Chromium (Total)	0.5 mg/l	0.5 mg/l	<0.02	<0.02	<0.02	<0.02
Cadmium	0.5 mg/l	0.1 mg/l	<0.002	<0.002	<0.002	<0.002
Lead (Pb)	0.1 mg/l	0.1 mg/l	<0.05	<0.05	<0.05	<0.05
<p align="center"><u>Comments</u></p> <p>From the analysis, it has been observed that all parameters were found within the acceptable limit DoE and IFC. These indicate that the project is not posing any detrimental effect to the surrounding environment by surface water pollution.</p>						
RIVER WATER	LIMITS		NOVEMBER 2018			
PARAMETER	DoE (Bangladesh) Standard *	IFC/World Bank Standard	Upstream	Downstream	Outfall	AVERAGE NOVEMBER
Temperature	40°C	---	27.3	29.1	30.6	29
Dissolved Oxygen (DO)	4.5 -8 mg/l	---	6.7	6.2	5.4	6.1
BOD5	50 mg/l	50 mg/l	1.0	0.8	0.4	0.74
COD	200 mg/l	250 mg/l	3.2	2.5	2.1	2.6
Oil & Grease	10 mg/l	10 mg/l	<2.0	<2.0	<2.0	<2.0
Chromium (Total)	0.5 mg/l	0.5 mg/l	<0.02	<0.02	<0.02	<0.02
Cadmium	0.5 mg/l	0.1 mg/l	<0.002	<0.002	<0.002	<0.002
Lead (Pb)	0.1 mg/l	0.1 mg/l	<0.05	<0.05	<0.05	<0.05
<p align="center"><u>Comments</u></p> <p>From the analysis, it has been observed that all parameters were found within the acceptable limit DoE and IFC. These indicate that the project is not posing any detrimental effect to the surrounding environment by surface water pollution.</p>						

RIVER WATER	LIMITS		DECEMBER 2018			
PARAMETER	DoE (Bangladesh) Standard *	IFC/World Bank Standard	Upstream	Downstream	Outfall	AVERAGE DECEMBER
Temperature	40°C	---	27.4	28.9	30.4	28.9
Dissolved Oxygen (DO)	4.5 -8 mg/l	---	6.4	6.1	5.2	5.9
BOD5	50 mg/l	50 mg/l	0.6	1.08	0.2	0.62
COD	200 mg/l	250 mg/l	2.3	3	1.5	2.27
Oil & Grease	10 mg/l	10 mg/l	<2.0	<2.0	<2.0	<2.0
Chromium (Total)	0.5 mg/l	0.5 mg/l	<0.02	<0.02	<0.02	<0.02
Cadmium	0.5 mg/l	0.1 mg/l	<0.002	<0.002	<0.002	<0.002
Lead (Pb)	0.1 mg/l	0.1 mg/l	<0.05	<0.05	<0.05	<0.05
Comments From the analysis, it has been observed that all parameters were found within the acceptable limit DoE and IFC. These indicate that the project is not posing any detrimental effect to the surrounding environment by surface water pollution.						

Table: 4.9 Ground Water Quality

GROUND WATER	LIMITS		OCTOBER 2018				
PARAMETER	DoE (Bangladesh) Standard *	IFC/World Bank Standard	G1	G2	G3	G4	AVERAGE OCTOBER
pH	6.5 -8.5	6.5 -8.5	6.18	6.45	6.59	6.96	6.54
TDS	1000 mg/l	1200 mg/l	236	316	252	229	258.25
Ammonia	0.5 mg/l	---	0.07	0.07	0.08	0.06	0.07
Nitrate	10 mg/l	50 mg/l	<1	<1	<1	5.5	
Phosphate	6 mg/l	---	0.08	<0.07	<0.07	0.25	
As	0.05 mg/l	0.01 mg/l	0.019	0.004	<0.003	0.04	
Fe	0.3 - 1 mg/l	0.3 mg/l	1.50	1.25	1.93	5.75	2.6
Mn	0.1 mg/l	0.5 mg/l	0.1	0.1	0.2	0.2	0.15
Total coliform	0/100 ml	0/100 ml	0	0	0	0	
Faecal Coliform	0/100 ml	0/100 ml	0	0	0	0	
Comments From the analysis, it has been observed that all parameters were found within the acceptable limit DoE and IFC. These indicate that the project is not posing any detrimental effect to the surrounding environment by Groundwater pollution.							

4.3.4 Impact on Waste and Labor Camp

Construction debris and wastes to be generated during the construction phases are scrap iron, steel, wooden frames, piping, and other solid wastes. Most of them are generated toward the end of the construction phase during carrying out of the finishing works, while the site will be cleared of waste materials. The volume of such construction wastes is likely to be significant. Indiscriminate storage and disposal of this construction debris and wastes could create local waterlogging and ponding by blocking drainage lines and would be aesthetically displeasing. Proper disposal of these wastes is described in Section 4.3.

Solid waste of domestic nature that would be generated in the temporary labor sheds at the construction site is not likely to be significant in volume. But indiscriminate disposal of such solid waste would create environmental pollution and the unhealthy situation at the project site. These solid wastes are disposed of properly as outlined in Section 4.3.

Assessment of construction impact on air, water, noise, construction waste and labor camp management

Table 4.10 summarizes the effect of project activities on physicochemical environmental parameters during the construction phase of the project. The physicochemical environmental parameters that could be affected by the project activities include water, air quality and noise level. As discussed above, water quality could be affected mainly by project activities such as mobilization of equipment and personnel (e.g., solid and liquid waste from labor sheds), and site preparation. Effects of solid and liquid wastes generated during the construction phase would not be very significant, especially if mitigation measures as outlined in Section 4.3 are adopted. The overall negative impact of such activities is likely to be “short-term (Sh)” and of “low” intensity.

Deterioration of air quality during the construction phase may result from the increased concentration of particulate matter in the air from construction activities such as vehicular movement and wind-blown dust. However, these adverse impacts are greatly minimized by adopting mitigation measures as outlined in Section 4.3.

The likely noise level to be generated for different construction activities and its impact on the surrounding environment was assessed using a noise meter. Results of the assessment are presented in table 4.6 shows that different construction activities would generate significant noise and would produce some adverse impacts.

Similarly, the cumulative noise caused by the heavy trucks and excavator simultaneously during the construction of the access road is also of some concern. The adverse effect of project activities on noise level has therefore been categorized as “short-term (Sh)” and of “moderate” intensity.

Table 4.10: Effect of Project Activities on Physico-Chemical Environmental Parameters during Construction Phase

Physico-chemical parameters	Environmental Examination						
	Positive Impact			No Impact	Negative Impact		
	Low	Moderate	High		Low	Moderate	High
Air Quality					X(Sh)		
Noise Level						X (Sh)	
Drinking Water Quality					X(Sh)		
River Water Quality					X(Sh)		
Ground Water Quality					X(Sh)		

Note: Sh=Short-term; Lo=Long-term

4.4 Mitigation Measure

4.4.1 Air Quality

Construction materials at the site are properly covered while hauled and stored, roads properly cleaned and water sprayed in order to minimize the concentration of dust in the air when dust increases. Vehicle movement to and from the site is properly managed to ensure that does not significantly aggravate the traffic problem and air pollution. Stone (aggregate) crushing activities are properly done in fine tune batching plant which is far away from the construction site and not allowed within the Ashuganj plant premises. Health status of all workers has monitored regularly at the Health Center established at the project site.

4.4.2 Water Quality

The human wastes from the labour camp are appropriately disposed of through construction of sanitary latrines connected to an appropriately designed septic tank system (consisting of a septic tank and soakage pit). Wastewater generated from different construction activities is not likely to be significant in volume. Disposal of such wastewater is carried out by draining them in shallow pits (1 to 1.5 m deep) dug in the ground at appropriate locations, and filling them up with sand at the end of the construction phase. In all cases, the wastewater streams are separated from the stormwater stream, which is disposed of separately utilizing the existing stormwater disposal system at the Ashuganj complex.

4.4.3 Noise Level

- Use “quiet” equipment (i.e., equipment designed with noise-control elements);
- Route truck traffic away from noise-sensitive areas, where feasible;
- Install sound barriers for pile driving activity, where practicable (e.g., use an acoustic curtain or blanket around the point of impact);

- Unnecessary vehicle movement are avoided
- Switch off the engines while remaining unused.

4.4.4 Solid Waste

The solid wastes of domestic nature generated mainly in the labor sheds are collected and stored separately (i.e., without mixing it with construction wastes/debris) in appropriate containers within the construction site. The solid wastes are disposed of away from the site (e.g., in a municipal landfill/waste dumping ground) outside the complex, at the responsibility of the Contractor & monitored by APSCL.

4.5 Progress of Work

Ambient air quality monitoring: Measurements of selected air quality parameters for PM_{2.5}, PM₁₀ and SPM has been carried out (July–December 2016) during the ongoing construction work. Air samples were collected for measurements of selected air quality parameters for PM_{2.5}, PM₁₀ and SPM.

Drinking water monitoring: Drinking water sample was collected from supply water in January-June 2016 for analyzing pH, Ammonia, nitrate, phosphate, As, Fe, Mn, Fecal and total coliform. Test report also is shown in Annex II.

River water monitoring: River water sample was collected from Meghna River in January-June 2016 for analyzing temperature, dissolved oxygen (DO) along with BOD₅, COD, Oil and Grease, and selected heavy metals (Cr, Cd, Pb). Test report also is shown in Annex II.

Groundwater monitoring: Groundwater sample was collected from supply water in January-June 2016 for analyzing pH, TDS, Ammonia, nitrate, phosphate, As, Fe, Mn, Fecal and Total Coliform. Test report also is shown in Annex II.

Noise level monitoring: Noise level monitoring is also necessary during the construction period, because the use of heavy construction equipment may increase the noise level at the work location. So, Noise level data were collected from selected 4 locations.

Waste management and process waste monitoring: Disposal of construction debris away from the site and their appropriate disposal sanitary landfill are ongoing. Hazardous waste and non-hazardous waste are also disposing of by proper way.

Trees cutting: The project site is in a bare field. So, there was no scope of tree cutting. But tree plantation program and landscaping are going on for providing a better environment at the project site and APSCL area.

Others: There is no significant impact on the existing road network in the project area. Major transportation of plant and construction material are done by the Meghna River with unloading of materials by crane owned by APSCL and at the jetty which is within the existing APSCL complex.

All slopes are protected and suitable erosion protection measures are employed to reduce any impact from runoff during the monsoon rainy season.

Health and Safety: The general health and safety of workers is safeguarded with the provision of medical and health facilities on-site, the provision of personal protective equipment (hard hats, safety belt, full body safety harness, ear plugs, ear muff, welding shield, grinding shield, safety shoe, safety goggle, welding apron, hand gloves, safety jacket, anti-dust masks, anti-gas masks etc. as required). There is an emergency response system and workers and supervisors are received training on any accident and immediate medical facility in its own round the clock medical center. There is a full-time emergency ambulance to provide immediate service if required. Safe drinking water and sanitation facilities are established and provided to all project related employees (officer, staff and workers) at the site.

Set up of the in-house monitoring system

APSCL is being set up of the in-house monitoring system and require manpower with its own staffs. In-house environmental monitoring system with manpower is as follows.

Manpower for Environmental Management Plan.

1. Manager (Health, Safety & Environment) – 1 nos.
2. Asst. Manager (Health, Safety & Environment), for ambient air, stacks emission and noise etc.-01 no's
3. Manager (Chemical) For ETP, WTP, etc. -1 nos.
4. Assistant Manager (Chemical) For ETP, WTP, etc. - 1 no's.
5. Operator – 3 Nos.
6. Environmental Specialist – 1 nos.

Environmental Clearance Certificate /Renewal of Environment Clearance:

APSCL received an exemption of IEE and approval of Term of Reference (ToR) for EIA for Implementation of APSCL 400 MW CCPP (East) from DoE. APSCL also received the EIA approval letter from the DoE, Bangladesh on 08.10.2015.

Based on the EIA approval letter from DoE, APSCL (Annex-II) has started bidding work and after successful completion of that construction activities will be started. After completion of construction work, APSCL will apply for environmental clearance certificate for operation of the plant. DoE did not provide any environmental certificate or any condition in the EIA approval letter, hence no renewal issue arises.

Table 4.11: List and Status of Regulatory Requirements for Asghuganj 400 MW East Project

Legal Documents		
SL No	Name of Certificate/License	Present Status
1	Trade License	During Construction phase no need to bring this licenses except EIA approval from DoE office.
2	BERC License	
3	Fire License	
4	Factory License	
5	ACID License	
6	Environmental Clearance Certificate	

4.5 WORKSHOP AND TRAINING MEETING AND DISCUSSION

At present an environmental team headed by Md. Atiqur Rahman, Manager (Health, Safety & Environment of APSCL) looking after an overall supervising the monitoring of 400 MW CCPP East Project environmental issues. The consultant conducted a training programmed on environmental issues for APSCL personnel and EPC contractors.

A training program for capacity building program of APSCL personnel and EPC contractors will be arranged upon the availability of requiring manpower. There will be environmental meeting performed in every month and will be discussed the overall performance of the environmental issues of under construction power plant. Beside this Mock drill on Fire and Earth Quake, Electric shock, Acid and chemical spillages are continuing regularly as per set schedule in the power plant.

Various training related to HSE usually conducted in this time period. The main topic of these training is headed by waste management, good housekeeping, induction, environmental issues, PPE and so on.

Some meetings have conducted in this time frame among EPC contractor, APSCL, Subcontractors regarding emergency cases, PPE, good housekeeping and so on. Also, some meetings regarding HSE monitoring have done between the consultants of APSCL and HSE representative of EPC contractor.

4.5.1 Audit and visit

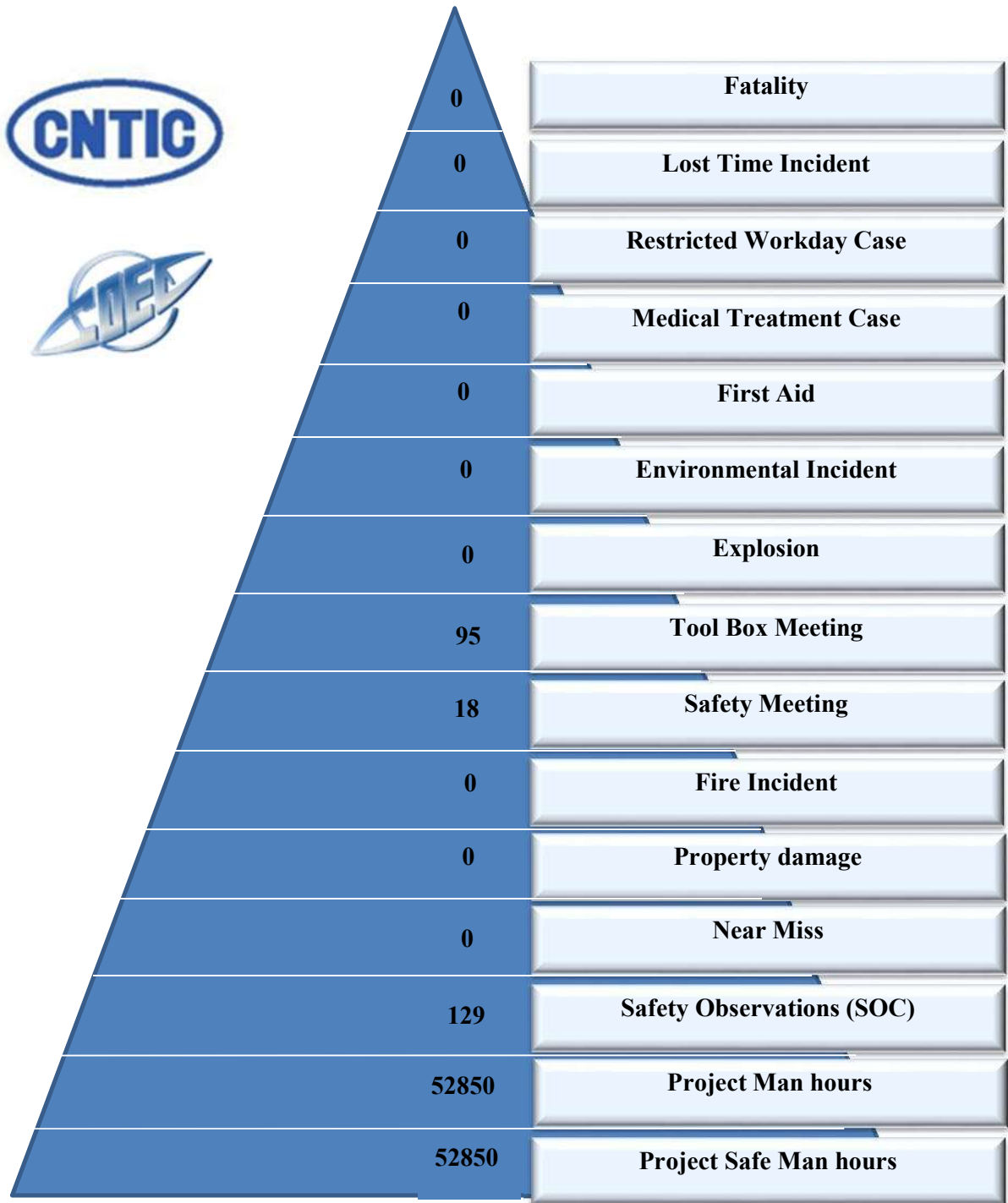
ADB team has visited the project site two times in the date of 7th and 14th November 2018 in this time period. They have discussed regarding the improvement of HSE issues. They mentioned about greenbelt plan, site-specific environmental management plan, spoil management plan, safety sign, environmental parameter monitoring. Few pictures have attached in the Annex-I.

5.0 SAFEGUARD MONITORING RESULTS AND UNANTICIPATED IMPACTS

5.1 Safety Assurance of the Project Site

Personal Safety Equipment (PSE): Use of proper safety materials is mandatory for all at the project site. Workers use appropriate personal protective equipment, such as safety boots, helmet, safety jacket, safety belt, safety harness, gloves, protective clothing, goggles, grinding shield, welding shield, anti-dust mask, anti-gas mask and ear protection etc. Daily toolbox meeting before starting of work is a mandatory practice at the project site. So long as safety does not suffer due to this action. There is no fatality and another casualty (Zero accident) and detail of safety issue are described in the following HSE Statistics chart.

HSE STATISTICS



5.2 OTHERS

5.2.1 Weather condition

The weather condition during the ambient air quality and noise monitoring was cold and partly sunny during the sampling. Wind direction was found calm. Hence there is no impact on monitoring due to weather condition.

5.2.2 Other factors which affect the monitoring results

Air monitoring: Factors which affect the air monitoring results including:

- Topography
- Congested Space
- Physical and chemical properties of pollutants
- Air Pressure
- Air Turbulence

Water monitoring: Factors which affect the water monitoring results including:

- Soil erosion
- Waste discharge
- Surface runoff
- Large numbers of bottom feeders (such as carp), which stir up bottom sediments
- Excessive algal growth.

Noise Monitoring: Factors which affect the noise monitoring results including:

- Type of source (point or line)
- Distance from source
- Atmospheric absorption
- Obstacles such as barriers and buildings
- Ground absorption
- Reflections
- Humidity

6.0 IMPLEMENTATION OF GRIEVANCE REDRESS MECHANISM AND COMPLAINTS RECEIVED FROM STAKEHOLDERS

There is a grievance redress mechanism developed in the project site. But until now there is not received any grievance to address.

7.0 CONCLUSION AND RECOMMENDATION

The environmental monitoring report is consist of 6th Semiannually environmental monitoring reporting based on monthly measured ambient air, noise, drinking water, ground and river water quality parameters. The work has been assigned EPC contractor CNTIC-CCOEC Consortium performed for the period of July to December 2018. Ambient air quality parameters were determined in the site with the help of high volume sampler and noise quality was done by noise level meter. Drinking water, ground and surface water quality parameters were analyzed in the laboratory. All of the mitigation measures are taken following ADB Environmental Safeguard Policy 2009, IFC/World Bank Thermal Power plant guideline 2008 and DoE, Bangladesh guideline.

From the analysis, it is found that the ambient air quality results found within DoE standards. This value are cumulative with surrounding ambient air and noise level. SO_x and CO are not a problem of the construction period of the power plant. But SPM, PM_{2.5}, PM₁₀ level during the construction period of the power plant is controlled by taking proper mitigation measures and spraying of water.









Noise level quality of Ashuganj 400 MW CCPP has also been measured by EPC contractor. According to the measurement, the noise level around the plant area found within the allowable limit of Industrial zone both day and also at night time. The noise level is controlled by using modern, new and fine-tuned equipment.

Surface water quality parameter at Meghna River was performed to evaluate whether this plant poses any detrimental effect on the water environment. From the analysis, it has been found that the project does not contaminate water pollution to the natural environment. Otherwise, any spill is not detected next to riverbeds around the worksite (oils, concrete waste or conglomerate asphalt, any colour changes of the water, etc.). Drinking and groundwater quality is also found good.

House-keeping is also in good condition at the plant site. All solid, liquid and hazardous waste are disposed of the designated container at the plant site. Most of the solid wastes are disposed of by landfill. The usable solid wastes are handed over to proper party for recycling.

Finally, it can be concluded that the plant has a minor detrimental impact for short period on the environment in terms of ambient air during the construction period. The plant provides a good working environment for the workers.

ANNEX-I: PHOTO APPENDIX

	
Toolbox meeting	Toolbox meeting
	
Toolbox meeting	Toolbox meeting
	
Demolition site	Site Demolition works
	
Iron Scrap stored in a fixed place	Iron Rod from demolition works stored in a fixed place



Demolition performed with proper PPE



Water spraying during cutting/hot works



Demolition at the end stage



Demolition waste stored in a place



Demolition works at site



Construction Debris Storage Location



Site visit of ADB Team



Site visit of ADB Team

	
Site visit of ADB Team	Safety Fencing at site
	
Safety Sign	Safety Sign
	
River water Sampling	Demolition activities with proper PPE
	
Noise Monitoring at night time	Noise Monitoring at daytime



Drinking water Sampling



Air quality monitoring



Air quality monitoring



Noise Monitoring at daytime



Noise Monitoring at night time



River water Sampling



Drinking water Sampling



Ground water Sampling

ANNEX-II: DoE Clearance of EIA

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

Memo No : DoE/Clearance/5484/2015/ 491

Date: 08/10/2015

Subject: Approval of Environmental Impact Assessment (EIA) Report for Ashuganj 400 MW Combined Cycle Power Plant (East) at Ashuganj under Brahmanbaria District.

Ref: Your Application dated 06/08/2015.

With reference to the above, the Department of Environment (DOE) is pleased to approve Environmental Impact Assessment (EIA) Report for Ashuganj 400 MW Combined Cycle Power Plant (East) at Ashuganj under Brahmanbaria District subject to fulfilling the following terms and conditions.


1. This EIA report is approved only for 400 MW Combined Cycle power plant. Any expansion or extension of this power plant will be required further/fresh EIA study for the Environmental clearance from the Department of Environment (DOE).
2. Project Proponent may undertake activities for land development and infrastructural development of the project.
3. Project Proponent may open L/C (Letter of Credit) for importing machineries for the project which shall also include machineries relating to waste treatment plant and other pollution control devices.
4. The activity under the Power Plant Construction Project shall not result in the loss of containment of any materials that would affect health or will have damaging impact on the environment or natural resources.
5. Proper and adequate mitigation measures shall be ensured throughout preparation, construction and operation period of the proposed Power Plant Construction Project activities.
6. Any heritage sight, ecological critical area, and other environmentally and/or religious sensitive places shall be avoided during project construction phase.
7. Proper construction and development practices shall be followed that minimize loss of habitats and fish breeding, feeding & nursery sites.
8. Construction works shall be restricted to day time hours so as to avoid/mitigate the disturbance of local lives as well as implementation schedules of the works shall be notified in advance to nearby residents.
9. Proper and adequate sanitation facilities shall be ensured in labor camps throughout the proposed project period.



10. In order to control noise pollution, vehicles & equipment shall be maintained regularly; working during sensitive hours and locating machinery close to sensitive receptor shall be avoided.
11. No solid waste can be burnt in the project area. An environment friendly solid waste management should be in place during the whole period of the project in the field.
12. Proper and adequate on-site precautionary measures and safety measures shall be ensured so that no habitat of any flora and fauna would be demolished or destructed.
13. All the required mitigation measures suggested in the EIA report along with the emergency response plan are to be strictly implemented and kept operative/functioning on a continuous basis.
14. To reduce dust, spraying of water over the earthen materials should be carried out from time to time.
15. Storage area for soils and other construction materials shall be carefully selected to avoid disturbance of the natural drainage.
16. Adequate considerations should be given to facilitate drainage system for run off water from rain.
17. Adequate facilities should be ensured for silt trap to avoid clogging of drain/canal/water bodies.
18. Construction material should be properly disposed off after the construction work is over.
19. The project authority shall submit a detail work plan with time schedule of development activities at least 7 (seven) days ahead of the work commences in the field to the Brahmanbaria District Office, Chittagong Regional Office and Headquarters of the Department of Environment simultaneously.
20. Environmental Monitoring Reports shall be made available simultaneously to DOE Brahmanbaria District Office, Chittagong Regional Office and Headquarters on a monthly basis during the construction period of the project.
21. The following records must be kept in respect of any samples required to be collected for the purposes of environmental monitoring activities :
 - (a) the date(s) on which the sample was taken;
 - (b) the time(s) at which the sample was collected;
 - (c) the point at which the sample was taken; and
 - (d) the name of the person who collected the sample.
22. The results of any monitoring required to be conducted under this EIA report must be recorded.
23. In case of any emergency, the following information shall immediately be reported to Brahmanbaria District Office, Chittagong Regional office and Headquarters of the Department of Environment (DOE) simultaneously
 - a) Nature of incident (land slides, fire, accident, collision, etc.)
 - b) Personnel affected (injured, missing, fatalities, etc.)
 - c) Emergency support available and its location (standby transport, medical facilities, etc.)
 - d) Weather conditions



- e) Current operations (abandoning the site, fire fighting, etc.)
24. Appropriate permission would require to be obtained from the Forest Department in favor of cutting/felling of any plant/tree/sapling forested by any individual or government before doing such type of activity.
 25. The project authority shall extend active cooperation to DOE officials to facilitate their visit to the site as and when necessary.
 26. The project authority shall, after land development, infrastructural development and installation of the power plant, apply for Environmental Clearance to the Brahmanbaria District Office of DOE with a copy to the Head Office of DOE in Dhaka.
 27. Without obtaining Environmental Clearance, the project authority shall not start the operation of the project.
 28. Violation of any of the above conditions shall render this approval void.
 29. The project authority shall, after land development, infrastructural development and installation of the plant, apply for Environmental Clearance Certificate without which proponent shall not start operation of the project.
 30. This EIA Approval has been issued with the approval of the appropriate authority.



08.10.2015

(Syed Nazmul Ahsan)
Director (Environmental Clearance)
Phone # 02-8181778

Managing Director
Ashuganj 400 MW Combined
Cycle Power Plant (East)
Sunarampur, Ashuganj
Brahmanbaria.

Copy Forwarded to :

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


09.01.2019
Md. Atiqur Rahman
Manager (Health, Safety & Environment)
Ashuganj Power Station Co. Ltd.
Ashuganj, Brahmanbaria