Bharat Heavy Electricals Limited

Monthly Monitoring Report - 6

(September, 2018)

Environment Compliance Monitoring
During Construction Period
of 2x660 MW Maitree Super Thermal Power Project
Rampal, Bagerhat

Submitted in October, 2018

CEGIS

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Acknowledgements

The Center for Environmental and Geographic Information Services (CEGIS), a Public Trust under the Ministry of Water Resources, is grateful to Bharat Heavy Electricals Limited (BHEL) for awarding the contract of consultancy for “Monthly Environment Compliance Monitoring during Construction Period for 2x660 MW Maitree Super Thermal Power Project at Rampal in Bagerhat District, Khulna Division” for a period of one year.

CEGIS greatly acknowledges the extensive support of Mr. Surojit Mandal, General and Construction Manager, BHEL (Power Sector – Eastern Region: Maitree 2x660 MW STPP) extended to CEGIS as an independent agency during September, 2018 for 6th monthly environmental compliance monitoring activities. CEGIS is thankful to Mr. Sartaj Husain, Dy. Engineer, BHEL (BIFPCL 2 x 660 MW MSTPP) for his cooperative and collaborative insistence for accelerating this Monthly Environment Compliance Monitoring Project. Additionally, CEGIS is also grateful to Mr. Ratnadeep Kumar, Asst. Engineer (Safety), BHEL (BIFPCL 2x660 MW MSTPP) for mobilizing the field activities.

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Abbreviations and Acronyms

BHEL	Bharat Heavy Electricals Limited
BIFPCL	Bangladesh-India Friendship Power Company Limited
BOD	Biochemical Oxygen Demand
BPDB	Bangladesh Power Development Board
CEGIS	Center for Environmental and Geographic Information Services
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
DoE	Department of Environment
EC	Electric Conductivity
EIA	Environmental Impact Assessment
EHS	Environmental Health Safety
EMP	Environmental Management Plan
EPC	Engineering, Procurement and Construction
HSE	Health Safety and Environment
MW	Mega Watt
NO_x	Oxides of Nitrogen
NTPC	National Thermal Power Corporation
PM	Particulate Matter
PP	Power Plant
PPE	Personal Protective Equipment
SO_2	Sulfur Dioxide
SPM	Suspended Particulate Matter
TDS	Total Dissolved Solid
ToR	Terms of Reference
USEPA	United States Environmental Protection Agency

Glossary

Term	Definition
Compliance	When construction activities are being conducted in accordance with the Environmental Requirements (standards) of the Project.
Environmental Requirements	Environmental Specifications set out in the Environmental Management Plan (EMP) and relevant Environmental Protection Plan (EPP). Conditions included in the Environmental Assessment Approval for the Project
Non-conformance	A construction activity conducted in a manner that deviates from a best management practice, compliance with which is required in the EPP for that construction activity.
Non-compliance	A construction activity conducted in a manner that deviates from a legal condition under a permit, an enactment, or a regulation, compliance with which is required in the EPP for that construction activity.
Reportable Environmental Incident	An incident of non-conformance or non-compliance which has caused or has the potential for causing an impact on the quality of air, land or water, wildlife, aquatic species, species at risk or heritage resources, and is reportable under a permit, an enactment, or a regulation.

1. Introduction

1.1 Background

The Maitree Super Thermal Power Plant is a joint venture Project of Bangladesh Power Development Board (BPDB), and National Thermal Power Corporation (NTPC) Ltd., India and is run by Bangladesh-India Friendship Power Company Pvt. Ltd. (BIFPCL). Bharat Heavy Electricals Limited (BHEL) has been awarded the contract of all Engineering, Procurement and Construction works of the Power Plant within the specified schedule. BHEL has already initiated the construction works. In order to fulfil the environmental due diligence, BHEL has decided to engage a third party for monthly monitoring of the environmental compliance within the Project area as per the requirement of Department of Environment (DoE), Bangladesh EIA approval Condition No-44 which is: "*Environmental Monitoring Reports according to specific format specified in the EIA Report shall be made available simultaneously to DoE Bagerhat District Office, Khulna Divisional Office and Headquarters on a monthly basis during the construction period of the Project.*" In this regard, monitoring of environmental parameters as well as the status of Environmental Health and Safety (EHS) should be conducted in accordance with the EMP as stated in EIA Study Report.

Accordingly, CEGIS has been appointed by BHEL for conducting the monthly monitoring of the environmental compliance of Maitree Super Thermal Power Plant of BIFPCL. This monitoring activities need to be continued for the entire construction period and the reports need to be submitted to DoE on monthly basis. According to the contract, CEGIS has already conducted environmental compliance monitoring from April till August, 2018 and submitted to BHEL. As a continuous process, CEGIS conducted the 6 th monthly monitoring activities during September, 2018 and this 6 th monitoring Report has been prepared for submission to BHEL for their consideration. The aforementioned format of the report specified in the EIA study along with the monitoring results has been appended in the **Annex-I.**

1.2 Brief of the Project

The construction of BIFPCL 2x660 MW Maitree STPP has been progressing well as the Project is now in the infrastructure development stage. The Project area includes 366.40 hectares (905 acres) of land (Block-A) which is just beside the BPDB Project area (Block-B). The MSTPP Project area is connected with a 6 km long two lane access road from the Khulna-Mongla Highway to the MSTPP area. Expansion works are going on to convert this access road into a six lane road. A number of construction companies are now working at the BIFPCL Project site to complete the civil works within the stipulated time schedule. The Project activities conducted at various stages, include:

- Extension work for increasing the width of the access road within the Project area;
- Passage of road for traffic movement for construction purposes;
- Construction works of road and drains in the Plant area.
- Construction materials are aggregated for major mechanical construction works
- Pile driving, Soil compaction, base and sub-base construction activities;
- Construction works in the Jetty area;
- Labour shed construction;

- Service works;
- Power supply from the national grid and also from generator at project site;
- Concrete Batching Plant and concrete pouring operations.
- Development of various infrastructure works like store, material shed, office complex, residential complex etc.

1.3 Selection of Sample Collection Site and Discussion with the Proponent

Sixth monthly environmental compliance monitoring has been conducted from 9th September 2018 to 12th September 2018. One environmental expert and one engineer along with two technician of CEGIS visited and conducted the field investigation. They have collected the samples from the pre-selected site and monitored the sampling equipment continuously.

The Team communicated with Mr. Sartaj Husain, Dy. Engineer, BHEL for informing him about the routine monitoring activities. An informal discussion meeting was held with the proponent regarding the sampling location, monitoring schedule and significant issues of ambient air quality and noise level. During this field visit of CEGIS monitoring team from 9-12th September, 2018, Mr. Sartaj Husain, Dy. Engineer, BHEL – has assisted the monitoring team in collecting data and information and facilitated the field monitoring activities. During this field trip the monitoring Team has successfully conducted the field activities and eventually, generated the monitoring results after laboratory analysis which has been presented in this Six monthly monitoring Report.

1.4 Location of the Project

The MST Power Plant is located in between latitude 22^0 37' 0''N to $22^0$34'30''N and longitude $89^0$32'0''E to $89^0$34'5''E and at about 23 km south of the Khulna City and 14 km north-westward from the Sundarbans. Location of the MSTP Project area is presented in Figure 1.1a and 1.1b

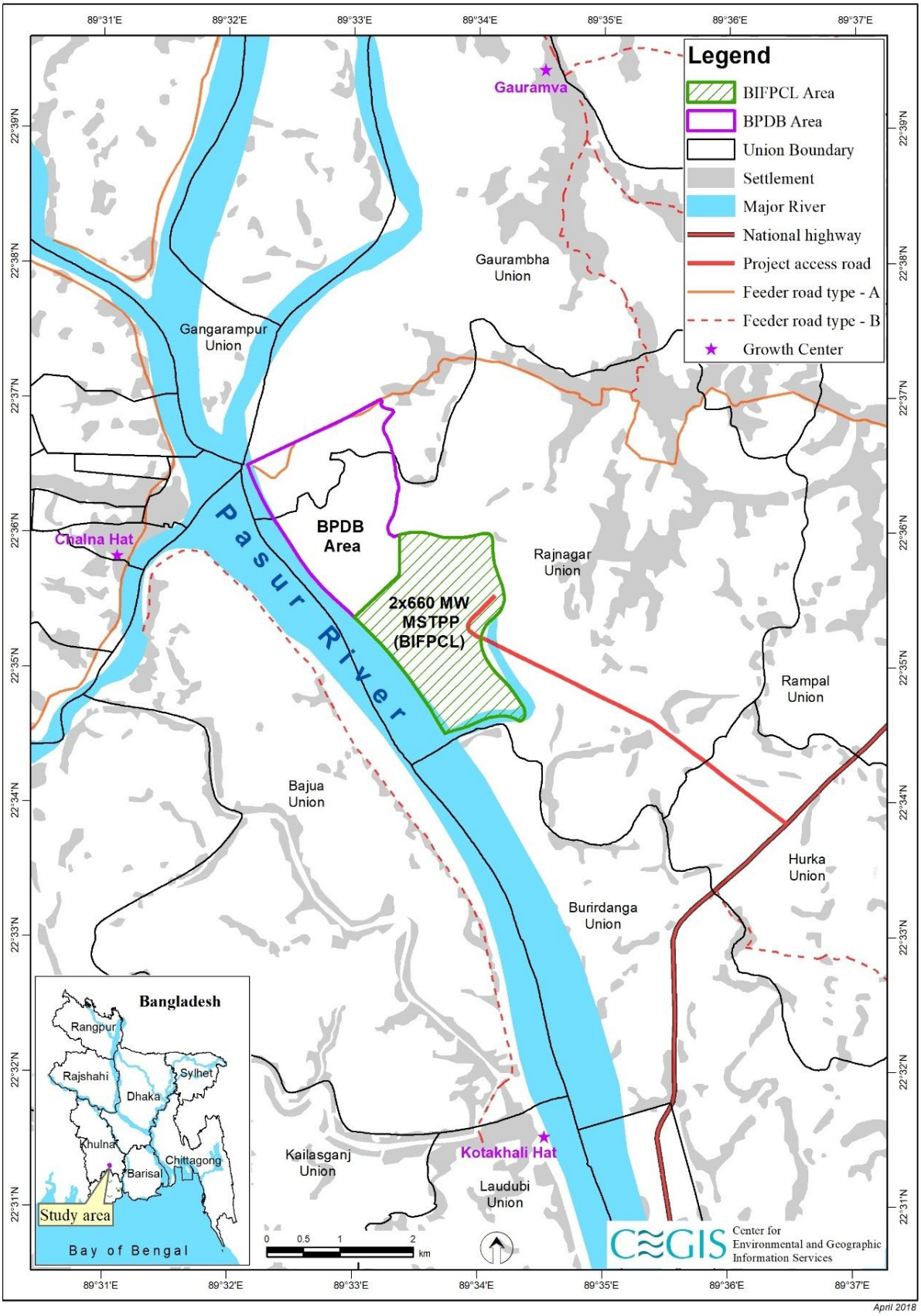

Figure 1.1a: Location of 2x660 MW Maitree Super Thermal Power Plant

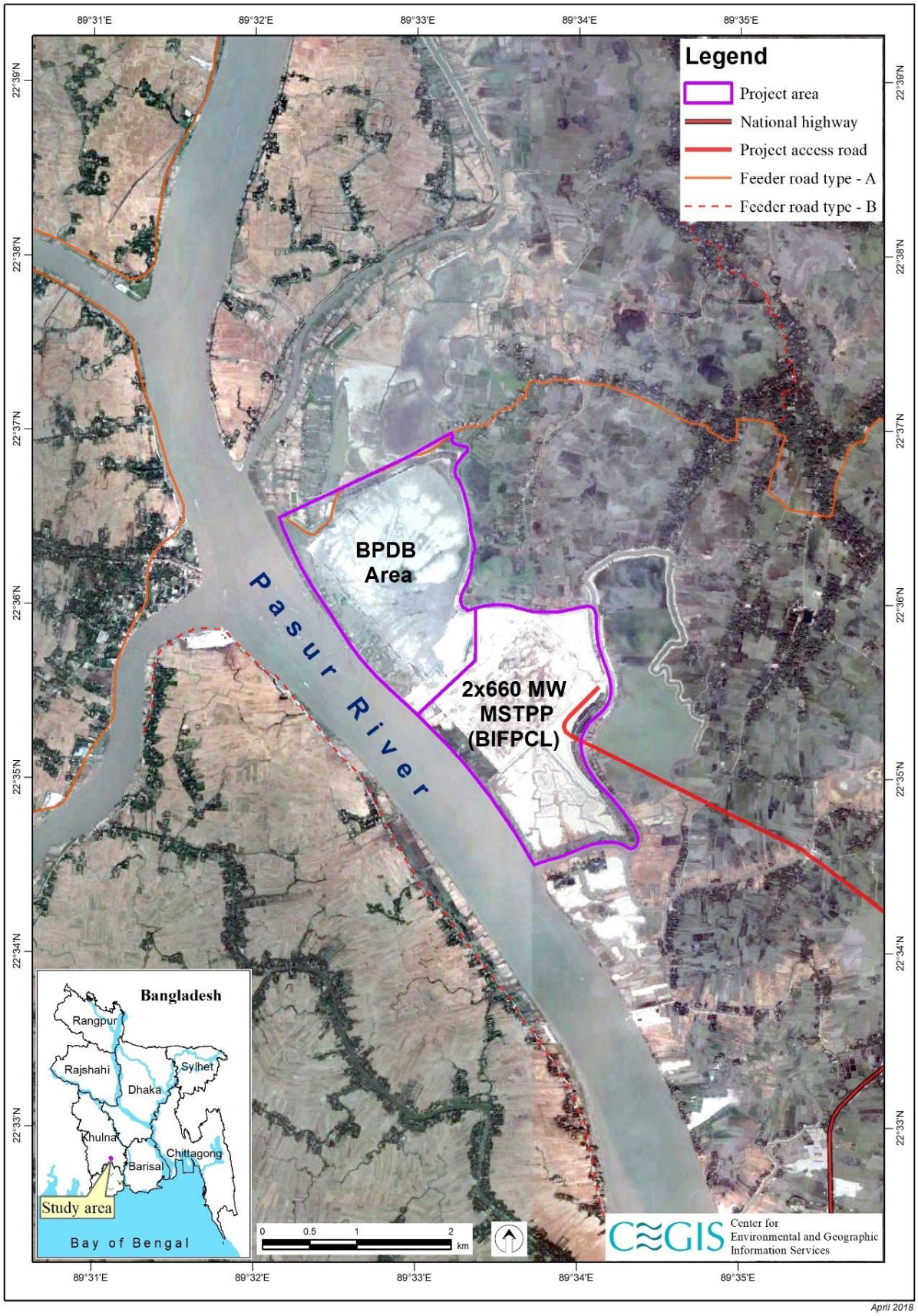

Figure 1.1b: Location of 2x660 MW Maitree Super Thermal Power Plant

1.5 Study Objectives

The overall objective of this study is to monitor the environmental compliance of certain parameters during the construction phase of this Power Plant Project.

- Monitoring of the certain environmental parameters of air quality, water quality and noise level at the sensitive receptor (point) in and around the Project site;
- Comparing the monitoring results with national (ECR, 1997) and international standard (IFC, 2007) and;
- Identifying the causes behind non-compliance and suggesting mitigation measures accordingly.

1.6 Scope of the Services

The scope of the study are as follows which are specified in **Table 1.1**

- Conducting monthly air quality monitoring continuously (24 hrs.) at the sensitive receptors within the project boundary. Air quality monitoring stations are to be set at least one in every location near the labour shed, one in major construction works area, and one at the Jetty area. Air quality monitoring parameters to be monitored include SO_2, NOx, CO, $PM_{2.5}$, PM_{10}, SPM and O_3.
- Conducting monthly water quality monitoring in the project area, especially at the discharge points. At least three samples are to be collected from the Project area which include discharge outlet point and drinking water, etc. The monitoring parameters are pH, DO, Temperature, BOD_5, COD, Hardness, Electric Conductivity (EC), TDS, NO_3, PO_4, SO_4, Cl^- after grab sampling.
- Conducting monthly monitoring of noise level as Leq (dBA) values both for day and night time. Noise level will be monitored at ten locations through USEPA approved standard procedure. Monitoring locations will be determined on the basis of site specific work and location sensitivity.

Table 1.1: Environmental Parameters Measurement during Monthly Monitoring Visit

Parameters		Number of Location	Frequency of Sampling	Quantity of Samples	Guidance and Acceptance of the tests
Air Quality	SO_x, NO_x, SPM, PM_{10} and $PM_{2.5}$,CO,O_3	• North west corner of the Power Plant./ Jetty Location • Labor Shed area. • Major Construction area	1	3	As per the guidelines provided in approved EIA reports for 2x660 MW, Coal based Thermal Power Construction. Project at Rampal Upazila, under Bagerhat
Water Quality	BOD_5	• Outlet point-1 • Outlet point-2 • Outlet point-3	1	3	
	COD		1	3	
	Total Hardness		1	3	
	Chlorine		1	3	
	pH		1	3	
	DO		1	3	
	Temperature		1	3	

Parameters		Number of Location	Frequency of Sampling	Quantity of Samples	Guidance and Acceptance of the tests
	EC		1	3	district of Bangladesh. And in line with the relevant Environmental Acts and Rules of Govt. of Bangladesh.
	Nitrate		1	3	
	Sulphate		1	3	
	Phosphate		1	3	
	TDS		1	3	
Noise Level	Noise level	10 sites (considering the major sensitive area/construction activities)	1	10	

1.7 Purpose of the Study

Environmental Compliance Monitoring is immensely necessary for a Project to assess the environmental status, non-compliance and non-conformance issues as per national environmental standards and good international practices. Additionally, with the aim of complying the EIA approval condition (Condition no.: 44) of Department of Environment, Bharat Heavy Electricals Limited (BHEL) has engaged Center for Environmental and Geographic Information Services (CEGIS) for carrying out the Monthly Environmental Compliance Monitoring study of the Maitree Super Thermal Power Plant. The Environmental Monitoring report presents the results of physical environment, particularly ambient air quality, ambient noise level and water quality, during the construction phase of the proposed Power Project. This monitoring activities will be conducted monthly, which has already started from the month of April, 2018 and will be continued for one year. Moreover, quarterly monitoring of environmental parameters is already being conducted by BIFPCL since February, 2014. The results of the monitoring will be presented monthly to BHEL reflecting the compliance status of the environmental parameters along with the follow-up action.

2. Approach and Methodology

2.1 Overall Approach

Study approach is prepared based on the scope of services. According to the ToR, this monitoring report is being prepared for the month of September, 2018. The environmental parameters for air quality, water quality and noise level have been selected based on the monitoring framework of the EIA study of 2x660 MW Coal based Thermal Power Plant Project at Rampal, Bagerhat which is also recommended in the scope of the services.

The location of air, water and noise monitoring sites (stations) are selected depending on the recommendation of the EIA study, location sensitivity and impact potentiality of that particular area in a specific time period. The **Figure 2.1** below provides an understanding of the different activity which has been carried out during the monitoring of Environmental Compliance of Maitree Super Thermal Power Plant.

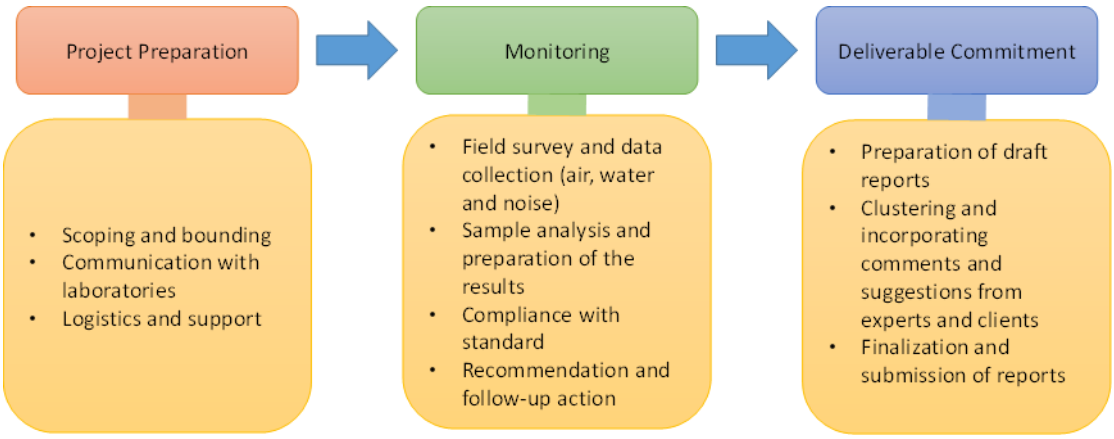

Figure 2.1: Monitoring Framework

Monitoring of environmental parameters like air quality, water quality and noise level are investigated though different monitoring equipment and tools. For air quality monitoring volumetric sampler has been used, water quality parameters has been tested in-situ in the field and grab sample has been collected for laboratory analysis and finally the sound pressure level meter has been used to estimate the present noise level equivalent in the surrounding areas. However, the monitoring activities have been conducted continuously at specified locations with skilled technicians and professionals.

2.2 Team Mobilization

An Environmental Compliance monitoring Team consisting of one Environmental Expert, one Junior Environmental Engineer and two technicians have conducted the monitoring study in the field (Table 2.1). The monitoring Team has worked at the BIFPCL 2x660 MW MSTPP site for 4 days i.e., from 9th to 12th September, 2018. The monitoring activities have been performed independently as per standard practices.

Table 2.1: Composition of Environmental Compliance Monitoring Team

Position Assigned	Number	Responsibilities
Environmental Expert	1	Preparation of the Monitoring Plan, maintaining effective communication with BHEL and preparation of the Report.
Junior Environmental Engineer	1	Implementation of the compliance monitoring and preparation of the Report
Technician	2	Operation of the machineries and equipment, sampling etc.,

Samples collected from the field have been submitted to laboratory for analysis and testing. The results were checked precisely. The root cause has been assessed after analysis of the results and field observation. Additionally, a compliance monitoring Report for the month of September, 2018 has been prepared, which is reviewed by the internal and external experts. A number of internal professional manpower inputs have been used within the Consultant's Team for the efficient functioning and completion of the services.

2.3 Methodology of Environmental Compliance Monitoring

The monitoring activities have been performed through a methodological frame work. QA/QC procedure have been maintained during the field investigation and sampling of all the environmental parameters. The locations of air quality, water quality and noise level monitoring are shown in **Figure 2.1a** and **Figure 2.1b**. The locations are subjected to change in future depending on the potentiality of the impacts and its magnitude, sensitivity of the receptors and capturing the worst case scenarios. The procedure associated with the monitoring of each of the environmental parameters are described in the following sub-articles.

2.3.1 Ambient Air Quality

The ambient air quality has been monitored in three locations as specified in **Figure 2.1a** and **Figure 2.1b.** Air quality monitoring is performed at locations adjacent to the labour shed, jetty areas and construction site where the ambient air quality might be affected by construction and installation works as well as transportation of materials for working. The air samples were collected at the construction areas to test the environmental parameters to ensure that the EPC contractor BHEL complies with the terms and condition of environmental protection.

Emission of particulate matters and gaseous pollutants from construction site are monitored for 24 hours continuously. All of the criteria pollutants (SPM, CO, O_3, $PM_{2.5}$, PM_{10}, SO_x, and NO_x) have been monitored at specified places. Respirable Dust Sampler (Model-Envirotech India APM-460BL) and Fine Particulate Sampler (Model-Envirotech India APM-550) have been used to collect the air samples. The $PM_{2.5}$, PM_{10}, and SPM have been tested by gravimetric method. The SO_2 has been absorbed in a specified chemicals and tested by West-Gaeke method. The NO_2 has also been absorbed in a specified chemicals and tested by Jacob and Hochheiser method. Finally CO and O_3 has been measured using a Metravi CO-10 meter and Tongdy O_3 monitor respectively.

2.3.2 Water Quality

Reverse osmosis technology is being used for producing fresh water by treatment of saline Passur river water as per suggestion of the EMP of EIA study. In this process, high concentrated saline water called brine is produced which ultimately discharged to the Passur river. At present there are two RO based Water Treatment Plants supplying water to the

officials of BFPCL, BHEL and Labours. Labours ususally collect their drinking water from Jetty Side RO drinking water point during two times in a day. Large quantiy of water barrel, jars are used to reserve water at worksite after filling from the RO drinking water supply point. At the time of field investigation, the RO based Water Treatment Plant near the Jetty area was in operation..

During this 6th monthly compliance monitoring program three water samples were collected, one from RO technology (near jetty area) based Water Treatment Plant discharge outlet, one from storm water discharge outlet and one from drinking water outlets from RO Plant near the Plant jetty site for analysis. The location of samples collected for water quality monitoring have been shown in **Figure 2.1a** and **Figur**e **2.1b.** Samples of water discharge from the Project site to Passur River has been collected to determine the current status of discharge water quality.

Water quality field investigation has been conducted on September, 2018 which is marked as full - monsoon. Storm water discharge outlet has been observed at different places around the project site. Therefore, one sample from storm water discharge outlet has also been collected.

Standard practices have been followed for monitoring water quality. In-situ testing have been done at field and collected samples were brought and submitted to the laboratory for various analyses. The parameters that are being analysed include pH, DO, Temperature, BOD_5, COD, EC, TDS, NO_3, PO_4, SO_4, and Chloride as recommended in the EIA study done for the BIFPCL Project. Detail methodology for testing the water quality parameters are shown in **Table 2.2.**

Table 2.2: Methods Followed in Analyzing Water Samples

Sl. No	Parameters	Methods	Reference
01	Temp	Electrode	HORIBA, U-50 Multi-parameter Water Quality Meter
02	pH	Electrode	HORIBA, U-50 Multi-parameter Water Quality Meter
03	EC	Electrode	Multi-parameter meter (Instrument Catalog)
04	TDS	Electrode	Multi-parameter meter (Instrument Catalog)
05	Dissolved Oxygen (DO)	DO Meter	Lutron DO 5519 (Instrument Catalog)
06	Biological Oxygen Demand (BOD_5)	DO Meter	Lutron DO 5519 (Instrument Catalog)
07	Chemical Oxygen Demand (COD)	Colorimetric Method (COD Reactor: Et 125 SC and Spectrophotometer: UNICO 4802)	APHA, (1992)
08	Total Hardness (TH)	Titrimetric Method	APHA, (1992)
09	Chloride (Cl^-)	Moh's Titration	APHA, (1992)
10	Sulfate (SO_4^{2-})	Turbidity metric Method	APHA, (1992)
11	Phosphate (PO_4^{3-})	Ascorbic Acid Method	APHA, (1992)
12	Nitrate (NO_3^-)	Ultraviolet Spectrophotometric Screening Method	APHA, (1992)
13	Salinity	Electrode	HORIBA, U-50 Multi-parameter Water Quality Meter
14	Turbidity	Electrode	HORIBA, U-50 Multi-parameter Water Quality Meter

2.3.3 Ambient Noise Level

During construction stage major source of noise is expected to stem from construction site, movement of vehicles, electricity producing generator etc. For the sake of this study, ambient noise levels have been monitored at ten locations. Noise levels have been measured during day and night time at each of the 10 locations based on the location sensitivity, importance and impact potentiality. Each time noise level was recorded for fifteen minutes continually by using portable noise level meter. The sites are subject to change in future monitoring schedule based on the changing of working areas, types of work and importance of the location.

Noise is described by a weighted sound intensity (or level) and is measured in units called decibels (dBA). However, in this circumstance the noise level has been measured in terms of A- weighted equivalent continuous sound pressure level (Leq) and recorded by Sound Level (Sound Pressure Level) Meter (kanomax-4431). Depending on the site condition and acoustic environment, the noise meter was set up and calibrated each time following the manufacturer's instruction manual.

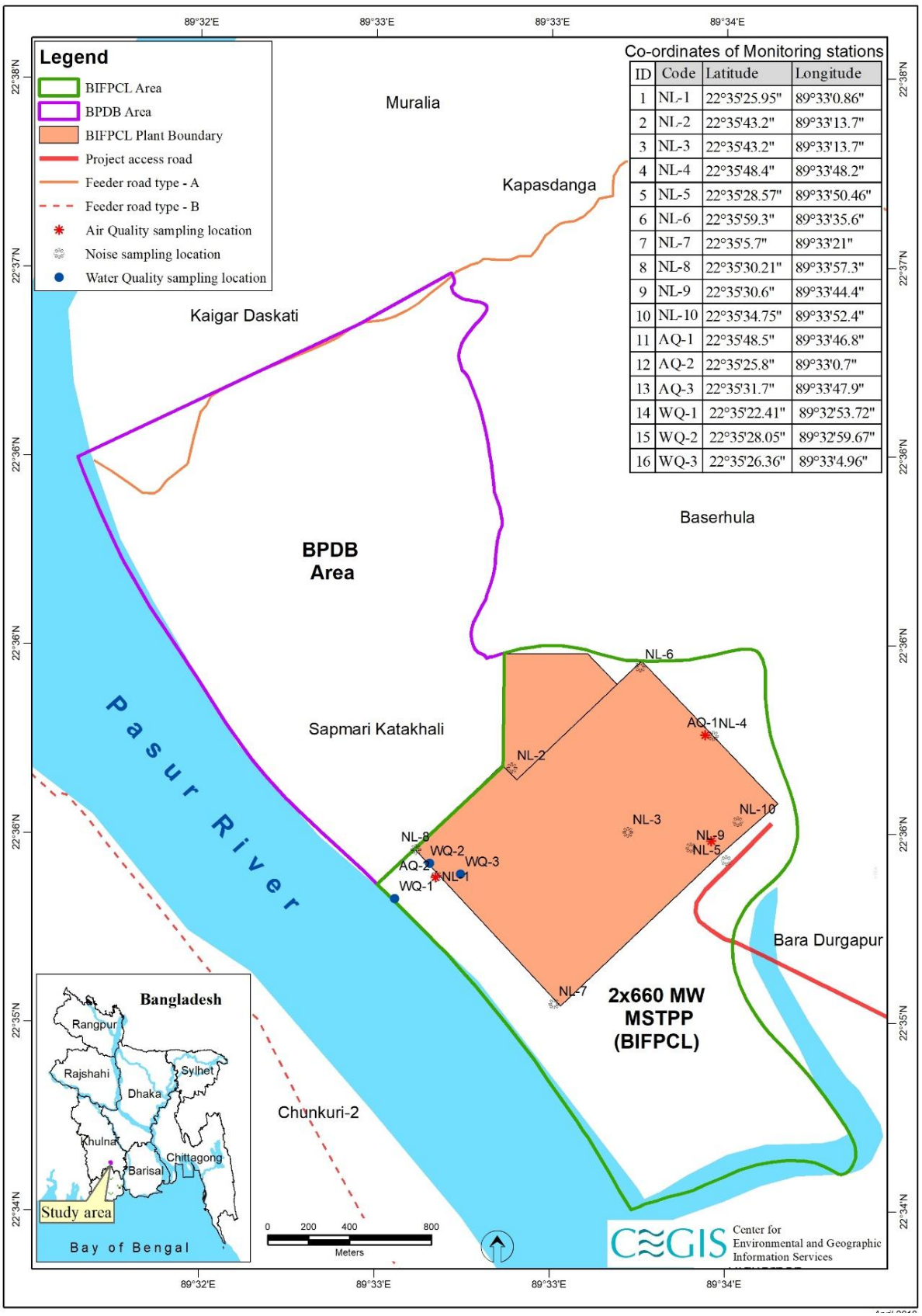

Figure 2.2a: Sampling Locations

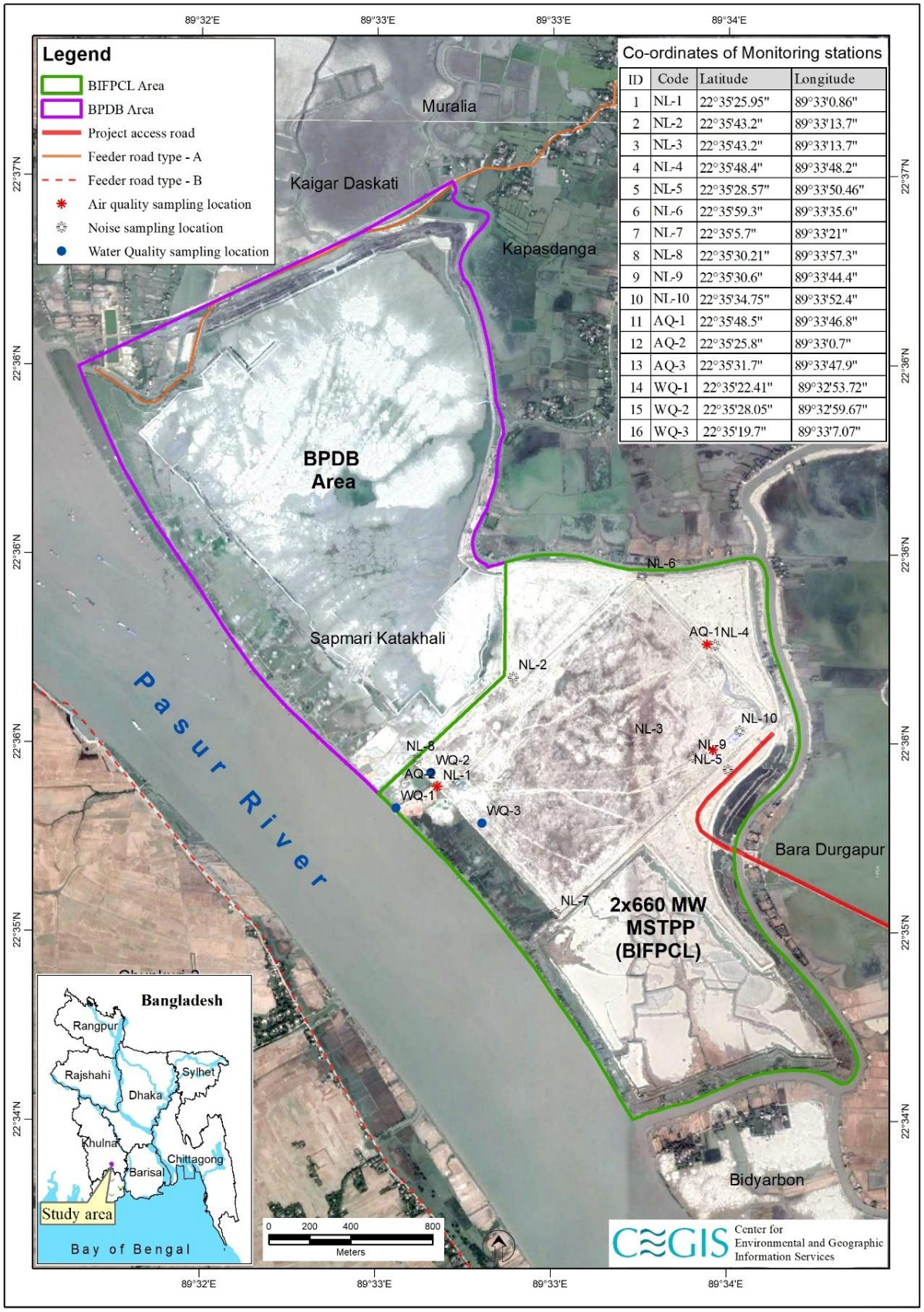

Figure 2.2b: Sampling Locations

3. Monitoring Results and Discussion

Environmental compliance monitoring is being implemented by an independent organization, CEGIS under a contract signed between BHEL and CEGIS. In line with the directives of the ToR of the contract, the environmental compliance monitoring is being performed. This monthly environmental monitoring results have been generated through in-situ testing and analysis of samples at the laboratory. This report also compares the sample results with the standard limits and provides commentary environmental issues during the month of September, 2018. Results of the previous investigations (1st to 5th month) have also been incorporated in this Report so as to compare the overall trend of the concerned environmental compliances.

3.1 Ambient Air Quality Monitoring Results and Discussion

Air quality has been sampled through volumetric sampling procedure. Sample has been collected for 24 Hours continually at three places especially at the site of labour shed, Jetty area and major construction areas. All of the criteria pollutants have been checked randomly in the Project site in order to assess the baseline situation as well as for the compliance standard. **Table 3.1** shows the monitoring results of the criteria pollutants.

Table 3.1: Ambient Air Quality Monitoring Results

Criteria Pollutant (µg/m³)	Monitoring Locations																		Standard Limit	
	Labour Shed AQ-1 (24hr)						Jetty Location AQ-2 (24hr)						Major Construction Area AQ-3 (24hr)							
	1st MM (Apr. 2018)	2nd MM (May, 2018)	3rd MM (Jun. 2018	4th MM (Jul. 2018)	5th MM (Aug. 2018)	6th MM (Sept. 2018)	1st MM (Apr. 2018)	2nd MM (May, 2018)	3rd MM (Jun. 2018	4th MM (Jul. 2018)	5th MM (Aug. 2018)	6th MM (Sept. 2018)	1st MM (Apr. 2018)	2nd MM (May. 2018)	3rd MM (Jun. 2018	4th MM (Jul. 2018)	5th MM (Aug. 2018)	6th MM (Sept. 2018)	**ECR2005**	**IFC, 2007**
SO_2	13.3	11.5	14.2	11.9	10.9	6.6	15.3	11.2	12.0	6.2	6.8	6.2	10.7	8.9	11.2	12.2	11.5	10.8	365 (24hr)	125 (IT-1), 20 (24hr)
NO_x	15.4	15.1	16.5	13.9	12.9	7.6	16.7	13.6	13.7	7.1	7.4	7.5	12.9	10.2	13.1	14.5	13.5	11.7	100 (Annual)	200 (1-Hr)
SPM	174.1	148.9	160.1	134.1	102.1	94.7	187.1	112.3	165.0	95.2	97.4	89.7	164.6	108.7	143.6	149.1	118.5	102.5	200 (8hr)	-
PM_{10}	149.1	115.1	140.2	109.3	89.9	85.6	134.3	103.4	130.3	74.9	69.6	73.1	91.9	69.2	101.0	122.5	98.9	95.0	150 (24hr)	150 (IT-1), 50 (24hr)
$PM_{2.5}$	32.2	24.6	34.0	28.9	22.2	19.8	35.7	25.2	36.3	20.2	19.8	13.8	23.0	15.0	26.2	32.7	27.8	24.9	65 (24hr)	75 (IT-1), 25 (24hr)
CO	35.0	25.0	29.0	31	28	23	41.0	32.0	21.0	36	30	27	29.0	21.0	23.0	26	21	19	10000 (8hr)	-
O_3	4.0	6.0	8.0	06	07	08	2.0	10.0	10.0	04	02	06	6.0	11.0	7.0	08	01	04	157 (8hr)	160 (IT-1), 100 (8-hr)

Source: CEGIS, 2018;

Note: MM: Monthly Monitoring; AQ: Air Quality

Ambient air quality for the pollutant gases has been recorded to be well below the standard limit during this month. Presence of criteria pollutants in ambient air quality at labour shed and construction area were recorded lower than previous month but slightly higher at major Jetty location. Increasing activities at the jetty area were responsible for rising the pollutants concentration. Regular monsoon rainfall reduces over pollutants in the ambient air quality of the project area. However, the potential sources of air pollutants at the time of sampling for 24 hrs is presented below.

- Massive construction activities
- Exposed/uncovered soil of the Project site.
- Land development activities of BPDB site.
- Construction works like piling, soil compaction, testing, building construction and other civil works etc.
- Vehicular movement over the paved and unpaved roads inside the Project area.
- Operation of generators and different types of machineries.
- Stockpile of sand, stone, debris etc.

Land development and excavation works of the Project site. Since maximum project works are limited to day time, the pollutants increases during day time and reduces during night time. Therefore, the collective pollution concentration for each of the criteria pollutants represent the average values for 24 hrs. Moreover, frequent rainfall is also responsible for washout of air pollutants of the Project air shed. However, the ambient air pollutants were found within the standard limit as set by the DoE. The Project authority should take further necessary action, such as, use of dust musk for the labour during working at the construction site.

Figure 3.1: Ambient Air Quality Monitoring

3.2 Water Quality Monitoring Results and Discussion

AS per EMP and EIA approval condition, “the Project Authority will not use ground water during construction as well as operation purposes of the Power Plant.” Therefore, BHEL has to use desalinized Passur river water during this construction stages of the Power Plant. Accordingly, a small scale RO desalinization Plant near the BHEL office had been operated to supply drinking water to the officials and labours. Additionally, a large scale desalinization Plant

based on Reverse Osmosis (RO) technology has been established near the proposed Jetty of the Project and is under operation for supplying the water for construction at site.

This desalinization RO technology based Plant is also used for supplying drinking water for the labours as well as officials working at site.

At present, a number of temporary drainage network are being developed for discharging storm water into the adjacent river. During the dry days, this storm water are re-used for sprinkling or curing purpose. As mentioned earlier, during this 6th monitoring program three samples were collected, one from RO technology based Water Treatment Plant discharge outlet, one from storm water discharge outlet and one from drinking water outlets from Plant jetty site for analysis.

Figure 3.2: In-situ parameters Testing

Figure 3.2a: Storm Discharge Water Sample Collection

Figure 3.2b: Storm Discharge Water Outlet

The analysis results has been presented in **Table 3.2**, **Table 3.3, Table 3.4** and **Table 3.5**.

Table 3.2: Discharge Water Quality Monitoring Result (RO Discharge Point)

Parameters	1st MM Result (April 2018)	2nd MM Result (May 2018)	3rd MM Result (June 2018)	4th MM Result (July 2018)	5th MM Result (August 2018)	6th MM (September 2018)	ECR , 1997 for Inland SW	IFC 2007, Effluent Guidelines	Remarks
Temp (^{0}C)	30.8	32.1	34.32	32.04	31.81	31.5	40^0 (Summer)	3^0 at the edge of the mixing zone	
pH	7.7	7.9	7.86	8.71	8.43	7.73	6-9	6-9	
EC (µS/cm)	28,000	48,800	30,700	1180	577.00	498.00	1200	-	
TDS (mg/L)	14,000	24,600	18,040	757	369.00	319.00	2100	-	
DO(mg/L)	4.50	4.90	4.34	7.86	7.32	6.84	4.8-8	-	
BOD_5 (mg/L)	2.30	2.41	2.0	1.0	1.0	1	50	30*	
COD (mg/L)	417.25	520	480	4	4	4	200	125*	
TH (mg/L)	4,900	5,220	4520	300	240	240	-	-	
Cl^- (mg/L)	514	14,500	11800	225	105	140	600	-	
SO_4^{2-} (mg/L)	1209	1520	1360	43	16	53	-	-	
PO_4^{3-} (mg/L)	0.299	0.450	2.06	0.35	0.53	0.22	-	2*	
NO_3^- (mg/L)	5.07	5.40	3.2	2.1	3.0	2.9	10	10*	
Salinity (ppt)	15.80	25.80	19	0.6	0.3	2.7	-	-	
Turbidity (NTU)	13.00	10.60	10.7	41.9	28.90	12.6	-	-	

Source: CEGIS 2018

Note: WQ – Water Quality; SW – Surface Water; MM: Monthly monitoring

*Sanitary Sewage Discharges of IFC, 2007

It has been observed that the discharge from RO Plant near the jetty site contains EC and TDS relatively lower than the previous month's data. Results of all the parameters are found within the standard limit.

Table 3.3: Storm Water Discharge Quality Monitoring Result

Parameters	3rd MM Result (June 2018)	4th MM Result (July 2018)	5th MM Result (August 2018)	6th MM (September 2018)	ECR , 1997 for Inland SW	IFC 2007, Effluent Guidelines	Remarks
Temp (^{0}C)	31.98	35.8	32.67	31.02	40 (Summer)	3 at the edge of the mixing zone	
pH	8.16	7.94	7.56	7.80	6-9	6-9	
EC (µS/cm)	1190	12,500	3830	823	1200	-	
TDS (mg/L)	593	7,780	2450	519	2100	-	
DO(mg/L)	4.63	6.84	6.89	6.92	4.8-8	-	
BOD_5 (mg/L)	2.0	3	12	4		30*	
COD (mg/L)	8.0	16	50	1		125*	
TH (mg/L)	300	3900	655	765		-	
Cl^- (mg/L)	290	3850	880	1360		-	
SO_4^{2-} (mg/L)	69	750	190	480		-	
PO_4^{3-} (mg/L)	1.91	0.37	0.43	0.36		2*	
NO_3^- (mg/L)	5.6	4.2	3.3	0.40		10*	
Salinity (ppt)	0.6	7.1	2.00	0.40		-	
Turbidity (NTU)	334	89.3	15.30	11.6		-	

Source: CEGIS 2018

Note: WQ – Water Quality; SW – Surface Water; MM: Monthly monitoring

**Sanitary Sewage Discharges of IFC, 2007*

Rainfall runoff from the project site is noted as storm water discharge. It contains project site washout i.e. solid waste, liquid waste. No national or international standard has been fixed for storm water discharge quality. Since, this storm water was released from the Project Site, the standard for effluent has been used for compliance. **Table 3.3** shows the storm water discharge quality. EC and TDS value of storm water discharge have been found lower than the previous month as well as within the standard values (ECR 1997). Discharge from construction waste water, batching Plant water, washing water, curing water, subsurface water increases the EC, TDS and salinity of the storm water discharge.

Drinking water is supplied to the workers continuously. The labours usually take their required drinking water from the RO supply line established at Jetty location. **Table – 3.4a** shows the quality of drinking water supplied to the labours for first four months are appended.

Table 3.4a: Drinking Water Quality Monitoring Result (Near Jetty Area)

Parameters	1st MM Result (April 2018)	2nd MM Result (May 2018)	3rd MM Result (May 2018)	5th MM Result (August 2018)	6th MM (September 2018)	ECR , 1997 standard for Drinking Water
Temp (^{0}C)	31.8	31.70	31.86	31.63	30.2	20-30
pH	8.7	8.97	8.8	8.09	8.7	6.5-8.5
EC (µS/cm)	70.50	176.00	272	13.00	54.25	-
TDS (mg.L-1)	34.80	87.00	135	9.00	26.14	1000
DO (ml.L^{-1})	4.10	5.14	4.5	7.56	7.10	6
BOD_5 (ml.L^{-l})	2.10	2.08	1	1	8.00	2.0
COD (ml.L^{-1})	bdl	4.00	4	4	3.00	4
TH (mg.L^{-1})	bdl	105.00	220	115	120.00	200-500
Cl^- (mg.L^{-1})	102.80	36.00	70	10	11.00	150-600
SO_4^{2-} (mg.L^{-1})	11.65	4.00	2	1	1.00	400
PO_4^{3-} (mg.L^{-1})	0.0795	0.18	0.66	0.50	0.23	6
NO_3^- (mg.L^{-1})	1.83	0.10	0.4	2.1	1.70	10
Salinity (ppt.)	1	0.20	0.1	0.00	0.21	-
Turbidity (NTU)	5.08	8.81	9.6	10.00	4.02	10

Source: CEGIS 2018

Note: WQ – Water Quality; SW – Surface Water; MM: Monthly monitoring

**Sanitary Sewage Discharges of IFC, 2007, bdl- beyond detectable limit; MM: Monthly monitoring*

The drinking water quality is good as the parameters results are well within the standard limit except the BOD, pH and Temperature, which is slightly higher. However, EC, TDS, Chloride, Phosphate and Total Hardness (TH) values are recorder within the standard limit. Necessary steps should be taken to reduce the BOD, pH and temperature of the drinking water. Water quality data from RO supply Plant located near the BHEL office has been presented in **Table-3.4b** where the water quality data for first two months and 4th months (July, 2018) are appended.

Table 3.4b: Drinking Water Quality Monitoring Result (Near BHEL Office)

Parameters	1st MM Result (April 2018)	2nd MM Result (May 2018)	4th MM Result (July 2018)	ECR , 1997 for Drinking Water
Temp (^{0}C)	32	31.96	33.93	20-30
pH	8.3	9.11	6.08	6.5-8.5
EC (µS/cm)	47.40	122.00	1	-
TDS (mg.L-1)	23.8	60.00	0	1000
DO (ml.L^{-1})	4.00	5.08	7.63	6
BOD_5 (ml.L^{-l})	2.20	2.31	1	2.0
COD (ml.L^{-1})	bdl	4.00	4	4
TH (mg.L^{-1})	bdl	110.00	105	4

Parameters	1st MM Result (April 2018)	2nd MM Result (May 2018)	4th MM Result (July 2018)	ECR , 1997 for Drinking Water
Cl^- ($mg.L^{-1}$)	70.90	15.00	10	150-600
SO_4^{2-} ($mg.L^{-1}$)	8.34	7.00	1	400
PO_4^{3-} ($mg.L^{-1}$)	0.0476	0.27	0.25	6
NO_3^- ($mg.L^{-1}$)	2.99	3.00	4.6	10
Salinity (ppt)	0	0.10	0	-
Turbidity (NTU)	6.18	5.97	0.001	10

Source: CEGIS, 2018

bdl- beyond detectable limit; MM: Monthly monitoring

3.3 Ambient Noise Level Monitoring Results and Discussion

Ambient noise level has been monitored at 10 locations in and around the Project area which are shown in **Figure 2.1a** and **Figure 2.1b**. The locations were selected based on the sensitivity of the areas and potentiality of the impact magnitude. Noise level monitoring results of the ambient noise are shown in **Table 3.5.** Results were recorded from 10 locations during both the day and night time as the equivalent noise level (Leq) in dBA scale.

Table 3.5: Ambient Noise Level from In and Around the Project Site

Location Name	Types of Area	Time	Noise Level dB(A) Leq (1st MM)	Noise Level dB(A) Leq (2nd MM)	Noise Level dB(A) Leq (3rd MM)	Noise Level dB(A) Leq (4th MM)	Noise Level dB(A) Leq (5th MM)	Noise Level dB(A) Leq (6th MM)	ECR 2006 dB(A) Leq	IFC 2007 dB(A) Leq	Remark
Jetty Site NL-1	Industrial	D	59.3	59.0	66.6	62.5	61.0	52.9	75	70	Movement of Vehicles, Noise from Water Treatment Plant and Air quality machine running etc.,
		N	55.0	66.9	47.3	58.6	59.2	53.3	70	70	Movement of Vehicles, Noise from Water Treatment Plant and Air quality machine running etc.,
Township Construction Area NL -2	Industrial	D	59.5	55.5	56.6	62.9	59.3	62.9	75	70	Noise generated due to construction

Location Name	Types of Area	Time	Noise Level dB(A) Leq (1st MM)	Noise Level dB(A) Leq (2nd MM)	Noise Level dB(A) Leq (3rd MM)	Noise Level dB(A) Leq (4th MM)	Noise Level dB(A) Leq (5th MM)	Noise Level dB(A) Leq (6th MM)	ECR 2006 dB(A) Leq	IFC 2007 dB(A) Leq	Remark
											activities, Vehicle movement, Human chattering etc.
		N	55.3	63.3	66.6	69.3	63.1	59.1	70	70	Noise generated due to construction activities, Vehicle movement, Running of generators etc.
Construction Area NL-3	Industrial	D	58.7	68.8	70	73.6	67.0	60.7	75	70	Noise generated due to construction activities, Vehicle movement (e.g. crane, trucks, lorries etc.), Running of generators etc.
		N	63.2	70.3	51.3	61.4	62.8	56.4	70	70	Noise generated due to construction activities, Vehicle movement (e.g. crane, trucks, lorries etc.) Human chattering etc.
Labor Shed (Area) NL-4	Residential	D	58.2	65.6	49.6	57.5	54.1	50.0	55	55	Vehicle movement, Human chattering etc.
		N	44.4	59.9	60.6	61.1	61.9	69.0	45	45	Generator noise,

Location Name	Types of Area	Time	Noise Level dB(A) Leq (1st MM)	Noise Level dB(A) Leq (2nd MM)	Noise Level dB(A) Leq (3rd MM)	Noise Level dB(A) Leq (4th MM)	Noise Level dB(A) Leq (5th MM)	Noise Level dB(A) Leq (6th MM)	ECR 2006 dB(A) Leq	IFC 2007 dB(A) Leq	Remark
											Human chattering, Vehicle movement etc.
Near Entrance Gate in front of Health Care Center NL-5	Commercial Area	D	59.6	60.6	62.5	63.6	51.5	60.6	70	70	Noise generated from Vehicle movement and Human chattering
		N	49.2	52.8	57.3	64.7	65.2	60.9	60	70	Vehicle movement, Wind blowing and Running of construction machine
North-East corner of the PB NL-6	Industrial	D	53.8	51.6	45.3	46.6	44.5	52.4	75	70	Construction works noise (such as lifting and dampening), noise generated from low lift pump etc.
		N	45.9	49.7	48.3	54.8	46.0	46.8	70	70	Movement of vehicles and construction noise
South – West Corner NL-7	Industrial	D	60.6	55.8	44.5	53.2	53.0	52.3	75	70	Movement of river vessel and vehicles, construction noise,
		N	53.5	52.4	49.7	55.9	51.5	57.7	70	70	Pile driving activities, noise from cement mixing machines, vehicular movements etc.
North west corner of the Project boundary	Industrial	D	49.8	54.4	57.4	59.5	62.5	49.2	75	70	Noise generated due to construction

Location Name	Types of Area	Time	Noise Level dB(A) Leq (1st MM)	Noise Level dB(A) Leq (2nd MM)	Noise Level dB(A) Leq (3rd MM)	Noise Level dB(A) Leq (4th MM)	Noise Level dB(A) Leq (5th MM)	Noise Level dB(A) Leq (6th MM)	ECR 2006 dB(A) Leq	IFC 2007 dB(A) Leq	Remark
NL-8											activities and vehicular movement
		N	63.4	50.5	42.3	62.0	49.4	46.8	70	70	Noise generated due to construction activities and vehicular movement
Major construction Area NL-9	Industrial	D	58.5	71.1	66.8	72.1	70.0	72.5	75	70	Noise generated from pile driving activities, crane operation, bulldozing activities and running of generators.
		N	55.1	73.3	61.5	70.3	66.2	65.2	70	70	Construction works and Vehicular movement.
Near BIFPCL Area NL-10	Commercial	D	62.8	62.8	59.9	51.3	62.4	45.6	70	70	Vehicular movement Nearby construction works, Human passing by, Wind blowing etc.
		N	49.4	51.1	45.9	55.7	56.4	54.0	70	70	Vehicular movement, noise of nocturnal animals (such as, insects and frogs)

Source: CEGIS, 2018

Massive civil construction activities and mechanical construction are being carried out by BHEL as per design and stipulated time schedule. The sources of noise has been identified and presented in **Table 3.5.** The construction activities, vehicular movement, running of generator, Crain activities, soil compaction machineries, Excavators activity and wind blowing

are major sources of noise generation. As seen from the above Table, noise level at labour shed areas exceeded the standard limit during night time. It has been observed that the noise level near the labour shed areas (NL-4) were slightly higher at night time with respect to the national and international standard limit. Operation of generator, construction works and vehicular movement are responsible for increasing noise level at labour shed. Moreover, construction of labour camp is responsible for increasing the noise level at the labour camp area. Proponent was informed about this and suggestions were given to implement the use of ear-muffs by the labourers during construction activities.

Figure 3.3: Ambient Noise Level Monitoring during Day Time

Figure 3.4: Ambient Noise Level Monitoring during day time

4. Follow-up Action Required

The monitoring activities have been performed independently in order to capture the worst case scenarios of the vital environmental parameters. The result of the environmental parameters shows that the overall values are within the standard limit in general as per ECR 2006 and IFC 2007, except few indicators for water quality and night time noise level in the labour shed area and near the entrance gate in front of Healthcare Centre, which surpasses both the national and international standard. In order to reduce the pollution and noise level in the coming months BHEL should adopt following measures immediately.

- Ensuring more safety training to the labours.
- Ensuring the use of ear plugs/ ear muffs by the labours for long time exposure at the construction sites;
- Ensuring the management and reuse of the RO Plant rejected water e.g. brine water after necessary treatment using Solvay process before the dry period; and
- Ensuring the continuation of the best working and safety practises at construction sites.

Annex-I

Compliance monitoring Form for 2x660 MW MSTPP, Rampal, Bagerhat

BIFPCL

Book No. _____ **Monitoring Report No.**_____

Date: _____ **Time:** _____

Location Id/GPS point: _____

Weather Condition: _____

Name of the Investigator: _____ **Signature:** _____

A	Monitoring	Description of equipment/ Indicators	Standard/ Situation	Observed Situation ($\mu g/m^{3)}$	Deviation / Change (± %)	Performance/ Comments	Remarks
Checking of the Equipment							
1	Air quality measuring instrument	i. Respirable Dust Sampler (Model-Envirotech India APM-460 BL) ii. Fine Particulate Sampler	1. CO (8hrs)- (10000µg/m^3-ECR)) 2. Oxides of Nitrogen (NOx)- 100 µg/m^3 (Annual)- ECR; [200 (1-Hr)- IFC] 3. Ozone (O_3)- 157 µg/m^3 (8 Hrs.)-ECR; 160-(IT-1), 100- (8-hr)-IFC 4. $PM_{2.5}$-65 µg/m^3-ECR; 75 (IT-1) , 25 (24 hr)-IFC	**AQ-1 (Labor Shed):** a. SO_2 = 6.6 b. NO_x = 7.6 c. SPM= 94.7 d. PM_{10} = 85.6 e. $PM_{2.5}$ = 19.8 f. CO = 23 g. O_3 = 08 **AQ-2 (Jetty area):** a. SO_2 = 6.2	N/A	**AQ 1-** Within the standard limit **AQ 2-** Within the standard limit **AQ 3-** Within the standard limit	

A	Monitoring	Description of equipment/ Indicators	Standard/ Situation	Observed Situation (µg/m$^{3)}$	Deviation / Change (± %)	Performance/ Comments	Remarks
		(Model-Envirotech India APM-550) iii. Metravi CO-10 meter and Tongdy O_3 Monitor	5. PM_{10}-150 µg/m^3-ECR; 150 (IT-1), 50 (24 hr)-IFC 6. SPM- 200 µg/m^3 (8 Hrs.)-ECR; Oxides of Sulfur (SOx)-365 µg/m^3	b. NO_x = 7.5 c. SPM= 89.7 d. PM_{10} = 73.1 e. $PM_{2.5}$ = 13.8 f. CO = 27 g. O_3 = 06 **AQ-3(Major Construction area):** a. SO_2 = 10.8 b. NO_x = 11.7 c. SPM= 102.5 d. PM_{10} = 95.0 e. $PM_{2.5}$ = 24.9 f. CO = 19 g. O_3 = 04			
2	Water quality measuring instrument	**HORIBA U-50 Multi-meter and Lab Analysis**	**Standard (Effluent Guidelines)** a. Temperature.=3^{0}C at the age of the mixing zone, IFC2007; 40^{0}C (ECR, 1997) b. pH=6-9 (ECR , 1997;IFC,2007) c. EC=1200 (µS/cm) (ECR , 1997) d. TDS=2100 mg/L(ECR,1997) e. DO=4.8-8 (mg/L) (ECR,1997)	**WQ-1 : RO Discharge Water** a. Temp = 31.50 (^{0}C), b. pH = 7.73 c. EC = 498 (µS/cm) d. TDS = 319 (mg/L) e. DO = 6.84 (mg/L) f. BOD_5 = 1.0 (mg/L) g. COD = 4 (mg/L) (std. 125, IFC-2007) h. TH = 240 (mg/L) i. Cl^- = 140 (mg/L) j. SO_4^{2-} = 53 (mg/L) k. PO_4^{3-} = 0.22 (mg/L) l. NO_3^- `= 3.0(mg/L)	N/A	**WQ -1** All of the parameter within the standard limit.	

A	Monitoring	Description of equipment/ Indicators	Standard/ Situation	Observed Situation (µg/m$^{3)}$	Deviation / Change (± %)	Performance/ Comments	Remarks
			f. BOD_5=50 (mg/L) (ECR,1997)/30 (mg/L) (IFC, 2007) g. COD=200 mg/L (ECR, 1997)/125 (mg/L) (IFC, 2007). h. TH=N/A Cl^- =600 mg/L (ECR, 1997) i. SO_4^{2-} =N/A j. PO_4^{3-} = 2 mg/L(IFC, 2007) k. NO_3^- =10 mg/L (ECR, 1997) l. Salinity= N/A m. Turbidity=N/A **Drinking water standard** a. Temp =20-30 (^{0}C) b. pH=6.5-8.5 c. EC=N/A d. TDS =1000 (mg/L) e. DO=6.00 (mg/L) f. BOD_5 =0.20 (mg/L) g. COD =4 (mg/L) h. TH=4 (mg/L) i. Cl^- =150-600 (mg/L) j. SO_4^{2-} =400 (mg/L) k. PO_4^{3-} =6 (mg/L) l. NO_3^- =10 (mg/L) m. Salinity =0 (ppt) n. Turbidity=10 (NTU)	m. Salinity = 2.9 (ppt.) n. Turbidity = 12.60 (NTU) **WQ-2: Drinking Water** a. Temp = 30.2 (^{0}C) b. pH = 8.7 c. EC = 54.25 (µS/cm) d. TDS = 26.14 (mg/L) e. DO = 7.10 (mg/L) f. BOD5 = 8 (mg/L) g. COD) = 3.00 (mg/L) h. TH = 120.00 (mg/L) i. Cl^- = 11.00 (mg/L) j. $SO4^{2-}$ = 1.00 (mg/L) k. $PO4^{3-}$= 0.23 (mg/L) l. NO^{3-} = 1.70 (mg/L) m. Salinity = 0.21 (ppt.) n. Turbidity = 4.02 (NTU) **WQ-3: Storm Water Discharge** a. Temp = 31.02 (^{0}C) b. pH = 7.80 c. EC = 823 (µS/cm) d. TDS = 519 (mg/L) e. DO = 6.92 (mg/L) f. BOD_5 = 4 (mg/L) g. COD = 1 (mg/L) h. TH= 765 (mg/L)		**WQ-2** All the analyzed results of the parameter were found within the standard limit except Temperature, and Hardness **WQ-3** All the analyzed results of the parameter were found within the standard limit Except EC and TDS	Necessary action should be taken for reducing the Temp and Hardness in Drinking water Temporary Storm water storage might be mixed with river water results slightly increasing of EC & TDS

A	Monitoring	Description of equipment/ Indicators	Standard/ Situation	Observed Situation (µg/m$^{3)}$	Deviation / Change (± %)	Performance/ Comments	Remarks
				i. Cl^- = 1360 (mg/L) j. SO_4^{2-} = 480 (mg/L) k. PO_4^{3-} = 0.36 (mg/L) l. NO_3^- = 0.40 (mg/L) m. Salinity = 0.40 (ppt) n. Turbidity= 11.60 (NTU)			value than standard
3	Noise quality measuring instrument	Kanomax Sound level meter-MODEL 4431	1. std. ECR 2006, day= 75dB(A),Night=70 dB(A) IFC2007, day=70 dB(A), night=70 dB(A) 2. std. ECR 2006, day= 75 dB(A),Night=70 dB(A) IFC2007, day=70 dB(A), night=70 dB(A) 3. std. ECR 2006, day= 75 dB(A),Night=70 dB(A); IFC2007, day=70 dB(A), night=70 dB(A) 4. std. ECR 2006, day= 55 dB(A),Night=45 dB(A);IFC2007, day=55 dB(A), night=45 dB(A) 5. std. ECR 2006, day= 70 dB(A),Night=60 dB(A);IFC2007, day=70 dB(A), night=70 dB(A)	1. Jetty Site NL-1, Day = 52.9 dB(A), Night = 53.3 dB(A) 2.Township Construction Area NL -2, Day = 62.9 dB(A), Night = 59.1 dB(A) 3. Construction Area NL-3, Day = 60.7 dB(A), Night = 56.4 dB(A) 4. Labor Shed (Area) NL-4, , Day = 50.0 dB(A), Night = 69.0 dB(A) 5. Near Entrance Gate in front of Health Care Center-NL-5, Day = 60.6 dB(A), Night = 60.9 dB(A) 6. North-East corner of the PB	N/A	All values were within standard limit except in the construction yard and labor shed area, where it exceeded the standard limit (for both day and night time)	Construction works at the major construction site have been running in full swing. The labor shed has also been in construction stages. Therefore, the noise level was slightly higher than the standard. The labors should use ear plug at construction site during long time exposure.

A	Monitoring	Description of equipment/ Indicators	Standard/ Situation	Observed Situation (µg/m3)	Deviation / Change (± %)	Performance/ Comments	Remarks
			6. std. ECR 2006, day= 75 dB(A),Night=70 dB(A);IFC2007, day=70 dB(A), night=70 dB(A) 7. std. ECR 2006, day= 75 dB(A),Night=70 dB(A); IFC2007, day=70 dB(A), night=70 dB(A) 8.. std. ECR 2006, day= 75 dB(A),Night=70 dB(A); IFC2007, day=70 dB(A), night=70 dB(A) 9. std. ECR 2006, day= 75 dB(A),Night=70 dB(A); IFC2007, day=70 dB(A), night=70 dB(A) 10. std. ECR 2006, day= 70 dB(A),Night=60 dB(A); IFC2007, day=70 dB(A), night=70 dB(A)	NL-6, Day = 52.4 dB(A), Night = 46.8 dB(A) 7. South –West Corner NL-7, Day = 52.3 dB(A), Night = 57.7 dB(A) 8. North west corner of the Project boundary NL-8, Day = 49.2 dB(A), Night = 46.8 dB(A) 9. Major construction Area NL-9, Day = 72.5 dB(A), Night = 65.2 dB(A) 10. Near BIFPCL Area NL-10, Day = 45.6 dB(A), Night = 54.0 dB(A)			
Activities of monitoring							
4	Digital process and online system						
5	Documentation/ archiving the monitoring data						
6	Number of						

A	Monitoring	Description of equipment/ Indicators	Standard/ Situation	Observed Situation (µg/m$^{3)}$	Deviation / Change (± %)	Performance/ Comments	Remarks
	accidental events						
7	Sampling of biota to the susceptible zone						
8	LCA of bio indicators						
9	Toxicity magnitude						
10	Behavioral/ attitude in all changes of fauna						
11	Performance of the Ecosystem management plan						
Interrogating to the investigator							
12	Regularity and authenticity check						
13	Continuation of training and capacity building and awareness, motivational program						
14	Ensure PEPs, ISO standards and ILL during operation of the projects						
15	Ensure the social development program and CSR during the operation of the project						
Interviews of the stakeholders							
16	Socio-economic						

A	Monitoring	Description of equipment/ Indicators	Standard/ Situation	Observed Situation ($\mu g/m^{3)}$	Deviation / Change (± %)	Performance/ Comments	Remarks
	Progress investigation						
17	Assessing Environmental pollution related problems						
18	Assess the changes of bio-diversity and ecosystem fragility						
19	Achievement of the social development program						
20	Checking of the Proper implementation of the EMP						

B. EVALUATION (of any of above points)

C. STEPS To Be TAKEN:

Non Compliance	Action	Tine Frame
1. Minor:		
2. Moderate:		
3. Major:		
4. Critical:		