



**Bangladesh – India Friendship Power Company (Pvt.) Limited**  
**(A Joint Venture of NTPC Ltd. and BPDB)**

*Monitoring of Environment Parameter and Implementation of Environmental Management Plan during Construction Period along with Engineering Activities for 2X660 MW Maitree Super Thermal Power Project at Rampal in Bagerhat District*

## **29<sup>th</sup> Quarter Monitoring Report**

**Monitoring Period: May – July 2021**

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**November 2021**



Monitoring of Environment Parameter and Implementation of Environmental Management  
Plan during Construction Period along with Engineering Activities  
for 2x660 MW Maitree Super Thermal Power Project at Rampal, Bagerhat

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## Abbreviations and Acronyms

|            |  |
|------------|--|
| AAS        | Atomic Absorption Spectrophotometer  |
| AECL       | Adroit Environment Consultants Ltd   |
| As, Pb, Hg | Arsenic, Lead and Mercury  |
| BCSIR      | Bangladesh Council of Scientific and Industrial Research   |
| BDS        | Business Development Studies   |
| BIFPCL     | Bangladesh-India Friendship Power Company (Pvt.) Limited   |
| BOD        | Biochemical Oxygen Demand  |
| BPDB       | Bangladesh Power Development Board   |
| BUET-BRTC  | Bangladesh University of Engineering and Technology - Bureau of Research, Testing and Consultation |
| CDM        | Clean Development Mechanism  |
| CEGIS      | Center for Environmental and Geographic Information Services                                       |
| COD        | Chemical Oxygen Demand   |
| CPUE       | Catch per Unit Effort  |
| CSR        | Corporate Social Responsibility  |
| dBH        | Diameter at Breast Height  |
| DCR        | Duplicate Carbon Receipt   |
| DO         | Dissolved Oxygen   |
| DoE        | Department of Environment  |
| DPHE       | Department of Public Health Engineering  |
| EC         | Electrical Conductivity  |
| ECR        | Environment Conservation Rules   |
| EHS        | Environmental Health Safety  |
| EIA        | Environmental Impact Assessment  |
| EMP        | Environmental Management Plan  |
| EPC        | Engineering Procurement Construction   |
| ESP        | Exchangeable sodium percentage   |
| FGD        | Focus Group Discussion   |
| FGD        | Flue Gas Desulfurization   |
| FSR        | Fisheries Species Richness   |
| GIS        | Geographic Information System  |
| GoB        | Government of Bangladesh   |
| GPS        | Global Positioning System  |

|        |   |
|--------|---|
| GW     | Groundwater                                       |
| HS     | Household Survey                                  |
| IFC    | International Finance Corporation                 |
| IGA    | Income Generation Activities                      |
| ISO    | International Organization for Standardization    |
| IUCN   | International Union for Conservation of Nature    |
| Kg     | Kilogram  |
| KII    | Key Informants Interview                          |
| MoPEMR | Ministry of Power, Energy and Mineral Resources   |
| MW     | Mega Watt   |
| MSDS   | Materials Safety Data Sheet                       |
| NTPC   | National Thermal Power Corporation                |
| OHSAS  | Occupational Health and Safety Management Systems |
| PCU    | Passenger Car Unit                                |
| PGCB   | Power Grid Company of Bangladesh Ltd              |
| PMU    | Project Management Unit                           |
| PRA    | Participatory Rural Appraisal                     |
| PWD    | Public Works Department                           |
| QMR    | Quarterly Monitoring Report                       |
| RRA    | Rapid Rural Appraisal                             |
| RS     | Remote Sensing                                    |
| SAR    | Sodium absorption ratio                           |
| SRDI   | Soil Resources Development Institute              |
| SRF    | Sundarbans Reserve Forest                         |
| TDS    | Total Dissolved Solid                             |
| TH     | Total Hardness                                    |
| ToR    | Terms of References                               |
| TSS    | Total Suspended Solid                             |
| USEPA  | United States Environmental Protection Agency     |
| VOC    | Volatile Organic Compounds                        |

## Units

|          |                    |
|----------|--------------------|
| dB       | Decibel            |
| hr       | Hour               |
| Kg       | Kilogram           |
| Km       | Kilometre          |
| KV       | Kilo Volt          |
| KW       | Killo Watt         |
| m        | Meter              |
| mg       | Milligram          |
| MW       | Mega Watt          |
| Nm       | Normal Meter       |
| ppm      | parts per million  |
| ppt      | parts per trillion |
| ton/year | Ton Per Year       |
| s        | Seconds            |

## Units Conversion Table

### General Units

1°C = 274.15 K=33.8° F  
1 hectare = 10<sup>-2</sup> km<sup>2</sup> = 2.471 acres  
1 kilogram = 2.20 pound  
1 kilometre = 0.62137 mile  
1 liter = 0.001 cubic meter  
1 meter = 3.2808 feet  
1 metric ton = 1000 kg  
1 mg/L ≈ 1 g/m<sup>3</sup> ≈ 1 ppm (w/w)  
1 mg/m<sup>3</sup> = 1 µg /L  
1 pascal = 1 N/m<sup>2</sup> = 0.01 millibar  
1 square mile = 640 acre = 2.590 km<sup>2</sup>

### Energy Units

1 GWyr = 8.76 x 10<sup>9</sup> kW  
1 horsepower = 746 W  
1 KWh = 3412 Btu  
1 kWh = 859.85 kcal  
1 KWh = 3.6 x 10<sup>6</sup> J  
1MW=1000KW=10<sup>6</sup>W



## Glossary

|                        |  |
|------------------------|--|
| <i>Aman:</i>           | Group of rice varieties grown in the monsoon season and harvested in the post-monsoon season. This is generally transplanted at the beginning of monsoon from July-August and harvested in November-Dec. Mostly rain-fed, supplemental irrigation needed in places during dry spell. |
| <i>Aus:</i>            | Group of rice varieties sown in the pre-monsoon season and harvested in the monsoon season. These are broadcasted/transplanted during March-April and harvested during June-July. Generally, rain-fed, irrigation needed for HYVT. (High yield variety) Aus.                         |
| <i>B Aus:</i>          | Broadcast Aus  |
| <i>Bazar:</i>          | Market   |
| <i>Beel:</i>           | A saucer-shaped natural depression, which generally retains water throughout the year and in some cases seasonally connected to the river system.  |
| <i>Boro:</i>           | A group of rice varieties sown and transplanted in winter and harvested at the end of the pre-monsoon season. These are mostly HYV and fully irrigated, planted in December-January and harvested before the onset of monsoon in April- May.   |
| <i>Haat:</i>           | Market place where market exchanges are carried out either once, twice or thrice a week, however not every day.  |
| <i>Gear/Jaal:</i>      | Different types of fishing net to catch fish from the water bodies.  |
| <i>Kutchra:</i>        | A house made of locally available materials with earthen floor, commonly used in the rural areas.  |
| <i>Khal:</i>           | A drainage channel usually small, sometimes man-made through which the water flows. These may or may not be perennial.   |
| <i>Kharif:</i>         | Pre-monsoon and monsoon growing season. Cropping season linked to monsoon between March-October, often divided into kharif-1 (March-June) and kharif-2 (July-October).   |
| <i>Perennial Khal:</i> | Water available in the khal all the year round.  |
| <i>Pacca:</i>          | Well-constructed building using modern masonry materials.  |
| <i>Rabi:</i>           | Dry agricultural crop growing season; mainly used for the cool winter season between November and February.  |
| <i>Seasonal Khal:</i>  | Water not available in the khal all the year round.  |
| <i>T. Aman:</i>        | Transplanted Aman  |
| <i>Upazila:</i>        | Upazila is an administrative subdivision of a District.  |



## Executive Summary

This 29<sup>th</sup> quarterly monitoring report covers the status of EMP (Environmental Management Plan) implementation for the concurrent period (during construction stage) as recommended in the EIA (Environmental Impact Assessment) study of power plant vide Memo No: DoE/Clearance/5062/2011 dt. 05/08/2013 as well as EIA report of Coal Transportation vide Memo No: DoE/Clearance/5532/2016 dtd.31/01/2018. During the month of August, 2021 CEGIS team carried out the monitoring activities covering every monitoring aspects as assigned in the ToR (Terms of Reference) and approval conditions of DoE along with valuable suggestions and recommendations from different national and international organizations. In other words, the aspects can briefly be addressed as monitoring of the Environmental Compliances and monitoring of the selected environmental parameters such as ambient air quality, noise level, water quality, land resource, traffic management status, water resources management status, agricultural resources monitoring, fisheries resources, Socio-economic monitoring, aquatic & terrestrial ecosystem monitoring and the Sundarbans Reserve Forest (SRF) health monitoring.

However, the present environmental compliance monitoring includes the status of EMP implementation based on physical observation, investigation and interviews/discussion to the proponents and project officials, contractor or sub-contractors, or relevant authorities. A comprehensive due diligence checklist was prepared to monitor the environmental compliance of different components e.g., Environmental and Social Management System and Action Plan; Labour and Working Condition; Community Health, Safety and Security; Biodiversity and Sustainable Management of Living Natural Resources.

The construction works is running amply amid the COVID situation. Most of the mechanical and electrical construction works are progressively installing. The Boiler, Turbine hall and Generator, cooling tower, Chimney and FGD, ESP, WTP, Ash silo, 275 m chimneys, Jetty area, covered coal storage, covered coal conveyer system, township area, internal road networks, permanent drainage networks are developing. EPC contractor i.e. Bharat Heavy Electricals Limited (BHEL) employed different local specialized sub-contractor i.e. KELLER, AFCON, POWER MAC etc. for progressing the construction works simultaneously.

The bridges and culvert area of the approach road is completed and extends up to the Block-B. Permanent entrance gate of the MSTPP power plant structure has been placed at the security check point. The main Administrative centre of BIFPCL and EPC contractor were shifted to the newly constructed buildings and accommodation facilities for the maximum professionals of BIFPCL has been made available to the newly constructed township named Padma Abason. According to the project planning, the first unit of Maitree Super Thermal Power plant would be in operation stage by September, 2021. But unfortunately, the COVID-19 outbreak has retarded the project progress up to June, 2022. Though, the project work was almost halted at the end of the March, 2020, it came into full pace in July, 2020. But, the second lockdown again slowed down the construction works. However, the construction activities are being continues within the project site by strictly maintaining the Government Decision on COVID Guidelines. EPC tried to expedite the contractors and sub-contractors for completion of the project works within the stipulated timeframe maintaining the instruction and health safety guideline of the existing pandemic.

In course of air quality monitoring it was observed that the concentration of major air pollutants was found comparatively lower in the Sundarbans area than that of other monitoring locations during the monitoring period. But due to the seasonal effect the concentration of the particulate matter was found to be slightly higher at Khan Jahan Ali Bridge area comparable to the standards set by DOE. However, major sources of criteria pollutants in and around the project site as observed were the piling activities, digging, tunnelling and burrowing works, jetty erection activities, major construction works, dust from unpaved roads and vehicle movement, construction materials and goods transportation activities through the roads and river Passur etc. Other sources of pollutants which may contribute to the existing pollution load are the small industries like cement works and refinery industries etc., diffuse sources like wood stoves, fires, and wind

generated dust etc.

Again, in course of the noise level monitoring it was found that, the noise levels at two commercial zones namely Chalna bazar (Dacope) and Khan Jahan Ali Bridge (toll office of Khan Jahan Ali Bridge) were as 51.21 dB(A) and 52.38 dB(A) respectively. On the other hand, the observed noise levels at NW Corner of the Project area (Kaigar Daskati), Chunkuri-2 (Bajua), SW corner of the project area (Moidara) and Proposed Township area (Shapmari) were recorded as 50.11 dB(A), 50.36 dB(A), 51.90 dB(A) and 53.84 dB(A) respectively. However, in effect it can be said that the Noise levels were found within the standard limit at all the locations. However, the noise generation sources in the study area can mainly be divided into two types; one is natural and the other one is anthropogenic. Natural sources of noise generation were birds' chirping, stormy wind, wave breaking on the shoreline, howling of leaves and so on. On the other hand, traffic mobilization, industrial activities, vessels movement within the rivers and local vehicles were the anthropogenic sources of noise.

In course of water quality monitoring it was observed that the Passur River is highly influenced by tidal effects. Tidal penetration in the Passur River depends on seasonal change, upstream flow and catchment water discharge. However, the physico-chemical properties of Passur River changes with the tidal intrusion in different seasons. In this 29<sup>th</sup> quarterly monitoring, pH was found slightly acidic in nature. Salinity during monsoon has been recorded significantly lower than the pre-monsoon and winter seasons. Temperature and dissolved oxygen level was found in fair and favourable for the aquatic life forms. In this 28<sup>th</sup> quarter (pre-monsoon, 2021), TDS and TH has been relatively lower with respect to the same seasons of last consecutive years. TSS of the rivers was also recorded lower than the previous year of pre-monsoon seasons. High COD was found in all the monitoring stations. Nitrate ( $\text{NO}_3^-$ ) level remained relatively lower. Sulphate concentration should be re-investigate after getting the data from future quarterly monitoring season.

The phosphate ( $\text{PO}_4^{3-}$ ) was found significantly high concentration in respect to the safe limit of aquatic organisms. In case of metal pollution, no variation was recorded for As, Pb and Hg concentration and even no issues as well. Oil & grease concentration was found less than 2.0 mg/L except Hiron Point (3.2 mg/L) which is even less than the recommended concentration (10 mg/L) for Inland Surface Water. No TOC and PAH issues were raised so far in the Passur-Sibsa RS. In course of groundwater quality monitoring it was found that the Groundwater quality is still in good condition with slight variation in pH and salinity. The reason being saline water intrusion and infiltration due to excessive withdrawn of groundwater by the surrounding communities during the dry season. In addition, evaporation also responsible for this slight salinity in groundwater. Project activities are not related to this sort of changes in salinity.

Chemical characteristics of the groundwater quality are also found relatively good but exceeded on the permissible limit for Bangladesh (Drinking water standards, ECR 1997). All the monitoring samples certainly exceeded the TH and COD standard guideline, the observed groundwater is completely free from the metal pollution particularly Lead and Mercury. As pollution was recorded at Kapashdanga monitoring station during the April, 2021. Out of 28 monitoring seasons, only three As became an issue temporarily with slightly higher concentrations than the drinking standards.

On the other hand, according to the soil analysis report, salinity of the monitoring plots were decreasing. Mono valent cations concentration (specially Na) was found to be decreased in most of the cases. pH was also found to be decreased. Organic matter concentration was found to be decreased in four locations and increased in two (Chunkuri-2 and kapalirmet). Cadmium concentration was found to be nil while lead concentration was observed to be decreased at all locations. Agricultural and livestock data was not collected during this monitoring field visit as per TOR obligation. Next survey will be conducted in October, 2021 and report will be incorporated accordingly. During the monitoring period sediment samples were collected from selected sampling locations during this monitoring field visit. These samples have been sent to BCSIR for analysis. The analysis data will be incorporated with next monitoring report.

Similar to the earlier months monitoring report Khulna Mongla Road at Khudir Bottola received the highest traffic volume compared to the other two locations namely Khulna Mongla Road at Gonai Bridge and



Powerplant access road at Gonabelai Bridge. It is to be mentioned here during the morning time traffic volume at Khudir Bottola was found to be higher during morning time and lower in the noon and evening time compared to the previous monitoring period. On the other hand, Khulna Mongla Road at Gonai Bridge and Power Plant access road at Gonabelai Bridge received similar kind of traffic volume compared to the previous monitoring period. One of the key factors behind this heavy traffic volume at Khulna Mongla Road at Khudir Bottola is the rigorous and heavy construction works of the Power Plant. Moreover, restriction on movement due current pandemic situation has been lifted up by the government. This could be another contributing factor for higher traffic volume in that area.

Monitoring of fisheries resources was conducted at 13 sampling sites and out of these sites, effective samplings were done at eight (08) sites whereas fishing in other sites across the river course were not observed. Amongst the effective sites, five (05) were in the river and three (03) were in the country side (shrimp farms). Changes in habitat uses were observed in every past fiscal year along with the current one and the changes were mainly due to biophysical changes like tidal effect, forest erosion and vegetation coverage, seasonal variability, food availability and also fisheries management practices.

Moreover, through analysing the type of habitat uses by different age group of fish species (based on the length-based community structure model) two types of habitats were found i.e. spawning and nursery ground and ground for maturation and feeding. Shannon-Weiner diversity index was observed to be varied among all the quarters of the monitoring tiers. Highest Shannon-Weiner index was found at at Mongla Point (0.85) indicating most evenly distributed fish species. On the contrary, lowest evenness was found at Akram point (0.49). However, maximum FSR was recorded at Harbaria (n=13), while very low FSR was recorded at Maidara Point (n=1). During the 29<sup>th</sup> quarter of monitoring shows that Juvenile were dominant at Mongla and Akram Point but adult age group were dominant at Maidara, Harbaria and Charaputia. Fish species like Silonda, Ilish, Poma and Phelsa attain the maximum abundance among the migratory fish species observed in the 29th quarter of monitoring. The present study revealed that the highest catch susceptibility was also found in case of Charpata Jal (5.6 kg/haul) and the highest productivity was found at Harbaria followed by Charaputia point and Maidara River.

In course of ecological monitoring it was found that vegetation composition, plant diversity, vegetation canopy status, plant health, bird habitat status, dolphin occurrence in river systems were monitored for this monitoring season. A total no. of 30 tree species was recorded from all the monitoring sites with Shanon-Winner diversity index of 1.27 which denotes that the diversity was decreasing and happened due to human interventions like land feeling and tree felling by the home owners. Canopy status of two studied homestead vegetation has been improved for expansion of branches of new planted trees. Plant health has slightly deteriorated at Rajnagar and Kalekarber sites due to same causes for deterioration of vegetation canopy status. The most affected tree species is date palm and coconut. On the other hand, occurrences of dolphin revealed lower than previous monitoring all the surveyed river/khal reaches due to seasonal effects, hindrance of visibility for heavy rainfall.

Various bio-indicators such as tree growth, species diversity, seedling regeneration capacity, phenmetaphore occurrence, crab hole density, canopy cover changes, Leaf Area Index, leaf phenology, pest and diseases, soil physical and chemical properties were observed in the permanent sample plots (PSPs) along the Passur River over the time for monitoring the Sundarbans Reserve Forest (SRF) Health. Monitoring results showed that Gewa (*Excoecaria agallocha*) was the dominant species among all the PSPs followed by Sundari (*Heritiera fomes*) and Kakra (*Bruguiera gymnorhiza*). Species diversity indices shows that sample plots of Karamjol has more diversity compare to other PSPs. When similarity in species composition was considered, Akram point and Hiron point got similar species composition comparing to Sutarkhali, Karamjol and Harbaria. No significant variation was observed in tree growth, pneumatophores density, crab hole density, canopy cover changes, Leaf Area Index and canopy cover over the monitoring period for all the PSPs. Tree diameter was observed higher in Karamjol whereas lower at Hiron Point. However, there is no significant tree growth declining trend was observed. Pneumatophores density was comparatively very low in Akram point whereas highest in karamjol PSPs. Akram point canopy cover was lower compare to the rest of PSPs canopy cover percentage. However, no significant variations among sites

were observed. Seedling and crab hole density among the studied plot was mostly similar but less in Akram point because of low seedling recruitment and survival rate. Among all the PSPs, highest crab holes were observed at Akram point whereas Hiron point got the lowest number of crab holes. In case of Leaf Area Index (LAI), there was no significant variation observed among the sites. No severe pest and disease attack were observed in the monitoring PSPs except top dying symptom of Sundari (*Heritiera fomes*). Phenological changes were not observed in all PSPs. Overall, it can be said that forest health along the Passur River is in stable condition (i.e. no detrimental condition) except top dying of Sundari (*Heritiera fomes*) tree species.

Moreover, in order to monitor the Socio-economic status physical observation, consultation and informal interview were used as tools for collecting information. About 30% local labours got working opportunities based on their skills that made a positive attitude towards the project. The PMU trained the labour force to obey and maintain the health safety rules. Regular tool box training is held before starting work to improve the working condition. Debriefing session is also held with the BIFPCL to monitor the noncompliance issues. Furthermore, labor sheds was found clean with adequate toilet facilities, drainage, and waste management and drinking water facilities. The PMU made a special medical unit to provide medical facilities due to Covid 19 and total of six (6) oxygen cylinders and medicines were brought to meet the emergency situation for covid patients. Again, a mini hospital equipped with ICU bed and permanent doctor was also inaugurated by the PMU.

Local communities were not facing any kind of problems due to the construction activities as listened. Plantation program is being continued to improve the greenbelt around the project boundary as well as within the project area. Under the CSR programs, medical campaigns at the community and labour colony are being held regularly and people received free treatment facilities. Additionally, wheel chair and school KIT distribution were arranged under the CSR of MSTPP.

# 1. Introduction

## 1.1 Background

The scope of works as assigned has provisioned to monitor the environmental components, social indicators and the implementation status of EMP (Environmental Management Plan) during the construction phase of 2x660 MW Maitree Super Thermal Power Plant. As an independent environmental monitoring agency, CEGIS was engaged for conducting the said activities in accordance with the Power Plant EIA approval condition no. 32 and Coal Transportation EIA approval condition no.17.

The location of 2x660 MW MSTPP project encompasses Sapmari, Katakhal and Kaigar Daskati Mauza of Rajnagar Union under Rampal Upazila of Bagerhat District (**Figure 1.1**). The Power Plant lies in between latitude 22° 37' 0" N and 22° 34' 30" N and longitude 89° 32' 0" E and 89° 34' 5" E. The Plant site is located at about 23 km south from the Khulna City and near about 14 km from the north-west direction of nearest tip of the Sundarbans (considering the proposed chimney location). Location of the study area along with the distance from World heritage sites are presented in **Figure 1.1**.

The study area includes: i) Area covering 10 km radius from the Plant location, ii) Area within 5 km strip from both banks of the Passur river starting from the Plant site to Hiron point (**Figure 1.2**). As per the contract, the findings of the previously formulated quarterly monitoring reports have been submitted to BIFPCL.

Monitoring of Environmental parameters and associated data collection is being continued considering the spatial as well seasonal variations. However, in August, 2021 CEGIS team has carried out the 29<sup>th</sup> quarterly monitoring activities covering all the preselected monitoring parameters and locations instead of conducting in July, 2021 due to the lockdown situation prevailed across the country.

## 1.2 Objectives

The prime objectives of the study are:

- To monitor the important environment and social parameters during construction phase of the Power Plant and
- To monitor, the environmental compliances regarding EMP implementation during Power Plant's construction works and associated activities.

## 1.3 Criteria for Selection of Monitoring Sites/Locations

The monitoring sites have been selected considering the sensitivity and the ambience of the surroundings likely to be impacted from the Project related activities which includes-

- Wind speed and direction, sensitive receptors in and around the vicinity of the project site for monitoring the ambient air quality. Potential areas are also identified and selected for noise level monitoring likely to be impacted by the project activities. Similarly, sites for water quality monitoring were selected considering the water resources (Maidara and other nearer water bodies, Passur River from Chalna to Hiron Point) likely to be impacted by the project activities.
- Potential locations for fisheries resources monitoring are selected considering the fish habitats, biodiversity, migration and production zones likely to be impacted by the project activities.
- Monitoring locations for ecosystem and biodiversity, Soil and land resources were selected considering the induced impacts of the Project related activities on the project surrounding areas.

- Monitoring of socio-economic conditions of the PAPs (Project Affected Peoples) and project surrounding communities are being carried out on the basis of their circumstances likely to be transformed and /or altered by the project activities.
- Locations for Sundarbans Reserve Forest (SRF) Health Monitoring were selected considering the potential access routes of coal transportation through Sundarbans Forest area and associated activities for different phases of the power plant development and operation which may have significant effects on Sundarbans's flora and fauna.
- Monitoring aspects for Environmental compliances regarding EMP implementation status in and around the project area has been set as per suggestions made in the EIA reports and approval conditions from DoE of both the Power Plant and Coal transportation studies respectively for ensuring environmental sustainability and social acceptability.



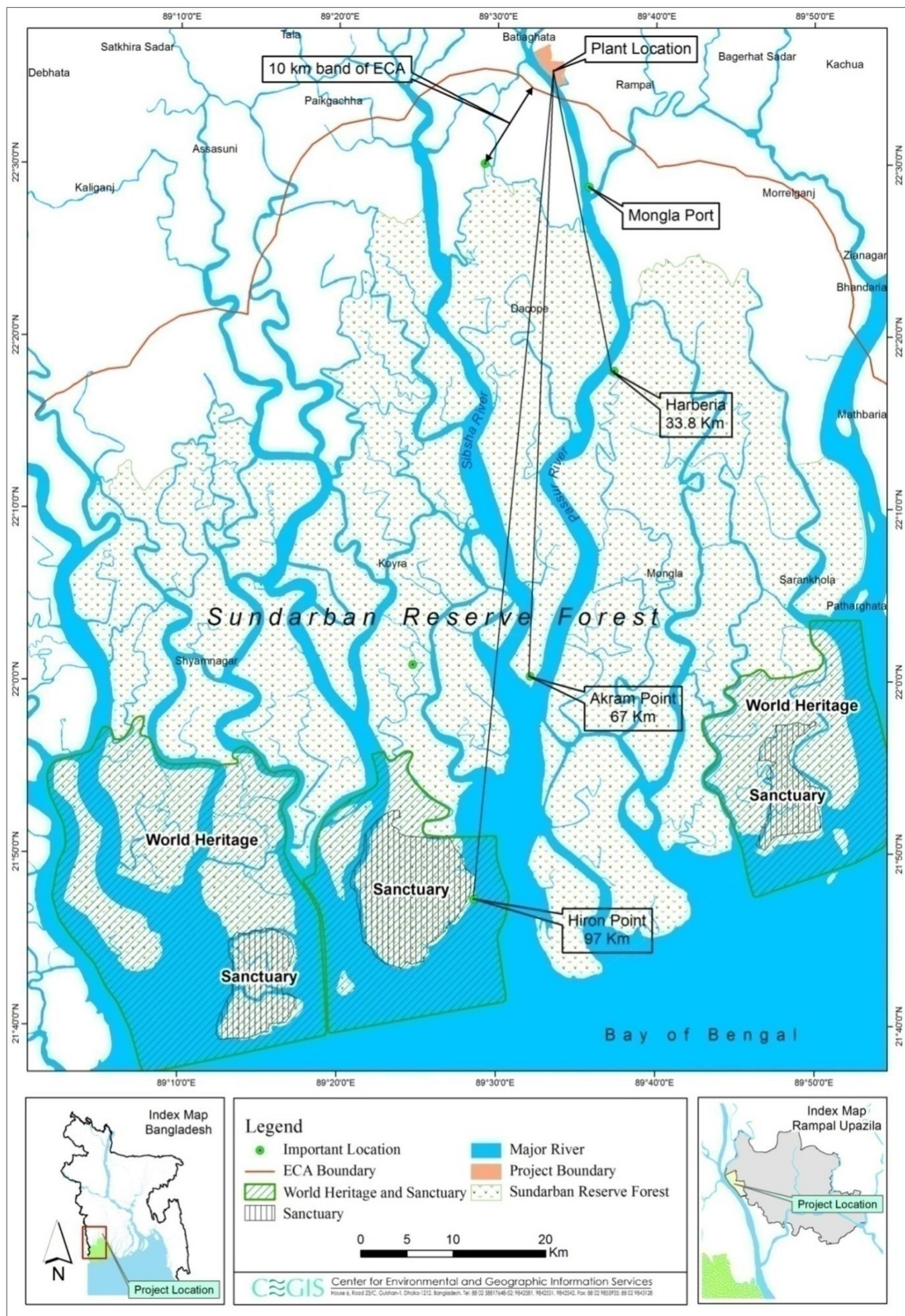


Figure 1.1: Location Map of the Study Area



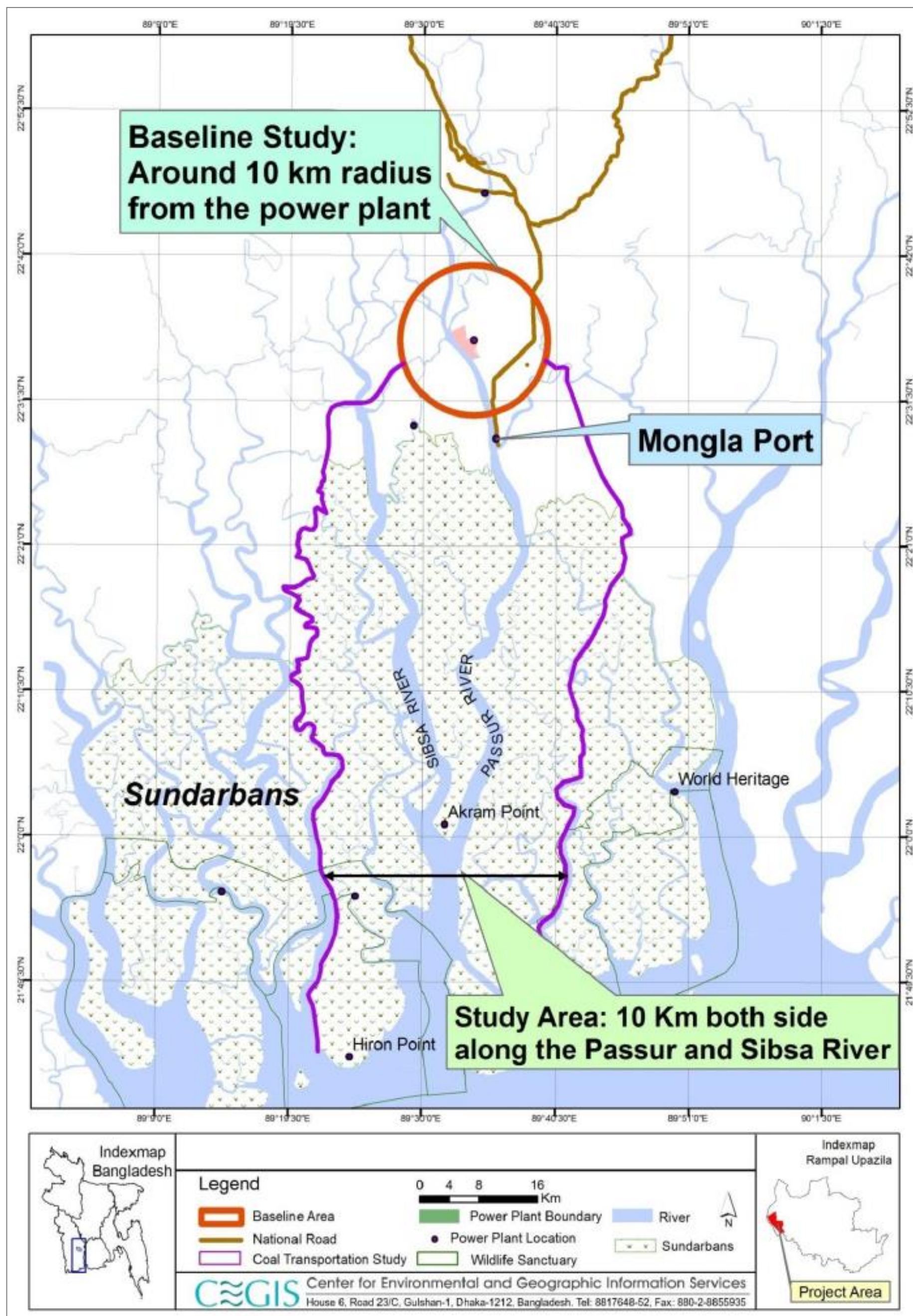


Figure 1.2: AOI of Environmental and Socio-economic Monitoring

## **1.4 Main Stakeholders**

### **1.4.1 Forest Department**

Monitoring of the Sundarbans Reserve Forest area need to be addressed as the conditions set out by the DoE. Hence, permission from the Forest Department is essential to carry out the said activities. The Forest Department has been providing the permission under certain conditions i.e. keeping close communication with the Forest Department, submission of the monitoring reports to the Forest Department along with the following activities:

- Inclusion of a Soil Scientist and a Botanist in the monitoring team,
- Monitoring of regeneration, in growths (seedlings), diseases and pests (if necessary, to carry out laboratory analysis),
- Monitoring of soil nutrients (macro, micro) and heavy metals,
- Monitoring of floral diversity, species richness and dominance,
- Measurement of carbon content both above and below the ground level,
- Assessment of impact on canopy cover, leaves phenology, flowers behaviour, pneumatophore and crab hole conditions.

However, BIFPCL forwards each copy of the earlier quarterly monitoring reports to the Chief Conservator of Forest, Bangladesh Forest Department, Agargaon, Dhaka and Conservator of Forest, Khulna Circle, Boyra, Khulna. Similarly, the report of 29<sup>th</sup> quarterly monitoring will also be forwarded to the same officials of the corresponding Departments.

### **1.4.2 Department of Environment (DoE)**

The monitoring plans, indicators, parameters, location have been selected and arranged by incorporating the suggestion(s) and approval condition(s) from both the Power Plant EIA study and Coal Transportation EIA study. The BIFPCL forwards the monitoring reports and data to DoE on a regular basis (Monthly and Quarterly). The monitoring reports are also presented to the Environmental Clearance Committee of the DoE during renewal of the site clearance. In addition, one representative from the local DoE office is involved in each monitoring visit to accompany the monitoring team.

### **1.4.3 Bangladesh India Friendship Power Company (Pvt.) Limited (BIFPCL)**

Bangladesh India Friendship Power Company (Pvt.) Limited (BIFPCL) is the Project Proponent of the proposed Power Project. The official(s) of BIFPCL has been assisting the study team from the beginning of the study. In addition, BIFPCL is thus far implementing the Environmental Management Plan (EMP) for ensuring environmental and social safeguarding of the Project surroundings including the Sundarbans Reserve Forest.

### **1.4.4 Local Community**

The Project Affected Peoples (PAPs) has been included in each of the social environment-monitoring program. The changes in important socio-economic indicators were examined through Focus Group Discussions (FGDs), Key informant interview(s) and other informal discussions with the local people in different locations of the project influenced area.

### **1.4.5 Major Component of Monitoring Study**

The Physical, Biological and Social aspects are monitored on regular basis and this quarterly monitoring report is furnished with the following subsequent chapters-

- Physical Environment covers monitoring of air quality, noise level, water quality, Soil and land resources, traffic management and the morphological study;
- Biological environment covers monitoring of fisheries resources, ecological resources and the Sundarbans Reserve Forest (SRF) health conditions;
- Socio-economic environment covers compensation, resettlement/rehabilitation, project related employment generation, labour and working condition, community health, security and safety, along with corporate social responsibilities.
- Environmental compliances monitoring includes Monitoring of Environmental and Social Management System Action Plan Implementation; Labour and working conditions; Community health, safety & security and Monitoring of biodiversity and sustainable management of living natural resources in and around the project area.



## 2. Physical Environment

### 2.1 Air Quality

Air is considered as one of the major environmental components and in this connection the parameters and monitoring locations of air quality were selected considering the major effects to be exerted by the power project activities during pre-construction, construction and operation stages. However, during the recent visit, all the preselected parameters and locations were monitored at locations to see if any major changes occurred due to concurrent construction and supporting erection activities of the project.

#### 2.1.1 Methodology

In general, Particulate Matters (i.e., PM<sub>2.5</sub>, PM<sub>10</sub>, and SPM), SO<sub>x</sub>, NO<sub>x</sub>, CO and O<sub>3</sub> are expected to be generated from the Power Plant activities at its different phases i.e. pre-construction, construction and operation. The monitoring locations as well as the indicators were selected during the EIA study based on a number of selected criteria e.g., the sensitivity of the receptors, project activities like movement of coal-carrying vessels, coal trans-shipment point; wind speed, wind direction, atmospheric deposition (Wet and Dry) and atmospheric stability classes etc. A comprehensive discussion on the recently assessed air quality is reported in the following sections.

#### 2.1.2 Method of Sampling and Laboratory Testing

Respirable Dust Sampler (Model-Envirotech India APM-460 BL) and Fine Particulate Sampler (Model-Envirotech India APM-550) were used to collect air samples from the selected sites. The PM<sub>2.5</sub>, PM<sub>10</sub>, and SPM were tested by gravimetric method. The concentration was analyzed by West-Gaeke method. Likewise, the concentration of NO<sub>2</sub> was tested by Jacob and Hochheiser method and concentration of CO and Ozone (O<sub>3</sub>) were measured by Metravi CO-10 meter and Tongdy O<sub>3</sub> Monitor respectively.

#### 2.1.3 Pollution Sources in the Sundarbans

The key sources of air pollution to the Mongla Port Area and project site are: the cement factories, non-regulated mechanized boats, cargo vessels and ships and other commercial activities. The non-regulated ships, mechanized boats, cargo vessels plying through the Sundarbans Reserve Forest (SRF) in connection with the Mongla Port operation, fishing activities, honey, Golpata and timber collection, tourism, etc. may be big sources of air pollutants i.e., Particulate matters (PM<sub>2.5</sub>, PM<sub>10</sub> and SPM), Oxides of Sulphur (SO<sub>x</sub>), Oxides of Nitrogen (NO<sub>x</sub>) and Green House Gases (GHGs) in the forest area. However, an inventory of the existing emission types and sources for the study area has been provided in **Table A2 of Appendix IV**.

#### 2.1.4 Monitoring Locations

Air quality is generally monitored at the fixed locations for each of the monitoring quarters. As per recommendations of DoE, two additional locations were included along with the existing monitoring locations. The air quality monitoring activities are shown in **Figure 2.1** and monitoring locations are shown in **Figure 2.2**. Details of the monitoring plan are attributed in **Table 2.1**.



Figure 2.1: Acquisition of Air Quality Monitoring data

Table 2.1: Air Quality Monitoring Plan

| Sl. No. | Monitoring Indicators   | Locations  | GPS Points                     | Frequency                | Methods/ Tools/ Techniques  |
|---------|---|--|--------------------------------|--------------------------|---|
| 1       | Particulate Matter (PM <sub>2.5</sub> , PM <sub>10</sub> and SPM) SO <sub>x</sub> , NO <sub>x</sub> , CO and O <sub>3</sub> . | South West corner of the Project boundary                              | 89°33'34.5"E;<br>22°34'33.8"N  | Each Quarter of the year | Method of testing PM <sub>2.5</sub> : Gravimetric   |
| 2       |   | Proposed township area near Chimney location, Mauza: Sapmari Katakhal. | 89°32'3.8"E;<br>22°36'32.5"N   |                          | Method of testing PM <sub>10</sub> : USEPA (1997) Method 201 or 201A (as appropriate)                                   |
| 3       |   | North West corner of the Project boundary (Kaigar Daskati)             | 89°33'51.8"E;<br>22°36'1.06"N  |                          | Method of testing SO <sub>x</sub> : USEPA (2000) Method 6 or 6A or 6B or ISO (1998)                                     |
| 4       |   | Barni, Gaurambha Union (4km North East from the chimney location)      | 89°34'37.7"E;<br>22°38'51.8"N  |                          | Method 11632 (as appropriate)   |
| 5       |   | Chunkuri-2, Bajua Union (4km South West from the chimney location)     | 89°34'01.1"E;<br>22°32'3.3"N   |                          | Method of testing NO <sub>x</sub> : USEPA (2000) Method 7, 7A, 7B, 7C, 7D, or ISO (1993) Method 10396 (as appropriate). |
| 6       |   | Pankhali, Dacope, (4km North West from the Chimney location)           | 89°31'24.2"E;<br>22°36'6.7"N   |                          |   |
| 7       |   | Mongla Port Area   | 89°35'50.4"E;<br>22°28'24.8"N  |                          |   |
| 8       |   | Harbaria, Sundarbans   | 89°35'34.2"E<br>22°17'43.1"N   |                          |   |
| 9       |   | Akram point, Sundarbans  | 89°30'54.1"E<br>22°23'50"N     |                          |   |
| 10      |   | Hiron Point, Sundarbans  | 89°27'53.2"E;<br>21°46'27.60"N |                          |   |
| 11      |   | Khulna city near Khan Jahan Ali Bridge                                 | 89°35'35.5"E;<br>22°46'36.8"N  |                          |   |
| 12      |   | Project site-1 (Proposed Township area)                                | 89°33'13.7"E<br>22°35'43"N     |                          |   |
| 13      |   | Access road bridge area  | 89°35'16.49"<br>22°34'37.11"N  |                          |   |



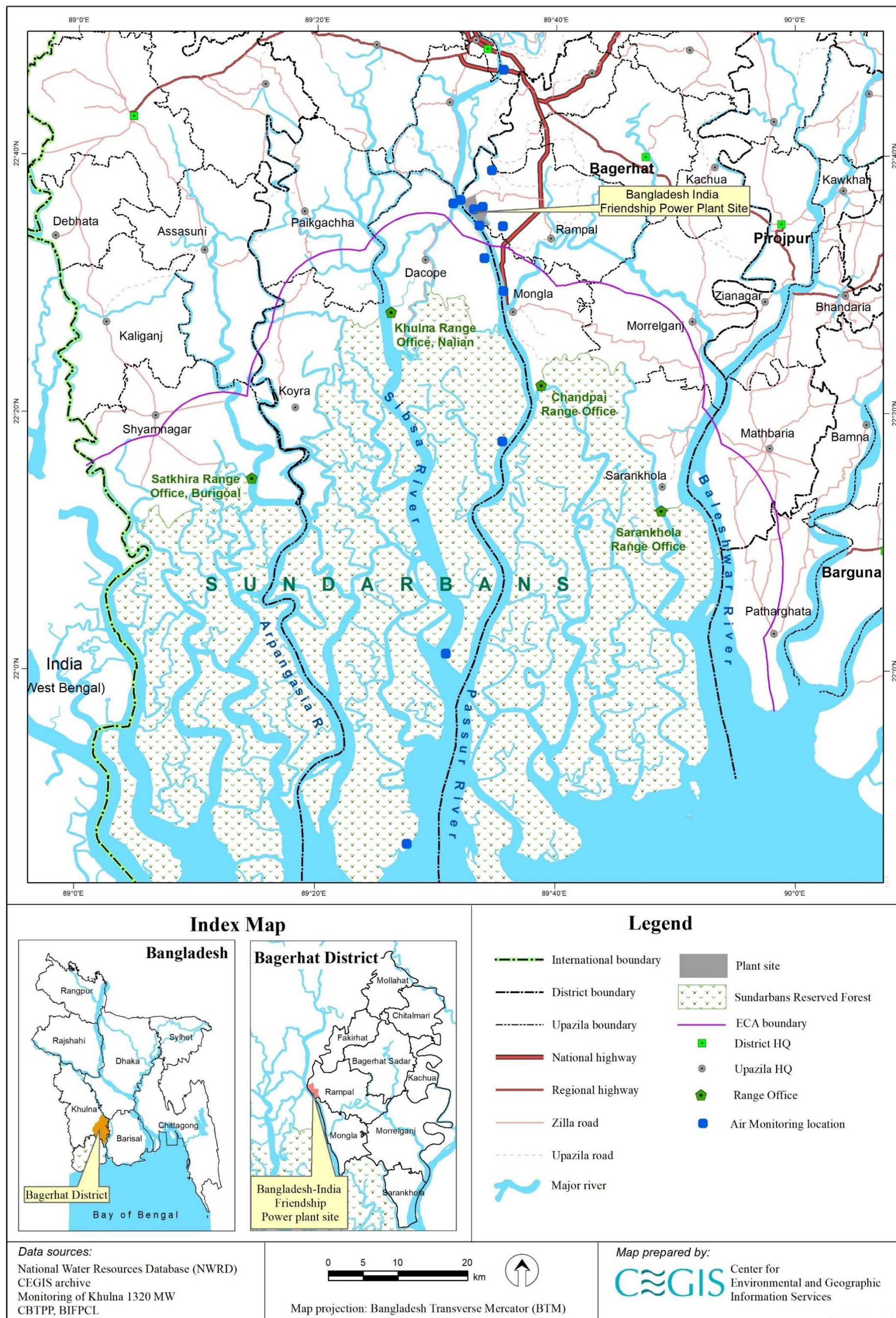


Figure 2.2: Air Quality Monitoring Locations





### 2.1.5 Status of Air Quality

In general, air quality is expressed in terms of the standards set forth for public health and welfare protection (against decreased visibility and damage to human being, animals, crops, vegetation etc.). The concentrations of the criteria pollutants along with the air pollution emission standards set by DoE are listed in **Table 2.2**.

During this monitoring tier, the maximum value ( $59.16 \mu\text{g}/\text{m}^3$ ) of  $\text{PM}_{2.5}$  was found at Township area of Power Plant whereas the minimum value ( $21.8 \mu\text{g}/\text{m}^3$ ) was recorded at Gaurambha area. The recorded values were found to be within the standard limit (ECR' 2005 i.e.  $65 \mu\text{g}/\text{m}^3$ ). On the other hand,  $\text{PM}_{10}$  concentration was found highest ( $96.05 \mu\text{g}/\text{m}^3$ ) at Taltola bazar (Approach road bridge near cyclone shelter) area and lowest ( $48.19 \mu\text{g}/\text{m}^3$ ) at Kaigardashkathir Char area. Similarly, the concentration of SPM was found higher at Township area ( $158.28 \mu\text{g}/\text{m}^3$ ) whereas, the minimum concentration ( $77.19 \mu\text{g}/\text{m}^3$ ) was observed at Kaigardashkathir Char area. However, in order to minimize the particulate matter concentration inside the power plant, the authority may take the necessary initiatives e.g. continuous or periodic water spraying on the connected road networks inside the power plant area, install water sprinkler system at the prominent infrastructures like office areas, township area etc., strictly maintain the vehicular speed at the sensitive areas and maintain the EMPs as stated in the EIA study of the power plant.

Then again, the concentration of Sulphur dioxide ( $\text{SO}_2$ ) in ambient air was found much lower than the Bangladesh standard limit of ( $365 \mu\text{g}/\text{m}^3$ ) at all the sampling locations. Among those, the maximum concentration ( $19.72 \mu\text{g}/\text{m}^3$ ) was found at Township area of Power plant while the minimum concentration ( $10.28 \mu\text{g}/\text{m}^3$ ) was recorded at Mongla area. Similarly, the values of  $\text{NO}_x$  were also observed well below than the Bangladesh standard value of  $100 \mu\text{g}/\text{m}^3$ . Maximum concentration ( $27.29 \mu\text{g}/\text{m}^3$ ) during this monitoring period was found Township area of Power plant area whereas the lowest concentration ( $18.66 \mu\text{g}/\text{m}^3$ ) was recorded at Bajua bazar area. The contributor of such  $\text{NO}_x$  emission may be from local human hauler, car, bus etc. and  $\text{SO}_2$  emission from industrial activities like brickworks, cement works, etc. in that area.

Furthermore, the maximum values of CO and  $\text{O}_3$  were measured at Khan Jahan Ali bridge area ( $4 \mu\text{g}/\text{m}^3$ ) and Township area ( $92 \mu\text{g}/\text{m}^3$ ) respectively though the results were found much lower than the standard value ( $10,000 \mu\text{g}/\text{m}^3$  and  $157 \mu\text{g}/\text{m}^3$ ) respectively set in ECR' 2005. From the measured values, it can be concluded that effect of seasonal variations on the surrounding environment may be the prominent reason for increasing/decreasing of the concentrations of the criteria pollutants for the corresponding air sheds. All the monitoring results are attached in **Table A1 of Appendix IV**. The baseline emissions scenarios are appended in **Table A2 of Appendix IV**.

Table 2.2: Air Quality Monitoring Results (29<sup>th</sup> Quarterly Program)

| Sl. No. | Location  | PM <sub>2.5</sub> (µg/m <sup>3</sup> ) |      | PM <sub>10</sub> (µg/m <sup>3</sup> ) |      | SPM (µg/m <sup>3</sup> ) |      | SO <sub>x</sub> (µg/m <sup>3</sup> ) |      | NO <sub>x</sub> (µg/m <sup>3</sup> ) |      | CO (mg/ m <sup>3</sup> ) |      | O <sub>3</sub> (ppb) |      |
|---------|---|--|------|---------------------------------------|------|--------------------------|------|--------------------------------------|------|--------------------------------------|------|--------------------------|------|----------------------|------|
|         |   | Value                                  | STD* | Value                                 | STD* | Value                    | STD* | Value                                | STD* | Value                                | STD* | Value                    | STD* | Value                | STD* |
| 1       | South West corner of the Project boundary (Maidara)                     | 38.25                                  | 65   | 59.17                                 | 150  | 99.44                    | 200  | 14.49                                | 365  | 19.87                                | 100  | 1                        | 10   | 42                   | 157  |
| 2       | North-east corner of the project boundary (Sapmari)                     | 41.2                                   | 65   | 64.28                                 | 150  | 116.48                   | 200  | 11.77                                | 365  | 21.94                                | 100  | 1                        | 10   | 28                   | 157  |
| 3       | North-west corner of the Project boundary (Kaigardaskati)               | 22.66                                  | 65   | 48.19                                 | 150  | 77.19                    | 200  | 13.58                                | 365  | 20.49                                | 100  | 1                        | 10   | 17                   | 157  |
| 4       | Barni, Gaurambha union<br>(4km North East from the chimney location)    | 21.8                                   | 65   | 50.26                                 | 150  | 83.2                     | 200  | 14.44                                | 365  | 19.48                                | 100  | 0                        | 10   | 19                   | 157  |
| 5       | Chunkuri-2, Bajua Union<br>(4km South West from the chimney location)   | 33.27                                  | 65   | 61.9                                  | 150  | 104.29                   | 200  | 15.98                                | 365  | 18.66                                | 100  | 0.8                      | 10   | 11                   | 157  |
| 6       | Pankhali (Chalna), Dacope<br>(4km North West from the Chimney location) | 32.45                                  | 65   | 74.89                                 | 150  | 118.4                    | 200  | 14.61                                | 365  | 20.27                                | 100  | 1                        | 10   | 10                   | 157  |
| 7       | Mongla Port Area  | 25.54                                  | 65   | 54.86                                 | 150  | 85.2                     | 200  | 10.28                                | 365  | 19.73                                | 100  | 2                        | 10   | 23                   | 157  |
| 8       | Harbaria, Sundarbans  | 34.94                                  | 65   | 61.53                                 | 150  | 108.74                   | 200  | 14.75                                | 365  | 23.28                                | 100  | 1                        | 10   | 9                    | 157  |
| 9       | Akram point, Sundarbans   | 39.16                                  | 65   | 76.18                                 | 150  | 123.59                   | 200  | 16.55                                | 365  | 21.18                                | 100  | 2                        | 10   | 11                   | 157  |
| 10      | Hiron Point, Sundarbans   | 25.3                                   | 65   | 59.7                                  | 150  | 94.7                     | 200  | 13.92                                | 365  | 20.06                                | 100  | 0                        | 10   | 14                   | 157  |
| 11      | Khulna city near Khan Jahan Ali Bridge                                  | 29.47                                  | 65   | 64.44                                 | 150  | 101.85                   | 200  | 12.73                                | 365  | 20.45                                | 100  | 4                        | 10   | 21                   | 157  |
| 12      | Project site-1 (Township area)  | 59.16                                  | 65   | 94.56                                 | 150  | 158.28                   | 200  | 19.72                                | 365  | 27.29                                | 100  | 1                        | 10   | 92                   | 157  |
| 13      | Access road bridge area   | 52.18                                  | 65   | 96.05                                 | 150  | 151.29                   | 200  | 13.26                                | 365  | 20.11                                | 100  | 2                        | 10   | 16                   | 157  |

Source: CEGIS field survey; STD\*-Standard

### Seasonal variations among the air quality parameters

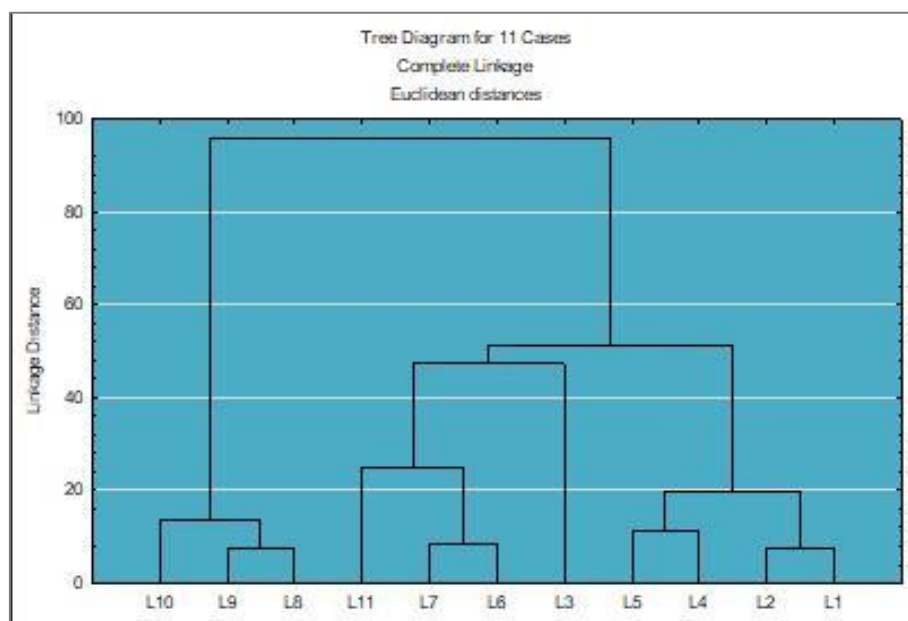
The values of all the criteria pollutants as averaged for the corresponding locations were found to be higher in Khan Jahan Ali Bridge area than the other locations in all seasons but lower in project influence area and lowest in the Sundarbans reserve Forest (SRF) area. On the other hand, the concentration of the measured parameters was found to be higher in winter seasons of the monitoring periods except for SO<sub>x</sub>, NO<sub>x</sub> and and were found to be higher in monsoon periods and CO concentration was found to be higher in post monsoon seasons. It can be mentioned here that the concentration was always observed to be much lower in SRF area than the other areas and never exceeded comparing to the standards set by DoE (ECR, 1997) (Figure 2.3). Seasonal variations of the previously monitored data are as followings-



Figure 2.3: Seasonal Variation of the Air Quality Parameters

## Cluster analysis

Cluster analysis was performed to identify the grouping pattern of the criteria pollutants along with their corresponding locations. Euclidean distances were observed to measure the distances among the objects using as variables (annual average concentrations of the seven studied variables for every station). According to the dendrogram (**Figure 2.4.**) Hiron point (L10), Akram Point (L9) and Harbaria (L8) represents the locations of minimum pollution level situated inside the Sundarbans Forest area and are away from the nuclei of Mongla industrial zone and the project site. On the other hand, Chalna (L6), Mongla Ghat (L7) and Khan Jahan Ali Bridge in Khulna (L11) are subjected to higher in population density and increased industrial activities among all sites whereas moidara (L1), shapmari (L2), Gaurambha (L4) and bajua (L5) represent lower in population density and moderate commercial activities (**Figure 2.4.**).



**Figure 2.4: Dendrogram of the Monitoring Stations using Euclidean Distance**

### 2.1.6 Findings

According to the observed data it can be concluded that the concentration of major air pollutants was found comparatively lower in the Sundarbans area than that of other monitoring locations. But due to the seasonal effect the concentration of the particulate matter was found to be slightly higher at Khan Jahan Ali Bridge area comparable to the standards set by DOE. However, major sources of criteria pollutants in and around the project site as observed were the piling activities, digging, tunnelling and burrowing works, jetty erection activities, major construction works, dust from unpaved roads and vehicle movement, construction materials and goods transportation activities through the roads and river Passur etc. Other sources of pollutants which may contribute to the existing pollution load are the small industries like cement works and refinery industries etc., diffuse sources like wood stoves, fires, and wind generated dust etc.

## 2.2 Noise Quality

Noise is described by a weighted sound intensity (or level), which represents sound heard by the human ear and is measured in units called decibels dB (A). However, engine boats, trawlers, small barges, ships plying over the waterways, birds' chirping, stormy wind, falling of leaves from the trees and the wave breaking sound were the main source of noise generation in and around the Sundarbans. On the other hand, construction activities, the urban and rural vehicles i.e. buses, trucks, local human haulers, auto-rickshaws, motorized vans, motorbikes etc. were much noticeable in the outside of Sundarbans area.



### 2.2.1 Methodology

Noise monitoring locations were selected considering the sensitivity of the nearest receptors and accordingly, 6 (six) sites were selected in and around the Project area, 3 (three) sites were designated inside the Sundarbans Reserve Forest area, 1 (one) at Mongla port area and the remaining one was selected at the Khan Jahan Ali Bridge toll plaza area near Khulna City (**Figure 2.6**). Levels of noise were measured thrice in a day (morning, afternoon and evening) at seven locations, twice (morning & noon; and morning & evening) at three locations in and around the project; and the study area. Due to heavy rainfall, the level of noise at Harbaria was not monitored at this monitoring season. Each time, noise levels were recorded using sound level meter for five minutes of time span with an interval period of 30 second and the noise meter was properly set up and calibrated following the instruction manual (**Figure 2.5**).



**Figure 2.5: Ambient Noise Acquisition**

### 2.2.2 Sources of Noise in the study area

Among the sources of noise generation, the urban and rural vehicles i.e. bus, truck, local human haulers, auto-rickshaws, motorized vans, motorbikes etc. were much noticeable in the study area. On the other hand, engine boats, trawlers, small barges, ships plying over the waterways and the wave breaking sound were found across the River Passur.

### 2.2.3 Locations of Noise Level Monitoring

Out of (11) locations, three (03) locations were inside the Sundarbans, six (06) locations were in and around the Project site, one at Khan Jahan Ali Bridge and the remaining one was at Mongla Ghat area (**Figure 2.6** and **Table 2.3**).

**Table 2.3: Noise Monitoring Plan**

| SL. No. | Monitoring locations  | GPS points                 | Time of noise monitoring  |
|---------|---|----------------------------|---------------------------|
| 1       | South West corner of the Project boundary                             | 89°33'34.5"E; 22°34'33.8"N | Morning, Noon and evening |
| 2       | Proposed township area near Chimney location, Mauza: Sapmari Katakhal | 89°32'3.8"E; 22°36'32.5"N  | Morning, Noon and evening |
| 3       | North West corner of the Project boundary (Kaigar Daskati)            | 89°33'51.8"E; 22°36'1.06"N | Morning, Noon and evening |
| 4       | Barni, Gaurambha union (4km North East from the chimney location)     | 89°34'37.7"E; 22°38'51.8"N | Morning, Noon and evening |
| 5       | Chunkuri-2, Bajua Union (4km South West from the chimney location)    | 89°34'01.1"E; 22°32'3.3"N  | Morning, Noon and evening |

| SL. No. | Monitoring locations   | GPS points                  | Time of noise monitoring  |
|---------|--|-----------------------------|---------------------------|
| 6       | Pankhali, Dacope, (4km North West from the Chimney location) | 89°31'24.2"E; 22°36'6.7"N   | Morning, Noon and evening |
| 7       | Mongla Port Area   | 89°35'50.4"E; 22°28'24.8"N  | Morning, Noon and evening |
| 8       | Harbaria, Sundarbans   | 89°35'34.2"E; 22°17'43.1"N  | Morning and Noon          |
| 9       | Akram point, Sundarbans                                      | 89°30'54.1"E; 22°23.50"N    | Morning and Noon          |
| 10      | Hiron Point, Sundarbans                                      | 89°27'53.2"E; 21°46'27.60"N | Not monitored             |
| 11      | Khulna city near Khan Jahan Ali Bridge                       | 89°35'35.5"E; 22°46'36.8"N  | Morning, Noon and evening |

#### 2.2.4 Status of Noise

In order to provide an overview of the observed data set, the average values for the respective locations have been appended in Table 2.4 for ready reference; but the detailed Noise Level Data have been attached in Table C1, C2, C3, C4, C5, C6 and C7 respectively in the Appendix IV.

The Department of Environment of the People's Republic of Bangladesh, an agency under the Ministry of Environment and Forests has set up the standard of permissible limits of noise level at day time for different classified areas. According to Bangladesh Noise Pollution Control Rules (2006), the whole study area can be classified into five distinctive noise zones named as commercial, residential, residential cum commercial (mixed), industrial and silent zone. However, a brief description of the noise status is described in the following section.

Two commercial zones were Chalna Bazar (Dacope) and Khan Jahan Ali Bridge (toll office of Khan Jahan Ali Bridge) where levels of noise were recorded as 51.21 dB(A) and 52.38 dB(A) respectively. For these locations, the standard level is 70 dB(A). So, it is calculated that levels of noise were 18.79 dB(A) and 17.62 dB(A) lower than that of their corresponding standard setup.

NW Corner of the Project area (Kaigar Daskati), Chunkuri-2 (Bajua), SW corner of the project area (Moidara) and Proposed Township area (Shapmari) falls within the residential zone standard. Observed noise levels at these four locations were recorded as 50.11 dB(A), 50.36 dB(A), 51.90 dB(A) and 53.84 dB(A) respectively. In this class (residential), all the locations showed no overtopping of standard noise level. Levels of noise were lower by 4.89 dB(A), 4.64 dB(A), 3.10 dB(A) and 1.16 dB(A) than that of their corresponding standard values.

The only mixed zone of the study area is Barni (Gaurambha). The level of noise at this location was recorded as 51.00 dB(A) which was lower by 9.00 dB(A) than that of its standard value. The level of noise at Mongla Port, the only industrial zone under this study area was recorded as 55.49 dB(A) which was far lower by 19.51 dB(A) than that of its standard value.

Harbaria, Akram Point and Hiron Point of Sundarbans are under the silent class zone and the standard limit of ambient noise at daytime is 50 dB (A) (Noise pollution control rules, 2006). These three locations are the most important biodiversity hot spot in the Sundarbans. The noise levels were measured at a distance of 100 m inside the forest area from the River bank. Due to heavy rainfall, Harbaria was not monitored in this monitoring season. Levels of noise were found as 44.62 dB(A) and 50.94 dB(A) at Akram Point and Hiron Point respectively. The level of noise at Hiron Point crossed its standard level slightly only by 0.94 dB(A) but at Akram point it was lowered by 5.38 dB(A). However, it is a matter of great joy that the observed noise levels at nine locations were recorded within the standard limit of their corresponding standard values. Only one location among ten monitored sites exceeded its standard limit just by 0.94 dB(A).



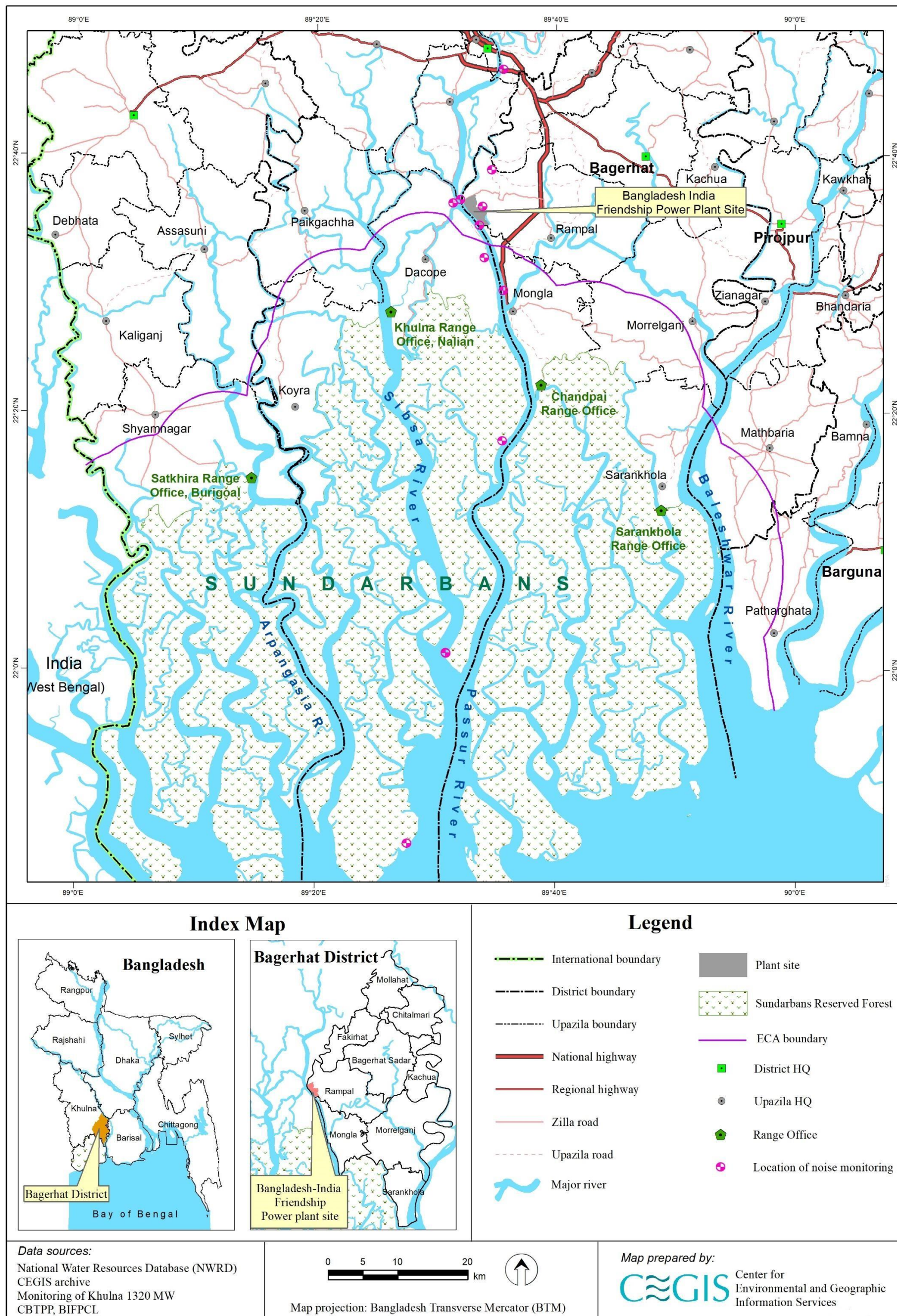


Figure 2.6: Noise Level Monitoring Locations





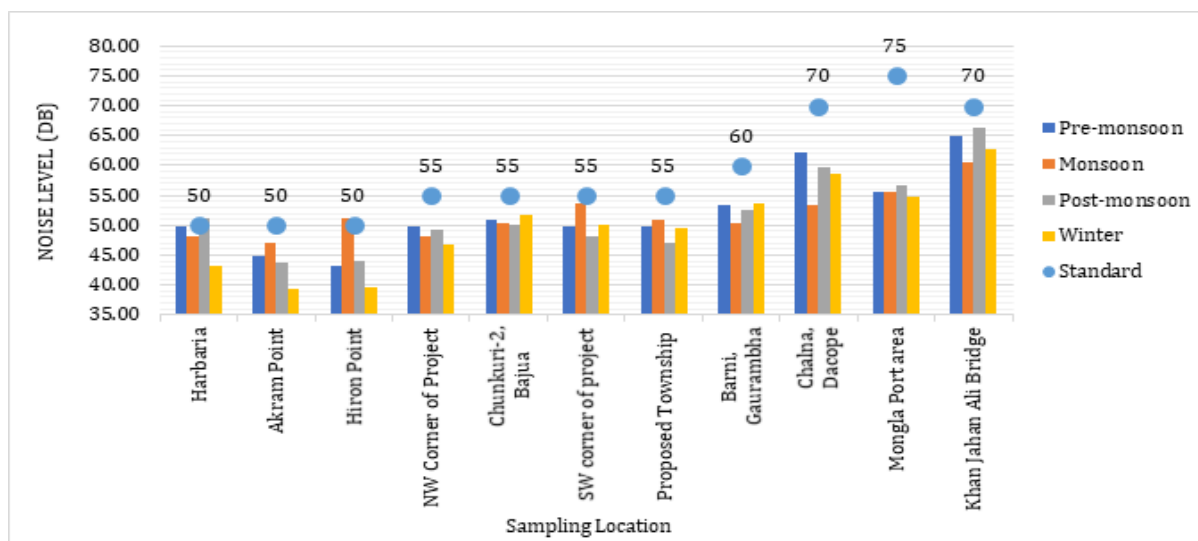


Figure 2.7: Status of average Noise level for all seasons at different locatons

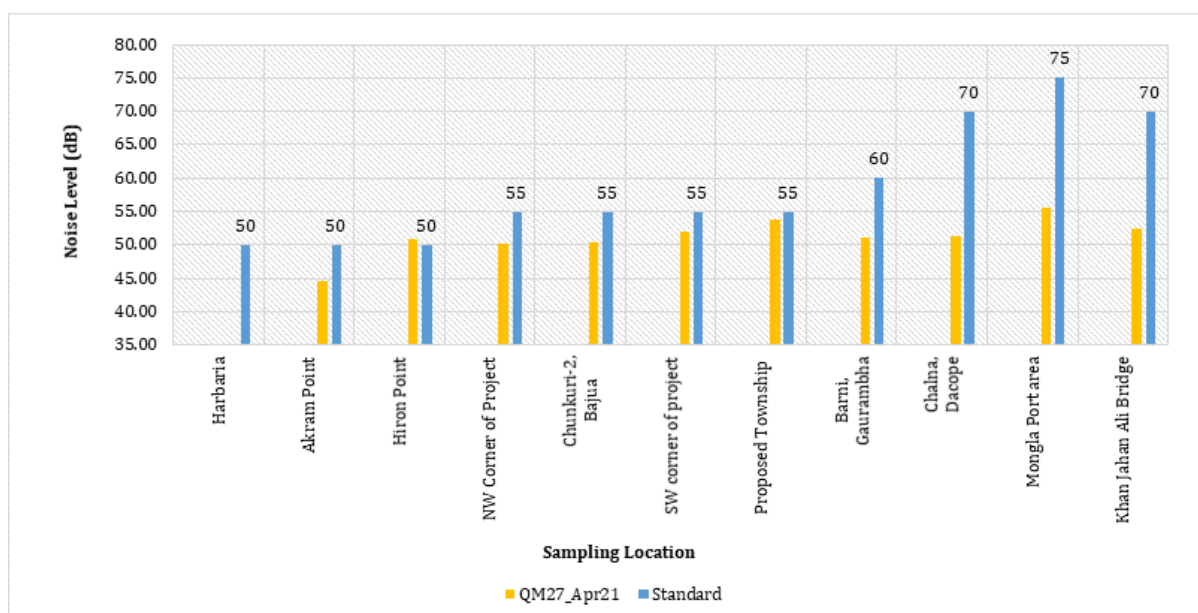


Figure 2.8: Status of average Noise Level at the Monitoring Locations (29<sup>th</sup> quarter)

Table 2.4: Summary of the Ambient Noise Levels Recorded in Consecutive Monitoring Periods

| Monitoring periods (Cont.) |  |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |           |
|----------------------------|--|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----------|
| Sl.                        | Location                                       | QM-29<br>(Aug-21) | QM-28<br>(Apr-21) | QM-27<br>(Jan-21) | QM-26<br>(Nov-20) | QM-25<br>(Jul-20) | QM-23<br>(Feb-20) | QM-22<br>(Nov-19) | QM-21<br>(Jul-19) | QM-20<br>(Apr-19) | QM-19<br>(Feb-19) | QM-18<br>(Nov-18) | QM-17<br>(Jul-18) | QM-16<br>(Apr-18) | QM-15<br>(Jan-18) | QM-14<br>(Oct-17) | Std* (dB) |
| 1                          | Chalna, Dacope                                 | 51.21             | 61.44             | 60.50             | 58.15             | 51.28             | 54.59             | 58.60             | 59.34             | 61.67             | 56.45             | 58.23             | 57.54             | 59.63             | 60.1              | 58.64             | 70        |
| 2                          | NW Corner of the Project area (Kaigar daskati) | 50.11             | 49.50             | 51.42             | 48.48             | 43.37             | 45.42             | 51.11             | 55.18             | 56.85             | 50.75             | 58.82             | 45.63             | 47.90             | 49.3              | 46.95             | 55        |
| 3                          | Chunkuri-2, Bajua                              | 50.36             | 51.31             | 47.05             | 45.91             | 48.75             | 55.44             | 55.27             | 59.36             | 51.68             | 50.18             | 48.69             | 47.54             | 52.93             | 51.4              | 50.44             | 55        |
| 4                          | SW corner of the project area (Moidara)        | 51.90             | 55.24             | 52.36             | 49.18             | 50.18             | 55.60             | 46.57             | 63.66             | 56.05             | 55.79             | 61.78             | 52.63             | 47.55             | 44.5              | 43.26             | 55        |
| 5                          | Proposed Township area (Shapmari)              | 53.84             | 52.05             | 49.09             | 44.45             | 53.72             | 48.95             | 54.88             | 54.53             | 58.83             | 58.13             | 50.68             | 44.25             | 50.81             | 53.3              | 43.93             | 55        |
| 6                          | Barni, Gaurambha                               | 51.00             | 52.34             | 53.09             | 58.33             | 48.80             | 61.97             | 50.53             | 54.67             | 53.18             | 52.57             | 53.03             | 45.52             | 56.14             | 55.6              | 45.52             | 60        |
| 7                          | Khan Jahan Ali Bridge, Khulna                  | 52.38             | 54.65             | 61.94             | 81.81             | 66.31             | 62.20             | 66.05             | 63.46             | 66.95             | 66.93             | 62.15             | 63.36             | 64.87             | 61.7              | 62.47             | 70        |
| 8                          | Mongla Port area                               | 55.49             | 53.63             | 56.52             | 76.92             | 64.41             | 61.06             | 57.25             | 62.01             | 63.99             | 66.18             | 55.97             | 60.97             | 62.95             | 59.8              | 49.66             | 75        |
| 9                          | Harbaria, Sundarbans                           | NM                | 48.04             | 44.40             | 54.54             | 49.97             | 43.94             | 44.10             | 44.90             | 48.43             | 49.67             | 48.80             | 50.28             | 47.93             | 44.4              | 46.48             | 50        |
| 10                         | Akram Point, Sundarbans                        | 44.62             | 43.42             | 37.85             | 42.23             | 51.04             | 36.59             | 44.86             | 44.84             | 42.33             | 46.45             | 41.00             | 45.20             | 45.39             | 40.1              | 42.38             | 50        |
| 11                         | Hiron Point, Sundarbans                        | 50.94             | NM                | 38.85             | 50.70             | NM                | 40.34             | 40.28             | NM                | NM                | 39.21             | 39.4              | NM                | NM                | 38.8              | 39.79             | 50        |

| Sl. | Location                                       | QM-13<br>(Apr-17) | QM-12<br>(Jan-17) | QM 11<br>(Oct-16) | QM 10<br>(Jul-16) | QM 9<br>(Apr-16) | QM 8<br>(Jan-16) | QM 7<br>(Oct-15) | QM 6<br>(Jul-15) | QM 5<br>(Apr-15) | QM 4<br>(Jan-15) | QM 3<br>(Oct-14) | QM 2<br>(Jul-14) | QM 1<br>(Apr-14) | Std* (dB) |
|-----|--|-------------------|-------------------|-------------------|-------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------|
| 1   | Chalna, Dacope                                 | 61.62             | 59.29             | 65.51             | 52.42             | 65.08            | 66.07            | 65.12            | 49.77            | 57.08            | 53.28            | 54.63            | 52.87            | 68.13            | 70        |
| 2   | NW Corner of the Project area (Kaigar Daskati) | 47.19             | 44.52             | 55.48             | 52.65             | 50.79            | 50.96            | 41.94            | 41.56            | 44.67            | 35.25            | 41.92            | NM               | 51.89            | 55        |
| 3   | Chunkuri-2, Bajua                              | 50.44             | 55.31             | 51.55             | 53.4              | 44.49            | 53.62            | 47.43            | 40.66            | 47.05            | 49.29            | 51.39            | 52.55            | 57.76            | 55        |
| 4   | SW corner of the project area (Moidara)        | 43.25             | 45.19             | 48.51             | 65.37             | 54.50            | 60.44            | 42.7             | 43.75            | 43.58            | 36.03            | 45.95            | 47.6             | 49.2             | 55        |
| 5   | Proposed Township area (Shapmari)              | 42.65             | 42.62             | 43.69             | 55.79             | 53.37            | 53.77            | 50.52            | 46.75            | 41.47            | 41.47            | 41.92            | 46.68            | 48.75            | 55        |
| 6   | Barni, Gaurambha                               | 44.83             | 49.05             | 54.91             | 56.75             | 53.97            | 59.16            | 55.16            | 46.18            | 54.17            | 43.6             | 49.78            | 49.95            | 58.84            | 60        |
| 7   | Khan Jahan Ali Bridge, Khulna                  | 56.72             | 55.57             | 60.95             | 63.77             | 65.85            | 68.45            | 64.25            | 52.82            | 73.45            | 61.72            | 66.28            | 60.8             | 71.7             | 70        |
| 8   | Mongla Port area                               | 47.61             | 48.95             | 49.86             | 52.86             | 49.88            | 52.7             | 47.01            | 39.61            | 48.15            | 38.69            | 60.5             | 53.84            | 61.24            | 75        |
| 9   | Harbaria, Sundarbans                           | 54.10             | 41.18             | 55.33             | 52.9              | 44.55            | 45.2             | 50.75            | 35.03            | 65.37            | 34.38            | 55.3             | 56.13            | 40.88            | 50        |
| 10  | Akram Point, Sundarbans                        | 44.30             | 38.08             | 41.77             | 47.96             | 42.95            | 42.95            | 49.6             | NM               | 54.86            | 34.32            | 43.98            | 47.9             | 40.94            | 50        |
| 11  | Hiron Point, Sundarbans                        | NM                | 42.29             | 44.38             | NM                | 43.11            | NM               | 46.06            | NM               | 47.84            | 37.37            | 47.98            | 51.29            | 38.63            | 50        |

Note: All values are in decibels (dBA), QM- Quarter Monitoring, NM – Not Monitored, \*Std- Standard as defined in National Noise Control Rules, 2006

### 2.2.5 Findings

The noise generation sources in the study area can mainly be divided into two types; one is natural and the other one is anthropogenic. Natural sources of noise generation were birds' chirping, stormy wind, wave breaking on the shoreline, howling of leaves and so on. On the other hand, traffic mobilization, industrial activities, vessels movement within the rivers and local vehicles were the anthropogenic sources of noise. However, the observed noise level was not found to exceed the Bangladesh standard limit of noise level (Table 2.4).

## 2.3 Water Quality

An updated water quality status of the Passur-Sibsa River system and adjacent water bodies have been depicted in this section. The methodologies used for the entire monitoring activities, both the national and international guidelines were followed and adopted. This report includes physical water quality parameters collected during 29<sup>th</sup> quarterly monitoring (August 2021) and the tested results obtained from the laboratory up to April 2021 (28<sup>th</sup> quarterly monitoring). The surface and groundwater quality were monitored in the respective locations performed during the previous monitoring. A number of identical parameters were selected to understand the quality of the water for community use, aquatic life, and for the Sundarbans Forest ecosystem itself.

### 2.3.1 Methodology

Water quality monitoring covers selection of water quality parameters, identification of sampling locations, determination of sampling frequency and evaluation criteria of the monitoring parameters etc. Standard approaches and methodologies were followed for the above-mentioned events. Both the surface and groundwater quality statuses in and around the Power Plant and the Sundarbans area were examined. The monitoring results have been presented graphically and been compared with the national standards (ECR, 1997 and all available amendments).

The samples were collected from eighteen (18) pre-selected locations (15 locations for surface water along the Passur River, Sibsa River, Maidhara River, near the proposed township area, and 3 locations for groundwater around the study area). The selected monitoring locations for the current monitoring program are shown in **Figure 2.9**. The details of the monitoring plan covering sampling locations, geographical locations, frequency and analysis techniques of sampling for surface and groundwater are given in **Table 2.5** and **Table 2.6** respectively.

**Table 2.5: Groundwater Quality Monitoring Parameters, Locations and Plan**

| Sl No | Locations                   | GPS (Decimal Degree) |             | Frequency | Methods/Monitoring indicators/Techniques   |
|-------|-----------------------------|----------------------|-------------|-----------|--|
|       |                             | Easting              | Northing    |           |  |
| 1     | Near Proposed Township Area | 89.566139°E          | 22.594167°N | Quarterly | In-situ testing of physical water quality parameters by Horiba U-50 multi-meter. Sample preserving and Laboratory analysis at DPHE Central Laboratory and BCSIR for inorganic non-metallic, aggregate organic and metals quality. However, one of the monitoring locations (Kalekarber) has been found damaged since 2015. Hence, the corresponding data for this location were not collected. |
| 2     | Rajnagar                    | 89.576056°E          | 22.612528°N |           |  |
| 3     | Kapasdanga                  | 89.563000°E          | 22.622528°N |           |  |

**Table 2.6: Surface Water Quality Monitoring Parameters, Locations and Plan**

| Sl no | Monitoring Indicators                                  | Locations   | GPS (Decimal Degree) |             | Frequency | Methods/Tools/<br>Techniques   |
|-------|--|---|----------------------|-------------|-----------|--|
|       |  |   | Easting              | Northing    |           |  |
| 1     | pH, Temperature, Salinity, DO, BOD <sub>5</sub> , TDS, | Left Bank of Passur River at 100m u/s of North West corner of the Project boundary            | 22.604167°N          | 89.527222°E | Quarterly | In-situ measurement (pH, Temperature, Salinity, DO) and Laboratory analysis (TDS, TH, TSS, COD, Nitrate, Sulphate, Phosphate, Arsenic, Lead, Mercury, Oil & Grease, PAH, TOC, TC). |
| 2     | TH, TSS, COD, Nitrate, Sulphate, Phosphate,            | Middle of Passur River at 100m u/s of North West corner of the Project boundary               | 22.607222°N          | 89.528889°E |           |  |
| 3     | Arsenic, Lead, Mercury, Oil & Grease, PAH, TOC, TC     | Right Bank of Passur River at 100m u/s of North West corner of the Project boundary           | 22.609361°N          | 89.531417°E |           |  |
| 4     |  | Left Bank of Passur River at Project Site-Jetty   | 22.584833°N          | 89.543583°E |           |  |
| 5     |  | Middle of Passur River at Project Site-Jetty  | 22.587667°N          | 89.546472°E |           |  |
| 6     |  | Right Bank of Passur River at Project Site-Jetty  | 22.589333°N          | 89.548222°E |           |  |
| 7     |  | Left Bank of Passur River at South West corner of the Project boundary                        | 22.572889°N          | 89.552583°E |           |  |
| 8     |  | Middle of Passur River at South West corner of the Project boundary                           | 22.574611°N          | 89.557500°E |           |  |
| 9     |  | Right Bank of Passur River at South West corner of the Project boundary                       | 22.575667°N          | 89.559861°E |           |  |
| 10    |  | Maidara river at the South East corner of the project boundary at Ichamoti-Maidara confluence | 22.600639°N          | 89.565611°E |           |  |
| 11    |  | Maidara river near proposed Township area   | 22.577472°N          | 89.569250°E |           |  |
| 12    |  | Passur river at Passur – Ghasiakhali confluence   | 22.473861°N          | 89.602361°E |           |  |
| 13    |  | Passur river at Harbaria of the Sundarbans Reserve Forest area                                | 22.295250°N          | 89.593139°E |           |  |
| 14    |  | Passur river at Akram Point of the Sundarbans Reserve Forest Area                             | 22.024120° N         | 89.514220°E |           |  |
| 15    |  | Passur river at Hiron point of the Sundarbans Reserve Forest Area                             | 21.774183°N          | 89.464778°E |           |  |



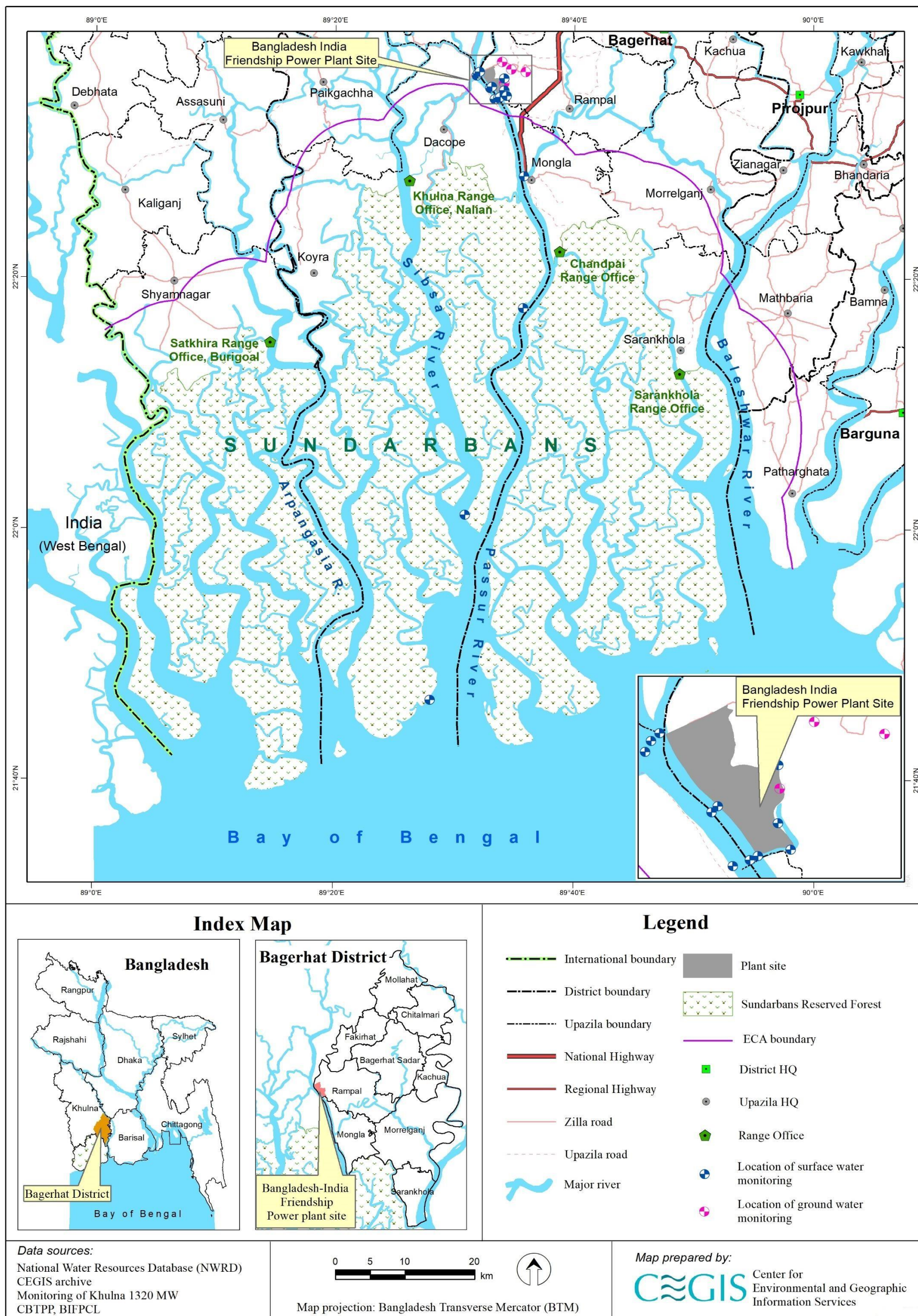


Figure 2.9: Surface Water and Groundwater Quality Monitoring Locat





### 2.3.2 Selection of Parameters

Water quality parameters were selected based on tentative potential impacts to be generated during pre-construction, construction and operation phases of the Power Plant Project.

### 2.3.3 Surface Water Quality Parameters

The selected parameters for surface water quality include Temperature, pH, Dissolved Oxygen (DO), Total Dissolve Solids (TDS), Total Suspended Solids (TSS), Total Hardness (TH), Turbidity, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Salinity, Nitrate ( $\text{NO}_3^-$ ), Phosphate ( $\text{PO}_4^{3-}$ ), Sulphate ( $\text{SO}_4^{2-}$ ), Heavy Metals (As, Pb, Hg), and Oil and Grease. The parameters were categorized into 4 groups:

- Physical and aggregate properties i.e. pH, Temperature, Salinity, Hardness, TDS, TSS, Turbidity, Oil & Grease;
- Inorganic non-metallic constituents i.e., DO,  $\text{NO}_3^-$ ,  $\text{PO}_4^{3-}$  and  $\text{SO}_4^{2-}$ ;
- Aggregate organic constituents i.e. BOD, COD;
- Heavy metals i.e. As, Pb and Hg;

However, some additional parameters i.e., PAH (Polycyclic Aromatic Hydrocarbons), TOC (Total Organic Carbon) and TC (Total Carbon) were included in the monitoring study as per recommendation of the DoE approved coal transportation study monitoring framework. The analysed data of the additional parameters will be recorded and submitted to the DoE and other concerned authorities as per the condition no. 26 of the EIA approval of coal transportation study. Nevertheless, these three (03) additional parameters will be incorporated and discussed in the respective monitoring report (half yearly) after obtaining the analysed results from the respective organizations (BCSIR and DPHE).

### 2.3.4 Groundwater Quality Parameters

Ground water quality parameters include pH, Temperature, Dissolved Oxygen (DO), Total Dissolve Solids (TDS), Total Hardness (TH), Chemical Oxygen Demand (COD), Salinity, Nitrate ( $\text{NO}_3^-$ ), Phosphate ( $\text{PO}_4^{3-}$ ), Sulphate ( $\text{SO}_4^{2-}$ ), and Heavy Metals (As, Pb, Hg).

### 2.3.5 Sampling Procedure

The standard sampling procedure was followed for both surface and groundwater sampling to reduce the possibility of any error. Each sample was labelled at the time of sampling.

### 2.3.6 Surface Water Sampling Procedure

The study area is highly influenced by tidal variation. Hence, temporal and spatial variations of tides were considered in sampling procedure. Surface water samples were collected at a distance of 30-50m away from the riverbank and at a depth of 6 cm below the water surface during low tides or relative slag period after the low tide for all parameters except oil and grease. The non-acidified sampling bottles were rinsed with respective water samples before sampling and storing below  $10^\circ\text{C}$ . Acidified sampling bottles were used for heavy metal (As, Pb, Hg) sample collection while wrinkle bottles were used for  $\text{BOD}_5$ . All samples were preserved as per standard procedure. The in-situ testing of the water quality parameters are shown in **Figure 2.10**.



**Figure 2.10: Water Sample Collection and insitu Testing of Water Parameters**

### 2.3.7 Groundwater Sampling Procedure

The groundwater samples were collected from hand operated tube wells after 5-7 minutes of water extraction. Each sampling bottle was rinsed with respective water samples before sample collection and storing. Acidified sampling bottles were used for heavy metals (As, Pb, Hg) sample collection and were preserved following standard procedure.

### 2.3.8 Water Quality Parameter Analysis Techniques/Methods

Water quality parameters were analyzed as per the procedure of American Public Health Association (APHA) standard. The analysis procedures of different parameters along with the standards are given in **Table 2.7**.

**Table 2.7: Testing Methodology of Water Quality Parameter**

| Parameters                                       | Methods/Measuring Tools   | Unit        | BD Standard (ECR 1997) |
|--|---|-------------|------------------------|
| Temperature                                      | Horiba U-50 multimeter  | °C          | 20 - 30                |
| pH   | Horiba U-50 multimeter  | -           | 6.5-8.5                |
| TDS  | Horiba U-50 multimeter  | ppm or mg/L | 2100 (SW), 1000 (GW)   |
| TSS  | Horiba U-50 multimeter  | ppm or mg/L | 150 (SW), 10 (GW)      |
| Salinity   | Horiba U-50 multimeter  | ppt         | -                      |
| DO   | Horiba U-50 multimeter  | ppm or mg/L | 6                      |
| BOD <sub>5</sub>                                 | 5-Day BOD Test at 20°C  | ppm or mg/L | 50 (SW)                |
| COD  | Closed Reflux Method  | ppm or mg/L | 200 (SW), 4.0 (GW)     |
| Total Hardness (as CaCO <sub>3</sub> )           | Titrimetric   | ppm or mg/L | 200-500                |
| Ortho-Phosphate (PO <sub>4</sub> <sup>3-</sup> ) | UV-VIS Spectrophotometers   | ppm or mg/L | 6                      |
| Nitrate (NO <sub>3</sub> <sup>-</sup> )          | UV-VIS Spectrophotometers   | ppm or mg/L | 10                     |
| Sulphate (SO <sub>4</sub> <sup>2-</sup> )        | UV-VIS Spectrophotometers   | ppm or mg/L | 400                    |
| Oil and Grease                                   | Liquid-liquid extraction with hexane, treatment with silica gel and gravimetric determination | ppm or mg/L | 10 (SW)                |
| Arsenic (As)                                     | Atomic Absorption Spectrophotometers-Hydride Vapor Generating (AAS-HVG)                       | ppm or mg/L | 0.05                   |

| Parameters   | Methods/Measuring Tools  | Unit        | BD Standard (ECR 1997) |
|--------------|--|-------------|------------------------|
| Lead (Pb)    | Atomic Absorption Spectrophotometers–Graphite Furnace (AAS-GF) | ppm or mg/L | 0.05                   |
| Mercury (Hg) | Mercury Analyzer   | ppm or mg/L | 0.001                  |
| PAH          | APHA 5310.B  | mg/L        | N/A                    |
| TOC and TC   | APHA 5310.B  | mg/L        | N/A                    |

### 2.3.9 Water Quality Reporting Arrangement

Water quality status of the adjacent water bodies of power plants and the Sundarbans deep forests are being observed since April 2014. In this 28<sup>th</sup> quarterly water quality monitoring report, yearly variations of winter (January, 2021) for chemical water quality statuses and yearly variations in pre-monsoon (April 2021) for physical water quality statuses are presented and compared with the ECR' 1997 Standards. To do so, all sampling points are clustered in five different sampling sites considering homogenous characteristics of the sampling points as well as the type of ecosystem touching the sample points. The clustered sample monitoring sites and the logical explanation of the clusters are presented in the following Table 2.8.

**Table 2.8: Monitoring Sites and Characteristics**

| SL  | Monitoring sites                        | Site Characteristics  |
|-----|---|---|
| (a) | <b>Power plant &amp; adjacent areas</b> | In this monitoring site, total 11 sampling points have been averaged to represent the water quality status of power plant and its adjacent surface water bodies. These 11 sampling points are situated in the same river system and embedded within 1km radius of power plant. In addition, previous monitoring results indicated same water chemistry. Therefore, this study makes the clusters to represent the water quality status of the areas in a more explainable and understandable way. |
| (b) | <b>Mongla-Passur confluence</b>         | This monitoring site comprises with an individual monitoring point situates at least 13km downstream of the power plant. This point is a confluence of Passur river and Mongla-Ghasiakhali channel. The terrestrial ecosystem is mostly dominated by agricultural lands followed by rural settlements.  |
| (c) | <b>Harbaria</b>                         | Harbaria site comprises with an individual monitoring point situates around 15 km downstream of the Mongla-Passur confluence. This site is dominated by Sundarbans Forest. Heavy activities of mother vessels unloading and small cargo movement for carrying of clinker, coal and LPG gas. Influenced by tidal effects of Bay of Bengal.   |
| (d) | <b>Akram point</b>                      | Akram point is an individual point, which is, located around 35 km downstream of the Harbaria point. This site is situated on the bank of Sibsa river before mixing with Passur river at Sibsa point. This site is completely dominated by deep forests ecosystems. Influenced by tidal effects of Bay of Bengal.   |
| (e) | <b>Hiron Point</b>                      | Hiron point is the furthest point of this surface water-monitoring scheme. This point is at 25 km downstream of the Akram point. Deep forests and marine habitats are the main characteristics of the site. This site is completely exposed to Bay of Bengal. This site is also an individual monitoring point.   |

### *Status of Surface Water Quality*

#### In-situ tested parameters

The in-situ tested results obtained up to 29<sup>th</sup> monitoring period (September 2021: monsoon season) are described below:

#### pH

Twentieth (29<sup>th</sup>) quarterly monitoring has been held in the month of September 2021, usually called the monsoon season of Bangladesh. During this visit, pH values in the monitoring sites are found to range between 6.0 and 8.0.

Generally, pH value was found to be relatively lower during monsoon due to contribution of high rainfall in river water. It decreases at every places of sampling than the monsoon of 2020 except at Akram point. The main reason can be the influence of rainfall runoff and minimum salinity intrusion. During the last visit, salinity concentration was also found almost one-third than the previous monsoon season of the year 2021 (Figure 2.11). Altogether, pH value was almost 7 near the power plant areas and reduces up to 6.0 at Akram point. In the last monsoon season, pH value showed harmonizing around 7.4 values of the sampling areas. However, the pH values of surface water monitoring data have been found within the standard limit of ECR, 1997 Standard (6.5-8.5). That indicated slightly acidic in nature During the monsoon.

The pH values of pre-monsoon and monsoon seasons were found to be comparatively lower than those of the post-monsoon and winter seasons (Table B.1: Appendix-IV). During post monsoon and winter season, river flow and water level normally reduced due to inadequate rainfall and insufficient inflow from U/S (upstream) of Passur-Sibsa RS (River System). As a result, pH values increased than those of the pre-monsoon and monsoon seasons, which has also reported by others (Rahman et al., 2013). Fluctuations in pH values during different season of the year can be attributed to factors like; removal of CO<sub>2</sub> by photosynthesis through bicarbonate degradation, dilution of waste with freshwater, reduction in salinity and temperature, and decomposition of organic matter (Rajasegar, 2003).

Seasonal variations in pH concentrations among the selected monitoring sites during the quarterly monitoring programs of first, second, third, fourth, fifth, sixth and seventh year of Passur-Sibsa RS are presented in Figure 2.11 and the observed dataset are attached in Table B.1 of Appendix- IV.

#### Temperature

Surface water temperature indicated close conformity with the previously monitored values for the same monsoon season. The values in this monitoring period, varied from 29°C -31°C among the monitored sites. Water temperature was found the highest at the Hiron Point Area (Figure 2.12). Observation sites outside the Sundarbans and the Deep mangrove forests showed the same average temperature of 30°C. According to the ECR, 1997, 30°C water temperature is still be tolerable by the aquatic organisms in tropical environment. However, there were some sites that showed increasing pattern of temperature especially nearby the Power Plant and adjacent area rather than the ECR limit. That changes could be high salinity and hot environment of the last monsoon season. The power plant is not discharging any hot water into its surrounding environment as it is still in construction phase.

The surface water temperature largely depends on daily weather condition (Bartram J et al., 1996). According to the seasonal weather pattern of Bangladesh the temperature drops to a minimum level during winter, which is also applicable for the water temperature and thus it differs largely than the other season's temperatures. Recorded temperatures indicated that there was spatial variation among the monitoring sites even in the same season.

The measured temperature in the selected sites during the quarterly monitoring of first, second, third, fourth, fifth, sixth and seventh year are presented in Figure 2.12 and all the observed dataset are attached in Table B.2 of Appendix- IV.

### Salinity

The observed salinity concentration ranged between 0.1 ppt and 1.0 ppt during the last monsoon season. The maximum salinity was observed at Hiron point in the Sundarbans while minimum in the Sundarbans Areas. In the last monsoon (2020) monitoring, the salinity was found significantly higher especially inside the Sundarbans compares to the present salinity level. Sufficient fresh water flow from upstream section of the river system reduced the salinity concentrations in the monsoon than the pre-monsoon seasons.

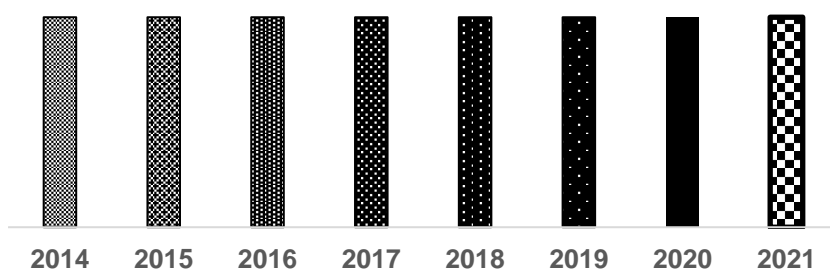
In general, high salinity from sea water increased water salinity in the direction of downstream to upstream. In the monitored river systems, the highest salinity was observed in pre-monsoon season followed by winter season where monsoon reflects the lowest. Freshwater flow from upstream and the dominated towards the sea water are the main reason of low salinity concentration in monsoon. . The water salinity data in the selected sampling stations of Passur-Sibsa RS of the 98<sup>th</sup> consecutive monitoring periods are presented in **Figure: 2.13** and all the observed dataset are attached in **Table B.3 of Appendix- IV**.

### Dissolved Oxygen

The standard DO level for the fisheries in aquatic environment is more than 5.0 mg/L (ECR'1997). In the last monsoon season, DO ranged from 5.5 mg/L to 7.2 mg/L which was found within the permissible limit recommended by DoE protocols. The average DO value of 6.4 mg/L (Averaging the values of DO concentration of 11 locations around the power plant) was found near the power plant sites which relatively vibrate slightly inside the Sundarbans. Still, DO level hasn't been an issue in the observed river systems.

In case of seasonal variations, maximum concentrations were observed during monsoon and post monsoon season. Higher DO level in monsoon and post-monsoon season, basically was for heavy rainfall and freshwater availability. During winter, salinity affects the temperature and then water temperature affects the holding capacity of DO in water. However, still the DO concentration of Passur-Sibsa RS (near project site and inside the Sundarbans), are complying with the water usable for irrigation, as irrigation usable DO concentration limit is only 5.0 mg/L (ECR, 1997).

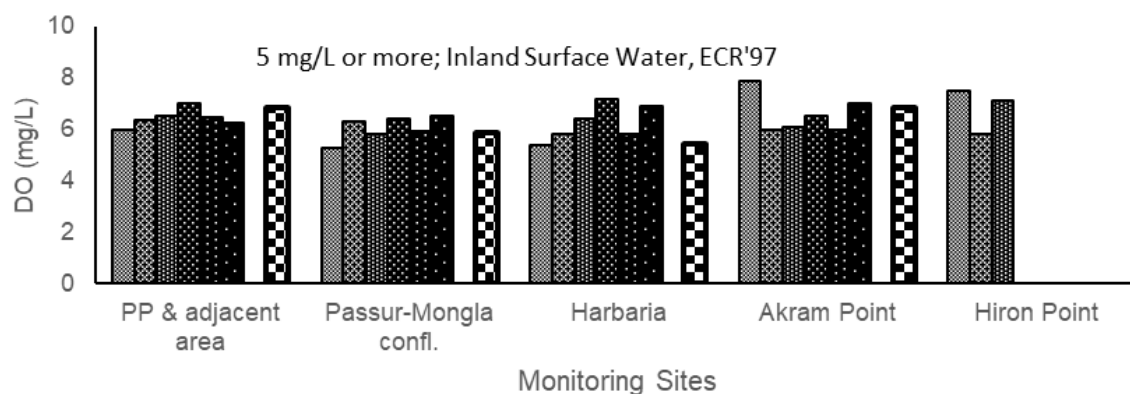
Monsoon variations of DO at the monitoring sites of Passur-Sibsa RS are shown in **Figure: 2.14** and all the observed dataset are attached in **Table B.4 of Appendix- IV**.



**Legend direction (left to right: 2014-2021)**







**Figure 2.14: Variations in Pre-monsoon DO in different monitoring sites**

#### *Laboratory tested parameters*

The laboratory tested results obtained up to 28<sup>th</sup> monitoring period (April 2021: Pre-monsoon) are described below:

#### Total Dissolved Solids (TDS), Total Hardness (TH) and Total Suspended Solids (TSS)

**TDS** mainly indicates the presence of various kinds of minerals like ammonia, nitrate, phosphate, alkalis, some acids, sulphates and metallic ions etc., which comprise both colloidal and dissolved solids in water (Tareq M S et al., 2013). During the last pre-monsoon, the TDS values were found to range between 11800- 18500mg/L (**Figure 2.15**). In general, the trend of TDS has been increased at each of the sampling location during the pre-monsoon from 2014 to 2019. But in the pre-monsoon of 2021, this trend has been broken which reduced around 20% from the pre-monsoon result in 2019. The main reason of lowering the TDS was the increasing the flow pattern in April, 2021. At that time, the economic activities were significantly lower due to COVID lockdown in Bangladesh which further affected the chemical properties of the river and water consumption pattern. However, the TDS concentration in Passur river were increased as it progressed toward the Sea. Therefore, Akram point was showing the highest TDS with respect to remaining sampling point. **Table B.8: Appendix IV**.

In Passur-Sibsa RS, TDS has temporal variations as well. The TDS values during pre-monsoon and winter is high because of low rainfall and at the same time the tidal effects. The Bay of Bengal contains many minerals and turn the dominant composition of the said river system during pre-monsoon and winter. Therefore, in monsoon and post monsoon, the TDS concentration falls down. Regarding spatial variation, towards downstream of the RS, usually high TDS concentrations due to tidal influence of the Bay of Bengal that contains lots of salts and other nutrients.

**TH** follows similar pattern as that of TDS e.g. high TH during pre-monsoon and winter season particularly. The higher the TDS results indicates the presence of higher dissolve ions in the water bodies. Insufficient freshwater supply due to low rainfall during winter and pre-monsoon period increase the TH concentrations in Passur-Sibsa RS. Seawater contains huge quantity of calcium and magnesium along with other salt ions, which make the water hard. In the last pre-monsoon season, the range was found to be 4100-4500 mg/L. Water body of power plant and its adjacent areas (4255 mg/L: averaging the values of 11 locations around the power plant site) are slightly less hard than the water body of the deep Sundarbans Forests (Akram point: 4300 mg/L (**Figure 2.16**).

According to the **Figure 2.16**, it is noticeable that water hardness of the last pre-monsoon are comparatively lower than the pre-monsoon season in 2019. The water hardness is even higher than the ECR limit of 200-500mg/L. During the rainy season, the water hardness in all the monitoring stations in Passur River were found to be low whereas it was found remarkably higher in pre-monsoon season (**Table B.9: Appendix IV**). Generally, water hardness is found to be higher in monsoon season but in Passur River,

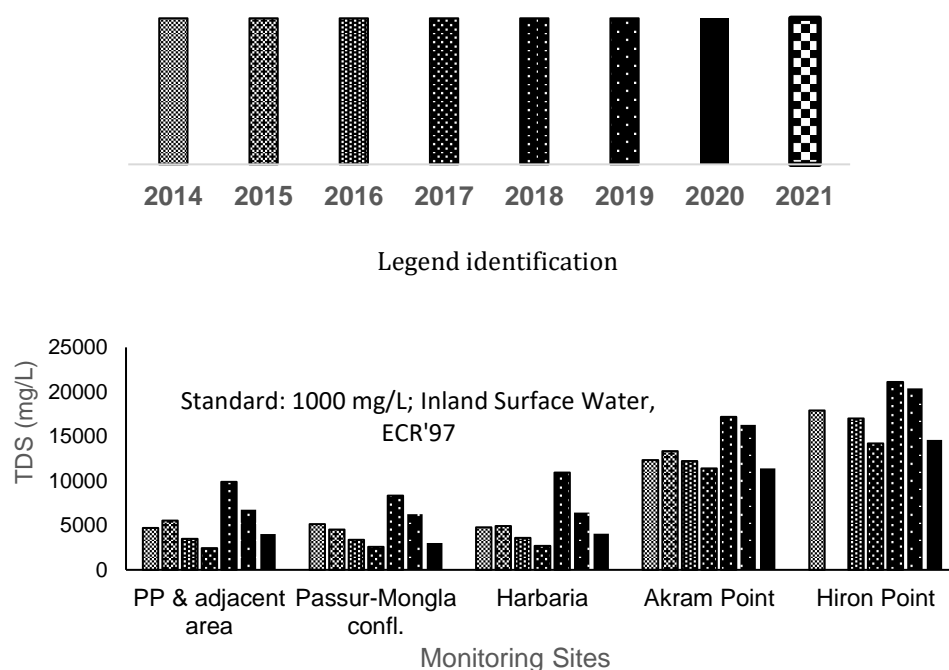
it is found to be higher in pre-monsoon season due to the saline water intrusion toward upstream (Rahman et al., 2013).

**TSS** includes solid materials of organic and inorganic in origins, which are normally suspended in water. In Passur and Sibsa RS, the suspended matters generally contain sand, clay, silt and loam. During the 28<sup>th</sup> quarterly monitoring period, the TSS concentrations among the monitoring sites varied from 3-23 mg/L (**Figure 2.17**). TSS values in every spots recorded during the last pre-monsoon period found to be within the Bangladesh standard limit of 150 mg/L (ECR, 1997).

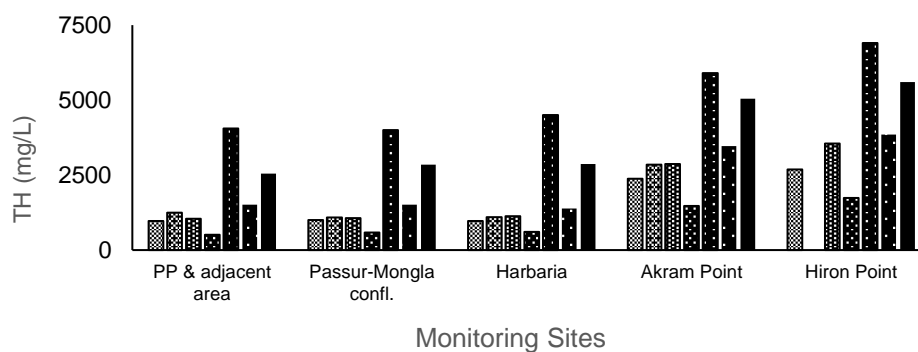
In 2014, TSS reached more than 300mg/L at both the Akram and Hiron points due to the oil spillage occurred at 9<sup>th</sup> December 2014. It extended up to the 2015 where the TSS concentration was recorded more than 150 mg/L at every monitoring points. Presence of suspended matters indicates the normal physical quality of the river water **Table B.10: Appendix IV**).

Generally, in Passur-Sibsa RS, TSS was found to be slightly higher in post-monsoon and winter season than those of pre-monsoon and monsoon. During post-monsoon and winter season, the TSS value increases, probably due to comparatively low amount of rains and less freshwater flow, urban runoff, industrial wastes, bank erosion, bottom feeders (such as carp), algae growth or wastewater discharges.

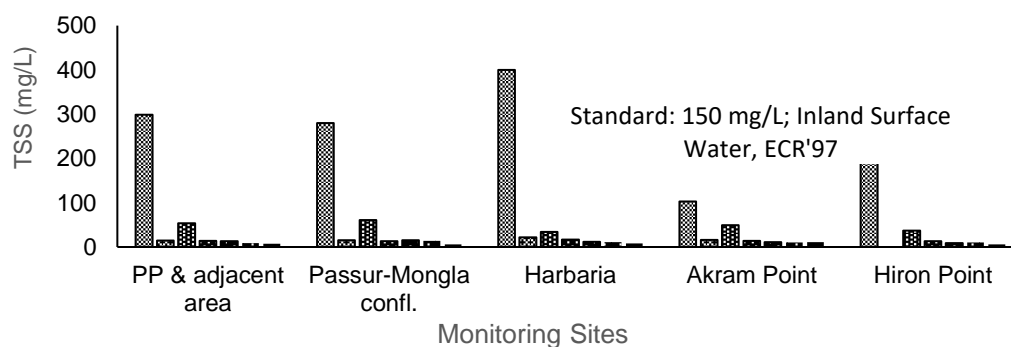
The status of TDS, TH and TSS of Passur River in the observed winter seasons at different monitoring sites are presented in **Figure 2.15, 2.16 and 2.17** respectively and all the observed dataset are attached in **Table B.8, Table B.9 and Table B.10 of Appendix- IV**.



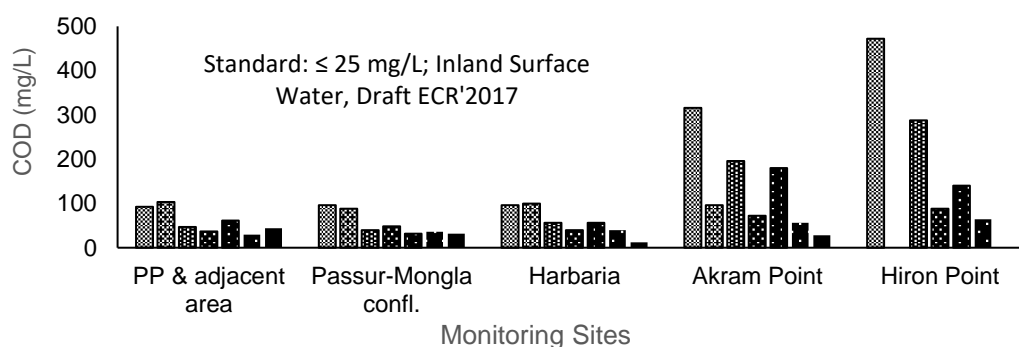
**Figure 2.15: Variations in TDS concentrations in different monitoring sites**



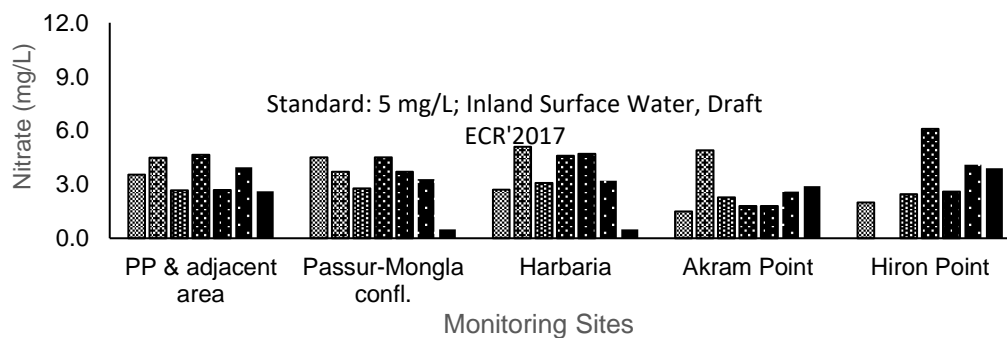
**Figure 2.16: Variations in TH status in different monitoring sites**



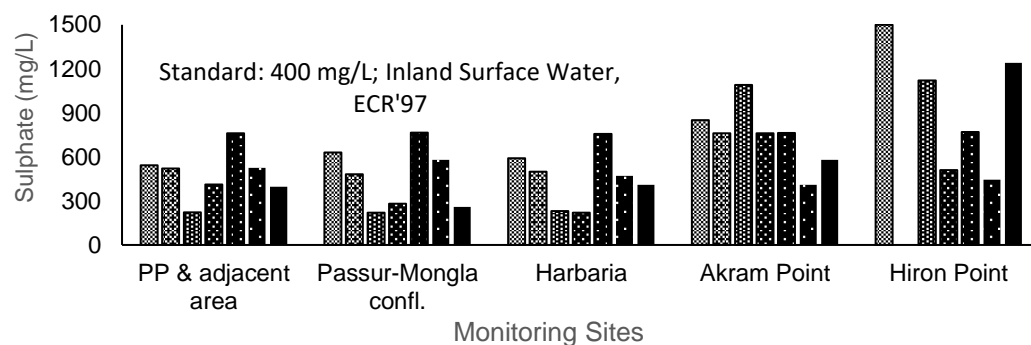
**Figure 2.17: Variations in TSS concentrations in different monitoring sites**



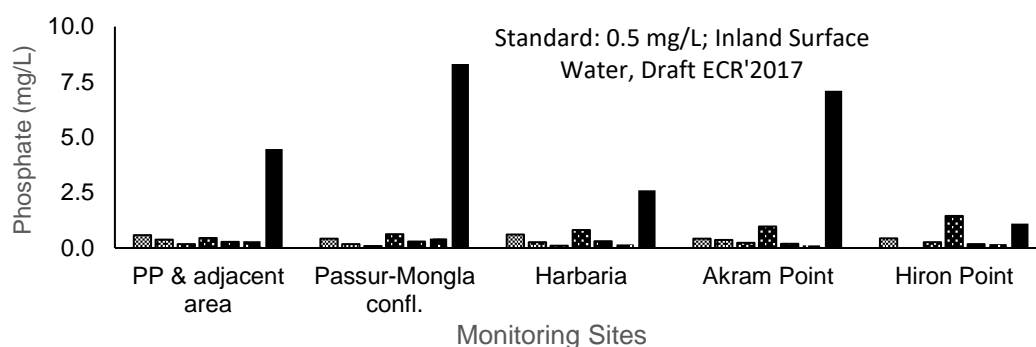
**Figure 2.18: Variations in COD concentrations in different monitoring sites**



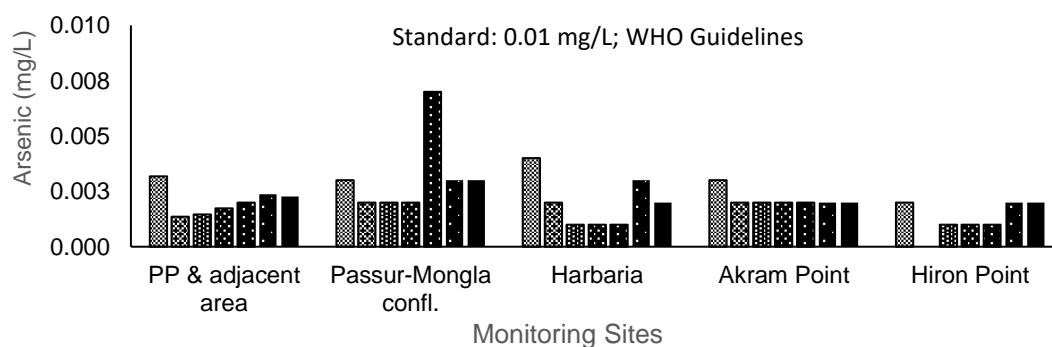
**Figure 2.19: Variations in Nitrate concentrations in different monitoring sites**



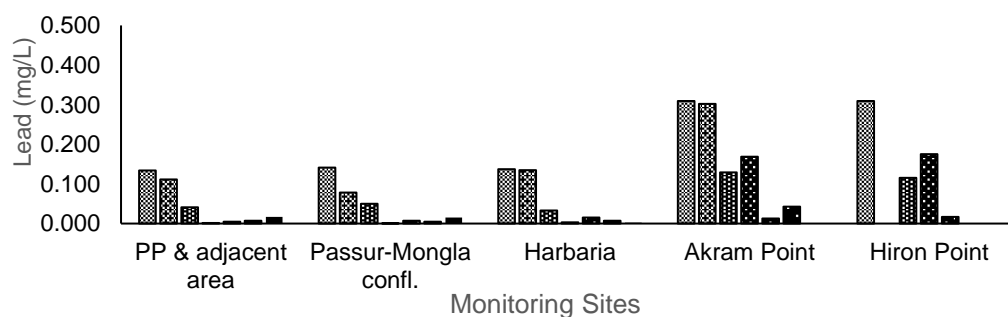
**Figure 2.20: Variations in Sulphate concentrations in different monitoring sites**



**Figure 2.21: Variations in Phosphate concentrations in different monitoring sites**



**Figure 2.22: Variations in Arsenic concentrations in different monitoring sites**



**Figure 2.23: Variations in Lead concentrations in different monitoring sites**

### Chemical Oxygen Demand (COD)

COD is an indicator of organic pollution, which is caused by the inflow of natural organic loads, domestic, livestock and industrial wastes, which contain elevated levels of organic pollutants (Ayati, 2003). In fact, the higher the organic matter, the higher will be the decomposition and hence there will be a higher demand of O<sub>2</sub> in the water body.

COD concentrations varied from 304mg/L to 508mg/L during the last pre-monsoon season (**Figure 2.18**). The highest value was found at Mongla-Passur confluence while the lowest was at Akram Point. The high values of COD indicate high level of organic pollution in the river water (Sivasubramaniam, 1999). **Figure 2.18** indicates that, organic loads are higher in the upstream areas and decreases to the downstream areas. Deep forests supply many organic loads in the river which distributed through tidal effects and discharge of effluent to the upstream loads increases the organic materials concentrations significantly to the Passur RS.

In the last monitoring results, most of the cases COD was found beyond the permissible limit of Draft ECR' 2017 (25 mg/L) inland surface water standard. Various activities near the power plant sites, other industrial and agricultural activities may influence the COD continuously. The extreme high COD at 2014 was the reason of oil spillage of that year which lead the death of planktons and other aquatic life forms ultimately increased the organic matter decomposition rate.

Over the year, COD concentration was found to be higher in pre-monsoon season followed by winter as these seasons had insignificant rainfall comparing to those of other seasons and which actually increased the density of organic matter. The COD concentrations of pre-monsoon and winter seasons (dry) were found higher than those of monsoon and post-monsoon seasons. In monsoon, higher discharge diluted the COD load of the river water, which in turn reduced COD concentration in post monsoon. All observed values of COD are shown in **Figure 2.18** and the completely monitored dataset are provided in **Table B.6 of Appendix- IV**.

### Nitrate, Sulphate and Phosphate

In the last monitoring, NO<sub>3</sub><sup>-</sup> concentrations varied from 1.0 mg/L to 3.3 mg/L. The maximum concentration of 3.3 mg/L recorded at the left bank of Passur river at 100 m u/s of NW corner of the project boundary area whilst lowest concentration of 1.0mg/L was found at the Maidara river near township area. NO<sub>3</sub><sup>-</sup> concentration showed both temporal and seasonal variations in the same season among 28<sup>th</sup> quarterly monitoring. For instance, in the last pre-monsoon season, power plant and adjacent areas NO<sub>3</sub><sup>-</sup> concentration was found around 2.2mg/L which showed increasing trend toward downstream except the Passur-Mongla confluence (**Figure 2.19**). However, the results obtained from all the monitoring sites were found to be within the standard concentration stated in Draft ECR'2017 (5 mg/L).

The highest values were found in pre-monsoon season of 1st quarter of 2nd year, which would be due to the higher amount of surface and groundwater runoff, dissolution of nitrogen-rich geological deposits, and biological degradation of organic matter as observed from numerous studies (Spencer, 1975; Kinne, 1984; Gleick, 1993; Wetzel, 2001; Rabalais, 2002) (**Table B.11 of Appendix-IV**). High nitrate concentration was found in monsoon period across the Passur-Sibsa RS, which would be the result of surface run-off, agricultural run-off, atmospheric deposition and domestic wastes dumping together with industrial pollution from upstream.

Naturally, sulphate (SO<sub>4</sub><sup>2-</sup>) concentration is higher in seawater as well as in coastal river due to tidal interactions. The monitored dataset substantiates this fact i.e., SO<sub>4</sub><sup>2-</sup> concentration of Passur-Sibsa RS increases in the direction of upstream to downstream. However, this variation is visible clearly in monsoon and pre-monsoon seasons only. Freshwater availability from upstream makes this variation.

The highest value (15 mg/L) of Sulphate was found at Maidara river near proposed township area. From the data analysis, it can be concluded that the monitoring sample was highly influenced by fresh water. This is an exceptional findings in compare to the earlier monitoring record. Sulphate starts usually to increase from winter season and reaches at its highest peak in pre-

monsoon season. Comparatively lower concentration of  $\text{SO}_4^{2-}$  in monsoon and post monsoon seasons could be due to the dilution effect of upstream freshwater (**Figure 2.20**). However, a contradictory has been raised which should be resolved after further monitoring investigation in future quarterly monitoring.

Since the beginning of the monitoring activities,  $\text{PO}_4^{3-}$  concentrations mostly found to be a range of acceptable limit (less than 0.5 mg/L) except 2014 which was assumed to be the reason of oil spillage of 2014 in the Sundarbans. During the last pre-monsoon season, it was found that phosphate level has been increased enormously near the Power Plant and adjacent areas. Average phosphate concentration near the power plant sites was found 3.6 mg/L (Averaging the values of 11 locations around the site) which was even higher in the deep Sundarbans (3.0 mg/L). It should be mentioned here that washing would be the major sources of Phosphate from the project site and its activities (**Figure 2.21**).

Phosphate increases during wet season in the Passur-Sibsa RS due to the upstream flows from agricultural and surface runoff and also the other flows from the cities and the wetlands those carries phosphate in the dissolved forms. Interestingly it was found that last pre-monsoon showed high phosphate level in the Passur-Sibsa RS. However, the sources of this higher amount of  $\text{PO}_4^{3-}$  and in the study area will be further investigated in the next monitoring period.

$\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$  and  $\text{PO}_4^{3-}$  concentrations at different monitoring sites of the 28 consecutive monitoring periods are shown in **Figure 2.19, 2.20 and in 2.21** and all the observed dataset are given in **Table B.11, Table B.12 and Table B.13 of Appendix- IV**.

#### Heavy Metals

It has earlier been revealed that Arsenic (As) concentrations varied between 0.002 to 0.004 mg/L. During this 28<sup>th</sup> monitoring, the results again fitted with the said range. Though there were some seasonal variations in Arsenic (As) concentrations, but still As concentration complies with the drinking water quality standard of WHO (0.01 mg/L). The Bangladesh limit is as high as of 0.05 mg/L (**Figure 2.22**).

Lead (Pb) dissolved in water is very harmful to aquatic organisms; due to bioaccumulation, it increases in body tissue of organisms (Rompas, 2010). It is also evident that organic fertilizer, which comes from lime and compost fertilizers, can contain heavy metal, e.g., NPK fertilizer (phosphate fertilizers containing Pyromorphite-  $\text{Pb}_5(\text{PO}_4)_3$  like the way said by Zhu et. al., 2004), which may result in higher amount of Pb concentration in river water. During 28<sup>th</sup> monitoring period, the concentration of Pb ranged 0.001-0.02 mg/L (**Figure 2.23**). The standard concentration for inland surface water is 0.1 mg/L.

The values of Hg (Mercury) revealed a continuous consistency among all the spots in all the seasons. The values never exceeded 0.001 mg/L. In the winter, the concentrations persisted also the same. All the observed data found to be within the Bangladesh standard limit (0.05 mg/L) set by the ECR, 1997 of Bangladesh.

The average value of As and Pb concentrations at different monitoring sites of the consecutive monitoring periods for pre-monsoon season are presented in **Figure 2.22 and in 2.23** and all the observed dataset are given in **Table B.14, Table B.15 of Appendix- IV**.

#### Oil and Grease

In order to measure the concentration of oil and grease in Passur-Sibsa River, samples were collected at five locations during low tide from the surface layer and analyzed following the standard testing method of APHA. The concentration of oil and grease are presented in **Table-B.7 of Appendix-IV**.

During monsoon and post monsoon periods, the concentration of oil and grease were found lower than that of winter and pre-monsoon season. It appears from the data that Passur and Sibsa river system recorded high concentration of oil and grease in winter period in 2014, which might be due to accidental oil spillage occurred on 9 December 2014. An amount of 350,000 litres (Philips, 2014) of furnace oil had spilled in the river and spread over an area of 350 km<sup>2</sup> (Welle, 2014).

Oil and grease was ranged <2.0- mg/L for all the monitoring sites except Hiron Point in the pre-monsoon season. The concentration of oil & grease at Hiron point has been recorded 3.2 mg/L during the pre-monsoon season. Plying of motorized boats, launches and other tourist boats, Navy boats and fishing boat at Dular char could be the reasons of high oil and grease in that areas. Moreover, for the seasonal fishing at sea, the engine boats and other fishing boats contributes huge amount of oil and grease in the river water. Therefore, due to oil spillage and discharges of other organic residual from large number of marine vessels in the location; oil discharge from the fishing boats and other anthropogenic activities might be the reason of having such higher amount of oil and grease concentration sometimes.

#### Total Organic Carbon

Total Carbon (TC) represents all the carbon in the sample, including both inorganic and organic carbon. Total Organic Carbon (TOC) is the amount of carbon found in an organic compound and is often used as a non-specific indicator of water quality or cleanliness of pharmaceutical manufacturing equipment. Total Inorganic Carbon (TIC) often referred to as inorganic carbon (IC), carbonate, bicarbonate, and dissolved carbon dioxide (CO<sub>2</sub>).

This study only considers TOC, which is very important in detecting contaminants in drinking water, cooling water, water used in semiconductor manufacturing, and water for pharmaceutical use. Three sites of Project Jetty, Harbaria and Hiron Point were monitored for TOC concentrations. According to the monitoring results, it was found that TOC concentrated less than 5.0 mg/L in each site. The normal standard for TOC varies from 7.0 mg/L to 10.0 mg/L in the river. Observed surface water is safe from TOC contaminant so far (**Table B.29: Appendix IV**).

#### PAHs (Polycyclic aromatic hydrocarbons)

During the last monitoring (monsoon), the PAHs was undetectable near the Project jetty site, Harbaria and at the Hirpon point. It indicates that there were no PAHs pollution until now in the Passur-Sibsa RS **Table B.28: Appendix IV**).

### *Findings*

Passur River is highly influenced by tidal effects. Tidal penetration in the Passur River depends on seasonal change, upstream flow and catchment water discharge. However, the physico-chemical properties of Passur River changes with the tidal intrusion in different seasons.

In this 29<sup>th</sup> quarterly monitoring, pH was found slightly acidic in nature. Salinity during monsoon has been recorded significantly lower than the pre-monsoon and winter seasons. Temperature and dissolved oxygen level was found in fair and favourable for the aquatic life forms. In this 28<sup>th</sup> quarter (pre-monsoon, 2021), TDS and TH has been relatively lower with respect to the same seasons of last consecutive years. TSS of the rivers was also recorded lower than the previous year of pre-monsoon seasons. High COD was found in all the monitoring stations. Nitrate (NO<sub>3</sub><sup>-</sup>) level remained relatively lower. Sulphate concentration should be re-investigate after getting the data from future quarterly monitoring season.

The phosphate (PO<sub>4</sub><sup>3-</sup>) was found significantly high concentration in respect to the safe limit of aquatic organisms. In case of metal pollution, no variation was recorded for As, Pb and Hg concentration and even no issues as well. Oil & grease concentration was found less than 2.0 mg/L except Hiron Point (3.2 mg/L) which is even less than the recommended concentration (10 mg/L) for Inland Surface Water. No TOC and PAH issues were raised so far in the Passur-Sibsa RS.

#### **2.3.10 Status of the Groundwater quality**

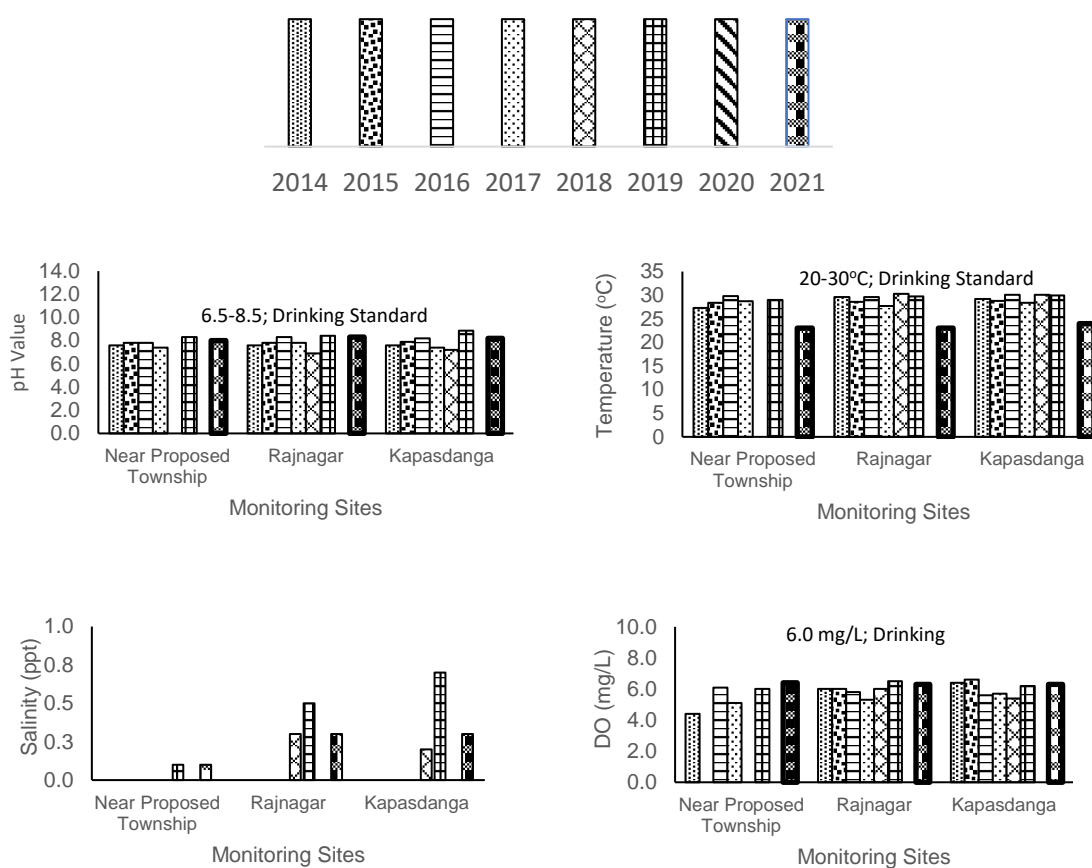
##### *In-situ tested parameters*

The in-situ tested results obtained up to 29<sup>th</sup> monitoring period (September 2021: monsoon season) are described below:



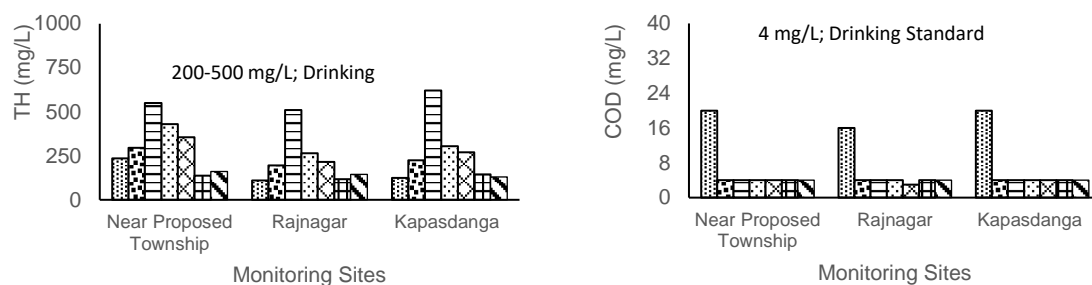
### pH and Temperature

The values of pH and temperature of groundwater in the monitored sites complied with the drinking water quality standards as specified in ECR, 1997 (6.5-8.5 and 20-30°C respectively). The pH values during 29<sup>th</sup> monitoring scheme were found to vary from 5.6 to 7.4. Infiltration of rainfall-runoff to the ground water may reduce the pH value during the monsoon period. It has in-fact the lowest pH ever recorded during the monsoon time among the previous years. The temperature ranged was recorded between 30-31°C. No significant differences have been observed against the previous monsoon season results. Temperature were found more or less consistent with the previously respective season's data. However, the 29<sup>th</sup> consecutive monitoring results of pH and temperatures (monsoon) of selected sites are presented in **Figure 2.24**. pH, Temperature and all the observed dataset are attached in **Table B.17** of **Appendix- IV**.

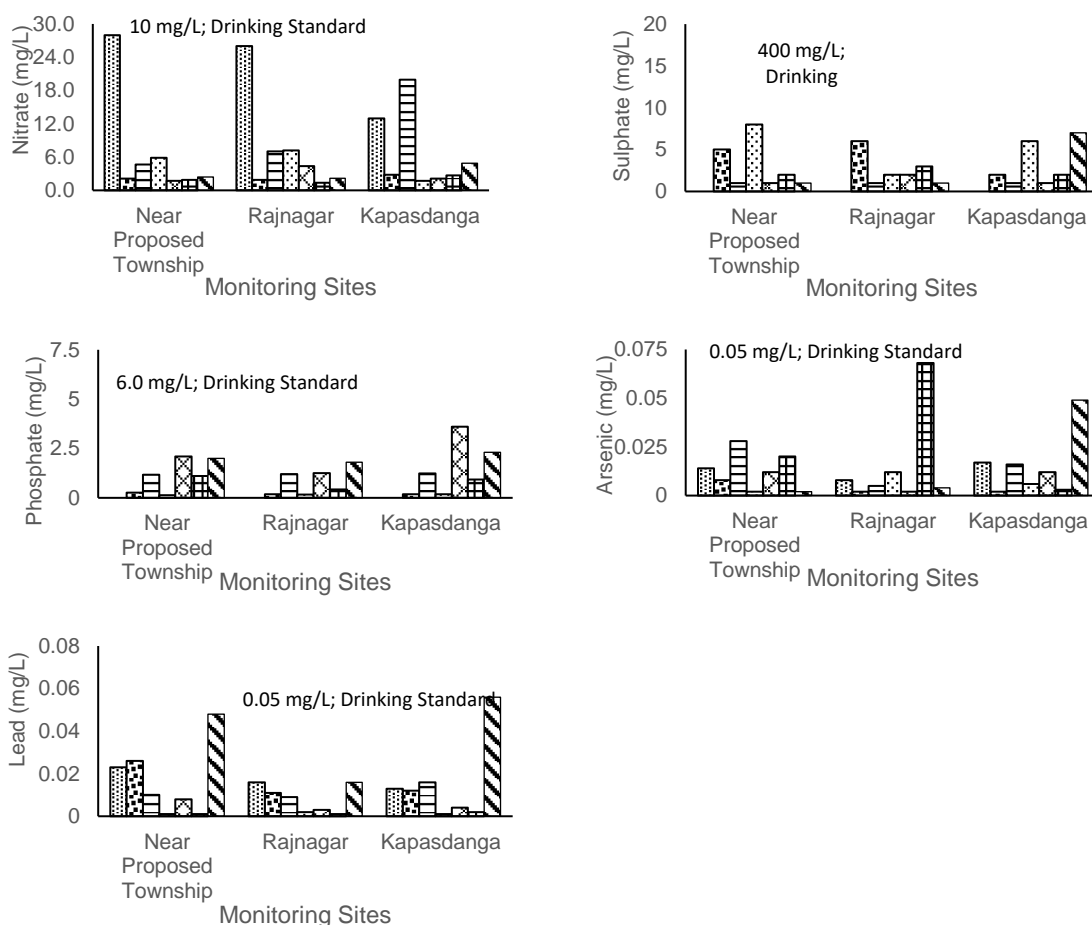


**Figure 2.24: Status of pH, Temperature, DO and Salinity of pre-monsoon season of the last eight consecutive years**





**Figure 2.25: Status of TDS, TSS, TH and COD of winter season of the last seven consecutive years**



**Figure 2.26: Status of Nitrate, Sulphate, Phosphate, Arsenic and Lead of winter season of the last seven consecutive years**

#### Salinity and Dissolved Oxygen (DO)

Groundwater salinity concentration in all the monitoring sites were found to be increasing trend with respect to previous years during monsoon period. Over the years the ground water salinity is incrementally increased especially at Rajnagar and Kapashdanga. High ground water extraction, ground water salinity intrusion or surface salinity water percolation may be the key reason for increasing the level of salinity in ground water over the years (**Table B.18: Appendix- IV**).

DO ranged between 5 - 6 mg/L during this monitoring season. DO concentrations were found within the permissible limit of ECR, 1997 (6.0 mg/L), except at Kapashdanga. A slight low DO concentration in

drinking water might only reduce the taste of water. Higher DO level makes water tastier but causes corrosion to the supply pipe.

The concentration of salinity and DO of the selected monitoring sites are presented in **Figure 2.24** and observed dataset are attached in **Table B.18** of **Appendix- IV** respectively.

#### *Laboratory tested parameters*

The laboratory tested results obtained up to 28<sup>th</sup> monitoring period (April 2021: pre-monsoon season) are described as follows:

##### TDS, TSS and TH

The highest TDS value (810 mg/L) was recorded near the Project Township Area, followed by Kapashdanga (570 mg/L) and Rajnagar (450 mg/L). Which complied completely with the ECR' 1997 (1,000 mg/L) (**Figure 2.25**).

TSS also known as non-filterable residue, are the solids (minerals and organic material) which remain trapped on a 1.2µm filter (U.S.EPA, 1998). During this monitoring period, the TSS concentrations was recorded around 1 mg/L, which complied within the Standard for Drinking Water, Bangladesh (TSS: 10mg/L, ECR, 1997) (**Figure 2.25**). TSS was found much higher than the drinking standard quality particularly at Rajnagar during the pre-monsoon in 2017 and 2018. But the last monitoring in pre-monsoon, the TSS remain 1 mg/L due to sufficient groundwater recharge and filtration. TH concentrations of the three monitored spots varied from 1200 mg/L to 1600 mg/L (**Figure 2.25**) in the last pre-monsoon season monitoring period. The maximum value was found near proposed near Rajnagar followed by Township area and Kapashdanga. Over the last seven pre-monsoon seasons, monitoring drinking water hardness complied with standard limit (200-500 mg/L) set by the ECR 1997 most of the time. But, in this monitoring period during April, 2021 the TH was exceeded tremendously. Excessive ground water extraction, ground water salinity intrusion and weathering of  $\text{Ca}^{2+}$  bearing minerals or excessive application of lime could be the major cause excessive amount of TH in groundwater.

Groundwater TDS, TSS and TH values of the consecutive winter periods are presented in **Figure: 2.25** and all the observed dataset are attached in **Table B.19** and **B.20** of **Appendix- IV**.

##### Chemical Oxygen Demand

The Bangladesh standard for COD in drinking water is 4.0 mg/L. Monitoring sites completely breached with the Bangladesh Standard as COD concentrations for every sites in the last pre-monsoon period as like the year 2014 and 2015. Increasing organic or inorganic compounds or ion in the ground water was the major cause for increasing COD in the ground water during pre-monsoon in the monitoring areas.

The COD concentrations of all the pre-monsoon period monitoring sites are given in **Figure 2.25** and observed dataset are attached in **Table B.21** of **Appendix- IV**.

##### Nitrate, Sulphate and Phosphate

Nitrate ( $\text{NO}_3^-$ ) values ranged between 1 mg/L and 2 mg/L in the last pre-monsoon period (**Figure 2.26**). The maximum value was recorded in Kapasdanga while the same amount was recorded in Rajnagar and Township.  $\text{NO}_3^-$  concentrations were within ECR, 1997 limit (10mg/L) in this 28<sup>th</sup> monitoring period.  $\text{NO}_3^-$  in groundwater showed both spatial and temporal variations in pre-monsoon season.

Sulphate ( $\text{SO}_4^{2-}$ ) level has been monitored since 2015. On that time,  $\text{SO}_4^{2-}$  concentrations were complying with the Bangladesh Standard for Drinking Water Quality (400 mg/L).  $\text{SO}_4^{2-}$  concentration in groundwater showed significantly decreasing trend during concentrations during pre-monsoon monitoring in April, 2021 (**Figure 2.26**).

On the other hand, the concentrations of  $\text{PO}_4^{3-}$  were found between 0.98 mg/L and 4 mg/L, which was

within the standard limit of 6.0 mg/L (ECR'1997) (**Figure 2.26**).  $\text{PO}_4^{3-}$  concentration reached to its highest peak at 4 mg/L at Kapashdanga during the pre-monsoon in 2021.  $\text{PO}_4^{3-}$  concentrations actually have both spatial and temporal variations but which is minor in the interest of this monitoring objectives as well as drinking purpose by the community resides there. The observed winter seasons  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$  and  $\text{PO}_4^{3-}$  concentrations of groundwater are presented in **Figure 2.26** and observed dataset are attached in **Table B.22, B.23, and B.24 of Appendix- IV**.

#### Arsenic (As), Lead (Pb) and Mercury (Hg)

According to Bangladesh Standard (ECR, 1997), the maximum acceptable concentration of Arsenic (As) in groundwater is 0.05 mg/L. The As concentrations among all the monitoring locations ranged between 0.002 mg/L and 0.008 mg/L in the last pre-monsoon which are very much within the Bangladesh standard for drinking water quality (ECR, 1997) (**Figure 2.26: Arsenic**) except Kapashdanga. Earlier, there were two cases was noted as exceedance during the entire monitoring scheme since 2014. The first one was during the winter period of 2019 (0.063 mg/L) and the second one was during the post-monsoon of 2020 (0.053 mg/L) at Rajnagar. Now, it was the third time, where the As concentration exceeds the Bangladesh standard of Drinking water (ECR, 1997) at Kapashdanga monitoring well. Therefore, we have to investigate further for find out the root cause and taking firm decision about the monitoring well. We should aware to the ground water user on As issue.

Lead (Pb) and Mercury (Hg) concentrations were also measured and the values were found within the permissible limit specified in ECR 1997 (0.05 mg/L for Pb and 0.001 mg/L for Hg). The concentration of Pb showed only spatial variation to some extent (**Figure 2.26: Lead**). However, the water of the tube-wells was found suitable for drinking purpose in terms of metal pollution status.

The observed values of As and Pb in all the winter seasons are presented in **Figure: 2.26** and all the observed dataset of As, Pb and Hg are presented in **Table B.25 and B.26 of Appendix-IV**.

#### *Remarks*

This concluding remark represent the status of physical (Monsoon, 2021), chemicals and metals status (Pre-monsoon 2021) characteristics of drinking water. It has been observed that the physical characteristics of groundwater quality is still in good condition with slight variation in pH and salinity. The reason being saline water intrusion and infiltration due to excessive withdrawn of groundwater by the surrounding communities during the dry season. In addition, evaporation also responsible for this slight salinity in groundwater. Project activities are not related to this sort of changes in salinity.

Chemical characteristics of the groundwater quality are also found relatively good but exceeded on the permissible limit for Bangladesh (Drinking water standards, ECR 1997). All the monitoring samples certainly exceeded the TH and COD standard guideline, the observed groundwater is completely free from the metal pollution particularly Lead and Mercury. As pollution was recorded at Kapashdanga monitoring station during the April, 2021. Out of 28 monitoring seasons, only three As became an issue temporarily with slightly higher concentrations than the drinking standards.

## **2.4 Land Resources Monitoring**

### **2.4.1 Methodology**

Monitoring of selected indicators very crucial for better management of land resources in the study area. Plot/land use, soil fertility/nutrient status, soil contamination with heavy metals and soil salinity are considered as the major indicators for land resources monitoring. It is also assumed that during the operation phase of the power plant fly ash and other air borne pollutants may deposit on the surrounding agriculture land, which ultimately pollute the study area soil. Before that (during pre-construction and construction stage), only natural phenomena are responsible to alter soil parameters.

### Sampling Frequency

The frequency of monitoring for land resources data collection was considered twice in a year. So, plot wise agricultural and land resources monitoring is accomplished in April and October in each year. Accordingly, agriculture production related data was collected during this monitoring field visit.

### Monitoring Indicators

The continuous monitoring has given an opportunity to observe seasonal change along with spatial change of selected indicators of sampling plots. The selected indicators are soil reaction (pH), soil salinity (EC), Organic matter (OM), base Cations (Ca, Mg, K and Na), status of macro nutrients (N, P and S), status of micro nutrients (B, Fe, Mn and Zn) and presence of heavy metals (Pb and Cd). Sodium absorption ratio (SAR), exchangeable sodium percentage (ESP) can be calculated from the analysed data. It can also be mentioned that the structural change of soils in the sampling plots may also be identified from these data.

The formula to calculate SAR is given below, with concentration expressed in milli equivalents per liter (meq/L) analysed from a saturated paste soil extract.

$$SAR = \frac{[Na^+]}{\sqrt{\frac{1}{2}([Ca^{2+}] + [Mg^{2+}])}}$$

ESP is the sodium adsorbed on soil particles as a percentage of the Cation Exchange Capacity (CEC). It is calculated as:

$$ESP = \frac{[Na]^+}{CEC} \times 100$$

CEC is often estimated as the major exchangeable cations, including hydrogen. Both cation and CEC are expressed as meq/100g. ESP can also be calculated as:

$$ESP = \frac{[Na]^+}{[Ca^{2+} + Mg^{2+} + Na^+ + K^+]}$$

ESP is used to characterise the sodicity of soils only, whereas SAR is applicable to both soil and soil solution or irrigation water.

### Location

The selected mauzas for monitoring are Baranpara (E-89°30'59.1", N-22°37'57.0") of Batiaghata Upazila, Chunkuri-2 (E-89°32'20.0", N-22°34'51.0") of Dacope Upazila, Kapalirmet (E-89°36'8.8", N-22°32'18.9") of Mongla Upazila, Chakgona (E-89°34'25.3", N-22°34'18.3") of Rampal Upazila and Basherhula (E-89°34'25.0", N-22°36'14.0") of Rampal Upazila under Khulna and Bagerhat Districts. However, a new sampling location (Bidyarbon- E-89°34'40.0", N-22°33'42.0") of Mongla Upazila was included with the previous ones for monitoring as per ToR. The sampling locations with their corresponding coordinates are stated in **Table 2.9**. Locations of collected soil samples are presented in **Figure 2.27**.

#### 2.4.2 Process of Soil Samples Collection

##### Plot Selection

Monitoring plots were selected at the very beginning of this study. Expert's judgement along with plot owner's opinion was taken into consideration for this selection. Upazila Agriculture Officers of Batiaghata and Dacope of Khulna, Rampal and Mongla of Bagerhat District and Senior Scientific Officer of Soil Resource Development Institute (SRDI) of Khulna were contacted for collecting expert's judgement. Wind speed and wind direction were considered as potential local factor for the monitoring purpose.



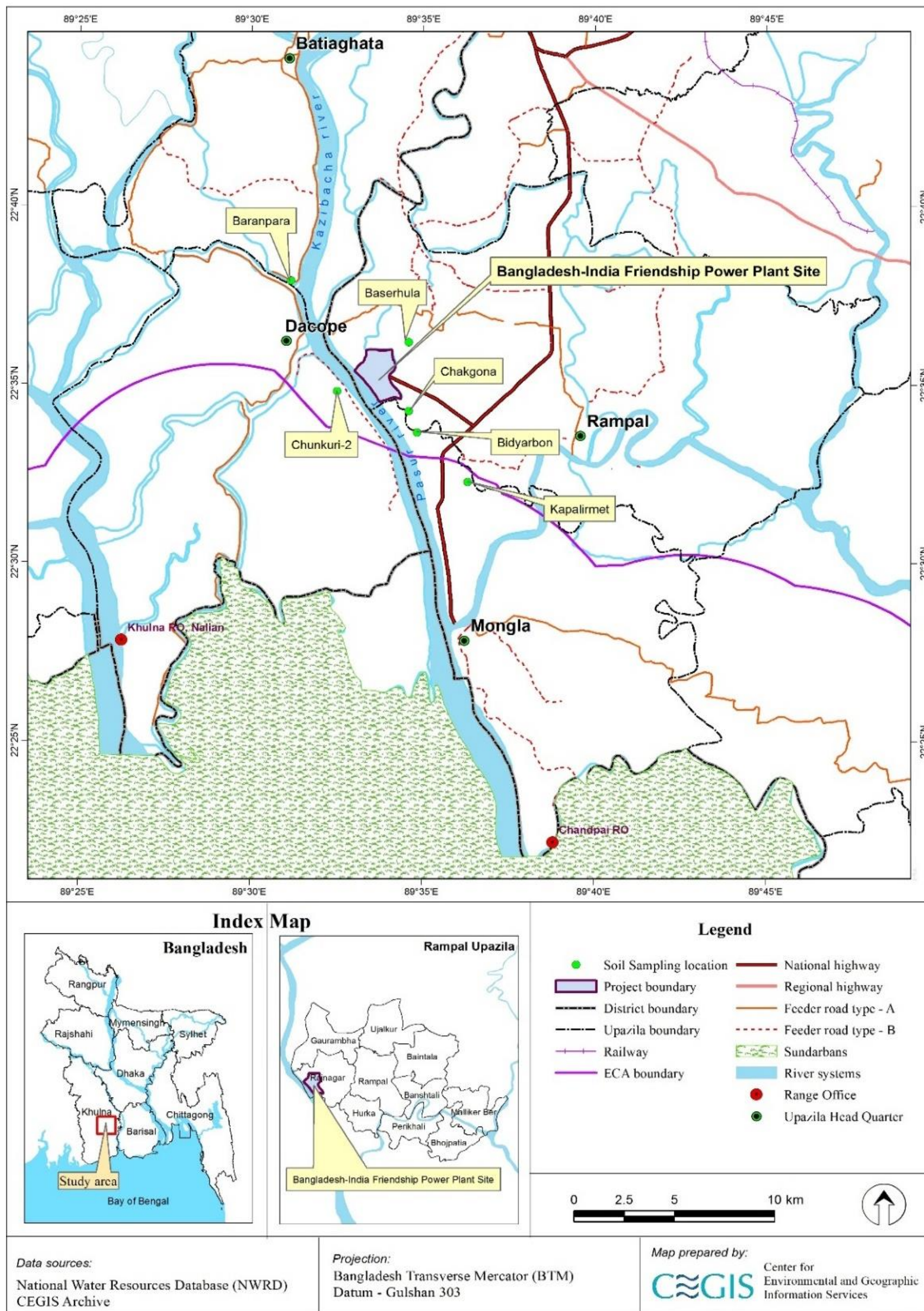


Figure 2.27: Land and Agricultural Resource Monitoring Locations





**Table 2.9: Land Resources Monitoring Plan**

| Site No. | Monitoring indicators   | Location  | GPS (Decimal Degree) |               | Sampling Frequency               | Methods/Tools/ Techniques                             |
|----------|---|---|----------------------|---------------|----------------------------------|---|
|          |   |   | Easting              | Northing      |                                  |   |
| 1        | Plot use, Soil fertility and Nutrient, Chemical Properties of Soil (pH, Pb, Cd), Crop production and damage | Mauza: Baranpara<br>Union: Gangarampur<br>Upazila: Batiaghata,<br>District: Khulna            | E-89°30'59.1"        | N-22°37'57.0" | Bi-yearly<br>(April and October) | In situ field sampling and Laboratory Testing in SRDI |
| 2        |   | Mauza: Chunkuri-2<br>Union: Bajua<br>Upazila: Dacope<br>District: Khulna                      | E-89°32'20.0"        | N-22°34'51.0" |                                  |   |
| 3        |   | Mauza: Kapalirmet/<br>Buridmial<br>Union: Burirdanga<br>Upazila: Mongla<br>District: Bagerhat | E-89°36'8.8"         | N-22°32'18.9" |                                  |   |
| 4        |   | Mauza: Chakgona<br>Union: Rajnagar<br>Upazila: Rampal<br>District: Bagerhat                   | E-89°34'25.3"        | N-22°34'18.3" |                                  |   |
| 5        |   | Mauza: Basherhula<br>Union: Rajnagar<br>Upazila: Rampal<br>District: Bagerhat                 | E-89°34'25.0"        | N-22°36'14.0" |                                  |   |

All the selected plots were characterized as medium high land (F<sub>1</sub>), which are normally flooded in the range of 30-90 cm and remain inundated for more than two weeks to few months during the flood period.

Standard procedure was maintained during the collection of soil samples. In every plot, minimum three pits were dug through augur to collect composite sample. Each plot had three composite samples, top soil (0-15 cm), sub soil (15-30 cm) and sub stratum (30-45 cm). Soil samples were preserved in an air-tight plastic bag for laboratory analysis. Collected soil samples for pre-monsoon period were submitted to the SRDI, Dhaka for laboratory analysis. The analysis data and report are incorporated with this monitoring (29<sup>th</sup> monitoring) report.

#### **2.4.3 Status of soil quality of monitoring plots**

##### *Monitoring Plot-1 (Baranpara)*

Soil fertility and health is largely depending on salinity of the study area. According to the last soil chemical analysis, SAR and ESP value decreases than last wet season while EC increases. This might be due to the increase of divalent cations (Ca and Mg) instead of mono valents (Na and K). Increase of divalent cations is good for soil health and fertility. pH is also decreasing. Top soil organic matter decreases significantly compared to last wet season. Nitrogen and Phosphorus follows the similar trend. This might be an effect of soil erosion. Only Sulphur concentration increase this year which might be impact of salinity (EC) increase. Boron and Zinc have increased than the previous year. Over use of zinc fertilizer might be cause of this situation. Excess presence of these two elements may suppress other elements (Iron and Manganese) present in soil solution. Decrement of lead concentration continues for second consecutive year and cadmium presence is not identified in this monitoring period.

##### *Monitoring Plot-2 (Chunkuri-2)*

Good agricultural practice is found in this monitoring plot. As a result, soil condition has improved from the previous monitoring. Organic matter and Nitrogen concentration continue to increase for fifth consecutive years while phosphorus and sulfur concentration is decreased than last wet season monitoring. Organic

matter concentration increase might be a result of application of organic fertilizer while phosphorus and Sulphur might be washed out or replaced by other elements. Increase of Na and Mg concentration triggers up SAR and EC values increase of these two-element concentrations suppressed Ca and K concentration. As a result, ESP concentration decreases. pH is decreases. Among the micro elements, only Zn and Fe showed decreasing trend while Mn and B showed increasing trend during the monitoring period. Macro elements have tendency to form chalet with organic matter. Increasing trend of Organic matter concentration was also observed during this monitoring period. This might be cause of decrease of Fe and Zn concentration in this monitoring plot. Decrement of lead concentration continues for fourth consecutive year and cadmium presence is not identified in this monitoring period.

#### *Monitoring Plot-3 (Kapalirmet)*

This monitoring plot was used for fish cultivation during pre-monsoon and post monsoon period. During monsoon period this area completely goes under water. Decreasing salinity was a common scenario of this monitoring plot due to leaching and continues lentic ecosystem. This situation also prevails this year. All salinity related parameters (EC, SAR and ESP) decreases while pH increases. Due to submerged condition, organic matter of this area increases. Other essential elements (N and P) concentration is follow the similar trend excepts. Micro elements (Mn, Zn and B) concentration increases except iron. This might be another impact of submergence. Decrement of lead concentration continues for second consecutive year and cadmium presence is not identified in this monitoring period.

#### *Monitoring Plot-4 (Chakgona)*

Overall salinity of this area continues of decrease after last year rise. All base cations (Na, K, Ca) showed the similar trend except Mg. This might be an after impact of tropical cyclone. pH is almost similar to the previous year. Organic matter has increased, so is Nitrogen. But Sulphur and Phosphorus concentration is decreased which is in indication of soil degradation and erosion of top soil of that area during rainy season. Increasing trend of Zn, B and Mn concentration might be an over application of fertilizer. But decrease of Fe might be the impact of increasing leaching. Decrement of lead concentration continues for fourth consecutive year and cadmium presence is not identified in this monitoring period.

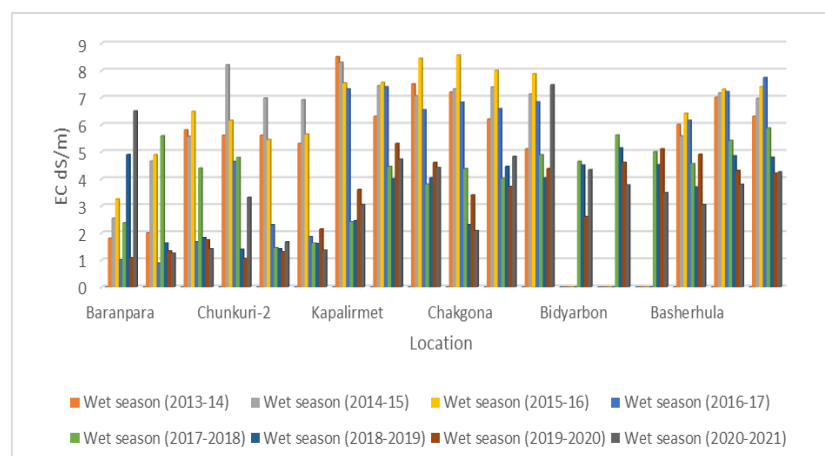
#### *Monitoring Plot-5 (Basherhula)*

Overall salinity decreased in this area. All salinity related parameters follow the similar trend. This might be due to reduction of mono valent cations concentration and increase of divalent cations. pH is also decreasing. Organic matter concentration has decreased. Major nutrients (N, and S) follow the similar trend. This might be the impact washout and erosion of the top soil during monsoon. Increase of P might be an impact of over application of fertilizer use. All micro nutrients show (Fe, Zn, B) increasing trend except Fe. While decrement of lead concentration continues for third consecutive year and cadmium presence is not identified in this monitoring period.

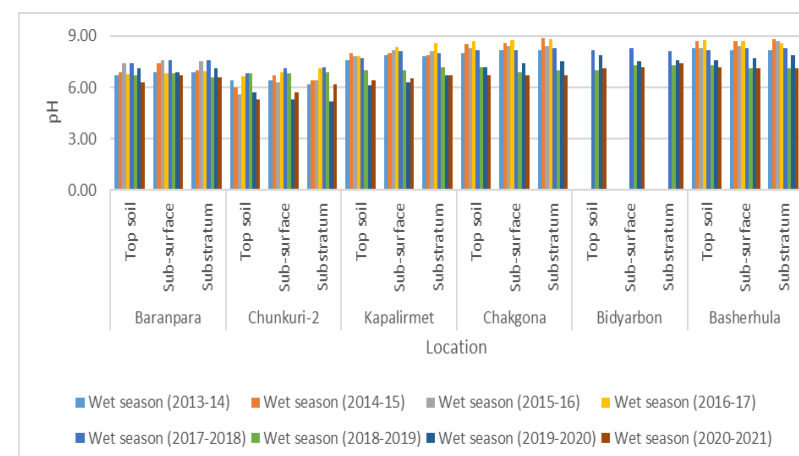
#### *Monitoring Plot-6 (Bidyarbon)*

One part of this monitoring plot is exposed to river. So there is a good possibility of quick wash out and soil erosion during monsoon period. This scenario also indicates vulnerability to storm surge and salinity intrusion from riverside during extreme events. Overall EC is decreased in this area where base cations (Na, K, Ca) are also decreased except Mg. pH is also decreased.

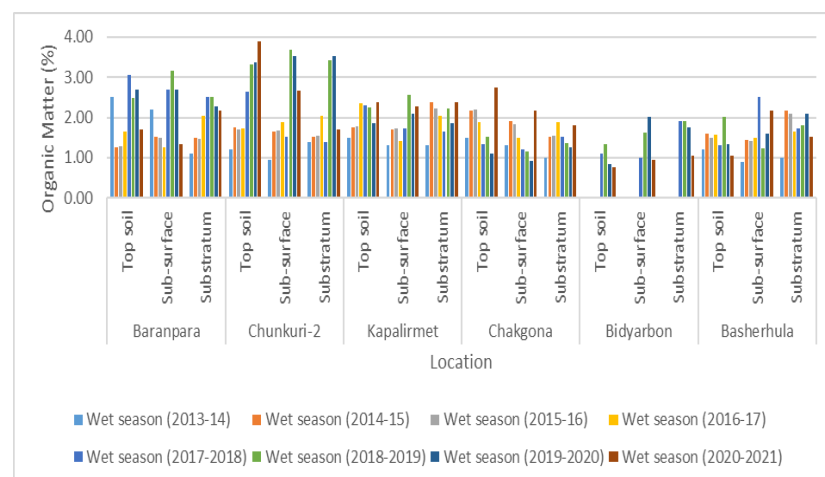
Organic matter and Nitrogen concentration have decreased which might be due to the impact erosion. Increment of P and S might be cause of over application of fertilizer. Fe and Mn concentration has increased during this monitoring while Zn and B concentration has decreased. Increasing salinity might reduce the presence of these two elements. Lead concentration dropped after continuous rise of three years and cadmium presence is not identified in this monitoring period.



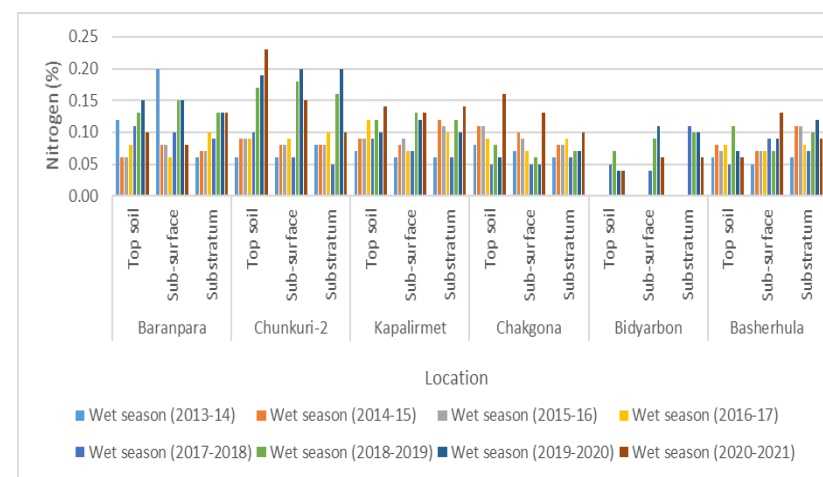
Changes of EC (dS/m) in wet seasons in sampling locations throughout the monitoring period



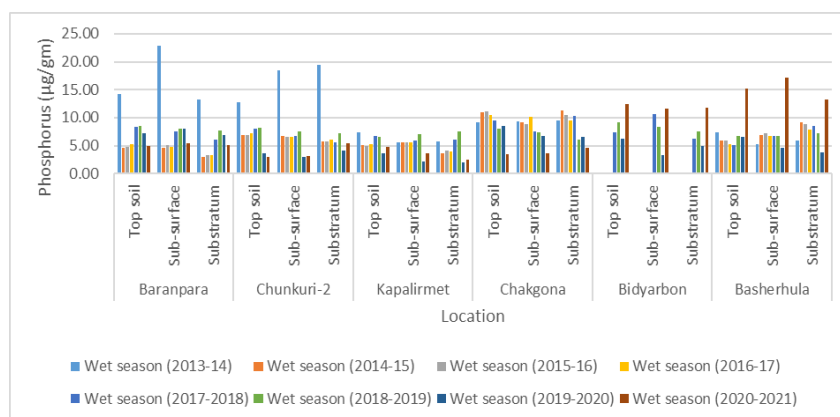
Changes of pH in wet seasons in sampling locations throughout the monitoring period



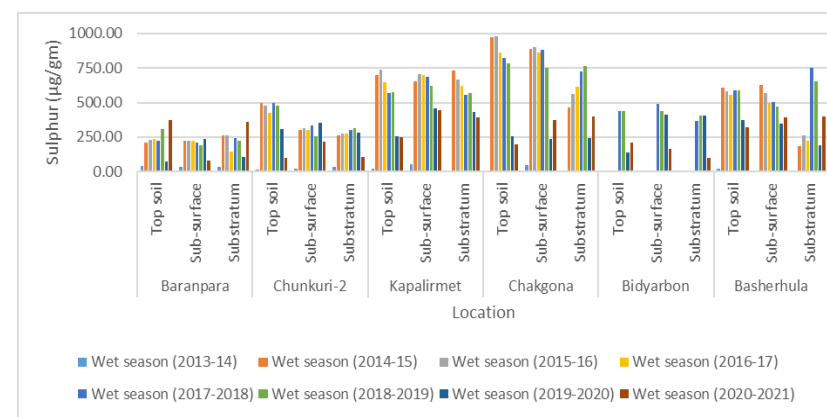
Changes of Organic matter (%) in wet seasons in sampling locations throughout the monitoring period



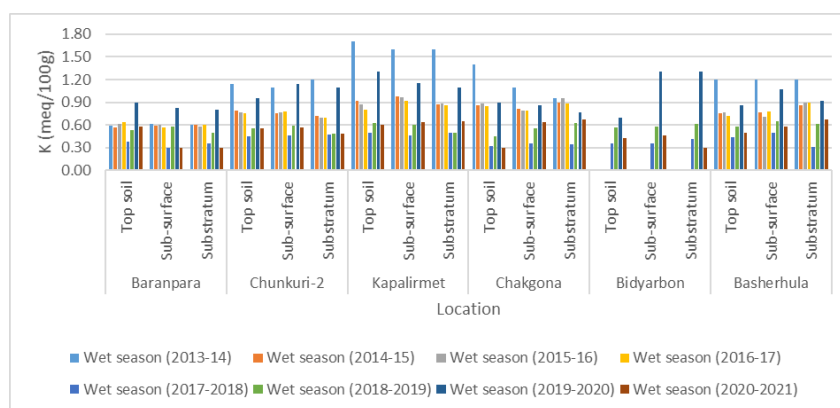
Changes of Nitrogen (%) in wet seasons in sampling locations throughout the monitoring period



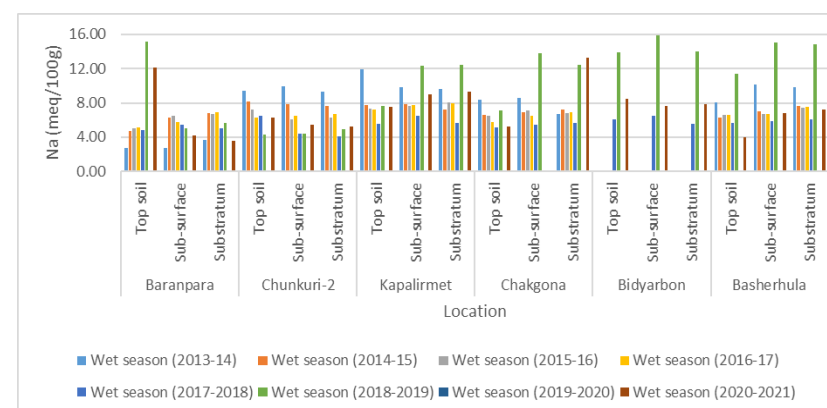
Changes of Phosphorus ( $\mu\text{g/gm}$ ) in wet seasons in sampling locations throughout the monitoring period



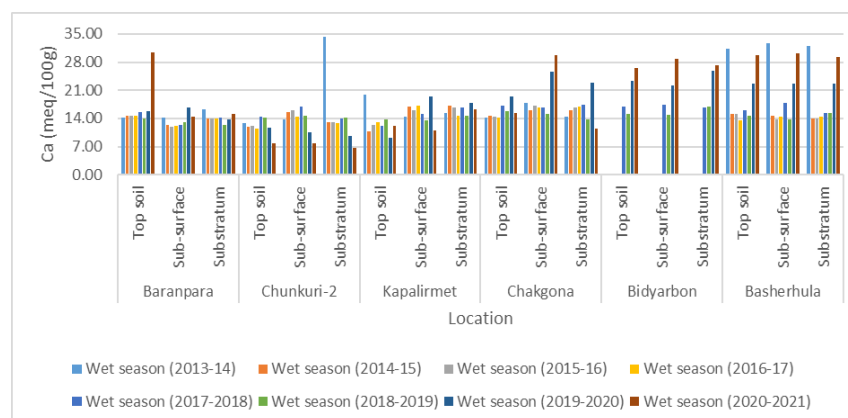
Changes of Sulfur ( $\mu\text{g/gm}$ ) in wet seasons in sampling locations throughout the monitoring period



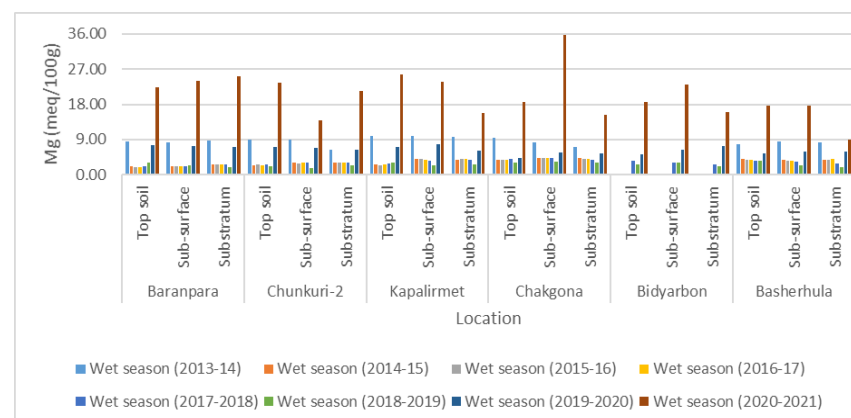
Changes of Potassium (meq/100g) in wet seasons in sampling locations throughout the monitoring period



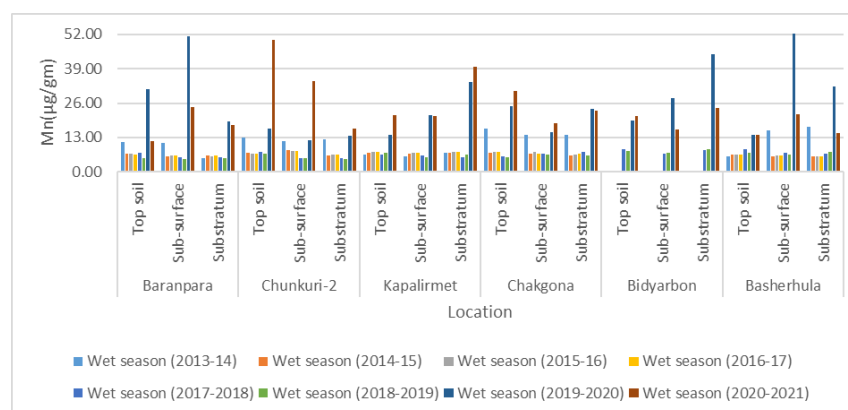
Changes of Sodium (meq/100g) in wet seasons in sampling locations throughout the monitoring period



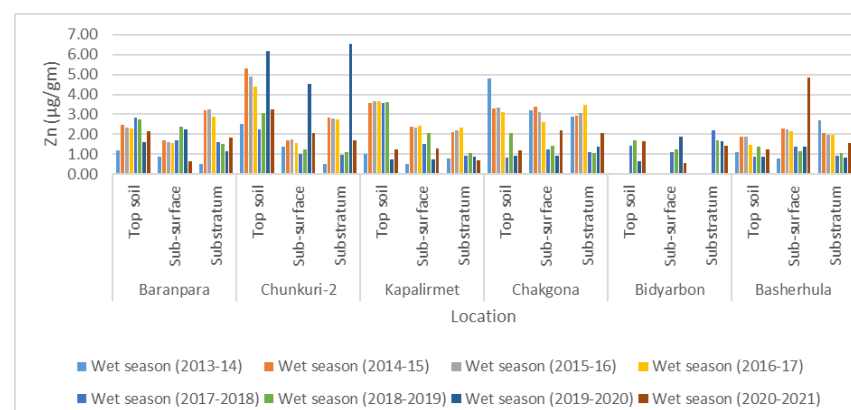
Changes of Calcium (meq/100g) in wet seasons in sampling locations throughout the monitoring period



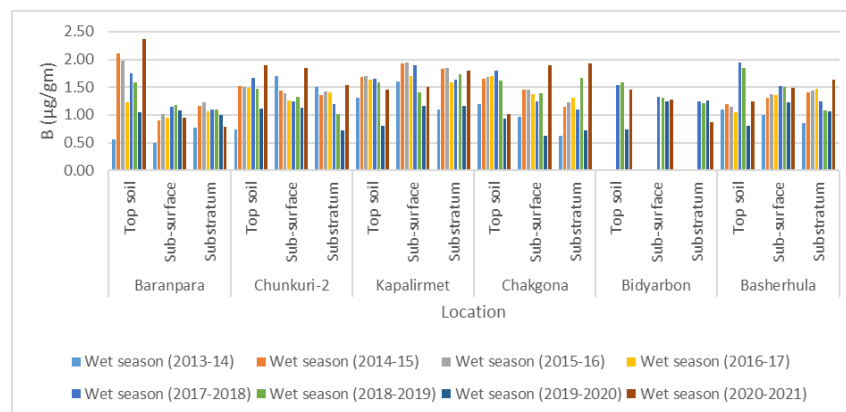
Changes of Magnesium (meq/100g) in wet seasons in sampling locations throughout the monitoring period



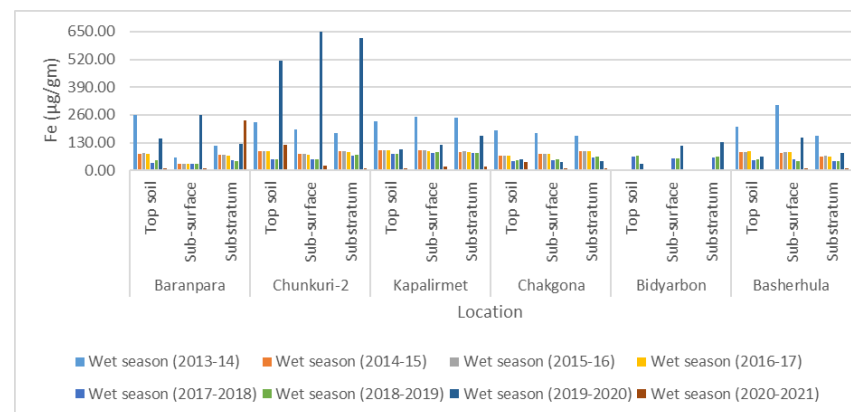
Changes of Manganese (µg/gm) in wet seasons in sampling locations throughout the monitoring period



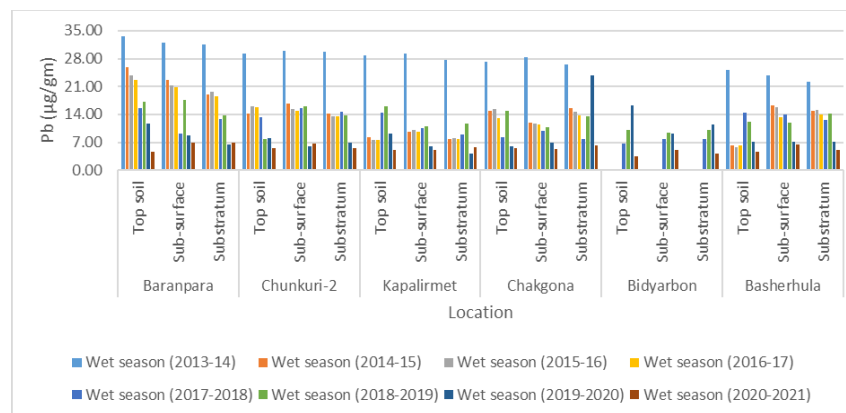
Changes of Zinc (µg/gm) in wet seasons in sampling locations throughout the monitoring period



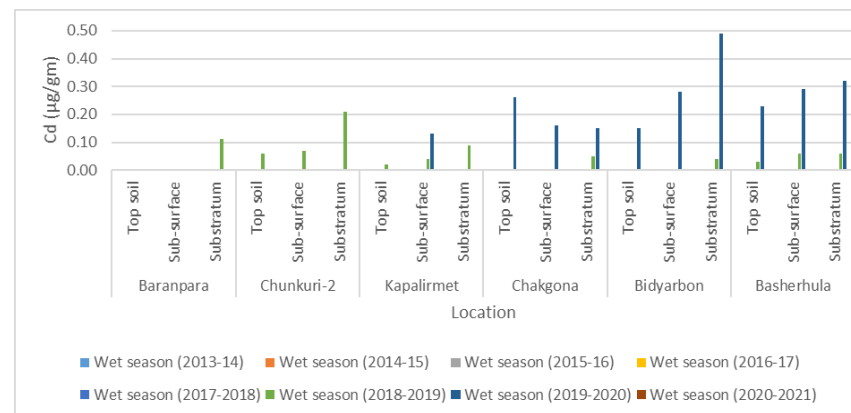
Changes of Boron ( $\mu\text{g/gm}$ ) in wet seasons in sampling locations throughout the monitoring period



Changes of Iron ( $\mu\text{g/gm}$ ) in wet seasons in sampling locations throughout the monitoring period



Changes of Lead ( $\mu\text{g/gm}$ ) in wet seasons in sampling locations throughout the monitoring period



Changes of Cadmium ( $\mu\text{g/gm}$ ) in wet seasons in sampling locations throughout the monitoring period

**Figure 2.28: Changes in chemical properties of soil at the sampling locations throughout the monitoring period**



## 2.5 Agriculture Resources and Livestock Monitoring

Monitoring of agriculture resources and Livestock has been scheduled twice (April and October) a year as per the monitoring plan of the ToR. In this regard, the next survey will be conducted in 30<sup>th</sup> Monitoring (October, 2021) and report will be incorporated accordingly.

## 2.6 Transportation Monitoring

### 2.6.1 Location of Traffic Survey

The traffic survey for this monitoring during the construction phase was conducted from September 3<sup>rd</sup> to September 5<sup>th</sup>, 2021 on two weekends and on one weekday at three pre-selected locations around the project site. Weather was sunny during the days when the survey was conducted. The selected sites were Khudir Bottola and Gonai Bridge at Khulna Mongla Road and Gonabelai Bridge at Power Plant access road presented in the **Figure 2.29**.

### 2.6.2 Methodology

Traffic surveys were carried out at three distinct periods (morning - 7:00 AM to 10:00AM; noon-12:00 PM to 2:00PM and evening- 17:00 PM to 19:00PM) to understand the nature of traffic flow and traffic load on the preselected locations during different phase of the day. Vehicles were categorized based on the available vehicle types around the project area.

### 2.6.3 Traffic Volume Calculation

The survey results were used in computing the traffic volume of these roads in Passenger Car Unit (PCU). PCU is a matrix used in Transportation Engineering, to assess traffic-flow rate on roadways. A PCU is essentially the impact that a mode of transport has on traffic variables (such as headway, speed, density) compared to a single car. While calculating the traffic volume in PCU, vehicle conversion factors suggested by the Roads and Highway department of Bangladesh were used as mentioned in **Table 2.10**.

**Table 2.10: Vehicle conversion factors**

| Vehicle type           | Factor |
|------------------------|--------|
| Bus                    | 2.5    |
| Minibus/Truck          | 2      |
| Car/Microbus/Zeep      | 1      |
| CNG                    | 0.5    |
| Rickshaw/Auto Rickshaw | 0.8    |
| Tempo/Human hauler     | 0.6    |
| Motorcycle             | 0.3    |
| Bicycle                | 0.2    |
| Push Chart             | 4      |

### 2.6.4 Results of Monitoring

The summary results of vehicular movements at three different locations in **Table 2.11** shows that, the Passenger Car Unit (PCU) per hour suggest that the Khulna-Mongla Highway receives the largest number of vehicles, compared to other surveyed roads.

**Table 2.11: Calculated PCU in Three Locations at Three Different Time Period**

| Location                             | 7:00 AM to 10:00AM | 12:00 PM to 2:00PM | 17:00 PM to 19:00PM |
|--------------------------------------|--------------------|--------------------|---------------------|
| Khulna Mongla Road at Khudir Bottola | 751                | 913                | 599                 |
| Khulna Mongla Road at Gonai Bridge   | 205                | 285                | 330                 |

| Location                                    | 7:00 AM to 10:00AM | 12:00 PM to 2:00PM | 17:00 PM to 19:00PM |
|---|--------------------|--------------------|---------------------|
| Power Plant access road at Gonabelai Bridge | 100                | 76                 | 150                 |

Source: Field Survey, April, 2021

Similar to the earlier months monitoring report, vehicular movements were observed during the surveys were mostly for the regular construction activities of the Power Plant as the construction activities of the Power Plant are progressing heavily. Khulna Mongla Road at Khudir Bottola received the highest traffic volume compared to the other two locations namely Khulna Mongla Road at Gonai Bridge and Powerplant access road at Gonabelai Bridge. It is to be mentioned here during the morning time traffic volume at Khudir Bottola was found to be higher during morning time and lower in the noon and evening time compared to the previous monitoring period. On the other hand, Khulna Mongla Road at Gonai Bridge and Power Plant access road at Gonabelai Bridge received similar kind of traffic volume compared to the previous monitoring period. One of the key factors behind this heavy traffic volume at Khulna Mongla Road at Khudir Bottola is the rigorous and heavy construction works of the Power Plant. Moreover, restriction on movement due current pandemic situation has been lifted up by the government. This could be another contributing factor for higher traffic volume in that area. On the other hand, reason behind the lower traffic volume at the other two locations namely Khulna Mongla Road at Gonai Bridge and Power Plant access road at Gonabelai Bridge may be because the survey date fell on two weekends. The detail survey findings regarding the traffic volume surveys as well as the detail calculations are attached in **Table E1, E2 and E3 of Appendix-IV**.

## 2.7 Water resources monitoring

### 2.7.1 Introduction

Bangladesh is a riverine country. Rivers in different hydrological regions have different characteristics. Rivers in the northern part have fluvial characteristics while it is tidal in the south. The Passur River is one of the dynamic and major rivers in the southern part of Bangladesh. Rampal power plant is being constructed along the left bank of the Passur River. It is always important to monitor the morphological characteristics of the river at regular interval to assess the dynamics of the river in case of any development works. Monitoring of river dynamics like erosion, accretion and shifting of the bankline of the Passur River with a half-yearly basis may facilitate the proper planning and management of the development work.

### 2.7.2 Methodology

For the assessment of the riverbank erosion and accretion, time series satellite images were used. Then images were processed and analyzed before the assessment and identify the locations of erosion and accretion as well as the shifting of bankline. The steps of images processing and analysis is briefly explained below.

#### *Collection and Processing of Images*

Sentinel-1 Radarsat satellite images having 10m resolution covering the Passur River from Chalna to Hiron Point for the period from January 2021 to September 2021 were collected. After that, satellite images were geo-referenced to have the same projection system. Then, it was found that one image differs with other image. Under this circumstances, images were co-registered to avoid the distortion with each image.

#### *Delineation of Banklines*

After collection and processing of images, banklines were delineated for the mentioned period using Arc-GIS tool. Then, banklines were analyzed and superimposed to assess the erosion-accretion and shifting of the river during period from January 2021 to September 2021.

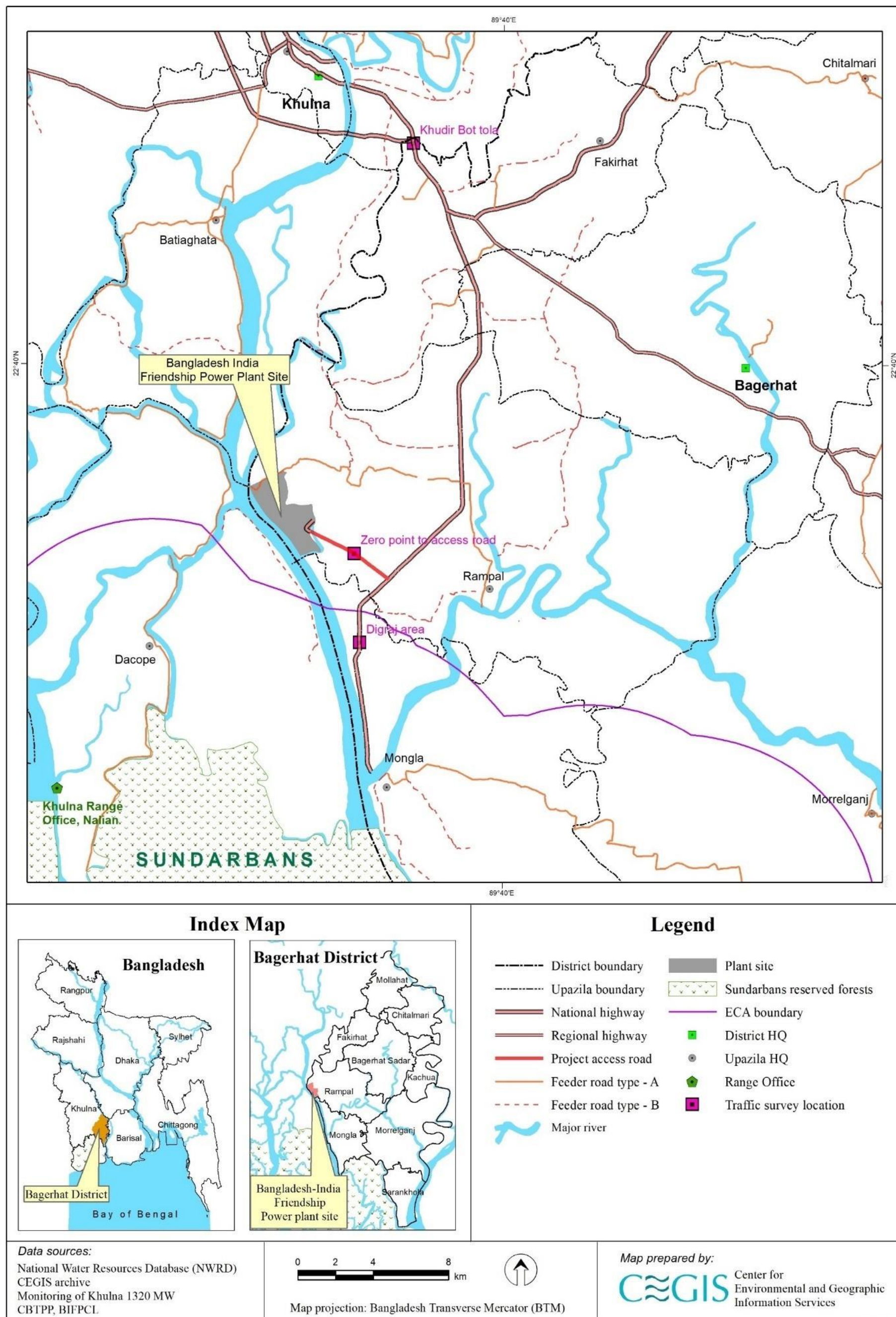


Figure 2.29: Locations of Traffic Survey



### 2.7.3 Monitoring of Erosion and Accretion

For monitoring the erosion and accretion at the project site, Mongla, Harbaria and Akram point areas, banklines of the Passur River were superimposed with each other. It was found that the river is stable and there is no riverbank erosion or accretion as the river has not shifted from January, 2021 to September, 2021 (**Figure 3.30**) although there are red color (represents erosion) in few locations along its both banks during its passage from Chalna to Hiron Point which may be considered as insignificant.

### 2.7.4 Monitoring of sedimentation

#### 2.7.5 Methodology

Sediment is considered an important environmental indicator for metal pollution in any natural ecosystem. The investigation of heavy metals in water and sediments could be used to assess the anthropogenic impacts and risks posed by waste discharges to the riverine ecosystems. Therefore, sediment quality assessment has been done during environmental issues monitoring of this project.

#### Sampling Frequency

The frequency of monitoring for sediment quality has been considered twice in a year (January and July). Accordingly, the sediment sampling was done in 29th monitoring (September, 2021). The sediment quality assessment will be incorporated in 30th monitoring report.

#### Monitoring Indicators

The main objective of sediment quality monitoring is to find out the heavy metal accumulation in sediments due to anthropogenic activities (e.g. power plant activity and coal transportation). To find out the answers, a biannual sediment monitoring is done in different sampling points. The major indicators for monitoring are heavy metals (As, Pb and Hg), pH and Sulphate. The selected heavy metals are mainly found in coal and assumed to pollute the sediment and water system during operation stage of power plant.

#### Location

The sampling locations are selected in both near places of project area and inside the Sundarbans. The sampling locations are stated in **Table 2.12**. Locations of collected samples are presented in **Figure 2.31**.

**Table 2.12: Location and Sediment Monitoring Plan**

| Site No | Monitoring Indicators   | Location      | GPS(Decimal Degree) |               | Sampling Frequency           | Methods/Tools/Techniques                               |
|---------|---|---------------|---------------------|---------------|------------------------------|--|
|         |   |               | Northing            | Easting       |                              |  |
| 1       | Heavy metals (Arsenic-As, Mercury-Hg, Lead-Pb); pH and Sulfate (SO <sub>4</sub> ) | Project Site  | N-22°35'21.2"       | E-89°32'53.4" | Bi-yearly (January and July) | In situ field sampling and Laboratory Testing at BCSIR |
| 2       |   | Moidara River | N-22°34'33.4"       | E-89°33'38.8" |                              |  |
| 3       |   | Mongla Port   | N-22°30'57.1"       | E-89°35'0.3"  |                              |  |
| 4       |   | Harbaria      | N-22°17'44.2"       | E-89°32'53.4" |                              |  |
| 5       |   | Akram Point   | N-22°01'07.6"       | E-89°30'34.4" |                              |  |

### 2.7.6 Process of Sediment Sample Collection:

#### Plot Selection

The sampling locations were selected on the basis of potential route of coal transshipment and assumed major polluted area. Project site and Moidara River are beside the power plant, while Harbaria and Akram point are inside the Sundarbans area where the coal transportation will take place. The sampling points were selected on the basis of TOR. Expert's judgement was also taken to validate the sampling points.

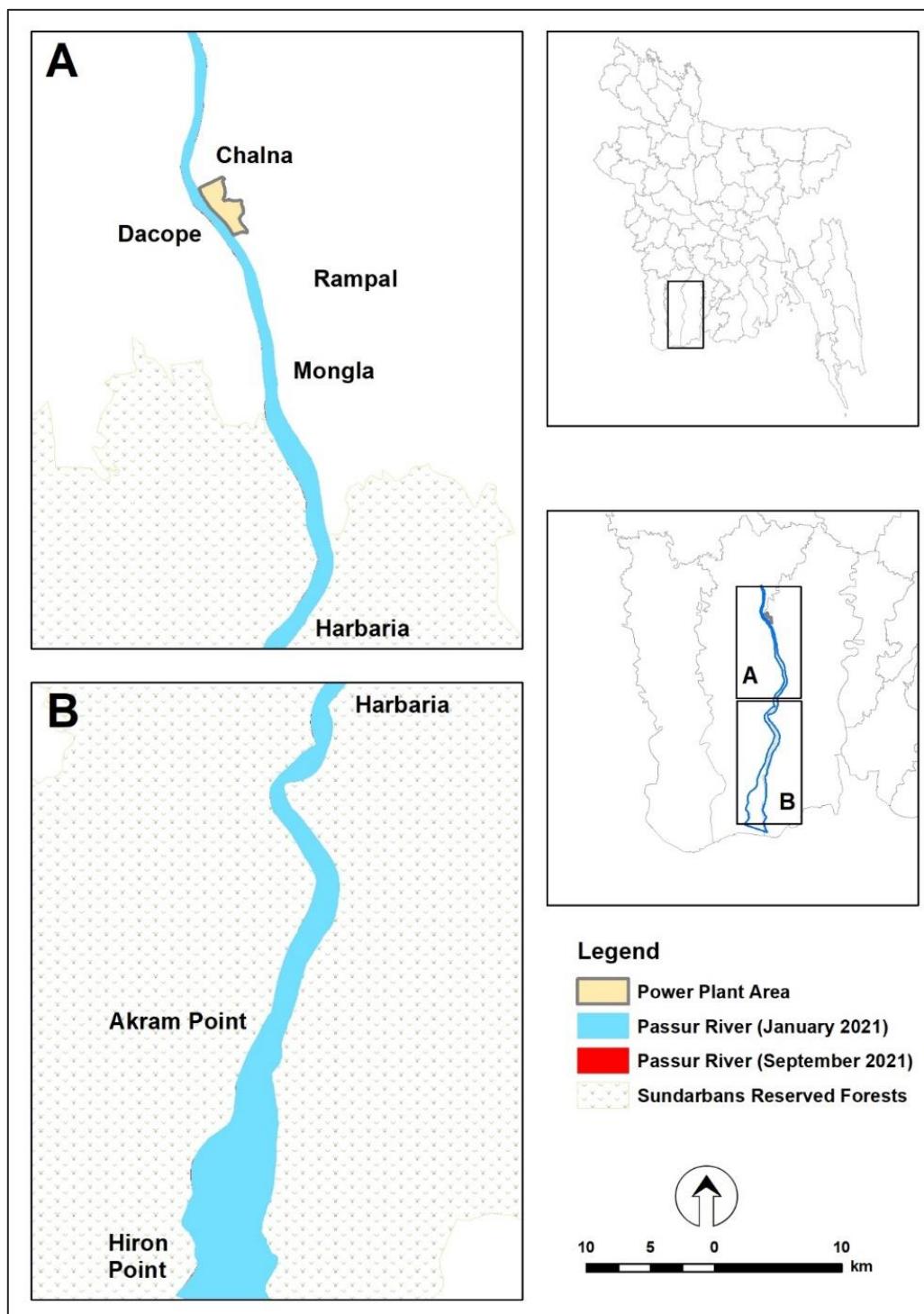


### Sediment Samples Collection

Standard procedure was maintained during the collection of sediment samples. At least three replications were taken to ensure composite samples. Sediment samples were preserved in air-tight plastic bag for laboratory analysis.

### Laboratory Analysis

Collected sediment samples have been handed over to BCSIR, Dhaka for laboratory analysis immediate after 29<sup>th</sup> monitoring. After the analysis the data will be incorporated in 30<sup>th</sup> monitoring report.



**Figure 3.30: Riverbank Erosion and Accretion of the Passur River from January 2021 to September 2021**



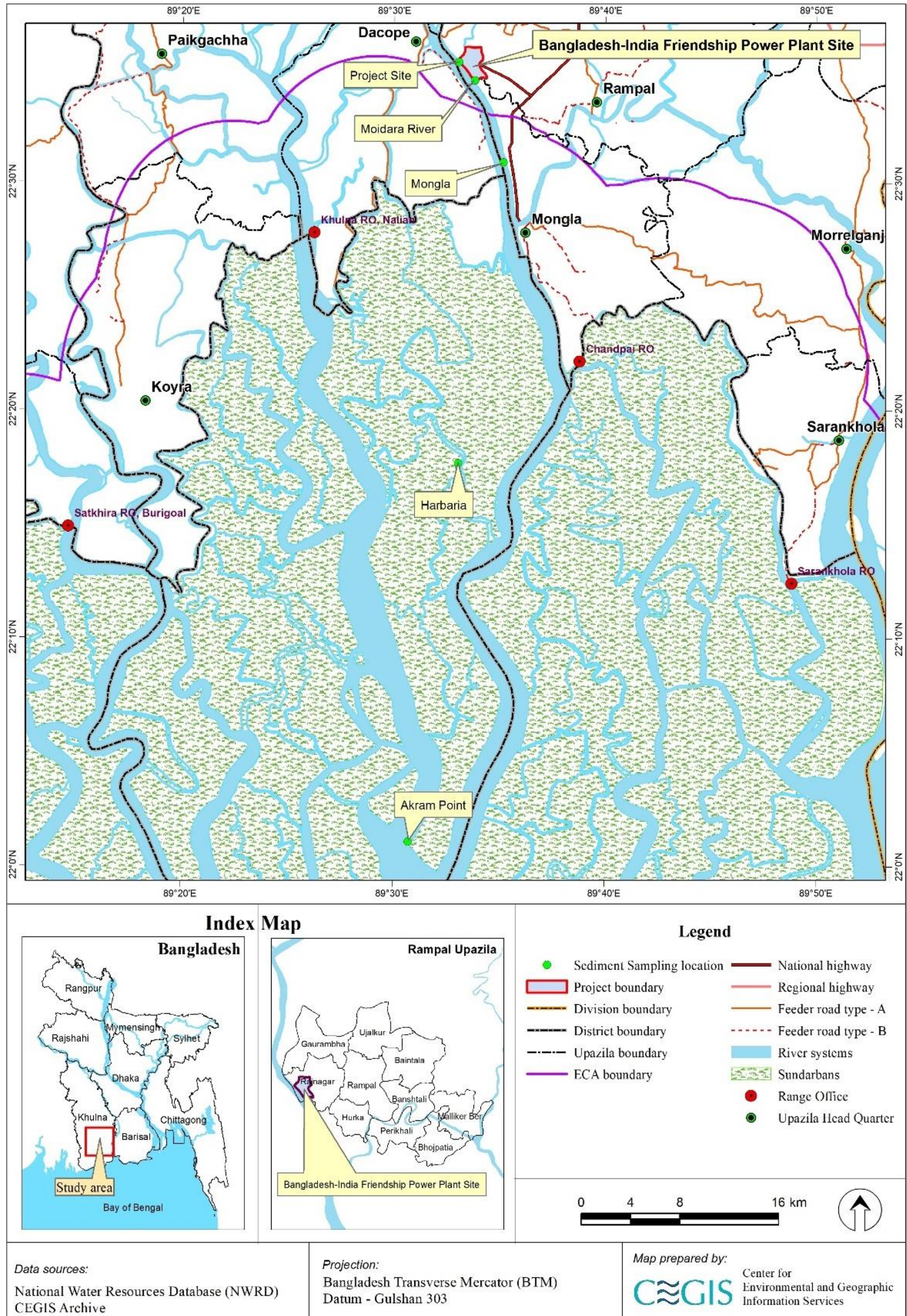


Figure 2.31: Sediment Sampling Locations

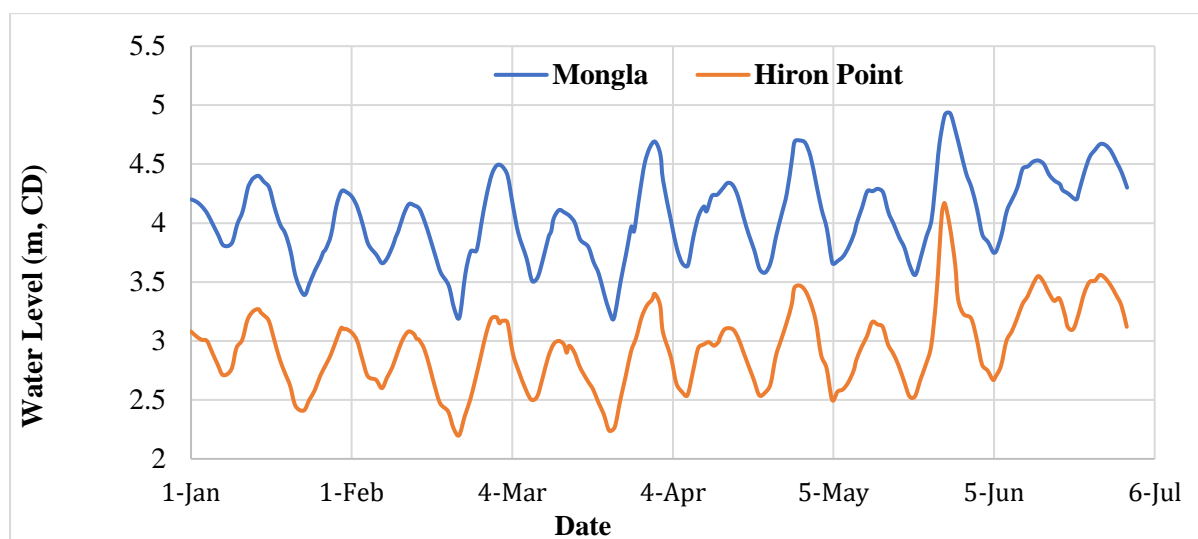


### 2.7.7 Tidal Water Level Data Analysis

For the monitoring of the tidal water level of the Hiron Point, Mongla Port and Rampal Jetty area, daily tidal water level data at Hiron Point and Mongla Port were collected from Bangladesh Inland Transport Authority (BIWTA) for the period from January 2021 to June 2021. Based on the relationship of the water level between Mongla Port and Hiron Point, the lag time and peak attenuation from Mongla Port to Rampal Jetty area were extrapolated.

#### *Relation between Hiron Point and Mongla Port*

For the assessment of lag time and peak attenuation between Hiron Point and Mongla Port, daily peak tidal water level was taken into consideration for the period from January 2021 to June 2021. After that, peak tidal water level data were plotted in the same graph both for Hiron Point and Mongla Port which is presented in **Figure 2.32**.

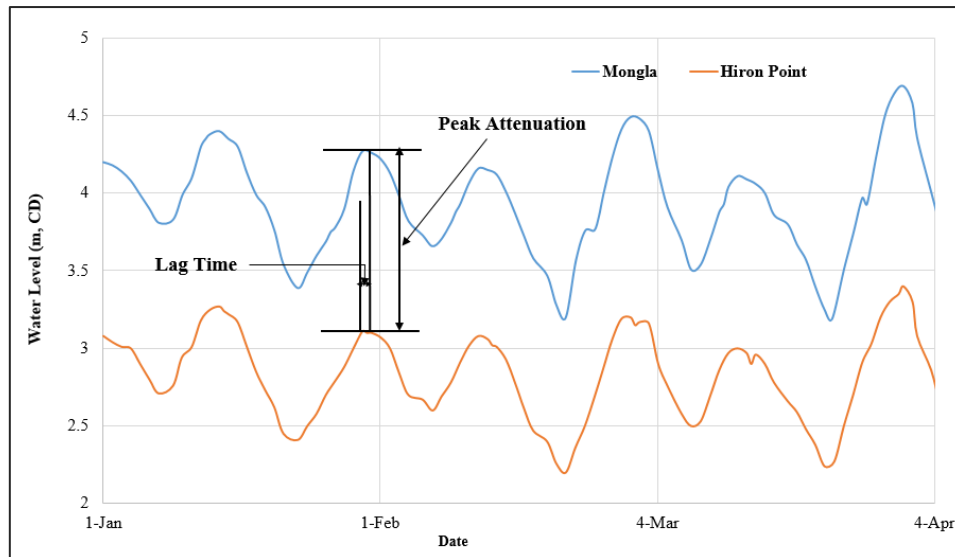


**Figure 2.32: Peak water level at Hiron Point and Mongla Port for the period from January to June 2021**

Moreover, maximum water level and corresponding time during full moon and no-moon were assessed to find out the lag time and peak attenuation between two stations (Mongla and Hiron Point) considering the distance between stations. For the assessment of the lag time and peak attenuation between two stations for two different quarters for the first half of the year 2021, tidal water level data from January to March 2021 as well as April to June 2021 were analyzed respectively.

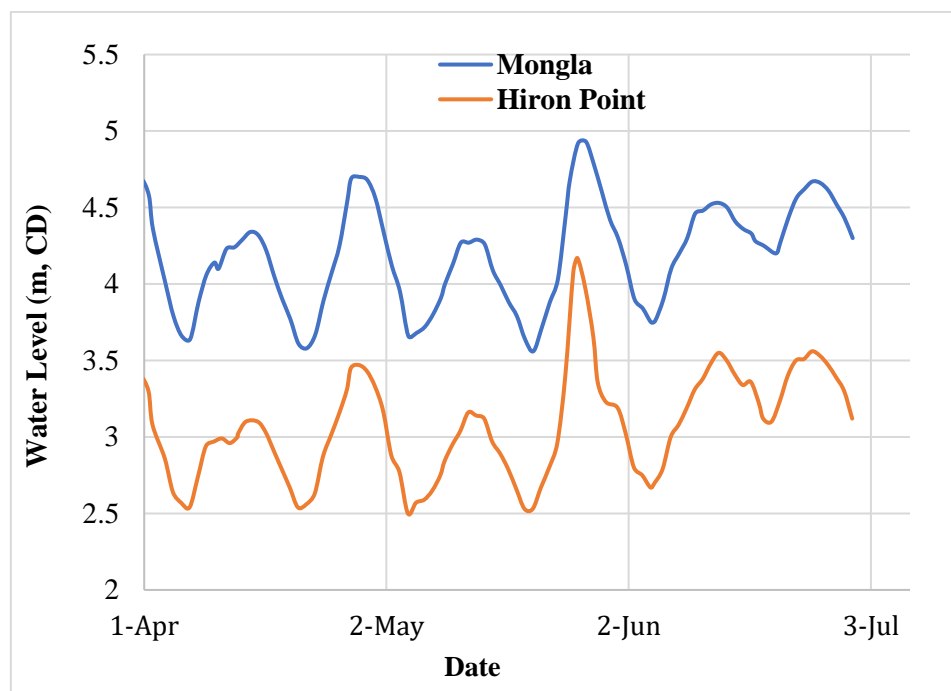
It was found that during no-moon period, peak water level of 3.10 m at Hiron Point at the end of the January 2021 travels through tide to the upstream at Mongla Port where its peak water level become 4.26 m on the same day. The peak attenuation between this two stations is 1.16 m. It was also found that the travelling time or lag time to reach this peak is around 1 hour 20 minutes. Additionally, peak attenuation for the month of February 2021 and March 2021 are 1.1 and 1.31 respectively. While the lag time are 1 hour 5 minutes and 1 hour 30 minutes correspondingly for the month of February and March 2021 (**Figure 2.33**). The methodology is shown in **Figure 2.33**. It was measured that the distance between Hiron Point and Mongla Port is approximately 80 km. The average travelling time to pass the peak water level through tide from Hiron Point to Mongla Port during the period from January to March 2021 is about 1 hour 18 minutes while the peak attenuation is nearly 1.19 m.

Furthermore, analysis was done for the period of April to June 2021 (**Figure 2.34**). It was found that the peak attenuation during the month of April and May are 1.22 and 1.15 respectively while it is only 1.0 for the month of June 2021.



**Figure 2.33: Process of calculation of lag time & peak attenuation during the period January-March 2021**

On the other hand, the lag time to reach peak water level from Hiron Point to Mongla Port for the month of April and May 2021 are 1 hour 30 minutes and 1 hour 35 minutes respectively. While it is 1 hour 20 minutes for the month of June 2021 (**Figure 2.34**). In addition, average travelling time to pass the peak water level through tide from Hiron Point to Mongla Port during the period from April to June 2021 is about 1 hour 28 minutes while the peak attenuation is nearly 1.12 m.



**Figure 3.34: Peak water level at Hiron Point and Mongla Port for the period from April 2021 to June 2021**

In summary, it was found that average travelling time to pass the peak water level through tide from Hiron Point to Mongla Port during the period from January to June 2021 is about 1 hour 23 minutes while the peak attenuation is nearly 1.16 m.

Relation between Hiron Point and Mongla Port was used to extrapolate the lag time and peak attenuation at Rampal Jetty area. The travelling distance from Mongla Port to Rampal Jetty area is 15 km. Based on the relation, it was estimated water level at certain peak at Hiron Point needs 1 hour 40 minutes to reach at Rampal Jetty area where peak attenuation is nearby 1.38 m.

### 3. Biological Environment

Biological resources include all living organisms within an ecosystem which interact with one another as well as with the concerned physical environment. The biological resources around the project site were categorized into three major groups and monitored quarterly with the aim to establish baseline conditions to compare with the probable impact of proposed project in place. These groups include fisheries resources, ecological resources and Sundarbans Reserve Forest (SRF).

#### 3.1 Fisheries Resources

The monitoring of twenty-eight quarters for the session of 2014-15, 2015-16, 2016-17, 2017-18, 2018-2019, 2019-20 as well as of 2020-21 was completed and reported earlier. This chapter contains the findings of 29<sup>th</sup> quarter and comparison with the earlier 28<sup>th</sup> quarters.

##### *Location of Monitoring Sites*

In this phase, the monitoring activities were carried out in 13 pre-selected locations of which 10 locations were for capture fish habitat and three (03) were for shrimp/fish farms (culture fish habitat). Sampling sites for capture fishery were selected based on the available fishing grounds at upstream, midstream and downstream of the Passur River system. Sampling sites for culture fishery (shrimp/fish farms) were selected considering the project influence area. The fisheries resources monitoring locations are provided in **Table 3.1** and also shown in **Figure 3.1**.

**Table 3.1: The Sampling Locations for Monitoring of Fisheries Resources**

| Site | Capture Habitat Location   | Site | Capture Habitat Location |
|------|----------------------------|------|--------------------------|
| A    | Akram Point                | F    | Chandpai                 |
| B    | Haldikhali                 | G    | Jongra                   |
| C    | Charaputia                 | H    | Mongla Port              |
| D    | Bhodra                     | I    | Maidara                  |
| E    | Harbaria                   | J    | Chalna Point, Batiaghata |
| Site | Culture Habitat Location   | Site | Culture Habitat Location |
| 1    | Bhekatkhali Khal, Rajnagar | 3    | Chunkuri-2               |
| 2    | Kapasdanga-Muralia         |      |                          |

##### *Selection of Parameters*

According to ToR, five major components were selected for fisheries monitoring, such as fish habitat status, fish migration, fish diversity, shrimp/fish farm practices and fish production. Fish habitat status was monitored through investigating habitat suitability index in view of habitat classification based on length frequencies of different fish species, sensitivity of fish diversity and survival success of different life stages of fish to abiotic factors (water quality, bed material, morphological aspects and biotic factors (food cover). Fish migration status was monitored through assessing migratory fish species diversity, migration pattern, migration purpose, period and extent of migration etc. Species evenness, species richness and community structure were investigated for monitoring fish diversity. Shrimp/fish farm practice was monitored by viewing stocking pattern, growth rate and mortality rate. Fish production monitoring was divided into capture and shrimp/fish farm production.

### **3.1.1 Methodology**

#### *Fish Habitat Status*

Fish habitat status was monitored through determination of Habitat Suitability Index (HSI) by applying numerical habitat model based on the habitat classification and sensitivity of fish diversity and survival success of different life stages of fish to abiotic and biotic factors. Fish habitat classification was analyzed by calculating Euclidean Distance among sampling sites. Moreover, the similarities in species composition among the sites were analyzed using the Jaccard Index (JI) for estimating the extent of similarity between pairs of data sets.

#### *Fish Migration*

Migratory species were identified from the sampling sites by analyzing the common species found in the catch assessment survey and based on IUCN list.

#### *Fish Diversity*

Fish diversity was surveyed by Catch Per Unit Effort (CPUE) method. The fish individuals were counted according to the length of each species from the samples. Diversity was estimated by analyzing Shannon-Weiner Index ranges from 0 to 1. Fish species richness (FSR) was analyzed using the Simpson's Index that generates two types of values. The first one includes values from 0 to 1 expressing normalization scores for species richness status and the second one includes values from one (01) to values equal to the total number of species found in the sample which suggests that how many species are dominant in this fish community. Fish community structure has also been analyzed through counting the length-wise fish individuals.

#### *Fish-Shrimp Culture Practice*

For monitoring shrimp/fish farm, three farms within the direct impact zone of the proposed Power Plant were surveyed. Stocking pattern of the shrimp/fish farm is the major issue for successful production, because of having natural genetic resources from the wild source of the Passur River System. Moreover, mortality rate should be minimized for getting more economical output from the farms. So, stocking pattern and mortality rate and its causes were surveyed intensively.

#### *Fish Production*

Fish production for riverine fish was surveyed through CPUE. The information on the species-wise production of shrimp/fish farm was collected from the selected farms for the last catch.

### **3.1.2 Status of Monitoring**

Followed by the quarter monitoring of the 2014-15, 2015-16, 2016-17, 2017-18, 2018-19, 2019-20 and 2020-21 (up to 28<sup>th</sup> quarter monitoring), 29<sup>th</sup> quarter monitoring of session 2021-22 was conducted during the period from 2-13 September, 2021. No fishing activities were observed at Haldikhali Khal (B), Bhodra (D), Jongra (G), Chandpai (H) and Chalna Point (J) during field visit.

#### *Fish Habitat Status*

Fish habitat status has also varied in the view of habitat classification and habitat use pattern of different life stages of different fish species.





Figure 3.1: Fisheries Resources Monitoring Locations





Habitat Classification

Habitat classification was analyzed by using the length-wise distribution of different fish species in the sampling sites. The length of different life stages of fish species was identified and evaluated from literature review. Linkage distance was calculated with the similarity in distribution. The entire stretch of the Passur River System consists of three major behavioral habitats. The sampling sites were classified on the basis of abundance of different life stages of fish species in those habitats. The following tables show the classification of seven (07) sampling site for 1 to 15<sup>th</sup> quarter monitoring and ten (10) sampling sites from 16<sup>th</sup> to 25<sup>th</sup> quarter monitoring according to the ToR in respect of habitat uses for previous quarters of fisheries monitoring (Table 3.2).

**Table 3.2: Classification of habitat use of 10 sampling sites**

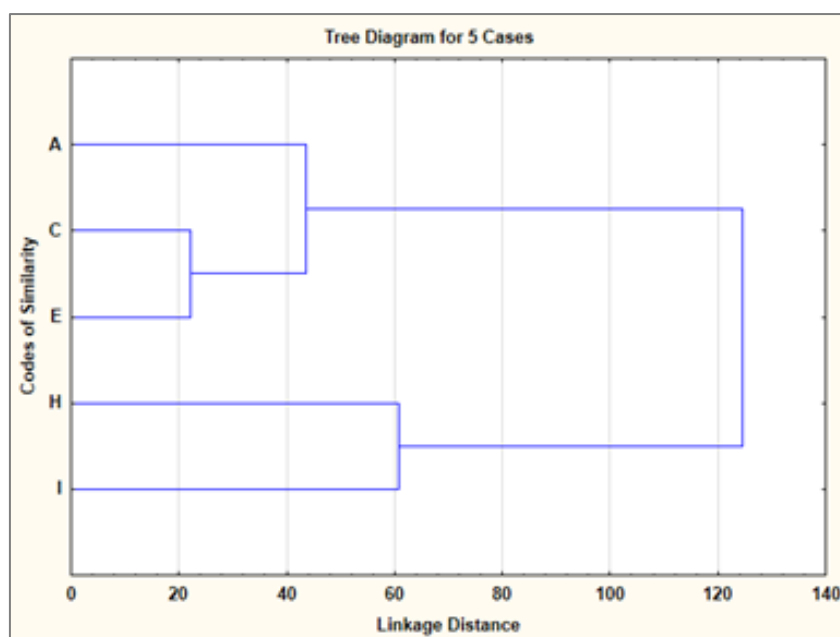
| Monitoring Quarter               | Type of Habitat Use   |
|----------------------------------|---|
| 1 <sup>st</sup> (April, 2014)    | <ul style="list-style-type: none"> <li>Grazing Ground</li> <li>Grazing and Breeding Ground</li> </ul>   |
| 2 <sup>nd</sup> (July, 2014)     | <ul style="list-style-type: none"> <li>Grazing Ground</li> <li>Spawning and Nursery Ground</li> </ul>   |
| 3 <sup>rd</sup> (October, 2014)  | <ul style="list-style-type: none"> <li>Grazing Ground</li> <li>Grazing and Breeding Ground</li> <li>Spawning, Nursery and Grazing Ground</li> </ul> |
| 4 <sup>th</sup> (January, 2015)  | <ul style="list-style-type: none"> <li>Grazing Ground</li> <li>Grazing and Breeding Ground</li> <li>Spawning, Nursery and Grazing Ground</li> </ul> |
| 5 <sup>th</sup> (April, 2015)    | <ul style="list-style-type: none"> <li>Grazing Ground</li> <li>Nursery Ground</li> <li>Spawning and Nursery</li> </ul>                              |
| 6 <sup>th</sup> (August, 2015)   | <ul style="list-style-type: none"> <li>Grazing, Breeding Ground</li> <li>Spawning, and Nursery Ground</li> </ul>                                    |
| 7 <sup>th</sup> (October, 2015)  | <ul style="list-style-type: none"> <li>Grazing Ground,</li> <li>Nursery Ground and</li> <li>Growing and Feeding</li> </ul>                          |
| 8 <sup>th</sup> (January, 2016)  | <ul style="list-style-type: none"> <li>Nursery and Feeding Ground</li> <li>Growing and Feeding</li> </ul>   |
| 9 <sup>th</sup> (April, 2016)    | <ul style="list-style-type: none"> <li>Spawning and Nursery Ground</li> <li>Feeding and Growing Ground</li> </ul>                                   |
| 10 <sup>th</sup> (July, 2016)    | <ul style="list-style-type: none"> <li>Nursery Ground</li> <li>Feeding and Breeding Ground</li> </ul>   |
| 11 <sup>th</sup> (October, 2016) | <ul style="list-style-type: none"> <li>Breeding and Spawning Ground</li> <li>Feeding and Grazing Ground</li> </ul>                                  |
| 12 <sup>th</sup> (January, 2017) | <ul style="list-style-type: none"> <li>Grazing and Spawning Ground</li> <li>Nursing Ground</li> </ul>   |
| 13 <sup>th</sup> (April, 2017)   | <ul style="list-style-type: none"> <li>Grazing and Feeding Ground</li> <li>Nursing Ground</li> </ul>  |
| 14 <sup>th</sup> (October, 2017) | <ul style="list-style-type: none"> <li>Grazing and Feeding Ground</li> <li>Nursing Ground</li> </ul>  |
| 15 <sup>th</sup> (January, 2018) | <ul style="list-style-type: none"> <li>Grazing and Feeding Ground</li> <li>Nursing Ground</li> </ul>  |
| 16 <sup>th</sup> (April, 2018)   | <ul style="list-style-type: none"> <li>Feeding ground</li> <li>Growing ground</li> <li>Nursing ground</li> </ul>                                    |

| Monitoring Quarter                | Type of Habitat Use   |
|-----------------------------------|---|
| 17 <sup>th</sup> (July, 2018)     | <ul style="list-style-type: none"> <li>• Spawning and Nursery Ground</li> <li>• Nursery Ground with Feeding and Growing Capacity</li> <li>• Growing and Feeding Ground</li> <li>• Omni-ground</li> </ul>                            |
| 18 <sup>th</sup> (November, 2018) | <ul style="list-style-type: none"> <li>• Ground for Maturation</li> <li>• Omni-Ground: Nursery and Feeding Ground/Migratory Route; Ground for Maturation; Growing and Maturation Ground; Maturation Ground for Juveniles</li> </ul> |
| 19 <sup>th</sup> (February, 2019) | <ul style="list-style-type: none"> <li>• Ground for Feeding</li> <li>• Omni-Ground including Nursery Ground and Ground for Maturation</li> </ul>  |
| 20 <sup>th</sup> (April, 2019)    | <ul style="list-style-type: none"> <li>• Ground for Feeding and Maturation</li> <li>• Omni-Ground including Nursery Ground and Ground for Maturation</li> </ul>   |
| 21 <sup>st</sup> (July, 2019)     | <ul style="list-style-type: none"> <li>• Ground for Feeding and Maturation</li> <li>• Omni-Ground including Nursery Ground and Ground for Maturation</li> </ul>   |
| 22 <sup>nd</sup> (November, 2019) | <ul style="list-style-type: none"> <li>• Spawning and Nursery Ground</li> <li>• Omni-Ground including Feeding and Maturation Ground</li> </ul>  |
| 23 <sup>rd</sup> (February, 2020) | <ul style="list-style-type: none"> <li>• Nursery Ground</li> <li>• Spawning ground</li> <li>• Ground for maturation and feeding</li> </ul>  |
| 25 <sup>th</sup> (July, 2020)     | <ul style="list-style-type: none"> <li>• Nursery Ground</li> <li>• Ground for maturation and feeding</li> </ul>   |
| 26 <sup>th</sup> (November, 2020) | <ul style="list-style-type: none"> <li>• Nursery Ground</li> <li>• Omni-Ground including Spawning and Nursery Ground, and Maturation Ground</li> </ul>  |
| 27 <sup>th</sup> (January, 2021)  | <ul style="list-style-type: none"> <li>• Nursery Ground</li> <li>• Omni-Ground including Spawning and Nursery Ground, and Maturation Ground</li> </ul>  |
| 28 <sup>th</sup> (April, 2021)    | <ul style="list-style-type: none"> <li>• Spawning and Nursery Ground</li> <li>• Ground for Maturation and Feeding</li> </ul>  |

During the 29<sup>th</sup> quarterly monitoring conducted in September of 2021-22 Session, the sampling sites were divided into two major classes and shown in the Figure-3.2 (Figure D.1 of Appendix IV).

**Nursery Ground:** The catch revealed that availability of Juvenile stage (Length group: 2-3cm and 3-5cm) of different fish species were dominant at Mongla (H) point. It indicates that the mentioned sampling sites were found to be used as nursery ground for aggregation of juvenile age group for many medium and large sized fish species (Ref. Article No. XX: Fish Community Structure).

**Ground for Maturation and feeding:** Another class, which is found to support multi-length groups (5-10cm, 10-20cm and >25cm) of observed fish species, was considered as the maturation and feeding-ground for fishes (following the considerations of Rahman, 1989 and 2005; Huda et al., 2003).

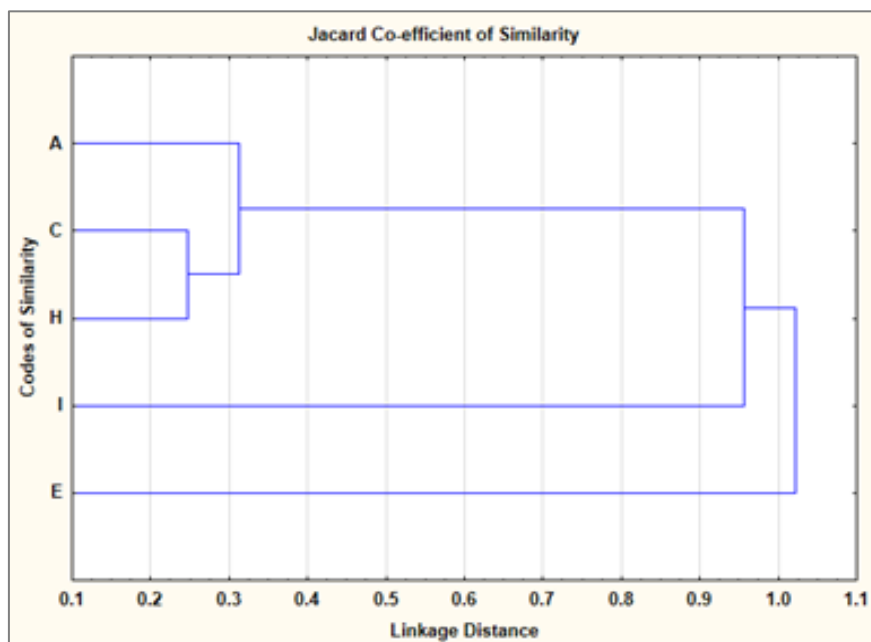


29<sup>th</sup> Monitoring (August, 2021)

(Note: Life stages are identified through length measurement of the fish individuals)

**Figure 3.2: Habitat classification on the basis of different life stages of fish species**

The dendrogram indicated the distances among the JI (Jaccard Coefficient Index) indices which are opposite to the JI values. It was found that the length-wise distribution relationship varied not only with the seasons but also with the year to year. In this quarterly monitoring in 2021-22 (29<sup>th</sup>), the JI value between the Charapuntia (C) and Mongla Point (H) sampling sites were the highest (**Figure 3.3**) which indicates the maximum similarity in species occurrence between the two sites out of 5 sampling sites of available fishing. Previous dendrograms are available in **Figure D2** of **Appendix-IV**



29<sup>th</sup> Monitoring (August, 2021)

**Figure 3.3: Dendrogram showing similarity in binary species composition in three sampling sites**

### Habitat Suitability Index (HSI)

Habitat Suitability Index (HSI) was determined for the year of 2014-15 and 2015-16 considering the exposure to water quality and the production performance of different fish species. Production performance was measured through considering length-structured production assessment model (E. L. Cadima, 2003). Suitability analysis was conducted by applying Iyengar and Sudarshan (1982) developed model. All data was normalized through using UNDP developed normalization equation (UNDP, 2006).

In the first year of monitoring, Sheola Khal at Chandpai was found as the most suitable habitat for fish species among the Passur River System. Sheola Khal has also been identified as the most suitable in second year which is followed by Harbaria, Akram Point, Haldikhali, Mongla Point, Maidara and Chalna Point. In third year (2016-17) of monitoring, Harbaria Khal was found to be mostly suitable habitat for fish. In 2017-18, the Sheola Khal at Chandpai was highly suitable habitat, which was observed to support various length groups of diversified fishes. In the last monitoring year (2018-19), the Sheola Khal at Chandpai attained again highest suitability index, which indicates that this habitat has the potentiality to support various length groups of diversified fishes.

### *Fish Diversity*

#### Shannon-Weiner Index

In this monitoring year of 2021-22, species evenness also varies among the sampling sites. Highest Shannon-Weiner index was found at Mongla Point (0.85) indicating most evenly distributed fish species. On the contrary, lowest evenness was found at Akram point (0.49) (shown in **(Table 3.3 and D.5 of Appendix -IV)**). It has also been found that both the number of fish species found in in-situ catch and the evenness of their distribution within the sampling sites show high variation with the changing seasonal and yearly bio-physical conditions.

#### Fish Species Richness (FSR)

Fish species richness was identified through Simpson's Index<sup>1</sup>. Considerable difference is noticed in the fish species richness (FSR) in different habitat classes (**Table 3. 4 and 3.5 and Figure-3.4 and 3.5**). In this monitoring phase, species richness varies with the sampling sites. Maximum FSR was obtained at Harbaria (n=13), while very low FSR was recorded at Maidara Point (n=1). Different scenarios of richness were found in this quarter in comparison to the previous monitoring years. Among habitats in the downstream of the Passur River system, Charaputia Khal was home to rich assemblage of Chitra, Harbaria Point was of *Goda Kathali*, *Kalo Bele* and Akram Point was of *Boiragi*. In midstream portion, Mongla was rich in *Ilish*, *Chewa* and *Poma*.

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<sup>1</sup>Simpson's index is a method to calculate the community characteristics of fish in a particular habitat. It is mainly used to know about the species richness of a particular habitat to tell how many species are rich in their abundance. The value of this index ranges from 0 to 1. There is other kind of value which is described in the methodology section. The second value is mainly used to measure the species richness in the sampling sites.



Table 3.3: Site Wise Species Diversity using Shannon-Weiner Index (1<sup>st</sup> to 13<sup>th</sup> QM)

| Site | Species No         |                    |                    |                    |                    |                    |                    |                    |                    |                     |                     |                     |                     | Shannon-Weiner Index* |                    |                    |                    |                    |                    |                    |                    |                    |                     |                     |                     |                     |
|------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|-----------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|
|      | 1 <sup>st</sup> QM | 2 <sup>nd</sup> QM | 3 <sup>rd</sup> QM | 4 <sup>th</sup> QM | 5 <sup>th</sup> QM | 6 <sup>th</sup> QM | 7 <sup>th</sup> QM | 8 <sup>th</sup> QM | 9 <sup>th</sup> QM | 10 <sup>th</sup> QM | 11 <sup>th</sup> QM | 12 <sup>th</sup> QM | 13 <sup>th</sup> QM | 1 <sup>st</sup> QM    | 2 <sup>nd</sup> QM | 3 <sup>rd</sup> QM | 4 <sup>th</sup> QM | 5 <sup>th</sup> QM | 6 <sup>th</sup> QM | 7 <sup>th</sup> QM | 8 <sup>th</sup> QM | 9 <sup>th</sup> QM | 10 <sup>th</sup> QM | 11 <sup>th</sup> QM | 12 <sup>th</sup> QM | 13 <sup>th</sup> QM |
| A    | 33                 | 0                  | 13                 | 7                  | 3                  | 0                  | 10                 | 15                 | 0                  | 0                   | 1                   | 2                   | 2                   | 0.5                   | 0                  | 0.7                | 0.6                | 1                  | -                  | 0.6                | 0.4                | 0                  | 0                   | 0                   | 0.9                 | 0.74                |
| B    | 12                 | 0                  | 24                 | 14                 | 0                  | 0                  | 11                 | 3                  | 0                  | 0                   | 1                   | 0                   | 5                   | 0.9                   | 0                  | 0.6                | 0.4                | 0                  | -                  | 0.6                | 0.6                | 0                  | 0                   | 0                   | 0                   | 0.37                |
| C    | 2                  | 12                 | 9                  | 0                  | 11                 | 26                 | 18                 | 24                 | 17                 | 0                   | 23                  | 10                  | 18                  | 0.3                   | 0.77               | 0.4                | 0                  | 0.8                | 0.6                | 0.5                | 0.7                | 0.6                | 0                   | 0.6                 | 0.6                 | 0.79                |
| D    | 12                 | 22                 | 15                 | 26                 | 27                 | 24                 | 20                 | 25                 | 8                  | 19                  | 32                  | 27                  | 15                  | 0.3                   | 0.78               | 0.7                | 0.5                | 0.7                | 0.7                | 0.5                | 0.7                | 0.6                | 0.6                 | 0.6                 | 0.8                 | 0.76                |
| E    | 7                  | 13                 | 10                 | 11                 | 6                  | 16                 | 9                  | 9                  | 15                 | 12                  | 5                   | 4                   | 4                   | 0.4                   | 0.6                | 0.8                | 0.8                | 0.2                | 0.7                | 0.9                | 0.4                | 0.7                | 0.5                 | 0.7                 | 0.7                 | 0.51                |
| F    | 3                  | 13                 | 6                  | 4                  | 10                 | 8                  | 14                 | 6                  | 7                  | 5                   | 7                   | 12                  | 9                   | 0.8                   | 0.77               | 0.5                | 0.6                | 0.7                | 0.4                | 0.8                | 0.7                | 0.8                | 0.7                 | 0.9                 | 0.9                 | 0.53                |
| G    | 6                  | 3                  | 5                  | 7                  | 18                 | 3                  | 8                  | 6                  | 6                  | 4                   | 12                  | 3                   | 15                  | 0.7                   | 0.82               | 0.7                | 0.7                | 0.2                | 1                  | 0.7                | 0.8                | 0.6                | 0.9                 | 0.2                 | 0.7                 | 0.67                |

Site Wise Species Diversity using Shannon-Weiner Index (14<sup>th</sup> to 29<sup>th</sup> QM)

| Site | Species Number      |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     | Shannon-Weiner Index |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|      | 14 <sup>th</sup> QM | 15 <sup>th</sup> QM | 16 <sup>th</sup> QM | 17 <sup>th</sup> QM | 18 <sup>th</sup> QM | 19 <sup>th</sup> QM | 20 <sup>th</sup> QM | 21 <sup>st</sup> QM | 22 <sup>nd</sup> QM | 23 <sup>rd</sup> QM | 25 <sup>th</sup> QM | 26 <sup>th</sup> QM | 27 <sup>th</sup> QM | 28 <sup>th</sup> QM | 14 <sup>th</sup> QM  | 15 <sup>th</sup> QM | 16 <sup>th</sup> QM | 17 <sup>th</sup> QM | 18 <sup>th</sup> QM | 19 <sup>th</sup> QM | 20 <sup>th</sup> QM | 21 <sup>st</sup> QM | 22 <sup>nd</sup> QM | 23 <sup>rd</sup> QM | 25 <sup>th</sup> QM | 26 <sup>th</sup> QM | 27 <sup>th</sup> QM | 28 <sup>th</sup> QM | 29 <sup>th</sup> QM |
| A    | 0                   | 0                   | 3                   | 0                   | 8                   | 0                   | 2                   | 0                   | 0                   | 0                   | 0                   | 7                   | 18                  | 0                   | 0                    | 0                   | 0.92                | 0                   | 0.16                | 0                   | 0.65                | 0                   | 0                   | 0                   | 0                   | 0.64                | 0.59                | 0                   | 0.49                |
| B    | 0                   | 0                   | 0                   | 0                   | 2                   | 0                   | -                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0                    | 0                   | 0                   | 0                   | 0.92                | 0                   | -                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   |
| C    | 0                   | 0                   | 12                  | 0                   | 0                   | 24                  | 11                  | 0                   | 0                   | 10                  | 0                   | 4                   | 28                  | 4                   | 0                    | 0                   | 0.69                | 0                   | 0                   | 1.69                | 0.86                | 0                   | 0                   | 0.78                | 0                   | 0.82                | 0.53                | 0.88                | 0.82                |
| D    | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   | -                   | 0                   | 0                   | 1                   | 0                   | 0                   | 0                   | 0                   | 0                    | 0                   | 0                   | 0                   | 0                   | 0                   | -                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   |
| E    | 0                   | 0                   | 0                   | 17                  | 12                  | 0                   | 2                   | 0                   | 0                   | 2                   | 0                   | 9                   | 0                   | 3                   | 0                    | 0                   | 0                   | 0.31                | 0.73                | 0                   | 0.99                | 0                   | 0                   | 0.72                | 0                   | 0.29                | 0                   | 0.74                | 0.79                |
| F    | 6                   | 17                  | 0                   | 0                   | 0                   | 13                  | 22                  | 19                  | 11                  | 11                  | 0                   | 12                  | 7                   | 20                  | 0.85                 | 0.81                | 0                   | 0                   | 0                   | 1.44                | 0.74                | 0.5                 | 0.81                | 0.56                | 0                   | 0.70                | 0.18                | 0.37                | 0                   |
| G    | 81                  | 29                  | 21                  | 16                  | 19                  | 0                   | 26                  | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0.62                 | 0.74                | 0.78                | 0.85                | 0.34                | 0                   | 0.58                | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   |
| H    | 112                 | 13                  | 3                   | 18                  | 2                   | 13                  | -                   | 5                   | 11                  | 10                  | 11                  | 0                   | 3                   | 0                   | 0.54                 | 0.21                | 0.55                | 0.49                | 0                   | 1.44                | -                   | 0.14                | 0.76                | 0.40                | 0.55                | 0                   | 0.12                | 0                   | 0.85                |
| I    | 3                   | 13                  | 12                  | 10                  | 17                  | 11                  | 8                   | 9                   | 11                  | 12                  | 6                   | 16                  | 0                   | 18                  | 0.88                 | 0.33                | 0.21                | 0.65                | 0.85                | 1.46                | 0.14                | 0.52                | 0.80                | 0.54                | 0.45                | 0.41                | 0                   | 0.52                | 0                   |
| J    | 4                   | 5                   | 10                  | 14                  | 11                  | 21                  | 12                  | 14                  | 9                   | 8                   | 15                  | 11                  | 12                  | 4                   | 0.78                 | 0.32                | 0.54                | 0.52                | 0.52                | 0.98                | 0.50                | 0.71                | 0.50                | 0.64                | 0.46                | 0.53                | 0.19                | 0.96                | 0                   |

\*According to Shannon-Weiner Index, 0-0.30: Low diversity/equally distribution (VH); 0.31-0.50: Moderate Diversity (M); 0.51-0.80: High Diversity (HD) and 0.80-1.0: Very High Diversity (VHD)

**Table 3.4: Site wise Rich Species Number (1<sup>st</sup> to 12<sup>th</sup> QM)**

| Site | Location     | No. of Rich Species |                 |                 |                 |                 |                 |                 |                 |                 |                  |                  |                  |
|------|--------------|---------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|
|      |              | 2014-2015           |                 |                 |                 | 2015-2016       |                 |                 |                 | 2016-2017       |                  |                  |                  |
|      |              | 1 <sup>st</sup>     | 2 <sup>nd</sup> | 3 <sup>rd</sup> | 4 <sup>th</sup> | 5 <sup>th</sup> | 6 <sup>th</sup> | 7 <sup>th</sup> | 8 <sup>th</sup> | 9 <sup>th</sup> | 10 <sup>th</sup> | 11 <sup>th</sup> | 12 <sup>th</sup> |
| A    | Akram Point  | 4                   | 0               | 4               | 3               | 3               | -               | 3               | 2               | 0               | 0                | 1                | 2                |
| B    | Haldikhali   | 7                   | 0               | 4               | 2               | 0               | -               | 3               | 2               | 0               | 0                | 1                | 0                |
| C    | Harbaria     | 1                   | 5               | 2               | 0               | 4               | 4               | 3               | 6               | 4               | 0                | 4                | 2                |
| D    | Chandpai     | 2                   | 2               | 5               | 4               | 5               | 8               | 3               | 7               | 4               | 6                | 3                | 7                |
| E    | Mongla Point | 1                   | 10              | 4               | 5               | 3               | 6               | 4               | 2               | 4               | 7                | 3                | 2                |
| F    | Maidara      | 3                   | 6               | 2               | 2               | 4               | 2               | 4               | 2               | 3               | 2                | 3                | 3                |
| G    | Chalna Point | 3                   | 3               | 2               | 3               | 1               | 3               | 3               | 4               | 2               | 4                | 1                | 2                |

**Table 3.5: Site wise Rich Species Number (13<sup>th</sup> to 29<sup>th</sup> QM)**

| Site | Location     | No. of Rich Species |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
|------|--------------|---------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|      |              | 2017-18             |                  |                  | 2018-19          |                  |                  |                  | 2019-20          |                  |                  |                  | 2020-21          |                  |                  |                  |                  |
|      |              | 13 <sup>th</sup>    | 14 <sup>th</sup> | 15 <sup>th</sup> | 16 <sup>th</sup> | 17 <sup>th</sup> | 18 <sup>th</sup> | 19 <sup>th</sup> | 20 <sup>th</sup> | 21 <sup>st</sup> | 22 <sup>nd</sup> | 23 <sup>rd</sup> | 25 <sup>th</sup> | 26 <sup>th</sup> | 27 <sup>th</sup> | 28 <sup>th</sup> | 29 <sup>th</sup> |
| A    | Akram Point  | 2                   | 0                | 0                | 4                | 0                | 1                | 0                | 2                | 0                | 0                | 0                | 0                | 2                | 4                | 0                | 1                |
| B    | Haldikhali   | 1                   | 0                | 0                | 0                | 0                | 3                | 0                | -                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                |
| C    | Charaputia   | 0                   | 0                | 0                | 4                | 0                | 0                | 4                | 7                | 0                | 0                | 5                | 0                | 3                | 3                | 2                | 2                |
| D    | Bhodra       | 0                   | 0                | 0                | 0                | 0                | 0                | 0                | -                | 0                | 0                | 1                | 0                | 0                | 0                | 0                | 0                |
| E    | Harbaria     | 7                   | 6                | 6                | 0                | 2                | 4                | 0                | 2                | 0                | 0                | 2                | 0                | 1                | 0                | 2                | 4                |
| F    | Chandpai     | 6                   | 5                | 7                | 11               | 9                | 2                | 3                | 7                | 4                | 6                | 2                | 0                | 4                | 1                | 2                | 0                |
| G    | Jongra       | 0                   | 0                | 0                | 0                | 0                | 0                | 0                | 3                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                |
| H    | Mongla Point | 2                   | 2                | 1                | 2                | 3                | 0                | 3                | -                | 1                | 5                | 2                | 3                | 0                | 1                | 0                | 3                |
| I    | Maidara      | 1                   | 3                | 2                | 1                | 3                | 9                | 3                | 1                | 1                | 6                | 3                | 2                | 3                | 0                | 3                | 1                |
| J    | Chalna Point | 4                   | 2                | 1                | 2                | 3                | 2                | 2                | 2                | 3                | 2                | 3                | 2                | 3                | 1                | 2                | 0                |

Source: CEGIS Field Survey, April 2014-January 2021



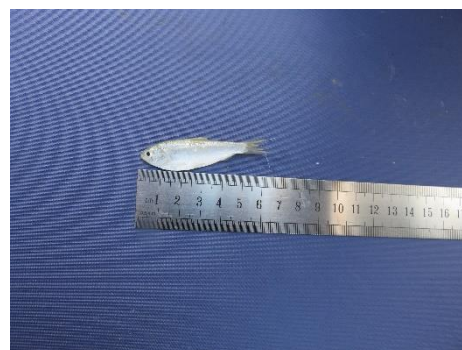
Ilish



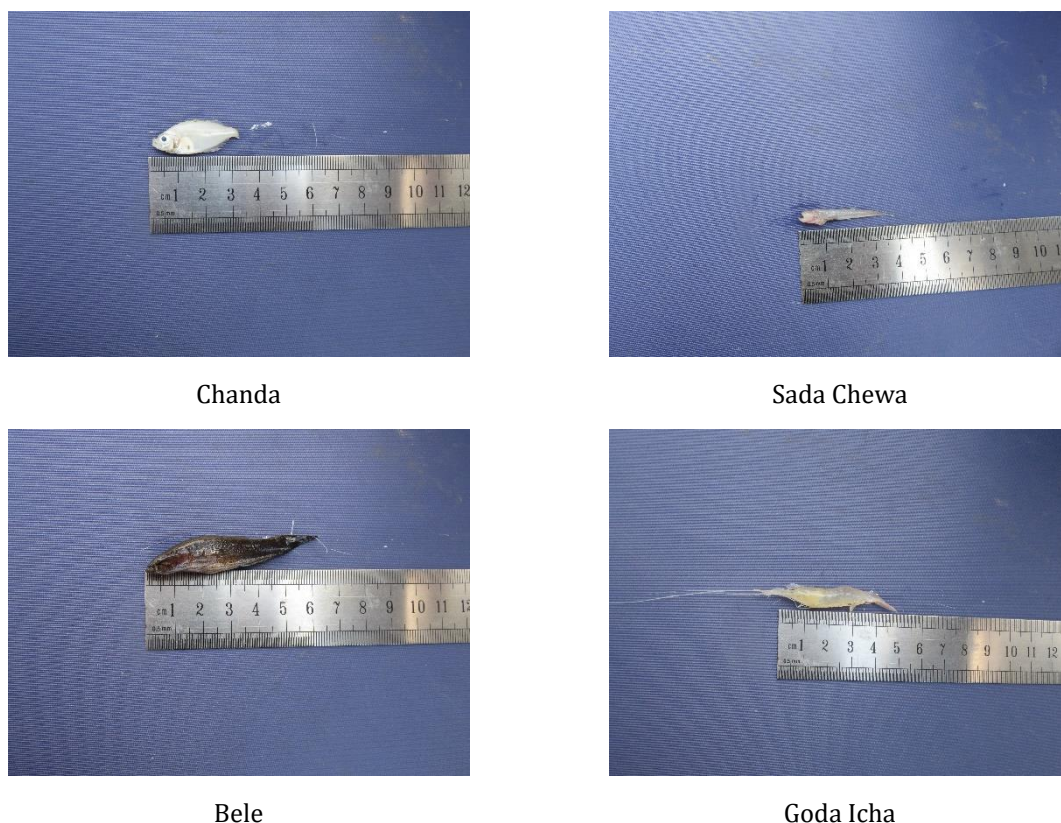
Poma



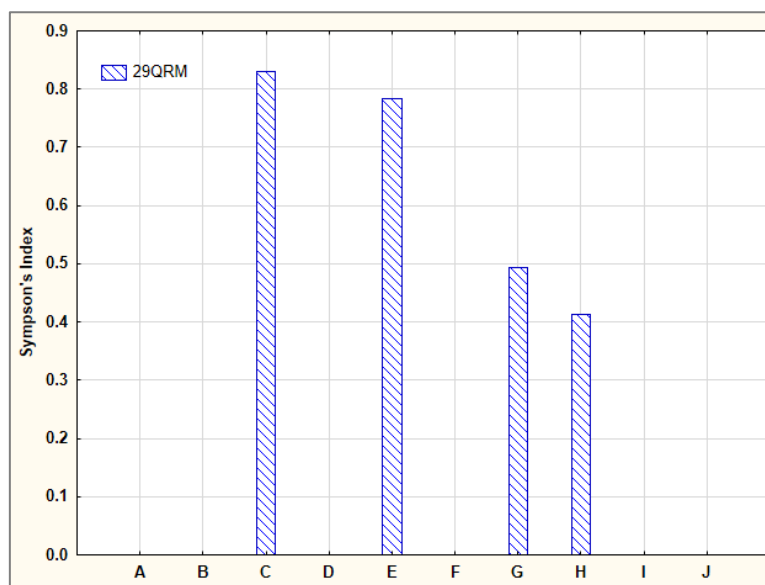
Silonda



Khoira



**Figure 3.4: Different available observed fish species in 29<sup>th</sup> quarter monitoring**

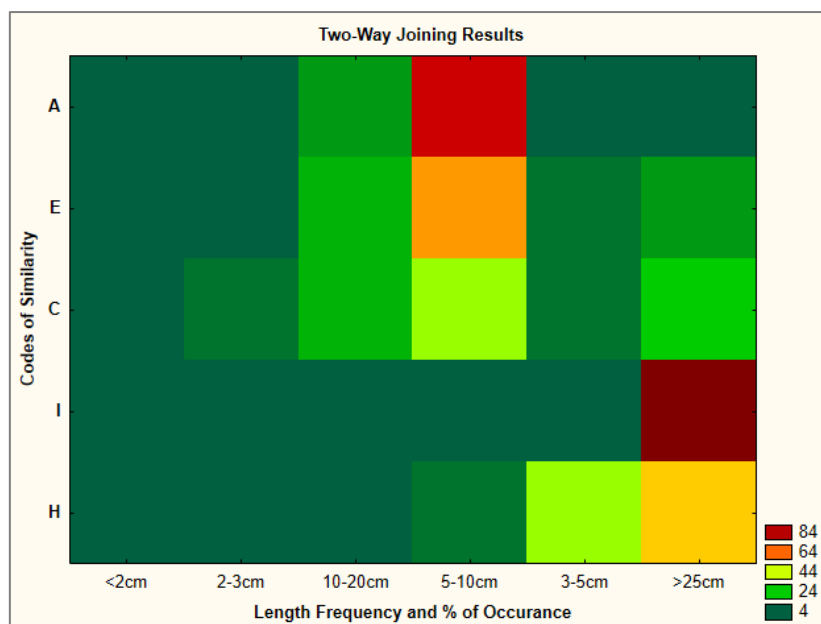


(FSR is identified through Simpson's Index)

**Figure 3.5: Site-wise fish species richness (FSR) in the Passur River System**

#### Fish Community Structure

Fish community structure was analyzed through counting the length-wise fish individuals (**Figure 3.6**). The following Table D.3 of **Appendix IV** and **Figure 3.6** for 29<sup>th</sup> quarter of monitoring shows that Juvenile were dominant at Mongla and Akram Point but adult age group were dominant at Maidara, Harbaria and Charaputia.



29<sup>th</sup> Monitoring, August, 2021

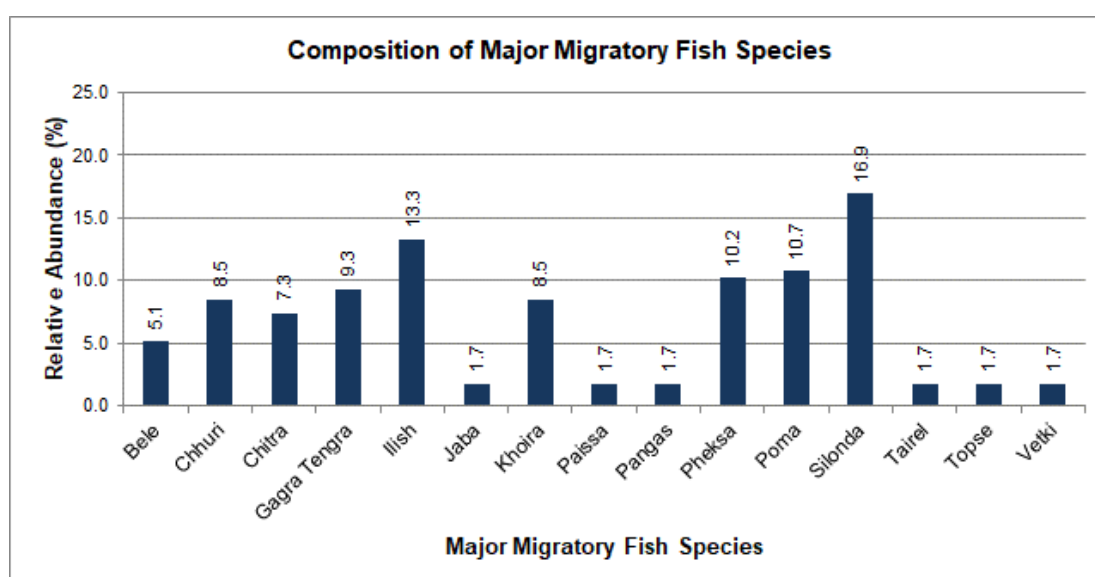
**Figure 3.6: Habitat Distribution of Different Life Stages of Fish Species**

Note: N.B.: Colour ranges from deepest green to deepest red. 0-4.99% Occurrence signifies Deepest Green; 5-9.99%-Shaded Green; 11-14.99%-Normal Green; 15-19.99%-Light Green; 20-24.99%; 25-29.99%-Lightest Green; 30-34.99%; 35-39.99%; 40-44.99; 45-49.99; 50-54.99-Light Magenta; 55-59.99-Deep Magenta; 60-64.99%; 65-69.99%; 70-74.99%; 75-79.99%-Light Red; 80-84.99%-Deep Red; 85-89.99%; 90-94.99%; 95-100%-Deepest Red

### Fish Migration

#### Migratory Species Diversity

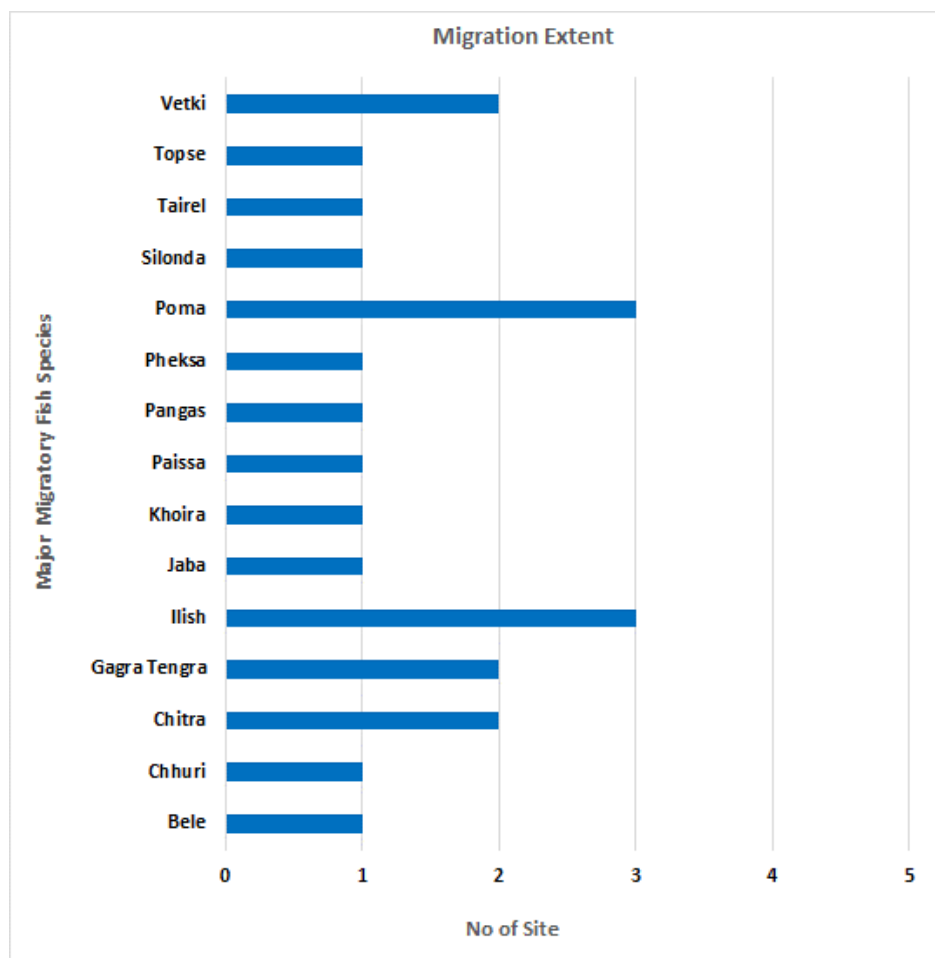
Migratory species were identified by analyzing the common species available in the regular catch from the sampling sites. Fish species like Silonda, Ilish, Poma and Phelsa attain the maximum abundance among the migratory fish species observed in the 29<sup>th</sup> quarter of monitoring. The relative abundance of the migratory species is given below in the **Figure 3.7**.



**Figure 3.7: Relative abundance of major migratory fish species in sampling sites**

### Migration Extent, Time and Purpose

Major fish species showed interesting pattern in distribution for exploiting different purposes mentioned in the following table all along the sampling sites. Among migratory species, Ilish and Poma were observed to migrate long distance (**Figure 3.8 and Table D.6 of Appendix-IV**)



**Figure 3.8: Migration extent of major migratory fish species in sampling sites**

### *Shrimp/Fish Farm*

Three farms situated in the direct impact zone of Power Plant were surveyed for monitoring shrimp/fish. Stocking pattern of the shrimp/fish farm is one of the major issues for successful production because of having natural genetic resources from the wild source of the Passur River System. Moreover, maximization of growth rate and minimization of mortality rate should be ensured for getting more economical output from the farms. So, stocking pattern, growth rate and mortality rate and its causes were surveyed intensively.

### *Stocking Pattern*

It is reported by the farmers of the shrimp farms that maximum stocking was found at Chunkuri Gher in case of Bagda Chingri.

### *Shrimp/Fish Growth Rate and Mortality*

During the 29<sup>th</sup> quarter of monitoring, the highest growth rate was observed in the Rajnagar Gher followed by Chunkuri and Kapashdanga gher (**Table 3.6 and Table 3.7**).

**Table 3.6: Growth Rate and Mortality of Fish/Shrimp (1<sup>st</sup> to 13<sup>th</sup> QM)**

| Gher No. | 1 <sup>st</sup> QM (Apr 2014) |               | 2 <sup>nd</sup> QM (Jul 2014) |               | 3 <sup>rd</sup> QM (Oct 2014) |               | 4 <sup>th</sup> QM (Jan 2015) |               | 5 <sup>th</sup> QM (Apr 2015) |               | 6 <sup>th</sup> QM Aug 2015) |               | 7 <sup>th</sup> QM (Oct 2015) |               | 8 <sup>th</sup> QM (Jan 2016) |               | 9 <sup>th</sup> QM   |               | 10 <sup>th</sup> QM  |               | 11 <sup>th</sup> QM  |               | 12 <sup>th</sup> QM  |               | 13 <sup>th</sup> QM  |               |
|----------|-------------------------------|---------------|-------------------------------|---------------|-------------------------------|---------------|-------------------------------|---------------|-------------------------------|---------------|------------------------------|---------------|-------------------------------|---------------|-------------------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|
|          | Growth Rate (cm/day)          | Mortality (%) | Growth Rate (cm/day)          | Mortality (%) | Growth Rate (cm/day)          | Mortality (%) | Growth Rate (cm/day)          | Mortality (%) | Growth Rate (cm/day)          | Mortality (%) | Growth Rate (cm/day)         | Mortality (%) | Growth Rate (cm/day)          | Mortality (%) | Growth Rate (cm/day)          | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) |
| 1        | 0.3                           | 15-20         | 0.2                           | 40            | 0.25                          | 50            | -                             | -             | -                             | 30            | 0.18                         | 25            | 0.20                          | 60            | -                             | -             | -                    | -             | 0.2                  | 20            | 0.20                 | 60            | -                    | -             | -                    | 30            |
| 2        | 0.3                           | 30-35         | 0.3                           | 94            | 0.25                          | 10            | -                             | -             | -                             | -             | 0.14                         | 20            | 0.15                          | 100           | -                             | -             | 0.21                 | 15            | 0.3                  | 40            | 0.25                 | 50            | -                    | -             | -                    | 10            |
| 3        | 0.2                           | 25-30         | 0.2                           | 25            | 0.20                          | 65            | -                             | -             | -                             | 10            | 0.15                         | 50            | 0.25                          | 20            | -                             | -             | 0.17                 | 30            | 0.15                 | 30            | 0.20                 | 30            | -                    | -             | -                    | 25            |

**Table 3.7: Growth Rate and Mortality of Fish/Shrimp (14<sup>th</sup> to 29<sup>th</sup> QM)**

| Gher No. | 14 <sup>th</sup> QM  |               | 15 <sup>th</sup> QM  |               | 16 <sup>th</sup> QM  |               | 17 <sup>th</sup> QM  |               | 18 <sup>th</sup> QM  |               | 19 <sup>th</sup> QM  |               | 20 <sup>th</sup> QM  |               | 21 <sup>st</sup> QM  |               | 22 <sup>nd</sup> QM  |               | 23 <sup>rd</sup> QM  |               | 25 <sup>th</sup> QM  |               | 26 <sup>th</sup> QM  |               | 27 <sup>th</sup> QM  |               | 28 <sup>th</sup> QM  |               | 29 <sup>th</sup> QM  |               |
|----------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|
|          | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) | Growth Rate (cm/day) | Mortality (%) |
| 1        | 0.03                 | 50            | -                    | -             | 0.28                 | 0.28          | 0.38                 | 80            | -                    | -             | -                    | -             | 0.35                 | 50            | 0.38                 | -             | 0.35                 | -             | -                    | -             | 0.38                 | -             | 0.42                 | 35            | -                    | -             | 0.41                 | 20            | 0.38                 | -             |
| 2        | 0.38                 | 35            | -                    | -             | 0.42                 | 0.42          | 0.30                 | 70            | 0.30                 | 80            | -                    | -             | 0.45                 | 80            | 0.44                 | -             | 0.45                 | -             | -                    | -             | 0.48                 | -             | 0.45                 | 30            | -                    | -             | 0.35                 | 90            | 0.42                 | -             |
| 3        | 0.02                 | 25            | -                    | -             | 0.4                  | 0.4           | 0.20                 | 50            | -                    | -             | -                    | -             | 0.34                 | 40            | 0.36                 | -             | 0.37                 | -             | -                    | -             | 0.32                 | -             | 0.38                 | 90            | -                    | -             | 0.39                 | 30            | 0.4                  | -             |

Source: CEGIS Field Survey, 2014, 2015, 2016, 2017, 2018, 2019, 2020 &amp; 2021

### Fish Production

#### Capture Fish Production

The present study revealed that the highest catch susceptibility was also found in case of Charpata Jal (5.6 kg/haul) shown in **Table 3.8**. In 29<sup>th</sup> quarter monitoring, the highest productivity was found at Harbaria followed by Charaputia point and Maidara River (**Table 3.9**). It is to be noted that fries found in catch were not considered in the productivity assessment (**Figure 3.9**).

**Table 3.9: Total Catch in Different Gears in the Sampling Sites**

| Site | Habitat                   | Gear Name/Type | Haul Duration (hr) | No of Haul | kg/haul |
|------|---------------------------|----------------|--------------------|------------|---------|
| A    | Passur River              | Behundi Jal    | 3.0                | 1          | 1.1     |
| C    | Charaputia Khal           | Charpata Jal   | 12.0               | 2          | 2.25    |
| E    | Passur River              | Charpata Jal   | 12                 | 2          | 5.6     |
| I    | Maidara-Passur Confluence | Khepla Jal     | 0.6                | 10         | 0.02    |
| H    | Passur River              | Bepdijal       | 3.0                | 1          | 0.35    |

Source: Catch assessment survey, CEGIS, November 2021

\*\* Weight of Fry is not considered for catch assessment



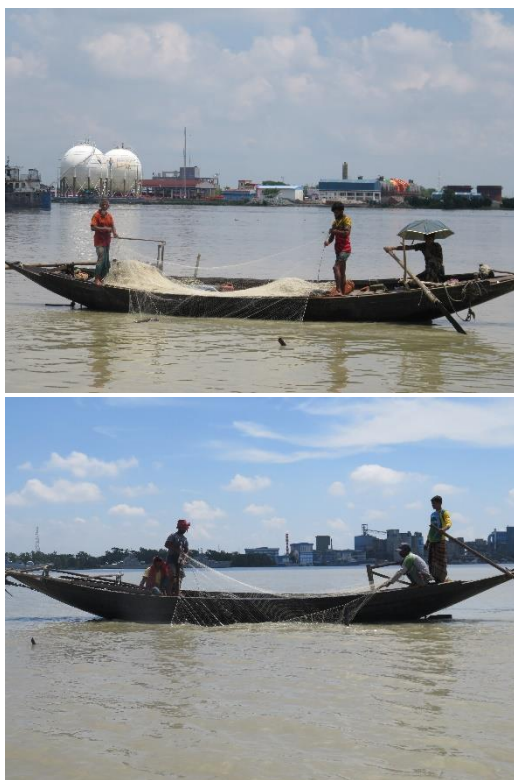
**Table 3.9: Total Catch in the Sampling Sites**

| Sampling Site | Total Catch (kg)   |                    |                    |                    |                    |                    |                    |                    |                    |                     |                     |                     |                     |
|---------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|
|               | 1 <sup>st</sup> QM | 2 <sup>nd</sup> QM | 3 <sup>rd</sup> QM | 4 <sup>th</sup> QM | 5 <sup>th</sup> QM | 6 <sup>th</sup> QM | 7 <sup>th</sup> QM | 8 <sup>th</sup> QM | 9 <sup>th</sup> QM | 10 <sup>th</sup> QM | 11 <sup>th</sup> QM | 12 <sup>th</sup> QM | 13 <sup>th</sup> QM |
| A             | 28                 | 0                  | 3                  | 28.7               | 6                  | 0                  | 20                 | 276.2              | 0                  | 0                   | 10                  | 2                   | 2                   |
| B             | 65                 | 0                  | 1                  | 3.3                | 0                  | 0                  | 10                 | 12.8               | 0                  | 0                   | 4                   | 0                   | 0.25                |
| C             | 1,559              | 0.5                | 8                  | 8.7                | 1.05               | 0.33               | 19.5               | 173.6              | 2.8                | 0                   | 2.6                 | 10                  | 8.13                |
| D             | 0                  | 12                 | 3                  | 30                 | 10.5               | 5.08               | 10.75              | 189                | 0                  | 12                  | 18                  | 56                  | 77.5                |
| E             | 0                  | 0.6                | 5                  | 0                  | 0.5                | 0.4                | 0.6                | 7.8                | 5                  | 7.5                 | 2.6                 | 0                   | 0                   |
| F             | 0                  | 1.2                | 13                 | 3.7                | 1.5                | 0.7                | 0.8                | 0                  | 1.5                | 0.8                 | 0.5                 | 0                   | 0.3                 |
| G             | 0                  | 1.6                | 4                  | 0.7                | 2.9                | 0.83               | 0.825              | 70                 | 1                  | 0.8                 | 0.1                 | 0                   | 0.12                |

| Sampling Site | Total Catch (kg)    |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|---------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|               | 13 <sup>th</sup> QM | 14 <sup>th</sup> QM | 15 <sup>th</sup> QM | 16 <sup>th</sup> QM | 17 <sup>th</sup> QM | 18 <sup>th</sup> QM | 19 <sup>th</sup> QM | 20 <sup>th</sup> QM | 21 <sup>st</sup> QM | 22 <sup>nd</sup> QM | 23 <sup>rd</sup> QM | 25 <sup>th</sup> QM | 26 <sup>th</sup> QM | 27 <sup>th</sup> QM | 28 <sup>th</sup> QM | 29 <sup>th</sup> QM |
| A             | 2                   | 0                   | 0                   | 17                  | 0                   | 16                  | 0                   | 0.40                | 0                   | 0                   | 0                   | 0                   | 30.5                | 3.5                 | -                   | 1.1                 |
| B             | 0.25                | 0                   | 0                   | 0                   | 0                   | 1                   | 0                   | 0.00                | 0                   | 0                   | 0                   | 0                   | -                   | -                   | -                   | 0                   |
| C             | 0                   | 0                   | 0                   | 1.50                | 0                   | 0                   | 93                  | 17.50               | 0                   | 0                   | 4.6                 | 0                   | 18.95               | 33                  | 12.7                | 5.85                |
| D             | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0.00                | 0                   | 0                   | 1.35                | 0                   | -                   | -                   | -                   | 0                   |
| E             | 8.13                | 1.5                 | 2.56                | 0                   | 0.1                 | 2                   | 0                   | 0.50                | 0                   | 0                   | 1.17                | 0                   | 2.07                | -                   | 47.5                | 11.34               |
| F             | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0                   | 0.00                | 0                   | 0                   | 0                   | 0                   | 0.6                 | -                   | 2.3                 | 0                   |
| G             | 77.5                | 10.5                | 37.67               | 3                   | 4                   | 27                  | 0                   | 0.00                | 0                   | 0                   | 0                   | 0                   | -                   | -                   | -                   | 0                   |
| H             | 0                   | 0                   | 0                   | 0.33                | 22                  | 0                   | 5                   | 0.00                | 11.5                | 0.2                 | 20                  | 10.5                | -                   | 4                   | -                   | 6.1                 |
| I             | 0.3                 | 0.4                 | 0.67                | 0.13                | 3                   | 5                   | 1.2                 | 0.00                | 0.5                 | 1.7                 | 0.4                 | 3.0                 | 5                   | -                   | 3.5                 | 7.75                |
| J             | 0.12                | 0.3                 | 0                   | 1                   | 0.25                | 1.2                 | 0.6                 | 0.17                | 1.6                 | 0.8                 | 0                   | 6.3                 | 7.5                 | -                   | 0.3                 | 0                   |

\*Average Weight 0.15kg/mud crab and average weight 0.6 kg/mud eel

\*\* Weight of Fry is not considered for catch assessment

**Figure 3.9: Fishing gears and crafts observed during 29<sup>th</sup> quarter monitoring**

### Culture Fish Production

The present study on shrimp/fish farm in the 29<sup>th</sup> quarter monitoring phase shows that the highest production was observed in the Kapashdanda Gher (**Table D-7, Appendix-IV**).

### **3.2 Monitoring of Ecosystem and Bio-diversity**

#### **3.2.1 Indicators Selection**

Indicators for terrestrial and aquatic ecosystems have been selected by prior anticipation of probable impacts on ecological resources in different phases of the proposed project.

Composition and diversity of flora is important for vegetation study which indicates vegetation structure of an area. Plant health is directly related with biomass productivity. Plant health of an area may change for changing of different environmental parameters like temperature, composition of gaseous components, soil salinity, humidity and nutrients, air particulate dust etc. Plant diseases and proportion of healthy/unhealthy plant is needed to observe for ensuring plant health condition.

Canopy status of terrestrial vegetation indicates plant health and biomass properties of an area. Vegetation canopy structure may be change for change of plant growth rate due to soil properties change, plant physiological disorders due to change of climatic parameters or even for different human interventions. To monitor vegetation canopy status of the study area, canopy cover has been followed in different time intervals.

Among the terrestrial faunal community, Bird is an important class that is sensitive to their habitat condition. Changes of environmental parameters, landuse and vegetation composition directly impact on bird's habitat of a locality. Broadly, two types of bird are found in an area; local and migratory. To observe local bird habitat suitability, number of bird nest and nesting bird species can be a good indicator. Numbers of wetlands where migratory birds come in each migration season have also been considered to observing migratory bird habitat suitability of the area.

In the respects of aquatic ecosystems, dolphin is an ecological indicator which indicates water quality as well as aquatic habitat suitability. This aquatic mammal is still present all the river systems of the study area. Any changes of water quality and river bed siltation may change dolphin occurrence in a river system. So, dolphin occurrence is needed to monitor for this study.

#### **3.2.2 Rationales for Selection of Locations**

Four (4) homesteads have been selected for monitoring terrestrial ecosystem's indicators of the study area. Locations of the homesteads have been selected considering wind direction and spatial distribution from the project boundary. All the selected locations for terrestrial ecosystem monitoring is at northern sites as maximum time of the wind rose south to north direction and anticipated impacts will be take part according to this area. Beside this, Sundarban Reserve Forest is located sum of 14 km south from the project and various indicators of different locations of this forest is also observing for forest health monitoring. So, no site has been selected at south site of the proposed project.

#### **3.2.3 Terrestrial Ecosystem**

Terrestrial ecosystem supports most of the floral and faunal communities which are directly related to the environmental parameters like temperatures, air quality, sunlight, soil nutrients etc. In the study area, homesteads occupy maximum portions of terrestrial ecosystems. As such, observation on different indicators of selected homestead vegetation and dweller wildlife will be helpful to know the ecological impacts for the proposed project.

##### *Description of the selected homestead*

The homestead in Rajnagar is located at 2.5 km. east from upper North-east boundary of the project site. This is situated inside the damp area as numerous small swamps exist inside and surround the homesteads. Water retention capacity of surface soil of this homestead is very low and for this reason very little number of grasses and other herbs are present. Land elevation of selected homestead at Kalekarber village is comparatively flood free. This is located at about 1.8 km. east from Middle-east boundary of the project.

Chalkghona village is located about 0.5 km south from south-east boundary of the project. The selected homestead of this village is close to Maidara River to its north side and saline water shrimp farms to its south periphery. Presence of shallow ditches and peripheral waterbodies support to grow staple coverage of saline tolerant plant species. Borni village is located at about 3.0 km north from north-east boundary. Sampled homestead at Borni is situated at the middle part of the village. This homestead is also dominated by planted tree species and soil condition is similar to Rajnagar site. Vegetation of this homestead have been severely been damaged by past Cyclone Aila.

#### *Species Composition of selected homestead vegetation*

##### Homestead at Rajnagar

Once, this homestead was dominated with Gewa (*Excoecaria agallocha*) among all the trees due to its height population which get favor from soil's salinity for luxurious succession. But at ending of the year 2020, the homestead owner re-developed the homestead platform by filling sand extracted from nearer canal beds. Due to this activities, a staple portion of the Gewa coverage has been damaged along with other tree species. As a result, it is difficult to indicate the dominated tree species of this site. However, monocots fruits including Narikel (*Cocos nucifera*) and Khejur (*Phoenix sylvestris*) occupied the top canopy of the vegetation. Beside this, Safeda (*Manilkara zapota*) and Boroi (*Zizyphus sp*) are the two species of fruit yielding trees. In addition, a number of Bola (*Hibiscus tiliaceus*), Kewra (*Sonneratia apetala*) and one Sundari (*Heritiera fomes*) also found to exist. The homestead was cover very few grasses or undergrowth vegetation which also have been scarce after the land re-development.

##### Homestead at Kalekarber dighi

Two species like Narikel (*Cocos nucifera*) and Khejur (*Phoenix sylvestris*) occupies the top canopy. The homestead has many Mahagoni (*Swietenia mahagoni*) saplings which population is also high. Aam (*Mangifera indica*), Safeda (*Manilkara zapota*), Peyara (*Psidium guajava*) and Boroi (*Zizyphus sp*) are common trees height not more than 7 m. Mahagoni (*Swietenia mahagoni*), Rendi Koroï (*Albizia saman*) and Raj Koroï (*A. richardiana*) are timber trees those are occupied top canopy height more than 10m. Beside this, Neem (*Azadirachta indica*), Bakul (*Mimusops elengii*) and few numbers of Kola (*Musa sp*) are found on these homestead platforms.

##### Homestead at Chalkghona

Vegetation of this homestead also have rich population of mangrove plant species like Gewa (*Excoecaria agallocha*), Gol (*Nipa fruticans*), Kewra (*Sonneratia apetala*), and Ora (*Sonneratia caseolaris*). Narikel is the dominating tree species as well as occupying the top canopy. As the homestead is near the peripheries of river and shrimp gher, soil salinity supports luxurious growth of mangrove plant. This homestead has two shallow ditches which contain brackish water throughout the year. A number of ornamental plants also observed on this homestead platform.

##### Homestead at Barni

A total of 30 tree species have been recorded through quadrature sample survey of this homestead. Of which, Rendi Koroï (*Albizia saman*), Mahagoni (*Swietenia mahagoni*), Taal (*Borassus flabellifer*), Narikel (*Cocos nucifera*), Khejur (*Phoenix sylvestris*) are referable. The home owner has planted many fruit yielding trees which is now in sapling form. Among this, Kotbel (*Limonia acidissima*), Aam (*Mangifera indica*) and Safeda (*Manilkara zapota*) are common. Gewa (*Excoecaria agallocha*) was dominated at western part of this homestead now being less populated due to fell by the house owner. Tiger Fern (*Acrostichum aureum*) is a mangrove herb which presence at here also referable.

Random quadrature vegetation survey has been conducted at selected homesteads during recent monitoring tier. A total of 30 plant species (excluding undergrowths) has been recorded from 16 number of surveyed sample quadrates. Details of the survey result is presented in **Table 3.10** below.

Plant species diversity followed lower than the previous monitoring as one of the site's trees has been cut/felled/died due to land development and in another one site at (Kalekarber has felled some trees for making a new cottage at there.

#### *Plant health*

Structure of vegetation community of this area is tree dominant. Random saline water shrimp farming is a big threat to plant health of this area. Hence, Plant health of this area is not satisfactory. Expansion of shrimp farming in this area triggered incursion of salinity of soils. For this reason, overall plant succession, growth and productivity have changed day by day.

#### Plant Diseases and symptoms in homestead vegetation

Plant diseases observation of an area is needed to evaluate plant health and productivity. During initial field survey, some tree species were selected for regular observation of plant disease. In this regards, a number of common tree species have been observed in each homestead.

Leaf blast, Leaf spot, lethal yellowing, nut fall, Mite damage on nut fruit are common diseases of the plants in the study area. A brief discussion was held with home owners about diseases of selected economic plants which exist in their homesteads. Most symptoms for plant diseases are descriptive. Although, all plant diseases symptoms are not visible in a same time of the year, but it was tried to observe the existing disease symptoms. Leaf spot and mite damage on fruits is the common symptoms of *Cocos nucifera*. In addition, bud/trunk rot (Heart Rot), lethal yellowing and diameter loss at top portion of this monocot is also common symptom of this plant in all location. Infection of fungal/bacterial is not remarkable all the homesteads. But Leaf Anthracnose on *Mangifera indica* and Bacteriosis on *Psidium guajava* is commonly found most of the trees. *Phoenix sylvestris* also found unhealthy due to leaf yellowing from manganese deficiency.

#### Number of diseases affected trees

Plant health has been showed slightly deteriorated at Rajnagar and Chalkghona sites, whereas unchanged at Borni and Kalekarber sites. Comparing to same season monitoring in previous tier (Jul, 2020), health deterioration of date palm has observed in Rajnagar due to continuation the effects of land re-development by the sand collected from nearer khals. Most of the Date Palm are suffered from lethal yellowing and terminal bud destruction. At Rajnagar and Chalkghona site, two *Excochordia* has newly affected which observed leaf curling. Following table (**Table 3.11**) represents the time series data on unhealthy plants in studied homesteads.

Table 3.10: Plant species composition of the sampled homesteads

| Sl. No. | Species Name                | Local Name     | Rajnagar |    |    |    | Borni |    |    |    | Kalekarber |     |     |     | Chalkghona |     |     |     | Tot. No. of individuals | Biodiversity Index |
|---------|-----------------------------|----------------|----------|----|----|----|-------|----|----|----|------------|-----|-----|-----|------------|-----|-----|-----|-------------------------|--------------------|
|         |                             |                | Q1       | Q2 | Q3 | Q4 | Q5    | Q6 | Q7 | Q8 | Q9         | Q10 | Q11 | Q12 | Q13        | Q14 | Q15 | Q16 |                         |                    |
| 1       | <i>Acrostichum aureum</i>   | Tiger Fern     | 1        |    |    |    |       |    |    |    | 2          |     |     | 3   |            |     |     |     | 6                       | 1.27               |
| 2       | <i>Albizia richardiana</i>  | Chambol        |          |    |    |    | 1     |    |    | 4  | 2          | 1   | 1   | 1   | 2          | 1   |     |     | 13                      |                    |
| 3       | <i>Albizia saman</i>        | Rendi Koro     | 1        |    |    |    | 3     | 1  | 2  | 1  | 1          |     |     |     | 1          |     |     |     | 10                      |                    |
| 4       | <i>Areca catechu</i>        | Supari         |          |    |    |    |       | 6  | 14 |    |            | 2   |     |     |            |     |     |     | 22                      |                    |
| 5       | <i>Azadirachta indica</i>   | Neem           |          |    |    |    | 3     |    | 1  |    |            |     | 2   |     |            |     |     |     | 6                       |                    |
| 6       | <i>Borassus flabellifer</i> | Taal           |          |    |    |    |       | 1  | 2  | 2  |            |     |     | 3   |            |     |     |     | 8                       |                    |
| 7       | <i>Cocos nucifera</i>       | Narikel        | 5        | 3  | 4  | 3  | 3     |    |    | 2  | 2          | 3   | 4   | 4   |            |     |     |     | 33                      |                    |
| 8       | <i>Cordia dichotoma</i>     | Bohal/Gum Tree |          |    |    |    |       |    |    |    |            |     |     |     | 1          |     |     |     | 1                       |                    |
| 9       | <i>Diospyros pregrina</i>   | Gab            |          |    |    |    |       |    |    |    | 2          |     |     |     | 1          | 2   |     |     | 5                       |                    |
| 10      | <i>Eucalyptus sp</i>        | Eucalyptus     |          |    |    |    | 1     |    |    |    |            |     |     |     |            |     |     |     | 1                       |                    |
| 11      | <i>Excoecaria agallocha</i> | Gewa           | 6        | 8  | 9  | 7  |       |    |    |    |            |     |     |     |            |     | 8   | 4   | 42                      |                    |
| 12      | <i>Ficus hispida</i>        | Dumur          |          |    |    |    |       |    |    |    |            |     | 2   |     |            |     |     |     | 2                       |                    |
| 13      | <i>Heritiera fomes</i>      | Sundari        | 1        |    |    |    |       |    |    |    |            |     |     |     |            |     |     |     | 1                       |                    |
| 14      | <i>Hibiscus tiliaceus</i>   | Bola           |          |    |    |    |       |    |    |    |            |     |     |     |            | 1   |     |     | 1                       |                    |
| 15      | <i>Limonia acidissima</i>   | Kotbel         |          |    |    | 1  |       |    |    | 1  |            |     |     |     |            |     |     |     | 2                       |                    |
| 16      | <i>Mangifera indica</i>     | Aam            |          |    |    |    | 3     |    |    | 1  |            |     |     |     | 3          |     |     |     | 7                       |                    |
| 17      | <i>Manilkara zapota</i>     | Safeda         |          |    |    |    |       |    |    | 1  | 1          |     |     |     |            |     |     |     | 2                       |                    |
| 18      | <i>Mimusops elengi</i>      | Bokul          |          |    |    |    |       |    |    |    |            | 1   |     |     |            |     |     |     | 1                       |                    |
| 19      | <i>Moringa oleifera</i>     | Sazna          |          |    |    |    |       |    |    |    |            |     | 1   |     |            |     |     |     | 1                       |                    |
| 20      | <i>Musa sp</i>              | Kola           |          | 6  | 1  |    |       |    |    |    | 7          | 3   |     |     |            |     |     |     | 17                      |                    |
| 21      | <i>Phoenix sylvestris</i>   | Khejur         |          | 2  | 4  | 4  | 1     |    |    |    |            |     | 1   | 1   |            |     | 3   | 2   | 18                      |                    |
| 22      | <i>Phyllanthus acidus</i>   | Orboroi        |          |    |    |    |       |    |    |    | 1          |     |     |     |            |     |     |     | 1                       |                    |
| 23      | <i>Sonneratia apetalla</i>  | Kewra          |          |    |    | 1  |       |    |    |    |            |     |     |     |            |     |     |     | 1                       |                    |
| 24      | <i>Swietenia mahagoni</i>   | Mahagoni       |          |    |    |    | 5     |    | 2  | 2  | 7          | 8   |     | 4   | 1          |     |     |     | 29                      |                    |
| 25      | <i>Syzygium cumini</i>      | Jaam           |          |    |    |    |       |    | 1  |    |            |     |     |     |            |     |     |     | 1                       |                    |
| 26      | <i>Tamarindus indica</i>    | Tentul         |          |    |    |    |       |    |    |    |            |     |     |     | 1          |     |     |     | 1                       |                    |
| 27      | <i>Terminalia arjuna</i>    | Arjun          |          |    |    |    |       |    |    |    |            |     |     |     | 1          |     |     |     | 1                       |                    |
| 28      | <i>Nypa fruticans</i>       | Golpata        |          |    |    |    |       |    |    |    |            |     |     |     |            |     |     | 2   | 2                       |                    |
| 29      | <i>Vachellia nilotica</i>   | Babla          |          |    |    |    |       |    |    |    |            |     |     |     |            |     | 1   |     | 1                       |                    |
| 30      | <i>Zizyphus sp</i>          | Kul boroi      |          |    |    |    |       | 1  | 1  |    |            |     |     |     | 2          |     |     |     | 4                       |                    |

Note: Q-Quadra

Table 3.11: No. of unhealthy plants in studied homesteads

| Location             | Plant Name           | Total No. of Plant | No. of Unhealthy Plant |           |          |          |          |           |           |           |           |           |           |           |           |           |        |           |           |           |           |           |           |           |           |            |
|----------------------|----------------------|--------------------|------------------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
|                      |                      |                    | Apr, 2014              | Jun, 2014 | Oct 2014 | Jan 2015 | Apr 2015 | Aug, 2015 | Oct, 2015 | Jan, 2015 | Oct, 2016 | Jan, 2017 | Jan, 2018 | Apr, 2018 | Jul, 2018 | Nov, 2018 | Feb-19 | Apr, 2019 | Jul, 2019 | Nov, 2019 | Feb, 2020 | Jul, 2020 | Nov, 2020 | Jan, 2021 | Apr, 2021 | July, 2021 |
| Rajnagar             | Cocos nucifera       | 17*                | NS                     | 10        | 5        | 5        | 15       | 4         | 5         | NS        | 3         | 4         | 6         | 6         | 9         | 4         | 4      | 3         | 2         | 3         | 10        | 3         | 7         | 11        | 10        | 10         |
|                      | Phoenix sylvestris   | 25                 | NS                     | 15        | 4        | 4        | 22       | 9         | 13        | NS        | 10        | 2         | 5         | 4         | 7         | 6         | 8      | 9         | 5         | 3         | 4         | 4         | 5         | 2         | 12        | 2          |
|                      | Manilkara zapota     | 1                  | NS                     | -         | -        | -        | -        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | -      | -         | -         | -         | -         | -         | 1         | -         | -         | -          |
|                      | Albizia saman        | 2                  | NS                     | -         | -        | -        | -        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | -      | -         | -         | -         | -         | -         | -         | 2         | 2         | 2          |
|                      | Excoecaria agallocha | 55*                | NS                     | -         | 1        | 1        | -        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | -      | -         | -         | -         | -         | -         | -         | -         | 5         | 10         |
|                      | Mangifera indica     | 3                  | NS                     | 1         | -        | -        | 2        | -         | -         | NS        | -         | NS        | 1         | -         | -         | 1         | -      | -         | -         | -         | -         | -         | -         | -         | -         | 2          |
|                      | Psidium guajava      | 2                  | NS                     | 2         | -        | -        | 2        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | -      | -         | -         | -         | -         | -         | -         | -         | -         | -          |
| Borni                | Cocos nucifera       | 10                 | 7                      | 3         | -        | -        | 3        | 1         | 2         | NS        | 1         | 2         | 3         | 1         | 2         | -         | 1      | 1         | 1         | 2         | 1         | -         | -         | -         | -         | -          |
|                      | Phoenix sylvestris   | 12                 | -                      | 5         | 4        | 4        | 3        | 1         | 4         | NS        | 4         | 3         | 4         | 2         | 1         | -         | 1      | 1         | -         | -         | -         | -         | -         | -         | -         |            |
|                      | Borassus flabellifer | 6                  | 3                      | 1         | -        | -        | -        | -         | -         | NS        | -         | -         | -         | -         | -         | 1         | 1      | -         | -         | -         | -         | 1         | -         | -         | -         | -          |
|                      | Mangifera indica     | 6                  | 3                      | 3         | 1        | 1        | 4        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | -      | -         | -         | -         | -         | -         | -         | -         | -         |            |
|                      | Excoecaria agallocha | 18                 | -                      | -         | -        | -        | -        | -         | -         | NS        | -         | -         | -         | -         | -         | 1         | -      | -         | -         | -         | -         | -         | -         | -         | -         | 3          |
|                      | Swietenia mehogani   | 11                 | -                      | -         | -        | -        | 1        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | -      | -         | -         | -         | -         | -         | -         | -         | -         | -          |
|                      | Areca catechu        | 10                 | -                      | 6         | 2        | 2        | 8        | 2         | 2         | NS        | -         | 1         | -         | 3         | -         | -         | -      | -         | -         | -         | -         | -         | -         | -         | -         |            |
|                      | Manilkara zapota     | 1                  | -                      | -         | -        | -        | -        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | -      | -         | -         | -         | -         | -         | -         | -         | -         | -          |
|                      | Psidium guajava      | 2                  | 2                      | 1         | -        | -        | -        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | -      | -         | -         | -         | -         | -         | -         | -         | -         | -          |
| Kalekarber Dighi     | Cocos nucifera       | 56                 | 35                     | 5         | 1        | 1        | 2        | 2         | 3         | NS        | 1         | 1         | -         | 6         | 3         | -         | 1      | 3         | 1         | 7         | 4         | 2         | -         | -         | -         | 2          |
|                      | Phoenix sylvestris   | 10                 | -                      | 3         | -        | -        | 1        | -         | 1         | NS        | 3         | -         | 3         | -         | -         | -         | -      | -         | -         | -         | -         | 3         | -         | -         | -         | -          |
|                      | Mangifera indica     | 5                  | 1                      | 1         | -        | -        | -        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | -      | -         | -         | -         | -         | -         | -         | -         | -         | -          |
|                      | Manilkara zapota     | 2                  | -                      | -         | -        | -        | 1        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | -      | -         | -         | -         | -         | -         | -         | -         | -         | -          |
|                      | Borassus flabellifer | 8                  | -                      | -         | -        | -        | -        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | -      | -         | -         | -         | -         | -         | -         | -         | -         | -          |
|                      | Zizyphus sp          | 1                  | -                      | -         | -        | -        | -        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | -      | -         | -         | -         | -         | -         | 1         | -         | -         | -          |
|                      | Psidium guajava      | 8                  | -                      | -         | -        | -        | -        | -         | -         | NS        | -         | -         | 1         | -         | -         | -         | -      | -         | -         | -         | -         | -         | -         | -         | -         | -          |
|                      | Tamarindus indica    | 2                  | -                      | -         | -        | -        | 1        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | -      | -         | -         | -         | -         | -         | -         | -         | -         | -          |
|                      | Chalkghona           | Cocos nucifera     | 39                     | 25        | 19       | 5        | 5        | 34        | 20        | -         | NS        | 2         | 2         | 4         | 5         | 3         | -      | 3         | 4         | 2         | 4         | 3         | 5         | -         | -         | -          |
| Phoenix sylvestris   |                      | 24                 | -                      | 10        | 1        | 1        | 6        | 5         | 1         | NS        | 1         | -         | 5         | 2         | 3         | -         | -      | 1         | 2         | 2         | 1         | 3         | -         | 1         | 3         | 2          |
| Albizia saman        |                      | 3                  | -                      | -         | -        | -        | 1        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | 1      | -         | -         | -         | -         | -         | -         | -         | -         | -          |
| Excoecaria agallocha |                      | 36                 | -                      | -         | 1        | 1        | -        | -         | -         | NS        | -         | -         | -         | -         | 2         | -         | -      | -         | -         | -         | -         | -         | -         | -         | 2         | -          |
| Manilkara zapota     |                      | 1                  | -                      | -         | -        | -        | -        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | -      | -         | -         | -         | -         | -         | -         | -         | -         | -          |
| Psidium guajava      |                      | 17                 | 1                      | 7         | -        | -        | -        | -         | -         | NS        | -         | -         | -         | -         | -         | 1         | 3      | -         | -         | 1         | -         | -         | -         | -         | -         | -          |
| Mangifera indica     |                      | 7                  | 2                      | 1         | -        | -        | -        | -         | -         | NS        | -         | 1         | -         | 1         | -         | -         | -      | -         | -         | -         | -         | -         | -         | -         | -         | -          |
| Borassus flabellifer |                      | 2                  | -                      | -         | -        | -        | -        | -         | -         | NS        | -         | -         | -         | -         | -         | -         | -      | -         | -         | -         | -         | -         | -         | -         | -         | -          |

Note: NS = Not Surveyed; \*=1 Cocos and 45 Excoecaria have been cut; Source: CEGIS field survey



### Vegetation Canopy Status

#### Species representation in different canopy layers of homestead vegetation

Coconut (*Cocos nucifera*) occupied top canopy of all the studied homestead vegetation. Date Palm (*Phoenix sylvestris*) is prevalent as second top layer followed by Gewa (*Excochcaria agallocha*). Most of the fruit yielding trees like Sofeda (*Manilkara zapota*), Mango (*Mangifera indica*) possess upper bole of canopy layer. Lower bole are occupied by small fruit yielding trees like Guava (*Psidium guajava*), Musa sp. Very few grass species and undergrowth vegetation were followed at studied homesteads.

#### Estimated Canopy cover in homestead vegetation of sampling sites

Status of vegetation canopy has improved at Chalkghona and Borni sites and insignificant change at Rajnagar and Kalekarber. The causes behind the improvement is added additional canopy for expansion of branches of new planted trees. In the case of another site, some big trees of Kalekarber homesteads have shaved out and the trees at Rajnagar site is suffering from land development effects done by the homestead owners. Comparing the same seasonal monitoring in Jul 2020, the Rajnagar site revealed significantly negative change in canopy status and it is due to land re-development effects by the house owner (**Table 3.12**).

**Table 3.12: Vegetation Canopy Cover in different Studied Homesteads**

| Location   | % of canopy Coverage |          |          |          |          |          |          |          |          |          |          |          |          |          |           |           |           |           |           |           |
|------------|----------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|
|            | Apr 2014             | Jun 2014 | Oct 2014 | Jan 2015 | Apr 2015 | Aug 2015 | Oct 2015 | Jan 2016 | Jul 2016 | Oct 2016 | Jan 2017 | Jan 2018 | Apr 2018 | Jul 2018 | Nov, 2018 | Feb, 2019 | Apr, 2019 | Jul, 2019 | Nov, 2019 | Feb, 2020 |
| Rajnagar   | NS                   | 19       | 19       | 17       | 20       | 20       | 20       | 20       | 21       | 23       | 19       | 15       | 18       | 14       | 11        | 22        | 19        | 18        | 16        | 14        |
| Borni      | NS                   | 26       | 18       | 18       | 12       | 14       | 20       | 20       | 25       | 25       | 23       | 21       | 21       | 23       | 20        | 21        | 21        | 20        | 18        | 20        |
| Kalekarber | NS                   | 20       | 24       | 25       | 23       | 24       | 24       | 22       | 24       | 26       | 25       | 23       | 24       | 24       | 25        | 24        | 25        | 25        | 24        | 24        |
| Chalkghona | NS                   | 13       | 24       | 22       | 17       | 21       | 21       | 20       | 21       | 27       | 26       | 25       | 16       | 18       | 21        | 22        | 22        | 22        | 20        | 23        |

Note: NS = Not Surveyed

### Bird Habitat

#### Local birds and their nesting behaviour

Numerous local bird species are occurred in the study area. Homestead vegetation are the prime habitat for local birds. Existence of vast shrimp farms as well as canals and rivers also favor good number of water dependent bird species in this area. Most of the birds are nesting on tall trees of homesteads. Small bird like Tailor bird, prefer small bushy shrubs. Although, birds do not follow any local boundaries, a clear conception on available bird species have been gathered through discussions with studied homestead owners as well as physical observation.

#### Bird species and number of Bird nests in sampling sites

None of the bird nest have been recorded from any monitoring homestead site. However, **Table 3.13** represent the bird nest monitoring datasheet over the monitoring periods.

Table 3.13: Bird nest observation datasheet

| Monitoring Tier    | Location | Name of nesting Bird |              |                     |             |             |              |
|--------------------|----------|----------------------|--------------|---------------------|-------------|-------------|--------------|
|                    |          | Little Cormorant     | Little Egret | Asian Pied Starling | Tailor Bird | Great Egret | Spotted Dove |
| 1st QM (Apr 2014)  | R        | NS                   | NS           | NS                  | NS          | NS          | -            |
|                    | B        | -                    | -            | 1                   | -           | -           | -            |
|                    | K        | NS                   | NS           | NS                  | NS          | NS          | -            |
|                    | C        | -                    | 1            | -                   | 1           | -           | -            |
| 2nd QM (Jun 2014)  | R        | 12                   | 4            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | 11                  | -           | -           | -            |
| 3rd QM( Sep 2014)  | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | -            |
| 4th QM (Dec 2014)  | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | -            |
| 5th QM (Apr 2014)  | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | -            |
| 6th QM (Aug 2015)  | R        | 1                    | 5            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | -            |
| 7th QM (Jan 2016)  | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | -            |
| 7th QM (Jun 2016)  | R        | 10                   | 5            | -                   | -           | 3           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | 1                    | 1            | -                   | -           | -           | -            |
| 11th QM (Oct 2016) | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | -            |
| 12th QM (Jan 2017) | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | -            |
| 13th QM (Jan 2018) | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | 1            | -                   | -           | -           | -            |
| 18th QM (Nov 2018) | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | -            |
| 19th QM (Feb 2019) | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | 1           | -           | -            |
| 20th QM (Apr 2019) | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | -            |
| 21th QM (Jul 2019) | R        | -                    | -            | -                   | 1           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | -            |
| 22th QM (Nov 2019) | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |

| Monitoring Tier    | Location | Name of nesting Bird |              |                     |             |             |              |
|--------------------|----------|----------------------|--------------|---------------------|-------------|-------------|--------------|
|                    |          | Little Cormorant     | Little Egret | Asian Pied Starling | Tailor Bird | Great Egret | Spotted Dove |
| 22th QM (Feb 2020) | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | -            |
|                    | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
| 23th QM (Jul 2020) | C        | -                    | -            | -                   | -           | -           | -            |
|                    | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | -            |
| 25th QM (Nov 2020) | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | -            |
|                    | R        | -                    | -            | -                   | -           | -           | -            |
| 26th QM (Jan 2021) | B        | -                    | -            | 1                   | 1           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | -            |
|                    | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
| 27th QM (Apr 2021) | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | 1            |
|                    | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
| 28th QM (Jul 2021) | C        | -                    | -            | -                   | -           | -           | -            |
|                    | R        | -                    | -            | -                   | -           | -           | -            |
|                    | B        | -                    | -            | -                   | -           | -           | -            |
|                    | K        | -                    | -            | -                   | -           | -           | -            |
|                    | C        | -                    | -            | -                   | -           | -           | -            |

Note: Location R=Rajnagar, B=Borni, K=Kalekarber, C=Chalkghona

### 3.2.4 Aquatic Ecosystem Monitoring

Rivers, canals, ponds and saline water shrimp farms are main wetland forms in the study area. Of which, river bear the flowing/ lotic and ponds bear the stagnant/lentic water systems. Canals of this area have merged with shrimp farms. Shrimp farms extend a large proportion of total watershed of the study area those are intervene by human. Therefore, canals are not an actual flowing or stagnant water system.

#### Monitoring Locations

Rivers, canals, ponds and saline water shrimp farms are main wetland forms in the study area. Of which, river bear the flowing/ lotic and ponds bear the stagnant/lentic water systems. Canals of this area have merged with shrimp farms. Shrimp farms extend a large proportion of total watershed of the study area those are intervene by human. Therefore, canals are not an actual flowing or stagnant water system.

#### Dolphin Occurrences

##### Dolphin migration route in the study area

Two dolphin species (Ganges River Dolphin and Irrawaddi Dolphin) travel throughout the Passur River for whole of the year. The Ganges river dolphin migrates from estuary regions to upstream connected rivers like Rupsha and Madhumoti. Though Irrawardi Dolphin is mostly habituated in estuary regions of Bangladesh, but this aquatic mammal is also occasionally sighted in Passur river. Ganges Dolphins also roam through Maidara River mainly during high tide. Siltation and narrowing of upstream branches are limiting the length of migration area of this river day by day.

##### Dolphin occurrence in Passur and Maidara River

Dolphin occurrence have been surveyed within about 11 km length of Passur and Madara river surround the project area (From Chalna to Digras Kheyaghat including Maidara River) through boat transact during Neap tide. A total of 7 dolphins have been recorded in Passur or Maidara River during the survey. Of which

1 were at Passur Channel and another 6 was sighted within the Maidara River. The recorded individual was lower than previous monitoring tier due to limiting the visibility for light raining waving on river surface during the survey. **Figure 3.10** represents the survey transact and location of dolphin occurrence within these river areas.

*Dolphin occurrence in Dhangmari Khal, Shella Gang and Bhadra khal*

Dolphin occurrences also surveyed at the Dhangmari Khal, Chandpai Shella Gang Wildlife Sanctuary and Bhadra Khal. In the case of Dhangmari Khal, total transect length was 12.26 km from Dhangmari-Passur confluence to Gagramari Forest Patrol Post up and down (**Figure 3.11**). A total of 6 dolphins with different sizes were recorded in Dhangmari Khal with an encounter rate 0.23/km/hour. In the case of Chandpai Shella Gang, the survey transact was bounded from Chandpai to Joymonirgol Thota to Food Silo to Joymonirgol Thota which transect length was about 8 km (**Figure 3.12**). No dolphin has been sighted during one-hour survey. Heavy rainfall and wavy condition of the river surface hindered the visibility of the dolphins during this survey time. 10 dolphins have been recorded at Bhadra Khal during 1 hour and 15 min survey time and the 5.9 km inner reach from Bhadra Patrol Post. The encounter rate was 1.76 individuals/km/hr. The distribution of dolphin occurrence at Bhadra Khal is presented in **Figure 3.13**.

Another short survey was conducted Karomjal, Harbaria and Akram Point while passing the river. Dolphin has been notified at each of the site while travelling on boat. However, the survey result is included in **Table: 3.14**

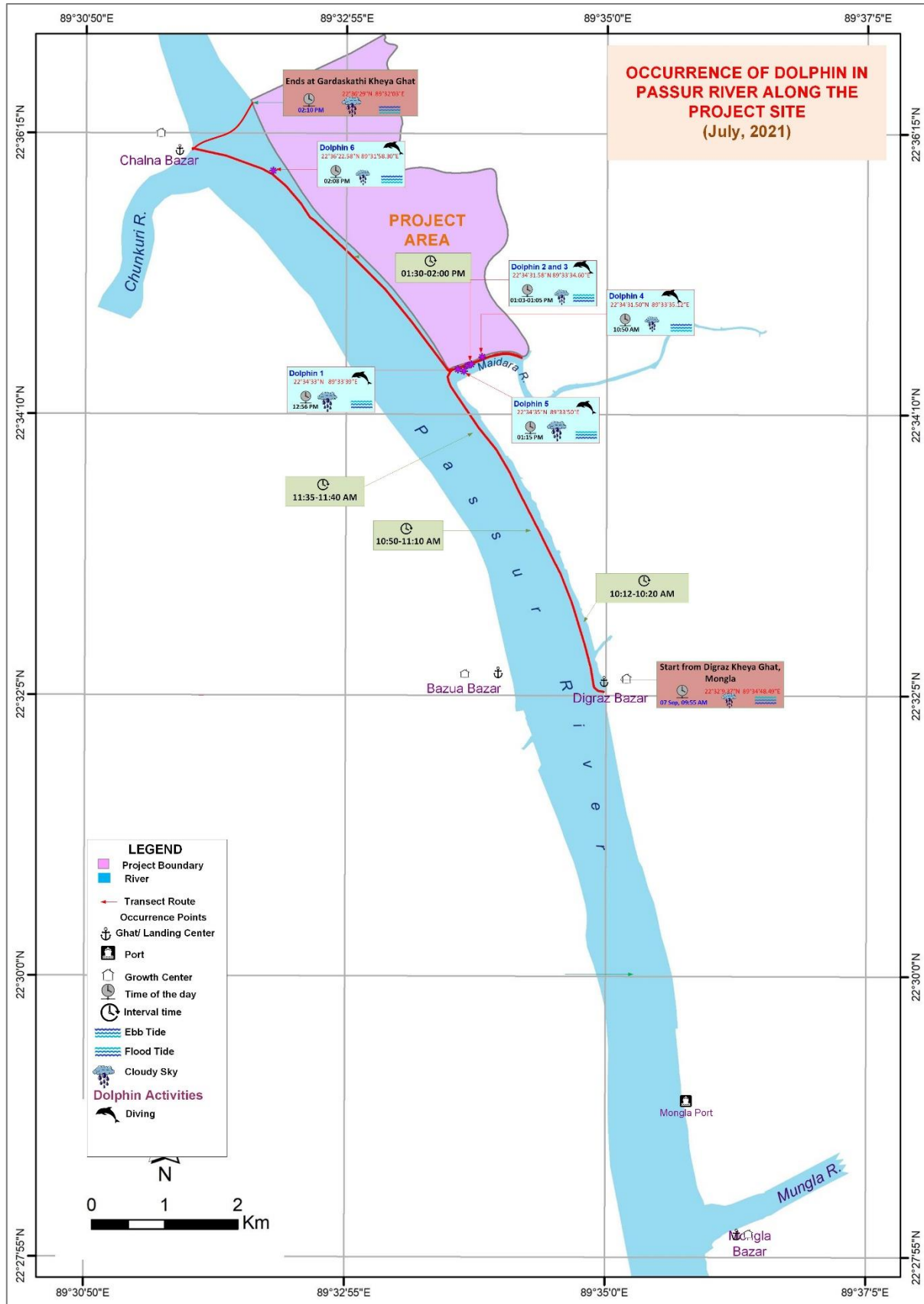


Figure 3.10: Occurrence of dolphin at Passur and Maidara River along the project site

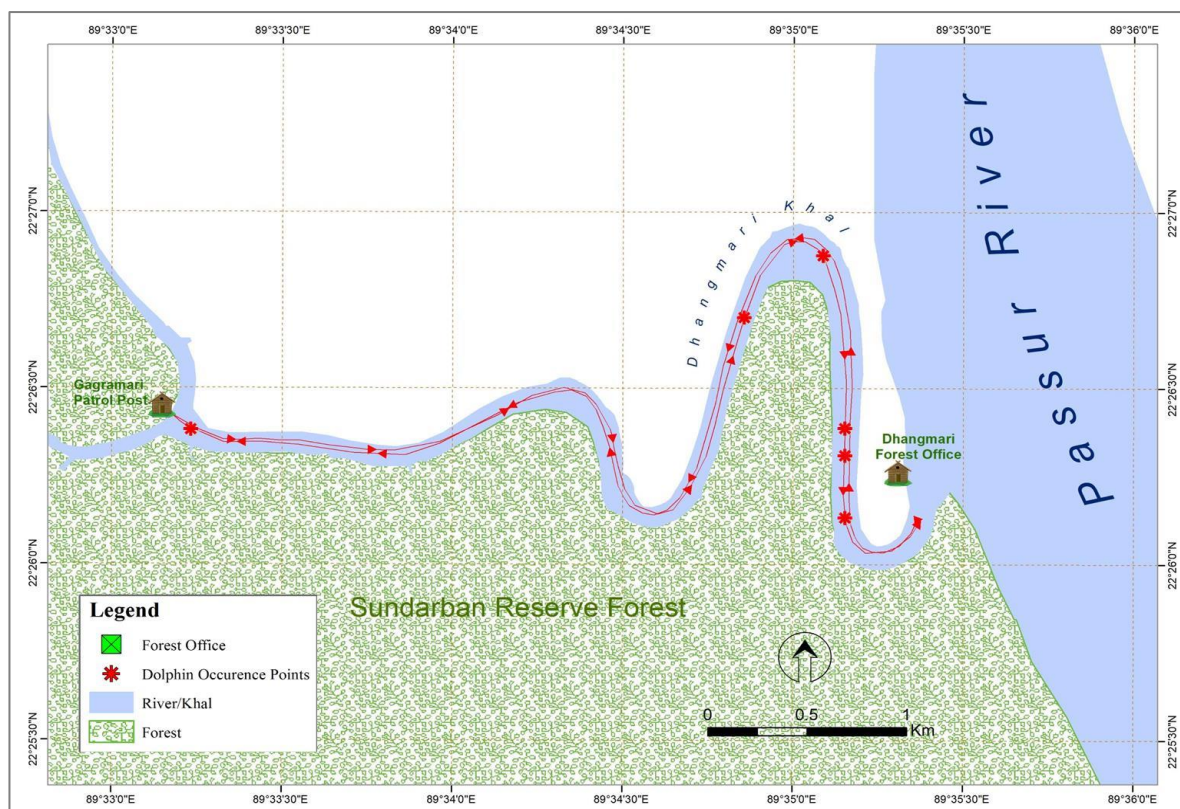


Figure 3.11 Location of dolphin Occurrence at Dhangmari Khal

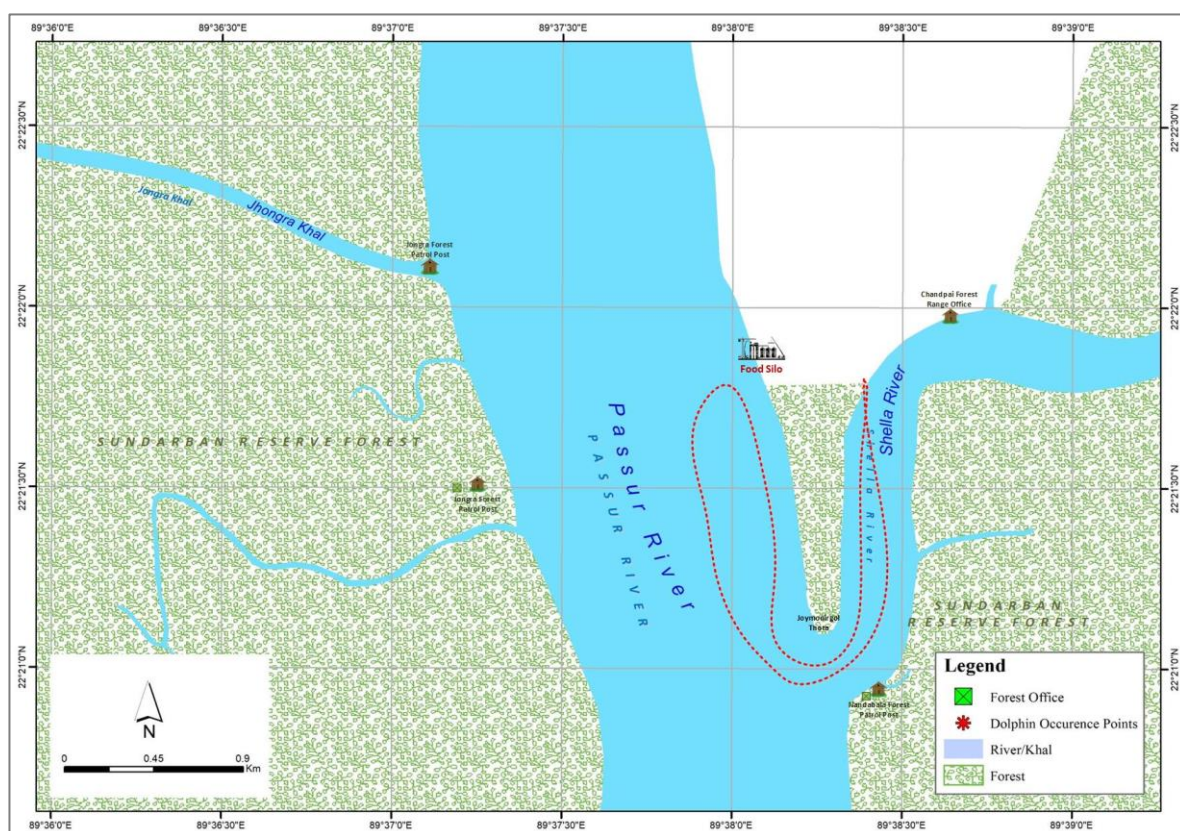


Figure 3.12: Location of dolphin Occurrence at Chandpai



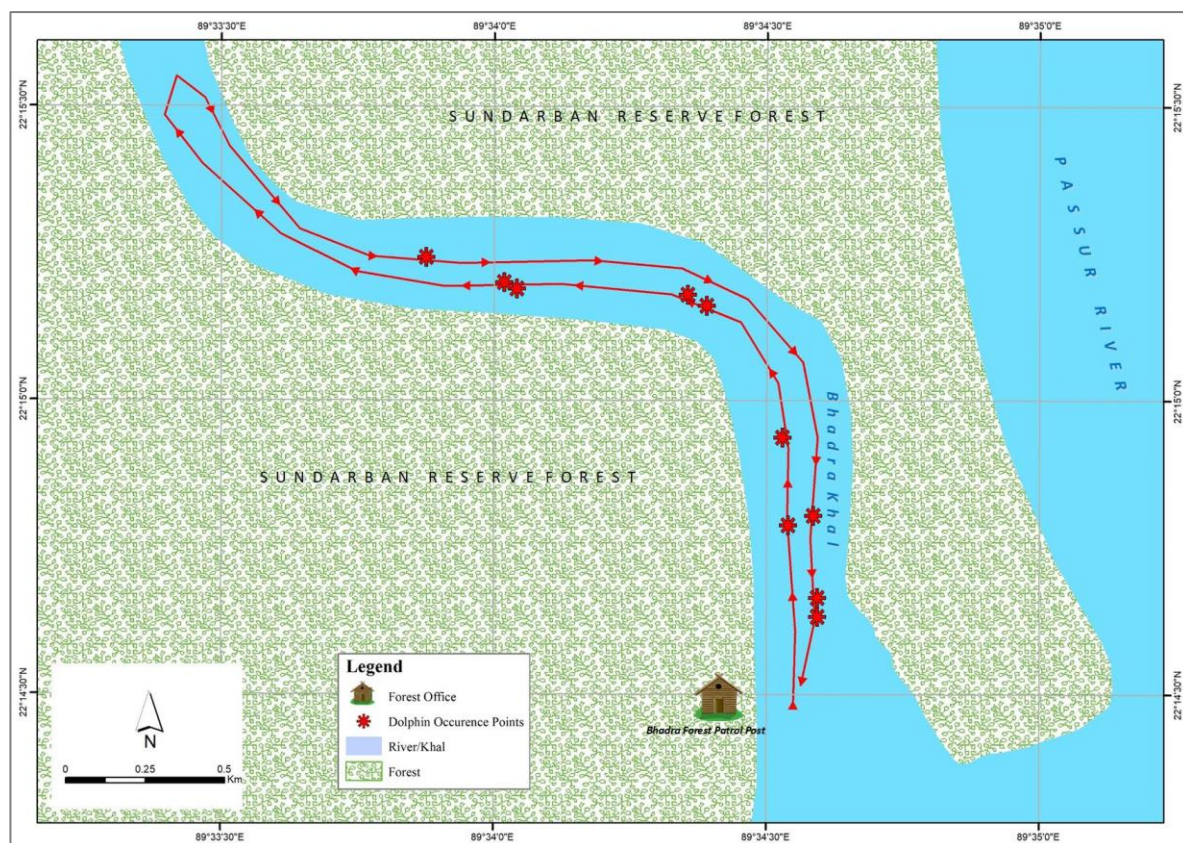


Figure 3.13: Location of dolphin Occurrence within Bhadra Khal

Table 3.14: Dolphin Observation Datasheet

| Monitoring Tier | Tidal Condition | Passur River at Project Site | Karamjal | Harbaria | Akram Point | Moidara River | Shella River at Chandpai |
|-----------------|-----------------|------------------------------|----------|----------|-------------|---------------|--------------------------|
| Apr-14          | FT              | Y                            | NS       | NS       | NS          | Y             | NS                       |
|                 | NT              | Y                            | NS       | NS       | NS          | N             | NS                       |
| Jun-14          | FT              | Y                            | NS       | NS       | NS          | N             | NS                       |
|                 | NT              | Y                            | N        | N        | N           | N             | NS                       |
| Oct-14          | FT              | Y                            | NS       | NS       | NS          | Y             | NS                       |
|                 | NT              | Y                            | Y        | Y        | N           | Y             | NS                       |
| Jan-15          | FT              | Y                            | Y        | Y        | NS          | Y             | NS                       |
|                 | NT              | Y                            | Y        | N        | Y           | N             | NS                       |
| Apr-15          | FT              | Y                            | N        | N        | Y           | Y             | NS                       |
|                 | NT              | Y                            | N        | N        | Y           | N             | NS                       |
| Aug-15          | FT              | Y                            | NS       | N        | NS          | Y             | NS                       |
|                 | NT              | Y                            | Y        | N        | NS          | N             | NS                       |
| Oct-15          | FT              | NS                           | NS       | Y        | N           | NS            | NS                       |
|                 | NT              | Y                            | Y        | NS       | Y           | Y             | NS                       |
| Oct-15          | FT              | Y                            | Y        | Y        | Y           | N             | NS                       |
|                 | NT              | Y                            | N        | N        | NS          | Y             | NS                       |
| Jul-16          | FT              | Y                            | Y        | Y        | NS          | Y             | NS                       |
|                 | NT              | Y                            | NS       | Y        | NS          | NS            | NS                       |
| Oct-16          | FT              | N                            | Y        | Y        | N           | NS            | NS                       |
|                 | NT              | Y                            | Y        | NS       | N           | Y             | NS                       |
| Jan-17          | FT              | Y                            | Y        | N        | NS          | N             | NS                       |
|                 | NT              | Y                            | Y        | N        | NS          | Y             | NS                       |
| Jan-18          | FT              | Y                            | NS       | Y        | N           | NS            | NS                       |
|                 | NT              | Y                            | Y        | N        | N           | Y             | N                        |
| Jun-18          | FT              | Y                            | N        | N        | N           | Y             | Y                        |
|                 | NT              | Y                            | NS       | N        | Y           | Y             | NS                       |

| Monitoring Tier | Tidal Condition | Passur River at Project Site | Karamjal | Harbaria | Akram Point | Moidara River | Shella River at Chandpai |
|-----------------|-----------------|------------------------------|----------|----------|-------------|---------------|--------------------------|
| Nov-18          | FT              | NS                           | N        | N        | N           | NS            | NS                       |
|                 | NT              | Y                            | N        | N        | N           | Y             | Y                        |
| Feb-19          | FT              | NS                           | Y        | Y        | N           | NS            | Y                        |
|                 | NT              | Y                            | N        | N        | Y           | N             | NS                       |
| Apr-19          | FT              | NS                           | Y        | N        | N           | NS            | NS                       |
|                 | NT              | N                            | N        | Y        | N           | N             | Y                        |
| Jul-19          | FT              | Y                            | Y        | N        | N           | Y             | Y                        |
|                 | NT              | Y                            | NS       | N        | N           | N             | NS                       |
| Nov-19          | FT              | NS                           | Y        | Y        | N           | NS            | Y                        |
|                 | NT              | Y                            | Y        | N        | Y           | Y             | Y                        |
| Feb-20          | FT              | Y                            | Y        | Y        | Y           | Y             | Y                        |
|                 | NT              | Y                            | N        | NS       | NS          | Y             | Y                        |
| Jul-20          | FT              | Y                            | N        | N        | N           | Y             | Y                        |
|                 | NT              | NS                           | Y        | N        | N           | NS            | Y                        |
| Nov-20          | FT              | NS                           | NS       | NS       | NS          | NS            | Y                        |
|                 | NT              | Y                            | NS       | NS       | NS          | Y             | NS                       |
| Jan-21          | FT              | NS                           | NS       | NS       | NS          | NS            | Y                        |
|                 | NT              | Y                            | NS       | NS       | NS          | Y             | NS                       |
| Apr-21          | FT              | NS                           | NS       | NS       | NS          | NS            | Y                        |
|                 | NT              | Y                            | NS       | NS       | NS          | Y             | NS                       |
| Jul-21          | FT              | Y                            | NS       | Y        | Y           | Y             | Y                        |
|                 | NT              | NS                           | Y        | N        | N           | NS            | NS                       |

Note: FT=Flood Tide, NT=Neap Tide, NS=Not Surveyed; Occurrence Status: Y = Occurred, N = Not occurred

### 3.3 Sundarbans Forest Health

Healthy forests are a critical part of our nation's landscape. Healthy forests are vital to our future (Edmonds and others 2011), and consistent, large-scale, and long-term monitoring of key indicators of forest health status, change, and trends is necessary to identify forest resources deteriorating across large regions (Riitters and Tkacz 2004). Forest Health Monitoring program designed to determine the status, changes, and trends in indicators of forest condition on certain time interval basis. The Forest Health Monitoring program uses data from various sources such as ground plots (i.e. long-term monitoring plot) surveys, aerial surveys, and other biotic and abiotic data sources and develops analytical approaches to address forest health issues that affect the sustainability of forest ecosystems. One of the widely used forests healthy monitoring Bio-indicators is growth trend overtime and its relation with leaf area index (Beets and Whitehead 1996). Stands with a high leaf area index will accumulate more biomass and total volume per ha than stands with a low leaf area, other things being equal (Beets et al. 2008). Lichen abundance is another good indicator of forest health. Lichens often grow on trees and shrubs, absorbing nutrients from the atmosphere. Because lichens are very sensitive to air pollution—particularly to sulfur dioxide, fluoride, and ammonia—their presence or absence is an indicator of forest health. The acidity of a tree's bark can also affect lichen abundance (Smith et al. 2003). If air is very badly polluted with sulphur dioxide there may be no lichens present, just green algae may be found. If the air is clean, shrubby, hairy and leafy lichens become abundant (Bates et al 1996). The quality of the soil in a forest is another important indicator of forest health (USDA Forest Service. 2007). An evaluation of soil quality usually involves measuring the soil's physical, chemical, and biological makeup at different depths. Plant species diversity is another Bio-indicator of healthy forest. One way to assess this diversity is to determine whether there is a mix of plant species of different sizes and ages, thus creating forest "layers" that provide habitat for many species (Greenleaf Forestry and Wood Products Inc. 2010). A healthy forest has good regeneration capacity, which is also a bio-indicator of forest health monitoring. These bio-indicators will be investigated in Sundarbans Reserve Forest (SRF) in light of the Rampal Power Plant Installation.

Forest health Bio-indicators will be applied in Sundarbans Reserve Forest (SRF) to monitor the probable impacts of Rampal Thermal Coal Power Plant Project. To discern the true scenario of power plant impact on forest health, it is mandatory to create a baseline condition. Taking this into consideration, CEGIS is conducting forest health monitoring program at five locations namely Sutarkhali, Karamjal, Harbaria,

Akram point and Hiron Point at Sundarbans Reserve Forest (SRF) along the Passur River. The parameters that included in this monitoring program were tree growth, regeneration capacity, lichen abundance, plant diversity, and biomass and carbon stock.

### 3.4 Methodology

#### 3.4.1 Permanent Sample Plot (PSP) Establishment and Layout

To set up permanent sample plots, five plots were established. Among those, five sites are along the Passur River at Karamjal, Harbaria, Akram point and in Hiron point respectively and the fifth plot is near Sutarkhali forest office (**Table 3.15**). The sites were selected considering the distance from the proposed project site, wind directions, coal transportation route, river systems and vegetation types. In this present census, *Hiron* point was not considered.

#### 3.4.2 Bio-Indicators for Forest Health Monitoring

There are many Bio-indicators for forest health monitoring. As the study forest is a mangrove forest, some of the mangrove traits were also selected as Bio-indicator. The Bio-indicators observed in this forest health monitoring program were seedling regeneration, pneumatophores, species diversity, crab hole density, canopy cover, leaf phenology, Leaf Area Index, Tree growth, phenological behaviour, pest and disease.

#### 3.4.3 Sampling Design of Permanent Sample Plots (PSPs)

In each site, a transect line was laid out perpendicular to river or canal bank. Along the transect line, three circular nested subplots of 12.62m radius have been laid out at 100m intervals in order to capture the maximum tree species (**Figure 3.14**). Because of the variation in species composition in SRF, observation plots were laid out from the coast, river or canal side to upper slope zone where forest area is denser. The location of the first subplot was 40m away from ecotone zone in order to save the subplot from river bank erosion. Each subplot was again subdivided into four quadrates (**Figure 3.15**) During this monitoring period 50% of the sub plot 1 at Hironpoint is eroded and 10 m of the subplot 1 at Akram point is eroded due to high tidal inundation and erosion. The location and plot layout is shown in **Figure 3.16**.

**Table 3.15: General Description of Permanent Sampling Plots (PSPs)**

| Transect    | Plot | Range    | Compartment No. | GPS $\pm$ (m) |               | Soil Description | Plot Location Notes  |
|-------------|------|----------|-----------------|---------------|---------------|------------------|--|
|             |      |          |                 | Latitude (N)  | Longitude (E) |                  |  |
| Sutar Khali | 1    | Khulna   | 32              | 22.4981       | 89.4875       | Hard Clay        | Just opposite from Sutar Khali Forest Station and 40m SW from Sutar Khali Canal  |
|             | 2    | Khulna   | 32              | 22.4973       | 89.4871       | Hard Clay        | Just opposite from Sutar Khali Forest Station and 140m SW from Sutar Khali Canal |
|             | 3    | Khulna   | 32              | 22.4965       | 89.4866       | Hard Clay        | Just opposite from Sutar Khali Forest Station and 240m SW from Sutar Khali Canal |
| Karamjal    | 1    | Chandpai | 31              | 22.4253       | 89.5943       | Hard Clay        | Plot center 40m west from Passur River   |
|             | 2    | Chandpai | 31              | 22.4252       | 89.5934       | Hard Clay        | Plot center 140m west from Passur River  |
|             | 3    | Chandpai | 31              | 22.4226       | 89.5925       | Hard Clay        | Plot center 240m west from Passur River  |
| Harbaria    | 1    | Chandpai | 29              | 22.2061       | 89.5924       | Hard Clay        | 40m west from Passur River   |
|             | 2    | Chandpai | 29              | 22.2962       | 89.5917       | Hard Clay        | 140m west from Passur River  |
|             | 3    | Chandpai | 29              | 22.2962       | 89.5908       | Muddy            | 240m west from Passur River  |
| Akram Point | 1    | Khulna   | 17              | 22.0195       | 89.5129       | Hard Clay        | 40m east from Shibsha River  |
|             | 2    | Khulna   | 17              | 22.0187       | 89.5134       | Clay             | 140m east from Shibsha River   |
|             | 3    | Khulna   | 17              | 22.0180       | 89.5140       | Hard Clay        | 240m east from Shibsha River   |

| Transect    | Plot | Range  | Compartment No. | GPS $\pm$ (m) |               | Soil Description | Plot Location Notes                |
|-------------|------|--------|-----------------|---------------|---------------|------------------|------------------------------------|
|             |      |        |                 | Latitude (N)  | Longitude (E) |                  |                                    |
| Hiron Point | 1    | Khulna | 44              | 22.7753       | 89.4610       | Sandy            | 350m east from Gogari Canal        |
|             | 2    | Khulna | 44              | 21.9166       | 89.2333       | Sandy            | 40m north from Bay of Bengal       |
|             | 3    | Khulna | 44              | 22.1833       | 89.5000       | Hard Clay        | 648m south east from Shibsha River |

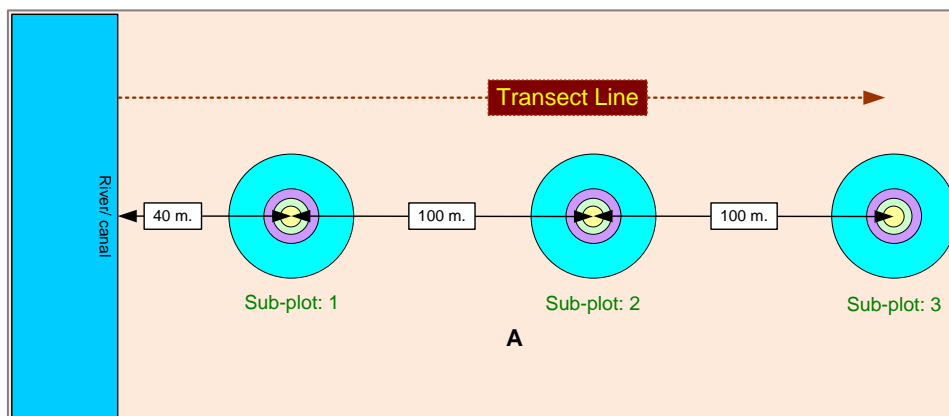


Figure 3.14: Layout of the Subplots and Transect Line Perpendicular from Ecotone (river or canal bank)

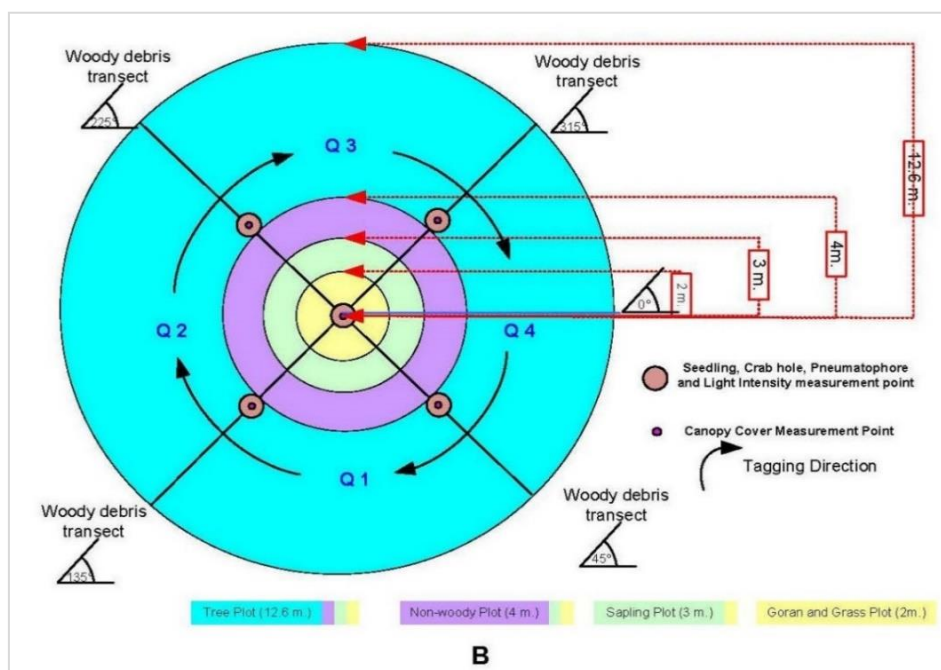


Figure 3.15: Layout of the Survey Activities in each Subplot



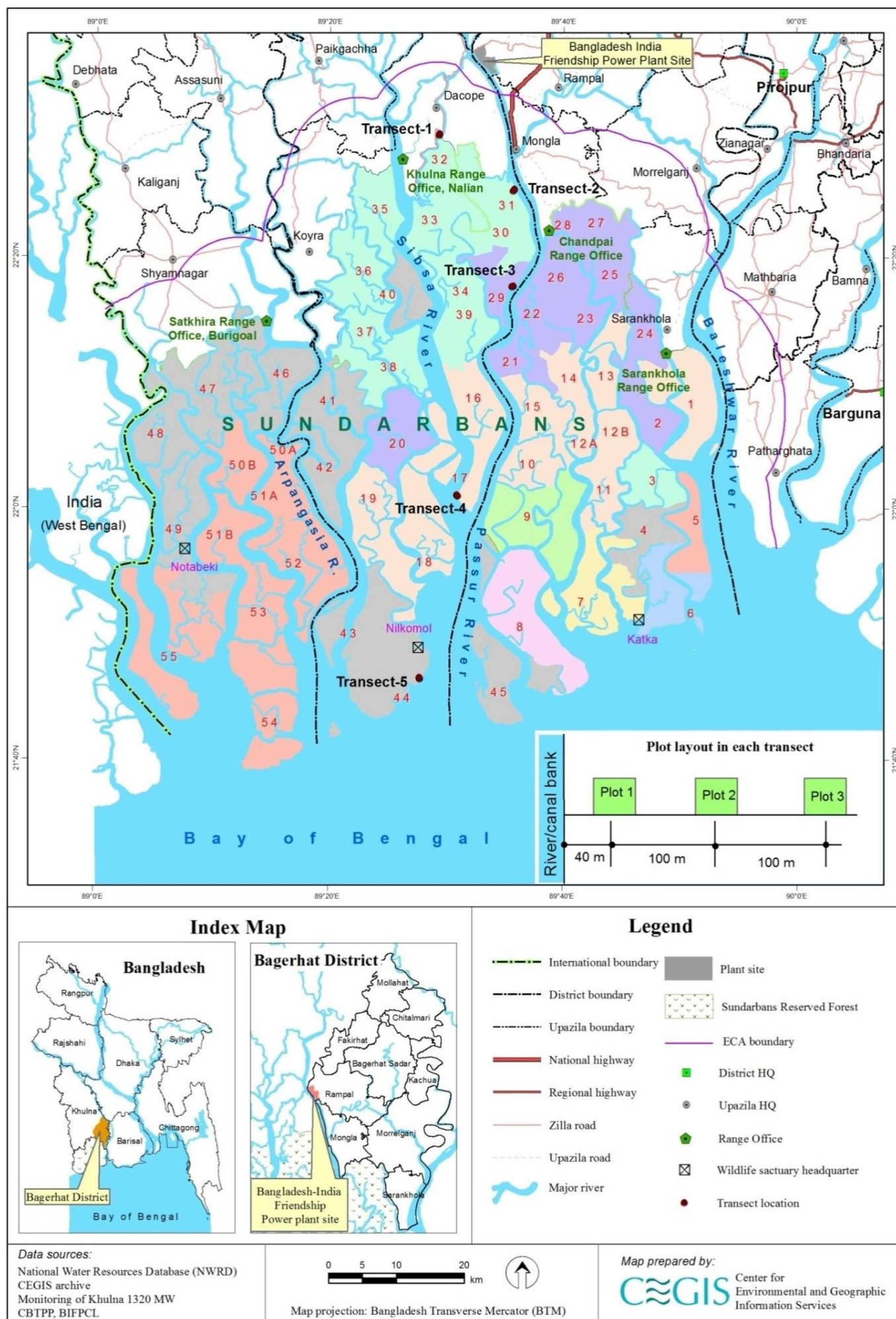


Figure 3.16: Location Map of Sundarbans Forest Health Monitoring Plots (PSP)





### *Biomass and carbon stock estimation in tree*

From each plot tree species were identified and each individual was recorded. Diameter at breast height (1.37m) and height was measured in the field. Total biomass of trees was estimated after adding above and below ground biomass. As the study was conducted in a reserved forest area, it was not possible to cut all the trees and brought them to laboratory for estimating biomass. After reviewing models developed by several authors from across the world (e.g., FAO 1997, Brown et al. 1989), the generic allometric model developed by Chave et al. (2014) was used for measuring biomass as this widely used for tropical region tree standing biomass. Below ground biomass was calculated considering 15% of above ground biomass (Mac-Dicken 1997). After calculating biomass, carbon content was calculated based on the assumption that carbon content is 50 percent of the dry woody biomass (Brown 1997). Aboveground biomass and carbon was calculated on a per-hectare (ha) basis. The model for above ground biomass estimation is as follows:

$$AGB = 0.0673 \times (\rho D^2 H)^{0.976}$$

Where, Y = above ground biomass in Kg; H = Height of the trees in meter; D = Diameter at breast height (1.3m) in cm;  $\rho$  = Wood density in units of g/cm<sup>3</sup>

### *Pneumatophores*

The total numbers of living pneumatophores were recorded within a circular area of 1m radius centring each of the four points of all the subplots.

### *Crab hole*

Crab plays an important role in mangrove ecosystems such as decomposing litter fall which play an important role in increasing soil fertility. In order to record the crab density, crab hole abundance was monitored. For this purpose, the crab holes were counted within an area of 1m radius circle in each subplot's centre and in the midpoint of four transect.

### *Canopy Cover*

Canopy cover percentage was estimated by a spherical densitometer (i.e. Densitometers a gridded convex mirror that provides a simple and inexpensive approach of measuring canopy cover). The densitometer was held at a distance of 30–40 cm from the body and at an elbow height so that head not become visible in the mirror. After levelling the instrument using the level bubble, the dots which had not been occupied by canopy were systematically counted. In each subplot, the meter readings have been taken at four points facing north, south, east, and west direction including the centre point of the subplot. The canopy cover was calculated by taking the average of these readings.

### *Leaf Area Index*

Leaf Area Index (LAI) is a key structural characteristic of forest ecosystems because of the role of green leaves in controlling many biological and physical processes in plant canopies. LAI influences net canopy photosynthesis. Light absorption by the forest canopy can be used to estimate Leaf Area Index (LAI). In this monitoring report, LAI was calculated as follows:

Leaf Area Index (LAI) =  $\log_e (I/I_0) / -K$  leaf area / area of ground (Where, I = Under Canopy Light Intensity,  $I_0$  = Open Canopy Light Intensity and K is Canopy light extension coefficient i.e., 0.5).

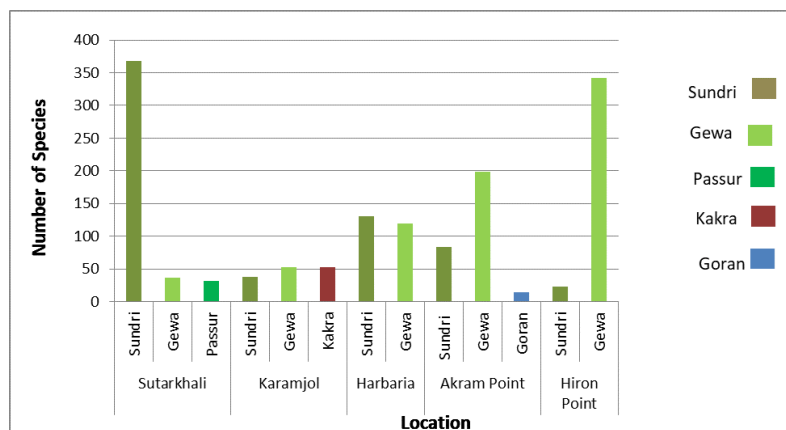
### *Leaf Phenology*

Leaf phenological trait of major mangrove species such as leaf emergence, leaf shedding, flowering and fruiting and fruit/ propagule dropping time was investigated through secondary information. Leaf phenology has been first introduced in this study for the first time. From next field inventory, leaf phenological behavioral change will be monitored.

### 3.4.4 Results and Discussion

#### *Vegetation Diversity, Richness and Compositional Variation*

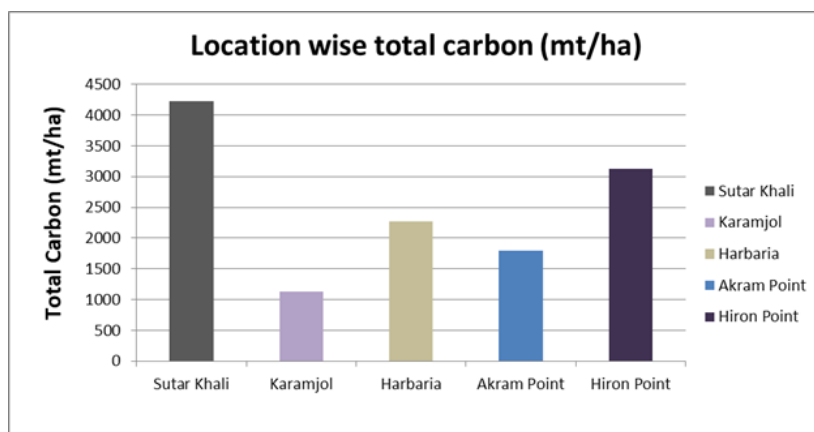
From the **Figure 3.17** it has been seen that in Sutarkhali range Sundri is the dominant species followed by Gewa & passur. Karamjol is less dense forest than other plots and gewa is the dominant species in there. However, Species composition is higher in Karamjol. Harbaria range is largely covered by Sundri and Gewa where Sundri is dominant species. During this monitoring period. It has been observed that Gewa is the dominant species in Akram point and Hiron point.



**Figure 3.17: Dominant species in 5 plots**

#### *Carbon stock in trees:*

Comparing the carbon stock (mt/ha) of the mangrove stand in different regions of Sundarban, the Sutarkhali range was found to have the maximum carbon stock with 4230.14 mt/ha with a recruit density of 105.75 trees/ha. The lowest carbon stock was observed in Karamjol (1131.31 mt/ha) with a recruit density of 39 trees/ha. Hiron point was found second highest carbon stock of 3129.36 mt/ha. Carbon stock in Harbaria and Akram Point was found 2269.26 mt/ha and 1790.55 mt/ha respectively with a density of 63.5 and 73.25 tree/ha. The total carbon stock in different location of the Sunderbans are in the order of Sutar Khali> Hiron Point> Harbaria> Akram Point> Karamjol (**Figure 3.17**). The difference in the carbon stocks in the vegetation biomass of mangrove systems in different zones may be attributed to the structural peculiarities of the stands in each region (Kasawani et al. 2007).



**Figure 3.17: carbon stock in five (5) plots**

### Status of Forest Health Indicator

Average number of pneumatophores per hectare increased in all plots except Akram point area whereas pneumatophores density was highest in karamjol sample plots. There is no significant variation ( $p>0.05$ ) in pneumatophores density over the monitoring period for each PSPs (**Figure 3.20**). This indicates that forest health condition is improving in terms of steady state condition of pneumatophores density over time.



Measuring Canopy cover at Karamjal



Measuring Height at Hironpoint site



Measuring Light intensity at Harbaria



Measuring DBH at Sutarkhali

**Figure 3.18: Surveying the forest health indicators**

There are significant decreases of crab density over the monitoring period for all plots. Weather plays a significant role in crab density. Heavy rains and the influx of too much freshwater can prevent crabs from migrating to their spawning grounds. As the data was taken during monsoon season so that significant changes may be seen from the previous tier of pre-monsoon season.

The Seedling density among the four PSP was not significantly different ( $P>0.05$ ) except Akram point (**Figure 3.20**). An increasing trend of seedling survival was found in Sutarkhali, Karamjol, Akram point and Hiron point but alarming decrease of seedlings observed in Harbaria from the oprevious tier. This is because of the time of seed germination and seedling survival in the observed PSPs.

All PSP shows increasing trend of canopy cover except Akram point and canopy cover doesn't vary significantly ( $P>0.05$ ). Akram point PSP's permanent plot canopy cover was lower compare to the rest of PSPs canopy cover percentage (**Figure 3.20**). Increasing trends of canopy cover indicates positive changes in forest health condition.

Light intensity is higher in Harbaria and lower in Hiron point. The LAI (Light Area Index) influences daily rate of net canopy photosynthesis which results in exchange of atmospheric CO<sub>2</sub>. The minimum the ratio of under canopy to open canopy light intensity value indicates the maximum LAI. There was no significant prominent trend observed for all the PSP's (**Figure 3.20**).

There were no changes observed in phonological behavior of the dominant tree species during the monitoring period.



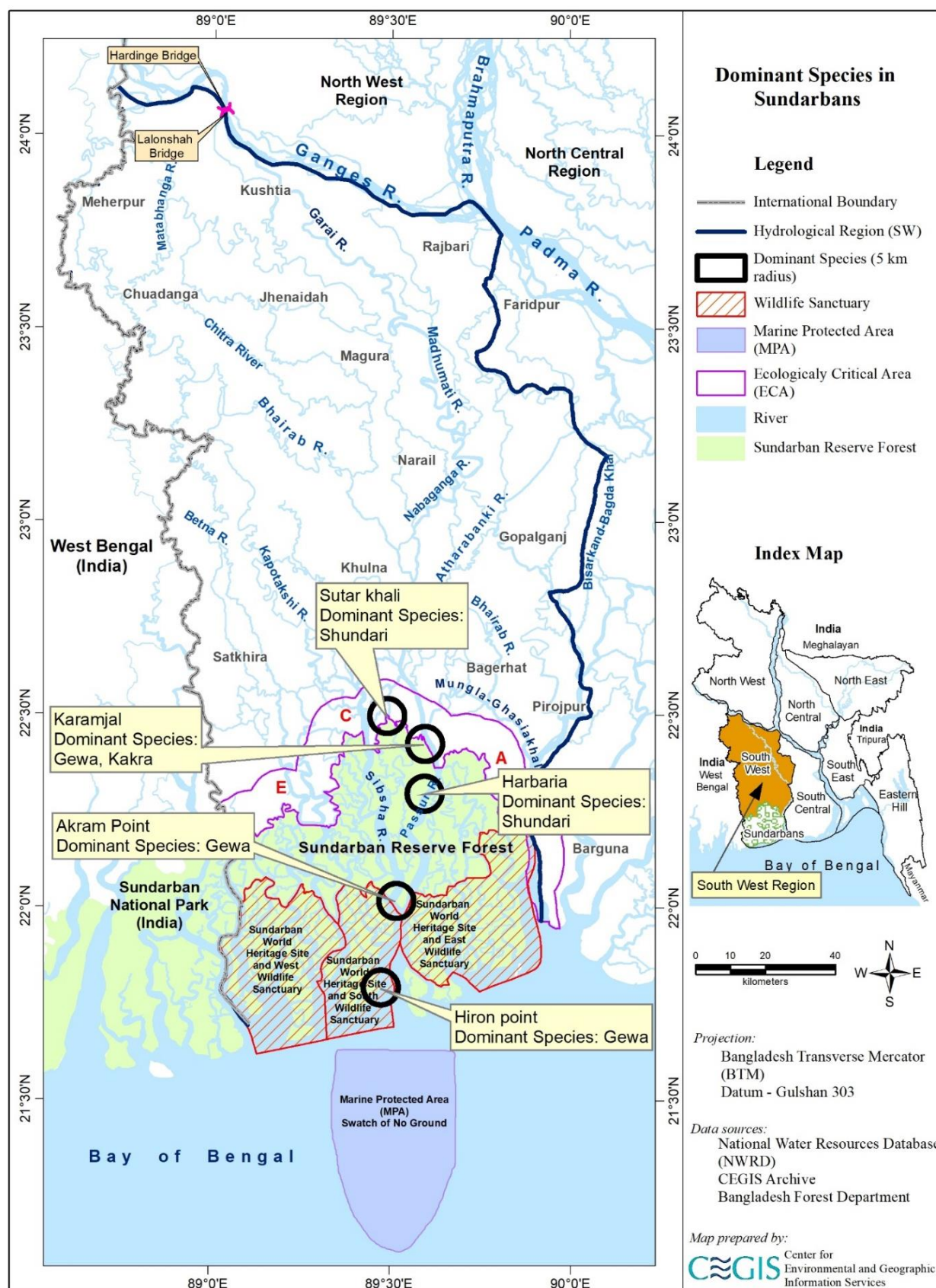
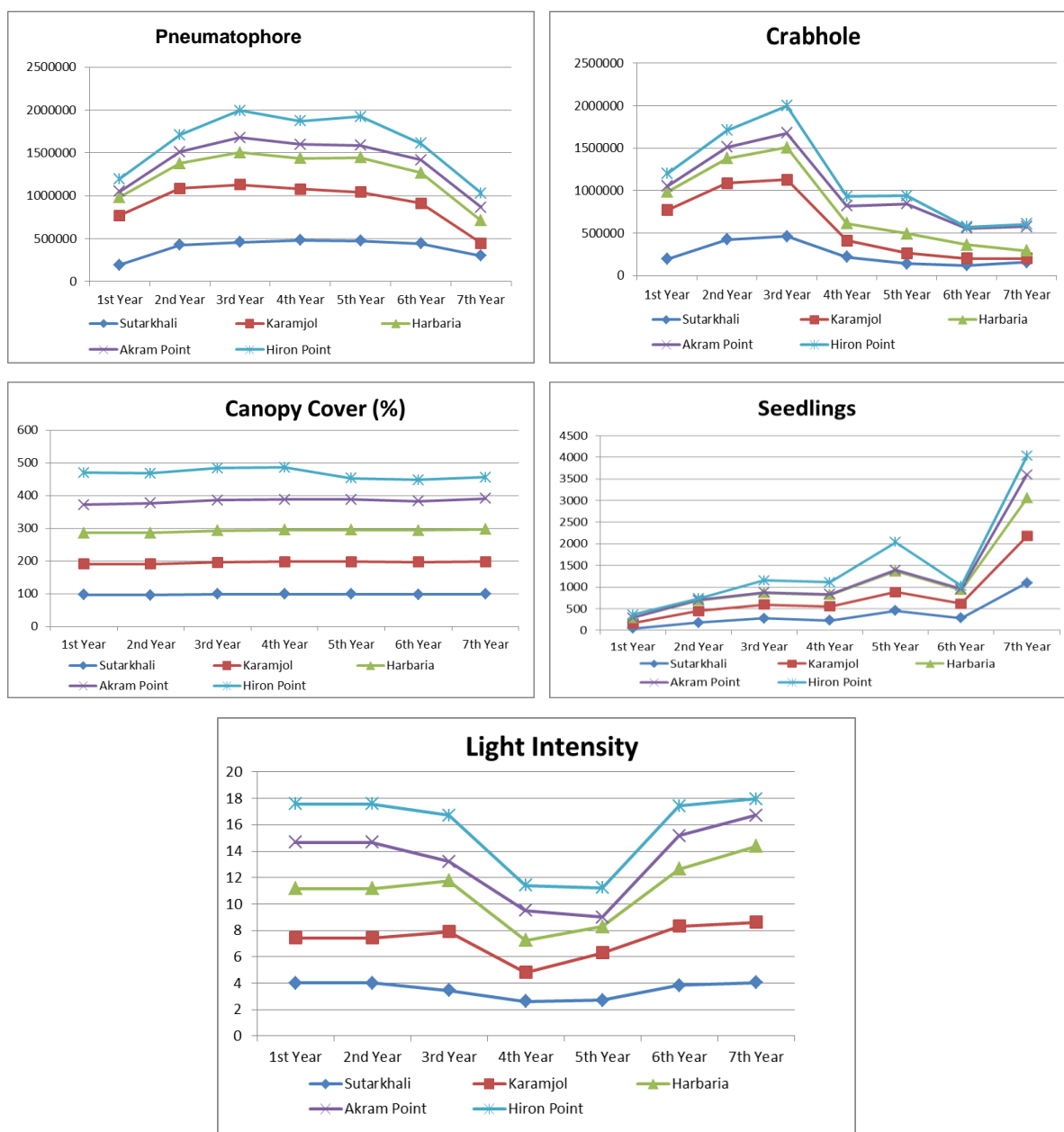


Figure 3.19: Map of Species diversity



**Figure 3.20: Seedling Density, Pneumatophore, Crab Hole Density, LAI and Diameter Increment (DBH) over different census period**

*Note: Each year represent average of 4 monitoring period except for 7<sup>th</sup> year*

#### Forest soil sampling

The soil sampling was carried out during the 29<sup>th</sup> monitoring tier and the soil properties data after being analyzed will be incorporated in next tier. However, an open face split auger (1m long) has been used to pull out one-meter-long soil core. Soil core has been taken around the centre of each plot. From the 100 cm soil core, a 5 cm long subsample has been taken from the middle point of 0-15, 15-30, 30-50 and 50-100 cm intervals for bulk density, soil pH, salinity, soil nutrients (Ca, Mg, Al, K, N and P) and organic carbon assessment (Kuaffman, and Donato, 2012).





## 4. Social Environment

### 4.1 Introduction

The social safeguard monitoring conducted to explore the safeguard issues that occurred during the construction phase of the project. It is a follow up study conducted following the guidelines of DoE, and Environmental Management Plan (EMP) of Environmental Impact Assessment (EIA). This monitoring was held to check the compliance status in order to ensure good working environment, community safety and security, and successful completion of the construction related activities. Considering this aspect, this monitoring tried to understand impacts on livelihoods, working environment, community health and safety and Corporate Social Responsibility (CSR). Additionally, this monitoring tried to address the non-compliance issues and suggested some action oriented Corrective Action Plan (CAP) to comply the non-complied issues.

### 4.2 Methodology

Physical observation was used as a data collection technique (during the field work) to understand the status of the following monitoring indicators. Besides, a consultation meeting held at the MSTPP site where project officials attended and made answers on the raised questions on the compliance and CSR related issues. Additionally, informal interviews were carried out with local people at zero point, Kapasdanga, Rajnagar, Bajua, Gaurambha, Pankhali, Foylarhat, Borodurgapur and Rajnagar area to explore their opinion about the safeguard issues (**Figure 4.2**).

### 4.3 Results of Social Safeguard Status

#### *Impact on Employment and Livelihood*

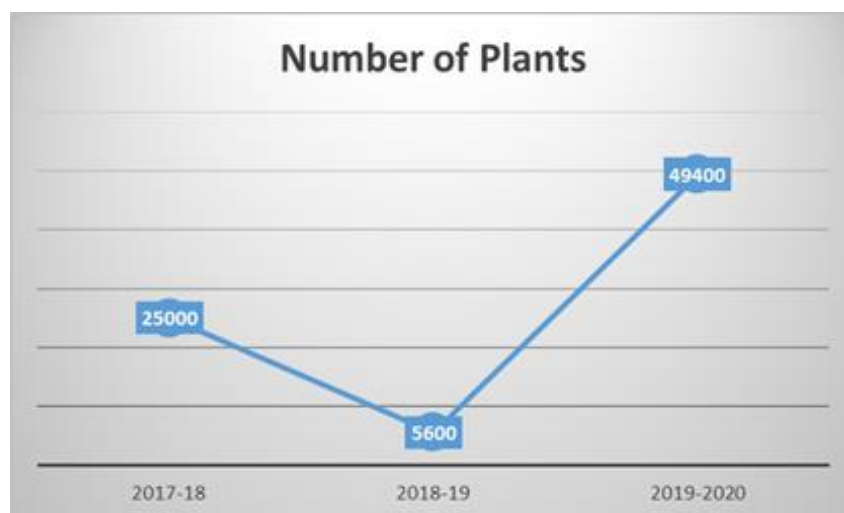
Engagement of the local labors increased than the previous time. More than about 30% local labours (out of total number of labors) are working presently at the project site. The interest of local people become positive for being involved in the construction activities, shown attitude towards to the project related activities. It was observed that people from Gaurambha, Kapasdanga, Hurka Rampal, Pankhali, Bajua and Borodurgapur and Gurudaskathi are working as labor force. The place adjacent to the power plant became business hub where people opened shops for the labors and project officials. People from outside area also made some temporary shops, which also remarkable for getting earning opportunities. Additionally, about 200 people were registered (under the motor vehicle federation) to run motor vehicles at the approach road to carry both goods and passenger, as a result, it was helping people to involve earning opportunities. The number of vehicles for carrying passengers and goods increasing because of the development activities associated with the Rampal Power Plant. Furthermore, local people started thinking to be skilled more as they can join in future during the operation phase of the project.

#### *Working Environment*

The pandemic situation made some learning for the labors who are working at the project site. There is no entry without the masks. Local labors trained to use hand sanitizer or soap to ensure safety from the coronavirus at the project site as well as the labor colony. The PMU regularly monitor the safety related issue which is required for keeping a good working environment at the project site. The tri-party coordination meeting held where all safety officers from BIFPCL, BHEL and other construction companies presented. Regular tool box training held every day before starting the construction activities. However, the no training, no work- campaign is continuing. The PMU monitor the issue and without getting pass from the safety exam, no new labors can join as a working force at the project site. Labor sheds found clean with adequate toilet facilities, drainage, and waste management and drinking water facilities.

### Community Health

During the period of study, no grievance found from the local community due to the project construction activities. Every day, water sprays whole day or suppressing dust when the roads became dry. Local communities at Gaurambha, Rajnagar, and Bajua unions reported that they are not encountering noise related problems due to construction activities. Additionally, the PMU was trying to ensure the green environment. In this regard, till now, a total of 80,000 (**Figure 4.1**) mangrove, fruits, coconut, and herbal plants planted around the project area in different fiscal year. Local people stated that though the plantation program is ongoing but the survival rate is not a good number. So it is urgently required to take required steps.



Source: BIFPCL, August 2021

**Figure 4.1: Number of Plants planted in different fiscal year**

#### 4.4 Corporate Social Responsibility (CSR)

The BIFPCL is committed to continue the activities under the CSR. It made a significant impact to the community in which community people get better interaction with the project. However, the CSR was the part of operation phase but it was observed that the BIFPCL committed to organize different programs during the phase of construction.

They have been conducting medical campaigns along with different socially demand-based programs. They allocated vaccination program under the CSR in which officials and labor force got vaccinated:

#### *Covid 19 response and vaccination program*

The PMU made an extraordinary contribution to tackle the Coronavirus. Under the CSR program, the PMU made a special medical unit to mitigate the impacts due to the spread of Covid 19. A total of six (6) oxygen cylinders and medicines bought to response the emergency situation and covid patients. A mini hospital with modern equipment, ICU bed and permanent doctor inaugurated by the PMU (**Figure 4.3**). Here, project officials and affected or injured labors can get the emergency support. This will be help to make safeguard if any emergency situation occurred. Additionally, leaflet in both Bengali and Hindi languages were distributed among the local and international labors. This help them to raise awareness to mitigate the risks of coronavirus.



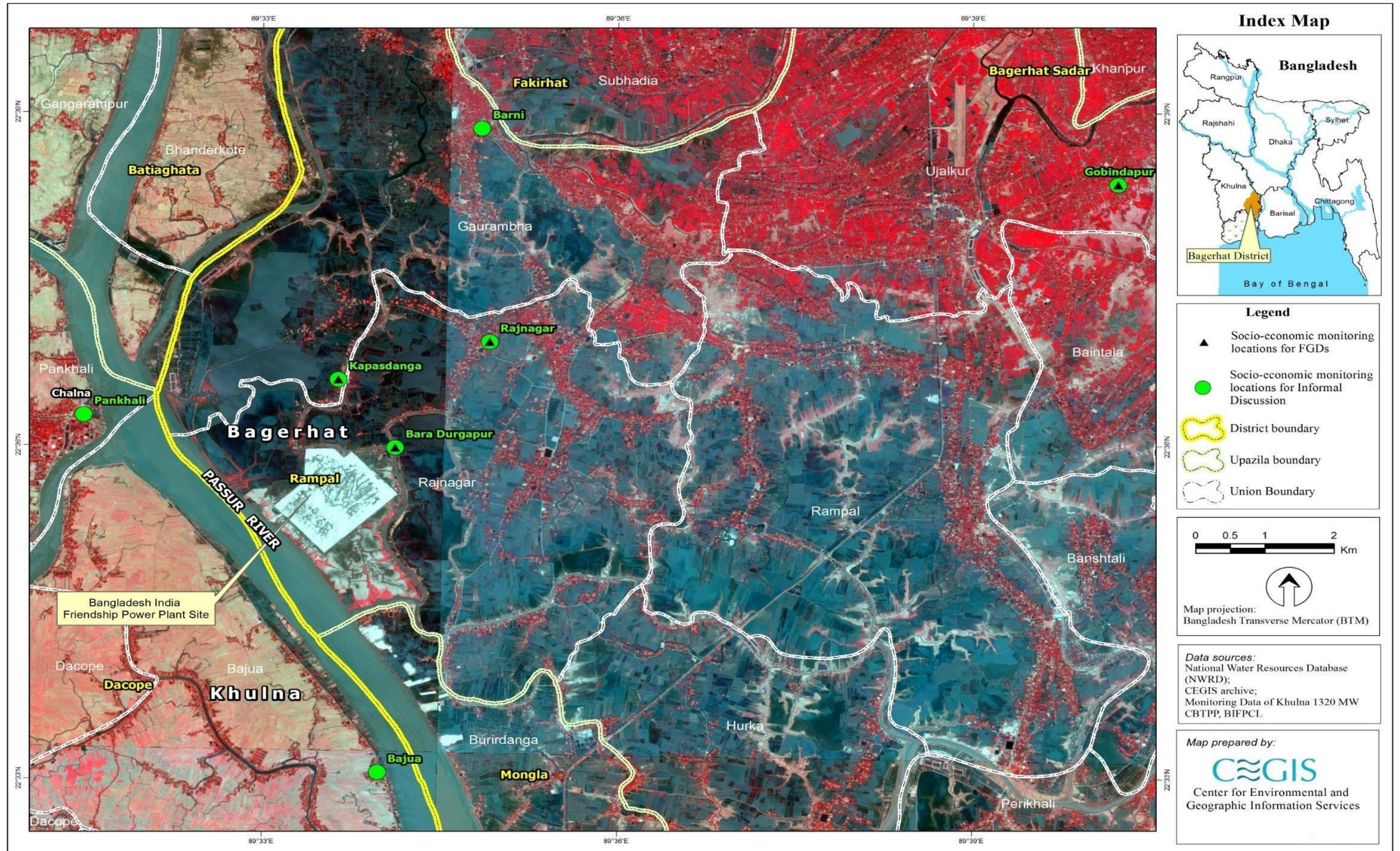


Figure 4.2: Socio-Economic Environment Monitoring Location







**Figure 4.3: Inauguration of Niramoy Medical Center at the project site**

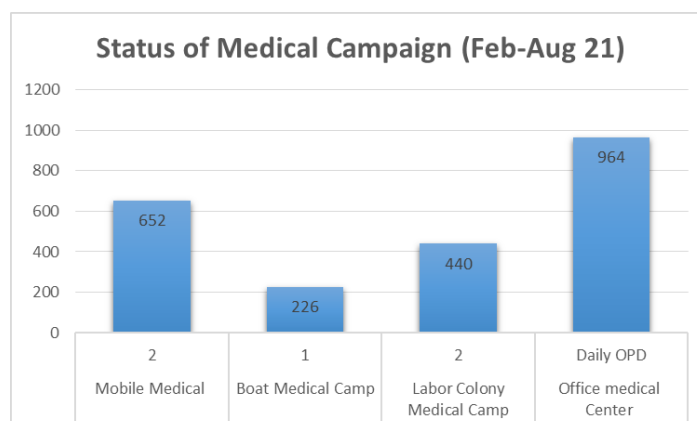
#### *Celebration of Mujib Year (Barsho)*

The MSTPP arranged some special programs to celebrate the Mujib borsho. As a part of this, different programs were organized by the PMU under the CSR. Among those blanket distribution program was held in January, 2020 at Rajnagar union, Gaurambha union, zero point of Hurka, and Burirdanga union. A total of 4,250 pcs. of blanket were distributed among the poor people. In addition, a total of 750 pcs. of blankets were also distributed at the orphanage of Dhaka city.

On the other hand, wheel chairs were distributed among the disabled peoples. This program was organized by the BIFPCL in December, 2020 at the project site. Honorable chairman, of Power Development Borard (PDB) Engineer Md Belayet Hossain, Project Director of MSTPP, Managing Director of BIFPCL and other personnel attended in that program. Following that programs, more wheel chair were distributed among the disabled people. Besides, educational supplies were distributed among the students who were living nearby to the project site. In addition, about 50,000 face masks were distributed to the local people to build consciousness and tackle the situation arisen due to the spread of Coronavirus. A certificate distribution program was also arranged for those who provided support to prepare the masks. This program helped them to give an appreciation and lead them to do further work in future. Additionally, school KITs were distributed among the students as a part of the celebration of Mujib Barsho.

#### *Medical Campaign*

Medical campaign is one of the major program under the CSR of MSTPP. From February 2021-Auguat 2021, a total of 2,722 people (**Figure 4.4**) received free treatment under the mobile, boat labor colony medical campaign and office medical center. According to the officials of MSTPP, till now (August 2021), a total of 57,493 people received free treatment from different medical campaign.



**Figure 4.4: Medical Campaign from February –August 21 under the CSR**

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### *Recommendations*

- a. Involve more local work forces by building capacity to them on plumbing, masonry, carpentering, electrician & electronics, welding, driving, safety, rock binding, and machineries as they can be prepared as semi-skilled working force for this project;
- b. It is required to establish a grievance redress team to monitor and solve the problem of localities regarding the aspect of construction activities of MSTTP;
- c. Local people are not aware how they can involve in the construction activities; because of the GAP, local people join through the 3<sup>rd</sup> party. As a result, grievance raised from the local people. Therefore, it is very much required to launch some awareness program especially on labor recruitment process, as they can understand the issue easily.
- d. A gender action plan regarding the women employment is required for the local communities;
- e. The coverage of training on women skill development is required to be strengthen as more women can participate at the programs;
- f. A group of people rehabilitated at the Kapasdanga Mauza, but they have no proper sanitation and drinking facilities. Therefore, it is suggested to take steps to make available proper drinking and sanitation facilities; A deep tube and wash block can be established, according to the rehabilitee at the Kapasdanga Mauza under the CSR;
- g. Regular refilling is to be continued for making the desired and committed greenery effectively as per conditions of DoE;
- h. Continuing regular health checkup and disease monitoring for the daily laborer at work place as well as for the laborer staying at labor colony;
- i. Special attention should be given on `workers if they have any syndrome related to the COVID 19;
- j. CSR activities should be performed primarily among the PAPs on equitable manner. This should be audited by a third party monitoring team;
- k. Ensure proper safety equipment for combatting against the COVID 19 virus;
- l. Create awareness about the Coronavirus disease (COVID-19);
- m. Wash hands and face immediate after entering the office substation from outside;
- n. Ensure masks for everyone who are working at the Project site;
- o. Health temperature should be checked before entering the Project site;
- p. Avoid (as much as possible) public transports, if possible walk on foot;
- q. Social distancing should be maintained in the labor shed as well as in the Project site;
- r. Paste poster on how to work during the COVID 19 situation for raising more awareness;
- s. Rehabilitees should be given preference in implementing CSR program as they are under serious threat of another shifting



## 5. Environmental Compliance

### 5.1 Introduction

Environmental monitoring has been conducted during the month of September 2021. All of the bio-physical parameters have been monitored through rigorous field visit and lab analysis. The environmental compliance monitoring was conducted after withdrawal of COVID lockdown as the Government of Bangladesh has lifted up all the restrictions on movement that was imposed due to current pandemic situation. At this time, the environmental compliance monitoring of Maitree Super Thermal Power Plant Construction has been conducted through face to face interviewing, filed investigation, document checking and stakeholder consultation to fill-up questionnaires .

The construction works is running amply amid the COVID situation. Most of the mechanical and electrical construction works are progressively installing. The Boiler, Turbine hall and Generator, cooling tower, Chimney and FGD, ESP, WTP, ash silo, 275 chimney, Jetty area, covered coal storage, covered coal conveyer system, township area, internal road networks, permanent drainage networks are developing. EPC contractor i.e. Bharat Heavy Electricals Limited (BHEL) employed different local specialized sub-contractor i.e. KELLER, AFCON, POWER MAC etc. for progressing the construction works simultaneously.

The bridges and culvert area of the approach road has completed and extended up to the Block-B Permanent entrance gate of the MSTPP power plant structure has been placed at the security check point. The main Administrative center of BIFPCL and EPC contractor were shifted to the newly constructed buildings and maximum professionals of BIFPCL were shifted to the newly constructed township named Padma Abason.

According to the project planning, the first unit of Maitree Super Thermal Power plant will be in operation by September 2021. But unfortunately, the COVID-19 outbreak has retarded the project progress upto June 2022. Though, the project work was almost halted at the end of the March 2020, it came into full pace in July 2020. But, the second lockdown, has again slowdown the construction works. However, the construction activities are progressing the project site strict maintaining the Government Decision on COVID Guidelines. EPC tried to expedite the contractors and sub-contractors for completion of the project works within the stipulated timeframe maintaining the instruction and health safety guideline of the existing pandemic.

However, the present environmental compliance monitoring includes the status of EMP implementation based on physical observation, investigation and interviews/discussion to the proponents and project officials, contractor or sub-contractors, or relevant authorities. A comprehensive due diligence checklist was prepared to monitor the environmental compliance of different components e.g., Environmental and Social Management System and Action Plan; Labor and Working Condition; Community Health, Safety and Security; Biodiversity and Sustainable Management of Living Natural Resources.

The aim of this compliance checklists is to check the implementation and effectiveness of mitigation measures as stated in EIA. The checklists are produced as Compliance Data Sheet that contains both quantitative and qualitative data. The summary of findings of the environmental compliance monitoring are presented in the following **Table no. 5.1, 5.2, 5.3 and 5.4** respectively.

**Table 5.1: Monitoring of Environmental and Social Management System Action Plan Implementation**

| Sl. No. | Potential Impacts  | EMP measures as proposed in the EIA   | Actual condition/ Measures already Implemented   | Compliance Status | Recommended Action   |
|---------|--|---|--|-------------------|--|
| 1       | Generation of Noise within the BIFPCL's Plant construction premises. | <ul style="list-style-type: none"> <li>Switch off / throttle down all site machinery, vehicles, water vessels, and generator when not in use</li> <li>No construction activities at night</li> </ul> <p>Use noise damper within the project boundary, Limit vehicle speed and monitor it at every suitable point.</p> | <ul style="list-style-type: none"> <li>Noise data are being monitored monthly and quarterly basis both night and day time at different potentially sensitive areas (Labour colony, township) and compared with the ECR-1997 Standard which are being documented by EPC contractor.</li> <li>Noise levels were found within the permissible limit near the project boundary.</li> <li>Signboards regarding noise permits were not observed at site.</li> <li>Vehicular speed is being maintained in the project site</li> <li>Workers at heavy noise generating activities (i.e., piling, rod cutting etc.) have been provided PPE (ear plug and ear muff) and its usage are being insured through safety audit clearance before start of work on every day.</li> <li>Silenced equipment's were utilized.</li> <li>Idle machines / equipment / generators are switched off/throttled down.</li> </ul> <p>Uses of noise damper has been ensured inside the project boundary.</p> | Complied          | <ul style="list-style-type: none"> <li>If construction activity would prolonged at night, additional measures to be adopted to limit noise (within permissible standard).</li> <li>Signboards about noise management should be available.</li> </ul>                   |
| 2       | <b>a. Dust generation</b> from construction works                    | <ul style="list-style-type: none"> <li>Limiting activities for producing fugitive dust particle within project area</li> <li>Vegetation clearance and base stripping should be minimized.</li> <li>Vehicle speed restriction must be enforced to control dust generation.</li> </ul>                                  | <ul style="list-style-type: none"> <li>Monthly and quarterly air quality monitoring in and around the project sites is being conducted and checked with ECR, 2005 standard.</li> <li>Mixing machine may generate localized dust during cement and concrete mixing. But all the crashing and storage of materials were recorded wet.</li> <li>Maintaining the vehicular speed</li> </ul>  | Complied          | <ul style="list-style-type: none"> <li>Stockpiles of dusty materials should be covered/watered for the coming dry season</li> <li>Dust suppression activities should be monitored on a regular basis for maintaining the air quality within standard limit.</li> </ul> |

| Sl. No. | Potential Impacts | EMP measures as proposed in the EIA  | Actual condition/ Measures already Implemented   | Compliance Status   | Recommended Action  |
|---------|-------------------|--|--|---------------------|---|
|         |                   | <ul style="list-style-type: none"> <li>• Earthen roads and undeveloped roads should be avoided to minimize dust generation</li> <li>• Construction materials must be covered to protect from wind action</li> <li>• Spray water regularly for suppressing fugitive dust</li> <li>• Dust particle generated from access road must be controlled by spraying water during dry season.</li> <li>• Stock piles of construction materials must be covered in order to protect from wind action.</li> </ul> <p>An appropriate freeboard must be maintained in trucks hauling construction materials.</p> | <ul style="list-style-type: none"> <li>• Regular water spraying is being conducted by two tankers from 9:00 am to 5:00pm in the project area as per requirement to suppress fugitive dust.</li> <li>•</li> <li>• Stockpiles of dusty materials are not covered and watered because of monsoon rainfall.</li> <li>•</li> <li>• Substantial warning sign, speed limit and convex mirror have been displayed at the strategic locations.</li> <li>• Monitoring of pollution control systems are done on a regular basis.</li> <li>•</li> <li>• All vehicles are carrying dusty loads are not covered / watered prior to leaving the site.</li> <li>• No black smoke observed because of plant and equipment are well maintained.</li> </ul> <p>Visual monitoring of dust is also being conducted.</p> |                     | <ul style="list-style-type: none"> <li>• Face mask should be use wear throughout the workplace.</li> <li>•</li> </ul>       |
| 3       | Water Quality     | <ul style="list-style-type: none"> <li>• Surface water must be saved from any harmful effluent emission and waste dumping from project site</li> <li>• Provide closed system facilities and wastewater treatment plant to minimize discharge of effluents from worker's colony.</li> <li>• Good housekeeping at workshop and construction site</li> <li>• Appropriate equipment with safety measures should be used for storage and handling of lubricant</li> <li>• Provide training and awareness building program to the workers</li> </ul>   | <ul style="list-style-type: none"> <li>• Surface water is regularly monitored. The discharge water quality has been recorded within the standard limit (ECR, 1997)</li> <li>• Surface concreting is being done at places where equipment is coming.</li> <li>• Ground water is not used for construction purpose.</li> <li>• Construction waste water discharge is minimum and need based only. They are also meeting effluent norms.</li> <li>• Permanent drainage for water discharge has been constructed. Some are already in operation.</li> </ul>  | Complied at present | <ul style="list-style-type: none"> <li>• Good housekeeping at workshop and construction site should be continued</li> </ul> |

| Sl. No. | Potential Impacts | EMP measures as proposed in the EIA  | Actual condition/ Measures already Implemented  | Compliance Status | Recommended Action  |
|---------|-------------------|--|---|-------------------|---|
|         |                   | <p>during construction. The training and awareness programs are:</p> <p>a) Arrange weekly consultation session among the workers through plant site managers. The duration of consultation is one hour according to ISO-14001 standard,</p> <p>Arrange monthly environmental meeting among the mid-level officers through top management when those issues will be discussed under guidance of ECR 1997.</p>   | <ul style="list-style-type: none"> <li>• Closed system facility and wastewater treatment system on site and worker's colony is under construction.</li> <li>• Silt trap has been prepared which is controlling the sediment discharge to the nearby river system</li> <li>• For storage and handling of lubricants/oil/chemicals appropriate equipment with safety measure is being used.</li> <li>• For chemical storage license has been taken from the District Commissioner (DC) office, Bagerhat and Gaseous License has taken from the Department of Explosion.</li> </ul> <p>Training and awareness program are being conducted regularly through PEP talks, lectures, one to one talk etc.</p>  |                   |   |
| 4       | Waste Generation  | <ul style="list-style-type: none"> <li>• Limiting site clearance and base stripping activities within the project boundary.</li> <li>• Gathering and stocking of construction materials and machinery must be within a limited area in the project boundary.</li> <li>• The project area has to be fenced prior to initiation of construction activities.</li> <li>• Stock piles of construction materials requiring cover up in order to protect them from wind and weathering action.</li> <li>• The existing right of way have to be used for material transportation without creating any block</li> </ul> | <ul style="list-style-type: none"> <li>• Construction wastes are being collected and put at demarcated places in limited scale.</li> <li>• The project area is being tightly protected.</li> <li>• The specific site for waste disposal were relatively kept clean.</li> <li>• Onsite waste collection and disposal facility has been observed.</li> <li>• Heavy / mechanical equipment is kept at demarcated places.</li> <li>• Wastes are not segregated and not kept in separate labelled container.</li> <li>• Burning of waste materials was not recorded inside plant.</li> <li>• Chemical wastes are properly stored and labelled.</li> <li>• Proponent has engaged a company name Rahman Brothers in collaboration with the KCC for collection of waste from the disposal.</li> </ul> | Complied          | <ul style="list-style-type: none"> <li>• Scrubbing materials should be managed within the designated places.</li> <li>• Awareness raising programs regarding waste segregation should be introduced.</li> </ul> |

| Sl. No. | Potential Impacts             | EMP measures as proposed in the EIA   | Actual condition/ Measures already Implemented   | Compliance Status            | Recommended Action  |
|---------|-------------------------------|---|--|------------------------------|---|
|         |                               | <ul style="list-style-type: none"> <li>Location of spoil stock pile ought to be located in safe area and protected from wind and rain action.</li> <li>No spoil store on River bank/slope</li> <li>Construction wastes must be reused or recycled as and where possible</li> <li>Burning of waste material should be restricted</li> <li>Quality housekeeping practice must be maintained by regular inspection and checking.</li> <li>Keep onsite waste collection and disposal facilities</li> <li>Keep provision of different colored waste bin for dumping biodegradable, reusable and recyclable wastes.</li> </ul> <p>Keep provision of awareness building meeting and training for employees</p> | <ul style="list-style-type: none"> <li>Waste management training has been included in induction training of the labor.</li> <li>Local languages (Bengali) and English are being included in the signboards.</li> <li>There development of solid waste management system has been progressing gradually according to the clause no B12, Part no 9 of book no -2, page no 147-161. In The waste management system has to be prepared through collection, waste segregation at source, recycling, treatment and disposal of waste.</li> </ul> <p>Separate labelled containers, recycling and waste segregation areas are included in solid waste management package which is under construction stages.</p> |                              |   |
| 5       | Compensation and Resettlement | <ul style="list-style-type: none"> <li>Proper resettlement action plan and compensation plan if the Project needs any land acquisition addressing compensation, restoration, livelihood, living standards etc. based on proper socio-economic studies.</li> <li>Resettlement of the PAPs</li> <li>Cash for compensation of land (CCL) before resettlement formal agreement with the affected people prior to migration/resettlement</li> <li>Sufficient standing crop compensation</li> <li>Compensation for movable structures</li> <li>Retention of salvageable materials</li> </ul>  | <ul style="list-style-type: none"> <li>Compensation has been given to the rightful owners of the land as per the laws of Bangladesh e.g., 'Acquisition and Requisition of Immovable Property Ordinance, 1982'.</li> <li>Compensation was paid by the local DC office as per law of the land.</li> <li>Local DC office facilitates to obtain house of the PAPs (settlers of the project area) in cluster villages provided by the GoB.</li> <li>Almost 32 affected families are now having their houses at Foyla cluster villages.</li> <li>BIFPCL is giving priority to affected people in project employment or trained them as much possible.</li> </ul>   | In the process of Compliance | The CSR activities should be oriented towards the affected people or household; |



| Sl. No. | Potential Impacts               | EMP measures as proposed in the EIA  | Actual condition/ Measures already Implemented  | Compliance Status | Recommended Action   |
|---------|---------------------------------|--|---|-------------------|--|
|         |                                 | <ul style="list-style-type: none"> <li>• Compensation for loss of trading income one-time moving assistance grant to cover loss of regular wage income</li> <li>• Has a resettlement plan been developed which includes compensation, restoration, livelihood, living standards etc. based on proper socio-economic studies?</li> <li>• Human provide/ take extra care/caution for the disadvantaged/ vulnerable group/s (i.e. women, children, ethnic minorities, indigenous people etc.)</li> </ul> <p>Provision of monitoring the compensation and resettlement process</p> | <ul style="list-style-type: none"> <li>• A significant number of affected people (especially who deserve) are working at the construction site.</li> <li>• 136 indirectly affected people were given compensation by the DC Office, Bagerhat.</li> <li>• About one third of the labor has been recorded from the locals.</li> <li>• The project authority has given training on computer and swing to the nearby villagers including PAPs which is stopped at present due to COVID.</li> <li>• 17 families got their residence who have shifted their houses from project area to Kapashdanga.</li> </ul> <p>The project authority has developed plans to monitoring the resettled PAPs</p>   |                   |  |
| 6       | Livelihood and living condition | <ul style="list-style-type: none"> <li>• The labor recruitment policy must be formulated in such a way that the local laborers can easily get the chance of employment in the project work force.</li> <li>• Govt./NGOs need to provide support the skill development program and income generation activities to local people;</li> <li>• For the increased movement of people and heavy vehicles, the road networks must be developed.</li> </ul> <p>Keep provision of sanitary toilet, one toilet for 10 persons.</p>   | <ul style="list-style-type: none"> <li>• BIFPCL are recruiting the local people especially PAPs with the help of local government.</li> <li>• Accidental log sheet or injury log book are being maintained.</li> <li>• Provisions has been kept for health facilities to the labors as well as for the communities.</li> <li>• Proponent has taken numbers of potential measures for COVID protection which is continued</li> <li>• The wage of the labor was found compatible with the national standard.</li> <li>• Available drinking water, sanitation facilities, prayer room are provided at site.</li> <li>• Facemask and other sanitation facilities are provided for the labors and employees in association with medical check-up by the authority</li> </ul> | Complied          | Health and financial support should be available for the labour in case of COVID and other health effects. |

| Sl. No. | Potential Impacts                    | EMP measures as proposed in the EIA   | Actual condition/ Measures already Implemented  | Compliance Status  | Recommended Action   |
|---------|--------------------------------------|---|---|--------------------|--|
| 7       | Green House Gas Controlling Measures | <ul style="list-style-type: none"> <li>• Restriction of any kind of solid waste disposal</li> <li>• Approved pollution control devices to be fitted in equipment and machinery.</li> <li>• Transport vehicles must not be overloaded.</li> <li>• Avoid queuing of vehicles in areas adjacent to site, particularly near sensitive receptors including housing.</li> <li>• Switch off / throttle down all site vehicles, water vessels, generator and machinery when not in use.</li> </ul> <p>Regular maintenance of water vessels, vehicles, generator and machinery in accordance with manufacturer's</p> | <ul style="list-style-type: none"> <li>• Fitness certification of vehicles and equipment are lacking for the construction works</li> <li>• The EPC Contractor using relatively new equipment and vehicles to reduce the GHGs emission.</li> <li>• Energy efficient goods like light, AC and other equipment are used.</li> <li>• Equipment, generators and vehicles were observed switched off during non-operation period.</li> <li>• Vehicles are maintaining the road safety regulations and</li> </ul> <p>No GHG inventories were prepared yet.</p> | Partially Complied | <ul style="list-style-type: none"> <li>• GHGs inventory checklist should be prepared;</li> </ul> |

Table 5.2: Monitoring of Labor and Working Condition

| Sl. No. | Potential Impacts  | EMP measures as proposed in the EIA   | Actual measures already Implemented   | Compliance Status | Recommended Action  |
|---------|--|---|---|-------------------|---|
| 1       | Working Conditions and Management of Worker Relationship | <ul style="list-style-type: none"> <li>• Preparation of Human Resources Policies and Procedures for Direct workers;</li> <li>• Defined Working condition and Terms of Employment for direct worker;</li> <li>• Sustainably equivalent terms and condition for migrant workers;</li> <li>• Compliance to national law of forming workers' organization;</li> <li>• No discrimination and equal opportunity for all;</li> </ul> <p>Grievance Redress Mechanism.</p> | <ul style="list-style-type: none"> <li>• BIFPCL is run through the HR polices and switching their professionals as per demand of the project.</li> <li>• EHS department has been established where Environment, Health and safety issues are taking care</li> <li>• Electrocutation/ firefighting facilities are properly maintained</li> <li>• Accidents, incidents, near miss, corrective actions, preventive measures, are reviewed and recorded.</li> </ul> | Being Complied    | <ul style="list-style-type: none"> <li>• OHAS must be monitored the training for construction workers</li> <li>• To develop labour association protecting labour interest</li> <li>• Create fund to support the labour/his families in case of any fatalities</li> </ul> <p>Take care the payment of recruited labour though sub-contractor or local contractor</p> |

| Sl. No. | Potential Impacts     | EMP measures as proposed in the EIA   | Actual measures already Implemented  | Compliance Status | Recommended Action  |
|---------|-----------------------|---|--|-------------------|---|
|         |                       |   | <ul style="list-style-type: none"> <li>The EHS department is also monitoring and the occupational health safety issues carefully under this COVID situation.</li> <li>No major accident has been recorded from the last monitoring period except few injuries</li> <li>No discrimination was recorded among at labor level between local or migrating labor in Bangladesh</li> <li>The OHAS Company named Cholanmandalam has been looking into the occupational safety system of this project.</li> <li>BIFPCL has ensured minimum wage and working hours for the labor as per GoB rules and regulation.</li> <li>Routine medical checkup and emergency medical care has been ensured.</li> </ul> <p>Induction training and regular training of first aid, toolbox are being Continued in association with COVID management guideline.</p> |                   |   |
| 2       | Protecting Work Force | <ul style="list-style-type: none"> <li>The client will not employ children in any manner that is economically exploitative, or is likely to be hazardous or to interfere with the child's education, or to be harmful to the child health or physical, mental, spiritual, moral, or social development.</li> </ul> <p>No Forced Labor</p> | <ul style="list-style-type: none"> <li>EPC contractors and sub-contractors are not employing any child labor in the project area.</li> <li>No forced labor has been recorded in the project.</li> <li>Proper documentation of contract with the worker is being maintained which includes working hour, wage and benefit.</li> <li>First Aid support is provided to the labors as required.</li> <li>Wearing the PPEs on the site is mandatory on this pandemic situation</li> </ul>   | Being complied    | Awareness work should be continued regarding the local cultural values, STD, redressing of workers grievances, insurance policy related facilities and also contract clauses of the job to get maximum benefit. |

| Sl. No. | Potential Impacts | EMP measures as proposed in the EIA   | Actual measures already Implemented   | Compliance Status | Recommended Action   |
|---------|-------------------|---|---|-------------------|--|
|         |                   |   | <ul style="list-style-type: none"> <li>Workers must get the safety clearance before initiating any work like – routine checkup of the work places and administrative clearance</li> <li>Work in hot condition and height need another permission</li> <li>Sanitization is being done at regular intervals at Offices and labor sheds</li> </ul> <p>Awareness about Covid-19 is being spread among workers and office support staff.</p>   |                   |  |
| 3       | Safety at site    | <ul style="list-style-type: none"> <li>Installation/Construction of Safety Fence around the Project area</li> <li>Use of Personnel Protective Equipment's (i.e. safety vest, safety goggles, ear plug, safety shoes, gloves, dust mask, etc.);</li> <li>Safety trainings for workers (i.e. fire control, working at height, working in heat, first aid etc.);</li> <li>Practice of Tool box meeting, safety talks</li> <li>Safe Storage of Hazardous Chemicals (e.g. fuel, flammable chemical, toxic chemicals, etc.);</li> <li>Maintaining Material Safety Data Sheet (MSDS);</li> <li>Provision of Health care facilities such as doctor, hospital etc. available at/nearby the Plant construction site;</li> <li>Availability of First Aid at work place;</li> <li>Preparation and Follow of Emergency Response Plan (ERP);</li> </ul> | <ul style="list-style-type: none"> <li>BIFPCL has demarcated the specific construction site with warning sign;</li> <li>Basic Medical care with free medicine and counseling is being provided to workers on regular basis at site.</li> <li>Labors and Project personnel are using appropriate PPEs like reflecting vest, helmet, and safety shoes etc. But they are lenient to use face mask around throughout the working hours.</li> <li>The existing temporary hospital are fully running with doctors and 24hr availability of ICU supporting ambulance at the Project site;</li> <li>Emergency contact address was found on the board at the site for any kind of sudden incident;</li> <li>The proponent arranged a meeting once in a week with EPC contractor on safety measures and follow up actions.</li> <li>EPC has made a contract with the Gazi Medical of Khulna city for emergency medical support.</li> <li>Medical checkup is mandatory for all employee before starting the work at the project site.</li> </ul> | Being Complied    | <ul style="list-style-type: none"> <li>Monitoring about PPE and body temperature of labors.</li> </ul> <p>Musk have to be compulsory for each of the worker.</p> |

| Sl. No. | Potential Impacts                        | EMP measures as proposed in the EIA  | Actual measures already Implemented  | Compliance Status | Recommended Action  |
|---------|--|--|--|-------------------|---|
|         |  | <ul style="list-style-type: none"> <li>Adequate fire precautions in place (e.g., fire extinguishers, escape routes etc.);</li> <li>Documentation and reporting of occupational accidents, diseases, and incidents;</li> </ul> <p>Policies and procedures for managing and monitoring the performance of third-party employers in relation to OHS</p> | <ul style="list-style-type: none"> <li>The major construction work at site has been performed in presence of safety officer.</li> <li>Fire extinguisher was found sufficiently at required places.</li> <li>Weekly checking of all the safety records and implementation of HIRA at site.</li> </ul> <p>They are arranging COVID vaccination program for the officer and encourage the labours to take COVID vaccine early basis.</p>  |                   |   |
| 4       | Occupational Health and Safety procedure | <ul style="list-style-type: none"> <li>Provision of complete EHS division in the Human Resources Planning/ Organogram</li> </ul> <p>Preparation of Safety Policy to be adopted during Plant operation</p>  | <ul style="list-style-type: none"> <li>Adequate number of safety officers have been employed by the EPC contractor and Sub-contractors.</li> <li>One safety park has been established for continual training as well as training during induction level.</li> <li>The necessity of PPE and safety protocol has been displayed at signboard which are need to be re-installed</li> <li>Medical aid, fire extinguishers, PPEs are being provided adequately.</li> <li>Regular Safety talk, safety meetings are being organized at site and also in class rooms. Photo are being attached.</li> <li>Keys safety instruction has been hanged at the eye sight places.</li> <li>Adequate safety bill-boards etc. have been displaced all over the construction area.</li> </ul> <p>Speed barriers are being instructed by substantial warning sign, speed limit and convex mirror have been displayed at the strategic locations.</p> | Being Complied    | <ul style="list-style-type: none"> <li>Awareness build-up, strict to the safety issues,</li> <li>Continued the safety training, buildup the awareness and make the labour habituated with the safety procedure</li> </ul> |
| 5       | Workers Well Being                       | <ul style="list-style-type: none"> <li>Provision of Welfare facilities for Worker/Labor such as, timely</li> </ul>   | <ul style="list-style-type: none"> <li>Workers are generally satisfied with the residence facilities</li> </ul>  | Being Complied    | <ul style="list-style-type: none"> <li>Freedom of Association, Rights &amp; scope of</li> </ul>   |



| Sl. No. | Potential Impacts | EMP measures as proposed in the EIA  | Actual measures already Implemented   | Compliance Status | Recommended Action  |
|---------|-------------------|--|---|-------------------|---|
|         |                   | <p>bonuses, wage, overtime, sick leaves, vacations etc.;</p> <ul style="list-style-type: none"> <li>Routine medical check-up and emergency medical care for the sick and injured;</li> </ul> <p>Appointment of a leader amongst the labor group, who will look into workers' well-being.</p> | <ul style="list-style-type: none"> <li>BIFPCL has developed apps <a href="https://bifpcl.com/safety.aspx">https://bifpcl.com/safety.aspx</a> for stepping up the safety issues well.</li> <li>BIFPCL has ensured the benevolent grant developed by the contractor for the victim's family as per Government' rule.</li> <li>Basic services like food, medicines, hygiene etc. are being ensured in labor colony</li> <li>Workers get lemon or water during work period</li> <li>Basic Medical care with free medicine and counseling is being provided to workers on regular basis.</li> <li>Vitamin-C rich fruits, ORS distribution being done to contract workers occasionally.</li> </ul> <p>Grievance of the workers were usually addressed especially for safety issues.</p> |                   | <p>bargaining should be open for the workers.</p> <p>Take care about the ultimate payment of the labors from the sub-contractor or local contractor. It should not be lower than the national standard fixed by the PWD for the labors.</p> |

Table 5.3: Monitoring of Community Health, Safety and Security

| Sl. no | Potential Impacts  | Proposed EMP  | Actual measures already Implemented  | Compliance Status | Recommended Action  |
|--------|--|---|--|-------------------|---|
| 1      | Disturbance to nearby community due to dust from developed land and Noise from construction activities | <ul style="list-style-type: none"> <li>Construction of boundary wall around the Project area;</li> <li>Installed water spraying system to control dusts;</li> <li>Conducting dust monitoring and visual inspection around the site boundary;</li> </ul> <p>Adopted noise management plan.</p> | <ul style="list-style-type: none"> <li>Boundary wall has been constructed around the project area.</li> <li>Water spraying has been conducted at least four times in a day by two water tankers or as per requirement are being done to suppress fugitive dust.</li> <li>Water is also being sprayed regularly on the stockpiles and registered.</li> <li>Third party is routinely communicating with the nearby communities for assessing impacts and related complaints on dust generation issue.</li> </ul> | Being complied    | <ul style="list-style-type: none"> <li>Any complaint regarding noise and dust from local people must be addressed immediately and recorded accordingly in the register.</li> </ul> <p>The grievance register should be placed at the gate of MSTPP so that the communities could easily</p> |

| Sl. no | Potential Impacts                  | Proposed EMP  | Actual measures already Implemented   | Compliance Status | Recommended Action   |
|--------|------------------------------------|---|---|-------------------|--|
|        |                                    |   | <ul style="list-style-type: none"> <li>Regular communication and consultation are taken places with the local government and local administration officials except this COVID situation</li> </ul> <p>Environmental parameters are continuously monitored in and around the project site by separate entities except the lockdown period</p>  |                   | raise their issues on this ground.   |
| 2      | Grievance of local people          | <ul style="list-style-type: none"> <li>Availability and operation of Grievance Redress Mechanism; Maintaining open communication channel with the local community.</li> </ul>   | <ul style="list-style-type: none"> <li>Social liaison officer is working for maintaining relation with local communities especially the CSR activities.</li> <li>BIFPCL regularly display the progress of the development through their website (<a href="https://www.bifpcl.com/">https://www.bifpcl.com/</a>) and disclosure meeting at the local government</li> <li>Grievance register has been placed at the BIFPCL main office inside the project boundary.</li> <li>BIFPCL is also receiving grievance from local community through local government like Union Chairman or Local Administration</li> </ul> <p>Proponent is observing the community grievance or quarries though the monitoring study conducted by CEGIS or local government</p> | Being complied    | Put the grievance register outside the project boundary or at the project entrance gate so that the local community could easily state any grievance properly.   |
| 3      | Risk of breaching Community Safety | <ul style="list-style-type: none"> <li>Construction of boundary wall/safety fence around the Project area;</li> <li>Practicing Risk Assessment and Evaluation Process;</li> <li>Practicing safe management for hazardous materials which may pose threat to the community;</li> <li>Availability and operation of Emergency Response Plan;</li> </ul> | <ul style="list-style-type: none"> <li>Implement numbers of pollution mitigating system for protecting the dust and other pollution outside to the project area.</li> <li>Strictly prohibited to enter outsider to the project site or labor camp.</li> <li>Entry pass is required to enter the project site area.</li> <li>Health check-up is mandatory to every labor during the induction training on which they get pass for work.</li> </ul>   | Being complied    | <ul style="list-style-type: none"> <li>Maintain social distancing with the communities during this COVID situation</li> </ul> <p>Keep on tack about the communicable diseases transmission between the labors and nearby communities</p> |

| Sl. no | Potential Impacts         | Proposed EMP  | Actual measures already Implemented  | Compliance Status | Recommended Action  |
|--------|---------------------------|---|--|-------------------|---|
|        |                           | <ul style="list-style-type: none"> <li>Maintaining open communication channel with the local community;</li> <li>Training and instruction to the security personnel about their behavior and communication with the local people;</li> </ul> <p>Aware the security personnel about the right of the community people.</p> | <ul style="list-style-type: none"> <li>No conflict has been noticed between local communities and project authorities or workers.</li> <li>Maintaining communication with local community regarding their grievance about the worker and work facilities.</li> <li>The routine (twice in every week) medical checkup with essential medicine facilities from BIFPCL and specialized medical camp nearby village will be initiated like pre-COVID situation for the community</li> <li>Distribution of essential food items, soaps to nearby villages and contract workers was done.</li> </ul> <p>The proponent is also contributing fund from CSR for training, lab development at Digraj college, RO drinking water supply at Mongla which is supplying fresh water for the community and arranged football tournament, gift to the bright student, school lab development etc. to make a congenial relation with the communities.</p> |                   |   |
| 4      | Community Health and Risk | <ul style="list-style-type: none"> <li>Provision of providing health service facilities to community if the Project poses any health risk like sexually transmitted disease, contract disease, vector-borne diseases;</li> </ul> <p>Implement all pollution mitigation measures to ensure safeguarding to community.</p>  | <ul style="list-style-type: none"> <li>Continued the medical facilities (consisting medical officer, medical assistant, office assistant) at Plant site for checkup the communicable diseases of the workers and staffs;</li> <li>Distribution of essential food items, soaps to nearby villages and contract workers during this COVID situation</li> <li>BIFPCL is going to arrange again the weekly health service program (medical consultation and free medicine) for the local community considering the COVID situation.</li> <li>Medical facilities for the local people has been running amid the COVID situation</li> </ul>  | Being Complied    | BIFPCL may introduce awareness program through health, nutrition and disease prevention for the community |

| Sl. no | Potential Impacts                                | Proposed EMP  | Actual measures already Implemented   | Compliance Status | Recommended Action  |
|--------|--|---|---|-------------------|---|
|        |  |   | <ul style="list-style-type: none"> <li>Local people are coming to the office medical center for health issues where they are supported with health check-up and common medicine.</li> </ul> <p>EPC contractor is educating to the labors about protective action taken to avoid vector borne diseases and HIV positives and COVID pandemic</p>  |                   |   |
| 5      | Youth Employment (Local)                         | Providing training/awareness program for the local youth to let them aware about the required qualification to get involved in the Project related activities Emphasis to recruit local labors according to their skills and capacities.  | <ul style="list-style-type: none"> <li>Regular communication is being maintained with the local government and community representatives for labor recruitment;</li> </ul> <p>The proponent took a number of initiatives to encourage local students through awarding them scholarships before the COVID situation. They will work again on this field after reducing the COVID cases significantly.</p>  | Being Complied    | Training related to skilled construction work i.e. masonry, rod binding, plumbing, carpenter, electrician, lineman, elevator mechanic, glazier, iron worker, driving, heavy equipment operator or laborer etc. should be introduced immediately;                            |
| 6      | Public Communication, Consultation and Awareness | <ul style="list-style-type: none"> <li>Arranging public communication/consultation meeting;</li> <li>Sharing of Project information with local people;</li> </ul> <p>Organizing environmental and social awareness programs/meetings.</p> | <ul style="list-style-type: none"> <li>One social liaison officer is working continuously for developing relation with local communities.</li> <li>Regular consultation meetings are carried out with the local government and administration.</li> <li>Environmental and social awareness programs are organized and conducted by proponent on a regular basis except during the COVID situation.</li> <li>BIFPCL regularly display the progress (thru Video) of the development through their website (<a href="https://www.bifpcl.com/">https://www.bifpcl.com/</a>) and also disclosure meeting at the local government.</li> </ul> <p>The local people are aware regarding the project activities from multiple sources like consultation, display board, website etc.</p> | Being Complied    | <ul style="list-style-type: none"> <li>BIFPCL may use print media, social media, digital media might be used for spreading the project right information</li> </ul> <p>The proponent should aware and clarify about the project the local people to stopover any rumor.</p> |

**Table 5.4: Monitoring of Biodiversity and Sustainable Management of Living Natural Resources**

| Sl No | Potential Impacts  | EMP measures as proposed in the EIA  | Actual condition/ Measures already Implemented  | Compliance Status | Recommended Action  |
|-------|--|--|---|-------------------|---|
| 1     | Rainfall runoff from the construction site would cause deterioration of aquatic ecosystem. | <ul style="list-style-type: none"> <li>Installation of proper runoff drains;</li> </ul> <p>Use of sediment fences, traps and basins for trapping the sediment, if required.</p>  | <ul style="list-style-type: none"> <li>Construction of permanent drainage system to discharge water from the project area.</li> <li>The connectivity of Maidara River is being maintained.</li> <li>EPC Contractor is monitoring the water quality on monthly basis at every outlet of the project site.</li> <li>Bank protective works has been continued at the western bank of Maidhara River for block-B.</li> <li>Solid waste has been managed by third parties and finally disposed to the KCC disposal areas</li> <li>Construction waste water discharge is minimum and need based only which are also meeting effluent norms.</li> <li>The same is being discharged through north-east corner of the project &amp; also monitored regularly.</li> </ul> <p>A sediment trap has been prepared to trapping the sediment before final discharge of the storm water to the river in this monsoon.</p> | Being complied    | <ul style="list-style-type: none"> <li>Maintain the roads and bank protective works during the heavy rainfall.</li> </ul>   |
| 2     | Disturbance to nearby ecosystem due to different construction activities                   | <ul style="list-style-type: none"> <li>No cutting/ felling of trees along the river bank;</li> <li>Implementation of onsite waste and air quality management plan;</li> <li>Limiting soil extraction activities within the defined area;</li> <li>Limiting the vegetation clearance and base stripping process within the Project boundary;</li> <li>Safety fence around the construction site;</li> <li>Limiting the use of night light;</li> </ul> | <ul style="list-style-type: none"> <li>Main project activities (Construction and erection) are limited within the project boundary though some of the project activities (Gathering of stockpiles, concrete mixing activities) are being conducted in the south western side of the project and near bank of the Passur River (Jetty construction).</li> <li>The project construction works are curtailed temporarily due to worsen COVID situation</li> <li>Limiting the vegetation clearance within the Project boundary especially around the ash impoundment.</li> </ul>  | Being Complied    | <ul style="list-style-type: none"> <li>Regular monitoring of the planted trees.</li> <li>Reduce the rate of mortality at the sapling stages.</li> </ul> <p>Bird sheds shall be created at the green belt areas.</p> |

| Sl No | Potential Impacts                                     | EMP measures as proposed in the EIA  | Actual condition/ Measures already Implemented   | Compliance Status | Recommended Action  |
|-------|---|--|--|-------------------|---|
|       |   | <ul style="list-style-type: none"> <li>Using shade (directed downwards) around the outdoor lights;</li> <li>Provision of cut-off time to switch off unnecessary lights at night;</li> <li>Initiate Green plantation;</li> <li>No plantation of non-native species;</li> <li>Retaining top soil for future habitat restoration;</li> </ul> <p>No degradation of sensitive habitat.</p>  | <ul style="list-style-type: none"> <li>Plantation program is in progress with the help of forest department.</li> <li>The client is going to plant 50000 of fruits and medicinal plants as per the greenbelt position of layout by 2019-2020</li> <li>Local plant species like Goalpata, Sundori, Bain, Keora for green plantation are being planted</li> <li>They are maintaining the EMP for protecting the adjacent ecosystem</li> <li>No alien species has been recorded</li> <li>Wild species like avifauna and mammals are now recorded in the greenery areas of the project site</li> </ul> <p>Employees are aware about the rescues of species and no harm to wild species</p> |                   |   |
| 3     | Disturbance to river, inter-tidal areas and wet lands | <ul style="list-style-type: none"> <li>No encroachment of inter-tidal flood plain area;</li> <li>No disturbance to Dolphin community;</li> <li>Monitoring of Ecosystem Health and Monitoring of Sundarbans Forest Health;</li> <li>If required, embankment should be constructed considering a setback distance from river/canal bank;</li> <li>Slope protection work along the Maidara River should be completed on an urgent basis before rainy season come, and;</li> </ul> <p>BIFPCL may take initiatives of excavating of silted reach of Maidara river near proposed township area to facilitate proper functioning of River for maintaining tidal flow dynamics</p> | <ul style="list-style-type: none"> <li>Monitoring of ecosystem health of Sundarbans, and around the Project site is being continued.</li> <li>The project is not obstructing the surface water flow.</li> <li>BIFPCL has been started maintenance of the slop protection works</li> <li>Bank protection works of western bank of Maidhara river is progressing</li> <li>EPC Contractor is monitoring the discharged water quality at each of the outlet from this project on a monthly basis.</li> <li>The project authority is constructing the permanent jetty as per approved layout.</li> </ul> <p>The Maidara river is showing its natural phenomena.</p>                         | Being Complied    | Initiatives should be taken for excavation of silted reach of Maidara river to protect the rainfall runoff washout. |



**Table 5.5: Status of Compliance to the Conditions of DoE**

| Sl. No | Condition of DoE  | Compliance Status   | Remarks   |
|--------|---|---|---|
| 1      | This EIA Report is approved only for 1320 MW Khulna Coal Based Power Plant. Any expansion or extension of this Power Plant will require obtaining further Environmental Clearance with additional EIA Study.                        | BIFPCL has not yet initiated any plan for expansion or extension of the 2x660 MW Maitree Super Thermal Power Plant.   | BIFPCL will comply with the condition prior to initiation of any expansion or extension of the Power Plant. |
| 2      | The Coal Specification and Power Plant technology should be maintained as per EIA report. In case any change in design the proponent must obtain consent from DoE.  | The Coal Specification and Power Plant technology will be maintained as per EIA report. In case of any change in Plant design and coal specification, the proponent shall have to obtain early consent from DoE.  | Suggested to comply as and when required.   |
| 3      | Project Proponent may undertake activities for land development and infrastructural development of the Project.   | BIFPCL has already completed land development activities for the Block-An area. Infrastructure development activities are in progress.  | Being Complied.   |
| 4      | 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.                            | The appointed EPC contractor has already imported maximum Equipment & machineries relating to waste treatment plant and other pollution control devices through opening the L/C.  | Being Complied.   |
| 5      | The activity under Proposed Khulna 1320 MW Coal based Thermal Power Plant Construction and operation shall not release any pollutant that affect human health or will have damaging impact on the environment or natural resources. | BIFPCL engaged CEGIS as an independent entity for monitoring the construction activities for examining environmental impacts on quarterly basis before the construction works started and accordingly the environmental and social impacts are being monitored as per EMP since 2014. No significant impact of Power Plant activities on the surrounding environment or on the natural resources has been recorded and reported (by the community) yet.<br>Moreover, all the necessary pollution control measures and technologies i.e. Effluent Treatment Plant, ESP, and FGD etc. have already been incorporated in the technical specification of main Plant of EPC package as per DoE stipulations. The EPC contractor is constructing the Plant as per the contracted technical specification. Moreover, environmental compliance monitoring is also being continued in the project site in order to assess the impact on project ambient air quality, discharge water quality and noise level around the project site, working and labor conditions, occupational safety procedures community grievances etc. as per the monitoring plan stated in the EIA. | Being Complied.   |

| Sl. No | Condition of DoE  | Compliance Status   | Remarks         |
|--------|---|---|-----------------|
| 6      | Proper and adequate mitigation measures shall be ensured throughout preparation, construction and operation period of the proposed Khulna 1320 MW Coal based Thermal Power Plant Project activities.              | BIFPCL has taken befitting mitigation measures as per EMP and technical specification of main Plant at each of the stages of Project Development.   | Being Complied. |
| 7      | Any heritage sight, ecologically critical area, and other environmentally, religious and archaeologically sensitive places shall be kept protected during Project construction phase.                             | There is no religious, archaeological place in and around the site. Quarterly monitoring program has been continuing since 2014 to the potentially project influence area of the Sundarbans Reserve Forest, Ecologically Critical Area and World Heritage Site as per the guidance of DOE and Bangladesh Forest Department (BFD).   | Being Complied. |
| 8      | Environment friendly construction and development practices shall be followed that minimize loss of habitats and fish breeding, feeding & nursery sites.  | During the monitoring activities no noticeable impacts on fish habitats and fish breeding, feeding & nursery sites were recorded.   | Being Complied. |
| 9      | Construction works shall be restricted to daytime 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. | The construction works has been reduced due to Covid-19 from April, 2020. Working activities are restricted to daytime and sometimes extends to the late evening. The community responses towards construction works of Power Plant are being monitored and recorded regularly. Moreover, BIFPCL has appointed one social liaison officer who is working (24x7) for developing relation with local communities. Regular consultation meetings are carried out with the local government and administration in order to receive and realize the grievances and accordingly to redress those. There is no grievances related to the noise effects registered yet from the nearby communities. | Being Complied. |
| 10     | Proper and adequate sanitation facilities shall be ensured in labor camps throughout the proposed Project period.   | EPC contractor and sub-contractor are providing adequate sanitation facilities for the workers. Sanitation facilities for health safety from COVID are supplied by the Contractor at the labor camps as well as in the work areas.  | Being Complied  |
| 11     | In order to control noise pollution, vehicles & equipment shall undergo regular maintenance; working during sensitive hours and locating machinery close to sensitive receptor shall be avoided.                  | All vehicle & equipment used at site are under regular maintenance and registration process. Working during sensitive hours like late evening, the machineries are being avoided or managed through appropriate measures as observed during the monitoring period.  | Being Complied  |
| 12     | 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.   | Burning of waste materials is being prohibited inside the project area. Now, solid waste is managed with systematic processes. A solid waste management company is now collecting the solid waste from the project and dump it to the Khulna City Corporation (KCC) designated places. Development of environment friendly waste collection and disposal system like Solid Waste Management (SWM), STP etc. are being developed at the demarcated place in  | Being complied  |

| Sl. No | Condition of DoE   | Compliance Status   | Remarks                      |
|--------|--|---|------------------------------|
|        |  | plant premises. In addition, waste management training has been included in induction training of the labor.  |                              |
| 13     | Proper and adequate on-site precautionary measures and safety measures shall be ensured so that no habitat of any flora and fauna would be endangered or destructed.                           | Quarterly monitoring activities are being carried out to examine the potential impacts on habitat of flora and fauna. No significant changes are yet recorded. Moreover, monthly environmental monitoring has been performed for noticing any harmful air pollutant emission or waste discharge from the project area.  | Being Complied               |
| 14     | 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. | The project authority has increased the medical facilities for workers. An ICU supported ambulance and an MBBS with two paramedical doctors are now available at site. EPC contractor has established their own Medical facilities for the labors. In case of emergency situation for both BIFPCL and EPC contractor, a contract has been signed with a private hospital (GAZI medical, Khulna) for medical services.<br>EHS team of BIFPCL, BHEL and Choramandalam are compelling to ensure the safety mitigation measures as per EIA and EHS guideline. Moreover, Periodic training has been made as mandatory for the workers. | Being Complied               |
| 15     | To control dust, spraying of water over the earthen materials should be carried out from time to time.   | Periodic air quality monitoring in and around the project sites is being conducted and checked it with ECR, 2005 standard. Monthly air quality monitoring at three locations inside the project boundary are being carried out. Based on the air quality monitoring findings and seasonal aspects, site specific water spraying are scheduled. At least four times in a day by two numbers of water tankers or as per requirement are being used to suppress fugitive dust.   | Being Complied               |
| 16     | Storage area for soils and other construction materials shall be carefully selected to avoid disturbance of the natural drainage.  | BIFPCL authority has selected designated areas for safe storage of construction materials. In addition, the maximum stock piles are sprinkling. They have established a silt trap to control sediment running out from the projects with rainfall runoff.   | Being Complied               |
| 17     | Adequate considerations should be given to facilitate drainage system for runoff water from rain/tidal surge.  | Adequate drainage system has been developed to facilitate storm water drainage runoff from rain from the project area.  | Being Complied.              |
| 18     | Adequate facilities should be ensured for silt trap to avoid clogging of drain/canal/water bodies  | Silt trap has been developed at the north-east corner of the project site. It is used to depositing the sediments coming with the storm water and finally discharge relatively sediment free storm water through the drainage line.   | Being Complied.              |
| 19     | The entire coal handling system should be designed as an enclosed (and not only covered) conveyor system. There should be integrated dust control system with                                  | Entire coal handling system is designed and constructed as an enclosed conveyor system as per DoE requirement. Integrated dust control system with dust extraction system/bag filter and dust suppression system at   | Compliance action initiated. |

| Sl. No | Condition of DoE  | Compliance Status  | Remarks                      |
|--------|---|--|------------------------------|
|        | dust extraction and bag filters at unloading areas and at each transfer points on the conveyor system.  | crusher house, unloading points, transfer points has been specified in the technical specification of Main Plant EPC contract package. Refer Section (V), B4 of Technical Specification. The tender for coal transportation shall include the technical specification and EMP of coal transportation study.  |                              |
| 20     | Coal Plant should have high-efficiency bag filter for arresting dust emissions.   | Integrated dust control system with dust extraction system/bag filter and dust suppression system at crusher house, unloading points, transfer points has been specified in the technical specification of EPC contract. Refer Section (V), B4 of Technical Specification (Clause no B4.3.1.4). High-efficient ESP is now at construction stage.                                   | Compliance action initiated. |
| 21     | Coal should be stored in a covered storage yard.  | All these stipulations have been included in the technical specification of Main Plant EPC contract package, Section (V), B4 of Technical Specification (Clause No B4.3.1.6). Now, the covered coal stockyard is being constructed at site.  | Being complied               |
| 22     | The entire coal stockyard should be covered with water sprinkler provided with automated moisture sensor to control self-combustion.  | All these stipulations have been included in the technical specification of Main Plant EPC contract package, Section V, B4 of Technical Specification. The covered Coal stockyard is now at the initial stages of construction.  | Compliance action initiated. |
| 23     | 100% utilization of fly ash and bottom ash should be planned and implemented throughout the operation of the Plant. There should only be a provision of small ash dyke that will not exceed 25 (twenty-five) acres of land to store residual ash. | 100% utilization of fly ash has been planned and shall be implemented throughout the operation of this Plant. EOI has been received in this regard from nearby Cement Industries. 25 acres' area has been allocated to store residual ash in case of emergencies. The ash dyke is now under construction stage.  | Compliance action initiated. |
| 24     | Integrated dry ash handling, loading, unloading and transportation system should be established.  | Integrated dry ash handling, loading, unloading and transportation system will be established during the operation stage of the power plant. Provisions in line with this has been included in Technical Specification of main Plant EPC contract package (Section V, Chapter B4). Ash silo is constructing beside the jetties in order to transport the dry ash with ships/cargo. | Compliance action initiated. |
| 25     | There should be adequate and properly sized and designed dry ash silo with appropriate conveyor system.   | Adequate and properly sized dry ash silo with appropriate conveying system have been specified in Technical Specification of main Plant EPC contract package (Section V, Chapter B4). The construction work is progressing fast near the jetty.  | Compliance action continued  |
| 26     | Bottom ash should be extracted, crashed and stored in silos for utilization with proper collection and conveyor system.   | Bottom ash shall be extracted, crushed and stored in silos for utilization with proper collection and conveying system during the operation stage of the power plant. The procedures have been included in the technical Specification of EPC contract package. (Section V, Chapter B4). The construction silo is progressing.   | Compliance action initiated  |

| Sl. No | Condition of DoE   | Compliance Status   | Remarks                     |
|--------|--|---|-----------------------------|
| 27     | Resettlement and rehabilitation of the displaced population (including those who do not own land) should be done properly.   | Land has been acquired as per the legal procedure of GoB. However, BPDB wrote to Ministry for suitable resettlement and rehabilitation as per DoE requirement. BPDB prepared an assessment (Livelihood Restoration Plan) regarding the rehabilitees (including those who do not own land) for this Power Plant. As per the recommendation of the LRP, a NGO "Samahar" completed Their tasks. This monitoring has recorded that DC office has rehabilitated around 32 families at Foyla and 17 families at Koigardaskati.  | Compliance action continued |
| 28     | Resettlement plan should be properly implemented and people should be adequately compensated.  | Resettlement and rehabilitation action had been taken as per the law of the land, Bangladesh. However, BPDB conducted an assessment (Livelihood Restoration Plan) regarding the rehabilitees (including those who do not own land) for this Power Plant. Based on the recommendation of the LRP, local NGO conducted the training and other tasks to the PAPs. DC office is trying to resettle the PAPs at their selected sites according to the LRP.   | Compliance action continued |
| 29     | Construction material should be properly disposed-off after construction work is over.   | At present, the construction work is going on. Construction wastes are being collected and put at demarcated places Heavy/mechanical equipment are kept at demarcated places. Proponent has engaged one of the contractor (Khulna City Corporation (KCC) for safe disposal of waste materials form site.<br>Further development of environment friendly waste collection and disposal system like Solid Waste Management (SWM), STP etc. are being developed at the demarcated place in plant premises.<br>There is a provision of development of solid waste management system which is given at clause no B12 ,Part no 9 of book no -2 ,page no 147-161.In which there is development of WMC which has waste collection ,waste segregation at source, recycling ,treatment and disposal of waste will be done | Compliance action initiated |
| 30     | As described in the report environmental monitoring should be strictly followed and monitoring report should be shared with DoE to ensure the environmental management properly. | BIFPCL has engaged CEGIS as a third party independent entity for conducting environmental monitoring on a quarterly basis in February 2014. Accordingly, each quarterly monitoring report has been prepared, submitted and shared with DoE, which are also available at BIFPCL web site.  | Being Complied.             |
| 31     | All activities (pre-construction, construction and post-construction stage) should be implemented according to EMP clearly listed in the EIA report.                             | BIFPCL has adopted the EMP suggestions applicable at construction stages. BIFPCL is taking appropriate actions based on EMP monitoring report. BIFPCL regularly updates the EMP and OHAS which assist to reduce the risk of accidental events further.  | Being Complied              |
| 32     | A third party/independent monitoring bodies excluding JVC/BPDB should be engaged immediately for   | CEGIS has been engaged by BIFPCL as an independent monitoring entity for conducting environmental monitoring on a quarterly basis since February  | Being Complied              |

| Sl. No | Condition of DoE   | Compliance Status  | Remarks                      |
|--------|--|--|------------------------------|
|        | monitoring of all activities during pre-construction, construction and operation phases as per monitoring plan of EIA report and monitoring report must be submitted to Bagerhat District Office, Khulna Divisional Office and Headquarters of the Department of Environment simultaneously.   | 2014. Since the contract, CEGIS has been conducting the monitoring programs quarterly and producing monitoring reports on quarterly basis which are submitted by CEGIS to BIFPCL for onward submission to the Bagerhat District Office, Khulna Divisional Office and Headquarters of the Department of Environment as directed by DoE.   |                              |
| 33     | Regular monitoring of the susceptible places of Sundarbans for protecting ecosystem, biodiversity and forest coverage should be made using latest high-resolution image for keeping ambient environment.   | The Monitoring activities of CEGIS included monitoring of the susceptible places of Sundarbans. The monitoring report contains analysis of biodiversity and forest coverage. However, in addition to this, Forest Department has also suggested some survey & analysis which have also been monitored and reported by CEGIS through the quarterly monitoring report.   | Being Complied.              |
| 34     | Air, water, soil, biological and social data should be monitored regularly with a network monitoring system with a view to assess the natural quality of the Sundarbans and other fragile ecosystem and report of monitoring results should be submitted to Bagerhat District Office, Khulna Divisional Office and Headquarters of the Department of Environment simultaneously. | The network monitoring system will be installed as a part of the project construction and it will be run as online monitoring system during the operation of the Power Plant.<br>All these stipulations have been included in the technical specification of Main Plant EPC contract package. (Section-V, Clause No B0 6.19.13.2 and Clause No. B0 6.19.13.5). However, air, water, soil and biological components are regularly monitored as per recommendation of EMP. Each of the monitored environmental data has been incorporated in the Monitoring report and displayed on the BIFPCL website at present. | Compliance action initiated. |
| 35     | There should be regularly disclosure of the report through workshops and websites and responses should be taken care accordingly.  | CEGIS has been regularly carrying out public consultation at different levels.. All the monitoring reports are being kept available on website of BIFPCL ( <a href="http://www.bifpcl.com">www.bifpcl.com</a> )  | Being Complied.              |
| 36     | Online air and water quality monitoring system should be made functional throughout the life of the Plant.   | The online monitoring system will be installed when the Plant will be in operation phase. This will be continued throughout the life time of the Power Plant.<br>All these stipulations have been included in the technical specification of Main Plant EPC contract package. (Section-V, Clause No B0 6.19.13.2 and Clause No. B0 6.19.13.5).   | Compliance action initiated  |
| 37     | Management Information System (MIS) is to be developed for this coal-based Power Plant. The scope of MIS services will obviously include representing the real time monitored data especially environmental parameters displaying at Bagerhat District Office, Khulna Divisional Office and Headquarters of the  | The MIS will be prepared before commissioning of the Power Plant. For developing MIS, consultant will be engaged earlier. Specifications of MIS system is already included in EPC contract document. Technical Specification like DDCMIS, DDCCS, PADO System, HART system, Plant MMS, Information management security system etc. have been included. Moreover, the EPC contractor is going to initiate this activity.   | Compliance action initiated  |



| Sl. No | Condition of DoE   | Compliance Status   | Remarks  |
|--------|--|---|--|
|        | Department of Environment, BPDB and other concerned agencies/Ministries. The MIS should be web based for accessing every individual to show the real time monitored records. |   |  |
| 38     | JVC should provide all sort of logistics support to DoE and other relevant agencies for monitoring environment related items/events.   | BIFPCL is ready to provide all sort of logistic support as and when required by DoE and other relevant agencies for monitoring of Plant construction activities and environmental items/events maintain the health and safety protocol of the construction site.  | Being complied   |
| 39     | No ground water should be allowed to use for plant purposes.   | <p>The Power Plant has been designed considering use of surface water only during all stages of project development and operation. The authority has already installed Reverse Osmosis (RO) Water Treatment Plant (ABM Water) for use ground water for potable and domestic purposes. A second unit of RO plant is now in operation fulfilling fresh water from both domestic and construction requirements.</p> <p>However, a 1200ft deep tube well has been recorded near the ABM water plant for backup during emergencies. Proponent informed that some time it is used to supply the drinking water.</p> | Ground water is being withdrawn only for supplying the drinking water. |
| 40     | Conduct stakeholder meetings on regular basis for better performance of the Project as a whole.  | Pre-construction phase of the Plant was completed and the construction phase has been continued. BIFPCL has appointed a social worker and officers who regularly visits nearby community to consult with the local people. Besides CEGIS, appointed by the Project authority, is also carrying out consultation with the local people with interviews on regular basis for better performance of the Project as a whole.  | Being Complied   |
| 41     | Additional Environmental baseline data to be collected as suggested in the EIA report and conveyed to DoE and other concern authorities.                                     | All quarterly monitoring reports containing latest baseline data are being collected as suggested in the EIA study and are disseminated to DoE and other concerned authorities.   | Being Complied   |
| 42     | The Environmental Management Plan under the EIA study shall strictly be implemented and kept functioning on a continuous basis.  | BIFPCL has been implementing all the EMP measures realistically phase by phase as suggested in EIA report and approval condition of DoE. The status of EMP implementation are also regularly monitored. Based on the monitoring, BIFPCL continuously updated the site specific EMP for better management of the potential impacts.  | Being Complied   |
| 43     | 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          | The construction works is now going on. BIFPCL has submitted the detailed work plan seven (7) days before start of the construction activities to the suggested offices of DOE.   | Being complied   |

| Sl. No | Condition of DoE   | Compliance Status  | Remarks              |
|--------|--|--|----------------------|
|        | to the Bagerhat District Office, Khulna Divisional Office and Headquarters of the Department of Environment simultaneously.  |  |                      |
| 44     | 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.  | Environmental Monitoring Reports as per specific format provided in the EIA Report made available by BIFPCL and submitted to DoE Bagerhat District Office, Khulna Divisional Office and Headquarters accordingly.  | Being Complied       |
| 45     | The following records must be kept in respect if any samples required to be collected for the purpose of environmental monitoring activities: <ul style="list-style-type: none"> <li>• The date(s) on which the sample was taken;</li> <li>• The time(s) at which the sample was collected;</li> <li>• The point at which the sample was taken; and</li> <li>The name of the person who collected the sample.</li> </ul>   | The Monitoring report keeps all the records as suggested.  | Being Complied       |
| 46     | The results of any monitoring, required to be conducted under this EIA report must be recorded.  | BIFPCL has been collecting all the monitoring data and submitting with proper documentation and accordingly sharing with DoE on regular basis.   | Being Complied       |
| 47     | In case of any emergency, the following information shall be immediately be reported to Bagerhat District Office, Khulna Divisional Office and Headquarters of the Department of Environment (DoE) simultaneously. Nature of incident (oil spill, fire, accident. Collision, land slide, etc.). Personnel affected (injured, missing, fatalities, etc.). Emergency support available and its location (standby transport, medical facilities, etc.). Weather conditions Current operations (abandoning the site, firefighting, etc.) | No single emergency incident has been since April, 2021. The COVID restriction has been withdrawal by GoB with the decreasing infection which also implemented for the MSTPP construction site. At present, the labors are working fully to this project with proper COVID safety measures. BIFPCL has given top priority on safety issues as like environment for this project after the bitter experience of two incidents. They have instructed the EPC contractor to establish best practices on OHAS and keep all records for avoiding any incident as like earlier. However, taking numbers of initiatives by the EPC and proponent significantly improve the safety system of the project. No environmental, accidental, anthropogenic incident has been not recorded since April 2021. | Complied at present  |
| 48     | The Project authority or its employees must notify the department of Environment of incidents causing or threatening material harm to the environment as soon as practicable after the person becomes aware of the incident.   | BIFPCL has established a proper mechanism for recording such incident as suggested and notify the department of Environment regarding incidents causing or threatening material harm to the environment as soon as practicable after the person becomes aware of the incident. EPC have already revised the health and safety management manual to continue the work amid the COVID pandemic. Moreover, CEGIS is monitoring the EMP implementation as a whole.   | Complied at present. |

| Sl. No | Condition of DoE  | Compliance Status  | Remarks                      |
|--------|---|--|------------------------------|
| 49     | All pollution incidents shall be reported immediately and simultaneously to the Bagerhat District Office, Khulna Divisional Office and Headquarters of the Department of Environment (DoE) in Dhaka.              | BIFPCL has established a proper mechanism for recording such incident as suggested in the ERP  | Being complied               |
| 50     | Appropriate permission would require to be obtained from the Forest Department in favor of cutting/felling on any plant/tree/sapling forested by any individual or government before doing such type of activity. | There is no need of cutting/felling down of any trees outside the project boundary. However, in future, if any such case arises, BIFPCL would seek for appropriate permission from the Forest Department.  | Being complied               |
| 51     | Re-vegetation and re-plantation under green belt activities shall be undertaken in consultation with the Forest Department according to those mentioned in the EIA report.  | An MoU has been signed with Forest Dept., Bangladesh on 24.02.2015 for implementation of Afforestation Program. Initial target is to plant 2 lac saplings in 3 years. By this time, Forest Department has targeted initially to plant about 116000 nos. of saplings of different species. A fresh Agreement with BFD was signed on 24.01.2018 for plantation of 5 Lakh trees for at the end of construction stages. They planted 15000 fruits and medicinal plants at the laydown areas in the project site. However, the will fulfill the target before commissioning of the power plant. | Being Complied               |
| 52     | Climate Change impacts and maximum storm surge height shall have to consider at the design and construction phase.  | The design level (elevation) of the land and earthen embankment has been designed and constructed considering the climate change impact and maximum storm surge height.  | Being Complied               |
| 53     | A separate EIA/morphological study shall have to be conducted for coal transportation and river dredging to develop sound environmental management plan towards conservation of ecosystem and biodiversity.       | Coal transportation will be done through the existing maritime route, which is Mongla Port Authority (MPA) controlled waterways. M/s. Institute of Water Modelling (IWM) has already completed the EIA study for the dredging activity and submitted the report to MPA. A separate EIA study for Coal Transportation was conducted by M/s. Center for Environment and Geographic Information Services (CEGIS) which has been approved by DoE.  | Being Complied.              |
| 54     | A full-fledged institutional setup for EHS and CSR must be put in place before operation of the Power Plant.  | A full-fledged institutional setup for EHS activities have been operated. After the consecutive accidents, the EHS process has been drastically re-arranged and reshaped. No major incident has been occurred since April, 2021. Meanwhile, a number of CSR activities are ongoing at Project site, like free medical camp, Boat Medical camp, and medicines, free potable water supply to the local people, medical campaign, training etc. infrastructure development of nearby school.  | In the process of compliance |
| 55     | The Project authority shall extend active cooperation to DoE officials to facilitate their visit to the site as and when necessary.   | BIFPCL is extending its all-out cooperation to DoE.  | Being Complied               |

| Sl. No | Condition of DoE   | Compliance Status   | Remarks                     |
|--------|--|---|-----------------------------|
| 56     | Violation of any of the above conditions shall render this approval void.  | Noted by BIFPCL   |                             |
| 57     | Any injunction on this Project from the Honorable Supreme Court/High Court Division shall render this approval void.   | Noted by BIFPCL   |                             |
| 58     | Without installation of 275 Meter Height Chimney, Effluent Treatment Plant (ETP), Waste Water Treatment Plant (WWTP), Settling Pond, Desalinization Plant, API Oil Water Separator, High Efficiency Electro Static Precipitator (ESP), 'closed-loop' Flue Gas Desulfurization (FGD), Low NOx Burner, online air and water quality monitoring system and other pollution control equipment and obtaining Environmental Clearance Certificate, the proponent shall not start operation of the Project. | At present, the Plant is in construction phase. EPC contractor is constructing the main Plant includes 275-Meter-high Chimney, Effluent Treatment Plant (ETP), Waste Water Treatment Plant (WWTP), Settling Pond, Desalinization Plant, API, Oil Water Separator, High Efficiency Electro Static Precipitator (ESP), 'closed-loop' Flue Gas Desulfurization (FGD), Low NOx Burner, online air and water quality monitoring system for preventing pollution as per technical specification. Moreover, BIFPCL has got the Environmental Renewal Certificate each of the year through maintaining the conditions of DOE. | Compliance action initiated |
| 59     | This EIA Approval has been issued with the approval of the appropriate authority.  | BPDB and BIFPCL are thankful to DoE.  |                             |

## 5.2 Compliance to the Conditions of DoE (EIA study of Coal Transportation)

However, with reference to the approval of EIA study of coal transportation for 2x660 MWMSTPP having (Memo no: DoE/ clearance/ 5532 / 2016/50, dated 31/01/2018), Department of Environment has set some specific conditions to be followed as a fulfillment of the condition no.53 of the EIA approval letter of 2x660 MWMSTPP. The conditions and compliance status have been listed as follows-

**Table 5.6: Compliance conditions of DoE (EIA study of Coal transportation)**

| Sl. No. | Conditions   | Compliance status  | Remarks                                   |
|---------|--|--|---|
| 1       | This EIA Report is approved only for Coal Transportation for the Proposed 2x660 MW Maitree Super Thermal Power Plant Project. Any modification of this project as well as Coal Transportation will require further EIA approval with additional EIA Study. | The power plant is now in construction stage. BIFPCL will notify to DOE prior to initiation of any modification, expansion or extension of the Power Plant.  | Suggested to comply as and when required. |
| 2       | The route of coal Transportation should be maintained as per EIA Report. In case of any changes the proponent must obtain consent from DoE.  | The route of coal Transportation will be maintained as stated in the EIA report. In case of any changes in the transportation route, the proponent shall obtain consent from DoE.  | Suggested to comply as and when required. |
| 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 plant and other pollution control devices.  | EPC contractor has been appointed for this Project. Currently, they are importing Power Plant machineries complying the national laws and regulations.   | Being Complied.                           |
| 4       | The activity under Coal Transportation for the Proposed 2x660 MW Maitree Super Thermal Power Plant Project shall not release any pollutant that affect human health or will have damaging impact on the environment or natural resources.                  | So far, no activity under Coal Transportation for the Proposed 2x660 MW Maitree Super Thermal Power Plant Project has been commenced. So, there is no issue for impact on the surrounding environment or natural resources from the coal transportation activities. BIFPCL engaged CEGIS for monitoring and examining status of the environment or natural resources. A strong baseline has been prepared throughout the coal transportation route for assessing the impact in future. | Suggested to comply as and when required. |
| 5       | Proper and adequate mitigation measures shall be ensured throughout the operation period of the Project  | The project proponent has included all the mitigation measures in their BID document of Coal Transportation. However, BIFPCL is monitoring the implementation of mitigation measures for the construction period. They have developed a skilled manpower and system for ensuring the EMP during operation stage.   | Suggested to comply at operation phase.   |

| Sl. No. | Conditions   | Compliance status  | Remarks                                 |
|---------|--|--|---|
| 6       | Any heritage site, ecologically critical areas, and other environmentally, religious and archeologically sensitive places shall be kept protected during project operation.                  | There is no Religious and Archaeological place in and around the Project site. As a third party, CEGIS is now monitoring the potentially vulnerable locations and indicators which are sensitive to coal transportation in the Sundarbans ECA, Sundarbans Reserve Forest and Sundarbans World Heritage Site. Those information and data assist to protect the ecological critical areas in future during the operation of coal transportation. | Suggested to comply at operation phase. |
| 7       | Environment friendly construction and development practices shall be followed that minimize loss of habitats and fish breeding, feeding and nursery sites.                                   | Development of coal transportation system will be followed through best practices, EMPs of EIA of Coal Transportation Report, national and international rules and guideline. Since, the environmental monitoring indicators are not observed any anomalies, it can be concluded that the construction work is progressing in environment friendly procedure yet now.  | Being Complied                          |
| 8       | Proper and adequate sanitation facilities shall be ensured in labor camps throughout the proposed project period.  | At present, the civil construction of the Project including Jetty construction activities are progressing. The jetty construction works is running increasingly under this COVID situation. BIFPCL, EPC contractor and sub-contractors are providing sufficient safety materials, training, instruction and facilities for managing COVID and improve hygiene at labor camps and workplaces.   | Being Complied                          |
| 9       | Proper and adequate on-site precautionary Measures and safety measures shall be ensured so that no habitat of any flora and fauna would be endangered or destructed.                         | The construction of Jetty is being carried as per EMP guidelines. Moreover, regular monitoring activities are being carried out to assess the significant changes due to jetty construction activities. The quarterly monitoring reports do not reflect any significant changes of the habitat of flora and fauna of the project influenced Passur river and Sundarbans ecosystem.   | Being Complied                          |
| 10      | 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. | The proponent is giving top priorities to occupational health and safety issues after few incidents. They have significantly revised the OHAS guideline and practice it seriously. During this COVID situation, BIFPCL is tried aware and  | Compliance action initiated             |



| Sl. No. | Conditions   | Compliance status   | Remarks                      |
|---------|--|---|------------------------------|
|         |  | manage Covid-19 of the workers and office support staff.  |                              |
| 11      | To control dust, spraying of water over the earthen materials should be carried out from time to time  | Periodic air quality monitoring in and around the project sites is being conducted and checked it with ECR, 2005 standard. Water spraying at least four times in a day by two water tankers or as per requirement are being done to suppress fugitive dust.   | Being Complied               |
| 12      | The entire coal handling system should be designed as an enclosed (and not only covered) conveyor system. There should be integrated dust control system with dust extraction and bag filters at unloading areas and at each transfer points on the conveyor system. | In the BID document, the coal handling system has been mentioned as closed system with the integration of dust control measures. Moreover, continuous monitoring system has been instructed in the EIA monitoring section.  | Compliance action initiated  |
| 13      | Coal should be stored in a covered storage yard.   | All these stipulations have been included in the technical specification of Main Plant EPC contract package, Section V, B4 of Technical Specification (Clause No B4.3.1.6). The Covered coal stockyard is now under construction stage.   | Compliance Action initiated. |
| 14      | The entire coal stockyard should be Covered with water sprinkler provided with automated moisture sensor to control self-combustion.   | EIA study of the Power Plant suggested to install water sprinkler in coal stockyard which has been repeated in EIA study of Coal transportation. However, all these stipulations have been included in the technical specification of Main Plant EPC contract package. The coal stockyard is now under construction stage.  | Compliance Action initiated. |
| 15      | Construction material should be properly disposed of after the construction work is over.  | The construction scrubs are recorded scattered in the project site. They are now trying to contract a third party to remove the construction scrubs from the project site. The proponent is preparing an environmentally friendly procedure for disposing off the construction material like scraps as well as other construction wastes. They have already contracted one organization in association with KCC for solid waste management. They are now working at the project site. | Compliance Action initiated. |
| 16      | As described in the report environmental monitoring should be strictly followed and monitoring report should be shared with DOE to ensure the environmental management properly.   | BIFPCL has engaged CEGIS for environmental monitoring the environmental management plan in February 2014. Accordingly, each quarterly monitoring report has   | Being Complied.              |

| Sl. No. | Conditions  | Compliance status  | Remarks                                   |
|---------|---|--|---|
|         |   | been submitted and shared with DoE, which are also available at BIFPCL web site.   |   |
| 17      | A third party/independent monitoring bodies excluding BIFPCL should be engaged immediately for monitoring of all the activities during pre-construction, construction and operation phases as per monitoring plan of EIA report and monitoring report must be submitted to Bagerhat District Office, Khulna Divisional Office and Headquarters of the Department of Environment simultaneously. | CEGIS, as an independent monitoring body has been engaged by BIFPCL since February 2014 and still continued. From then on, CEGIS has been conducting the monitoring programs quarterly and producing monitoring reports on regular basis which are submitted by CEGIS to BIFPCL for onward submission to the Bagerhat District Office, Khulna Divisional Office and Headquarters of the Department of Environment as directed by DoE.                    | Being Complied                            |
| 18      | Regular monitoring of the susceptible places of the Sundarbans for protecting ecosystem, biodiversity and forest coverage should be made using latest high-resolution image for keeping ambient environment.  | The Monitoring activities have been carried out by CEGIS as third-party independent entity. The study includes all of recommended issues vastly. The monitoring report contains analysis of ecosystem, habitat, and biodiversity and forest coverage at susceptible sites of Sundarbans. In addition to this, Forest Department has also suggested some survey & analysis of Sundarbans ecosystem along with the quarterly compliance monitoring report. | Being Complied.                           |
| 19      | Air, water, soil, biological and social data should be monitored regularly with a network monitoring system with a view to assess the natural quality of the Sundarbans and other fragile ecosystem and report of monitoring results should be submitted to Bagerhat District Office, Khulna Divisional Office and Headquarters of the Department of Environment simultaneously.                | The network monitoring system will be installed as a part of the project construction for online monitoring and it will run at the time in operation phase. All these stipulations have been included in the technical specification of Main Plant EPC contract package. (Section-V, Clause No B0 6.19.13.2 and Clause No. B0 6.19.13.5). All the environmental monitoring reports are available on the BIFPCL website at present.                       | Being Complied.                           |
| 20      | There should be regular disclosure of the report through workshops and websites and responses should be taken care accordingly.   | All of the environmental monitoring reports and other relevant reports are available on website of BIFPCL ( <a href="http://www.bifpcl.com">www.bifpcl.com</a> ). BIFPCL as well as CEGIS is regularly carrying out public consultation at local level to get the responses from the community.  | Being Complied.                           |
| 21      | BIFPCL should provide all sort of logistics support to DOE and other relevant agencies for monitoring environment related items/events.   | BIFPCL is ready to provide all sort of logistic support as and when required by DoE and other relevant agencies for monitoring of Plant  | Suggested to Comply as and when required. |

| Sl. No. | Conditions  | Compliance status  | Remarks                                   |
|---------|---|--|---|
|         |   | construction activities and environmental items/events.  |   |
| 22      | In order to control noise pollution, vessels and equipment shall undergo regular maintenance; working during sensitive hours and locating machinery close to sensitive receptor shall be avoided.   | Not applicable in this stage   | Suggested to Comply as and when required. |
| 23      | Vessels of this project should follow the MPA guidelines and protocol to ensure no hindrance to other vessels.  | Not applicable in this stage   | Suggested to Comply as and when required. |
| 24      | The vessels used for this project should maintain IMO criteria to enable identification of substances harmful to the marine environment.  | Not applicable in this stage   | Suggested to Comply as and when required. |
| 25      | All the vessels should follow applicable MARPOL Convention, Appendix V on the prevention of pollution by garbage from ships.  | Not applicable in this stage   | Suggested to Comply as and when required. |
| 26      | Additional Environmental baseline data to be collected as suggested in the EIA report and conveyed to DOE and other concern authorities.  | Environmental baseline data has been collected by third party <i>i.e.</i> CEGIS. CEGIS has submitted reports of quarterly monitoring containing latest baseline data to BIFPCL for further dissemination to DoE and other concerned authorities.   | Being Complied                            |
| 27      | The Environmental Management Plan under the EIA study shall strictly be implemented and kept functioning on a continuous basis.   | BIFPCL has so far been implementing the EMP measures phase by phase as suggested in EIA report and approval condition of DoE. The status of EMP implementation are also regularly monitored by CEGIS.  | Being Complied                            |
| 28      | 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 Bagerhat District Office, Khulna Divisional Office and Headquarters of the Department of Environment simultaneously. | The jetty construction works is now going on. Beforehand, BIFPCL has submitted the detailed work plan seven (7) days before starting of the construction activities to the Bagerhat District Office, Khulna Divisional Office and Headquarters of the Department of Environment simultaneously. It must be maintained in future. | Being complied                            |
| 29      | 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 quarterly basis during the project period.                                     | Environmental Monitoring Reports of the Power Plant project including Jetty construction as per specific format provided in the EIA Report made available by BIFPCL and submitted to DoE Bagerhat District Office, Khulna Divisional Office and Headquarters on monthly basis since April, 2018.                                 | Being Complied                            |
| 30      | The following records must be kept in respect of any samples required to be collected for the purposes of environmental monitoring activities:  | The Monitoring report of CEGIS keeps all the records as suggested.   | Being Complied                            |

| Sl. No. | Conditions   | Compliance status   | Remarks                                   |
|---------|--|---|---|
|         | a) the date(s) on which the sample was taken;<br>b) the time(s) at which the sample was collected;<br>c) the point at which the sample was taken; and<br>The name of the person who collected the sample.  |   |   |
| 31      | The results of any monitoring required to be conducted under this EIA report must be recorded.   | CEGIS is recording all the monitoring data and submitting to BIFPCL through proper documentation. The report is being shared with DoE on regular basis through monitoring reports.  | Being Complied                            |
| 32      | In case of any emergency, the following information shall immediately be reported to Bagerhat District Office, Khulna Divisional office and Headquarters of the Department of Environment (DOE) simultaneously:<br>a. Nature of incident (oil spill, fire, accident, collision, land slide etc.)<br>b. Personnel affected (injured, missing, fatalities, etc.)<br>c. Emergency support available and its location (standby transport, medical facilities, etc.)<br>d. Weather conditions<br>Current operations (abandoning the site, firefighting, etc.) | Emergency Reporting/ Emergency response Plan have been prepared for the Power Plant which includes the Jetty. Health and safety management manual have been revised for better and precautions implementation of OHAS after few fatal incidents.<br>They have taken a lot of care regarding occupational health and safety.<br>BIFPCL will adopt the ERP suggested on the EIA study of coal transportation in association with the NOS COP and NPDM for any future incidents as suggested.  | Compliance Action initiated.              |
| 33      | National Oil Spill Contingency Plan (NOS COP) should be followed to establish an organizational structure to combat marine pollution   | Not applicable in this stage  | Suggested to comply as and when required. |
| 34      | The project authority or its employees must notify the Department of Environment of incidents causing or threatening material harm to the environment as soon as practicable after the person becomes aware of the incident.   | BIFPCL has strengthening the mechanism for the incident as suggested that is notify to the department of Environment regarding incidents causing or threatening material harm to the environment as soon as practicable after the person becomes aware of the incident.<br>The institutional arrangement for managing the incident during coal transportation will be set up before operation stage based on the EIA and DoE recommendations. Moreover, monitoring activities is continued for checking any significant changes in natural ecosystem. | Complied at present.                      |
| 35      | All pollution incidents shall be reported immediately and simultaneously to the Bagerhat District Office, Khulna Divisional Office and Headquarters of   | BIFPCL has established a proper mechanism for recording such incidents as suggested in the ERP. CEGIS has been engaged to monitor   | Complied at present.                      |

| Sl. No. | Conditions  | Compliance status  | Remarks                                   |
|---------|---|--|---|
|         | the Department of Environment (DOE) in Dhaka.   | the social and environmental compliance monitoring on a regular interval.  |   |
| 36      | Climate Change impacts and maximum storm surge height shall have to consider at the design and construction phase of the jetty.   | The design level (elevation) of the land and earthen embankment has been fixed considering the climate change impact and maximum storm surge height. | Being Complied                            |
| 37      | The transshipment point Faraway Buoy at the Bay should be used from November to March, and Mazhar point should be used from April to October every year for transporting coal which has been mentioned in the EIA Report. | Not applicable in this stage   | Suggested to comply as and when required. |
| 38      | Violation of any of the above conditions shall render this approval void.   | Noted by BIFPCL  | -   |
| 39      | Any injunction on this project from the Honorable Supreme Court/High Court Division shall render this approval void.  | Noted by BIFPCL  | -   |
| 40      | This EIA approval is valid for one year from the date of issuance and the project authority shall apply for renewal to the Bagerhat District Office of DoE at Bagerhat with a copy to Head Office of DOE in Dhaka.        | The authority is maintaining the renewal process as suggested. As like previous years, BIFPCL has got the renewal for this year.                     | Being complied                            |





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## **Appendices**





## Appendix I: Checklist of Monitoring Environmental Compliances

**Table A: Checklist of Monitoring for ESMP Implementation (During Construction Phase)**

| Sl No | Potential Impacts   | Proposed EMP   | Actual Implementation | Recommended Action | Compliance Status |
|-------|---|--|-----------------------|--------------------|-------------------|
| 1     | Generation of Noise within the BIFPCL's Plant premises                        | <ul style="list-style-type: none"> <li>• Conduct noise survey around and inside the site boundary</li> <li>• Reducing Noise and Vibrations to country's ambient standards, and occupational health and safety standards</li> <li>• Introducing vehicle speed limit and speed limit monitoring system</li> <li>• Green Plantation around the Project boundary</li> <li>• Switching off/ throttling down of machines/equipment's/generators which are not in use</li> </ul>  |                       |                    |                   |
| 2     | Dust Generation from Land development activities and other construction works | <ul style="list-style-type: none"> <li>• Conducting dust monitoring and visual inspection around the site boundary</li> <li>• No use of earthen and undeveloped roads by vehicles related to the Project use</li> <li>• Installation of water spraying system to control fugitive dusts</li> <li>• Introducing vehicle speed limit and speed limit monitoring system</li> <li>• If yes, do they monitor vehicle speed regularly?</li> </ul>  |                       |                    |                   |
| 3     | Water Quality   | <ul style="list-style-type: none"> <li>• Fencing the construction site by drum sheet or Tarjja of any other fencing</li> <li>• Arrangement of runoff drainage for reducing any water logging</li> <li>• Location of backfilling stockpile in safe area and protected from wind and rain action</li> <li>• No storing of backfilling materials/spoil stored on river bank/slope</li> <li>• No disposal of waste and wastewater to river or canal.</li> </ul>  |                       |                    |                   |
| 4     | Waste Management System   | <ul style="list-style-type: none"> <li>• Provision of onsite waste management system</li> </ul>  |                       |                    |                   |
| 5     | Compensation and Resettlement   | <ul style="list-style-type: none"> <li>• Prepare Proper resettlement action plant and compensation plan if the Project needs any land acquisition addressing compensation, restoration, livelihood, living standards etc. based on proper socio-economic studies</li> <li>• Resettlement of the PAPs</li> <li>• cash for compensation of land (CCL) before resettlement</li> <li>• formal agreement with the affected people prior to migration/resettlement</li> <li>• Sufficient standing crop compensation</li> <li>• Compensation for shift able structures?</li> <li>• Retention of salvageable materials?</li> </ul> |                       |                    |                   |

| Sl No | Potential Impacts                    | Proposed EMP  | Actual Implementation | Recommended Action | Compliance Status |
|-------|--------------------------------------|---|-----------------------|--------------------|-------------------|
|       |                                      | <ul style="list-style-type: none"> <li>• Compensation for loss of trading income?</li> <li>• one-time moving assistance</li> <li>• grant to cover loss of regular wage income</li> <li>• Has a resettlement plan been developed which includes compensation, restoration, livelihood, living standards etc. based on proper socio-economic studies?</li> <li>• Provide/take extra care/caution for the disadvantaged/vulnerable group(s) (i.e., women, children, ethnic minorities, indigenous people etc.)</li> <li>• Provision of monitoring the compensation and resettlement process</li> </ul>   |                       |                    |                   |
| 6     | Livelihood and living                | <ul style="list-style-type: none"> <li>• Does the Project pose any threat to the livelihood/living standards of the local people?</li> <li>• If yes, are adequate steps taken to reduce the impacts?</li> <li>• Has the company developed any policy which prioritizes the local laborers in employment opportunities?</li> <li>• Is there any possibility that large vehicle related to the Project will cause traffic induced disturbance/s to the local dwellers?</li> <li>• If yes, are there any mitigative steps taken to decrease the disturbance/s?</li> <li>• Has the road network been developed after the Project being proposed and during the construction phase?</li> <li>• Are there separate water and sanitation facilities for the construction workers in the Project area?</li> </ul> |                       |                    |                   |
| 7     | Green House Gas Controlling Measures | <ul style="list-style-type: none"> <li>• Use of efficient generator in the construction activities</li> <li>• Regular maintenance of vehicles, generator and machinery in accordance with manufacturer's specifications</li> <li>• Use of approved pollution control devices fitted in the equipment's and machineries</li> <li>• Switching off and throttling down the machines/equipment's/generators which are not in use</li> </ul>   |                       |                    |                   |

**Table B: Checklist of Monitoring ESMP Implementation (During Construction phase)**  
**(Labor and Working Condition)**

**Basic Data**

| SI No | Description          | Values |
|-------|----------------------|--------|
| 1     | Direct Workers       |        |
| 2     | Contracted Workers   |        |
| 3     | Supply Chain Workers |        |
| 4     | Child labor          |        |
| 5     | 0 - 12               |        |
| 6     | 13 - 14              |        |
| 7     | 14 - 18              |        |

**Checklist for Labor and Working Condition**

| SI No | Potential Impacts  | Proposed EMP  | Actual Implementation | Recommended Action | Compliance Status |
|-------|--|---|-----------------------|--------------------|-------------------|
| 1     | Working Conditions and Management of Worker Relationship | <ul style="list-style-type: none"> <li>Preparation of Human Resources Policies and Procedures for Direct workers</li> <li>Defined Working condition and Terms of Employment for direct worker</li> <li>Sustainably equivalent terms and condition for migrant workers</li> <li>Compliance to national law of forming workers' organization</li> <li>No discrimination and equal opportunity for all</li> <li>Measures for diminishing past discrimination</li> <li>Grievance Mechanism</li> </ul> |                       |                    |                   |
|       | Protecting Workforce                                     | <ul style="list-style-type: none"> <li>The client will not employ children in any manner that is economically exploitative, or is likely to be hazardous or to interfere with the child education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development.</li> <li>No Force Labor</li> </ul>  |                       |                    |                   |
| 2     | Safety at site   | <ul style="list-style-type: none"> <li>Installation/Construction of Safety Fence around the Project area</li> <li>Use of Personnel Protective Equipment (i.e. safety suit, safety goggles, ear plug, safety shoes, gloves, dust mask, etc.)</li> <li>Safety trainings for workers (i.e. fire control, working at height, working in heat, first aid etc.)</li> </ul>  |                       |                    |                   |

| SI No | Potential Impacts                        | Proposed EMP   | Actual Implementation | Recommended Action | Compliance Status |
|-------|--|--|-----------------------|--------------------|-------------------|
|       |  | <ul style="list-style-type: none"> <li>Practice of Tool box meeting, safety talks,</li> <li>Safe Storage of Hazardous Chemicals (e.g. fuel, flammable chemical, toxic chemicals, etc.)</li> <li>Maintaining Material Safety Data Sheet (MSDS)</li> <li>Provision of Health care facilities such as doctor, hospital etc. available at/nearby the plant construction site</li> <li>Availability of First Aid at work place</li> <li>Preparation and Follow of Emergency Response Plan</li> <li>Adequate fire precautions in place (for example, fire extinguishers, escape routes etc.)</li> <li>Documentation and reporting of occupational accidents, diseases, and incidents</li> <li>Policies and procedures for managing and monitoring the performance of third-party employers in relation to OHS</li> </ul> |                       |                    |                   |
| 3     | Occupational Health and Safety Procedure | <ul style="list-style-type: none"> <li>Provision of complete EHS division in the Human Resources Planning/Organogram</li> <li>Preparation of Safety Policy to be adopted during plant operation</li> </ul>   |                       |                    |                   |
| 4     | Worker's Well Being                      | <ul style="list-style-type: none"> <li>Establishment Grievance Mechanisms</li> <li>Ensuring fair treatment, non-discrimination and equal opportunity</li> <li>Compliance of Project's labor policy with the national labor law</li> <li>No Child Labor</li> <li>No incident of forced labor</li> <li>Provision of Welfare facilities for Worker/Labor</li> </ul>   |                       |                    |                   |

**Table C: Checklist of Monitoring ESMP Implementation (During Construction phase)**  
**(Community Health, Safety and Security)**

| SI No | Potential Impacts  | Proposed EMP   | Actual Implementation | Recommended Action | Compliance Status  |
|-------|--|--|-----------------------|--------------------|--------------------|
| 1     | Disturbance to nearby community due to dust from newly developed land and Noise from construction activities | <ul style="list-style-type: none"> <li>• Construction of boundary wall around the Project area</li> <li>• Installation of water spraying system to control dusts</li> <li>• Conducting dust monitoring and visual inspection around the site boundary</li> <li>• Adoption of Noise management plan</li> </ul>  |                       |                    |                    |
| 2     | Grievance of local people  | <ul style="list-style-type: none"> <li>• Availability and operation of Grievance Redress Mechanism</li> <li>• Maintaining open communication channel with the local community</li> </ul>   |                       |                    |                    |
| 3     | Risk of breaching Community Safety   | <ul style="list-style-type: none"> <li>• Construction of boundary wall/safety fence around the Project area</li> <li>• Practicing Risk Assessment and Evaluation Process</li> <li>• Practicing safe management for hazardous materials which may pose threat to the community</li> <li>• Availability and operation of Emergency Response Plan</li> <li>• Maintaining open communication channel with the local community</li> <li>• Training and instruction to the security personnel about their behaviour and communication with the local people</li> <li>• Aware the security personnel about the right of the community people</li> </ul> |                       |                    |                    |
| 4     | Community Health Risk  | <ul style="list-style-type: none"> <li>• Provision of providing health service facilities to community if the Project possess any health risk like sexually transmitted disease, communicable disease, vector-borne diseases</li> <li>• Implement all pollution mitigation measures to ensure safeguarding to community</li> </ul>   |                       |                    | <i>(Continued)</i> |
| 5     | Youth Employment   | <ul style="list-style-type: none"> <li>• Providing training/awareness program for the local youth to let them aware about the required qualification to get involved in the Project related activities</li> </ul>  |                       |                    |                    |
| 6     | Public Communication, Consultation and Awareness   | <ul style="list-style-type: none"> <li>• Arranging public communication/consultation meeting</li> <li>• Sharing of Project information with local people</li> <li>• Organizing environmental and social awareness programs/meetings</li> </ul>   |                       |                    |                    |

**Table D: Checklist of Monitoring ESMP Implementation (During Construction phase)**  
**(Biodiversity and Sustainable Management of Living Natural Resources)**

| Sl No | Potential Impacts  | Proposed EMP   | Actual Implementation | Recommended Action | Compliance Status |
|-------|--|--|-----------------------|--------------------|-------------------|
| 1     | Runoff (contain mostly sediment load) from newly developed land falls into nearby river and channel. | <ul style="list-style-type: none"> <li>• Installation of proper run on/runoff drains</li> <li>• Use of sediment fences, traps and basins for trapping the sediment, if required</li> </ul>   |                       |                    |                   |
| 2     | Disturbance to nearby ecosystem due to different construction activities                             | <ul style="list-style-type: none"> <li>• No cutting/ felling of trees along the river bank</li> <li>• Implementation of on-site waste and air quality management plan</li> <li>• Limiting soil extraction activities limited within the defined area</li> <li>• Limiting the vegetation clearance and base stripping process within the Project boundary</li> <li>• Safety fence around the construction site</li> <li>• Limiting the use of night light</li> <li>• Using shade (directed downwards) around the outdoor lights</li> <li>• Provision of cut-off time to switch off unnecessary lights at night</li> <li>• Initiate Green plantation</li> <li>• No plantation of non-native species</li> <li>• Retaining top soil for future habitat restoration</li> <li>• No degradation of critical habitat?</li> </ul> |                       |                    |                   |
| 3     | Occupation of river, inter-tidal areas and wetlands  | <ul style="list-style-type: none"> <li>• No encroachment of inter-tidal flood plain area</li> <li>• No disturbance to Dolphin community</li> <li>• Monitoring of Ecosystem Health and Monitoring of Sundarbans Forest Health</li> <li>• If required, embankment should be constructed considering a setback distance from river/canal bank</li> <li>• Slope protection work along the Maidara River should be completed on an urgent basis before rainy season come and</li> <li>• BIFPCL may take initiatives of excavating of silted reach of Maidara river near proposed township area to facilitate proper functioning of River for maintaining tidal dynamics</li> </ul>  |                       |                    |                   |



## Appendix II: Photo Album

### Environmental and Socio-economic Monitoring of Khulna 2×660 MW Power Plant for 28<sup>th</sup> monitoring program (April, 2021)



Monitoring team



Morphometric data collection



Observing fishing activities



Data collection



Measuring noise level




Observing the fishing activities

## Appendix III: Terms of References (ToR)

### Background

Bangladesh-India friendship Power Company (Pvt.) Ltd. (BIFPCL), a 50:50 Joint Venture Company of Bangladesh Power Development Board (BPDB) of Bangladesh & NTPC Limited of India is implementing a coal based thermal power plant named 2X660 MW Maitree Super Thermal Power Project at Rampal in Bagerghat District of Khulna Division of Bangladesh. The plant is envisaged to be based on super critical technology and is to be operated as Base Load Plant. The fuel envisaged is imported coal.

### General Description of 2X660 MW Maitree Super Thermal Power Plant Project

|                                     |  |
|-------------------------------------|--|
| <b>Project Location:</b>            | <p>Upazila: Rampal, District: Bagerhat</p> <p>Site is located at 23 kms Southward of Khulna City and 14 kms. North-Eastward from Mongla Port.</p>   |
| <b>Project Capacity:</b>            | 1320 MW (2x660 MW), based on Ultra Super-critical Technology   |
| <b>Mode of Operation:</b>           | Base Load  |
| <b>Fuel:</b>                        | Imported Coal  |
| <b>Fuel Transportation:</b>         | It is envisaged that imported coal from countries like Indonesia, Australia shall be transported through bigger ships, up to trans-shipment point, from where the coal shall be transported through barges to the coal unloading jetty at the plant end. From jetty to the power plant coal shall be transported through coal conveyor system. |
| <b>Land &amp; Land Development:</b> | Based on the layout in the FR, it is estimated that approx. 575 acres of land will be required for the project. (375 Acres for Main Plant, 50 Acres for Township, 50 Acres for Jetty).   |

|   |  |
|---|--|
| <b>Evacuation of power:</b>                         | Provision of line bays in generation switchyard for one no. 400 kV Double Circuit line and one no. 230 kV Double Circuit line have been kept. The Power evacuation (transmission line) system from the Project shall be at 400 kV level and will be outside the scope of the Project. 400 kV is being introduced for the first time in Bangladesh. |
| <b>Expected Timeline for project implementation</b> | The first unit of capacity 660 MW is scheduled to be synchronised in 41 months from the date of NTP to the EPC contractor for the Power project. Commissioning of the first unit of capacity 660 MW is envisaged at an interval of 5 months thereafter.  |

### **Broad Scope of Works**

The study covers quarterly monitoring of different environmental and social parameters, and implementation of EMP (Environment Management Plan) during implementation phases as per DoE approval/requirement. The monitoring locations were selected based on physical activities, wind direction, sensitive receptors, etc. and were finalized through the consultation with DoE, Department of Fisheries (DoF), MPA and Forest Department (FD).

### **The Broad objectives of independent monitoring covers the following activities**

- Monitoring implementation of EMP and environmental compliance;
- Monitoring of ambient air quality, noise level and water quality;
- Monitoring of cropping pattern and soil quality;
- Monitoring of fisheries resources covering fish habitats, biodiversity, migration and production;
- Monitoring of ecosystem and biodiversity;
- Monitoring of the Sundarbans Forest Health; and
- Monitoring of socio-economic condition and livelihoods.
- To evaluate the project environmental performance as due to construction activities.

### **The main objectives of this works are**

- Monitoring of Social and Environmental parameters to update the baseline.
- Monitoring of Social and Environmental parameters during Implementation of the Project.
- Assistance to BIFPCL for implementation of Environmental Management Plan (EMP) during construction period.

- 
- The scope of work of the Independent Monitoring will include the following specific tasks
  - Develop specific monitoring indicators, checklists, and questionnaires to undertake independent monitoring (a preliminary list of monitoring indicators has been given in the EMP) in consultation with BIFPCL, DoE, Forest Department and the Financer;
  - Review and verify the implementation progress of various EMP elements, particularly, mitigation plan, compliance monitoring, environmental trainings, documentation, and grievance redress mechanism;
  - Physical aspects would cover air quality, noise level, water quality and land resources;
  - Biological environment includes fisheries resources, ecological resources, Sundarbans Reserve Forest (SRF) health conditions including WHS;
  - Environmental compliance monitoring includes Monitoring of Environmental and Social Management System Action Plan Implementation, monitoring of labour and working conditions, monitoring of community health, safety and security and monitoring of biodiversity and sustainable management of living natural resources.
  - To establish baseline environmental conditions;
  - Provide and monitor the environmental parameter during construction activities.
  - To detect adverse environmental impacts for river dredging and other activities of site development;
  - Provide technical assistance to the client for implementation of the EMP during the power plant construction at different sector of construction activities.
  - To demonstrate whether the environmental control measures are operating as per designed;
  - To provide data for emission inventories;
  - To provide data at regular intervals for dissemination to the stakeholders
  - To provide data for improvement and updating of the monitoring program;
  - To assist in investigating the event of a trigger level or emission limit value being crossed.
  - Update baseline data as per monitoring schedule and location.
  - Provide technical assistance to the client for implementation of the EMP during power plant construction.
  - Review the EIA document to evaluate the EMP measures incorporated in the contract to mitigate different social and environmental hazards and risks during construction of the Project
  - Submit progress reports to the client.
  - Physical observation to assess that all mitigation measures mentioned in EMP are carried out in all place.
  - Sampling and carrying out necessary analysis of Environmental parameter such as surface & ground water quality, air quality, noise, Biological Environment, Socio-economic environment, Sundarbans Forest health etc. according to the monitoring framework in construction phase.
  - Morphological changes of the adjacent river of the project will be influenced by the constructional activities. River bank erosion-accretion, drainage system, tidal inundation etc. will be investigate after regular intervals in the study area as per monitoring location of the EIA. The procedure of investigation and methodologies of analysis will be the same as pre-



construction phases. River bed pollution will be identified through this study during construction of the power plant.

- Monitoring of floral resources will be performed quarterly. The indicators and procedures of flora monitoring will be relatively same as earlier studies of this projects. Plant composition, canopy coverage, indigenous and exotic species, plant intensities will be the main monitoring indicators during construction phases.
- Monitoring of faunal resources will be performed quarterly at the construction period. Faunal resources survey will coincide with floral resources survey as it will provide more insight about the inter-dependency between flora and fauna in an ecosystem.
- Render any other related services as and when requested.
- Conduct community level consultation in a regular interval and disclose project level information.
- Keep liaison with different organization like Govt department, NGOs, and relevant stakeholders.

**The Monitoring parameter & associated indicator are given below**

| Monitoring Parameter     | Indicators                                      |
|--------------------------|---|
| Socio-economy            | Livelihood and Occupation                       |
|                          | Income and expenditure                          |
|                          | Displacement and Migration                      |
|                          | Cultural and heritage                           |
|                          | Health and sanitation                           |
|                          | Risks and accidental assessment                 |
|                          | Transportation and communication                |
|                          | Public and private Infrastructure development   |
| Ecology and Biodiversity | Bio-indicator Assessment                        |
|                          | Movement of indigenous/ native species          |
|                          | Envision of exotic species and regime dominance |
|                          | Species composition (Flora and Fauna)           |
|                          | Assessment the services of dependent ecosystem  |
| Agriculture              | Land use and canopy coverage                    |
|                          | Soil quality (Salinity, pH, OM,)                |
|                          | Cropping pattern and crop intensities           |
|                          | Irrigation and crop production                  |
|                          | Farmers survey result                           |
| Fisheries                | Fish diversity and specification                |
|                          | Fish production and availability                |
|                          | Fisher survey result                            |
| Noise level              | Sound level at the sensitive zone               |
| Water resources          | DO, BOD, COD, Salinity, TDS, TS, pH, Hg, Pb     |

| Monitoring Parameter | Indicators  |
|----------------------|---|
|                      | Total Hardness, Hg, NO <sub>3</sub> and PO <sub>4</sub> |
|                      | River Morphology,                                       |
|                      | Tidal inundation  |
|                      | Drainage Network  |
|                      | Erosion and Accretion                                   |
|                      | Ground water quality                                    |
| Air quality          | SO <sub>x</sub>   |
|                      | NO <sub>x</sub>   |
|                      | SPM (PM <sub>10</sub> and PM <sub>2.5</sub> )           |
|                      | CO  |

### Air quality monitoring progress

The most commonly used method for automatically monitoring air pollutant such as those above are:

- SO<sub>x</sub>: measured by Fluorescent signal generated by exiting SO<sub>2</sub> with UV light
- NO<sub>x</sub>: measured by Chemiluminescent reaction between NO<sub>x</sub> & O<sub>3</sub>
- O<sub>3</sub>: measured by ultra violet absorption analyzer, this determines the Ozone concentration by the attenuation of 254 nm UV light along this signal fixed path cell
- Particulate matter (SPM, PM<sub>10</sub>, PM<sub>2.5</sub>): measured by gravimetric methods including true micro weighing technology for automatic monitoring & instrument named 'Tapered element oscillating micro balance (TOEM)' has been most frequently used. Measurement on filter tape using the principles of beta attenuation for estimating 30 mnt or 1 hr average concentrations of PM<sub>10</sub> or PM<sub>2.5</sub> has also been used.
- CO: In urban air pollution studies, a non-disruptive infrared photo meter utilizing a gas filter co relation technology & state of the art optical & electronic technology is used to measure low concentration of CO accurately & reliably.

### Expected Output

A breach of a trigger level or emission limit values may indicate a significant increase of a contaminate concentration in an environmental medium.

Baseline Monitoring is monitoring in and around the location of a proposed site so as to establish background environmental conditions prior to any development of the proposed site. In case of existing facilities, baseline-monitoring serves as a reference point to which later monitoring results are compared. The information will be used to evaluate in future compliance monitoring.

Compliance monitoring is periodic monitoring and is to determine whether there is any release of contaminants to the environment and to demonstrate compliance within the project area. It includes measurements of process conditions, process emissions and levels in receiving environments and the reporting of the results of such measurements to demonstrate compliance with limits specified in the legislation.

The information provided by compliance monitoring is also valuable for other environmental and management activities (e.g. for optimizing process, protecting sensitive ecosystems and informing the public of the effectiveness of environmental protection measures).

Assessment monitoring is investigative monitoring which is initiated after detection of the impacts to the environment or on attaining a trigger level. The assessment monitoring will:

- Identify the source of release materials;



- Characterize the nature, extent and rate of releases;
- Evaluate the risk to the environment and to human health;
- Evaluate measures to prevent or minimize future releases;
- Provide information for the design and implementation of corrective measures and
- Express the residual environmental impacts for proper compensation.

**Reporting Requirements**

As it is proposed to carry out the monitoring program for two quarters and the proposed deliverables are scheduled below

| SL | Name  | No. of copies |
|----|---|---------------|
| 1  | Monitoring Report after each monitoring mission (each in one quarter) with complete data, analysis, lab. Results, discussion etc. as intended in the scope of work. | 12            |
| 2  | CD-ROM in respect of documents/datasheets   | 2             |

## Appendix IV: Monitoring Data

### (A) Air Quality Data

Table A1: Ambient Air Quality Monitoring Results

| Locations of Monitoring  | Pollutants        | 1 <sup>st</sup> QM, Apr 2014            | 2 <sup>nd</sup> QM, Jul 2014 | 3 <sup>rd</sup> QM, Oct 2014 | 4 <sup>th</sup> QM, Jan 2015 | 5 <sup>th</sup> QM, Apr 2015 | 6 <sup>th</sup> QM, Jul 2015 | 7 <sup>th</sup> QM, Oct 2015 | 8 <sup>th</sup> QM, Jan 2016 | 9 <sup>th</sup> QM, Apr 2016 | 10 <sup>th</sup> QM, Jul 2016 | 11 <sup>th</sup> QM, Oct 2016 | 12 <sup>th</sup> QM, Jan 2017 | 13 <sup>th</sup> QM, April, 2017 | 14 <sup>th</sup> QM, Oct, 2017 | 15 <sup>th</sup> QM Jan, 2018 | 16 <sup>th</sup> QM April, 2018 | 17 <sup>th</sup> QM, Jul 2018 | 18 <sup>th</sup> QM, Nov, 2018 | 19 <sup>th</sup> QM, Feb, 2019 | 20 <sup>th</sup> QM, Apr, 2019 | 21 <sup>st</sup> QM, Jul, 2019 | 22 <sup>nd</sup> QM, Jul, 2019 | 23 <sup>rd</sup> QM, Feb, 2020 | 25 <sup>th</sup> QM, July, 2020 | 26 <sup>th</sup> QM, Oct, 2020 | 27 <sup>th</sup> QM, Jan, 2021 | 28 <sup>th</sup> QM, April, 2021 | 28 <sup>th</sup> QM, Aug, 2021 | Bangladesh (DoE) Standard (ECR, 2005) |
|--------------------------|-------------------|---|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|----------------------------------|--------------------------------|-------------------------------|---------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|--------------------------------|--------------------------------|----------------------------------|--------------------------------|---------------------------------------|
| Weather                  |                   | Sunny                                   | Rainy/ Cloudy                | Sunny                        | Sunny                        | Sunny                        | Rainy/ Cloudy                | Sunny/ Rainy                 | Sunny                        | Sunny                        | Rainy/ Cloudy                 | Rainy/ Cloudy                 | Sunny                         | Sunny/ Cloudy                    | Sunny                          | Sunny                         | Sunny/ Cloudy                   | Rainy/ Cloudy                 | Sunny/ Cloudy                  | Sunny                          | Sunny                          | Sunny/ Cloudy                  | Sunny/ Cloudy                  | Sunny                          | Rainy/ Cloudy                   | Sunny                          | Sunny                          | Sunny                            | Sunny                          |                                       |
|                          |                   | Concentrations are in µg/m <sup>3</sup> |                              |                              |                              |                              |                              |                              |                              |                              |                               |                               |                               |                                  |                                |                               |                                 |                               |                                |                                |                                |                                |                                |                                |                                 |                                |                                |                                  |                                |                                       |
| SW Corner of the PP area | PM <sub>2.5</sub> | 33                                      | 37                           | 25                           | 33                           | 47                           | 25                           | 22                           | 34                           | 19                           | 5                             | 9                             | 24.8                          | 8.12                             | 28.2                           | 32.9                          | 28.4                            | 15.2                          | 31.1                           | 27.3                           | 21.7                           | 37.76                          | 51.32                          | 27.12                          | 18.71                           | 44.18                          | 55.35                          | 49.13                            | 38.25                          | 65 <sup>24hr</sup>                    |
|                          | PM <sub>10</sub>  | 78                                      | 77                           | 53                           | 79                           | 83                           | 35                           | 52                           | 135                          | 117                          | 32                            | 22                            | 79                            | 43.8                             | 73.6                           | 133                           | 70                              | 15.8                          | 106                            | 105.4                          | 98.2                           | 67.15                          | 127.65                         | 68.12                          | 80.28                           | 107.16                         | 106.13                         | 103.88                           | 59.17                          | 150 <sup>24hr</sup>                   |
|                          | SPM               | 207                                     | 239                          | 190                          | 200                          | 177                          | 42                           | 91                           | 175                          | 332                          | 51                            | 53                            | 115.7                         | 122.4                            | 169.4                          | 145.6                         | 121.5                           | 12.9                          | 137.4                          | 151.6                          | 128.6                          | 109.25                         | 183.56                         | 108.48                         | 98.26                           | 149.73                         | 163.48                         | 155.14                           | 99.44                          | 200 <sup>8hr</sup>                    |
|                          | SO <sub>2</sub>   | 21                                      | 24                           | 19                           | 23                           | 15                           | 52                           | 35                           | 14                           | 18                           | 9                             | 8                             | 9.5                           | 9.0                              | 7.2                            | 14.3                          | 11.4                            | 11.9                          | 12.7                           | 11.6                           | 13.9                           | 56.5                           | 31.53                          | 18.35                          | 19.91                           | 26.63                          | 14.74                          | 16.26                            | 14.49                          | 365 <sup>24hr</sup>                   |
|                          | NO <sub>x</sub>   | 26                                      | 29                           | 27                           | 31                           | 29                           | 35                           | 29                           | 18                           | 18                           | 12                            | 10                            | 11.3                          | 10.7                             | 7.5                            | 17.7                          | 12.8                            | 10.2                          | 14.8                           | 12.4                           | 16                             | 55.08                          | 24.97                          | 12.12                          | 8.82                            | 16.62                          | 37.16                          | 22.31                            | 19.87                          | 100 <sup>Annual</sup>                 |
|                          | CO                | 120                                     | 188                          | 140                          | 190                          | 144                          | 146                          | 88                           | 74                           | 57                           | 35                            | 119                           | 59                            | 91                               | 73                             | 61                            | 32                              | 11.1                          | 28                             | 15                             | 18                             | 4                              | 16                             | 28                             | 0                               | 2                              | 0                              | 0                                | 1                              | (10000) <sup>8hr</sup>                |
| Shapmari area            | O <sub>3</sub>    | 27                                      | 26                           | 19                           | 22                           | 26                           | 12                           | 5                            | 4                            | 1                            | 1                             | 1                             | 5                             | 03                               | 10                             | 03                            | 9                               | 13.2                          | 7                              | 9                              | 6                              | 25                             | 10                             | 8                              | 8                               | 8                              | 9                              | 16                               | 42                             | 157 <sup>8hr</sup>                    |
|                          | PM <sub>2.5</sub> | 39                                      | 48                           | 48                           | 39                           | 34                           | 18                           | 17                           | 35                           | 25                           | 3                             | 8                             | 25                            | 14.6                             | 8.5                            | 31.5                          | 26.7                            | 15.8                          | 35.7                           | 30.6                           | 18.9                           | 50.24                          | 19.34                          | 19.14                          | 20.35                           | 29.17                          | 52.74                          | 48.64                            | 41.2                           | 65 <sup>24hr</sup>                    |
|                          | PM <sub>10</sub>  | 814.69                                  | 90                           | 74                           | 102                          | 97                           | 31                           | 48                           | 116                          | 44                           | 11                            | 11                            | 99.5                          | 56.9                             | 40.4                           | 147.8                         | 52                              | 64.4                          | 109.9                          | 126.3                          | 106.1                          | 63.94                          | 82.27                          | 83.22                          | 71.06                           | 84.3                           | 112.04                         | 83.1                             | 64.28                          | 150 <sup>24hr</sup>                   |
|                          | SPM               | 2156.3                                  | 263                          | 217                          | 274                          | 266                          | 47                           | 79                           | 192                          | 187                          | 27                            | 23                            | 154.2                         | 136.7                            | 45.3                           | 181.4                         | 138.7                           | 113.4                         | 143.9                          | 168                            | 150.8                          | 123.56                         | 120.45                         | 106.35                         | 95.24                           | 119.22                         | 170.33                         | 139.26                           | 116.48                         | 200 <sup>8hr</sup>                    |
|                          | SO <sub>2</sub>   | 19                                      | 28                           | 22                           | 21                           | 22                           | 58                           | 27                           | 13                           | 11                           | 4                             | 6                             | 12.9                          | 10                               | 4.3                            | 15                            | 9.6                             | 10.8                          | 12.2                           | 12.3                           | 12.1                           | 31.53                          | 60.26                          | 27.41                          | 17.44                           | 14.15                          | 18.32                          | 14.06                            | 11.77                          | 365 <sup>24hr</sup>                   |
|                          | NO <sub>x</sub>   | 29                                      | 39                           | 27                           | 26                           | 24                           | 46                           | 25                           | 16                           | 22                           | 6                             | 8                             | 15.7                          | 11.8                             | 6                              | 18.6                          | 10.2                            | 13.1                          | 13.6                           | 13.8                           | 13.9                           | 24.97                          | 58.39                          | 18.77                          | 10.17                           | 14.18                          | 29.9                           | 21.65                            | 21.394                         | 100 <sup>Annual</sup>                 |
| NW Corner of             | CO                | 165                                     | 210                          | 230                          | 164                          | 136                          | 127                          | 102                          | 77                           | 22                           | 31                            | 108                           | 66                            | 78                               | 79                             | 69                            | 27                              | 25                            | 30                             | 21                             | 20                             | 4                              | 11                             | 44                             | 4                               | 0.013                          | 0                              | 0                                | 1                              | (10000) <sup>8hr</sup>                |
|                          | O <sub>3</sub>    | 33                                      | 26                           | 26                           | 23                           | 21                           | 16                           | 1                            | 1                            | 1                            | 0                             | 0                             | 1                             | 08                               | 25                             | 04                            | 4                               | 8                             | 6                              | 4                              | 1                              | 34                             | 22                             | 9                              | 6                               | 2                              | 6                              | 9                                | 28                             | 157 <sup>8hr</sup>                    |
| NW Corner of             | PM <sub>2.5</sub> | 37                                      | 44                           | 19                           | 42                           | 59                           | 28                           | 19                           | 24                           | 11                           | 3                             | 10                            | 29                            | 10.3                             | 15.2                           | 40.7                          | 27.7                            | 12.9                          | 32.3                           | 20.3                           | 14.2                           | 37.27                          | 33.2                           | 21.61                          | 21.93                           | 46.73                          | 68.26                          | 58.81                            | 22.66                          | 65 <sup>24hr</sup>                    |

| Locations of Monitoring  |                   |                              | Concentrations are in $\mu\text{g}/\text{m}^3$ |                              |                              |                              |                              |                              |                              |                              |                               |                               |                               |                                  |                                |                               |                                 |                               |                                |                                |                                |                                |                                |                                |                                 |                                |                                |                                  | Bangladesh (DoE) Standard (ECR, 2005) |                        |
|--------------------------|-------------------|------------------------------|--|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|----------------------------------|--------------------------------|-------------------------------|---------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|--------------------------------|--------------------------------|----------------------------------|---------------------------------------|------------------------|
| Weather                  | Pollutants        | 1 <sup>st</sup> QM, Apr 2014 | 2 <sup>nd</sup> QM, Jul 2014                   | 3 <sup>rd</sup> QM, Oct 2014 | 4 <sup>th</sup> QM, Jan 2015 | 5 <sup>th</sup> QM, Apr 2015 | 6 <sup>th</sup> QM, Jul 2015 | 7 <sup>th</sup> QM, Oct 2015 | 8 <sup>th</sup> QM, Jan 2016 | 9 <sup>th</sup> QM, Apr 2016 | 10 <sup>th</sup> QM, Jul 2016 | 11 <sup>th</sup> QM, Oct 2016 | 12 <sup>th</sup> QM, Jan 2017 | 13 <sup>th</sup> QM, April, 2017 | 14 <sup>th</sup> QM, Oct, 2017 | 15 <sup>th</sup> QM Jan, 2018 | 16 <sup>th</sup> QM April, 2018 | 17 <sup>th</sup> QM, Jul 2018 | 18 <sup>th</sup> QM, Nov, 2018 | 19 <sup>th</sup> QM, Feb, 2019 | 20 <sup>th</sup> QM, Apr, 2019 | 21 <sup>st</sup> QM, Jul, 2019 | 22 <sup>nd</sup> QM, Jul, 2019 | 23 <sup>rd</sup> QM, Feb, 2020 | 25 <sup>th</sup> QM, July, 2020 | 26 <sup>th</sup> QM, Oct, 2020 | 27 <sup>th</sup> QM, Jan, 2021 | 28 <sup>th</sup> QM, April, 2021 | 289h QM, Aug, 2021                    |                        |
|                          |                   | Sunny                        | Rainy/ Cloudy                                  | Sunny                        | Sunny                        | Sunny                        | Rainy/ Cloudy                | Sunny/ Rainy                 | Sunny                        | Sunny                        | Rainy/ Cloudy                 | Rainy/ Cloudy                 | Sunny                         | Sunny/ Cloudy                    | Sunny                          | Sunny                         | Sunny/ Cloudy                   | Rainy/ Cloudy                 | Sunny/ Cloudy                  | Sunny                          | Sunny                          | Sunny/ Cloudy                  | Sunny/ Cloudy                  | Sunny                          | Rainy/ Cloudy                   | Sunny                          | Sunny                          | Sunny                            | Sunny                                 | Sunny                  |
| the PP area              | PM <sub>10</sub>  | 67                           | 78   | 56                           | 98                           | 91                           | 96                           | 29                           | 125                          | 29                           | 24                            | 14                            | 108.7                         | 31.3                             | 49.9                           | 136.3                         | 100.1                           | 44.3                          | 117.4                          | 93.6                           | 58.7                           | 42.99                          | 1119.34                        | 77.69                          | 76.76                           | 110.43                         | 131.84                         | 97.61                            | 48.19                                 | 150 <sup>24hr</sup>    |
|                          | SPM               | 234                          | 217  | 157                          | 310                          | 244                          | 321                          | 66                           | 187                          | 115                          | 31                            | 35                            | 168                           | 91.7                             | 63.9                           | 161.7                         | 116.2                           | 76.3                          | 156.2                          | 125.5                          | 119.2                          | 60.45                          | 175.13                         | 100.04                         | 101.33                          | 160.3                          | 180.43                         | 161.8                            | 77.149                                | 200 <sup>8hr</sup>     |
|                          | SO <sub>2</sub>   | 19                           | 22   | 18                           | 27                           | 21                           | 56                           | 32                           | 13                           | 17                           | 4                             | 8                             | 12.2                          | 5.8                              | 7.5                            | 9.6                           | 13.2                            | 5.8                           | 13.4                           | 10.7                           | 11.6                           | 60.26                          | 54.02                          | 19.68                          | 16.21                           | 25.82                          | 16.19                          | 16.58                            | 13.58                                 | 365 <sup>24hr</sup>    |
|                          | NOx               | 23                           | 28   | 22                           | 32                           | 39                           | 43                           | 21                           | 18                           | 16                           | 5                             | 11                            | 14.7                          | 7.1                              | 9.2                            | 11.7                          | 14.3                            | 5.9                           | 15                             | 11.3                           | 13.5                           | 58.39                          | 43.45                          | 17.53                          | 10.55                           | 18.91                          | 34.1                           | 27.42                            | 20.49                                 | 100 <sup>Annual</sup>  |
|                          | CO                | 110                          | 178  | 110                          | 210                          | 140                          | 133                          | 87                           | 77                           | 38                           | 47                            | 127                           | 31                            | 74                               | 80                             | 45                            | 43                              | 21                            | 32                             | 20                             | 16                             | 7                              | 0                              | 30                             | 2                               | 0.012                          | 0                              | 0.2                              | 1                                     | (10000) <sup>8hr</sup> |
|                          | O <sub>3</sub>    | 25                           | 19   | 17                           | 36                           | 44                           | 11                           | 8                            | 2                            | 0                            | 1                             | 1                             | 3                             | 05                               | 10                             | 05                            | 7                               | 6                             | 8                              | 1                              | 5                              | 18                             | 2                              | 9                              | 8                               | 8                              | 12                             | 14                               | 17                                    | 157 <sup>8hr</sup>     |
| Barni, Gaurambha         | PM <sub>2.5</sub> | 39                           | 47   | 57                           | 39                           | 41                           | 34                           | 11                           | 29                           | 23                           | 9                             | 10                            | 21.7                          | 7.9                              | 13.8                           | 52.3                          | 18                              | 11.9                          | 15.4                           | 19.3                           | 19.7                           | 57.51                          | 31.28                          | 26.66                          | 18.04                           | 38.69                          | 61.29                          | 62.29                            | 21.8                                  | 65 <sup>24hr</sup>     |
|                          | PM <sub>10</sub>  | 103                          | 122  | 67                           | 97                           | 82                           | 65                           | 26                           | 97                           | 82                           | 45                            | 13                            | 105.4                         | 30.5                             | 30.2                           | 140                           | 30.5                            | 20.5                          | 50.1                           | 102                            | 69.9                           | 33.25                          | 69.32                          | 61.11                          | 59.02                           | 91.79                          | 93.36                          | 103.42                           | 50.26                                 | 150 <sup>24hr</sup>    |
|                          | SPM               | 233                          | 244  | 183                          | 277                          | 236                          | 79                           | 112                          | 176                          | 268                          | 69                            | 30                            | 167.8                         | 95.6                             | 57.2                           | 171.9                         | 90.6                            | 5.2                           | 113.5                          | 127.5                          | 92.2                           | 75.13                          | 102.17                         | 98.74                          | 82.02                           | 128.48                         | 159.8                          | 154.35                           | 83.2                                  | 200 <sup>8hr</sup>     |
|                          | SO <sub>2</sub>   | 21                           | 23   | 17                           | 22                           | 25                           | 41                           | 31                           | 16                           | 20                           | 10                            | 7                             | 12.2                          | 5.5                              | 4.1                            | 13.8                          | 6.1                             | 6.1                           | 9.5                            | 11.5                           | 12.6                           | 54.02                          | 59.33                          | 18.88                          | 24.29                           | 20.17                          | 16.47                          | 13.52                            | 14.44                                 | 365 <sup>24hr</sup>    |
|                          | NOx               | 25                           | 28   | 22                           | 26                           | 27                           | 44                           | 32                           | 21                           | 16                           | 12                            | 9                             | 19.3                          | 9.8                              | 5.0                            | 16.7                          | 7.3                             | 7.4                           | 10.7                           | 13.8                           | 13.8                           | 43.45                          | 57.02                          | 11.58                          | 10.62                           | 14.47                          | 21.18                          | 19.371                           | 19.48                                 | 100 <sup>Annual</sup>  |
|                          | CO                | 175                          | 210  | 190                          | 150                          | 196                          | 96                           | 96                           | 81                           | 73                           | 41                            | 98                            | 63                            | 85                               | 77                             | 59                            | 24                              | 20                            | 20                             | 17                             | 18                             | 6                              | 0                              | 32                             | 0                               | 0                              | 0                              | 0                                | 0                                     | (10000) <sup>8hr</sup> |
|                          | O <sub>3</sub>    | 26                           | 29   | 22                           | 19                           | 15                           | 9                            | 6                            | 4                            | 0                            | 0                             | 3                             | 5                             | 08                               | 6                              | 04                            | 6                               | 6                             | 2                              | 3                              | 4                              | 7                              | 52                             | 12                             | 8                               | 0                              | 6                              | 2                                | 19                                    | 157 <sup>8hr</sup>     |
| Chunkuri-2, Bajua Dacope | PM <sub>2.5</sub> | 35                           | 39   | 46                           | 37                           | 33                           | 35                           | 28                           | 31                           | 25                           | 7                             | 5                             | 25.2                          | 8.7                              | 17.3                           | 33.4                          | 11.4                            | 10.2                          | 26.8                           | 22.8                           | 15                             | 19.46                          | 33.74                          | 39.44                          | 18.22                           | 43.91                          | 59.18                          | 53.36                            | 33.27                                 | 65 <sup>24hr</sup>     |
|                          | PM <sub>10</sub>  | 77                           | 86   | 69                           | 68                           | 61                           | 109                          | 49                           | 98                           | 60                           | 23                            | 20                            | 74.4                          | 44.4                             | 100.2                          | 157.1                         | 40.6                            | 30.6                          | 105.9                          | 126.7                          | 72.7                           | 46.37                          | 78.27                          | 100.08                         | 59.91                           | 88.93                          | 117.42                         | 86.44                            | 61.9                                  | 150 <sup>24hr</sup>    |
|                          | SPM               | 117                          | 113  | 162                          | 183                          | 188                          | 175                          | 94                           | 167                          | 167                          | 31                            | 48                            | 162                           | 110.6                            | 127.8                          | 200                           | 108                             | 78.6                          | 128.5                          | 146.6                          | 117.6                          | 80.31                          | 100.95                         | 146.72                         | 146.72                          | 139.04                         | 188.27                         | 128.36                           | 104.29                                | 200 <sup>8hr</sup>     |
|                          | SO <sub>2</sub>   | 19                           | 24   | 21                           | 18                           | 11                           | 55                           | 33                           | 21                           | 13                           | 7                             | 9                             | 18.9                          | 8.2                              | 7.9                            | 19                            | 10.4                            | 7.5                           | 12.1                           | 12.4                           | 11.2                           | 45.81                          | 35.42                          | 36.14                          | 18.74                           | 29.94                          | 16.45                          | 19.66                            | 15.98                                 | 365 <sup>24hr</sup>    |
|                          | NOx               | 23                           | 26   | 27                           | 24                           | 18                           | 49                           | 23                           | 16                           | 25                           | 10                            | 8                             | 18                            | 11.2                             | 8.4                            | 20.7                          | 11.6                            | 8.4                           | 14                             | 13.8                           | 13.7                           | 44.92                          | 40.09                          | 20.04                          | 10.19                           | 18.32                          | 26.14                          | 24.21                            | 18.66                                 | 100 <sup>Annual</sup>  |
|                          | CO                | 190                          | 205  | 170                          | 170                          | 33                           | 133                          | 75                           | 70                           | 33                           | 38                            | 79                            | 36                            | 94                               | 69                             | 58                            | 42                              | 23                            | 27                             | 25                             | 20                             | 10                             | 0                              | 18                             | 10                              | 0                              | 0.1                            | 0.1                              | 0.8                                   | (10000) <sup>8hr</sup> |
|                          | O <sub>3</sub>    | 27                           | 24   | 18                           | 22                           | 41                           | 21                           | 2                            | 1                            | 1                            | 0                             | 2                             | 2                             | 03                               | 5                              | 05                            | 2                               | 4                             | 5                              | 9                              | 8                              | 2                              | 38                             | 22                             | 8                               | 0                              | 23                             | 28                               | 11                                    | 157 <sup>8hr</sup>     |
| Pankhali, Dacope         | PM <sub>2.5</sub> | 47                           | 49   | 57                           | 41                           | 39                           | 34                           | 25                           | 47                           | 15                           | 8                             | 10                            | 38.7                          | 15.8                             | 17                             | 72.3                          | 15.9                            | 11.1                          | 24.8                           | 28.6                           | 15.8                           | 24.03                          | 24.03                          | 33.26                          | 16.63                           | 33.32                          | 66.31                          | 42.62                            | 32.45                                 | 65 <sup>24hr</sup>     |
|                          | PM <sub>10</sub>  | 119                          | 127  | 139                          | 101                          | 105                          | 144                          | 62                           | 128                          | 46                           | 42                            | 18                            | 141.6                         | 105                              | 63.4                           | 208.9                         | 74.3                            | 58.4                          | 92                             | 125.8                          | 92.7                           | 56.56                          | 119.28                         | 127.52                         | 55.78                           | 74.83                          | 102.73                         | 73.29                            | 74.89                                 | 150 <sup>24hr</sup>    |
|                          | SPM               | 297                          | 266  | 254                          | 208                          | 299                          | 339                          | 183                          | 198                          | 114                          | 78                            | 34                            | 194.6                         | 179                              | 87.5                           | 223.9                         | 154.1                           | 98.4                          | 139                            | 178.2                          | 141.1                          | 93.5                           | 100.95                         | 160.02                         | 70.23                           | 111.95                         | 156.56                         | 116.73                           | 118.4                                 | 200 <sup>8hr</sup>     |
|                          | SO <sub>2</sub>   | 28                           | 31   | 31                           | 24                           | 30                           | 58                           | 36                           | 18                           | 9                            | 8                             | 8                             | 16.1                          | 12.9                             | 8                              | 16.3                          | 12.2                            | 9.4                           | 10.4                           | 13.3                           | 10.4                           | 59.41                          | 44.29                          | 30.89                          | 16.73                           | 21.39                          | 16.16                          | 13.1                             | 14.61                                 | 365 <sup>24hr</sup>    |
|                          | NOx               | 41                           | 39   | 36                           | 26                           | 27                           | 47                           | 23                           | 15                           | 19                           | 9                             | 9                             | 19                            | 18.7                             | 10.2                           | 17.7                          | 13.7                            | 12.1                          | 13.4                           | 14.9                           | 11.7                           | 51.09                          | 17.72                          | 19.02                          | 10.52                           | 12.12                          | 28.54                          | 17.18                            | 20.27                                 | 100 <sup>Annual</sup>  |
|                          | CO                | 230                          | 217  | 250                          | 188                          | 177                          | 125                          | 105                          | 101                          | 55                           | 29                            | 112                           | 48                            | 83                               | 87                             | 49                            | 34                              | 29                            | 30                             | 14                             | 14                             | 9                              | 0                              | 11                             | 0                               | 0                              | 1                              | 0                                | 1                                     | (10000) <sup>8hr</sup> |
|                          | O <sub>3</sub>    | 49                           | 38   | 36                           | 27                           | 11                           | 13                           | 5                            | 2                            | 2                            | 0                             | 0                             | 3                             | 06                               | 0                              | 06                            | 6                               | 8                             | 8                              | 8                              | 3                              | 22                             | 26                             | 2                              | 2                               | 4                              | 20                             | 2                                | 10                                    | 157 <sup>8hr</sup>     |
| Mongla                   | PM <sub>2.5</sub> | 47                           | 55   | 39                           | 41                           | 26                           | 33                           | 19                           | 34                           | 21                           | 9                             | 11                            | 25.7                          | 22.6                             | 33.2                           | 70.1                          | 23.2                            | 13.2                          | 30.3                           | 26.6                           | 35                             | 56.67                          | 39.69                          | 38.92                          | 41.33                           | 40.75                          | 74.19                          | 65.37                            | 22.54                                 | 65 <sup>24hr</sup>     |

| Locations of Monitoring |                   |       | 1 <sup>st</sup> QM, Apr 2014            | 2 <sup>nd</sup> QM, Jul 2014 | 3 <sup>rd</sup> QM, Oct 2014 | 4 <sup>th</sup> QM, Jan 2015 | 5 <sup>th</sup> QM, Apr 2015 | 6 <sup>th</sup> QM, Jul 2015 | 7 <sup>th</sup> QM, Oct 2015 | 8 <sup>th</sup> QM, Jan 2016 | 9 <sup>th</sup> QM, Apr 2016 | 10 <sup>th</sup> QM, Jul 2016 | 11 <sup>th</sup> QM, Oct 2016 | 12 <sup>th</sup> QM, Jan 2017 | 13 <sup>th</sup> QM, April, 2017 | 14 <sup>th</sup> QM, Oct, 2017 | 15 <sup>th</sup> QM Jan, 2018 | 16 <sup>th</sup> QM April, 2018 | 17 <sup>th</sup> QM, Jul 2018 | 18 <sup>th</sup> QM, Nov, 2018 | 19 <sup>th</sup> QM, Feb, 2019 | 20 <sup>th</sup> QM, Apr, 2019 | 21 <sup>st</sup> QM, Jul, 2019 | 22 <sup>nd</sup> QM, Jul, 2019 | 23 <sup>rd</sup> QM, Feb, 2020 | 25 <sup>th</sup> QM, July, 2020 | 26 <sup>th</sup> QM, Oct, 2020 | 27 <sup>th</sup> QM, Jan, 2021 | 28 <sup>th</sup> QM, April, 2021 | 289 <sup>h</sup> QM, Aug 2021 | Bangladesh (DoE) Standard (ECR, 2005) |
|-------------------------|-------------------|-------|---|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|----------------------------------|--------------------------------|-------------------------------|---------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|--------------------------------|--------------------------------|----------------------------------|-------------------------------|---------------------------------------|
| Weather                 | Pollutants        | Sunny | Rainy/ Cloudy                           | Sunny                        | Sunny                        | Sunny                        | Rainy/ Cloudy                | Sunny/ Rainy                 | Sunny                        | Sunny                        | Rainy/ Cloudy                | Rainy/ Cloudy                 | Sunny                         | Sunny/ Cloudy                 | Sunny                            | Sunny                          | Sunny/ Cloudy                 | Rainy/ Cloudy                   | Sunny/ Cloudy                 | Sunny                          | Sunny                          | Sunny/ Cloudy                  | Sunny/ Cloudy                  | Sunny                          | Rainy/ Cloudy                  | Sunny                           | Sunny                          | Sunny                          | Sunny                            |                               |                                       |
|                         |                   |       | Concentrations are in µg/m <sup>3</sup> |                              |                              |                              |                              |                              |                              |                              |                              |                               |                               |                               |                                  |                                |                               |                                 |                               |                                |                                |                                |                                |                                |                                |                                 |                                |                                |                                  |                               |                                       |
| Port area               | PM <sub>10</sub>  | 139   | 174                                     | 77                           | 82                           | 35                           | 52                           | 33                           | 132                          | 45                           | 29                           | 15                            | 119.3                         | 93.6                          | 97                               | 209.1                          | 89.9                          | 47.5                            | 103.7                         | 109.3                          | 131                            | 119                            | 64.12                          | 119.61                         | 126.13                         | 114.61                          | 118.67                         | 129.71                         | 64.44                            | 150 <sup>24hr</sup>           |                                       |
|                         | SPM               | 288   | 303                                     | 197                          | 217                          | 214                          | 118                          | 65                           | 189                          | 144                          | 50                           | 6                             | 172.3                         | 196                           | 187.2                            | 242                            | 144.7                         | 73.7                            | 161.9                         | 157.1                          | 183.1                          | 192.17                         | 83.9                           | 173.36                         | 166.16                         | 152.76                          | 201.16                         | 180.22                         | 85.2                             | 200 <sup>8hr</sup>            |                                       |
|                         | SO <sub>2</sub>   | 27    | 28                                      | 26                           | 24                           | 14                           | 45                           | 36                           | 16                           | 10                           | 8                            | 7                             | 16.8                          | 10.5                          | 8.2                              | 15.5                           | 11.8                          | 6.5                             | 12                            | 10.8                           | 16.8                           | 59.33                          | 57.24                          | 31.33                          | 22.04                          | 20.06                           | 12.26                          | 18.91                          | 10.28                            | 365 <sup>24hr</sup>           |                                       |
|                         | NOx               | 44    | 39                                      | 33                           | 27                           | 17                           | 40                           | 20                           | 13                           | 14                           | 10                           | 8                             | 15.3                          | 15.1                          | 10.7                             | 18.4                           | 13.2                          | 7.2                             | 16.8                          | 12.6                           | 17.8                           | 57.02                          | 46.58                          | 13.34                          | 11.29                          | 9.69                            | 19.25                          | 30.2                           | 19.73                            | 100 <sup>Annual</sup>         |                                       |
|                         | CO                | 230   | 320                                     | 220                          | 211                          | 24                           | 110                          | 84                           | 71                           | 29                           | 31                           | 97                            | 44                            | 72                            | 79                               | 52                             | 29                            | 20                              | 33                            | 28                             | 17                             | 15                             | 48                             | 29                             | 24                             | 0                               | 2                              | 0.9                            | 2                                | (10000) <sup>8hr</sup>        |                                       |
|                         | O <sub>3</sub>    | 57    | 52                                      | 37                           | 26                           | 09                           | 15                           | 8                            | 3                            | 1                            | 2                            | 1                             | 4                             | 04                            | 9                                | 02                             | 3                             | 1                               | 9                             | 7                              | 3                              | 5                              | 40                             | 4                              | 2                              | 1                               | 66                             | 91                             | 23                               | 157 <sup>8hr</sup>            |                                       |
| Harbaria, Sundarbans    | PM <sub>2.5</sub> | 19    | 22                                      | 33                           | 27                           | 24                           | 27                           | 24                           | 26                           | 13                           | 6                            | 10                            | 19.2                          | 10.5                          | 28.3                             | 43.5                           | 11.6                          | 11.4                            | 20.6                          | 15.4                           | 14.2                           | 28.03                          | 39.69                          | 17.81                          | 20.11                          | 34.42                           | 53.28                          | 46.13                          | 34.94                            | 65 <sup>24hr</sup>            |                                       |
|                         | PM <sub>10</sub>  | 41    | 39                                      | 59                           | 56                           | 49                           | 42                           | 50                           | 82                           | 42                           | 20                           | 14                            | 85.2                          | 36.7                          | 89.9                             | 152.4                          | 29.1                          | 24.3                            | 80.5                          | 92.6                           | 63.9                           | 21.85                          | 64.12                          | 63.27                          | 62.24                          | 79.38                           | 100.11                         | 82.83                          | 61.53                            | 150 <sup>24hr</sup>           |                                       |
|                         | SPM               | 111   | 117                                     | 129                          | 139                          | 109                          | 70                           | 73                           | 159                          | 91                           | 43                           | 44                            | 93.5                          | 103.7                         | 107                              | 189.9                          | 72.4                          | 47.6                            | 90.3                          | 118.3                          | 90.9                           | 48.09                          | 83.9                           | 87.51                          | 87.71                          | 122.94                          | 146.2                          | 133.1                          | 108.74                           | 200 <sup>8hr</sup>            |                                       |
|                         | SO <sub>2</sub>   | 9     | 10                                      | 14                           | 12                           | 16                           | 51                           | 34                           | 15                           | 11                           | 6                            | 7                             | 11.9                          | 5.7                           | 7.6                              | 13.2                           | 7.9                           | 4.9                             | 11.6                          | 9.5                            | 11.6                           | 49.72                          | 57.24                          | 16.47                          | 13.31                          | 19.74                           | 14.66                          | 16.58                          | 14.75                            | 365 <sup>24hr</sup>           |                                       |
|                         | NOx               | 19    | 22                                      | 27                           | 18                           | 22                           | 34                           | 22                           | 14                           | 16                           | 8                            | 10                            | 13                            | 7.7                           | 9.3                              | 15.2                           | 8.3                           | 5.4                             | 13                            | 10.1                           | 13                             | 41.91                          | 46.58                          | 9.9                            | 8.13                           | 10.16                           | 21.44                          | 0                              | 23.28                            | 100 <sup>Annual</sup>         |                                       |
|                         | CO                | 65    | 58                                      | 70                           | 64                           | 56                           | 112                          | 81                           | 62                           | 47                           | 32                           | 110                           | 67                            | 73                            | 84                               | 57                             | 31                            | 20                              | 20                            | 25                             | 16                             | 16                             | 48                             | 30                             | 8                              | 0                               | 0                              | 3                              | 1                                | (10000) <sup>8hr</sup>        |                                       |
| Akram Point, Sundarbans | O <sub>3</sub>    | 13    | 12                                      | 13                           | 11                           | 14                           | 12                           | 4                            | 2                            | 2                            | 0                            | 1                             | 4                             | 08                            | 0                                | 02                             | 2                             | 6                               | 4                             | 3                              | 5                              | 8                              | 40                             | 12                             | 22                             | 3                               | 6                              | 46.13                          | 9                                | 157 <sup>8hr</sup>            |                                       |
|                         | PM <sub>2.5</sub> | 17    | 19                                      | 23                           | 18                           | 49                           | NO                           | 25                           | 18                           | 9                            | 4                            | 4                             | 14.3                          | 13.2                          | 7.5                              | 35.4                           | 13.7                          | 14                              | 29.1                          | 16.2                           | 13                             | 19.68                          | 36.67                          | 23.04                          | 13.16                          | 22.74                           | 48.2                           | 41.33                          | 39.16                            | 65 <sup>24hr</sup>            |                                       |
|                         | PM <sub>10</sub>  | 39    | 44                                      | 32                           | 39                           | 77                           | NO                           | 32                           | 77                           | 31                           | 15                           | 14                            | 85.5                          | 96.0                          | 37.8                             | 150.6                          | 36.4                          | 41.6                            | 100.2                         | 93.2                           | 51.9                           | 43                             | 87.15                          | 82.91                          | 58.82                          | 56.74                           | 90.12                          | 84.16                          | 76.18                            | 150 <sup>24hr</sup>           |                                       |
|                         | SPM               | 114   | 133                                     | 97                           | 88                           | 102                          | NO                           | 51                           | 128                          | 46                           | 23                           | 27                            | 90.9                          | 137.0                         | 41.8                             | 175.1                          | 90.3                          | 58                              | 121.4                         | 117.8                          | 71.1                           | 83.9                           | 122.62                         | 121.68                         | 78.8                           | 80.31                           | 144.95                         | 131.46                         | 123.59                           | 200 <sup>8hr</sup>            |                                       |
|                         | SO <sub>2</sub>   | 7     | 9                                       | 12                           | 13                           | 21                           | NO                           | 27                           | 14                           | 9                            | 4                            | 6                             | 8.4                           | 6                             | 5.8                              | 14                             | 8.3                           | 6.3                             | 10.8                          | 10.1                           | 8.9                            | 57.24                          | 35.23                          | 24.21                          | 15.06                          | 12.74                           | 15.05                          | 17.44                          | 16.55                            | 365 <sup>24hr</sup>           |                                       |
|                         | NOx               | 17    | 19                                      | 22                           | 17                           | 27                           | NO                           | 19                           | 15                           | 10                           | 5                            | 6                             | 12.7                          | 10.1                          | 5.9                              | 15.1                           | 9.9                           | 9.3                             | 11.7                          | 11.3                           | 9.4                            | 46.58                          | 31.26                          | 16.74                          | 10.47                          | 6.64                            | 20.6                           | 23.5                           | 21.28                            | 100 <sup>Annual</sup>         |                                       |
| Hiron Point, Sundarbans | CO                | 49    | 60                                      | 50                           | 46                           | 163                          | NO                           | 92                           | 64                           | 21                           | 37                           | 101                           | 58                            | 79                            | 69                               | 52                             | 21                            | 25                              | 28                            | 17                             | 14                             | 38                             | 24                             | 20                             | 14                             | 0                               | 0.2                            | 0                              | 2                                | (10000) <sup>8hr</sup>        |                                       |
|                         | O <sub>3</sub>    | 11    | 14                                      | 9                            | 10                           | 27                           | NO                           | 8                            | 1                            | 0                            | 0                            | 2                             | 3                             | 0                             | 0                                | 03                             | 3                             | 4                               | 5                             | 3                              | 1                              | 9                              | 90                             | 2                              | 4                              | 6                               | 8                              | 8                              | 11                               | 157 <sup>8hr</sup>            |                                       |
|                         | PM <sub>2.5</sub> | 15    | 23                                      | 19                           | 17                           | 28                           | NO                           | 27                           | NO                           | 17                           | NO                           | 9                             | 21.7                          | NO                            | 17.0                             | 40.5                           | NO                            | NO                              | 23.4                          | 18.2                           | NO                             | NO                             | 27.76                          | 17.39                          | NO                             | 28.15                           | 55.71                          | NO                             | 25.3                             | 65 <sup>24hr</sup>            |                                       |
|                         | PM <sub>10</sub>  | 44    | 38                                      | 34                           | 41                           | 60                           | NO                           | 45                           | NO                           | 40                           | NO                           | 14                            | 104.5                         | NO                            | 92.1                             | 149.8                          | NO                            | NO                              | 86.7                          | 96.1                           | NO                             | NO                             | 67.89                          | 72.45                          | NO                             | 59.31                           | 99.64                          | NO                             | 59.7                             | 150 <sup>24hr</sup>           |                                       |
|                         | SPM               | 101   | 119                                     | 107                          | 97                           | 110                          | NO                           | 88                           | NO                           | 132                          | NO                           | 26                            | 111.4                         | NO                            | 102                              | 173.7                          | NO                            | NO                              | 107.9                         | 127.8                          | NO                             | NO                             | 90.31                          | 94.28                          | NO                             | 91.06                           | 155.39                         | NO                             | 94.7                             | 200 <sup>8hr</sup>            |                                       |
|                         | SO <sub>2</sub>   | 8     | 7                                       | 13                           | 14                           | 15                           | NO                           | 28                           | NO                           | 15                           | NO                           | 9                             | 13.5                          | NO                            | 6                                | 15.8                           | NO                            | NO                              | 10.6                          | 10.7                           | NO                             | NO                             | 45.81                          | 13.33                          | NO                             | 11.36                           | 16.2                           | NO                             | 13.92                            | 365 <sup>24hr</sup>           |                                       |
|                         | NOx               | 18    | 18                                      | 19                           | 22                           | 20                           | NO                           | 23                           | NO                           | 19                           | NO                           | 9                             | 15.9                          | NO                            | 7.8                              | 18.1                           | NO                            | NO                              | 12.5                          | 10.9                           | NO                             | NO                             | 44.92                          | 8.65                           | NO                             | 9.74                            | 23.53                          | NO                             | 20.06                            | 100 <sup>Annual</sup>         |                                       |
|                         | CO                | 52    | 62                                      | 65                           | 60                           | 60                           | NO                           | 93                           | NO                           | 40                           | NO                           | 121                           | 43                            | NO                            | 72                               | 71                             | NO                            | NO                              | 22                            | 21                             | NO                             | NO                             | 2                              | 36                             | NO                             | 0                               | 0                              | NO                             | 0                                | (10000) <sup>8hr</sup>        |                                       |
|                         | O <sub>3</sub>    | 14    | 13                                      | 11                           | 9                            | 23                           | NO                           | 2                            | NO                           | 0                            | NO                           | 0                             | 4                             | NO                            | 0                                | 04                             | NO                            | NO                              | 6                             | 6                              | NO                             | NO                             | 16                             | 7                              | NO                             | 1                               | 11                             | NO                             | 14                               | 157 <sup>8hr</sup>            |                                       |
|                         | PM <sub>2.5</sub> | 54    | 39                                      | 52                           | 42                           | 55                           | 46                           | 19                           | 35                           | 11                           | 16                           | 9                             | 34.6                          | 23.1                          | 19.5                             | 78.7                           | 12.4                          | 12.5                            | 21.3                          | 20.8                           | 33                             | 38.59                          | 18.65                          | 40.22                          | 46.73                          | 48.32                           | 88.71                          | 71.2                           | 29.47                            | 65 <sup>24hr</sup>            |                                       |

| Locations of Monitoring                 | Weather | Pollutants        | Concentrations are in $\mu\text{g}/\text{m}^3$ |                              |                              |                              |                              |                              |                              |                              |                              |                               |                               |                               |                                  |                                |                               |                                 |                               |                                |                                |                                |                                |                                |                                |                                 |                                |                                |                                  |                                | Bangladesh (DoE) Standard (ECR, 2005) |
|---|---------|-------------------|--|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|----------------------------------|--------------------------------|-------------------------------|---------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|--------------------------------|--------------------------------|----------------------------------|--------------------------------|---------------------------------------|
|   |         |                   | 1 <sup>st</sup> QM, Apr 2014                   | 2 <sup>nd</sup> QM, Jul 2014 | 3 <sup>rd</sup> QM, Oct 2014 | 4 <sup>th</sup> QM, Jan 2015 | 5 <sup>th</sup> QM, Apr 2015 | 6 <sup>th</sup> QM, Jul 2015 | 7 <sup>th</sup> QM, Oct 2015 | 8 <sup>th</sup> QM, Jan 2016 | 9 <sup>th</sup> QM, Apr 2016 | 10 <sup>th</sup> QM, Jul 2016 | 11 <sup>th</sup> QM, Oct 2016 | 12 <sup>th</sup> QM, Jan 2017 | 13 <sup>th</sup> QM, April, 2017 | 14 <sup>th</sup> QM, Oct, 2017 | 15 <sup>th</sup> QM Jan, 2018 | 16 <sup>th</sup> QM April, 2018 | 17 <sup>th</sup> QM, Jul 2018 | 18 <sup>th</sup> QM, Nov, 2018 | 19 <sup>th</sup> QM, Feb, 2019 | 20 <sup>th</sup> QM, Apr, 2019 | 21 <sup>st</sup> QM, Jul, 2019 | 22 <sup>nd</sup> QM, Jul, 2019 | 23 <sup>rd</sup> QM, Feb, 2020 | 25 <sup>th</sup> QM, July, 2020 | 26 <sup>th</sup> QM, Oct, 2020 | 27 <sup>th</sup> QM, Jan, 2021 | 28 <sup>th</sup> QM, April, 2021 | 28 <sup>th</sup> QM, Aug, 2021 |                                       |
| Khulna City, near Khan Jahan Ali Bridge |         | PM <sub>10</sub>  | 139  | 117                          | 91                           | 84                           | 75                           | 89                           | 49                           | 112                          | 69                           | 68                            | 24                            | 145.9                         | 99.5                             | 39.6                           | 213.9                         | 38.8                            | 45.4                          | 57.9                           | 91.3                           | 125.9                          | 47.05                          | 59.19                          | 116.16                         | 119.11                          | 109.63                         | 159.22                         | 120.38                           | 64.44                          | 150 <sup>24hr</sup>                   |
|   |         | SPM               | 301  | 287                          | 239                          | 219                          | 222                          | 181                          | 101                          | 181                          | 112                          | 107                           | 64                            | 189.7                         | 187.2                            | 127.9                          | 243.4                         | 78.9                            | 69.9                          | 102.9                          | 158                            | 173.4                          | 100.95                         | 78.09                          | 157.28                         | 167.18                          | 157.35                         | 240.18                         | 193.61                           | 101.85                         | 200 <sup>8hr</sup>                    |
|   |         | SO <sub>2</sub>   | 33   | 29                           | 33                           | 28                           | 31                           | 59                           | 28                           | 16                           | 11                           | 10                            | 10                            | 17.1                          | 7.2                              | 7.1                            | 21                            | 7.5                             | 7.5                           | 8.7                            | 10.4                           | 15.3                           | 35.42                          | 49.72                          | 28.31                          | 30.73                           | 29.58                          | 18.8                           | 20.64                            | 12.73                          | 365 <sup>24hr</sup>                   |
|   |         | NO <sub>x</sub>   | 49   | 41                           | 39                           | 36                           | 33                           | 38                           | 26                           | 16                           | 15                           | 15                            | 14                            | 18.6                          | 11.7                             | 8.8                            | 25                            | 8.4                             | 11.1                          | 9.7                            | 11.1                           | 17.1                           | 40.09                          | 41.91                          | 24.14                          | 24.24                           | 20.44                          | 34.2                           | 28.35                            | 20.45                          | 100 <sup>Annual</sup>                 |
|   |         | CO                | 330  | 370                          | 330                          | 296                          | 101                          | 89                           | 94                           | 98                           | 68                           | 36                            | 104                           | 66                            | 79                               | 81                             | 69                            | 36                              | 28                            | 121                            | 19                             | 23                             | 11                             | 24                             | 32                             | 18                              | 0.7                            | 2                              | 3                                | 4                              | (10000) <sup>8hr</sup>                |
|   |         | O <sub>3</sub>    | 59   | 67                           | 57                           | 39                           | 21                           | 7                            | 4                            | 2                            | 1                            | 0                             | 2                             | 3                             | 07                               | 07                             | 09                            | 9                               | 7                             | 4                              | 5                              | 6                              | 6                              | 18                             | 10                             | 4                               | 0                              | 80                             | 63                               | 21                             | 157 <sup>8hr</sup>                    |
| Township area                           |         | PM <sub>2.5</sub> | x  | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                             | x                             | x                             | x                                | x                              | x                             | 29.1                            | 13.7                          | 28.6                           | 21.2                           | 17.2                           | 21.24                          | 29.64                          | 44.26                          | 22.08                           | 41.29                          | 166.72                         | 67.82                            | 59.2                           | 65 <sup>24hr</sup>                    |
|   |         | PM <sub>10</sub>  | x  | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                             | x                             | x                             | x                                | x                              | x                             | 70.3                            | 60.8                          | 111.7                          | 88.7                           | 61.6                           | 96.71                          | 98.15                          | 122.73                         | 86.26                           | 97.16                          | 234.41                         | 108.16                           | 94.6                           | 150 <sup>24hr</sup>                   |
|   |         | SPM               | x  | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                             | x                             | x                             | x                                | x                              | x                             | 120.6                           | 98.1                          | 144.6                          | 129.4                          | 102.5                          | 127.79                         | 127.79                         | 171.29                         | 111.73                          | 142.36                         | 347.39                         | 170.37                           | 158                            | 200 <sup>8hr</sup>                    |
|   |         | SO <sub>2</sub>   | x  | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                             | x                             | x                             | x                                | x                              | x                             | 13.1                            | 8.4                           | 10.2                           | 11.3                           | 7.9                            | 9.32                           | 19.32                          | 34.12                          | 20.61                           | 21.73                          | 18.61                          | 23.72                            | 19.7                           | 365 <sup>24hr</sup>                   |
|   |         | NO <sub>x</sub>   | x  | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                             | x                             | x                             | x                                | x                              | x                             | 14                              | 9                             | 11.6                           | 12.1                           | 11.9                           | 15.63                          | 15.63                          | 21.72                          | 11.17                           | 13.36                          | 33.48                          | 34.49                            | 27.3                           | 100 <sup>Annual</sup>                 |
|   |         | CO                | x  | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                             | x                             | x                             | x                                | x                              | x                             | 46                              | 32                            | 30                             | 18                             | 21                             | 9                              | 0                              | 18                             | 2                               | 0                              | 3                              | 1                                | 1                              | (10000) <sup>8hr</sup>                |
| Access road bridge                      |         | O <sub>3</sub>    | x  | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                             | x                             | x                             | x                                | x                              | x                             | 9                               | 4                             | 9                              | 1                              | 5                              | 19                             | 11                             | 4                              | 2                               | 0                              | 212                            | 108                              | 92                             | 157 <sup>8hr</sup>                    |
|   |         | PM <sub>2.5</sub> | x  | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                             | x                             | x                             | x                                | x                              | x                             | 33.1                            | 20.9                          | 40.9                           | 26.9                           | 36.1                           | 39.65                          | 14.65                          | 26.26                          | 20.16                           | 38.72                          | 94.23                          | 64.73                            | 52.2                           | 65 <sup>24hr</sup>                    |
|   |         | PM <sub>10</sub>  | x  | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                             | x                             | x                             | x                                | x                              | x                             | 118.1                           | 83.7                          | 128.3                          | 112.9                          | 137                            | 142.84                         | 79.92                          | 91.39                          | 78.69                           | 93.48                          | 188.64                         | 119.73                           | 96.1                           | 150 <sup>24hr</sup>                   |
|   |         | SPM               | x  | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                             | x                             | x                             | x                                | x                              | x                             | 142.5                           | 106.2                         | 177.8                          | 168.2                          | 163.2                          | 171.2                          | 109.25                         | 126.13                         | 102.03                          | 136.66                         | 269.3                          | 173.92                           | 151                            | 200 <sup>8hr</sup>                    |
|   |         | SO <sub>2</sub>   | x  | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                             | x                             | x                             | x                                | x                              | x                             | 12.2                            | 10.9                          | 13.4                           | 12.5                           | 15.7                           | 17.37                          | 56.5                           | 16.16                          | 18.82                           | 18.11                          | 20.23                          | 19.16                            | 13.3                           | 365 <sup>24hr</sup>                   |
|   |         | NO <sub>x</sub>   | x  | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                             | x                             | x                             | x                                | x                              | x                             | 14.8                            | 13.4                          | 15                             | 13                             | 17.6                           | 21.32                          | 55.08                          | 9.04                           | 9.22                            | 9.92                           | 26.3                           | 23.74                            | 20.1                           | 100 <sup>Annual</sup>                 |
|   |         | CO                | x  | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                             | x                             | x                             | x                                | x                              | x                             | 38                              | 34                            | 32                             | 23                             | 21                             | 8                              | 0                              | 22                             | 0                               | 0                              | 0.8                            | 0.2                              | 2                              | (10000) <sup>8hr</sup>                |
|   |         | O <sub>3</sub>    | x  | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                            | x                             | x                             | x                             | x                                | x                              | x                             | 5                               | 7                             | 9                              | 6                              | 7                              | 6                              | 6                              | 6                              | 8                               | 2                              | 68                             | 46                               | 16                             | 157 <sup>8hr</sup>                    |

Note(s): Concentrations are in  $\mu\text{g}/\text{m}^3$

- DoE- Department of Environment, NF- Not found; NO-Not observed; x-not measured at pre-construction stage.
- Fine Particulate Matter (PM<sub>2.5</sub>), Respirable Dust Content (PM<sub>10</sub>), Suspended Particulate Matter (SPM), Oxides of Nitrogen (NO<sub>x</sub>). Sulfur dioxide (SO<sub>2</sub>), Carbone Monoxide (CO) & Ozone (O<sub>3</sub>);
- Standards for 1hr, 24hr or Annual are indicated using superscript;
- This monitoring was carried out by - Respirable Dust Sampler (Model-Envirotech India APM-460BL) and Fine Particulate Sampler (Model-Envirotech India APM-550).
- All data presented here are 8 hrs. Monitoring data.

Table A.2: Baseline conditions of emission of different infrastructures and sources

| Sampling Locations               | Criteria Pollutant | Cement Industry | Condensate Fractionating Plant | LPG Bottling Plant | Brick Field | Road Traffic | Small vessels, engine boat | Inland Water Cargo vessel | Sea going Mother Vessel (MV) | Fly ash Carrier | Clinkers Carrier | Clinker, Fly Ash Handling | Coal Carrier (MV) | Coal Ash Carrier (MV) | Coal Carrier (Lighter Vessel) | Coal Ash Carrier (Lighter Vessel) | Coal Loading and Unloading | Coal Handling (Stock Yard, Conveyor belt, etc) | BIF Power Plant (PP) | Other Coal Based PP | Other Fuel Based PP | Dredging and Land Filling | Earth excavation | Other Construction Activities | Residential sources |
|----------------------------------|--------------------|-----------------|--------------------------------|--------------------|-------------|--------------|----------------------------|---------------------------|------------------------------|-----------------|------------------|---------------------------|-------------------|-----------------------|-------------------------------|-----------------------------------|----------------------------|--|----------------------|---------------------|---------------------|---------------------------|------------------|-------------------------------|---------------------|
| SW Corner of the PP area         | PM                 | ✓               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | ✓                         | X                | ✓                             | ✓                   |
|                                  | SOx                | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
|                                  | NOx                | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
|                                  | GHGs               | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
| Proposed Township area of the PP | PM                 | ✓               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | ✓                         | X                | X                             | ✓                   |
|                                  | SOx                | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
|                                  | NOx                | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
|                                  | GHGs               | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
| NW Corner of the PP area         | PM                 | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | ✓                         | X                | X                             | ✓                   |
|                                  | SOx                | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
|                                  | NOx                | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
|                                  | GHGs               | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
| Barni, Gaurambha                 | PM                 | X               | X                              | X                  | X           | ✓            | X                          | X                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | ✓                             | ✓                   |
|                                  | SOx                | X               | X                              | X                  | X           | ✓            | X                          | X                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
|                                  | NOx                | X               | X                              | X                  | X           | ✓            | X                          | X                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
|                                  | GHGs               | X               | X                              | X                  | X           | ✓            | X                          | X                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
| Chunkuri-2, Dacope               | PM                 | ✓               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
|                                  | SOx                | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
|                                  | NOx                | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
|                                  | GHGs               | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
| Pankhali, Dacope                 | PM                 | ✓               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | ✓                             | ✓                   |
|                                  | SOx                | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
|                                  | NOx                | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
|                                  | GHGs               | X               | X                              | X                  | X           | ✓            | ✓                          | ✓                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | ✓                   |
| Mongla Port area                 | PM                 | ✓               | ✓                              | ✓                  | X           | ✓            | ✓                          | ✓                         | ✓                            | ✓               | ✓                | ✓                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | ✓                   | X                         | X                | X                             | ✓                   |
|                                  | SOx                | X               | ✓                              | X                  | X           | ✓            | ✓                          | ✓                         | ✓                            | ✓               | ✓                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | ✓                   | X                         | X                | ✓                             | ✓                   |
|                                  | NOx                | X               | ✓                              | X                  | X           | ✓            | ✓                          | ✓                         | ✓                            | ✓               | ✓                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | ✓                   | X                         | X                | X                             | ✓                   |
|                                  | GHGs               | X               | ✓                              | X                  | X           | ✓            | ✓                          | ✓                         | ✓                            | ✓               | ✓                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | ✓                   | X                         | X                | X                             | ✓                   |
| Harbaria, Sundarbans             | PM                 | X               | X                              | X                  | X           | X            | ✓                          | ✓                         | ✓                            | ✓               | ✓                | ✓                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | X                   |

| Sampling Locations                      | Criteria Pollutant | Cement Industry | Condensate Fractionating Plant | LPG Bottling Plant | Brick Field | Road Traffic | Small vessels, engine boat | Inland Water Cargo vessel | Sea going Mother Vessel (MV) | Fly ash Carrier | Clinkers Carrier | Clinker, Fly Ash Handling | Coal Carrier (MV) | Coal Ash Carrier (MV) | Coal Carrier (Lighter Vessel) | Coal Ash Carrier (Lighter Vessel) | Coal Loading and Unloading | Coal Handling (Stock Yard, Conveyor belt, etc) | BIF Power Plant (PP) | Other Coal Based PP | Other Fuel Based PP | Dredging and Land Filling | Earth excavation | Other Construction Activities | Residential sources |
|---|--------------------|-----------------|--------------------------------|--------------------|-------------|--------------|----------------------------|---------------------------|------------------------------|-----------------|------------------|---------------------------|-------------------|-----------------------|-------------------------------|-----------------------------------|----------------------------|--|----------------------|---------------------|---------------------|---------------------------|------------------|-------------------------------|---------------------|
|   | SOx                | X               | X                              | X                  | X           | X            | √                          | √                         | √                            | √               | √                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | X                   |
|   | NOx                | X               | X                              | X                  | X           | X            | √                          | √                         | √                            | √               | √                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | X                   |
|   | GHGs               | X               | X                              | X                  | X           | X            | √                          | √                         | √                            | √               | √                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | X                   |
| Akram Point Sundarbans                  | PM                 | X               | X                              | X                  | X           | X            | √                          | √                         | X                            | X               | X                | √                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | X                   |
|   | SOx                | X               | X                              | X                  | X           | X            | √                          | √                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | X                   |
|   | NOx                | X               | X                              | X                  | X           | X            | √                          | √                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | X                   |
| Hiron Point Sundarbans                  | PM                 | X               | X                              | X                  | X           | X            | √                          | √                         | X                            | X               | X                | √                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | X                   |
|   | SOx                | X               | X                              | X                  | X           | X            | √                          | √                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | X                   |
|   | NOx                | X               | X                              | X                  | X           | X            | √                          | √                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | X                   |
| Khulna City, near Khan Jahan Ali Bridge | PM                 | √               | X                              | X                  | √           | √            | √                          | √                         | X                            | √               | √                | √                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | √                | √                             | √                   |
|   | SOx                | X               | X                              | X                  | √           | √            | √                          | √                         | X                            | √               | √                | √                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | √                   |
|   | NOx                | X               | X                              | X                  | √           | √            | √                          | √                         | X                            | √               | √                | √                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | √                   |
| Township area                           | PM                 | X               | X                              | X                  | X           | √            | X                          | X                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | √                         | √                | √                             | √                   |
|   | SOx                | X               | X                              | X                  | X           | √            | X                          | X                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | X                   |
|   | NOx                | X               | X                              | X                  | X           | √            | X                          | X                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | X                         | X                | X                             | X                   |
| Access road bridge area                 | PM                 | X               | X                              | X                  | X           | √            | X                          | X                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | X                   | X                   | √                         | √                | √                             | √                   |
|   | SOx                | X               | X                              | X                  | X           | √            | X                          | X                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | X                    | √                   | X                   | X                         | X                | X                             | X                   |
|   | NOx                | X               | X                              | X                  | X           | √            | X                          | X                         | X                            | X               | X                | X                         | X                 | X                     | X                             | X                                 | X                          | X  | √                    | X                   | X                   | X                         | X                | X                             | X                   |
|   | GHGs               | √               | √                              | X                  | √           | √            | X                          | X                         | X                            | X               | X                | √                         | X                 | X                     | X                             | X                                 | X                          | X  | √                    | X                   | X                   | √                         | √                | √                             | √                   |

Legend X-Absence of source or no emission

√-Presence of source, emission of pollutant



(B) Water Quality Data  
Surface Water Quality Monitoring Data

Table B.1: pH Values of Passur River Water

| Sl | Sampling Locations  | Monitoring periods |      |     |     |     |      |      |     |     |      |      |      |      |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      | Std*    |
|----|---|--------------------|------|-----|-----|-----|------|------|-----|-----|------|------|------|------|------|------|------|------|-------|------|------|------|------|------|------|------|------|------|------|---------|
|    |   | Apr                | July | Oct | Jan | Apr | July | Oct  | Jan | Apr | July | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | July | Nov   | Feb  | Apr  | July | Nov  | Feb  | July | Oct  | Jan  | Apr  | Aug  |         |
|    |   | 1QM                | 2QM  | 3QM | 4QM | 5QM | 6QM  | 7QM  | 8QM | 9QM | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM  | 19QM | 20QM | 21QM | 22QM | 23QM | 25QM | 26QM | 27QM | 28QM | 29QM |         |
| 1  | Left Bank of Passur River at 100m u/s of North West corner from the Project boundary  | 7.2                | 7.0  | 8.1 | 7.9 | 7.6 | 7.8  | 7.6  | 7.1 | 7.5 | 7.27 | 6.9  | 7.6  | 7.2  | 7.1  | 8.28 | 8.1  | 8.4  | 7.9   | 8.18 | 9.0  | 6.8  | 7.9  | 8.4  | 6.9  | 6.9  | 8.5  | 8.3  | 5.5  | 6.5–8.5 |
| 2  | Middle Passur River at 100m u/s of North West corner from the Project boundary        | 7.2                | 7.0  | 8.2 | 8.0 | 7.7 | 7.9  | 7.58 | 7.3 | 7.8 | 7.3  | 7    | 7.5  | 7.3  | 6.9  | 8.25 | 8.1  | 8.4  | 6.04  | 8.03 | 9.9  | 6.8  | 7.8  | 8.3  | 7.0  | 6.66 | 7.8  | 8.1  | 6.5  |         |
| 3  | Right Bank of Passur River at 100m u/s of North West corner from the Project boundary | 7.2                | 6.9  | 8.0 | 8.1 | 7.8 | 7.8  | 7.64 | 7.3 | 7.2 | 7.93 | 7.2  | 7.8  | 7.3  | 6.9  | 8.17 | 8.1  | 8.4  | 8.09  | 8.06 | 8.7  | 7.1  | 7.8  | 8.8  | 7.1  | 6.59 | 8.0  | 8.0  | 8.5  |         |
| 4  | Left Bank of Passur River at Project Site-Jetty                                       | 7.9                | 7.1  | 8.1 | 7.9 | 7.5 | 7.9  | 7.6  | 7.1 | 7.4 | 7.56 | 7.3  | 8.2  | 7.2  | 6.9  | 8.2  | 8.1  | 8.3  | 7.65  | 7.78 | 8.9  | 7.5  | 7.5  | 8.3  | 7.0  | 6.6  | 7.7  | 8.6  | 7.4  |         |
| 5  | Middle Passur River at Project Site-Jetty   | 7.1                | 6.9  | 8.1 | 7.9 | 7.6 | 8    | 7.58 | 7.5 | 7.8 | 7.6  | 7    | 8.5  | 7.8  | 7.2  | 8.21 | 8.1  | 8.3  | 8.20  | 7.97 | 8.4  | 7.2  | 7.4  | 8.3  | 7.2  | 6.77 | 7.7  | 8.0  | 8.4  |         |
| 6  | Right Bank of Passur River at Project Site-Jetty                                      | 7.1                | 6.9  | 8.2 | 7.9 | 7.7 | 8    | 7.62 | 7.6 | 7.4 | 7.9  | 6.9  | 8.7  | 7.4  | 7.2  | 8.2  | 8.1  | 8.2  | 7.87  | 8.04 | 8.5  | 6.7  | 7.4  | 8.0  | 7.2  | 6.88 | 7.8  | 8.9  | 5.8  |         |
| 7  | Left Bank of Passur River at South West corner from the Project boundary              | 7.4                | 7.0  | 8.1 | 7.6 | 7.5 | 8.1  | 7.78 | 8.1 | 7.6 | 7.94 | 7.2  | 8.1  | 6.9  | 7.2  | 8.39 | 8.0  | 8.4  | 8.11  | 7.89 | 9.3  | 7.4  | 7.3  | 8.6  | 7.4  | 7.13 | 7.8  | 8.2  | 6.7  |         |
| 8  | Middle of Passur River at South West corner from the Project boundary                 | 7.4                | 6.9  | 8.0 | 7.5 | 7.2 | 8    | 7.6  | 8   | 7.1 | 8.04 | 7.5  | 8.6  | 6.8  | 7.1  | 8.15 | 8.1  | 8.5  | 7.44  | 7.85 | 8.7  | 6.5  | 7.2  | 8.2  | 7.6  | 6.82 | 8.0  | 8.4  | 8.6  |         |
| 9  | Right Bank of Passur River at South West corner from the Project boundary             | 7.3                | 6.8  | 8.0 | 7.8 | 7.3 | 8.1  | 7.64 | 7.9 | 7.2 | 8.2  | 7.3  | 8.9  | 7.1  | 7    | 8.16 | 8.1  | 8.5  | 7.07  | 8.06 | 8.4  | 7.3  | 7.2  | 8.3  | 7.8  | 6.8  | 7.8  | 8.3  | 8.5  |         |
| 10 | Maidara river of the South East corner of the Project at Ichamoti-Maidara confluence  | 7.4                | 6.9  | 8.1 | 7.7 | 7.5 | 8.1  | 7.3  | 7.3 | 7.1 | 8.1  | 6.8  | 8.1  | 7.2  | 7.1  | 8.4  | 8.1  | 8.6  | 7.94  | 8.05 | 9.3  | 7.2  | 7.4  | 8.0  | 7.1  | 6.85 | 7.4  | 8.0  | 5.9  |         |
| 11 | Maidara river near proposed township area   | 7.4                | 6.8  | 8.1 | 7.3 | 7.6 | 6.9  | 7.56 | 7.1 | 7.4 | 7.8  | 7.1  | 7.6  | 7.4  | 7    | 7.92 | 7.6  | 7.3  | 7.631 | 7.8  | 8.2  | 7.0  | 7.3  | 7.9  | 6.9  | 6.83 | 7.5  | 8.3  | 6.9  |         |
| 12 | Passur river at Passur-Ghasiakhali confluence   | 7.3                | 6.8  | 7.4 | 8.2 | 7.5 | 7.9  | 7.1  | 7.4 | 7.3 | 7.3  | 6.9  | 7.2  | 6.9  | 6.8  | 7.48 | 7.3  | 8.3  | 7.02  | 8.65 | 8.1  | 7.0  | 8.0  | 8.3  | 7.1  | 7.06 | 7.8  | 8.6  | 7.3  |         |
| 13 | Passur river at Harbaria of Sundarbans  | 7.9                | 6.9  | 8.0 | 8.1 | 7.7 | 7.9  | 7.8  | 8.2 | 7.3 | 7.63 | 7.4  | 7.8  | 6.9  | 7.1  | 8.19 | 8.1  | 8.4  | 7.19  | 7.71 | 8.2  | 7.2  | 8.0  | 8.4  | 7.4  | 6.1  | 8.2  | 7.8  | 6.6  |         |
| 14 | Passur river at Akram point of Sundarbans   | 7.2                | 6.9  | 7.9 | 8.1 | 7.7 | NS   | 7.63 | 8   | 7.9 | 7.67 | 7.1  | 8.2  | 7.2  | 7.1  | 8.22 | 8.2  | 8.2  | 8     | 7.77 | 7.9  | 7.1  | 7.8  | 8.2  | 7.7  | 6.6  | 7.7  | 8.2  | 6.0  |         |
| 15 | Passur river at Hiron po.000int of Sundarbans   | 7.2                | 7.0  | 7.0 | 8.1 | 7.7 | NS   | 7.39 | NS  | 7.8 | NS   | 7.6  | 8.5  | NS   | 6.8  | 8.2  | NS   | NS   | 7.18  | 7.79 | NS   | NS   | 7.8  | 8.2  | NS   | 6.7  | 7.6  | NS   | 8.0  |         |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring, NS – Not Surveyed

Table B.2: Surface Water Temperature (°C) in Passur River

| Sl. No. | Sampling Locations  | Monitoring periods |     |     |     |     |      |      |      |      |      |       |      |      |      |      |      |      |       |       |      |      |      |      |      |       |      |      |       |             |
|---------|---|--------------------|-----|-----|-----|-----|------|------|------|------|------|-------|------|------|------|------|------|------|-------|-------|------|------|------|------|------|-------|------|------|-------|-------------|
|         |   | Apr                | Jul | Oct | Apr | Apr | Jul  | Oct  | Jan  | Apr  | Jul  | Oct   | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov   | Feb   | Apr  | July | Nov  | Feb  | July | Oct   | Jan  | Apr  | Aug   |             |
|         |   | 1QM                | 2QM | 3QM | 4QM | 5QM | 6QM  | 7QM  | 8QM  | 9QM  | 10QM | 11QM  | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM  | 19QM  | 20QM | 21QM | 22QM | 23QM | 25QM | 26QM  | 27QM | 28QM | 29QM  |             |
| 1       | Left Bank of Passur River at 100m u/s of North West corner from the Project boundary  | 31                 | 33  | 31  | 19  | 30  | 31.8 | 31.2 | 22.0 | 31.2 | 29.6 | 30.1  | 22.8 | 30   | 29.8 | 19.7 | 30   | 30   | 28    | 22.02 | 31   | 30   | 27   | 25   | 30   | 27.67 | 20   | 31   | 30.26 | 20°C – 30°C |
| 2       | Middle Passur River at 100m u/s of North West corner from the Project boundary        | 31                 | 33  | 31  | 20  | 30  | 30.5 | 31.8 | 21.0 | 31.1 | 29.1 | 30.8  | 22.5 | 30   | 30.1 | 19.8 | 30   | 30   | 26.85 | 21.96 | 31   | 30   | 27   | 25   | 30   | 27.68 | 20   | 30   | 30.46 |             |
| 3       | Right Bank of Passur River at 100m u/s of North West corner from the Project boundary | 31                 | 33  | 30  | 20  | 30  | 30.5 | 30.9 | 21.0 | 30.8 | 29.4 | 30.4  | 22.1 | 29.8 | 30.2 | 20.2 | 31   | 30   | 27.49 | 21.82 | 31   | 30   | 27   | 24   | 31   | 27.7  | 20   | 30   | 30.46 |             |
| 4       | Left Bank of Passur River at Project Site-Jetty                                       | 31                 | 33  | 31  | 19  | 31  | 30.8 | 31.3 | 22.0 | 31.4 | 30.1 | 30.1  | 22.8 | 31.3 | 30.1 | 20.3 | 28   | 30   | 28.38 | 22.62 | 31   | 30   | 28   | 24   | 30   | 27.82 | 20   | 30   | 30.55 |             |
| 5       | Middle Passur River at Project Site-Jetty   | 30                 | 32  | 31  | 19  | 30  | 30.6 | 31.6 | 22.0 | 30.9 | 30.5 | 31.0  | 21.8 | 30.0 | 29.8 | 20.3 | 29   | 30   | 27.97 | 22.55 | 31   | 31   | 28   | 24   | 30   | 27.76 | 20   | 30   | 30.44 |             |
| 6       | Right Left Bank of Passur River at Project Site-Jetty                                 | 30                 | 32  | 31  | 19  | 30  | 30.4 | 31.1 | 21.0 | 31.0 | 30.5 | 31.1  | 21.9 | 30.0 | 29.9 | 20.3 | 28   | 31   | 28.05 | 22.35 | 31   | 30   | 28   | 24   | 30   | 27.67 | 20   | 30   | 30.54 |             |
| 7       | Left Bank of Passur River at South West corner from the Project boundary              | 31                 | 32  | 30  | 20  | 31  | 30.5 | 30.3 | 23.0 | 30.7 | 30.7 | 30.4  | 22.1 | 29.9 | 30.0 | 20.6 | 28   | 31   | 27.85 | 22.17 | 33   | 30   | 27   | 25   | 30   | 28.42 | 21   | 30   | 30.44 |             |
| 8       | Middle of Passur River at South West corner from the Project boundary                 | 31                 | 31  | 29  | 19  | 30  | 30.8 | 30.5 | 22.0 | 30.4 | 29.8 | 30.2  | 22.0 | 29.8 | 30.1 | 20.2 | 28   | 31   | 28    | 22.27 | 31   | 30   | 27   | 25   | 30   | 27.9  | 20   | 30   | 30.5  |             |
| 9       | Right Bank of Passur River at South West corner from the Project boundary             | 31                 | 31  | 29  | 19  | 31  | 30.6 | 30.8 | 21.0 | 30.1 | 29.8 | 31.1  | 22.1 | 30.1 | 30.1 | 20.3 | 28   | 31   | 28    | 22.54 | 32   | 30   | 27   | 25   | 30   | 27.83 | 21   | 30   | 30.46 |             |
| 10      | Maidara river of the South East corner of the Project at Ichamoti-Maidara confluence  | 30                 | 31  | 28  | 19  | 30  | 30.8 | 31.8 | 22.0 | 31.2 | 30.4 | 31.1  | 21.9 | 30.3 | 29.9 | 19.1 | 28   | 31   | 27.62 | 22.06 | 33   | 30   | 27   | 25   | 30   | 28.67 | 22   | 31   | 30.39 |             |
| 11      | Maidara river near proposed township area   | 30                 | 32  | 27  | 20  | 30  | 31.6 | 31.2 | 23.0 | 30.6 | 30.7 | 31.2  | 21.8 | 30.1 | 30.0 | 21.1 | 31   | 31   | 30.2  | 21    | 32   | 30   | 27   | 23   | 30   | 28    | 21   | 31   | 30.54 |             |
| 12      | Passur river at Passur-Ghasiakhali confluence   | 29                 | 30  | 32  | 19  | 30  | 29.8 | 30.7 | 21   | 31.3 | 30.7 | 30.38 | 22.1 | 30.2 | 30   | 20.8 | 30   | 29   | 26.82 | 21.89 | 31   | 30   | 28   | 22   | 30   | 28.07 | 21   | 29   | 30.15 |             |
| 13      | Passur river at Harbaria of Sundarbans  | 30                 | 30  | 27  | 22  | 30  | 29.0 | 30.8 | 22.0 | 31.5 | 30.9 | 29.9  | 23.1 | 30.2 | 29.8 | 21   | 30   | 29   | 27.62 | 21.81 | 31   | 31   | 30   | 24   | 31   | 28.35 | 21   | 30   | 29.6  |             |
| 14      | Passur river at Akram point of Sundarbans   | 29                 | 29  | 30  | 21  | 30  | NS   | 30.2 | 21.0 | 30.8 | 30.4 | 30.4  | 22.5 | 30.8 | 29.9 | 21.2 | 32   | 30   | 27.21 | 22.42 | 31   | 31   | 29   | 24   | 31   | 29.48 | 22   | 30   | 29.75 |             |
| 15      | Passur river at Hiron point of Sundarbans   | 29                 | 30  | 29  | 21  | 30  | NS   | 30.4 | NS   | 31.4 | NS   | 31.3  | 21.4 | NS   | 29.4 | 21.2 | NS   | NS   | 28.66 | 23.78 | NS   | NS   | 31   | 23   | NS   | 29.02 | 22   | NS   | 30.66 |             |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring, NS – Not Surveyed

Table B.3: Salinity (ppt) in Passur River

| Sl. No | Sampling Locations  |      |      |     | Monitoring periods |     |     |     |      |     |      |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |
|--------|---|------|------|-----|--------------------|-----|-----|-----|------|-----|------|------|------|------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|--|--|--|--|
|        |   | Apr  | Jul  | Oct | Jan                | Apr | Jul | Oct | Jan  | Apr | Jul  | Oct  | Jan  | Apr  | Oct  | Jan   | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb  | July | Oct  | Jan  | Apr  | Aug  |  |  |  |  |  |
|        |   | 1QM  | 2QM  | 3QM | 4QM                | 5QM | 6QM | 7QM | 8QM  | 9QM | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM  | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23QM | 25QM | 26QM | 27QM | 28QM | 29QM |  |  |  |  |  |
| 1      | Left Bank of Passur River at 100m u/s of North West corner from the Project boundary  | 11.5 | 2.5  | 0.0 | 4.5                | 13  | 0   | 0   | 4.1  | 8   | 0    | 0    | 3.7  | 6.3  | 0    | 2     | 11.5 | 0.2  | 0.9  | 11.1 | 16.6 | 0.5  | 0.4  | 3.8  | 0.2  | 0.1  | 2.4  | 7.1  | 0.1  | No Specific standard for salinity has Been mentioned in the ECR'1997 |  |  |  |  |
| 2      | Middle Passur River at 100m u/s of North West corner from the Project boundary        | 11.5 | 0.3  | 0.0 | 4.1                | 15  | 0   | 0   | 4.3  | 7.4 | 0    | 0    | 3.8  | 5.9  | 0    | 2     | 11.5 | 0.2  | 0.1  | 11.1 | 16.2 | 0.2  | 0.3  | 3.9  | 0.3  | 0.1  | 2.7  | 7.5  | 0.1  |  |  |  |  |  |
| 3      | Right Bank of Passur River at 100m u/s of North West corner from the Project boundary | 11.5 | 0.2  | 0.0 | 4.5                | 16  | 0   | 0   | 4.3  | 7   | 0    | 0    | 3.6  | 6.2  | 0    | 2     | 11.5 | 0.4  | 0.8  | 10.6 | 16.5 | 0.3  | 0.3  | 4.0  | 0.2  | 0.1  | 2.7  | 7.2  | 0.1  |  |  |  |  |  |
| 4      | Left Bank of Passur River at Project Site-Jetty                                       | 12.0 | 2.2  | 0.0 | 4.7                | 9   | 0   | 0   | 4.4  | 6   | 0    | 0    | 4    | 6.8  | 0    | 2.6   | 12.0 | 0.3  | 0.9  | 10.8 | 16.6 | 0.2  | 0.5  | 3.8  | 0.1  | 0.1  | 2.5  | 7.2  | 0.1  |  |  |  |  |  |
| 5      | Middle Passur River at Project Site-Jetty   | 12.0 | 0.3  | 0.0 | 5.1                | 13  | 0   | 0   | 5.1  | 6.2 | 0    | 0    | 3.9  | 6.9  | 0    | 2.6   | 12.0 | 0.2  | 0.8  | 10.8 | 16.9 | 0.2  | 0.3  | 3.9  | 0.2  | 0.1  | 2.7  | 7.3  | 0.1  |  |  |  |  |  |
| 6      | Right Left Bank of Passur River at Project Site-Jetty                                 | 12.0 | 0.5  | 0.0 | 5.0                | 14  | 0   | 0   | 5    | 9   | 0    | 0    | 4.2  | 6.1  | 0    | 2.7   | 12.0 | 0.2  | 0.8  | 11   | 16.9 | 1.2  | 0.3  | 3.9  | 0.1  | 0.1  | 2.4  | 7.3  | 0.1  |  |  |  |  |  |
| 7      | Left Bank of Passur River at South West corner from the Project boundary              | 9.5  | 4.0  | 0.0 | 5.2                | 14  | 0   | 0   | 5.2  | 8   | 0    | 0    | 4.2  | 6.5  | 0    | 2.8   | 9.5  | 0.2  | 1    | 9.9  | 12.0 | 0.3  | 2.1  | 3.7  | 0.2  | 0.2  | 2.6  | 7.0  | 0.1  |  |  |  |  |  |
| 8      | Middle of Passur River at South West corner from the Project boundary                 | 9.0  | 0.0  | 0.0 | 5.2                | 13  | 0   | 0   | 4.9  | 7   | 0    | 0    | 4.1  | 7.1  | 0    | 2.8   | 9.0  | 0.3  | 0.2  | 11.5 | 16.7 | 0.2  | 0.1  | 0.1  | 0.2  | 0.1  | 2.5  | 7.3  | 0.1  |  |  |  |  |  |
| 9      | Right Bank of Passur River at South West corner from the Project boundary             | 10.0 | 2.5  | 0.0 | 5.1                | 12  | 0   | 0   | 5.5  | 6.8 | 0    | 0    | 4.1  | 7    | 0    | 2.8   | 10.0 | 0.3  | 0.3  | 11.1 | 16.9 | 0.3  | 0.4  | 3.5  | 0.3  | 0.1  | 2.7  | 7.4  | 0.1  |  |  |  |  |  |
| 10     | Maidara river of the South East corner of the Project at Ichamoti-Maidara confluence  | 10.0 | 0.5  | 0.0 | 5.2                | 10  | 0   | 0   | 3.8  | 7.1 | 0    | 0    | 3.9  | 7    | 0    | 2.6   | 10.0 | 0.3  | 0.9  | 11.3 | 16.5 | 0.3  | 0.3  | 4.0  | 0.3  | 0.2  | 2.5  | 7.0  | 0.1  |  |  |  |  |  |
| 11     | Maidara river near proposed township area   | 9.0  | 4.5  | 0.0 | 4.5                | 9   | 0   | 0   | 2.5  | 6.3 | 0    | 0    | 3.8  | 6.9  | 0    | 2.52  | 9.0  | 0.2  | 0.02 | 9.9  | 8.0  | 1.0  | 0.3  | 4.0  | 0.5  | 2.   | 2.5  | 6.5  | 0.8  |  |  |  |  |  |
| 12     | Passur river at Passur-Ghasiakhali confluence   | 10.0 | 9.5  | 0.0 | 5.0                | 14  | 0   | 0   | 4.8  | 6   | 0    | 0    | 6.7  | 10.4 | 1.2  | 10.8  | 10.0 | 0.6  | 1    | 7.9  | 14.9 | 0.4  | 0.5  | 3.6  | 0.4  | 0.2  | 1.8  | 6.9  | 0.1  |  |  |  |  |  |
| 13     | Passur river at Harbaria of Sundarbans  | 12.0 | 10.0 | 0.0 | 6.0                | 15  | 0   | 0   | 5.3  | 8.9 | 0    | 0    | 8.9  | 10.4 | 2.3  | 2.8   | 12.0 | 2.2  | 1.8  | 11.9 | 15.6 | 0.3  | 0.7  | 3.7  | 1.5  | 0.2  | 2.6  | 7.0  | 0.1  |  |  |  |  |  |
| 14     | Passur river at Akram point of Sundarbans   | 19.0 | 15.0 | 1.0 | 16.0               | 20  | NS  | 5   | 11.3 | 9.4 | 4    | 3    | 16.3 | 16   | 3.6  | 13.1  | 19.0 | 2.8  | 9.1  | 16.7 | 22.9 | 0.9  | 6.6  | 8.9  | 4.0  | 1.6  | 7.1  | 10.9 | 1.0  |  |  |  |  |  |
| 15     | Passur river at Hiron point of Sundarbans   | 23.0 | 19.5 | 2.0 | 23.0               | 25  | NS  | 6.2 | NS   | 14  | NS   | 5.8  | 21.4 | NS   | 5.1  | 16.45 | 23.0 | NS   | 13.9 | 22.7 | NS   | NS   | 9.2  | 11.0 |      | 2.6  | 8.2  |      | 0.9  |  |  |  |  |  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring, NS – Not Surveyed

Table B.4: Dissolve Oxygen (DO) in Passur River

| SL | Sampling Locations  | Monitoring periods |     |     |     |     |     |     |     |     |      |      |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |   |
|----|---|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|---|
|    |   | Apr                | Jul | Oct | Jan | Apr | Jul | Oct | Jan | Apr | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr   | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb  | July | Oct  | Jan  | Apr  | Aug  |   |
|    |   | 1QM                | 2QM | 3QM | 4QM | 5QM | 6QM | 7QM | 8QM | 9QM | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM  | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23QM | 25QM | 26QM | 27QM | 28QM | 29QM |   |
| 1  | Left Bank of Passur River at 100m u/s of North West corner from the Project boundary  | 5.9                | 6.1 | 5.6 | 5.5 | 6.2 | 5.3 | 6.8 | 5.1 | 7.1 | 6.2  | 6    | 6.1  | 7.1  | 6.3  | 5.19 | 6.575 | 6.0  | 6.4  | 8.7  | 5.9  | 6.0  | 7.7  | 8.4  | 6.1  | 6.4  | 9.2  | 6.5  | 5.8  | 5 or more (standard for sustaining fisheries) |
| 2  | Middle of Passur River at 100m u/s of North West corner from the Project boundary     | 4.9                | 6.8 | 7.7 | 6.6 | 6.4 | 5   | 6.4 | 5.1 | 6.4 | 5.7  | 6.1  | 5.9  | 7.2  | 6.4  | 5.03 | 6.225 | 6.2  | 6.2  | 7.9  | 6.5  | 6.0  | 7.8  | 8.6  | 6.1  | 7.64 | 9.6  | 6.0  | 6.0  |   |
| 3  | Right Bank of Passur River at 100m u/s of North West corner from the Project boundary | 5.2                | 6.7 | 7.7 | 6.7 | 6.2 | 5   | 7.1 | 6.2 | 6.9 | 5.6  | 6    | 6.1  | 6.8  | 6.5  | 5.06 | 6.275 | 6.1  | 6.3  | 7.3  | 6.3  | 6.1  | 7.8  | 7.6  | 6.0  | 6.3  | 7.8  | 6.8  | 6.3  |   |
| 4  | Left Bank of Passur River at Project Site-Jetty                                       | 5.7                | 6.8 | 7.6 | 5.8 | 6.2 | 6.7 | 6.8 | 5.9 | 5.8 | 6.1  | 6.3  | 6.2  | 6.9  | 6.3  | 5.1  | 6.15  | 5.5  | 6    | 8.7  | 6.1  | 6.5  | 8.6  | 8.1  | 6.0  | 8.2  | 9.0  | 8.4  | 6.6  |   |
| 5  | Middle of Passur River at Project Site-Jetty  | 5.9                | 6.9 | 7.2 | 5.9 | 6.6 | 6.6 | 7.2 | 5.3 | 6.1 | 6.3  | 5.9  | 5.9  | 7.4  | 6.3  | 5.03 | 6.5   | 6.0  | 6.2  | 7.3  | 6.5  | 6.3  | 8.0  | 8.2  | 6.4  | 8.89 | 8.9  | 8.0  | 6.2  |   |
| 6  | Right Bank of Passur River at Project Site-Jetty                                      | 5.8                | 6.6 | 8.0 | 6.8 | 6.4 | 6   | 7.6 | 5.4 | 6.6 | 5.8  | 6.1  | 5.9  | 7.5  | 6.5  | 4.9  | 6.575 | 6.5  | 6    | 7.4  | 6.0  | 6.4  | 8.2  | 7.0  | 6.2  | 7.8  | 9.3  | 8.5  | 6.8  |   |
| 7  | Left Bank of Passur River at South West corner from the Project boundary              | 6.6                | 7.3 | 5.6 | 6.1 | 6.3 | 7.5 | 6.4 | 6   | 6.9 | 6.3  | 5.9  | 6.3  | 6.4  | 6.5  | 5    | 6.55  | 6.8  | 6.1  | 7.8  | 6.1  | 6.2  | 9.9  | 6.9  | 6.6  | 9.7  | 9.6  | 5.4  | 7.2  |   |
| 8  | Middle of Passur River at South West corner from the Project boundary                 | 6.5                | 7.1 | 5.6 | 6.9 | 6.5 | 7.4 | 6.1 | 6.1 | 7.1 | 6.4  | 6    | 6.4  | 7.2  | 7.1  | 4.98 | 6.825 | 6.2  | 6.3  | 7.1  | 6.5  | 6.2  | 10.0 | 7.2  | 6.5  | 9.76 | 7.0  | 6.3  | 6.2  |   |
| 9  | Right Bank of Passur River at South West corner from the Project boundary             | 6.5                | 7.2 | 5.8 | 6.6 | 6.4 | 7.3 | 6.3 | 5.8 | 6.8 | 5.6  | 6    | 6.4  | 6.8  | 6.5  | 5.11 | 6.625 | 6.0  | 6.2  | 6.9  | 6.1  | 6.3  | 10.5 | 7.8  | 6.3  | 9.76 | 6.4  | 5.9  | 6.7  |   |
| 10 | Maidara river of the South East corner of the Project at Ichamoti-Maidara confluence  | 6.0                | 6.5 | 8.0 | 6.0 | 6.2 | 6   | 7.1 | 4.1 | 6.4 | 5.2  | 6.1  | 6.7  | 6.8  | 6.3  | 5.17 | 6.35  | 6.7  | 5.8  | 7.5  | 6.3  | 6.4  | 7.1  | 9.7  | 6.4  | 9.7  | 8.1  | 7.5  | 6.8  |   |
| 11 | Maidara river near proposed township area   | 6.7                | 6.8 | 8.0 | 6.2 | 6.5 | 6.4 | 7.1 | 5.2 | 5.9 | 5.4  | 6.4  | 6.7  | 7.1  | 6.2  | 5.11 | 6.7   | 6.3  | 6    | 6.0  | 6.2  | 6.0  | 7.7  | 7.5  | 6.1  |      | 8.0  | 7.0  | 5.5  |   |
| 12 | Passur river at Passur-Ghasiakhali confluence   | 5.3                | 6.2 | 7.0 | 6.5 | 6.3 | 7   | 6.6 | 5.4 | 5.8 | 5.4  | 5.6  | 5.9  | 6.4  | 6.4  | 5.23 | 5.95  | 5.8  | 6    | 6.9  | 6.5  | 6.2  | 7.9  | 8.6  | 6.0  | 8.14 | 9.2  | 5.9  | 6.2  |   |
| 13 | Passur river at Harbaria of Sundarbans  | 5.4                | 5.9 | 7.0 | 6.6 | 5.8 | 7.5 | 7.1 | 5.2 | 6.4 | 5.4  | 5.8  | 6.1  | 6.4  | 6.2  | 5.03 | 5.8   | 6.9  | 8.21 | 7.5  | 6.9  | 6.0  | 8.4  | 6.9  | 6.1  | 7.65 | 7.6  | 5.5  | 6.6  |   |
| 14 | Passur river at Akram point of Sundarbans   | 7.9                | 6.4 | 7.7 | 6.7 | 6   | NS  | 7.3 | 6.2 | 6.1 | 6.2  | 6.7  | 6.5  | 7.2  | 6.8  | 5.4  | 6     | 6.8  | 6.9  | 7.7  | 7.0  | 6.6  | 7.7  | 9.7  | 6.5  | 6.61 | 7.2  | 6.8  | 6.1  |   |
| 15 | Passur river at Hiron point of Sundarbans   | 7.5                | 6.5 | 7.8 | 6.5 | 5.8 | NS  | 7   | NS  | 7.1 | 6.8  | 6.9  | 6.8  | NS   | 7.3  | 5.4  | NS    | NS   | 7.2  | 8.0  | NS   | NS   | 8.6  | 6.7  | NS   | 8.2  | 9.0  | NS   | 6.2  |   |

Source: CEGIS Field Survey-

Note: 1QM= First Quarterly Monitoring (April, 2014), 2QM = Second Quarterly Monitoring (July, 2014), 3QM = Third Quarterly Monitoring (October, 2014), 4QM = Fourth Quarterly Monitoring (January 2015)

Table B.5: BOD<sub>5</sub> of Passur River Water

| SL | Sampling Locations  | Apr | Jul | Oct | Jan | Apr | Jul | Oct | Jan | Apr | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  |  |
|----|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|--|
|    |   | 1QM | 2QM | 3QM | 4QM | 5QM | 6QM | 7QM | 8QM | 9QM | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM |  |
| 1  | Left Bank of Passur River at 100m u/s of North West corner from the Project boundary  | 3.4 | 2.2 | 1.9 | 1.6 | 3.1 | 3   | 2.1 | 2.1 | 2.8 | 2.4  | 2.8  | 1.8  | 2.1  | 1.9  | 2.1  | 3    | 5 or more<br>(standard for<br>sustaining<br>fisheries) |
| 2  | Middle of Passur River at 100m u/s of North West corner from the Project boundary     | 4.9 | 3.3 | 4.1 | 2.3 | 3.2 | 2.4 | 1.9 | 2.2 | 3.2 | 2.8  | 2.7  | 1.9  | 3.4  | 2.1  | 1.9  | 2    |  |
| 3  | Right Bank of Passur River at 100m u/s of North West corner from the Project boundary | 2.2 | 2.8 | 3.4 | 2.7 | 3.1 | 2.9 | 3.4 | 1.9 | 3   | 2.5  | 2.8  | 1.9  | 2.5  | 2.7  | 1.9  | 3    |  |
| 4  | Left Bank of Passur River at Project Site-Jetty                                       | 3.2 | 3.1 | 4.0 | 0.8 | 3   | 4.4 | 3.2 | 1.1 | 3.6 | 2.1  | 3.1  | 2.1  | 2.4  | 2.8  | 2.0  | 4    |  |
| 5  | Middle of Passur River at Project Site-Jetty  | 3.0 | 2.5 | 3.5 | 1.4 | 3.5 | 4.3 | 3.7 | 2.4 | 3.3 | 2.2  | 2.5  | 2.2  | 2.6  | 2.4  | 2.0  | 4    |  |
| 6  | Right Bank of Passur River at Project Site-Jetty                                      | 5.8 | 3.5 | 3.6 | 2.0 | 3.4 | 3.7 | 2.9 | 1.7 | 3.1 | 3.1  | 2.9  | 2.1  | 3.1  | 2.1  | 2.3  | 4    |  |
| 7  | Left Bank of Passur River at South West corner from the Project boundary              | 3.9 | 2.8 | 2.6 | 1.0 | 3.1 | 5.3 | 2.2 | 1.2 | 3.1 | 2.9  | 2.4  | 2.1  | 3.2  | 2.4  | 2.0  | 5    |  |
| 8  | Middle of Passur River at South West corner from the Project boundary                 | 3.8 | 3.3 | 2.8 | 2.6 | 3.2 | 5.2 | 2.3 | 2.3 | 2.6 | 2.7  | 2.7  | 1.9  | 2.5  | 2.7  | 1.9  | 5    |  |
| 9  | Right Bank of Passur River at South West corner from the Project boundary             | 6.5 | 3.8 | 2.9 | 2.1 | 3.4 | 5   | 3.1 | 2.4 | 3   | 3.1  | 3.1  | 2.1  | 2.6  | 2.3  | 2.1  | 5    |  |
| 10 | Maidara river of the South East corner of the Project at Ichamoti-Maidara confluence  | 3.2 | 3.3 | 5.5 | 1.5 | 3.2 | 3.9 | 4.2 | 2.7 | 3.3 | 3.4  | 2.8  | 1.8  | 3.4  | 2.4  | 2.1  | 4    |  |
| 11 | Maidara river near proposed township area   | 4.1 | 3.7 | 4.0 | 2.0 | 3.4 | 4.2 | 1.6 | 1.8 | 3.5 | 3.2  | 2.9  | 2.1  | 3.2  | 2.1  | 2.0  | 4    |  |
| 12 | Passur river at Passur-Ghasiakhali confluence   | 2.3 | 2.2 | 1.7 | 2.0 | 3.3 | 4.9 | 2.1 | 2.2 | 3.4 | 2.8  | 2.3  | 2    | 2.7  | 3.1  | 2.4  | 3.1  |  |
| 13 | Passur river at Harbaria of Sundarbans  | 2.2 | 2.5 | 2.6 | 1.9 | 2.4 | 3.9 | 2.7 | 2.1 | 3.2 | 2.8  | 2.7  | 2.1  | 2.7  | 3.1  | 2.9  | 2.3  |  |
| 14 | Passur river at Akram point of Sundarbans   | 3.4 | 2.2 | 1.9 | 1.6 | 3.1 | 3   | 2.1 | 2.1 | 2.8 | 2.4  | 2.8  | 1.8  | 2.1  | 1.9  | 2.1  | 3    |  |
| 15 | Passur river at Hiron point of Sundarbans   | 4.9 | 3.3 | 4.1 | 2.3 | 3.2 | 2.4 | 1.9 | 2.2 | 3.2 | 2.8  | 2.7  | 1.9  | 3.4  | 2.1  | 1.9  | 2    |  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring, NS – Not Surveyed

Table B.6: COD (mg/L) of Passur River System

| SI | Sampling Locations  | Monitoring periods |     |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |  |
|----|---|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|--|
|    |   | Apr                | Jul | Oct | Jan | Apr | Jul | Oct | Jan | Apr | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb  | July | Oct  | Jan  | April |  |
|    |   | 1QM                | 2QM | 3QM | 4QM | 5QM | 6QM | 7QM | 8QM | 9QM | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23QM | 25QM | 26QM | 27QM | 28QM  |  |
| 1  | Left Bank of Passur River at 100m u/s of North West corner from the Project boundary  | 288                | 24  | 6   | 128 | 87  | 42  | 32  | 124 | 220 | 8    | 12   | 56   | 52   | 24   | 48   | 276  | 20   | 56   | 72   | 188  | 36   | 56   | 24   | 32   | 16   | 56   | 508   |  |
| 2  | Middle Passur River at 100m u/s of North West corner from the Project boundary        | 284                | 20  | 30  | 68  | 58  | 43  | 36  | 100 | 240 | 8    | 8    | 40   | 48   | 8    | 28   | 240  | 24   | 44   | 60   | 180  | 24   | 40   | 28   | 36   | 12   | 32   | 404   |  |
| 3  | Right Bank of Passur River at 100m u/s of North West corner from the Project boundary | 328                | 56  | 14  | 92  | 132 | 18  | 28  | 96  | 280 | 8    | 8    | 44   | 56   | 40   | 40   | 230  | 12   | 48   | 48   | 176  | 32   | 26   | 32   | 28   | 8    | 20   | 400   |  |
| 4  | Left Bank of Passur River at Project Site-Jetty                                       | 376                | 28  | 18  | 84  | 102 | 26  | 36  | 100 | 280 | 8    | 12   | 48   | 40   | 32   | 36   | 232  | 30   | 60   | 44   | 192  | 20   | 40   | 24   | 24   | 28   | 48   | 304   |  |
| 5  | Middle Passur River at Project Site-Jetty   | 400                | 60  | 14  | 116 | 110 | 21  | 36  | 108 | 240 | 12   | 16   | 52   | 36   | 40   | 32   | 254  | 16   | 36   | 56   | 180  | 28   | 28   | 40   | 36   | 16   | 20   | 412   |  |
| 6  | Right Bank of Passur River at Project Site-Jetty                                      | 364                | 496 | 18  | 108 | 88  | 24  | 40  | 80  | 260 | 8    | 12   | 42   | 48   | 16   | 28   | 252  | 12   | 42   | 64   | 172  | 24   | 24   | 24   | 40   | 20   | 56   | 390   |  |
| 7  | Left Bank of Passur River at South West corner from the Project boundary              | 364                | 108 | 10  | 104 | 96  | 32  | 42  | 100 | 240 | 12   | 8    | 56   | 42   | 48   | 40   | 212  | 10   | 48   | 88   | 200  | 28   | 20   | 26   | 48   | 8    | 48   | 408   |  |
| 8  | Middle of Passur River at South West corner from the Project boundary                 | 400                | 40  | 22  | 16  | 18  | 25  | 28  | 100 | 180 | 8    | 8    | 52   | 36   | 8    | 44   | 218  | 24   | 32   | 36   | 160  | 20   | 32   | 20   | 36   | 12   | 56   | 424   |  |
| 9  | Right Bank of Passur River at South West corner from the Project boundary             | 408                | 120 | 10  | 100 | 106 | 25  | 48  | 124 | 200 | 12   | 12   | 44   | 52   | 4    | 36   | 230  | 16   | 28   | 68   | 180  | 32   | 20   | 28   | 42   | 20   | 8    | 448   |  |
| 10 | Maidara river of the South East corner of the project at Ichamoti-Maidara confluence  | 276                | 32  | 10  | 116 | 88  | 51  | 40  | 100 | 160 | 8    | 8    | 36   | 44   | 16   | 40   | 180  | 40   | 36   | 72   | 160  | 24   | 24   | 44   | 32   | 12   | 12   | 400   |  |
| 11 | Maidara river near proposed township area   | 284                | 96  | 26  | 84  | 94  | 36  | 42  | 108 | 210 | 30   | 8    | 48   | 40   | 32   | 32   | 252  | 20   | 42   | 68   | 172  | 20   | 36   | 36   | 48   | 28   | 24   | 380   |  |
| 12 | Passur river at Passur - Ghasiakhali confluence                                       | 408                | 172 | 14  | 96  | 92  | 30  | 46  | 88  | 220 | 12   | 16   | 40   | 64   | 40   | 48   | 260  | 10   | 20   | 32   | 178  | 24   | 40   | 36   | 72   | 56   | 32   | 472   |  |
| 13 | Passur river at Harbaria of Sundarbans  | 372                | 216 | 14  | 96  | 102 | 26  | 36  | 100 | 140 | 16   | 12   | 40   | 216  | 32   | 40   | 280  | 16   | 58   | 56   | 184  | 32   | 32   | 40   | 80   | 76   | 12   | 424   |  |
| 14 | Passur river at Akram point of Sundarbans   | 536                | 520 | 54  | 316 | 302 | NS  | 84  | 96  | 156 | 4    | 68   | 56   | 240  | 16   | 72   | 296  | 110  | 44   | 180  | 160  | 220  | 92   | 56   | 108  | 60   | 28   | 392   |  |
| 15 | Passur river at Hiron point of Sundarbans   | 540                | 416 | 122 | 472 | 470 | NS  | 96  | NS  | 160 | NS   | 56   | 196  | NS   | 4    | 88   | NS   | NS   | 76   | 140  | NS   | NS   | 72   | 64   | NS   | 40   | NS   | NS    |  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring: NS – Not Surveyed.

Table B.7: Oil and grease (mg/L) concentration of Passur River System

| SI | Sampling Locations   | Monitoring periods |     |     |     |      |      |      |     |      |      |      |      |      |      |      |      |      |      |      |      |      |       |      |      |      |      |       |    |
|----|--|--------------------|-----|-----|-----|------|------|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|------|------|------|-------|----|
|    |  | Apr                | Jul | Oct | Jan | Apr  | Jul  | Oct  | Jan | Apr  | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov   | Feb  | Jul  | Oct  | Jan  | April |    |
|    |  | 1QM                | 2QM | 3QM | 4QM | 5QM  | 6QM  | 7QM  | 8QM | 9QM  | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22 QM | 23QM | 25QM | 26QM | 27QM | 28QM  |    |
| 1  | Left Bank of Passur River at South West corner from the Project boundary | <5                 | <5  | <5  | >15 | 16.9 | 9    | <5   | 39  | 61   | 5    | <5   | 9.2  | 5.73 | <5   | 16.6 | <5   | <1   | <2.0 | <2.0 | <2.0 | <2.0 | <2.0  | 2.3  | <2.0 | <2.0 | 2.93 | <2.0  | 10 |
| 2  | Passur-Ghasiakhali Confluence  | <5                 | <5  | <5  | >15 | 13   | 7.63 | 9.87 | 21  | 30.3 | 13.5 | <5   | 15.6 | <5   | <5   | <5   | <5   | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0  | <2.0 | <2.0 | <2.0 | <2.0 | <2.0  |    |
| 3  | Passur river at Harbaria of Sundarbans                                   | <5                 | 6.3 | <5  | >20 | 39.1 | 10.1 | <5   | 14  | 26   | 5.73 | <5   | <5   | <5   | <5   | <5   | <1   | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0  | <2.0 | <2.0 | <2.0 | <2.0 | <2.0  |    |
| 4  | Akram point of Sundarbans  | <5                 | <5  | <5  | >20 | <5   | NS   | 10.8 | ND  | 31   | NS   | 10.1 | 13.8 | 7.71 | <5   | <5   | <5   | NS   | <2.0 | <2.0 | <2.0 | <2.0 | <2.0  | 4.4  | <2.0 | <2.0 | <2.0 | <2.0  |    |
| 5  | Hiron Point of Sundarbans  | <5                 | <5  | <5  | >20 | <5   | NS   | 9.73 | 36  | 82   | 5.87 | <5   | 14.2 | ND   | <5   | <5   | <5   | <1   | <2.0 | <2.0 | <2.0 | <2.0 | <2.0  | 2.3  | <2.0 | <2.0 | NS   | 3.2   |    |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring: NS – Not Surveyed.

Table B.8: TDS (mg/L) of Passur River System

| SL | Sampling Locations  | Monitoring periods |       |      |       |       |      |      |       |       |      |      |       |       |      |       |       |      |       |       |       |       |      |       |      |      |       |       |
|----|---|--------------------|-------|------|-------|-------|------|------|-------|-------|------|------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|------|-------|------|------|-------|-------|
|    |   | Apr                | Jul   | Oct  | Jan   | Apr   | Jul  | Oct  | Jan   | Apr   | Jul  | Oct  | Jan   | Apr   | Oct  | Jan   | Apr   | Jul  | Nov   | Feb   | Apr   | July  | Nov  | Feb   | Jul  | Oct  | Jan   | Apr   |
|    |   | 1QM                | 2QM   | 3QM  | 4QM   | 5QM   | 6QM  | 7QM  | 8QM   | 9QM   | 10QM | 11QM | 12QM  | 13QM  | 14QM | 15QM  | 16QM  | 17QM | 18QM  | 19QM  | 20QM  | 21QM  | 22QM | 23QM  | 25QM | 26QM | 27QM  | 28QM  |
| 1  | Left Bank of Passur River at 100m u/s of North West corner from the Project boundary  | 13060              | 251   | 176  | 4360  | 14400 | 937  | 158  | 5570  | 13400 | 179  | 138  | 3100  | 13400 | 496  | 1913  | 14500 | 315  | 855   | 9940  | 15800 | 290   | 480  | 6800  | 134  | 122  | 3770  | 12500 |
| 2  | Middle of Passur River at 100m u/s of North West corner from the Project boundary     | 12630              | 246   | 162  | 3950  | 14700 | 941  | 169  | 5910  | 13280 | 112  | 106  | 3140  | 13480 | 122  | 1919  | 14420 | 224  | 733   | 9950  | 15600 | 150   | 175  | 6950  | 114  | 96   | 4410  | 12700 |
| 3  | Right Bank of Passur River at 100m u/s of North West corner from the Project boundary | 12900              | 383   | 153  | 4330  | 14900 | 127  | 152  | 5490  | 13560 | 125  | 108  | 3330  | 13400 | 123  | 1915  | 14650 | 232  | 722   | 9730  | 15500 | 152   | 170  | 7300  | 116  | 94   | 4390  | 12300 |
| 4  | Left Bank of Passur River at Project Site-Jetty                                       | 13190              | 445   | 169  | 4750  | 14600 | 175  | 172  | 5720  | 12830 | 162  | 147  | 3630  | 13560 | 172  | 2500  | 14300 | 328  | 824   | 9860  | 15700 | 205   | 190  | 6760  | 221  | 102  | 4150  | 12800 |
| 5  | Middle Passur River at Project Site-Jetty   | 13330              | 353   | 156  | 4920  | 14500 | 132  | 162  | 5850  | 13100 | 185  | 110  | 3600  | 13490 | 125  | 2520  | 14450 | 235  | 716   | 9980  | 16000 | 142   | 175  | 6760  | 125  | 179  | 4170  | 13100 |
| 6  | Right Bank of Passur River at Project Site-Jetty                                      | 13380              | 402   | 152  | 4870  | 14200 | 156  | 160  | 5480  | 13460 | 143  | 112  | 3520  | 13330 | 125  | 2500  | 14540 | 208  | 732   | 9800  | 16100 | 150   | 174  | 6900  | 132  | 105  | 4060  | 13200 |
| 7  | Left Bank of Passur River at South West corner from the Project boundary              | 13180              | 655   | 162  | 5040  | 14500 | 336  | 192  | 5650  | 12820 | 205  | 113  | 3470  | 13640 | 160  | 2840  | 14400 | 205  | 945   | 10190 | 15640 | 208   | 325  | 6740  | 195  | 181  | 4100  | 13100 |
| 8  | Middle of Passur River at South West corner from the Project boundary                 | 13390              | 587   | 153  | 5050  | 14600 | 158  | 164  | 5740  | 12960 | 195  | 108  | 3790  | 13680 | 126  | 2710  | 14500 | 286  | 784   | 10280 | 16000 | 145   | 180  | 6450  | 128  | 98   | 4210  | 13300 |
| 9  | Right Bank of Passur River at South West corner from the Project boundary             | 13240              | 916   | 154  | 5130  | 14250 | 160  | 164  | 5650  | 13590 | 140  | 146  | 3770  | 13360 | 127  | 2720  | 14610 | 296  | 786   | 10080 | 15800 | 154   | 172  | 6700  | 114  | 92   | 4450  | 13200 |
| 10 | Maidara river of the South East corner of the project at Ichamoti-Maidara confluence  | 12400              | 455   | 214  | 5050  | 14000 | 2320 | 183  | 5450  | 13340 | 165  | 196  | 2920  | 13490 | 1616 | 2500  | 14160 | 265  | 992   | 10040 | 15700 | 940   | 1405 | 7250  | 229  | 206  | 4170  | 12500 |
| 11 | Maidara river near proposed Township area   | 10970              | 2510  | 257  | 4390  | 13900 | 355  | 176  | 4420  | 11700 | 5170 | 238  | 3960  | 13110 | 1200 | 2970  | 14450 | 340  | 827   | 8860  | 15100 | 365   | 875  | 5800  | 2893 | 164  | 2320  | 11800 |
| 12 | Passur river at Passur - Mongla confluence  | 12800              | 6410  | 209  | 5130  | 14050 | 298  | 227  | 4540  | 11330 | 893  | 162  | 3370  | 12340 | 204  | 2570  | 14500 | 580  | 940   | 8350  | 15722 | 172   | 350  | 6240  | 740  | 148  | 3010  | 12100 |
| 13 | Passur river at Harbaria of Sundarbans  | 12280              | 9360  | 285  | 4780  | 13900 | 683  | 205  | 4940  | 13580 | 1321 | 301  | 3370  | 13600 | 245  | 2690  | 15350 | 2190 | 1715  | 10950 | 15400 | 560   | 474  | 6430  | 489  | 2260 | 4060  | 12400 |
| 14 | Passur river at Akram point of Sundarbans   | 21500              | 15960 | 3400 | 12350 | 13600 | NS   | 4220 | 13330 | 20720 | 7330 | 2550 | 3580  | 19370 | 3270 | 11390 | 20600 | 7680 | 8100  | 17200 | 14800 | 12500 | 3950 | 16300 | 4188 | 1472 | 11400 | 18500 |
| 15 | Passur river at Hiron point of Sundarbans   | 21500              | 14050 | 5720 | 17900 | 25300 | NS   | 5830 | NS    | 25500 | NS   | 4120 | 12210 | NS    | 4450 | 14190 | NS    | NS   | 12500 | 21110 | NS    | NS    | 5750 | 20400 | NS   | 490  | 14600 | NS    |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NS – Not Surveyed.

Table B.9: TH (mg/L) Passur River System

| SL | Sampling Locations  | Monitoring periods |      |      |      |      |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |
|----|---|--------------------|------|------|------|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
|    |   | Apr                | Jul  | Oct  | Jan  | Apr  | Jul | Oct  | Jan  | Apr  | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb  | Jul  | Oct  | Jan  | Apr  |  |
|    |   | 1QM                | 2QM  | 3QM  | 4QM  | 5QM  | 6QM | 7QM  | 8QM  | 9QM  | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23QM | 25QM | 26QM | 27QM | 28QM |  |
| 1  | Left Bank of Passur River at 100m u/s of North West corner from the Project boundary  | 2900               | 250  | 216  | 930  | 3000 | 245 | 250  | 1270 | 3130 | 240  | 255  | 1090 | 3640 | 200  | 430  | 3100 | 210  | 335  | 2050 | 3000 | 2100 | 215  | 1540 | 205  | 272  | 2800 | 4500 |  |
| 2  | Middle of Passur River at 100m u/s of North West corner from the Project boundary     | 2500               | 180  | 218  | 870  | 3050 | 110 | 330  | 1380 | 3090 | 205  | 250  | 980  | 3420 | 150  | 510  | 1040 | 205  | 310  | 3900 | 5000 | 1950 | 125  | 1485 | 200  | 195  | 2700 | 4200 |  |
| 3  | Right Bank of Passur River at 100m u/s of North West corner from the Project boundary | 2650               | 170  | 335  | 870  | 3250 | 105 | 360  | 1240 | 3140 | 205  | 190  | 1030 | 3300 | 155  | 498  | 1030 | 185  | 313  | 4100 | 5000 | 1900 | 190  | 1530 | 187  | 225  | 2750 | 4300 |  |
| 4  | Left Bank of Passur River at Project site-Jetty                                       | 2550               | 175  | 390  | 940  | 3450 | 118 | 365  | 1220 | 3010 | 220  | 265  | 1020 | 3400 | 160  | 570  | 1060 | 200  | 285  | 4600 | 5200 | 1850 | 175  | 1580 | 217  | 210  | 3000 | 4100 |  |
| 5  | Middle Passur River at Project Site-Jetty   | 2600               | 275  | 340  | 990  | 3250 | 103 | 355  | 1300 | 3070 | 232  | 237  | 915  | 3440 | 145  | 590  | 1040 | 210  | 255  | 4200 | 5000 | 2500 | 178  | 1560 | 215  | 235  | 3100 | 4500 |  |
| 6  | Right Bank of Passur River at Project site-Jetty                                      | 2625               | 350  | 355  | 970  | 3200 | 105 | 350  | 1260 | 3100 | 218  | 242  | 1070 | 3380 | 140  | 480  | 1085 | 215  | 275  | 4400 | 4800 | 2550 | 155  | 1490 | 202  | 200  | 2500 | 4000 |  |
| 7  | Left Bank of Passur River at South West corner from the Project boundary              | 2550               | 325  | 330  | 1045 | 3600 | 153 | 345  | 1370 | 3060 | 235  | 205  | 935  | 3540 | 150  | 505  | 1080 | 205  | 295  | 4400 | 4400 | 1700 | 175  | 1530 | 195  | 240  | 2550 | 4400 |  |
| 8  | Middle of Passur River at South West corner from the Project boundary                 | 2800               | 350  | 345  | 1125 | 3670 | 105 | 390  | 1340 | 3130 | 242  | 217  | 1100 | 3480 | 155  | 530  | 1110 | 212  | 265  | 4300 | 5100 | 1850 | 150  | 1560 | 210  | 235  | 3200 | 4100 |  |
| 9  | Right Bank of Passur River at South West corner from the Project boundary             | 2500               | 475  | 325  | 975  | 3540 | 165 | 445  | 1270 | 3110 | 224  | 238  | 1110 | 3600 | 175  | 512  | 1100 | 205  | 325  | 4600 | 4900 | 2000 | 115  | 1485 | 207  | 243  | 2800 | 4400 |  |
| 10 | Maidara river of the South East corner of the project at Ichamoti-Maidara confluence  | 2500               | 450  | 350  | 980  | 3260 | 470 | 183  | 950  | 3180 | 220  | 250  | 1040 | 1960 | 165  | 505  | 1300 | 210  | 295  | 4000 | 5200 | 2000 | 350  | 1460 | 310  | 198  | 1400 | 4200 |  |
| 11 | Maidara river near proposed township area   | 2400               | 725  | 330  | 970  | 3190 | 130 | 340  | 1075 | 3080 | 875  | 240  | 1170 | 2300 | 320  | 478  | 1120 | 220  | 315  | 4100 | 5000 | 2200 | 285  | 1440 | 742  | 217  | 1200 | 4100 |  |
| 12 | Passur river at Passur - Mongla confluence  | 3150               | 1400 | 377  | 1000 | 3210 | 135 | 410  | 1090 | 3060 | 405  | 245  | 1070 | 2450 | 220  | 1070 | 1410 | 245  | 325  | 4000 | 4782 | 1800 | 200  | 1510 | 250  | 265  | 2850 | 4200 |  |
| 13 | Passur river at Harbaria of Sundarbans  | 2625               | 2150 | 345  | 970  | 3080 | 200 | 430  | 1100 | 3050 | 415  | 282  | 1070 | 3560 | 200  | 610  | 1330 | 530  | 2550 | 4500 | 4500 | 1400 | 185  | 1390 | 280  | 225  | 2870 | 4400 |  |
| 14 | Passur river at Akram point of Sundarbans   | 4500               | 3625 | 980  | 2380 | 3420 | NS  | 1090 | 2850 | 4520 | 1750 | 670  | 1130 | 4300 | 640  | 1475 | 1440 | 2030 | 2750 | 5900 | 4500 | 4300 | 830  | 3470 | 1000 | 210  | 5050 | 4300 |  |
| 15 | Passur river at Hiron point of Sundarbans   | 4850               | 3050 | 1440 | 2690 | 3640 | NS  | 1460 | NS   | 5050 | NS   | 810  | 2870 | NS   | 905  | 1740 | NS   | NS   | 4200 | 6900 | NS   | NS   | 1225 | 3850 | NS   | 230  | 5600 | NS   |  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NS – Not Surveyed.

Table B.10: TSS (mg/L) Passur River System

| SL | Sampling Locations  | Monitoring periods |     |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |
|----|---|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
|    |   | Apr                | Jul | Oct | Jan | Apr | Jul | Oct | Jan | Apr | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb  | Jul  | Oct  | Jan  | Apr  |  |
|    |   | 1QM                | 2QM | 3QM | 4QM | 5QM | 6QM | 7QM | 8QM | 9QM | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23QM | 25QM | 26QM | 27QM | 28QM |  |
| 1  | Left Bank of Passur River at 100m u/s of North West corner from the Project boundary  | 598                | 126 | 234 | 180 | 160 | 26  | 76  | 14  | 8   | 61   | 20   | 46   | 51   | 18   | 14   | 18   | 17   | 14   | 15   | 12   | 14   | 8    | 11   | 14   | 7    | 11   | 15   |  |
| 2  | Middle of Passur River at 100m u/s of North West corner from the Project boundary     | 45                 | 92  | 193 | 210 | 167 | 25  | 80  | 12  | 7   | 48   | 18   | 52   | 42   | 15   | 15   | 17   | 16   | 11   | 12   | 14   | 11   | 7    | 8    | 6    | 11   | 6    | 23   |  |
| 3  | Right Bank of Passur River at 100m u/s of North West corner from the Project boundary | 53                 | 112 | 174 | 230 | 170 | 127 | 65  | 14  | 10  | 56   | 16   | 48   | 48   | 22   | 14   | 22   | 15   | 15   | 14   | 13   | 13   | 6    | 7    | 11   | 8    | 7    | 20   |  |
| 4  | Left Bank of Passur River at Project Site-Jetty                                       | 54                 | 99  | 227 | 450 | 160 | 30  | 92  | 17  | 10  | 62   | 20   | 42   | 52   | 16   | 13   | 20   | 18   | 11   | 12   | 11   | 12   | 8    | 8    | 12   | 7    | 7    | 13   |  |
| 5  | Middle Passur River at Project Site-Jetty   | 60                 | 100 | 232 | 250 | 165 | 27  | 85  | 18  | 8   | 45   | 24   | 54   | 43   | 20   | 13   | 19   | 16   | 13   | 13   | 12   | 13   | 7    | 9    | 9    | 6    | 6    | 12   |  |
| 6  | Right Bank of Passur River at Project Site-Jetty                                      | 55                 | 105 | 186 | 200 | 155 | 40  | 97  | 22  | 7   | 49   | 19   | 46   | 38   | 17   | 14   | 21   | 15   | 12   | 15   | 15   | 14   | 6    | 6    | 12   | 9    | 8    | 16   |  |
| 7  | Left Bank of Passur River at South West corner from the Project boundary              | 24                 | 116 | 185 | 300 | 150 | 32  | 104 | 20  | 12  | 51   | 20   | 61   | 32   | 15   | 15   | 17   | 16   | 14   | 16   | 12   | 13   | 7    | 7    | 14   | 15   | 7    | 14   |  |
| 8  | Middle of Passur River at South West corner from the Project boundary                 | 27                 | 112 | 536 | 530 | 147 | 40  | 90  | 7   | 10  | 43   | 18   | 58   | 44   | 16   | 17   | 19   | 14   | 13   | 13   | 11   | 12   | 6    | 8    | 13   | 8    | 6    | 15   |  |
| 9  | Right Bank of Passur River at South West corner from the Project boundary             | 67                 | 37  | 459 | 450 | 155 | 44  | 82  | 18  | 11  | 39   | 16   | 63   | 40   | 14   | 12   | 18   | 20   | 15   | 14   | 13   | 13   | 5    | 6    | 8    | 6    | 6    | 13   |  |

| SL | Sampling Locations   | Monitoring periods |     |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |
|----|--|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
|    |  | Apr                | Jul | Oct | Jan | Apr | Jul | Oct | Jan | Apr | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb  | Jul  | Oct  | Jan  | Apr  |  |
|    |  | 1QM                | 2QM | 3QM | 4QM | 5QM | 6QM | 7QM | 8QM | 9QM | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23QM | 25QM | 26QM | 27QM | 28QM |  |
| 10 | Maidara river of the South East corner of the project at Ichamoti-Maidara confluence | 7                  | 65  | 798 | 280 | 148 | 36  | 96  | 11  | 7   | 42   | 24   | 55   | 37   | 26   | 14   | 23   | 13   | 11   | 14   | 14   | 15   | 9    | 13   | 11   | 8    | 7    | 17   |  |
| 11 | Maidara river near proposed township area  | 9                  | 24  | 389 | 206 | 160 | 28  | 92  | 10  | 6   | 11   | 30   | 66   | 49   | 30   | 15   | 32   | 12   | 42   | 8    | 12   | 12   | 7    | 12   | 5    | 7    | 8    | 12   |  |
| 12 | Passur river at Passur - Mongla confluence   | 50                 | 310 | 203 | 280 | 165 | 24  | 60  | 15  | 13  | 47   | 27   | 61   | 38   | 25   | 13   | 14   | 17   | 27   | 15   | 13   | 13   | 15   | 14   | 9    | 8    | 6    | 3    |  |
| 13 | Passur river at Harbaria of Sundarbans   | 65                 | 90  | 869 | 400 | 160 | 42  | 74  | 22  | 18  | 31   | 18   | 61   | 33   | 27   | 17   | 15   | 13   | 22   | 12   | 11   | 12   | 11   | 11   | 17   | 5    | 8    | 14   |  |
| 14 | Passur river at Akram point of Sundarbans  | 115                | 99  | 28  | 103 | 150 | NS  | 110 | 16  | 23  | 16   | 41   | 34   | 28   | 22   | 14   | 18   | 14   | 15   | 11   | 10   | 7    | 7    | 10   | 18   | 8    | 11   | 11   |  |
| 15 | Passur river at Hiron point of Sundarbans  | 91                 | 72  | 267 | 200 | 180 | NS  | 144 | NS  | 15  | NS   | 33   | 49   | NS   | 16   | 13   | NS   | NS   | 6    | 9    | NS   | NS   | 5    | 10   | NS   | 6    | 6    | NS   |  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NS – Not Surveyed.

Table B.11: Nitrate (NO3<sup>2-</sup>) (mg/L) concentration of Passur River System

| Sl | Sampling Locations  | Monitoring periods |      |      |     |     |      |      |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|----|---|--------------------|------|------|-----|-----|------|------|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|    |   | Apr                | Jul  | Oct  | Jan | Apr | Jul  | Oct  | Jan | Apr | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb  | Jul  | Oct  | Jan  | Apr  |
|    |   | 1QM                | 2QM  | 3QM  | 4QM | 5QM | 6QM  | 7QM  | 8QM | 9QM | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23QM | 25QM | 26QM | 27QM | 28QM |
| 1  | Left Bank of Passur River at 100m u/s of North West corner from the Project boundary  | 0.9                | 2.89 | 0.32 | 3   | 33  | 9.1  | 4    | 6.3 | 3   | 3.9  | 0.25 | 3.62 | 4.35 | 5.8  | 3    | 6.8  | 0.8  | 2.8  | 3.5  | 0.3  | 0.1  | 3.5  | 1.3  | 3    | 3.2  | 4.3  | 3.3  |
| 2  | Middle of Passur River at 100m u/s of North West corner from the Project boundary     | 0.7                | 2.4  | 1.57 | 1.5 | 13  | 7.5  | 7.1  | 4.3 | 2.9 | 6.2  | 0.39 | 2.89 | 5.05 | 6.8  | 4.2  | 4.9  | 1.7  | 0.1  | 2.6  | 0.3  | 1.1  | 2.7  | 1.7  | 3.3  | 1.3  | 2.2  | 2.1  |
| 3  | Right Bank of Passur River at 100m u/s of North West corner from the Project boundary | 0.1                | 3.2  | 1.84 | 4.3 | 39  | 6.2  | 5    | 3.9 | 2.5 | 4.3  | 0.42 | 1.87 | 4.55 | 4.5  | 3.6  | 5.1  | 2.1  | 0.11 | 1.9  | 3.7  | 1.2  | 3.4  | 3.2  | 9.5  | 4.7  | 1.2  | 1.3  |
| 4  | Left Bank of Passur River at Project Site-Jetty                                       | 1.3                | 0.76 | 1.64 | 3.1 | 48  | 6.6  | 5.7  | 3.1 | 2   | 5.1  | 0.76 | 2.25 | 6.11 | 7.1  | 3    | 2.8  | 2.8  | 1.7  | 2.1  | 3.0  | 1.5  | 3.0  | 4.5  | 2.9  | 2.5  | 0.7  | 2.1  |
| 5  | Middle Passur River at Project Site-Jetty   | 1.4                | 2.69 | 1.42 | 2.2 | 69  | 6.1  | 3.3  | 5.2 | 3.1 | 2.7  | 0.52 | 2.46 | 3.4  | 3.1  | 4.7  | 5.2  | 1.8  | 0.9  | 2.2  | 1.2  | 1.5  | 1.7  | 2.7  | 1.9  | 2.6  | 3.1  | 3.0  |
| 6  | Right Bank of Passur River at Project Site-Jetty                                      | 1.1                | 2.98 | 1.33 | 8.5 | 8   | 6.6  | 4.7  | 4.1 | 3.6 | 3.9  | 0.31 | 3.01 | 3.16 | 5    | 7.6  | 5.5  | 3.2  | 0.1  | 3.5  | 4.8  | 2.1  | 2.1  | 5.1  | 1.8  | 1.0  | 2.7  | 1.5  |
| 7  | Left Bank of Passur River at South West corner from the Project boundary              | 0.75               | 2.13 | 1.85 | 2.7 | 87  | 14.9 | 4.4  | 4.9 | 2.6 | 3.6  | 0.2  | 3.64 | 3.14 | 4.1  | 8.8  | 2.6  | 4    | 0.1  | 4.2  | 0.5  | 1.5  | 2.0  | 7.4  | 1    | 0.5  | 1.8  | 1.7  |
| 8  | Middle of Passur River at South West corner from the Project boundary                 | 1.1                | 2.43 | 2.09 | 1.8 | 48  | 4    | 6.2  | 3.7 | 2.9 | 5.1  | 0.41 | 1.93 | 3.34 | 3.4  | 8.5  | 4.5  | 3.7  | 3.4  | 3.0  | 3.4  | 1.7  | 1.3  | 3.9  | 1.5  | 2.1  | 3.0  | 2.0  |
| 9  | Right Bank of Passur River at South West corner from the Project boundary             | 1.2                | 2.05 | 2.21 | 1.9 | 128 | 4.9  | 4.4  | 4.4 | 2.6 | 4.9  | 0.63 | 2.17 | 2.00 | 3.1  | 2.8  | 5.3  | 3.8  | 0.7  | 3.1  | 4.1  | 0.5  | 2.2  | 4.1  | 1.3  | 3.0  | 1.9  | 2.3  |
| 10 | Maidara river of the South East corner of the project at Ichamoti-Maidara confluence  | 0.3                | 2.18 | 2.26 | 6   | 62  | 7    | 4.9  | 5.6 | 2.7 | 5.2  | 0.4  | 2.46 | 3.61 | 2.3  | 1.6  | 5.9  | 4.4  | 2.3  | 2.1  | 5.0  | 3.1  | 2.9  | 4.7  | 3.9  | 1.5  | 3.0  | 4.2  |
| 11 | Maidara river near proposed township area   | 0.5                | 0.88 | 1.98 | 4   | 48  | 3.1  | 2.9  | 3.9 | 3.1 | 5.3  | 0.32 | 3.1  | 1.60 | 3.2  | 3.4  | 3.9  | 3.1  | 0.12 | 1.3  | 2.9  | 2.5  | 1.6  | 4.9  | 2.1  | 1.3  | 4.9  | 1.0  |
| 12 | Passur river at Passur - Mongla confluence  | 0.6                | 1.52 | 1.64 | 4.5 | 29  | 7.8  | 3.1  | 3.7 | 3   | 5.2  | 0.27 | 2.78 | 2.49 | 3.5  | 4.5  | 4.7  | 2.4  | 1.6  | 3.7  | 2.7  | 1.8  | 2.0  | 3.3  | 1.5  | 2.6  | 0.5  | 1.7  |
| 13 | Passur river at Harbaria of Sundarbans  | 1.4                | 1.75 | 1.67 | 2.7 | 18  | 4.4  | 4.4  | 5.1 | 3.4 | 5.1  | 0.39 | 2.78 | 2.46 | 4.2  | 4.6  | 5.2  | 2.7  | 0.1  | 4.7  | 4.4  | 1.7  | 2.1  | 3.2  | 5.7  | 2.6  | 0.5  | 2.6  |
| 14 | Passur river at Akram point of Sundarbans   | 2.7                | 3.32 | 0.59 | 1.5 | 25  | NS   | 3.2  | 4.9 | 2.9 | 5.4  | 0.25 | 3.08 | 3.69 | 2.2  | 1.8  | 5.5  | 4.2  | 0.1  | 1.8  | 2.7  | 1.3  | 1.6  | 2.6  | 4    | 2.6  | 2.9  | 2.8  |
| 15 | Passur river at Hiron point of Sundarbans   | 0.8                | 2.84 | 0.4  | 2   | 28  | NS   | 11.5 | NS  | 3.5 | NS   | 0.38 | 2.28 | NS   | 2.6  | 6.1  | NS   | NS   | 0.9  | 2.6  | NS   | NS   | 2.5  | 4.1  | NS   | 2.6  | 3.9  | NS   |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NS – Not Surveyed.

Table B.12: Sulphate (SO4<sup>2-</sup>) (mg/L) concentration of Passur River System

| Sl | Sampling Locations  | Monitoring periods |      |      |      |      |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |       |      |      |      |      |      |
|----|---|--------------------|------|------|------|------|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|------|------|------|------|
|    |   | Apr                | Jul  | Oct  | Jan  | Apr  | Jul | Oct | Jan | Apr  | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov   | Feb  | Jul  | Oct  | Jan  | Apr  |
|    |   | 1QM                | 2QM  | 3QM  | 4QM  | 5QM  | 6QM | 7QM | 8QM | 9QM  | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM  | 23QM | 25QM | 26QM | 27QM | 28QM |
| 1  | Left Bank of Passur River at 100m u/s of North West corner from the Project boundary  | 1840               | 20   | 26   | 580  | 1360 | 67  | 7   | 570 | 1080 | 18   | 5    | 230  | 422  | 29   | 630  | 1400 | 24   | 51   | 760  | 1460 | 23   | 37.0  | 490  | 4    | 3    | 270  | 1    |
| 2  | Middle of Passur River at 100m u/s of North West corner from the Project boundary     | 1320               | 23   | 28   | 450  | 1260 | 11  | 8   | 590 | 1040 | 10   | 3    | 210  | 460  | 3    | 370  | 1320 | 18   | 49   | 756  | 1380 | 19   | 6.0   | 510  | 3    | 6    | 420  | 5    |
| 3  | Right Bank of Passur River at 100m u/s of North West corner from the Project boundary | 1280               | 36   | 34   | 480  | 1240 | 9   | 11  | 560 | 1020 | 13   | 4    | 200  | 1340 | 5    | 410  | 1440 | 20   | 46   | 764  | 1420 | 21   | 6.0   | 560  | 5    | 11   | 460  | 2    |
| 4  | Left Bank of Passur River at Project Site-Jetty                                       | 1360               | 45   | 33   | 550  | 1240 | 26  | 10  | 550 | 1060 | 15   | 4    | 230  | 1380 | 2    | 310  | 1260 | 22   | 52   | 748  | 1410 | 16   | 5.0   | 530  | 8    | 5    | 410  | 1    |
| 5  | Middle Passur River at Project Site-Jetty   | 1040               | 32   | 30   | 520  | 1120 | 6   | 8   | 580 | 980  | 17   | 6    | 280  | 1280 | 1    | 310  | 1200 | 21   | 38   | 760  | 1440 | 17   | 4.0   | 640  | 10   | 3    | 420  | 3    |
| 6  | Right Bank of Passur River at Project Site-Jetty                                      | 1320               | 20   | 27   | 540  | 820  | 8   | 9   | 565 | 1100 | 14   | 5    | 230  | 1400 | 2    | 490  | 1400 | 16   | 42   | 762  | 1400 | 19   | 8.0   | 490  | 13   | 8    | 430  | 2    |
| 7  | Left Bank of Passur River at South West corner from the Project boundary              | 1640               | 60   | 40   | 630  | 880  | 9   | 12  | 640 | 1060 | 15   | 6    | 230  | 880  | 2    | 700  | 1300 | 10   | 56   | 768  | 1500 | 15   | 25.0  | 520  | 16   | 6    | 450  | 3    |
| 8  | Middle of Passur River at South West corner from the Project boundary                 | 1520               | 40   | 35   | 560  | 1180 | 19  | 8   | 560 | 1020 | 18   | 5    | 231  | 1440 | 1    | 340  | 1380 | 24   | 52   | 760  | 1450 | 16   | 9.0   | 470  | 8    | 4    | 440  | 1    |
| 9  | Right Bank of Passur River at South West corner from the Project boundary             | 1280               | 80   | 64   | 620  | 900  | 12  | 6   | 550 | 1080 | 12   | 8    | 250  | 1340 | 3    | 340  | 1240 | 22   | 39   | 770  | 1460 | 14   | 6.0   | 510  | 16   | 12   | 450  | 2    |
| 10 | Maidara river of the South East corner of the project at Ichamoti-Maidara confluence  | 1120               | 20   | 63   | 570  | 1220 | 72  | 11  | 96  | 1040 | 11   | 14   | 160  | 1220 | 120  | 270  | 1200 | 21   | 65   | 758  | 1500 | 18   | 71.0  | 490  | 16   | 31   | 420  | 3    |
| 11 | Maidara river near proposed township area   | 1320               | 210  | 63   | 460  | 840  | 27  | 9   | 480 | 1020 | 480  | 14   | 200  | 1340 | 76   | 350  | 1250 | 18   | 46   | 760  | 1490 | 12   | 55.0  | 565  | 21   | 26   | 190  | 15   |
| 12 | Passur river at Passur - Mongla confluence  | 1360               | 620  | 44   | 630  | 980  | 39  | 13  | 482 | 1100 | 42   | 14   | 220  | 1220 | 5    | 280  | 1260 | 28   | 30   | 765  | 1446 | 14   | 33.0  | 580  | 12   | 21   | 260  | 13   |
| 13 | Passur river at Harbaria of Sundarbans  | 1560               | 860  | 69   | 590  | 900  | 51  | 7   | 500 | 1080 | 60   | 19   | 220  | 1300 | 13   | 220  | 1300 | 35   | 20   | 756  | 1500 | 16   | 38.0  | 470  | 34   | 540  | 410  | 5    |
| 14 | Passur river at Akram point of Sundarbans   | 2600               | 1400 | 1390 | 850  | 1540 | NS  | 84  | 760 | 1650 | 620  | 190  | 230  | 1420 | 30   | 760  | 1460 | 620  | 250  | 764  | 1500 | 980  | 370.0 | 410  | 60   | 430  | 580  | 5    |
| 15 | Passur river at Hiron point of Sundarbans   | 2080               | 1160 | 2360 | 1500 | 1920 | NS  | 97  | NS  | 2100 | NS   | 320  | 1090 | NS   | 2    | 510  | NS   | NS   | 780  | 769  | NS   | NS   | 540.0 | 445  | NS   | 30   | 1240 | NS   |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NS – Not Surveyed.

Table B.13: Phosphate (PO<sub>4</sub><sup>2-</sup>) (mg/L) concentration of Passur River System

| Sl | Sampling Locations  | Monitoring periods |      |      |      |      |      |      |       |      |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |
|----|---|--------------------|------|------|------|------|------|------|-------|------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
|    |   | Apr                | Jul  | Oct  | Jan  | Apr  | Jul  | Oct  | Jan   | Apr  | Jul   | Oct   | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb  | Jul  | Oct  | Jan  | Apr  |  |
|    |   | 1QM                | 2QM  | 3QM  | 4QM  | 5QM  | 6QM  | 7QM  | 8QM   | 9QM  | 10QM  | 11QM  | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23QM | 25QM | 26QM | 27QM | 28QM |  |
| 1  | Left Bank of Passur River at 100m u/s of North West corner from the Project boundary  | 0.52               | 2.23 | 0.67 | 0.32 | 0.86 | 10   | 1.27 | 0.269 | 0.22 | 1.14  | 3.39  | 0.67 | 1.31 | 0.49 | 0.21 | 0.38 | 1.03 | 0.25 | 0.25 | 0.25 | 10.1 | 0.3  | 0.2  | 0.25 | 0.5  | 5.3  | 4.9  |  |
| 2  | Middle Passur River at 100m u/s of North West corner from the Project boundary        | 0.5                | 1.99 | 1.12 | 0.61 | 0.53 | 0.23 | 1.97 | 0.269 | 0.36 | 1.76  | 4.11  | 0.31 | 1.72 | 2.5  | 0.16 | 0.25 | 0.83 | 0.3  | 0.30 | 0.32 | 0.6  | 0.3  | 0.2  | 0.27 | 0.5  | 3.5  | 2    |  |
| 3  | Right Bank of Passur River at 100m u/s of North West corner from the Project boundary | 1.1                | 2.55 | 0.95 | 0.7  | 0.72 | 0.67 | 1.94 | 0.179 | 0.27 | 1.77  | 4.58  | 0.09 | 2.73 | 2.8  | 0.3  | 0.29 | 0.76 | 0.22 | 0.17 | 0.40 | 0.5  | 0.4  | 0.3  | 0.3  | 0.5  | 3.2  | 1.9  |  |
| 4  | Left Bank of Passur River at Project Site-Jetty                                       | 2.1                | 0.45 | 0.92 | 0.43 | 0.49 | 0.27 | 2.53 | 0.357 | 0.31 | 2.31  | 2.76  | 0.07 | 2.77 | 3.3  | 0.19 | 0.38 | 0.88 | 0.24 | 0.20 | 0.30 | 0.6  | 0.2  | 0.3  | 0.35 | 0.7  | 2.9  | 2.3  |  |
| 5  | Middle Passur River at Project Site-Jetty   | 2.2                | 2.13 | 1.11 | 0.41 | 0.68 | 0.59 | 1.3  | 0.536 | 0.3  | 0.98  | 3.2   | 0.12 | 0.66 | 3.9  | 0.17 | 0.34 | 1.07 | 0.4  | 0.35 | 0.27 | 0.6  | 0.3  | 0.2  | 0.29 | 0.5  | 3.0  | 5.7  |  |
| 6  | Right Bank of Passur River at Project Site-Jetty                                      | 2                  | 2.42 | 0.99 | 0.55 | 0.61 | 0.13 | 1.32 | 0.269 | 0.43 | 1.01  | 2.48  | 0.16 | 0.62 | 3.9  | 0.47 | 0.27 | 0.67 | 0.53 | 0.27 | 0.25 | 0.9  | 0.4  | 0.3  | 0.36 | 0.8  | 5.4  | 4    |  |
| 7  | Left Bank of Passur River at South West corner from the Project boundary              | 0.57               | 1.25 | 1.18 | 0.76 | 0.65 | 0.1  | 0.99 | 0.536 | 0.63 | 0.87  | 4.16  | 0.09 | 0.65 | 4.6  | 1.31 | 0.29 | 1.16 | 0.32 | 0.20 | 0.41 | 11.1 | 0.5  | 0.4  | 0.4  | 0.7  | 3.0  | 1.2  |  |
| 8  | Middle of Passur River at South West corner from the Project boundary                 | 1.2                | 1.51 | 1.25 | 0.85 | 0.53 | 0.18 | 1.02 | 0.625 | 0.21 | 0.96  | 2.76  | 0.04 | 0.37 | 0.41 | 0.39 | 0.29 | 0.86 | 0.43 | 0.20 | 0.35 | 0.8  | 0.7  | 0.4  | 0.43 | 0.4  | 2.5  | 2.4  |  |
| 9  | Right Bank of Passur River at South West corner from the Project boundary             | 1.5                | 1.1  | 1    | 0.53 | 0.6  | 0.1  | 1.39 | 0.536 | 0.33 | 1.123 | 2.71  | 0.07 | 0.45 | 0.63 | 0.62 | 0.42 | 1.03 | 0.57 | 0.37 | 0.27 | 0.8  | 0.5  | 0.4  | 0.52 | 1.3  | 3.2  | 6.3  |  |
| 10 | Maidara river of the South East corner of the project at Ichamoti-Maidara confluence  | 0.55               | 2.1  | 1.27 | 0.59 | 0.7  | 0.5  | 1.27 | 0.351 | 0.19 | 1.06  | 2.836 | 0.07 | 0.61 | 0.51 | 0.38 | 0.24 | 0.83 | 0.27 | 0.40 | 0.28 | 0.5  | 0.6  | 0.5  | 0.25 | 1.2  | 13.1 | 8    |  |
| 11 | Maidara river near proposed township area   | 1.1                | 0.53 | 1.04 | 0.64 | 0.55 | 0.29 | 1.28 | 0.269 | 0.13 | 1     | 5.23  | 0.2  | 0.47 | 15.3 | 0.71 | 0.28 | 1.2  | 0.22 | 0.28 | 0.30 | 0.8  | 0.4  | 0.3  | 0.56 | 0.7  | 4.1  | 0.76 |  |
| 12 | Passur river at Passur - Mongla confluence  | 1.3                | 0.35 | 0.86 | 0.42 | 0.71 | 0.59 | 0.95 | 0.179 | 0.31 | 0.78  | 4.01  | 0.09 | 0.18 | 1.3  | 0.63 | 0.37 | 0.86 | 0.33 | 0.29 | 0.31 | 0.6  | 0.6  | 0.4  | 0.53 | 0.8  | 9.6  | 0.79 |  |
| 13 | Passur river at Harbaria of Sundarbans  | 1.1                | 0.56 | 1.22 | 0.61 | 0.59 | 0.89 | 0.35 | 0.269 | 0.42 | 0.53  | 1.16  | 0.09 | 0.21 | 3.15 | 0.81 | 0.26 | 0.5  | 0.25 | 0.30 | 0.52 | 0.6  | 0.7  | 0.2  | 0.4  | 0.3  | 2.6  | 0.6  |  |
| 14 | Passur river at Akram point of Sundarbans   | 1.3                | 0.29 | 0.8  | 0.42 | 0.61 | NS   | 0.43 | 0.357 | 0.26 | 0.47  | 9.08  | 0.1  | 0.19 | 0.36 | 0.97 | 0.20 | 0.67 | 0.5  | 0.19 | 0.63 | 0.5  | 0.3  | 0.1  | 0.37 | 0.4  | 7.1  | 3    |  |
| 15 | Passur river at Hiron point of Sundarbans   | 7.51               | 0.29 | 1.09 | 0.44 | 0.47 | NS   | 0.45 | NS    | 0.36 | NS    | 5.9   | 0.23 | NS   | 0.55 | 1.45 | NS   | NS   | 0.61 | 0.18 | NS   | NS   | 0.3  | 0.2  | NS   | 0.4  | 1.1  | NS   |  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NS – Not Surveyed.

Table B.14: Arsenic (As) (mg/L) concentration of Passur River System

| Sl | Sampling Locations  | Monitoring periods |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |  |
|----|---|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|--|
|    |   | Apr                | Jul   | Oct   | Jan   | Apr   | Jul   | Oct   | Jan   | Apr   | Jul   | Oct   | Jan   | Apr   | Oct   | Jan   | Apr   | Jul   | Nov   | Feb   | Apr   | July  | Nov   | Feb   | Jul   | Oct   | Jan   | Apr  |  |
|    |   | 1QM                | 2QM   | 3QM   | 4QM   | 5QM   | 6QM   | 7QM   | 8QM   | 9QM   | 10QM  | 11QM  | 12QM  | 13QM  | 14QM  | 15QM  | 16QM  | 17QM  | 18QM  | 19QM  | 20QM  | 21QM  | 22QM  | 23QM  | 25QM  | 26QM  | 27QM  | 28QM |  |
| 1  | Left Bank of Passur River at 100m u/s of North West corner from the Project boundary  | 0.002              | 0.003 | 0.004 | 0.003 | 0.002 | 0.002 | 0.001 | 0.001 | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.001 | 0.004 | 0.003 | 0.002 | 0.003 | 0.002 | 0.002 | 0.002 | 0.003 | 0.003 | 0.002 | 0.003 |      |  |
| 2  | Middle Passur River at 100m u/s of North West corner from the Project boundary        | 0.002              | 0.003 | 0.004 | 0.003 | 0.002 | 0.002 | 0.001 | 0.001 | 0.003 | 0.003 | 0.003 | 0.001 | 0.002 | 0.001 | 0.002 | 0.001 | 0.005 | 0.002 | 0.001 | 0.002 | 0.002 | 0.003 | 0.003 | 0.003 | 0.002 | 0.004 |      |  |
| 3  | Right Bank of Passur River at 100m u/s of North West corner from the Project boundary | 0.001              | 0.003 | 0.004 | 0.003 | 0.003 | 0.002 | 0.001 | 0.001 | 0.003 | 0.005 | 0.002 | 0.001 | 0.001 | 0.002 | 0.003 | 0.001 | 0.004 | 0.002 | 0.003 | 0.003 | 0.002 | 0.002 | 0.002 | 0.003 | 0.003 | 0.002 |      |  |
| 4  | Left Bank of Passur River at Project Site-Jetty                                       | 0.002              | 0.004 | 0.004 | 0.004 | 0.002 | 0.002 | 0.001 | 0.002 | 0.002 | 0.004 | 0.002 | 0.002 | 0.001 | 0.002 | 0.002 | 0.002 | 0.005 | 0.002 | 0.001 | 0.003 | 0.002 | 0.003 | 0.003 | 0.002 | 0.003 | 0.002 |      |  |
| 5  | Middle Passur River at Project Site-Jetty   | 0.002              | 0.004 | 0.004 | 0.003 | 0.002 | 0.001 | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.001 | 0.003 | 0.002 | 0.001 | 0.003 | 0.002 | 0.003 | 0.002 | 0.002 | 0.004 | 0.003 |      |  |
| 6  | Right Bank of Passur River at Project Site-Jetty                                      | 0.002              | 0.003 | 0.003 | 0.003 | 0.002 | 0.002 | 0.001 | 0.001 | 0.002 | 0.002 | 0.002 | 0.001 | 0.002 | 0.003 | 0.002 | 0.002 | 0.002 | 0.001 | 0.002 | 0.003 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.004 |      |  |
| 7  | Left Bank of Passur River at South West corner from the Project boundary              | <0.001             | 0.003 | 0.006 | 0.003 | 0.002 | 0.002 | 0.001 | 0.002 | 0.001 | 0.003 | 0.002 | 0.002 | 0.002 | 0.003 | 0.001 | 0.002 | 0.005 | 0.002 | 0.003 | 0.003 | 0.003 | 0.003 | 0.002 | 0.005 | 0.004 | 0.003 |      |  |
| 8  | Middle of Passur River at South West corner from the Project boundary                 | <0.002             | 0.004 | 0.004 | 0.003 | 0.002 | 0.002 | 0.001 | 0.001 | 0.002 | 0.003 | 0.003 | 0.001 | 0.002 | 0.002 | 0.001 | 0.001 | 0.003 | 0.002 | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.003 | 0.002 |      |  |
| 9  | Right Bank of Passur River at South West corner from the Project boundary             | 0.002              | 0.003 | 0.006 | 0.003 | 0.002 | 0.003 | 0.001 | 0.001 | 0.002 | 0.004 | 0.002 | 0.002 | 0.003 | 0.002 | 0.001 | 0.001 | 0.004 | 0.002 | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.003 | 0.002 |      |  |
| 10 | Maidara river of the South East corner of the project at Ichamoti-Maidara confluence  | <0.001             | 0.003 | 0.006 | 0.004 | 0.003 | 0.002 | 0.001 | 0.002 | 0.002 | 0.005 | 0.002 | 0.001 | 0.003 | 0.003 | 0.002 | 0.002 | 0.004 | 0.001 | 0.002 | 0.003 | 0.003 | 0.003 | 0.003 | 0.004 | 0.004 | 0.003 |      |  |
| 11 | Maidara river near proposed township area   | 0.002              | 0.002 | 0.003 | 0.003 | 0.003 | 0.002 | 0.001 | 0.001 | 0.002 | 0.002 | 0.002 | 0.001 | 0.003 | 0.001 | 0.001 | 0.001 | 0.003 | 0.001 | 0.005 | 0.003 | 0.004 | 0.004 | 0.003 | 0.002 | 0.004 | 0.002 |      |  |
| 12 | Passur river at Passur - Mongla confluence  | 0.002              | 0.004 | 0.003 | 0.003 | 0.004 | 0.002 | 0.001 | 0.002 | 0.003 | 0.004 | 0.003 | 0.002 | 0.002 | 0.002 | 0.001 | 0.002 | 0.003 | 0.001 | 0.007 | 0.003 | 0.002 | 0.004 | 0.003 | 0.002 | 0.002 | 0.003 |      |  |
| 13 | Passur river at Harbaria of Sundarbans  | 0.004              | 0.003 | 0.004 | 0.004 | 0.004 | 0.002 | 0.001 | 0.002 | 0.005 | 0.002 | 0.003 | 0.002 | 0.001 | 0.003 | 0.002 | 0.001 | 0.003 | 0.002 | 0.001 | 0.002 | 0.001 | 0.002 | 0.003 | 0.002 | 0.002 | 0.002 |      |  |
| 14 | Passur river at Akram point of Sundarbans   | 0.004              | 0.002 | 0.002 | 0.003 | 0.002 | NS    | 0.001 | 0.002 | 0.006 | 0.001 | 0.003 | 0.001 | 0.002 | 0.002 | 0.001 | 0.002 | 0.002 | 0.001 | 0.002 | 0.002 | 0.001 | 0.002 | 0.002 | 0.003 | 0.002 | 0.002 |      |  |
| 15 | Passur river at Hiron point of Sundarbans   | 0.003              | 0.002 | 0.003 | 0.002 | 0.002 | NS    | 0.001 | NS    | 0.004 | NS    | 0.002 | 0.002 | NS    | 0.002 | 0.001 | NS    | NS    | 0.001 | 0.001 | NS    | NS    | 0.002 | 0.002 | NS    | 0.009 | 0.002 |      |  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NS – Not Surveyed

Table B.15: Pb (mg/L) concentration of Passur River System

| Sl | Sampling Locations  | Monitoring periods |       |       |       |       |        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |        |  |
|----|---|--------------------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--|
|    |   | Apr                | Jul   | Oct   | Jan   | Apr   | Jul    | Oct   | Jan   | Apr   | Jul   | Oct   | Jan   | Apr   | Oct   | Jan   | Apr   | Jul   | Nov   | Feb   | Apr   | July  | Nov   | Feb   | Jul   | Oct   | Jan   | Apr    |  |
|    |   | 1QM                | 2QM   | 3QM   | 4QM   | 5QM   | 6QM    | 7QM   | 8QM   | 9QM   | 10QM  | 11QM  | 12QM  | 13QM  | 14QM  | 15QM  | 16QM  | 17QM  | 18QM  | 19QM  | 20QM  | 21QM  | 22QM  | 23QM  | 25QM  | 26QM  | 27QM  | 28QM   |  |
| 1  | Left Bank of Passur River at 100m u/s of North West corner from the Project boundary  | 0.053              | 0.004 | 0.002 | 0.104 | 0.098 | 0.0059 | 0.007 | 0.168 | 0.203 | 0.01  | 0.009 | 0.024 | 0.002 | 0.003 | 0.001 | 0.002 | 0.002 | 0.003 | 0.004 | 0.003 | 0.001 | 0.001 | 0.008 | 0.006 | 0.002 | 0.016 | 0.029  |  |
| 2  | Middle Passur River at 100m u/s of North West corner from the Project boundary        | 0.055              | 0.002 | 0.003 | 0.104 | 0.102 | 0.0038 | 0.006 | 0.092 | 0.302 | 0.009 | 0.007 | 0.034 | 0.001 | 0.003 | 0.001 | 0.001 | 0.001 | 0.007 | 0.005 | 0.002 | 0.003 | 0.002 | 0.007 | 0.004 | 0.005 | 0.017 | 0.029  |  |
| 3  | Right Bank of Passur River at 100m u/s of North West corner from the Project boundary | 0.055              | 0.005 | 0.002 | 0.111 | 0.138 | 0.0058 | 0.008 | 0.176 | 0.347 | 0.017 | 0.01  | 0.03  | 0.003 | 0.003 | 0.002 | 0.004 | 0.02  | 0.017 | 0.007 | 0.004 | 0.002 | 0.001 | 0.009 | 0.007 | 0.006 | 0.018 | 0.036  |  |
| 4  | Left Bank of Passur River at Project Site-Jetty                                       | 0.057              | 0.002 | 0.003 | 0.154 | 0.142 | 0.011  | 0.01  | 0.115 | 0.336 | 0.014 | 0.007 | 0.036 | 0.001 | 0.002 | 0.002 | 0.001 | 0.018 | 0.013 | 0.005 | 0.003 | 0.009 | 0.001 | 0.008 | 0.005 | 0.008 | 0.015 | 0.016  |  |
| 5  | Middle Passur River at Project Site-Jetty   | 0.06               | 0.002 | 0.002 | 0.139 | 0.135 | 0.002  | 0.009 | 0.148 | 0.317 | 0.006 | 0.006 | 0.046 | 0.003 | 0.002 | 0.001 | 0.003 | 0.008 | 0.01  | 0.003 | 0.003 | 0.003 | 0.001 | 0.006 | 0.007 | 0.006 | 0.017 | 0.014  |  |
| 6  | Right Bank of Passur River at Project Site-Jetty                                      | 0.058              | 0.002 | 0.002 | 0.138 | 0.156 | 0.0021 | 0.007 | 0.112 | 0.298 | 0.01  | 0.005 | 0.041 | 0.002 | 0.001 | 0.001 | 0.001 | 0.041 | 0.012 | 0.007 | 0.002 | 0.009 | 0.003 | 0.004 | 0.008 | 0.005 | 0.019 | 0.012  |  |
| 7  | Left Bank of Passur River at South West corner from the Project boundary              | 0.053              | 0.002 | 0.003 | 0.16  | 0.142 | 0.0076 | 0.01  | 0.134 | 0.396 | 0.007 | 0.006 | 0.048 | 0.003 | 0.001 | 0.001 | 0.007 | 0.012 | 0.011 | 0.003 | 0.002 | 0.120 | 0.001 | 0.006 | 0.019 | 0.018 | 0.019 | 0.0140 |  |
| 8  | Middle of Passur River at South West corner from the Project boundary                 | 0.054              | 0.003 | 0.004 | 0.153 | 0.148 | 0.002  | 0.011 | 0.099 | 0.323 | 0.006 | 0.007 | 0.044 | 0.009 | 0.002 | 0.001 | 0.003 | 0.015 | 0.014 | 0.004 | 0.003 | 0.006 | 0.002 | 0.008 | 0.009 | 0.008 | 0.017 | 0.003  |  |
| 9  | Right Bank of Passur River at South West corner from the Project boundary             | 0.056              | 0.005 | 0.004 | 0.139 | 0.163 | 0.002  | 0.009 | 0.093 | 0.331 | 0.012 | 0.007 | 0.056 | 0.003 | 0.002 | 0.002 | 0.005 | 0.03  | 0.019 | 0.006 | 0.002 | 0.004 | 0.001 | 0.007 | 0.01  | 0.004 | 0.022 | 0.014  |  |

| Sl | Sampling Locations   | Monitoring periods |       |        |       |       |       |       |       |       |       |       |       |        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |  |
|----|--|--------------------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|
|    |  | Apr                | Jul   | Oct    | Jan   | Apr   | Jul   | Oct   | Jan   | Apr   | Jul   | Oct   | Jan   | Apr    | Oct   | Jan   | Apr   | Jul   | Nov   | Feb   | Apr   | July  | Nov   | Feb   | Jul   | Oct   | Jan   | Apr   |  |
|    |  | 1QM                | 2QM   | 3QM    | 4QM   | 5QM   | 6QM   | 7QM   | 8QM   | 9QM   | 10QM  | 11QM  | 12QM  | 13QM   | 14QM  | 15QM  | 16QM  | 17QM  | 18QM  | 19QM  | 20QM  | 21QM  | 22QM  | 23QM  | 25QM  | 26QM  | 27QM  | 28QM  |  |
| 10 | Maidara river of the South East corner of the project at Ichamoti-Maidara confluence | 0.053              | 0.004 | 0.004  | 0.143 | 0.135 | 0.002 | 0.07  | 0.023 | 0.35  | 0.008 | 0.008 | 0.038 | <LOQ   | 0.003 | 0.002 | 0.002 | 0.01  | 0.008 | 0.004 | 0.002 | 0.003 | 0.002 | 0.008 | 0.013 | 0.003 | 0.019 | 0.013 |  |
| 11 | Maidara river near proposed township area  | 0.048              | 0.004 | <0.002 | 0.133 | 0.14  | 0.002 | 0.008 | 0.067 | 0.275 | 0.015 | 0.007 | 0.056 | 0.001  | 0.011 | 0.001 | 0.003 | 0.016 | 0.017 | 0.005 | 0.003 | 0.004 | 0.003 | 0.006 | 0.005 | 0.006 | 0.007 | 0.015 |  |
| 12 | Passur river at Passur - Mongla confluence   | 0.05               | 0.032 | <0.002 | 0.141 | 0.14  | 0.002 | 0.009 | 0.078 | 0.258 | 0.098 | 0.011 | 0.05  | 0.0001 | 0.011 | 0.001 | 0.002 | 0.015 | 0.009 | 0.007 | 0.003 | 0.002 | 0.002 | 0.005 | 0.003 | 0.007 | 0.015 | 0.014 |  |
| 13 | Passur river at Harbaria of Sundarbans   | 0.043              | 0.044 | 0.004  | 0.137 | 0.13  | 0.002 | 0.012 | 0.135 | 0.228 | 0.02  | 0.01  | 0.05  | 0.001  | 0.005 | 0.003 | 0.003 | 0.017 | 0.009 | 0.015 | 0.002 | 0.006 | 0.014 | 0.007 | 0.009 | 0.004 | 0.002 | 0.014 |  |
| 14 | Passur river at Akram point of Sundarbans  | 0.194              | 0.071 | 0.032  | 0.309 | 0.297 | NS    | 0.084 | 0.302 | 0.359 | 0.142 | 0.126 | 0.033 | 0.009  | 0.004 | 0.169 | 0.001 | 0.062 | 0.018 | 0.013 | 0.002 | 0.001 | 0.019 | 0.043 | 0.011 | 0.020 | 0.001 | 0.018 |  |
| 15 | Passur river at Hiron point of Sundarbans  | 0.224              | 0.05  | 0.07   | 0.309 | 0.291 | NS    | 0.073 | NS    | 0.607 | NS    | 0.151 | 0.129 | NS     | 0.019 | 0.175 | NS    | NS    | 0.014 | 0.017 | NS    | NS    | 0.008 | 0.056 | NS    | 0.013 | 0.001 | NS    |  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NS – Not Surveyed.

Table B.16: Hg (mg/L) concentration of Passur River System

| Sl | Sampling Locations  | Monitoring periods |            |            |            |            |            |            |            |            |             |             |             |             |             |             |             |             |             |             |             |              |             |             |             |             |             |             |  |
|----|---|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|--|
|    |   | Apr<br>1QM         | Jul<br>2QM | Oct<br>3QM | Jan<br>4QM | Apr<br>5QM | Jul<br>6QM | Oct<br>7QM | Jan<br>8QM | Apr<br>9QM | Jul<br>10QM | Oct<br>11QM | Jan<br>12QM | Apr<br>13QM | Oct<br>14QM | Jan<br>15QM | Apr<br>16QM | Jul<br>17QM | Nov<br>18QM | Feb<br>19QM | Apr<br>20QM | July<br>21QM | Nov<br>22QM | Feb<br>23QM | Jul<br>25QM | Oct<br>26QM | Jan<br>27QM | Apr<br>28QM |  |
|    |   |                    |            |            |            |            |            |            |            |            |             |             |             |             |             |             |             |             |             |             |             |              |             |             |             |             |             |             |  |
| 1  | Left Bank of Passur River at 100m u/s of North West corner from the Project boundary  | < 0.00015          | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015   | < 0.00015   | < 0.00015   | < 0.001     | < 0.001     | < 0.001     | 0.004       | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001      | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     |  |
| 2  | Middle Passur River at 100m u/s of North West corner from the Project boundary        | < 0.00015          | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015   | < 0.00015   | < 0.00015   | < 0.001     | < 0.001     | < 0.001     | 0.002       | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001      | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     |  |
| 3  | Right Bank of Passur River at 100m u/s of North West corner from the Project boundary | < 0.00015          | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015   | < 0.00015   | < 0.00015   | < 0.001     | < 0.001     | < 0.001     | 0.001       | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001      | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     |  |
| 4  | Left Bank of Passur River at Project Site-Jetty                                       | < 0.00015          | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015   | < 0.00015   | < 0.00015   | < 0.001     | < 0.001     | < 0.001     | 0.001       | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001      | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     |  |
| 5  | Middle Passur River at Project Site-Jetty   | < 0.00015          | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015   | < 0.00015   | < 0.00015   | < 0.001     | < 0.001     | < 0.001     | 0.001       | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001      | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     |  |
| 6  | Right Bank of Passur River at Project Site-Jetty                                      | < 0.00015          | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015   | < 0.00015   | < 0.00015   | < 0.001     | < 0.001     | < 0.001     | 0.001       | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001      | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     |  |
| 7  | Left Bank of Passur River at South West corner from the Project boundary              | < 0.00015          | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015   | < 0.00015   | < 0.00015   | < 0.001     | < 0.001     | < 0.001     | 0.001       | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001      | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     |  |
| 8  | Middle of Passur River at South West corner from the Project boundary                 | < 0.00015          | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015   | < 0.00015   | < 0.00015   | < 0.001     | < 0.001     | < 0.001     | 0.001       | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001      | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     |  |
| 9  | Right Bank of Passur River at South West corner from the Project boundary             | < 0.00015          | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015   | < 0.00015   | < 0.00015   | < 0.001     | < 0.001     | < 0.001     | 0.001       | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001      | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     |  |
| 10 | Maidara river of the South East corner of the project at Ichamoti-Maidara confluence  | < 0.00015          | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015   | < 0.00015   | < 0.00015   | < 0.001     | < 0.001     | < 0.001     | 0.001       | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001      | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     |  |
| 11 | Maidara river near proposed township area   | < 0.00015          | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015   | < 0.00015   | < 0.00015   | < 0.001     | < 0.001     | < 0.001     | 0.001       | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001      | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     |  |
| 12 | Passur river at Passur - Mongla confluence  | < 0.00015          | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015   | < 0.00015   | < 0.00015   | < 0.001     | < 0.001     | < 0.001     | 0.001       | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001      | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     |  |
| 13 | Passur river at Harbaria of Sundarbans  | < 0.00015          | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015   | < 0.00015   | < 0.00015   | < 0.001     | < 0.001     | < 0.001     | 0.001       | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001      | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     |  |
| 14 | Passur river at Akram point of Sundarbans   | < 0.00015          | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015   | < 0.00015   | < 0.00015   | < 0.001     | < 0.001     | < 0.001     | 0.001       | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001      | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     | < 0.001     |  |
| 15 | Passur river at Hiron point of Sundarbans   | < 0.00015          | NS         | < 0.00015  | < 0.00015  | < 0.00015  | < 0.00015  | NS         | NS         | < 0.00015  | NS          | < 0.00015   | < 0.00015   | < 0.001     | < 0.001     | < 0.001     | NS          | NS          | < 0.001     | < 0.001     | NS          | < 0.001      | < 0.001     | < 0.001     | NS          | < 0.001     | < 0.001     | NS          |  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NS – Not Surveyed.

Parameters for ground water quality monitoring

Table B.17: pH and Temperature (°C) of Ground Water

| Sl | Locations              | Tube Well Type    | Monitoring periods |     |     |     |     |     |      |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|----|------------------------|-------------------|--------------------|-----|-----|-----|-----|-----|------|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|    |                        |                   | Apr                | Jul | Oct | Jan | Apr | Jul | Oct  | Jan | Apr | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb  | July | Oct  | Jan  | Apr  | Aug  |
|    |                        |                   | 1QM                | 2QM | 3QM | 4QM | 5QM | 6QM | 7QM  | 8QM | 9QM | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23QM | 2QM  | 26QM | 27QM | 28QM | 29QM |
| 1  | Near Proposed Township | Deep (>600 ft)    | 7.6                | 7.7 | 7.9 | 8   | TC  | 8.1 | 7.49 | 7.6 | 7.8 | 7.8  | 8.4  | 8.1  | 7.4  | 8.2  | 6.9  | NF   | NF   | MF   | 7.1  | 8.3  | 8.2  | 7.2  | 7.8  | 8.1  | 7.4  | 7.2  | 8.0  | 2QM  |
| n2 | Rajnagar               | Deep (>600 ft)    | 7.6                | 7.8 | 8   | 8.2 | 7.8 | 8.3 | 7.93 | 8.1 | 8.3 | 8.1  | 7.9  | 7.5  | 7.8  | 8.1  | 7.4  | 6.9  | 7.9  | 7.3  | 6.9  | 8.4  | 7.9  | 7.6  | 7.3  | 8.0  | 8    | 7.5  | 8.3  | 5.6  |
| 3  | Kapasdanga             | Deep (>600 ft)    | 7.6                | 7.7 | 8   | 8.1 | 7.9 | 8.3 | 7.7  | 7.9 | 8.2 | 7.9  | 7.9  | 7.6  | 7.4  | 7.8  | 7.2  | 7.2  | 7.6  | 7.6  | 6.5  | 8.9  | 8.1  | 7.4  | 7.5  | 8.0  | 8    | 7.5  | 8.2  | 6.2  |
| 4  | Kalekharber            | Shallow (<250 ft) | 6.3                | 6.5 | NF  | NF  | NF  | NF  | NF   | NF  | NF  | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | 7.4  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NF-Not Functional.



| Locations              | Tube Well Type    | Monitoring periods |      |     |      |      |     |      |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |
|------------------------|-------------------|--------------------|------|-----|------|------|-----|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
|                        |                   | Apr                | Jul  | Oct | Jan  | Apr  | Jul | Oct  | Jan | Apr  | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb  | July | Oct  | Jan  | Apr  | Aug   |
|                        |                   | 1QM                | 2QM  | 3QM | 4QM  | 5QM  | 6QM | 7QM  | 8QM | 9QM  | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23QM | 2QM  | 26QM | 27QM | 28QM | 29QM  |
| Near Proposed Township | Deep (>600 ft)    | 27.3               | 28.5 | 26  | 24.5 | TC   | 31  | 30   | 24  | 29.8 | 28.6 | 29.1 | 25.1 | 28.7 | 27.2 | 22.9 | NF   | NF   | NF   | 23.8 | 29   | 31.4 | 27   | 24   | 31   | 27   | 22   | 23   | 31.3  |
| Rajnagar               | Deep (>600 ft)    | 29.6               | 29.9 | 28  | 22.5 | 28.6 | 28  | 27.8 | 23  | 29.6 | 29.1 | 30.4 | 24.3 | 27.7 | 26.5 | 23.8 | 30.3 | 29.3 | 30   | 23.7 | 30   | 30.0 | 27   | 23   | 30   | 28   | 25   | 23   | 30.45 |
| Kapasdanga             | Deep (>600 ft)    | 29.2               | 28.9 | 28  | 25.1 | 28.8 | 30  | 28.7 | 25  | 30.1 | 29.4 | 29.8 | 24   | 28.4 | 26.4 | 23.6 | 30.1 | 29.7 | 29   | 23.2 | 30   | 31.2 | 26   | 23   | 30   | 27   | 25   | 24   | 30.72 |
| Kalekharber            | Shallow (<250 ft) | 27.5               | 28.7 | NF  | NF   | NF   | NF  | NF   | NF  | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF    |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NF=Not Functional.

\*Drinking water quality standards, The Environment Conservation Rules, 1997

Table B.18: Salinity (ppt) and DO (mg/L) in Groundwater

| Sl | Locations              | Tube Well Type    | Monitoring periods |     |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|----|------------------------|-------------------|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|    |                        |                   | Apr                | Jul | Oct | Jan | Apr | Jul | Oct | Jan | Apr | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb  | July | Oct  | Jan  | Apr  | Aug  |
|    |                        |                   | 1QM                | 2QM | 3QM | 4QM | 5QM | 6QM | 7QM | 8QM | 9QM | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23QM | 2QM  | 26QM | 27QM | 28QM | 29QM |
| 1  | Near Proposed Township | Deep (>600 ft)    | 0                  | 0   | 0   | 1   | TC  | 0   | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 0    | NF   | NF   | NF   | 0.1  | 0.1  | 0.0  | 0.1  | 0.1  | 0.18 | 0.1  | 0.1  |      |      |
| 2  | Rajnagar               | Deep (>600 ft)    | 0                  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 0.3  | 0.3  | 0.1  | 0.1  | 0.1  | 0.5  | 0.1  | 0.0  | 0.1  | 0.1  | 0.1  | 0.2  | 0.3  | 0.2  |
| 3  | Kapashdanga            | Deep (>600 ft)    | 0                  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 0.4  | 0.2  | 0.1  | 0.1  | 0.1  | 0.7  | 0.1  | 0.0  | 0.1  | 0.1  | 0.1  | 0.4  | 0.3  | 0.4  |
| 4  | Kalekharber            | Shallow (<250 ft) | 0                  | 0   | NF  | NF  | NF  | NF  | NF  | NF  | NF  | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   |      |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NF=Not Functional.

| Sl | Locations              | Tube Well Type    | Monitoring periods |     |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|----|------------------------|-------------------|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|    |                        |                   | Apr                | Jul | Oct | Jan | Apr | Jul | Oct | Jan | Apr | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb  | July | Oct  | Jan  | Apr  | Aug  |
|    |                        |                   | 1QM                | 2QM | 3QM | 4QM | 5QM | 6QM | 7QM | 8QM | 9QM | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23QM | 2QM  | 26QM | 27QM | 28QM | 29QM |
| 1  | Near Proposed Township | Deep (>600 ft)    | 4.4                | 5.2 | 6.5 | 6.7 | TC  | 6   | 5.4 | 4.9 | 6.1 | 5.8  | 6.3  | 4.5  | 5.1  | 6.2  | 5.2  | NF   | NF   | NF   | 6.0  | 6.0  | 6.1  | 6.0  | 6.0  | 6.0  | 6    | 6.4  | 6.4  | 6.0  |
| 2  | Rajnagar               | Deep (>600 ft)    | 6                  | 6.2 | 7.7 | 6.3 | 6   | 5.9 | 6.1 | 5.2 | 5.8 | 6.1  | 5.8  | 4.8  | 5.3  | 5.8  | 4.47 | 6.0  | 6    | 5.9  | 6.1  | 6.5  | 6.0  | 6.2  | 6.1  | 6.1  | 6.2  | 6.7  | 6.3  | 6    |
| 3  | Kapasdanga             | Deep (>600 ft)    | 6.4                | 6.5 | 6.1 | 6.5 | 6.6 | 6   | 5.6 | 4.8 | 5.6 | 5.7  | 6.1  | 4.6  | 5.7  | 6.2  | 4.26 | 5.4  | 5.9  | 6.1  | 6.2  | 6.2  | 6.0  | 6.0  | 6.0  | 6.1  | 6    | 4.9  | 6.3  | 5    |
| 4  | Kalekharber            | Shallow (<250 ft) | 4.4                | 6   | NF  | NF  | NF  | NF  | NF  | NF  | NF  | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring;

NF=Non-functional \*Drinking water quality standards, The Environment Conservation Rules, 1997

Table B.19: TDS (mg/L) and TSS (mg/L) concentrations in Groundwater

| SL | Locations                  | Type of tube wells | Monitoring periods |     |     |      |     |     |      |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |
|----|----------------------------|--------------------|--------------------|-----|-----|------|-----|-----|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
|    |                            |                    | Apr                | Jul | Oct | Jan  | Apr | Jul | Oct  | Jan | Apr  | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb  | Jul  | Oct  | Jan  | Apr  |  |
|    |                            |                    | 1QM                | 2QM | 3QM | 4QM  | 5QM | 6QM | 7QM  | 8QM | 9QM  | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23QM | 25QM | 26QM | 27QM | 28QM |  |
| 1  | Township near project site | Deep (>600 ft)     | 1113               | 999 | -   | 1021 | NO  | 881 | 377  | 447 | 1025 | 1000 | 617  | 623  | 395  | 602  | 405  | NF   | NF   | NF   | 1315 | 915  | 25   | 900  | 3080 | 1196 | 139  | 200  | 810  |  |
| 2  | Rajnagar                   | Deep (>600 ft)     | 4090               | 371 | -   | 378  | 390 | 574 | 1007 | 491 | 384  | 408  | 382  | 401  | 617  | 996  | 602  | 615  | 390  | 365  | 376  | 380  | 602  | 385  | 660  | 701  | 335  | 350  | 450  |  |
| 3  | Kapasdanga                 | Deep (>600 ft)     | 643                | 635 | -   | 600  | 600 | 328 | 611  | 284 | 645  | 607  | 636  | 998  | 558  | 390  | 994  | 370  | 608  | 610  | 927  | 610  | 360  | 603  | 370  | 316  | 202  | 610  | 570  |  |
| 4  | Kalekharber                | Shallow (<250 ft)  | 1055               | 970 | -   | NF   | NF  | NF  | NF   | NF  | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   |      |  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NS – Not Surveyed.

| SL | Locations                  | Type of tube wells | Monitoring periods |     |     |     |      |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |                    |                     |      |      |      |      |  |
|----|----------------------------|--------------------|--------------------|-----|-----|-----|------|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|--------------------|---------------------|------|------|------|------|--|
|    |                            |                    | Apr                | Jul | Oct | Jan | Apr  | Jul | Oct | Jan | Apr | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov                | Feb                 | Jul  | Oct  | Jan  | Apr  |  |
|    |                            |                    | 1QM                | 2QM | 3QM | 4QM | 5QM  | 6QM | 7QM | 8QM | 9QM | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22 <sup>n</sup> QM | 23 <sup>rd</sup> QM | 25QM | 26QM | 27QM | 28QM |  |
| 1  | Township near project site | Deep (>600 ft)     | -                  | 6   | 19  | 40  | NF** | 23  | 4   | 31  | 3   | 5    | 7    | 32   | 4    | 8    | 12   | NF   | NF   | NF   | 3    | 3    | 2    | 4                  | 2                   | 1    | 3    | 1    | 1    |  |
| 2  | Rajnagar                   | Deep (>600 ft)     | -                  | 6   | 2   | 28  | 4    | 16  | 5   | 46  | 4   | 4    | 4    | 28   | 10   | 10   | 6    | 12   | 2    | 6    | 3    | 2    | 1    | 3                  | 3                   | 5    | 2    | 1    | 1    |  |
| 3  | Kapasdanga                 | Deep (>600 ft)     | -                  | 8   | 6   | 32  | 6    | 14  | 4   | 41  | 3   | 4    | 5    | 25   | 9    | 9    | 7    | 5    | 3    | 8    | 4    | 4    | 4    | 4                  | 2                   | 1    | 2    | 5    | 1    |  |
| 4  | Kalekharber                | Shallow (<250 ft)  | -                  | 48  | NF  | NF  | NF   | NF  | NF  | NF  | NF  | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | Nf   | NF                 | NF                  | NF   | NF   | NF   | NF   |  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NS=Not Surveyed; NF=Non functional;

Table B.20: TH (mg/L) concentrations in Groundwater

| Sl No | Locations                  | Type of tubewell  | Monitoring periods |     |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |                     |      |      |      |      |  |
|-------|----------------------------|-------------------|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------------|------|------|------|------|--|
|       |                            |                   | Apr                | Jul | Oct | Jan | Apr | Jul | Oct | Jan | Apr | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb                 | Jul  | Oct  | Jan  | Apr  |  |
|       |                            |                   | 1QM                | 2QM | 3QM | 4QM | 5QM | 6QM | 7QM | 8QM | 9QM | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23 <sup>rd</sup> QM | 25QM | 26QM | 27QM | 28QM |  |
| 1     | Township near project site | Deep (>600 ft)    | 425                | 250 | 300 | 235 | NO  | 225 | 325 | 295 | 305 | 320  | 175  | 550  | 720  | 145  | NF   | NF   | NF   | NF   | 355  | 235  | 97   | 145  | 137                 | 625  | 232  | 160  | 1400 |  |
| 2     | Rajnagar                   | Deep (>600 ft)    | 220                | 175 | 180 | 110 | 138 | 125 | 450 | 195 | 263 | 248  | 295  | 510  | 420  | 240  | 265  | 195  | 235  | 178  | 215  | 182  | 167  | 245  | 118                 | 210  | 185  | 145  | 1600 |  |
| 3     | Kapasdanga                 | Deep (>600 ft)    | 190                | 140 | 180 | 125 | 216 | 115 | 480 | 225 | 163 | 28   | 183  | 620  | 654  | 215  | 305  | 215  | 170  | 138  | 270  | 167  | 212  | 137  | 145                 | 237  | 207  | 130  | 1200 |  |
| 4     | Kalekarber                 | Shallow (<250 ft) | 780                | 450 | NF  | NF  | NF  | NF  | NF  | NF  | NF  | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF                  | NF   | NF   | NF   | NF   |  |

Source: CEGIS Field Survey;

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring;

NF=Nonfunctional; \*Drinking water quality standards, The Environment Conservation Rules, 1997.

Table B.21: COD (mg/L) concentrations of monitored ground water locations

| Sl | Locations                  | Tube-well Type    | Monitoring periods |     |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |                     |      |      |      |      |  |
|----|----------------------------|-------------------|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------------|------|------|------|------|--|
|    |                            |                   | Apr                | Jul | Oct | Jan | Apr | Jul | Oct | Jan | Apr | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb                 | Jul  | Oct  | Jan  | Apr  |  |
|    |                            |                   | 1QM                | 2QM | 3QM | 4QM | 5QM | 6QM | 7QM | 8QM | 9QM | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23 <sup>rd</sup> QM | 25QM | 26QM | 27QM | 28QM |  |
| 1  | Township near project site | Deep (>600 ft)    | 32                 | 32  | 34  | 20  | NO  | 12  | 4   | 4   | 4   | 4    | 4    | 4    | 8    | NF   | NF   | NF   | NF   | 4    | 352  | 4    | 4    | 4    | 4                   | 4    | 4    | 16   |      |  |
| 2  | Rajnagar                   | Deep (>600 ft)    | 28                 | 28  | 18  | 16  | 14  | 10  | 8   | 4   | 4   | 4    | 4    | 4    | 8    | 4    | 4    | 4    | 4    | 3    | 4    | 4    | 4    | 4    | 4                   | 4    | 4    | 32   |      |  |
| 3  | Kapasdanga                 | Deep (>600 ft)    | 48                 | 32  | 34  | 20  | 18  | 14  | 4   | 4   | 4   | 2    | 4    | 4    | 4    | 16   | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4    | 4                   | 4    | 4    | 8    |      |  |
| 4  | Kalekarber                 | Shallow (<250 ft) | 32                 | 36  | NF  | NF  | NF  | NF  | NF  | NF  | NF  | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF                  | NF   | NF   | NF   |      |  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NS=Not Surveyed; NF=Non-functional; N/A=Not Availability; \*Drinking water quality standards, The Environment Conservation Rules, 1997

Table B.22: NO<sub>3</sub><sup>-</sup> (mg/L) Concentrations in Ground Water

| Sl | Locations                  | Type of tube well | Monitoring periods *BD Standard (10 mg/L) |      |       |     |     |     |     |     |     |      |       |      |      |      |      |      |      |      |      |      |      |      |                     |      |      |      |      |  |
|----|----------------------------|-------------------|---|------|-------|-----|-----|-----|-----|-----|-----|------|-------|------|------|------|------|------|------|------|------|------|------|------|---------------------|------|------|------|------|--|
|    |                            |                   | Apr                                       | Jul  | Oct   | Jan | Apr | Jul | Oct | Jan | Apr | Jul  | Oct   | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb                 | Jul  | Oct  | Jan  | Apr  |  |
|    |                            |                   | 1QM                                       | 2QM  | 3QM   | 4QM | 5QM | 6QM | 7QM | 8QM | 9QM | 10QM | 11QM  | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23 <sup>rd</sup> QM | 25QM | 26QM | 27QM | 28QM |  |
| 1  | Township near project site | Deep (>600 ft)    | 0.20                                      | 0.48 | <0.10 | 28  | -   | 7.6 | 4.3 | 2.1 | 1.7 | 3.8  | 6.1   | 4.65 | 9.32 | 3.3  | 5.9  | NF   | NF   | NF   | 1.7  | 4.4  | 1.4  | 1.8  | 1.9                 | 1.7  | 0.5  | 2.4  | 1    |  |
| 2  | Rajnagar                   | Deep (>600 ft)    | 0.60                                      | 0.68 | 0.31  | 26  | -   | 2.2 | 4.2 | 1.9 | 2.3 | 3.3  | 7.51  | 7.02 | 14.7 | 2.5  | 7.2  | 5.3  | 8.6  | 0.9  | 4.4  | 2.7  | 2.7  | 3.1  | 1.4                 | 7.5  | 3.8  | 2.2  | 1    |  |
| 3  | Kapasdanga                 | Deep (>600 ft)    | 0.80                                      | 0.40 | 0.80  | 13  | -   | 4.7 | 3.8 | 2.8 | 1.9 | 3.7  | 10.16 | 4.65 | 10.2 | 4.6  | 1.7  | 5.7  | 7.8  | 1.4  | 2.1  | 8.3  | 1.7  | 1.6  | 2.7                 | 1.7  | 3.1  | 4.9  | 2    |  |
| 4  | Kalekarber                 | Shallow (<250 ft) | 0.40                                      | 0.56 | NF    | NF  | NF  | NF  | NF  | NF  | NF  | NF   | NF    | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF                  | NF   | NF   | NF   | NF   |  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring;

NF=Nonfunctional; \*Drinking water quality standards, The Environment Conservation Rules, 1997

Table B.23: SO<sub>4</sub><sup>2-</sup> (mg/L) Concentrations in Ground Water

| Sl | Location                   | Typeof Tubewell   | Monitoring periods *BD Standard (400 mg/L) |     |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |
|----|----------------------------|-------------------|--|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
|    |                            |                   | Apr  | Jul | Oct | Jan | Apr | Jul | Oct | Jan | Apr | Jul  | Oct  | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb  | Jul  | Oct  | Jan  | Apr  |  |
|    |                            |                   | 1QM  | 2QM | 3QM | 4QM | 5QM | 6QM | 7QM | 8QM | 9QM | 10QM | 11QM | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23QM | 25QM | 26QM | 27QM | 28QM |  |
| 1  | Township near project site | Deep (>600 ft)    | -  | 3   | -   | -   | -   | -   | 1   | 5   | 1   | 1    | 1    | 1    | 5    | 1    | 8    | NF   | NF   | NF   | 1    | 4    | 1    | 2    | 2    | 4    | 9    | 1    | 1    |  |
| 2  | Rajnagar                   | Deep (>600 ft)    | -  | 2   | -   | -   | -   | -   | 2   | 6   | 2   | 1    | 1    | 1    | 1    | 2    | 2    | 4    | 1    | 2    | 1    | 2    | 2    | 3    | 3    | 3    | 1    | 1    |      |  |
| 3  | Kapasdanga                 | Deep (>600 ft)    | -  | 10  | -   | -   | -   | -   | 2   | 2   | 8   | 1    | 1    |      | 3    | 2    | 6    | 4    | 6    | 1    | 1    | 4    | 1    | 1    | 2    | 4    | 3    | 7    | 1    |  |
| 4  | Kalekarber                 | Shallow (<250 ft) | NF   | 3   | NF  | -   | -   | -   | -   | NF  | NF  | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   |  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring;

NF=Nonfunctional; \*Drinking water quality standards, The Environment Conservation Rules, 1997

Table B.24: PO<sub>4</sub><sup>3-</sup> (mg/L) Concentrations in Ground Water

| Sl | Location                   | Typeof Tubewell   | Monitoring periods *BD Standard (6.0 mg/L) |     |     |      |      |     |      |       |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |
|----|----------------------------|-------------------|--|-----|-----|------|------|-----|------|-------|------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
|    |                            |                   | Apr  | Jul | Oct | Jan  | Apr  | Jul | Oct  | Jan   | Apr  | Jul  | Oct   | Jan  | Apr  | Oct  | Jan  | Apr  | Jul  | Nov  | Feb  | Apr  | July | Nov  | Feb  | Jul  | Oct  | Jan  | Apr  |  |
|    |                            |                   | 1QM  | 2QM | 3QM | 4QM  | 5QM  | 6QM | 7QM  | 8QM   | 9QM  | 10QM | 11QM  | 12QM | 13QM | 14QM | 15QM | 16QM | 17QM | 18QM | 19QM | 20QM | 21QM | 22QM | 23QM | 25QM | 26QM | 27QM | 28QM |  |
| 1  | Township near project site | Deep (>600 ft)    | NF   | 2.2 | -   | 0.74 | NO   | 1.4 | 0.31 | 0.267 | 1.08 | 0.17 | 0.167 | 1.18 | 2.18 | 1.68 | 0.13 | NF   | NF   | NF   | 2.1  | 2.3  | 0.3  | 1    | 1.1  | 0.3  | 0.7  | 2.0  | 1.4  |  |
| 2  | Rajnagar                   | Deep (>600 ft)    | -  | 2.5 | -   | 0.44 | 1.98 | 1.6 | 0.27 | 0.179 | 1.53 | 0.29 | 0.67  | 1.21 | 1.8  | 3.5  | 0.17 | 4.5  | 2.9  | 0.15 | 1.3  | 2.5  | 4.0  | 0.5  | 0.4  | 1.5  | 6.3  | 1.8  | 0.98 |  |
| 3  | Kapasdanga                 | Deep (>600 ft)    | -  | 6.2 | -   | 0.48 | 4.54 | 4.1 | 0.48 | 0.179 | 3.26 | 0.31 | 0.6   | 1.18 | 2.1  | 4.7  | 0.18 | 0.27 | 4.8  | 0.26 | 3.6  | 3.2  | 2.0  | 1.5  | 0.9  | 1.7  | 2.3  | 2.3  | 4    |  |
| 4  | Kalekarber                 | Shallow (<250 ft) | NF   | 1.2 | NF  | NF   | NF   | NF  | NF   | NF    | NF   | NF   | NF    | 1.23 | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   | NF   |  |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring;

NF=Nonfunctional; \*Drinking water quality standards, The Environment Conservation Rules, 1997

Table B.25: As concentrations (mg/L) of monitored ground water locations

| Sl | Locations                  | Monitoring periods |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |                     |       |       |       |       |
|----|----------------------------|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------------|-------|-------|-------|-------|
|    |                            | Apr                | Jul   | Oct   | Jan   | Apr   | Jul   | Oct   | Jan   | Apr   | Jul   | Oct   | Jan   | Apr   | Jul   | Oct   | Jan   | Apr   | Jul   | Nov   | Feb   | Apr   | July  | Nov   | Feb                 | Jul   | Oct   | Jan   | Apr   |
|    |                            | 1QM                | 2QM   | 3QM   | 4QM   | 5QM   | 6QM   | 7QM   | 8QM   | 9QM   | 10QM  | 11QM  | 12QM  | 13QM  | 14QM  | 15QM  | 16QM  | 17QM  | 18QM  | 19QM  | 20QM  | 21QM  | 21QM  | 22QM  | 23 <sup>rd</sup> QM | 25QM  | 26QM  | 27QM  | 28QM  |
| 1  | Township near project site | 0.013              | 0.020 | 0.012 | 0.014 | NO    | 0.015 | 0.002 | 0.008 | 0.018 | 0.012 | 0.033 | 0.028 | 0.012 | 0.014 | 0.002 | 0.001 | NF    | NF    | 0.014 | 0.012 | 0.014 | 0.001 | 0.018 | 0.020               | 0.022 | 0.003 | 0.002 | 0.002 |
| 2  | Rajnagar                   | 0.006              | 0.009 | 0.006 | 0.008 | 0.01  | 0.014 | 0.012 | 0.002 | 0.007 | 0.018 | 0.011 | 0.005 | 0.022 | 0.004 | 0.012 | 0.022 | 0.012 | 0.007 | 0.003 | 0.012 | 0.006 | 0.027 | 0.006 | 0.068               | 0.045 | 0.053 | 0.004 | 0.003 |
| 3  | Kalekarber                 | 0.376              | 0.407 | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF                  | NF    | NF    | NF    | NF    |
| 4  | Kapasdanga                 | 0.036              | 0.033 | 0.020 | 0.017 | 0.034 | 0.024 | 0.011 | 0.002 | 0.047 | 0.005 | 0.016 | 0.028 | 0.010 | 0.027 | 0.002 | 0.001 | 0.004 | 0.050 | 0.004 | 0.012 | 0.022 | 0.001 | 0.033 | 0.003               | 0.004 | 0.006 | 0.049 | 0.008 |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NS=Not Surveyed; NF=Non-functional; N/A=Not Availability; TC=temporarily closed, D=Damaged

\*Drinking water quality standards, The Environment Conservation Rules, 1997.

Table B.26: Pb concentrations (mg/L) of monitored ground water locations

| Sl | Locations                  | Monitoring periods |        |        |       |       |        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |                     |       |       |       |       |
|----|----------------------------|--------------------|--------|--------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------------|-------|-------|-------|-------|
|    |                            | Apr                | Jul    | Oct    | Jan   | Apr   | Jul    | Oct   | Jan   | Apr   | Jul   | Oct   | Jan   | Apr   | Jul   | Oct   | Jan   | Apr   | Jul   | Nov   | Feb   | Apr   | July  | Nov   | Feb                 | Jul   | Oct   | Jan   | Apr   |
|    |                            | 1QM                | 2QM    | 3QM    | 4QM   | 5QM   | 6QM    | 7QM   | 8QM   | 9QM   | 10QM  | 11QM  | 12QM  | 13QM  | 14QM  | 15QM  | 16QM  | 17QM  | 18QM  | 19QM  | 20QM  | 21QM  | 22QM  | 22QM  | 23 <sup>rd</sup> QM | 25QM  | 26QM  | 27QM  | 28QM  |
| 1  | Township near project site | 0.002              | <0.002 | 0.004  | 0.023 | NO    | 0.002  | 0.006 | 0.026 | 0.019 | 0.002 | 0.001 | 0.01  | 0.001 | 0.003 | 0.001 | 0.001 | 0.001 | NF    | NF    | 0.008 | 0.004 | 0.018 | 0.002 | 0.001               | 0.001 | 0.004 | 0.048 | 0.003 |
| 2  | Rajnagar                   | <0.002             | <0.002 | <0.002 | 0.016 | 0.013 | 0.0027 | 0.021 | 0.011 | 0.007 | 0.002 | 0.001 | 0.009 | 0.001 | 0.007 | 0.002 | 0.001 | 0.001 | 0.001 | 0.004 | 0.003 | 0.004 | 0.002 | 0.008 | 0.001               | 0.001 | 0.006 | 0.016 | 0.008 |
| 3  | Kalekarber                 | 0.002              | 0.008  | NF     | NF    | D     | D      | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF    | NF                  | NF    | NF    | NF    | NF    |
| 4  | Kapasdanga                 | <0.002             | 0.004  | <0.002 | 0.013 | 0.017 | 0.002  | 0.005 | 0.012 | 0.008 | 0.002 | 0.001 | 0.016 | 0.001 | 0.002 | 0.001 | 0.001 | 0.001 | 0.001 | 0.056 | 0.004 | 0.006 | 0.001 | 0.001 | 0.002               | 0.001 | 0.002 | 0.056 | 0.002 |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NS=Not Surveyed; NF=Non-functional; N/A=Not Availability; TC=temporarily closed, D=Damaged

\*Drinking water quality standards, The Environment Conservation Rules, 1997

Table B.27: Hg concentrations (mg/L) of monitored ground water locations

| Sl | Locations                  | Monitoring periods*BD Standard (0.001 mg/L) |          |         |         |          |         |          |          |          |          |          |          |       |         |        |        |        |        |        |        |       |        |        |                     |        |        |        |        |
|----|----------------------------|---|----------|---------|---------|----------|---------|----------|----------|----------|----------|----------|----------|-------|---------|--------|--------|--------|--------|--------|--------|-------|--------|--------|---------------------|--------|--------|--------|--------|
|    |                            | Apr   | Jul      | Oct     | Jan     | Apr      | Jul     | Oct      | Jan      | Apr      | Jul      | Oct      | Jan      | Apr   | Jul     | Oct    | Jan    | Apr    | Jul    | Nov    | Feb    | Apr   | July   | Nov    | Feb                 | Jul    | Oct    | Jan    | Apr    |
|    |                            | 1QM   | 2QM      | 3QM     | 4QM     | 5QM      | 6QM     | 7QM      | 8QM      | 9QM      | 10QM     | 11QM     | 12QM     | 13QM  | 14QM    | 15QM   | 16QM   | 17QM   | 18QM   | 19QM   | 20QM   | 21QM  | 21QM   | 22QM   | 23 <sup>rd</sup> QM | 25QM   | 26QM   | 27QM   | 28QM   |
| 1  | Township near project site | <0.00015                                    | <0.00015 | <0.0005 | <0.0005 | <0.0005  | 0.00015 | <0.00015 | <0.00015 | <0.00015 | <0.00015 | <0.00015 | <0.00015 | 0.001 | <0.0001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001              | <0.001 | <0.001 | <0.001 | <0.001 |
| 2  | Rajnagar                   | <0.00015                                    | <0.00015 | <0.0005 | <0.0005 | <0.00015 | 0.00015 | <0.00015 | <0.00015 | <0.00015 | <0.00015 | <0.00015 | <0.00015 | 0.001 | <0.0001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.003 | <0.001 | <0.001 | <0.001              | <0.001 | <0.001 | <0.001 | <0.001 |
| 3  | Kalekarber                 | <0.00015                                    | <0.00015 | NF      | NF      | NF       | NF      | NF       | NF       | NF       | NF       | NF       | NF       | NF    | NF      | NF     | NF     | NF     | NF     | NF     | NF     | NF    | NF     | NF     | NF                  | NF     | NF     | NF     | NF     |
| 4  | Kapasdanga                 | <0.00015                                    | <0.00015 | <0.0005 | <0.0005 | <0.00015 | 0.00015 | <0.00015 | <0.00015 | <0.00015 | <0.00015 | <0.00015 | <0.00015 | 0.001 | <0.0001 | <0.001 |        | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 | <0.001 | <0.001              | NF     | <0.001 | <0.001 | <0.001 |

Source: CEGIS Field Survey

Note: 1QM= First Quarterly Monitoring, 2QM = Second Quarterly Monitoring, 3QM = Third Quarterly Monitoring, 4QM = Fourth Quarterly Monitoring; NS=Not Surveyed; NF=Non-functional; N/A=Not Availability; TC=temporarily closed, D=Damaged

\*Drinking water quality standards, The Environment Conservation Rules, 1997.

Table B.28: PAH (mg/L) concentrations of monitored locations

| PAH                        | July, 2018    |              |             | January, 2019 |              |             | July, 2019    |              |             | February, 2020 |              |             | July, 2020    |              |             | January, 2021 |              |             |
|----------------------------|---------------|--------------|-------------|---------------|--------------|-------------|---------------|--------------|-------------|----------------|--------------|-------------|---------------|--------------|-------------|---------------|--------------|-------------|
|                            | Project Jetty | Majhar point | Hiron point | Project Jetty | Majhar point | Hiron point | Project Jetty | Majhar point | Hiron point | Project Jetty  | Majhar point | Hiron point | Project Jetty | Majhar point | Hiron point | Project Jetty | Majhar point | Hiron point |
| Acenaphthylene             | ND            | ND           | NM          | ND            | ND           | NM          | ND            | ND           | NM          | ND             | ND           | NM          | ND            | ND           | ND          | ND            | ND           | ND          |
| Anthracene                 | ND            | ND           | NM          | ND            | ND           | NM          | ND            | ND           | NM          | ND             | ND           | NM          | ND            | ND           | ND          | ND            | ND           | ND          |
| Benzol (A) Anthracene      | ND            | ND           | NM          | ND            | ND           | NM          | ND            | ND           | NM          | ND             | ND           | NM          | ND            | ND           | ND          | ND            | ND           | ND          |
| Benzol (A) Pyrene          | ND            | ND           | NM          | ND            | ND           | NM          | ND            | ND           | NM          | ND             | ND           | NM          | ND            | ND           | ND          | ND            | ND           | ND          |
| Benzol (B) Fluoranthene    | ND            | ND           | NM          | ND            | ND           | NM          | ND            | ND           | NM          | ND             | ND           | NM          | ND            | ND           | ND          | ND            | ND           | ND          |
| Benzol (G, H, I) Perilene  | ND            | ND           | NM          | ND            | ND           | NM          | ND            | ND           | NM          | ND             | ND           | NM          | ND            | ND           | ND          | ND            | ND           | ND          |
| Benzol (K) Fluoranthene    | ND            | ND           | NM          | ND            | ND           | NM          | ND            | ND           | NM          | ND             | ND           | NM          | ND            | ND           | ND          | ND            | ND           | ND          |
| Chrysene                   | ND            | ND           | NM          | ND            | ND           | NM          | ND            | ND           | NM          | ND             | ND           | NM          | ND            | ND           | ND          | ND            | ND           | ND          |
| Dibenzol (A, H) Anthracene | ND            | ND           | NM          | ND            | ND           | NM          | ND            | ND           | NM          | ND             | ND           | NM          | ND            | ND           | ND          | ND            | ND           | ND          |
| Fluorene                   | ND            | ND           | NM          | ND            | ND           | NM          | ND            | ND           | NM          | ND             | ND           | NM          | ND            | ND           | ND          | ND            | ND           | ND          |
| Phenanthrene               | ND            | ND           | NM          | ND            | ND           | NM          | ND            | ND           | NM          | ND             | ND           | NM          | ND            | ND           | ND          | ND            | ND           | ND          |
| Pyrene                     | ND            | ND           | NM          | ND            | ND           | NM          | ND            | ND           | NM          | ND             | ND           | NM          | ND            | ND           | ND          | ND            | ND           | ND          |

Table B.29: TOC (mg/L) and TC (mg/L) concentrations of monitored locations

| Monitoring sites   | July, 2018   |                      | January, 2019 |                      | July, 2019   |                      | February, 2020 |                      | July, 2020   |                      | January, 2021 |                      |
|--------------------|--------------|----------------------|---------------|----------------------|--------------|----------------------|----------------|----------------------|--------------|----------------------|---------------|----------------------|
|                    | Total Carbon | Total Organic Carbon | Total Carbon  | Total Organic Carbon | Total Carbon | Total Organic Carbon | Total Carbon   | Total Organic Carbon | Total Carbon | Total Organic Carbon | Total Carbon  | Total Organic Carbon |
| Project jetty site | 26.4         | 19.5                 | 20.7          | 14.3                 | 17.2         | 13.6                 | 37.5           | 26.4                 | 152          | 9.17                 | 1302          | <5                   |
| Majhar point       | 21.9         | 25.1                 | 24.8          | 18.8                 | 21.7         | 18.1                 | 21.7           | 18.1                 | 200          | 9.48                 | 1568          | <5                   |
| Hiron point        | NM           | NM                   | 6.8           | 5.7                  | NM           | NM                   | 8.1            | 6.7                  | NM           | NM                   | 9241          | <5                   |

## (C) Noise Level monitoring data

Table C.1: Ambient noise monitoring status at the monitored locations

| Sl No | Location                             | QM1 (Noise Level in dB (A))<br>Mar-14 |              |                 |              | QM2 (Noise Level in dB (A))<br>Jul-14 |              |                 |              | QM3 (Noise Level in dB (A))<br>Oct-14 |              |                 |              | QM4 (Noise Level in dB (A))<br>Jan-15 |              |                 |              | Std*     |
|-------|--------------------------------------|---------------------------------------|--------------|-----------------|--------------|---------------------------------------|--------------|-----------------|--------------|---------------------------------------|--------------|-----------------|--------------|---------------------------------------|--------------|-----------------|--------------|----------|
|       |                                      | Morning (9:00)                        | noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                        | noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                        | noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                        | noon (13:00) | Evening (18:00) | Day time AVG | Day time |
| 1     | Chalna, Dacope                       | 80.32                                 | 60.86        | 63.22           | 68.13        | 52.71                                 | 55.62        | 50.27           | 52.87        | 53.37                                 | 53.52        | 57              | 54.63        | 51.92                                 | 53.7         | 54.21           | 53.28        | 70       |
| 2     | NW Corner of the Project area        | 55.23                                 | 53           | 47.43           | 51.89        | NM                                    | NM           | NM              | NM           | 42.67                                 | 41.73        | 41.37           | 41.92        | 33.87                                 | 36.42        | 35.46           | 35.25        | 50       |
| 3     | Chunkuri-2, Bajua                    | 62.69                                 | 57.19        | 53.39           | 57.76        | 54.61                                 | 51.14        | 51.9            | 52.55        | 52.26                                 | 51.14        | 50.76           | 51.39        | 55.08                                 | 46.29        | 46.49           | 49.29        | 50       |
| 4     | SW corner of the Project area        | 49.2                                  | NM           | NM              | 49.2         | 44.55                                 | 48.94        | 49.33           | 47.6         | 45.56                                 | 45.1         | 47.18           | 45.95        | 36.57                                 | 34.24        | 37.27           | 36.03        | 50       |
| 5     | Proposed Township area, Project site | 47.8                                  | 49.7         | NM              | 48.75        | 46.15                                 | 47.21        | NM              | 46.68        | 42.67                                 | 41.73        | 41.37           | 41.92        | 41.49                                 | 39.55        | 43.37           | 41.47        | 50       |
| 6     | Barni, Gaurambha                     | 64.95                                 | 50.93        | 60.65           | 58.84        | 48.73                                 | 50.37        | 50.75           | 49.95        | 50.18                                 | 50.89        | 48.27           | 49.78        | 43.36                                 | 38.56        | 48.86           | 43.6         | 50       |
| 7     | Khan Jahan Ali Bridge, Khulna        | 76.12                                 | 66.72        | 72.25           | 71.7         | 55.97                                 | 64.68        | 61.75           | 60.8         | 72.24                                 | 58.3         | 68.3            | 66.28        | 61.34                                 | 63.4         | 60.41           | 61.72        | 70       |
| 8     | Mongla Port area                     | 69.38                                 | 54.55        | 59.79           | 61.24        | 54.75                                 | 54.2         | 52.58           | 53.84        | 66.8                                  | 55.2         | 59.5            | 60.5         | 40.26                                 | 35.04        | 40.76           | 38.69        | 75       |
| 9     | Harbaria, Sundarbans                 | 39.24                                 | NM           | 42.51           | 40.88        | 59.25                                 | 60.52        | 48.62           | 56.13        | 54.08                                 | 56.51        | NM              | 55.3         | 36.36                                 | 32.4         | NM              | 34.38        | 45       |
| 10    | Akram Point, Sundarbans              | 40.95                                 | 41.98        | 39.9            | 40.94        | 48.95                                 | 46.86        | NM              | 47.9         | 45.27                                 | 42.69        | NM              | 43.98        | 37.9                                  | 30.75        | NM              | 34.32        | 45       |
| 11    | Hiron Point, Sundarbans              | 35.99                                 | 40.75        | 39.16           | 38.63        | 51.29                                 | NM           | NM              | 51.29        | 47.98                                 | 39.42        | NM              | 47.98        | 42.82                                 | 31.93        | NM              | 37.37        | 45       |

Note(s): NM – Not Monitored, \*Std- Standard as defined in National Noise Control Rules 2006

Table C.2: Ambient noise monitoring status at the monitored locations

| Sl No | Location                             | QM 5 (Noise Level in dB (A))<br>Apr-15 |              |                 |              | QM 6 (Noise Level in dB (A))<br>Jul-15 |              |                 |              | QM 7 (Noise Level in dB (A))<br>Oct-15 |              |                 |              | QM 8 (Noise Level in dB (A))<br>Jan-16 |              |                 |              | Std* |
|-------|--------------------------------------|--|--------------|-----------------|--------------|--|--------------|-----------------|--------------|--|--------------|-----------------|--------------|--|--------------|-----------------|--------------|------|
|       |                                      | Morning (9:00)                         | noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                         | noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                         | noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                         | noon (13:00) | Evening (18:00) | Day time AVG |      |
| 1     | Chalna, Dacope                       | 57.27                                  | 54.31        | 59.65           | 57.08        | 43.52                                  | 54.23        | 51.56           | 49.77        | 68.32                                  | 66.09        | 60.96           | 65.12        | 67.84                                  | 61.25        | 66.31           | 66.07        | 70   |
| 2     | NW Corner of the Project area        | 45.05                                  | 42.15        | 46.8            | 44.67        | 37.58                                  | 40.91        | 46.18           | 41.56        | 41.51                                  | 39.58        | 44.74           | 41.94        | 53.91                                  | 49.02        | 49.95           | 50.96        | 50   |
| 3     | Chunkuri-2, Bajua                    | 45.9                                   | 48.19        | NM              | 47.05        | 40.57                                  | 42.23        | 39.17           | 40.66        | 47.53                                  | 45.48        | 49.28           | 47.43        | 56.84                                  | 48.12        | 55.90           | 53.62        | 50   |
| 4     | SW corner of the Project area        | 40.6                                   | 43.25        | 46.89           | 43.58        | 44.57                                  | 44.30        | 42.36           | 43.75        | 36.15                                  | 48.26        | 43.68           | 42.70        | 60.32                                  | 55.30        | 63.70           | 60.44        | 50   |
| 5     | Proposed Township area, Project site | 41.49                                  | 39.55        | 43.37           | 41.47        | 43.41                                  | 50.86        | 45.99           | 46.75        | 46.89                                  | 49.47        | 55.20           | 50.52        | 54.79                                  | 52.22        | 54.29           | 53.77        | 50   |
| 6     | Barni, Gaurambha                     | 58.23                                  | 50.11        | NM              | 54.17        | 46.76                                  | 44.83        | 46.95           | 46.18        | 56.40                                  | 54.19        | 54.88           | 55.16        | 60.62                                  | 60.00        | 56.86           | 59.16        | 50   |
| 7     | Khan Jahan Ali Bridge, Khulna        | 75.2                                   | 72.75        | 72.42           | 73.45        | 52.95                                  | 52.18        | 53.34           | 52.82        | 64.43                                  | 61.65        | 66.65           | 64.25        | 69.96                                  | 64.81        | 70.56           | 68.45        | 70   |
| 8     | Mongla Port area                     | 46.02                                  | 49.29        | 49.15           | 48.15        | 36.72                                  | 38.56        | 43.54           | 39.61        | 45.39                                  | NM           | 48.63           | 47.01        | 54.15                                  | 51.82        | 52.14           | 52.70        | 75   |
| 9     | Harbaria, Sundarbans                 | 67.06                                  | 64.05        | 64.99           | 65.37        | 39.33                                  | 30.74        | NM              | 35.03        | 54.97                                  | 46.54        | NM              | 50.75        | 45.72                                  | 44.69        | NM              | 45.20        | 45   |
| 10    | Akram Point, Sundarbans              | 53.35                                  | 56.37        | NM              | 54.86        | NM                                     | NM           | NM              | NM           | 45.28                                  | 53.92        | NM              | 49.60        | 45.60                                  | 40.29        | NM              | 42.95        | 45   |
| 11    | Hiron Point, Sundarbans              | 47.48                                  | 48.2         | NM              | 47.84        | NM                                     | NM           | NM              | NM           | 54.44                                  | 37.69        | NM              | 46.06        | NM                                     | NM           | NM              | NM           | 45   |

Note(s): NM – Not Monitored, \*Std- Standard as defined in National Noise Control Rules 2006.

Table C.3: Ambient noise monitoring status at the monitored locations

| Sl No | Location                             | QM9 (Noise Level in dB (A))<br>Apr-16 |              |                 |              | QM 10 (Noise Level in dB (A))<br>Jul-16 |              |                 |              | QM 11 (Noise Level in dB (A))<br>Oct-16 |              |                 |              | QM 12 (Noise Level in dB (A)) Jan-17 |              |                 |              | Std*     |
|-------|--------------------------------------|---------------------------------------|--------------|-----------------|--------------|---|--------------|-----------------|--------------|---|--------------|-----------------|--------------|--------------------------------------|--------------|-----------------|--------------|----------|
|       |                                      | Morning (9:00)                        | noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                          | noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                          | noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                       | noon (13:00) | Evening (18:00) | Day time AVG | Day time |
| 1     | Chalna, Dacope                       | 67.71                                 | 61.23        | 66.31           | 65.08        | 50.92                                   | 50.04        | 52.3            | 51.42        | 60.1                                    | 68.6         | 67.8            | 65.5         | 54.4                                 | 61           | 61.46           | 58.95        | 70       |
| 2     | NW Corner of the Project area        | 53.81                                 | 48.66        | 49.90           | 50.79        | 54.40                                   | 53.19        | 50.36           | 52.65        | 54.7                                    | 54.8         | 57.0            | 55.5         | 44.52                                | 44.52        | NM              | 44.52        | 50       |
| 3     | Chunkuri-2, Bajua                    | 43.30                                 | 43.35        | 46.84           | 44.49        | 56.29                                   | 49.4         | 54.51           | 53.4         | 50.4                                    | 47.7         | 56.6            | 51.6         | 55.73                                | 56.2         | NM              | 55.31        | 50       |
| 4     | SW corner of the Project area        | 56.81                                 | 54.73        | 51.97           | 54.50        | 67.38                                   | 74.12        | 54.61           | 65.37        | 47.8                                    | 49.0         | 50.8            | 49.2         | 44.41                                | 45.96        | NM              | 45.19        | 50       |
| 5     | Proposed Township area, Project site | 55.02                                 | 52.41        | 52.69           | 53.37        | 62.71                                   | 52.98        | 51.67           | 55.79        | 45.8                                    | 41.6         | 48.7            | 45.4         | NM                                   | 43.4         | 41.85           | 42.63        | 50       |
| 6     | Barni, Gaurambha                     | 50.63                                 | 54.19        | 57.09           | 53.97        | 51.2                                    | 59.54        | 59.53           | 56.75        | 52.4                                    | 57.3         | 55.0            | 54.9         | 49.75                                | 48.35        | NM              | 49.05        | 50       |
| 7     | Khan Jahan Ali Bridge, Khulna        | 66.40                                 | 64.82        | 66.34           | 65.85        | 63.52                                   | 62.15        | 65.73           | 63.80        | 61.9                                    | 59.6         | 61.3            | 60.9         | 51.69                                | 60.05        | 54.97           | 55.57        | 70       |
| 8     | Mongla Port area                     | 49.89                                 | 48.67        | 51.07           | 49.88        | 53.87                                   | 52.04        | 52.7            | 52.87        | 49.5                                    | 50.0         | 50.2            | 49.9         | 47.82                                | 48.67        | 50.33           | 48.94        | 75       |
| 9     | Harbaria, Sundarbans                 | 44.40                                 | 44.69        | NM              | 44.55        | 53.87                                   | 53.04        | 52.79           | 52.9         | 57.2                                    | 53.5         | 49.3            | 53.3         | 41.13                                | 38.4         | 37.98           | 39.17        | 45       |
| 10    | Akram Point, Sundarbans              | 45.60                                 | 40.29        | NM              | 42.95        | 47.16                                   | 46.48        | 50.24           | 47.96        | 40.5                                    | 43.0         | 42.5            | 42.0         | 38.74                                | 38.45        | 37.06           | 38.08        | 45       |
| 11    | Hiron Point, Sundarbans              | 48.53                                 | 37.69        | NM              | 43.11        | NM                                      | NM           | NM              | NM           | 46.1                                    | 42.08        | 41.9            | 44.0         | 43.62                                | 40.96        | 42.29           | 42.29        | 45       |

Note(s): NM – Not Monitored, \*Std- Standard as defined in National Noise Control Rules 2006.



Table C.4: Ambient noise monitoring status at the monitored locations

| Sl No | Location                        | QM13 (Noise Level in dB (A))<br>Apr-17 |              |                 |              | QM 14 (Noise Level in dB (A))<br>Oct-17 |              |                 |              | QM 15 (Noise Level in dB (A))<br>Jan-18 |              |                 |              | QM 16 (Noise Level in dB (A))<br>April-18 |              |                 |              | Std*     |
|-------|---------------------------------|--|--------------|-----------------|--------------|---|--------------|-----------------|--------------|---|--------------|-----------------|--------------|---|--------------|-----------------|--------------|----------|
|       |                                 | Morning (9:00)                         | noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                          | noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                          | noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                            | noon (13:00) | Evening (18:00) | Day time AVG | Day time |
| 1     | Chalna, Dacope                  | 58.21                                  | 59.00        | 66.57           | 61.62        | 47.65                                   | 51.06        | 50.27           | 49.66        | 60.2                                    | 60.2         | 60.5            | 60.3         | 64.09                                     | 59.30        | 65.43           | 62.94        | 70       |
| 2     | NW Corner of the Project area   | 44.97                                  | 49.30        | 47.31           | 47.19        | 47.65                                   | 45.12        | 46.65           | 46.47        | 47.8                                    | 48.1         | 49.2            | 48.37        | 47.92                                     | 54.32        | 61.14           | 54.46        | 55       |
| 3     | Chunkuri-2, Bajua               | 45.60                                  | 52.29        | 53.42           | 50.44        | 39.82                                   | 45.60        | 41.73           | 42.38        | 51.1                                    | 51.2         | 52.1            | 51.47        | 44.77                                     | 46           | 63.14           | 51.30333     | 55       |
| 4     | SW corner of the Project area   | 39.62                                  | 42.64        | 47.48           | 43.25        | 60.80                                   | 64.08        | 62.52           | 62.47        | 43.5                                    | 43.5         | 45.7            | 44.23        | 64.45                                     | 63.49        | 66.63           | 64.85667     | 55       |
| 5     | Project site near Shapmari area | 41.40                                  | 43.09        | 43.45           | 42.65        | 43.05                                   | 48.52        | 45.01           | 45.53        | 53.2                                    | 54           | 52.82           | 53.34        | 51.95                                     | 59.66        | 56.8            | 56.13667     | 55       |
| 6     | Barni, Gaurambha                | 43.05                                  | 46.45        | 45.01           | 44.83        | 45.60                                   | 52.29        | 53.42           | 50.44        | 56.5                                    | 54.2         | 56.1            | 55.6         | 55.6                                      | 51.80        | 51.39           | 52.93        | 60       |
| 7     | Khan Jahan Ali Bridge, Khulna   | 54.01                                  | 57.50        | 58.66           | 56.72        | 40.60                                   | 42.64        | 46.55           | 43.26        | 60.2                                    | 62.1         | 62.2            | 61.5         | 49.4                                      | 45.25        | 47.98           | 47.54333     | 70       |
| 8     | Mongla Port area                | 47.78                                  | 47.45        | 45.25           | 47.61        | 41.40                                   | 44.68        | 45.71           | 43.93        | 60.2                                    | 60.2         | 58.4            | 59.6         | 50.84                                     | 48.33        | 53.25           | 50.80667     | 75       |
| 9     | Harbaria, Sundarbans            | 50.79                                  | 53.67        | 57.84           | 54.10        | 44.25                                   | 46.67        | 47.31           | 46.08        | 45.8                                    | 44.7         | 43.8            | 44.7         | 50.23                                     | 45.55        | 65.43           | 53.73667     | 50       |
| 10    | Akram Point, Sundarbans         | 43.41                                  | 45.60        | 43.89           | 44.30        | 58.21                                   | 58.59        | 58.70           | 58.50        | 39.4                                    | 40.5         | 41.1            | 40.3         | 58.31                                     | 60.93        | 64.87           | 61.37        | 50       |
| 11    | Hiron Point, Sundarbans         | NM                                     | NM           | NM              | NM           | 39.92                                   | 39.79        | 33.5            | 37.74        | 37.2                                    | 39           | 38.4            | 38.2         |   |              |                 |              | 50       |

Source: CEGIS field Survey

Note: NM-Not measured.

Table C.5 Ambient noise monitoring status at the monitored locations

| Sl No | Location                        | QM 17 (Noise Level in dB (A)) July-18 |                 |                 |              | QM 18 (Noise Level in dB (A)) Nov-18 |                 |                 |              | QM 19 (Noise Level in dB (A)) Feb-19 |                 |                 |              | QM 20 (Noise Level in dB (A)) Apr-19 |                 |                 |              | Std*     |
|-------|---------------------------------|---------------------------------------|-----------------|-----------------|--------------|--------------------------------------|-----------------|-----------------|--------------|--------------------------------------|-----------------|-----------------|--------------|--------------------------------------|-----------------|-----------------|--------------|----------|
|       |                                 | Morning (9:00)                        | A. noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                       | A. noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                       | A. noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                       | A. noon (13:00) | Evening (18:00) | Day time AVG | Day time |
| 1     | Chalna, Dacope                  | 57.64                                 | 56.94           | 58.03           | 57.54        | 61.3                                 | 56.3            | 57.1            | 70           | 56.14                                | 59.28           | 53.95           | 56.45        | 62.02                                | 61.91           | 61.08           | 61.67        | 70       |
| 2     | NW Corner of the Project area   | 42.80                                 | 47.51           | 46.57           | 45.63        | 56.5                                 | 60.1            | 59.85           | 55           | 45.15                                | 54.11           | 53              | 50.75        | 53.70                                | 58.92           | 57.92           | 56.85        | 55       |
| 3     | Chunkuri-2, Bajua               | 46.23                                 | 49.02           | 47.34           | 47.53        | 45.8                                 | 48.9            | 51.3            | 55           | 50.19                                | 49.35           | 51              | 50.18        | 49.66                                | 54.02           | 51.35           | 51.68        | 55       |
| 4     | SW corner of the Project area   | 58.84                                 | 48.00           | 51.03           | 52.63        | 64.5                                 | 60.6            | 60.2            | 55           | 53.50                                | 58.01           | 55.88           | 55.79        | 58.08                                | 54.79           | 55.27           | 56.05        | 55       |
| 5     | Project site near Shapmari area | 42.66                                 | 45.82           | 48.78           | 45.75        | 45.1                                 | 51.2            | 55.8            | 55           | 58.48                                | 61.21           | 54.70           | 58.13        | 61.35                                | 58.97           | 56.16           | 58.83        | 55       |
| 6     | Barni, Gaurambha                | 42.67                                 | 47.95           | 45.90           | 45.51        | 58.3                                 | 50.6            | 50.2            | 60           | 54.32                                | 57.65           | 45.75           | 52.57        | 58.58                                | 51.05           | 49.92           | 53.18        | 60       |
| 7     | Khan Jahan Ali Bridge, Khulna   | 64.1                                  | 64.06           | 61.90           | 63.35        | 64.6                                 | 60.9            | 60.9            | 70           | 65.72                                | 69.04           | 66.03           | 66.93        | 67.95                                | 63.09           | 69.82           | 66.95        | 70       |
| 8     | Mongla Port area                | 63.12                                 | 59.00           | 60.77           | 60.96        | 55.8                                 | 53.1            | 59.0            | 75           | 64.33                                | 63.37           | 70.85           | 66.18        | 64.12                                | 62.41           | 65.45           | 63.99        | 75       |
| 9     | Harbaria, Sundarbans            | 51.98                                 | 48.58           | 50.28           | 50.28        | 49.9                                 | 47.6            | NM              | 50           | 51.43                                | 47.90           | NM              | 49.67        | 49.42                                | 47.45           | NM              | 48.43        | 50       |
| 10    | Akram Point, Sundarbans         | 46.52                                 | 43.88           | 45.2            | 45.20        | 41.9                                 | 40.1            | NM              | 50           | 47.35                                | 45.55           | NM              | 46.45        | 46.16                                | 38.49           | NM              | 42.33        | 50       |
| 11    | Hiron Point, Sundarbans         | NM                                    | NM              | NM              | 57.54        | 39.7                                 | 39.1            | NM              | 50           | 33.8                                 | 44.62           | NM              | 39.21        | NM                                   | NM              | NM              | -            | 50       |

Source: CEGIS field Survey

Note: NM-Not measured.

Table C.6 Ambient noise monitoring status at the monitored locations

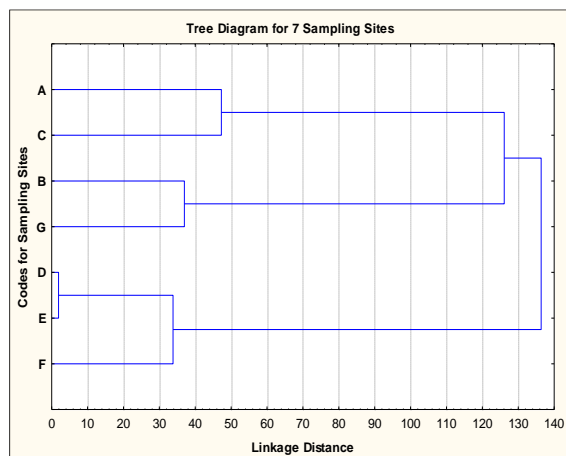
| Sl No | Location                        | QM 21 (Noise Level in dB (A)) July-19 |                 |                 |              | QM 22 (Noise Level in dB (A)) November-19 |                 |                 |              | QM 23 (Noise Level in dB (A)) February 20 |                 |                 |              | QM 25 (Noise Level in dB (A)) July, 20 |                 |                 |              | Std*     |
|-------|---------------------------------|---------------------------------------|-----------------|-----------------|--------------|---|-----------------|-----------------|--------------|---|-----------------|-----------------|--------------|--|-----------------|-----------------|--------------|----------|
|       |                                 | Morning (9:00)                        | A. noon (13:00) | Evening (18:00) | Day time AVG | Day time                                  | A. noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                            | A. noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                         | A. noon (13:00) | Evening (18:00) | Day time AVG | Day time |
| 1     | Chalna, Dacope                  | 55.92                                 | 60.88           | 61.23           | 59.34        | 70  | 61.03           | 55.78           | 58.60        | 56.24                                     | 54.09           | 53.45           | 54.59        | 52.00                                  | 51.11           | 50.56           | 51.28        | 70       |
| 2     | NW Corner of the Project area   | 56.44                                 | 53.21           | 55.88           | 55.18        | 55  | 53.45           | 50.97           | 51.11        | 40.96                                     | 43.33           | 51.98           | 45.42        | 43.9                                   | 42.95           | 43.26           | 43.37        | 55       |
| 3     | Chunkuri-2, Bajua               | 56.15                                 | 63.34           | 58.60           | 59.36        | 55  | 52.92           | 54.51           | 55.27        | 59.78                                     | 51.59           | 54.96           | 55.44        | 49.42                                  | 48.52           | 48.32           | 48.75        | 55       |
| 4     | SW corner of the Project area   | 66.94                                 | 58.41           | 65.65           | 63.66        | 55  | 49.98           | 42.05           | 46.57        | 56.35                                     | 54.05           | 56.40           | 55.60        | 49.91                                  | 49.78           | 50.85           | 50.18        | 55       |
| 5     | Project site near Shapmari area | 53.14                                 | 55.40           | 55.05           | 54.53        | 55  | 55.80           | 54.77           | 54.86        | 51.02                                     | 47.91           | 47.93           | 48.95        | 54.55                                  | 53.21           | 52.88           | 53.72        | 55       |
| 6     | Barni, Gaurambha                | 51.36                                 | 57.98           | NM              | 54.67        | 60  | 49.37           | 48.53           | 50.53        | 57.37                                     | 60.48           | 68.05           | 61.97        | 56.53                                  | 40.65           | 49.21           | 48.80        | 60       |
| 7     | Khan Jahan Ali Bridge, Khulna   | 63.38                                 | 60.55           | 66.44           | 63.46        | 70  | 67.65           | 65.32           | 66.05        | 60.75                                     | 62.81           | 63.05           | 62.20        | 65.55                                  | 66.86           | 66.52           | 66.31        | 70       |
| 8     | Mongla Port area                | 60.49                                 | 62.10           | 63.43           | 62.01        | 75  | 55.66           | 55.85           | 57.25        | 59.74                                     | 62.38           | 61.07           | 61.06        | 64.92                                  | 67.90           | 63.71           | 66.41        | 75       |
| 9     | Harbaria, Sundarbans            | 47.62                                 | 42.18           | NM              | 44.90        | 50  | 44.71           | NM              | 44.10        | 45.59                                     | 42.29           | 41.35           | 43.94        | 47.80                                  | 52.15           | 41.2            | 49.97        | 50       |
| 10    | Akram Point, Sundarbans         | 44.05                                 | 45.62           | NM              | 44.84        | 50  | 42.60           | NM              | 44.86        | NM  | 36.59           | 40.46           | 36.59        | 51.04                                  | 45.11           | 43.1            | 51.04        | 50       |
| 11    | Hiron Point, Sundarbans         | NM                                    | NM              | NM              | NM           | 50  | 41.34           | NM              | 40.28        | 41.3                                      | 39.41           | NM              | 40.34        | NM                                     | NM              | NM              | NM           | 50       |

Source: CEGIS field Survey

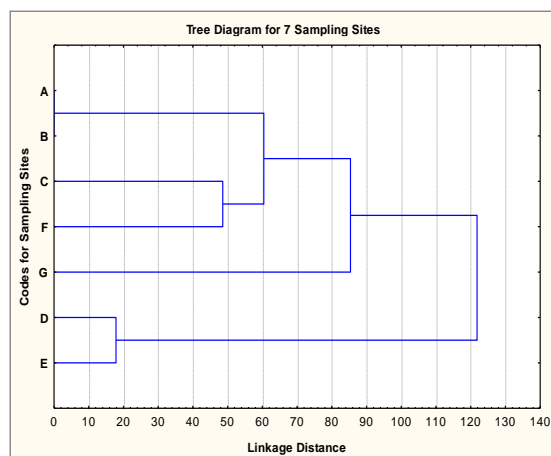
Note: NM-Not measured.

Table C.7 Ambient noise monitoring status at the monitored locations

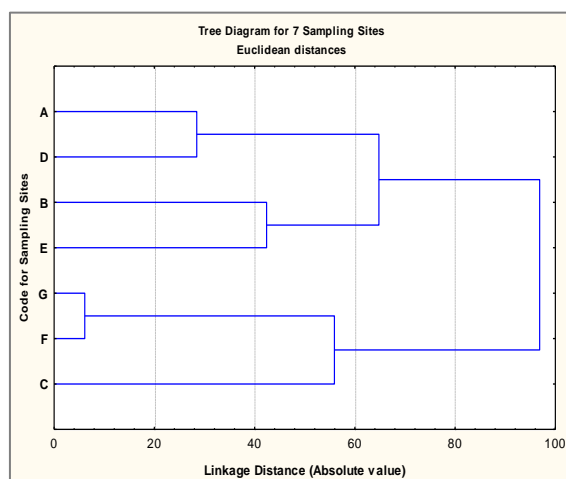
| Sl No | Location                        | QM 26 (Noise Level in dB (A)) Oct, 2020 |                 |                 |              | QM 27 (Noise Level in dB (A)) Jan, 2021 |                 |                 |              | QM 28 (Noise Level in dB (A)) Apr, 2021 |                 |                 |              | QM 29 (Noise Level in dB (A)) Jul, 2021 |                 |                 |              | Std*     |
|-------|---------------------------------|---|-----------------|-----------------|--------------|---|-----------------|-----------------|--------------|---|-----------------|-----------------|--------------|---|-----------------|-----------------|--------------|----------|
|       |                                 | Morning (9:00)                          | A. noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                          | A. noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                          | A. noon (13:00) | Evening (18:00) | Day time AVG | Morning (9:00)                          | A. noon (13:00) | Evening (18:00) | Day time AVG | Day time |
| 1     | Chalna, Dacope                  | 65.91                                   | 51.62           | 56.93           | 58.15        | 58.33                                   | NM              | 62.68           | 60.50        | 61.35                                   | 61.74           | 61.22           | 61.44        | 50.96                                   | 51.08           | 51.57           | 51.21        | 70       |
| 2     | NW Corner of the Project area   | 47.82                                   | 50.15           | 47.45           | 48.48        | 45.00                                   | 52.75           | 56.51           | 51.42        | 50.65                                   | 48.34           | NM              | 49.50        | 49.60                                   | 51.64           | 49.09           | 50.11        | 55       |
| 3     | Chunkuri-2, Bajua               | 43.58                                   | 47.68           | 46.45           | 45.91        | 48.75                                   | 45.45           | 46.96           | 47.05        | 50.22                                   | 52.90           | 50.81           | 51.31        | 49.93                                   | 51.65           | 49.52           | 50.36        | 55       |
| 4     | SW corner of the Project area   | 49.50                                   | 48.83           | 49.22           | 49.18        | NM                                      | 50.88           | 53.84           | 52.36        | 55.41                                   | 54.85           | 55.45           | 55.24        | 49.82                                   | 54.82           | 51.07           | 51.90        | 55       |
| 5     | Project site near Shapmari area | 50.23                                   | 41.71           | 41.43           | 44.45        | 49.19                                   | 47.07           | 51.00           | 49.09        | 52.23                                   | 51.24           | 52.67           | 52.05        | 53.45                                   | 54.35           | 53.71           | 53.84        | 55       |
| 6     | Barni, Gaurambha                | 67.71                                   | 51.76           | 55.51           | 58.33        | 51.69                                   | 51.99           | 55.60           | 53.09        | 54.16                                   | 51.69           | 51.15           | 52.34        | 52.73                                   | NM              | 49.28           | 51.00        | 60       |
| 7     | Khan Jahan Ali Bridge, Khulna   | 81.72                                   | 81.45           | 82.25           | 81.81        | 61.95                                   | NM              | 61.93           | 61.94        | 56.08                                   | 54.09           | 53.79           | 54.65        | 52.78                                   | 51.29           | 53.05           | 52.38        | 70       |
| 8     | Mongla Port area                | 74.72                                   | 75.67           | 80.37           | 76.92        | 55.16                                   | 56.85           | 57.53           | 56.52        | 54.01                                   | 52.41           | 54.48           | 53.63        | 55.26                                   | 55.54           | 55.68           | 54.49        | 75       |
| 9     | Harbaria, Sundarbans            | 59.01                                   | NM              | 50.06           | 54.54        | 46.98                                   | 41.82           | NM              | 44.40        | 48.54                                   | 47.54           | NM              | 48.04        | NM                                      | NM              | NM              | NM           | 50       |
| 10    | Akram Point, Sundarbans         | NM                                      | 42.23           | NM              | 42.23        | 40.34                                   | 35.35           | NM              | 37.85        | 45.95                                   | 40.89           | NM              | 43.42        | 46.31                                   | 42.94           | NM              | 44.62        | 50       |
| 11    | Hiron Point, Sundarbans         | 52.40                                   | 49.01           | NM              | 50.70        | 42.50                                   | 35.23           | NM              | 38.85        | NM                                      | NM              | NM              | NM           | 49.70                                   | 51.2            | NM              | 50.94        | 50       |

**(D) Fisheries resources monitoring data****D1: Classification of functional habitat**

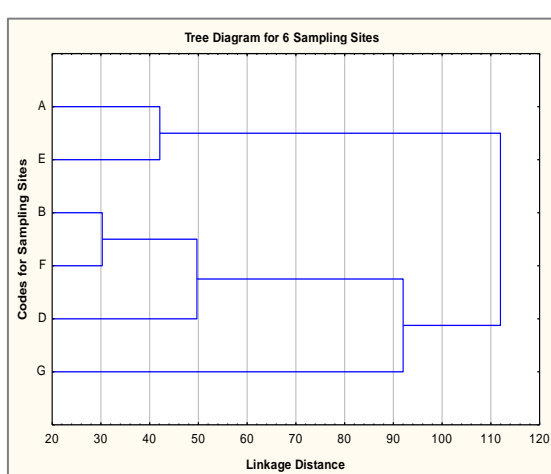
1st Monitoring, April, 2014



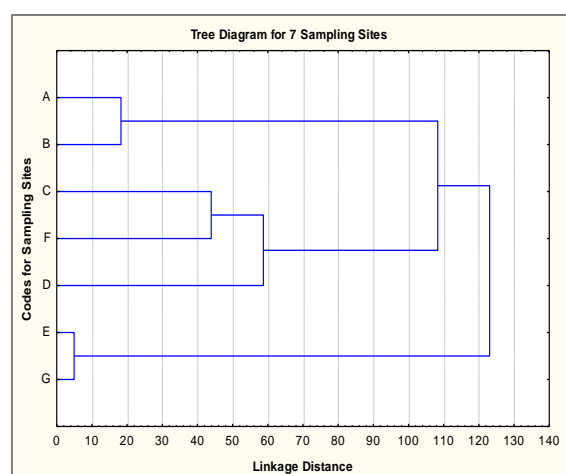
2nd Monitoring, July 2014



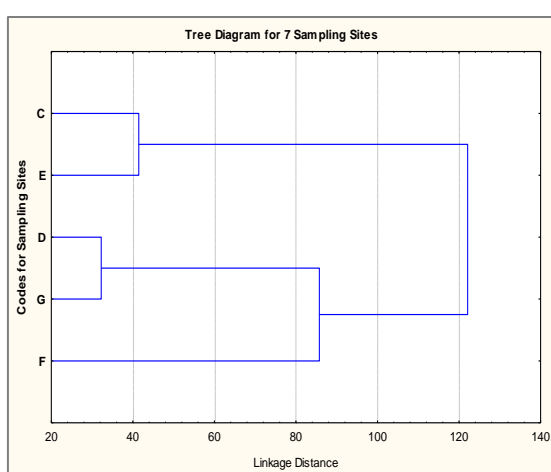
3rd Monitoring, October, 2014



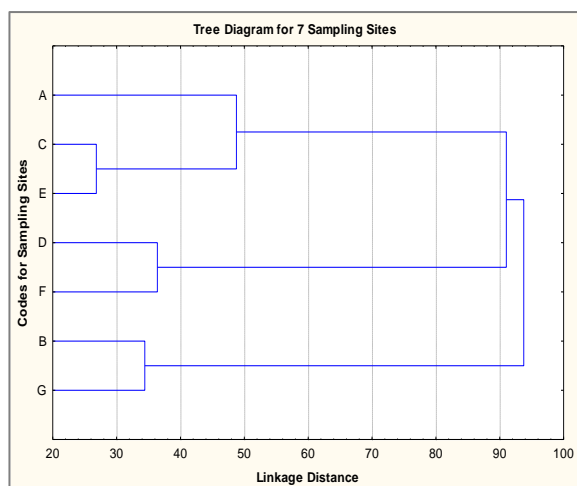
4th Monitoring, January 2015



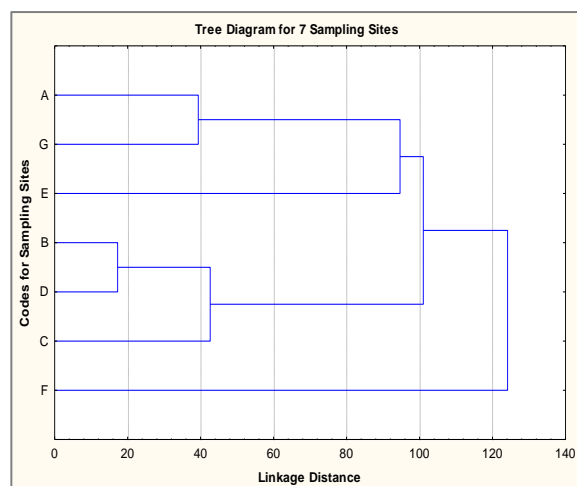
5th Monitoring, April, 2015



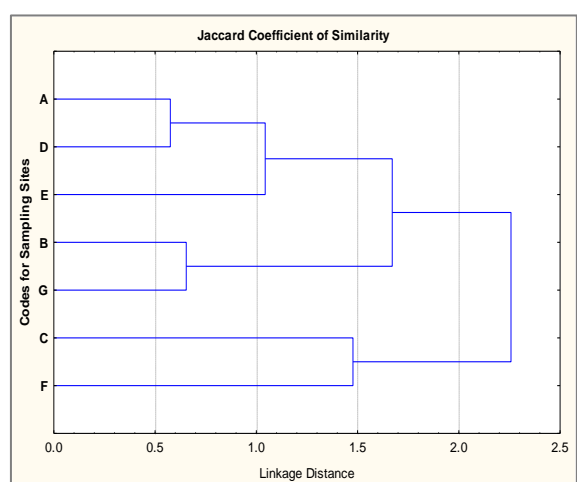
6th Monitoring, August, 2015



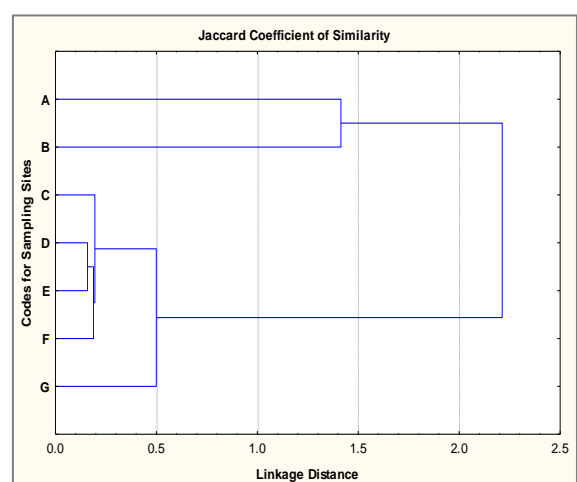
7th Monitoring, October, 2015



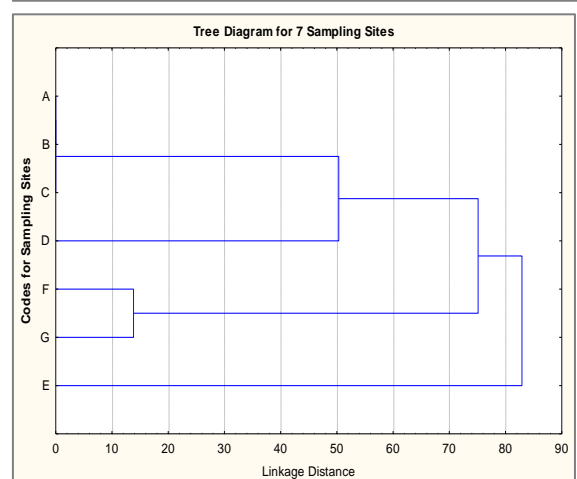
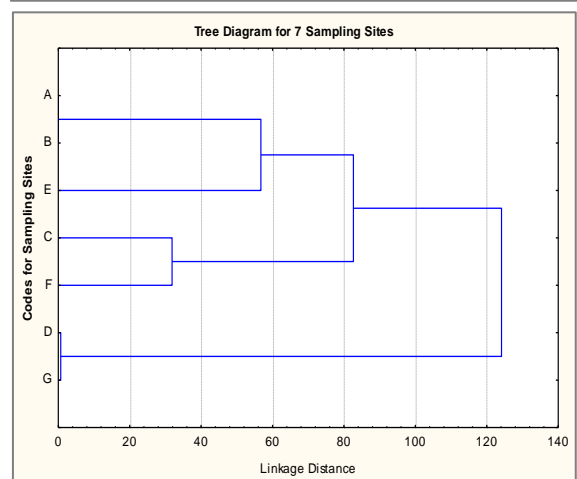
8th Monitoring, January, 2016

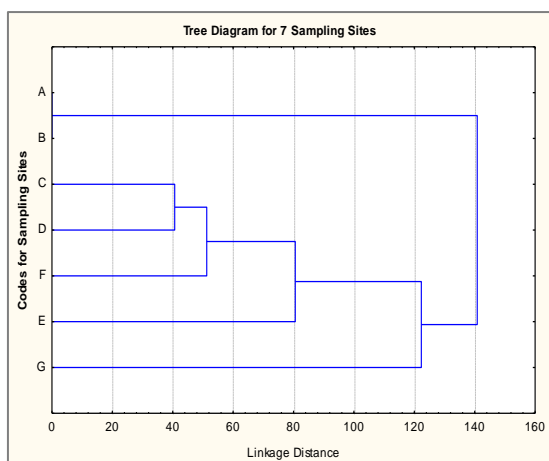


9th Monitoring, April, 2016

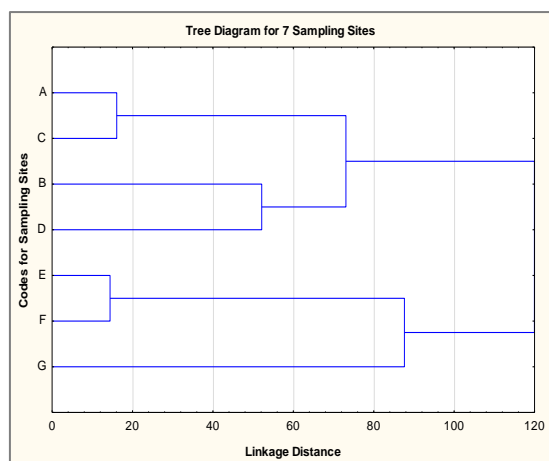


10th Monitoring, July, 2016

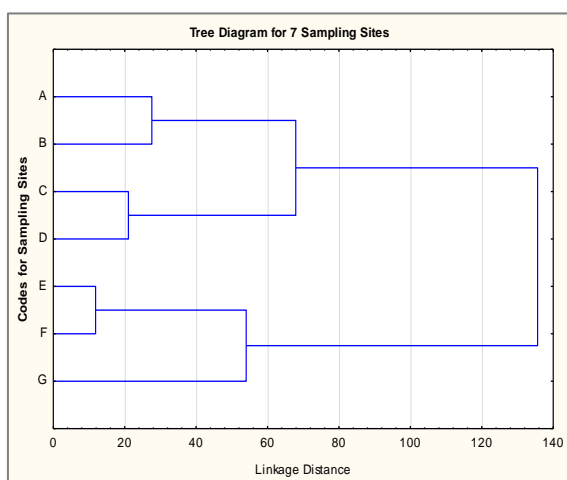




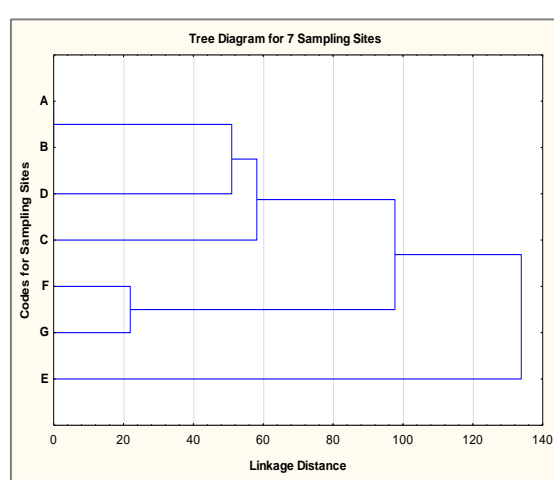
11th Monitoring, October, 2016



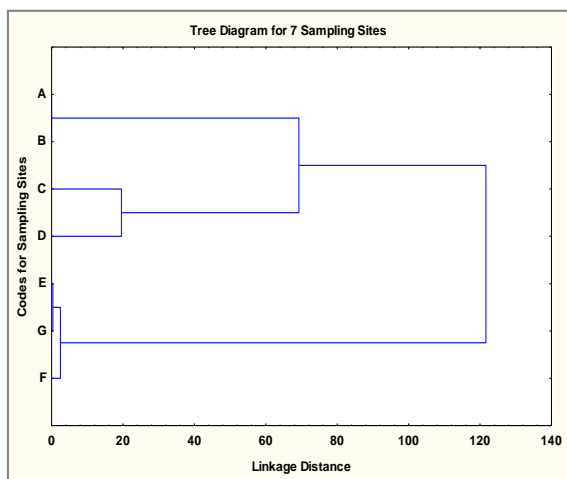
12th Monitoring, January, 2017



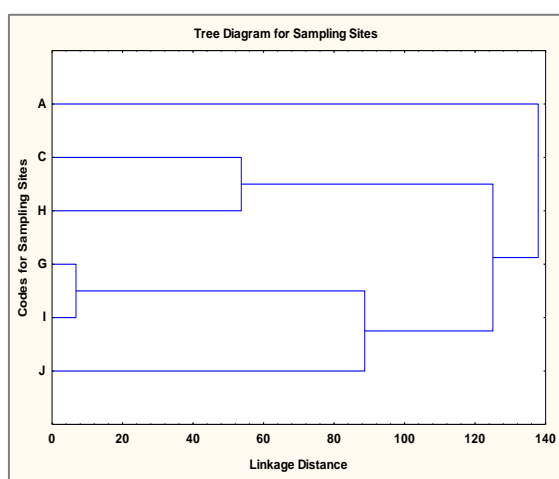
13th Monitoring, April, 2017



14th Monitoring, October, 2017

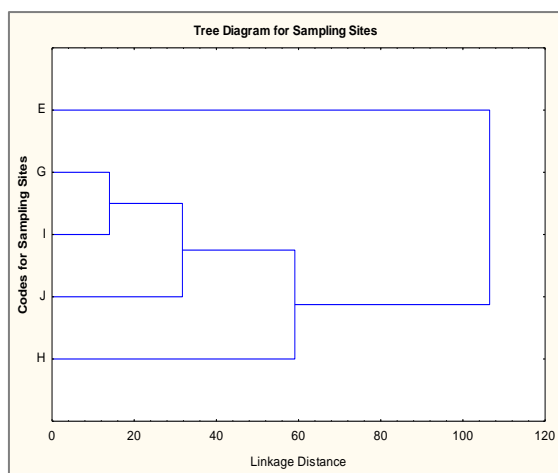


15th Monitoring, January, 2018

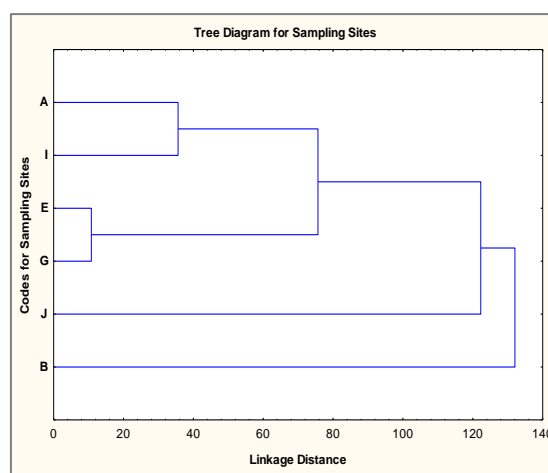


16th Monitoring, April, 2018

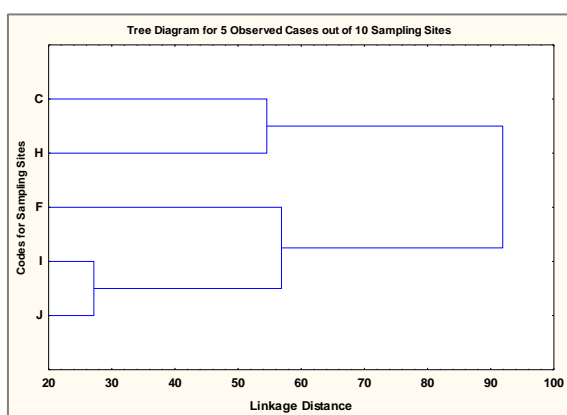




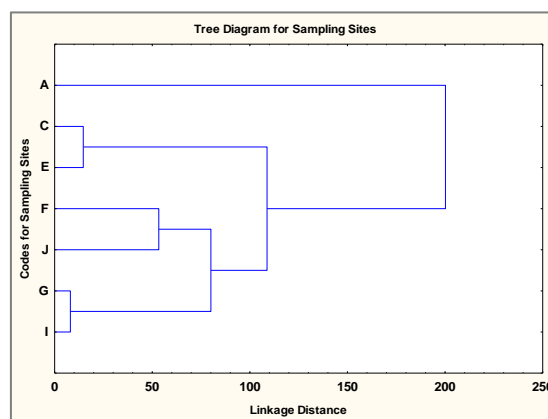
17th Monitoring, July, 2018



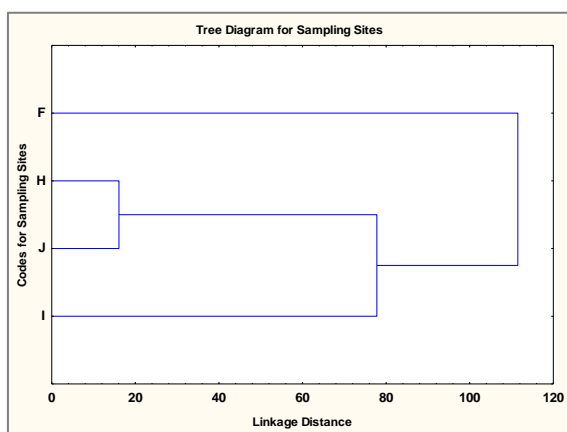
18th Monitoring, November, 2018



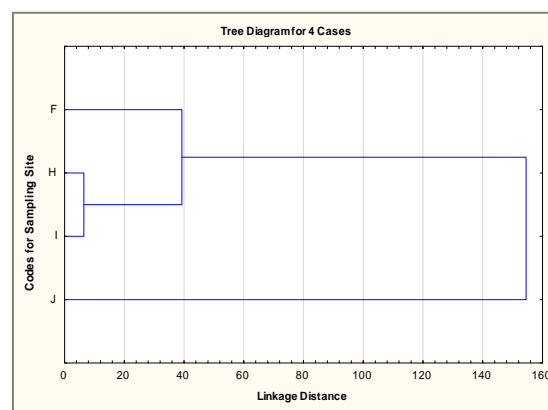
19th Monitoring, February, 2019



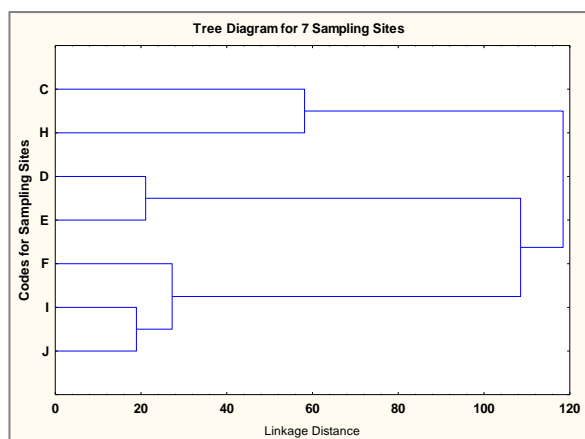
20th Monitoring, April, 2019



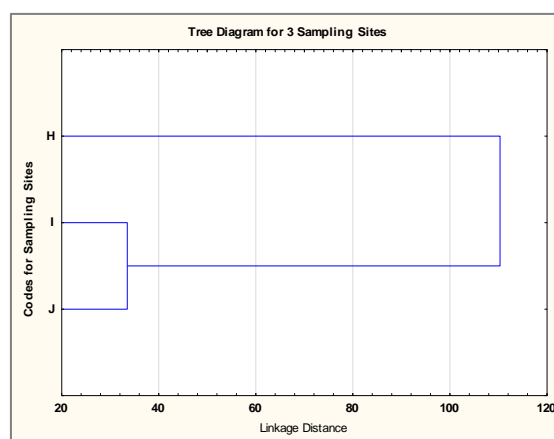
21st Monitoring, July 2019



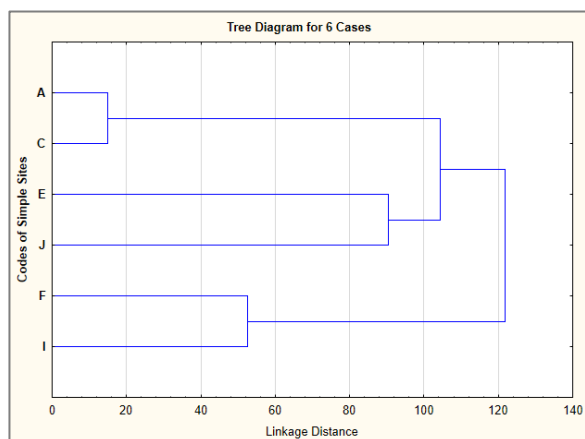
22nd Monitoring, November, 2019



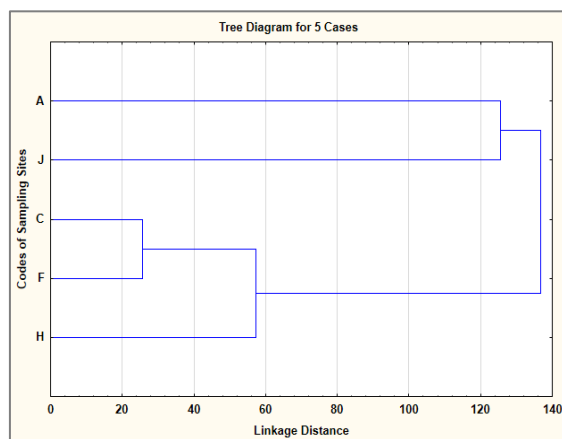
23rd Monitoring, February 2020



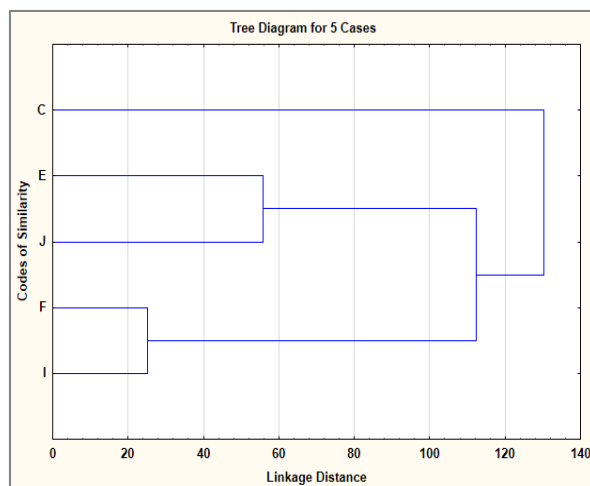
25th Monitoring, July 2020



26th Monitoring, November 2020

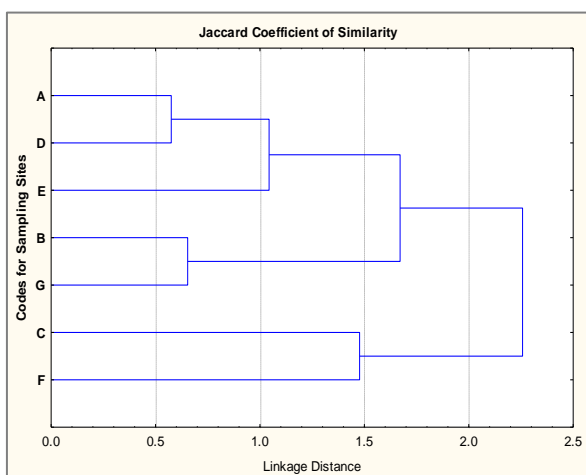
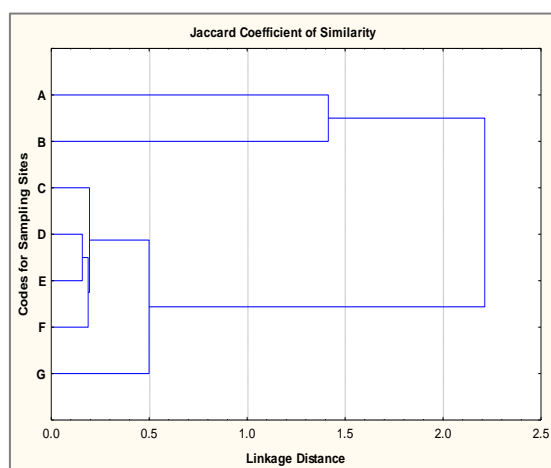
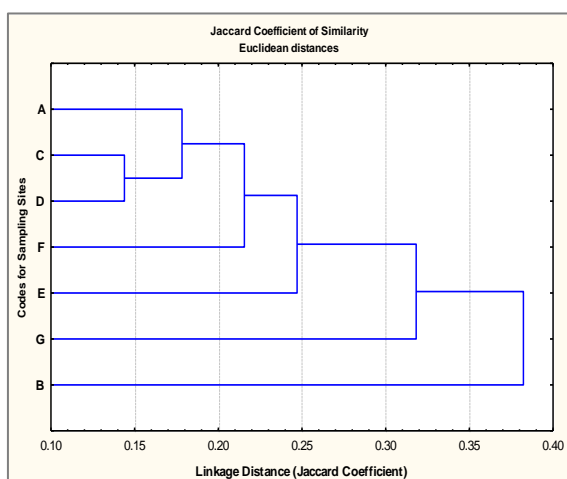
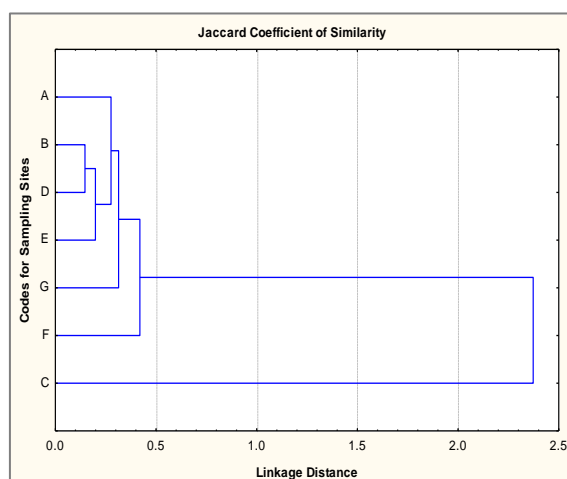
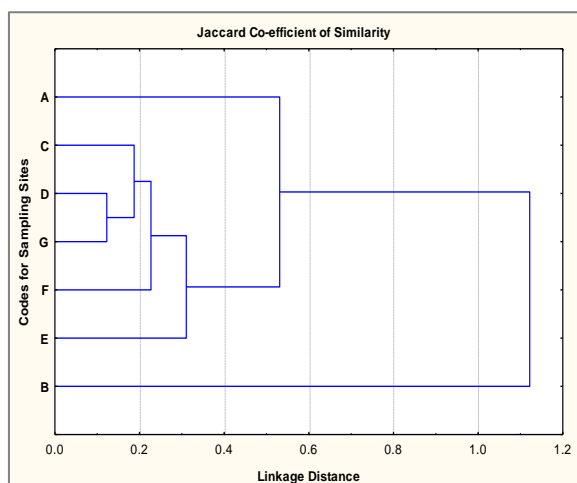
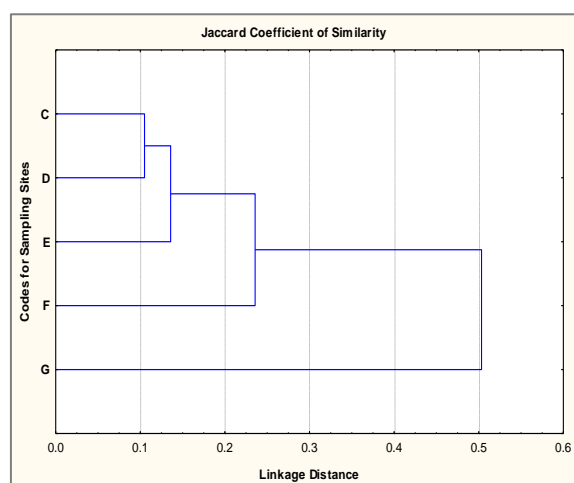


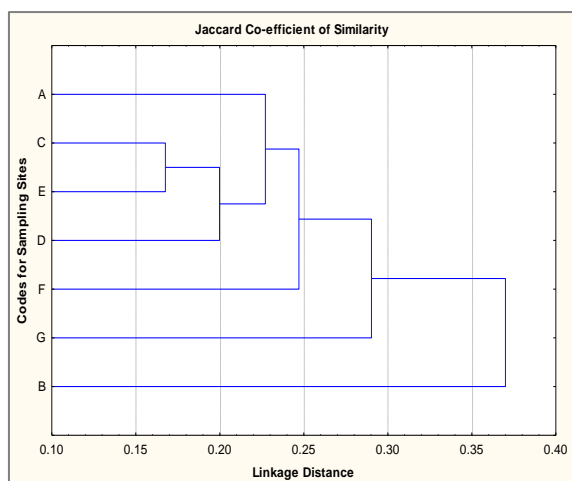
27th Monitoring, January 2021



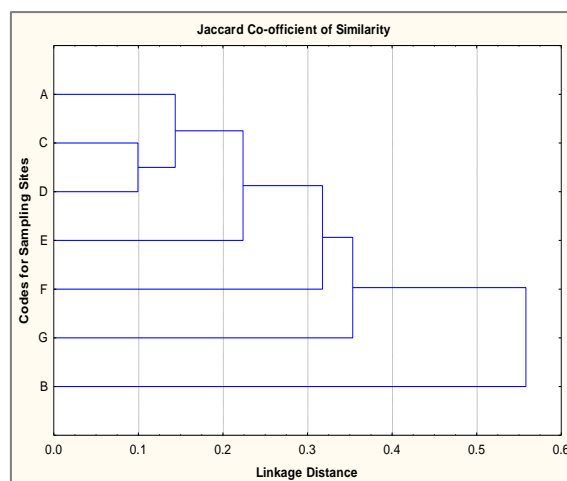
28th monitoring, April 2021

## D2: Jaccard Co-efficient of Similarity of Habitats respecting fish species occurrence

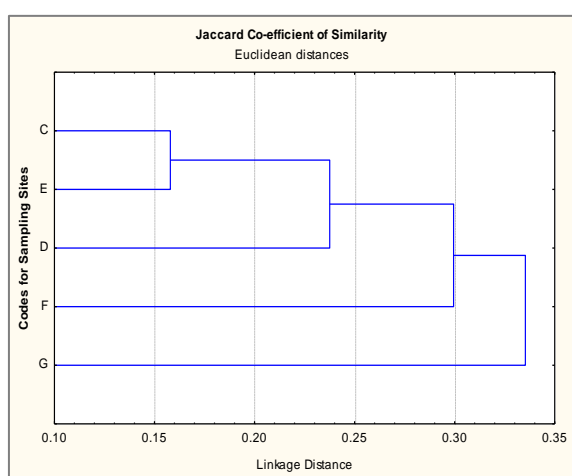
1<sup>st</sup> Monitoring, April, 20142<sup>nd</sup> Monitoring, July 20143<sup>rd</sup> Monitoring, October, 20144<sup>th</sup> Monitoring, January 20155<sup>th</sup> Monitoring, April, 20156<sup>th</sup> Monitoring, August, 2015



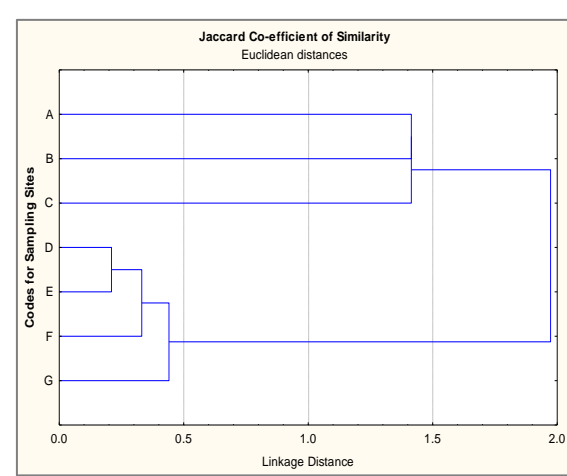
7th Monitoring, October, 2015



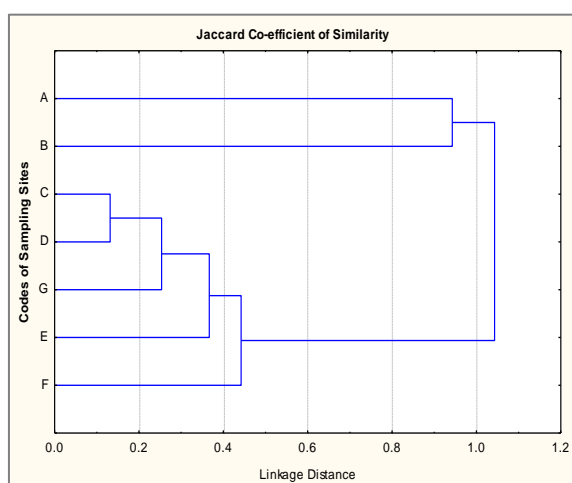
8th Monitoring, January, 2016



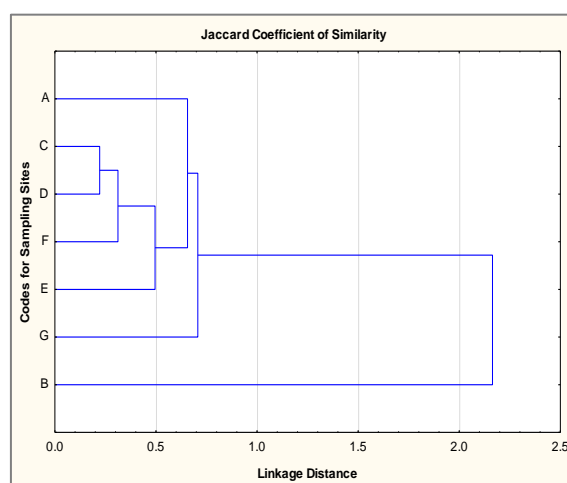
9th Monitoring, April, 2016



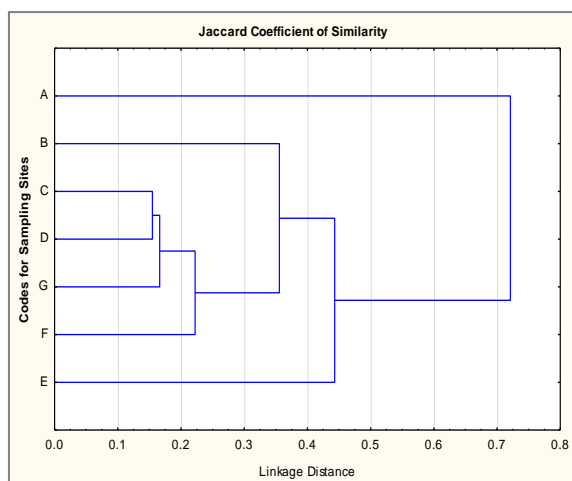
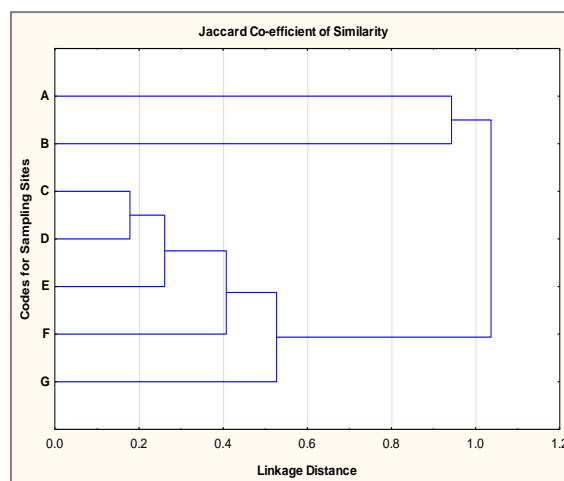
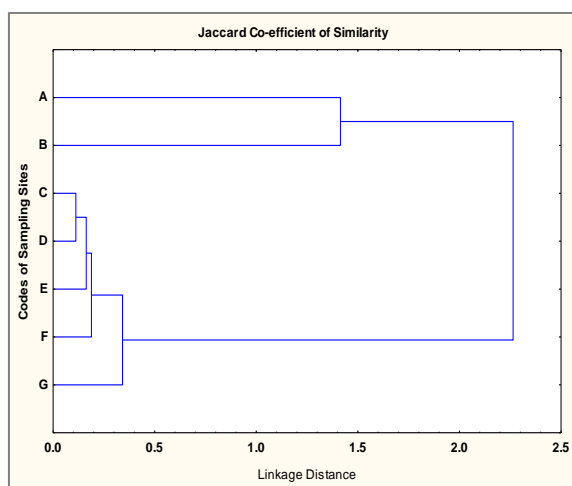
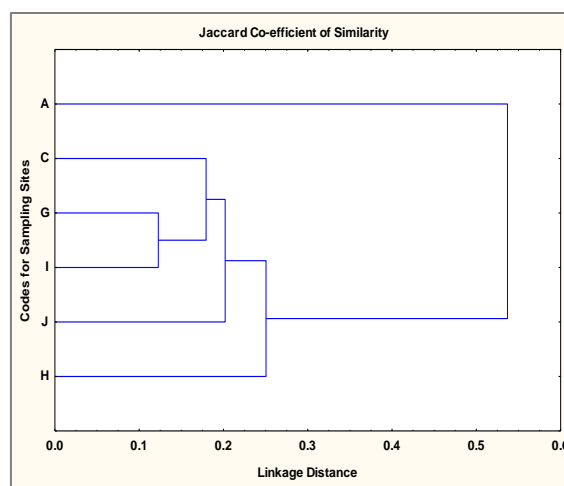
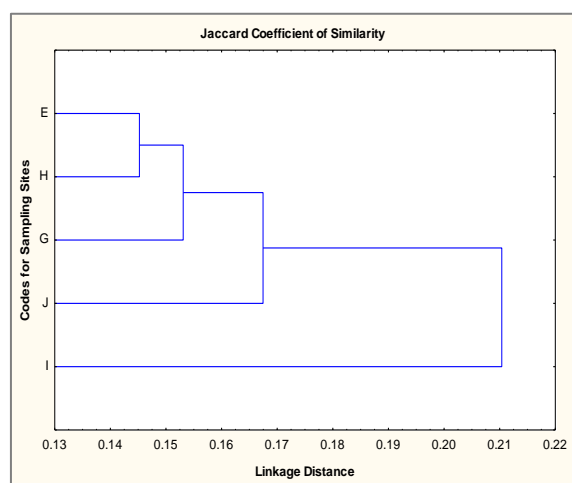
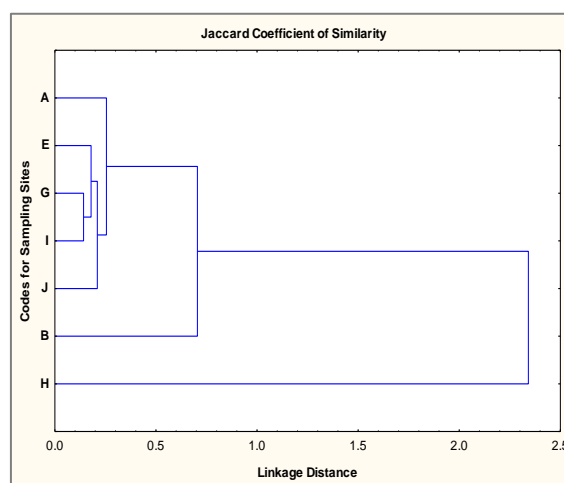
10th Monitoring, July, 2016

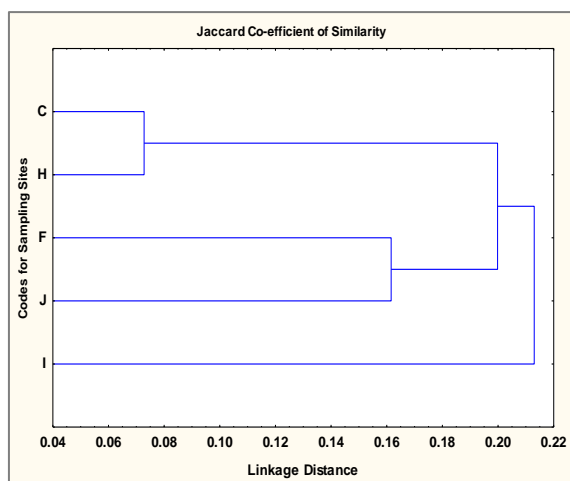
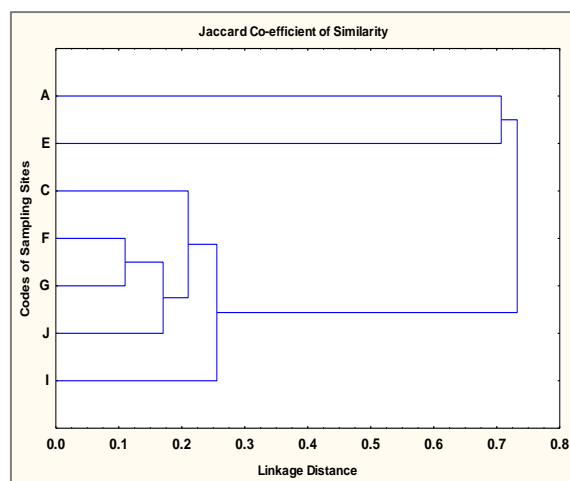
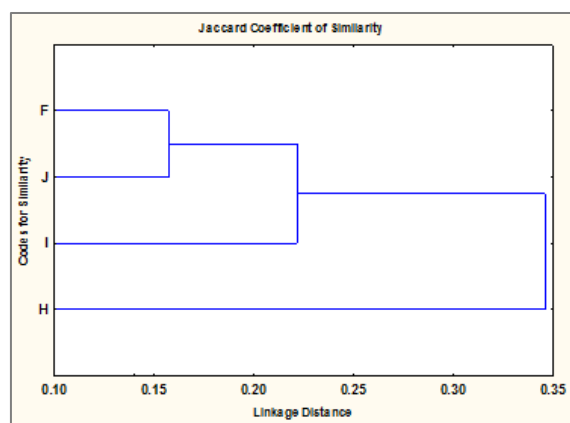
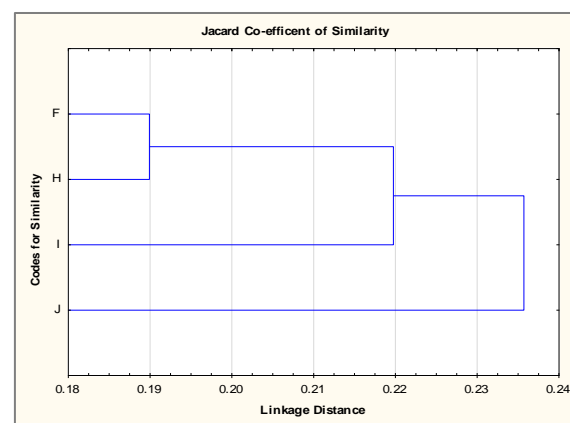
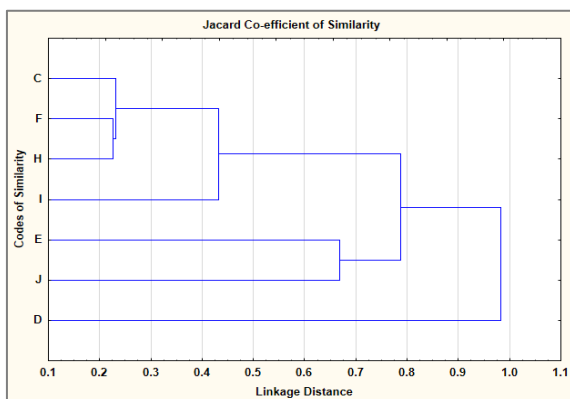
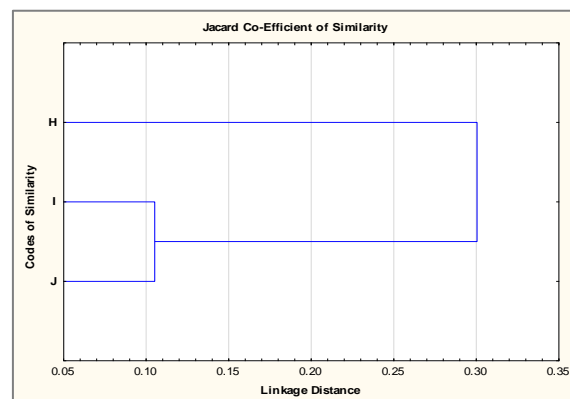


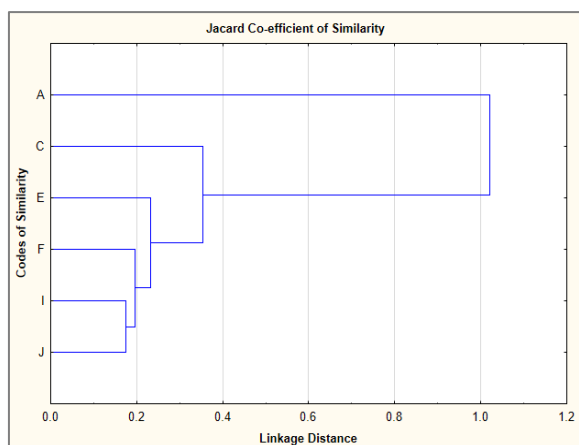
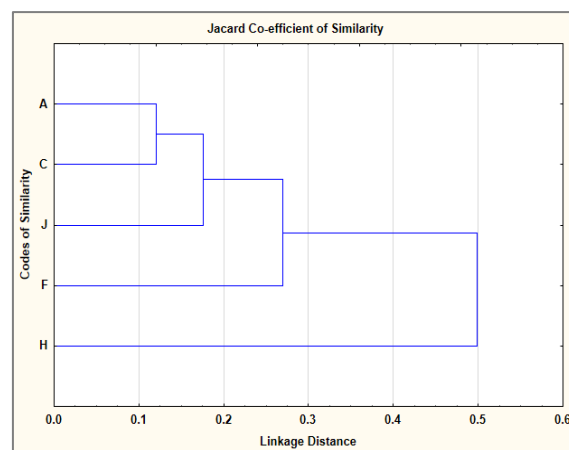
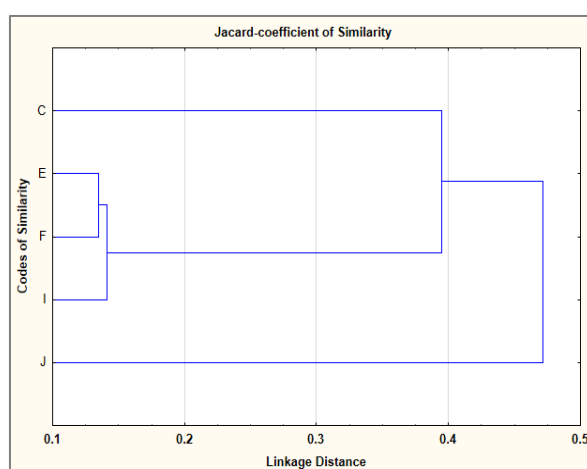
11th Monitoring, October, 2016



12th Monitoring, January, 2017

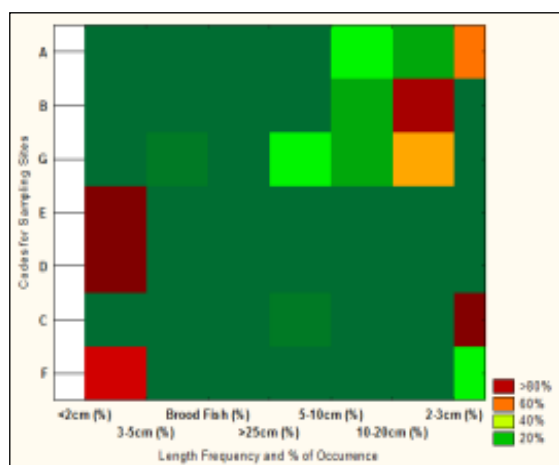
13<sup>th</sup> Monitoring, April, 201714<sup>th</sup> Monitoring, October, 201715<sup>th</sup> Monitoring, January, 201816<sup>th</sup> Monitoring, April, 201817<sup>th</sup> Monitoring, July, 201818<sup>th</sup> Monitoring, November, 2018

19<sup>th</sup> Monitoring, February, 201920<sup>th</sup> Monitoring, April, 201921<sup>st</sup> Monitoring, July 201922<sup>nd</sup> Monitoring, November 201923<sup>rd</sup> Monitoring, February 202025<sup>th</sup> Monitoring, July 2020

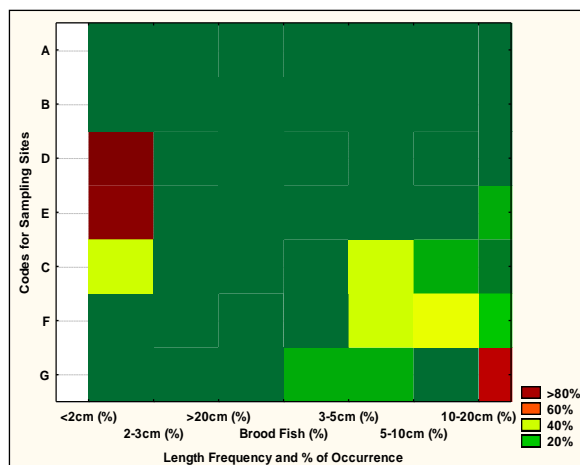
26<sup>th</sup> Monitoring, November, 202027<sup>th</sup> Monitoring, January, 202128<sup>th</sup> monitoring, April, 2021



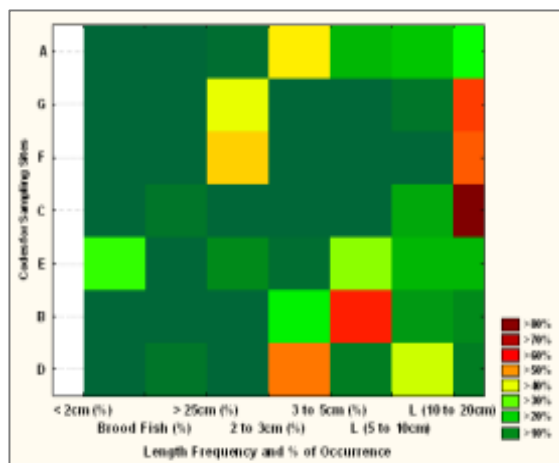
## D3: Fish Community Structure



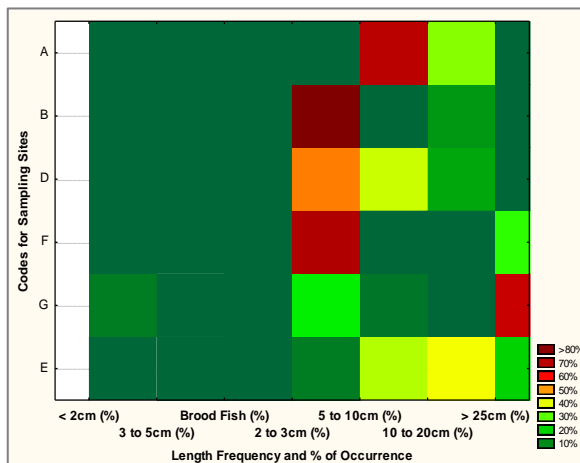
1st Monitoring, April, 2014



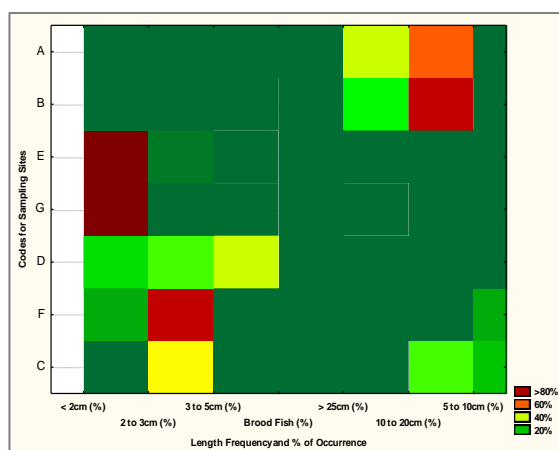
2nd Monitoring, July 2014



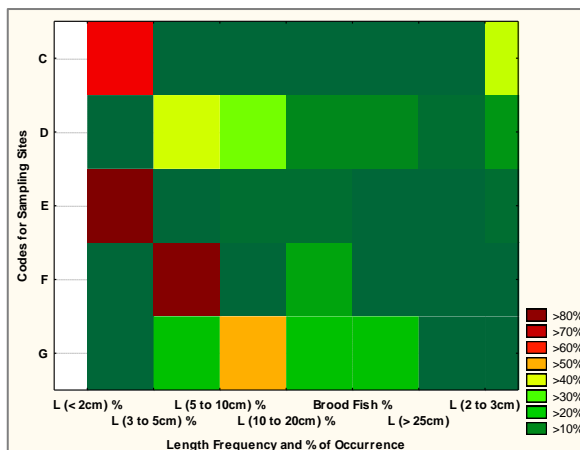
3rd Monitoring, October, 2014



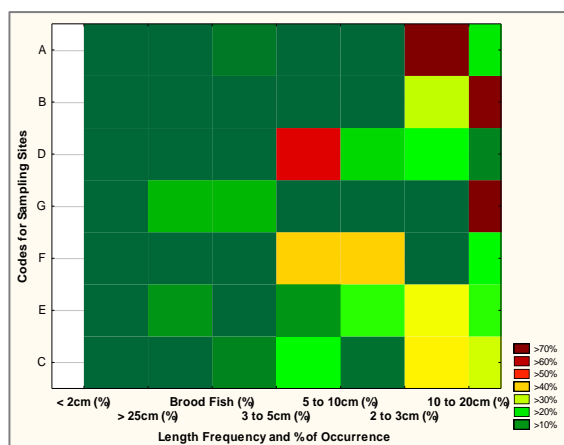
4th Monitoring, January 2015



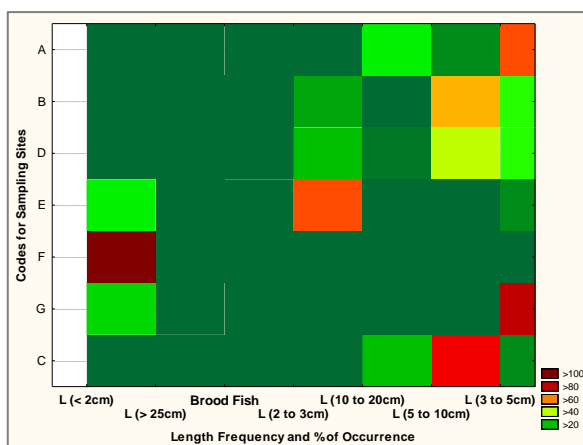
5th Monitoring, April, 2015



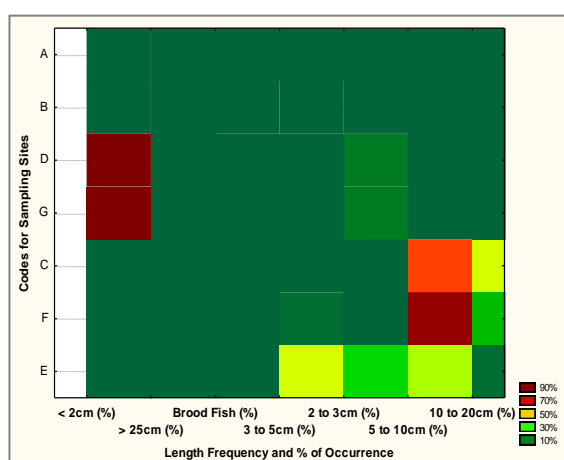
6th Monitoring, August, 2015



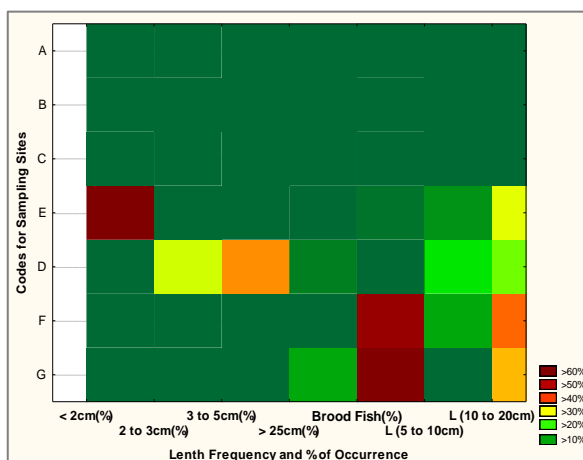
7th Monitoring, October, 2015



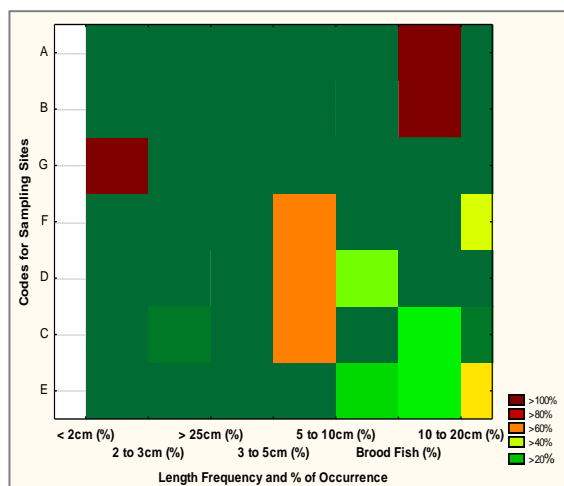
8th Monitoring, January, 2016



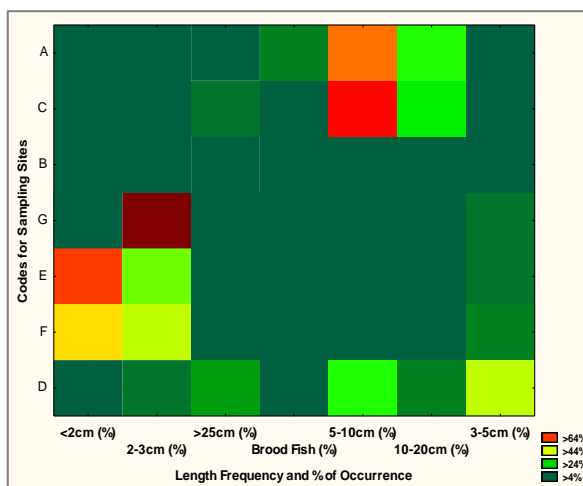
9th Monitoring, April, 2016



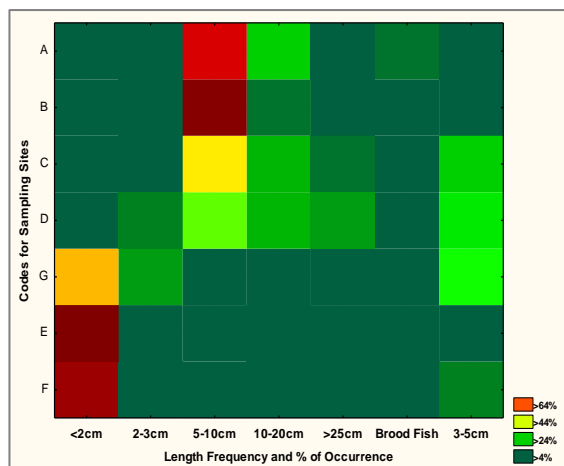
10th Monitoring, July, 2016



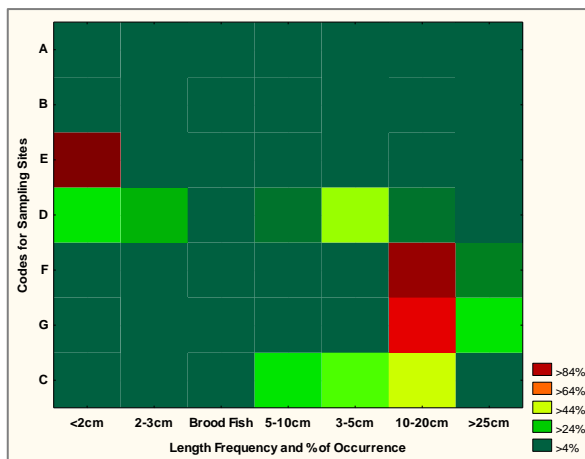
11th Monitoring, October, 2016



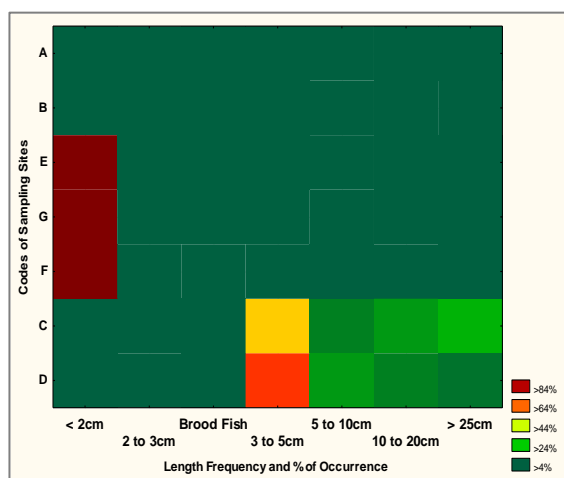
12th Monitoring, January, 2017



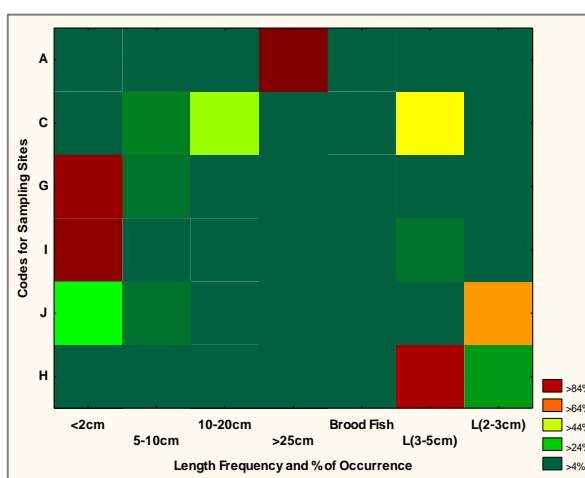
13th Monitoring, April, 2017



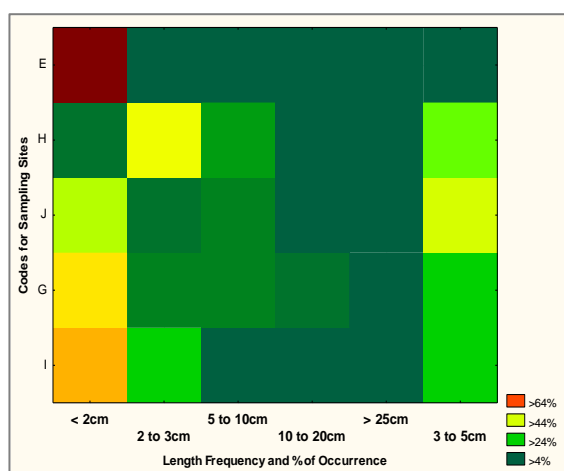
14th Monitoring, October, 2017



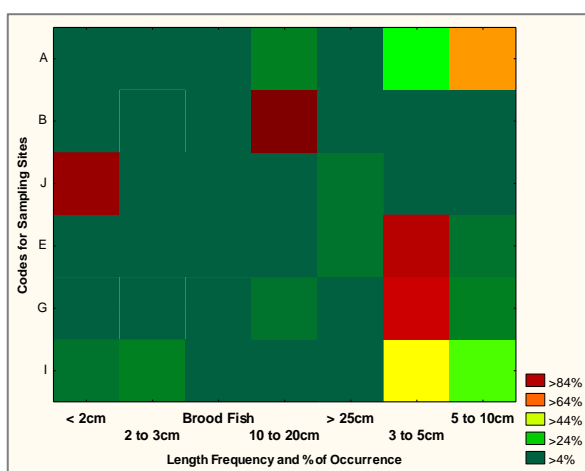
15th Monitoring, January, 2018



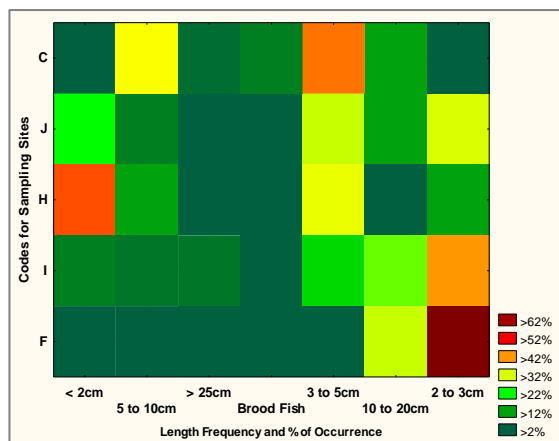
16th Monitoring, April, 2018



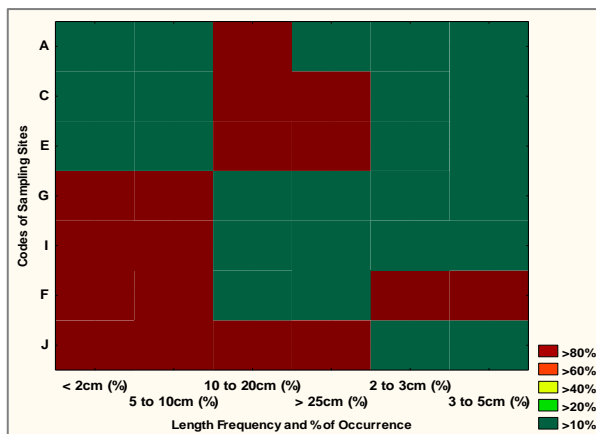
17th Monitoring, July, 2018



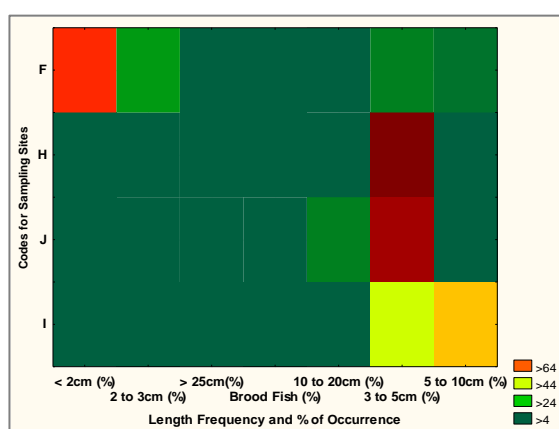
18th Monitoring, November, 2018



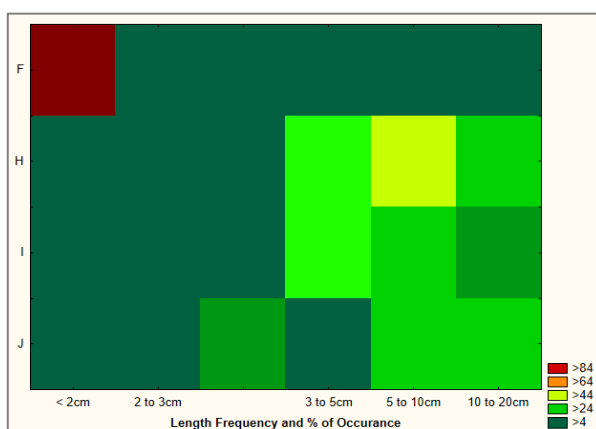
19th Monitoring, February, 2019



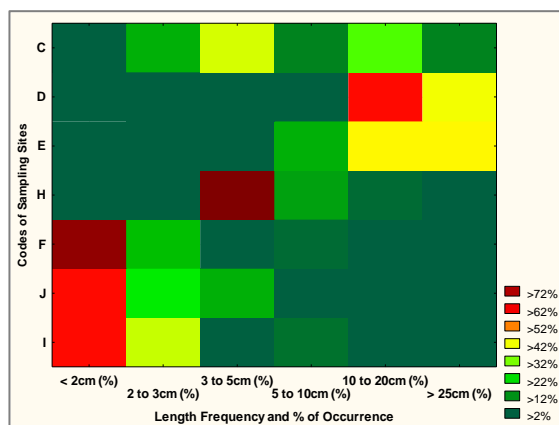
20th Monitoring, April, 2019



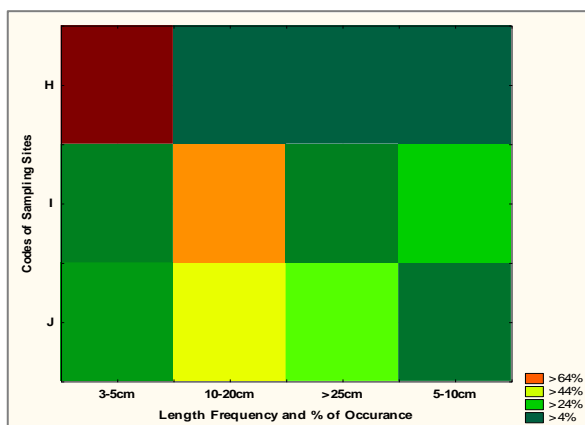
21st Monitoring, July 2019



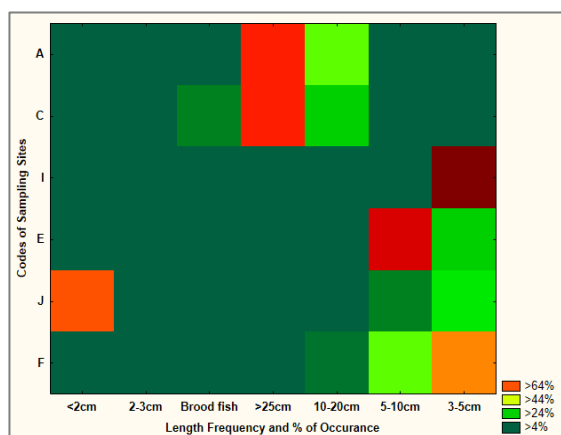
22nd Monitoring, November 2019



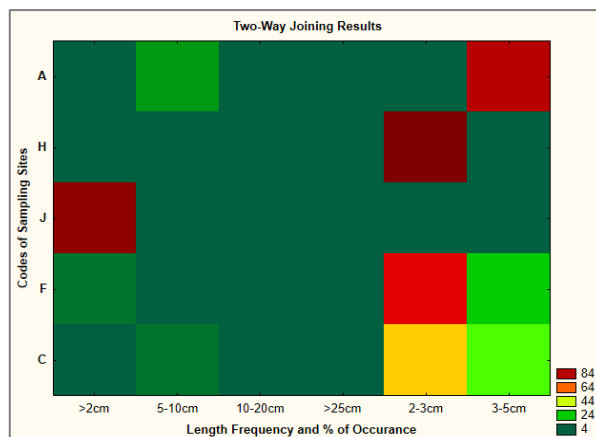
23rd Monitoring, February 2020



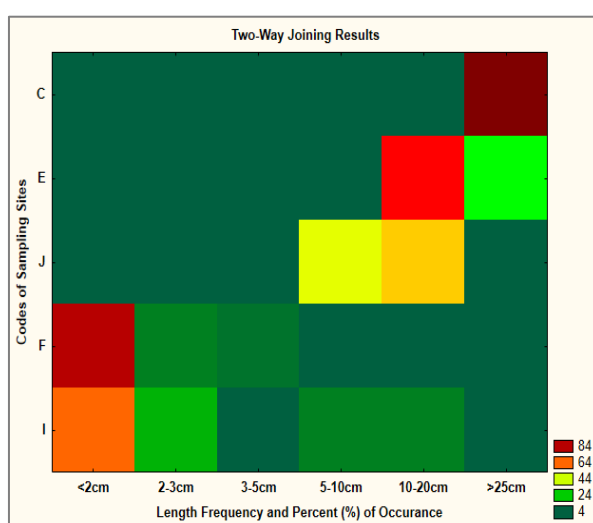
25th Monitoring, July 2020



26th Monitoring, November 2021



27th Monitoring, January, 2021



28th monitoring, April, 2021

## D.4: Occurrence of Species

| Local Name        | Scientific Name                       | Local Status* | 1st QM                     | 2nd QM | 3rd QM | 4th QM | 5th QM | 6th QM | 7th QM | 8th QM | 9th QM | 10th QM | 11th QM | 12th QM |
|-------------------|---------------------------------------|---------------|----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|
|                   |                                       |               | '-' = No; '+' = Occurrence |        |        |        |        |        |        |        |        |         |         |         |
| Hilsa             | <i>Tenualosa ilisha</i>               | NO            | -                          | -      | +      | -      | -      | +      | +      | -      | -      | -       | +       | -       |
| Sagor Baim        | <i>Anguilla bengalensis</i>           | NT            | +                          | -      | -      | -      | -      | +      | -      | -      | -      | -       | -       | -       |
| Bacha             | <i>Eutropiichthys vacha</i>           | CR            | +                          | -      | -      | -      | -      | -      | -      | -      | -      | +       | -       | -       |
| Bagda Chingri     | <i>Penaeus monodon</i>                | DD            | +                          | +      | +      | +      | +      | +      | +      | +      | +      | +       | -       | +       |
| Banspata          | <i>Brachypleura novae-zeelandiae</i>  | NO            | +                          | +      | +      | +      | -      | +      | +      | +      | +      | -       | +       | +       |
| Kukurjib          | <i>Cynoglossus lingua</i>             | NO            | +                          | -      | -      | -      | -      | -      | -      | +      | +      | +       | -       | +       |
| Bele              | <i>Glossogobius giuris</i>            | NO            | +                          | +      | +      | +      | +      | +      | +      | +      | +      | -       | +       | +       |
| Aswine Bele       | <i>Butis butis</i>                    | NO            | -                          | -      | -      | -      | -      | -      | +      | +      | +      | +       | +       | +       |
| Bairagi           | <i>Coilia dussumieri</i>              | NO            | +                          | +      | +      | +      | +      | +      | -      | +      | -      | -       | -       | +       |
| Boishakhi Chingri | <i>Macrobrachium</i> sp.              | NO            | -                          | +      | -      | -      | +      | +      | +      | +      | +      | -       | -       | -       |
| Chammu Chingri    | <i>Metapenaeus brevicornis</i>        | DD            | +                          | +      | +      | -      | +      | +      | +      | +      | +      | +       | +       | -       |
| Chaka Chingri     | <i>Penaeus indicus</i>                | DD            | +                          | +      | -      | +      | +      | +      | +      | +      | +      | -       | +       | -       |
| Ghora Chela       | <i>Securicula gora</i>                | -             | +                          | -      | -      | -      | -      | -      | -      | -      | -      | -       | -       | -       |
| Chanda Chela      | <i>Securicula</i> sp.                 |               | -                          | +      | +      | -      | -      | -      | -      | -      | +      | +       | -       | -       |
| Sada Chewa        | <i>Trepachen vagina</i>               | NO            | +                          | -      | +      | -      | -      | +      | -      | -      | -      | +       | -       | -       |
| Lal Chewa         | <i>Taenioides cirratus</i>            | NO            | +                          | +      | +      | +      | +      | +      | +      | +      | +      | -       | -       | -       |
| Chhuri            | <i>Trichiurus muticus</i>             | NO            | +                          | -      | +      | -      | -      | -      | -      | -      | -      | -       | -       | -       |
| Sagor Chela       | <i>Megalops cyprinoids</i>            | NO            | +                          | -      | -      | -      | -      | -      | -      | -      | -      | -       | -       | -       |
| Purabi Chela      | <i>Thryssa purava</i>                 | NO            | +                          | -      | -      | -      | -      | -      | -      | -      | -      | -       | -       | -       |
| Kabashi Tengra    | <i>Mystus cavasius</i>                | DD            | +                          | -      | -      | -      | -      | -      | -      | -      | -      | -       | -       | -       |
| Gagra Tengra      | <i>Nemapteryx nenga</i>               | DD            | -                          | +      | +      | -      | +      | -      | +      | -      | +      | +       | +       | +       |
| Gulsha Tengra     | <i>Mystus bleekery</i>                | DD            | +                          | +      | -      | +      | -      | +      | +      | +      | +      | +       | +       | +       |
| Harina Chingri    | <i>Metapenaeus ensis</i>              | DD            | +                          | +      | +      | +      | +      | +      | +      | +      | +      | -       | +       | -       |
| Ekthuto           | <i>Hyporhamphus limbatus</i>          | NO            | +                          | -      | +      | +      | -      | -      | -      | +      | +      | -       | +       | -       |
| Kakila            | <i>Xenentodon cancila</i>             | NO            | +                          | -      | -      | -      | -      | -      | -      | -      | -      | -       | +       | -       |
| Chapila           | <i>Gudusia chapra</i>                 | NO            | +                          | +      | -      | -      | -      | -      | -      | -      | -      | +       | -       | -       |
| Kuchia            | <i>Monopterusuchia</i>                | DD            | +                          | +      | -      | +      | +      | +      | +      | +      | +      | +       | +       | +       |
| Loitta            | <i>Harpodon nehereus</i>              | NO            | +                          | +      | +      | -      | +      | -      | -      | -      | +      | +       | -       | -       |
| Motka Chingri     | <i>Macrobrachium villosimanusless</i> | DD            | +                          | +      | +      | +      | +      | +      | +      | +      | +      | +       | +       | -       |
| Mud Crab          | <i>Scylla serrata</i>                 | NO            | +                          | -      | +      | +      | +      | +      | +      | +      | +      | -       | +       | +       |
| Tular Dandi       | <i>Sillaginopsis panijus</i>          | NO            | +                          | -      | +      | -      | +      | -      | +      | -      | -      | -       | +       | -       |
| Paira Chanda      | <i>Scatophagus argus</i>              | DD            | +                          | -      | -      | -      | -      | -      | -      | -      | -      | +       | -       | -       |
| Paissa            | <i>Liza parsia</i>                    | NO            | +                          | +      | +      | +      | +      | +      | +      | +      | +      | +       | +       | +       |
| Pangas            | <i>Pangasius pangasius</i>            | CR            | +                          | -      | +      | -      | -      | -      | -      | +      | -      | -       | -       | +       |

| Local Name  | Scientific Name                    | Local Status* | 1st QM                     | 2nd QM | 3rd QM | 4th QM | 5th QM | 6th QM | 7th QM | 8th QM | 9th QM | 10th QM | 11th QM | 12th QM |
|-------------|------------------------------------|---------------|----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|
|             |                                    |               | '-' = No; '+' = Occurrence |        |        |        |        |        |        |        |        |         |         |         |
| Tak Chanda  | <i>Leiognathus equulus</i>         | NO            | +                          | -      | -      | -      | -      | -      | +      | -      | -      | +       | -       | -       |
| Phessa      | <i>Setipinna phasa</i>             | NO            | +                          | +      | +      | +      | +      | +      | +      | +      | +      | -       | +       | -       |
| Teli Phessa | <i>Setipinna phasa</i>             | DD            | -                          | -      | +      | -      | -      | -      | -      | -      | -      | +       | -       | -       |
| Poma        | <i>Poma poma</i>                   | NO            | +                          | +      | +      | +      | +      | +      | +      | +      | +      | +       | +       | +       |
| Potka       | <i>Chelonodon patoca</i>           | NO            | +                          | +      | -      | +      | +      | +      | -      | +      | +      | -       | +       | +       |
| Shilong     | <i>Silonia silondia</i>            | EN            | +                          | -      | +      | -      | -      | -      | -      | -      | -      | -       | +       | -       |
| Tailla      | <i>Eleutheronema tetradactylum</i> | DD            | +                          | -      | -      | -      | -      | -      | -      | -      | -      | +       | -       | -       |
| Tapse       | <i>Polynemus paradiseus</i>        | DD            | +                          | +      | +      | -      | -      | +      | +      | +      | -      | -       | +       | +       |
| Daitna      | <i>Acanthopagrus latus</i>         | DD            | -                          | -      | -      | +      | -      | -      | -      | +      | +      | -       | +       | +       |
| Shole       | <i>Channa striatus</i>             | DD            | -                          | -      | -      | +      | -      | -      | -      | +      | -      | -       | -       | -       |
| Magur       | <i>Clarias batrachus</i>           | DD            | -                          | -      | -      | +      | -      | -      | -      | +      | -      | -       | -       | +       |
| Koi         | <i>Anabas testudineus</i>          | DD            | -                          | -      | -      | +      | -      | -      | -      | +      | -      | +       | -       | -       |
| Vetki       | <i>Lates calcarifer</i>            | DD            | -                          | -      | -      | +      | +      | +      | +      | +      | +      | -       | +       | +       |

| Local Name        | Scientific Name                      | Local Status* | 13 <sup>th</sup> QM        | 14 <sup>th</sup> QM | 15 <sup>th</sup> QM | 16 <sup>th</sup> QM | 17 <sup>th</sup> QM | 18 <sup>th</sup> QM | 19 <sup>th</sup> QM | 20 <sup>th</sup> QM | 21 <sup>st</sup> QM | 22 <sup>nd</sup> QM | 23 <sup>rd</sup> QM | 25 <sup>th</sup> QM | 26 <sup>th</sup> QM | 27 <sup>th</sup> QM | 28 <sup>th</sup> QM | 29 <sup>th</sup> QM |
|-------------------|--------------------------------------|---------------|----------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                   |                                      |               | '-' = No; '+' = Occurrence |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
| Hilsa             | <i>Tenualosa ilisha</i>              | NO            | -                          | -                   | -                   | -                   | -                   | +                   | -                   | -                   | -                   | +                   | -                   | -                   | -                   | -                   | -                   | +                   |
| Sagor Baim        | <i>Anguilla bengalensis</i>          | NT            | -                          | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
| Bacha             | <i>Eutropiichthys vacha</i>          | CR            | +                          | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | +                   | -                   | -                   | -                   | -                   | -                   | -                   |
| Bagda Chingri     | <i>Penaeus monodon</i>               | DD            | +                          | -                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | -                   | -                   | +                   | +                   | +                   |
| Banspata          | <i>Brachypleura novae-zeelandiae</i> | NO            | +                          | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | -                   | -                   | +                   | +                   | +                   | -                   | +                   |
| Kukurjib          | <i>Cynoglossus lingua</i>            | NO            | -                          | -                   | +                   | -                   | -                   | -                   | +                   | -                   | +                   | +                   | -                   | +                   | -                   | +                   | -                   | +                   |
| Bele              | <i>Glossogobius giuris</i>           | NO            | +                          | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   |
| Aswine Bele       | <i>Butis butis</i>                   | NO            | +                          | +                   | +                   | +                   | +                   | -                   | +                   | +                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
| Bairagi           | <i>Coilia dussumieri</i>             | NO            | +                          | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | -                   | +                   | +                   | -                   | +                   | +                   | +                   |
| Boishakhi Chingri | <i>Macrobrachium</i> sp.             | NO            | -                          | -                   | -                   | -                   | +                   | -                   | -                   | -                   | -                   | -                   | +                   | -                   | -                   | -                   | -                   | -                   |
| Chammu Chingri    | <i>Metapenaeus brevicornis</i>       | DD            | -                          | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | -                   | +                   | +                   | +                   | -                   |
| Chaka Chingri     | <i>Penaeus indicus</i>               | DD            | +                          | -                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | -                   | +                   | +                   | +                   | -                   |
| Ghora Chela       | <i>Securicula gora</i>               | -             | -                          | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
| Chanda Chela      | <i>Securicula</i> sp.                |               | -                          | -                   | +                   | +                   | +                   | +                   | -                   | -                   | -                   | +                   | +                   | -                   | -                   | -                   | -                   | -                   |
| Sada Chewa        | <i>Trepauchen vagina</i>             | NO            | -                          | -                   | -                   | +                   | -                   | -                   | -                   | +                   | -                   | +                   | -                   | -                   | -                   | -                   | -                   | +                   |
| Lal Chewa         | <i>Taenioides cirratus</i>           | NO            | +                          | +                   | -                   | +                   | +                   | -                   | +                   | -                   | -                   | -                   | +                   | -                   | -                   | -                   | +                   | +                   |
| Chhuri            | <i>Trichiurus muticus</i>            | NO            | -                          | -                   | -                   | +                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | +                   |
| Sagor Chela       | <i>Megalops cyprinoids</i>           | NO            | -                          | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
| Purabi Chela      | <i>Thyrssa purava</i>                | NO            | -                          | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |



| Local Name     | Scientific Name                       | Local Status*              | 13 <sup>th</sup> QM | 14 <sup>th</sup> QM | 15 <sup>th</sup> QM | 16 <sup>th</sup> QM | 17 <sup>th</sup> QM | 18 <sup>th</sup> QM | 19 <sup>th</sup> QM | 20 <sup>th</sup> QM | 21 <sup>st</sup> QM | 22 <sup>nd</sup> QM | 23 <sup>rd</sup> QM | 25 <sup>th</sup> QM | 26 <sup>th</sup> QM | 27 <sup>th</sup> QM | 28 <sup>th</sup> QM | 29 <sup>th</sup> QM |
|----------------|---------------------------------------|----------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                |                                       | '-' = No; '+' = Occurrence |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
| Kabashi Tengra | <i>Mystus cavasius</i>                | DD                         | -                   | -                   | -                   | -                   | +                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
| Gagra Tengra   | <i>Nemapteryx nenga</i>               | DD                         | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | -                   | +                   | +                   | +                   | +                   | +                   | +                   |
| Gulsha Tengra  | <i>Mystus bleekery</i>                | DD                         | +                   | +                   | +                   | +                   | +                   | -                   | +                   | +                   | +                   | -                   | +                   | -                   | -                   | +                   | -                   | -                   |
| Harina Chingri | <i>Metapenaeus ensis</i>              | DD                         | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | -                   |
| Ekthuto        | <i>Hyporhamphus limbatus</i>          | NO                         | +                   | +                   | -                   | -                   | +                   | +                   | +                   | +                   | +                   | +                   | -                   | -                   | -                   | +                   | -                   | -                   |
| Kakila         | <i>Xenentodon cancila</i>             | NO                         | -                   | +                   | -                   | -                   | +                   | -                   | -                   | -                   | -                   | +                   | -                   | -                   | +                   | -                   | -                   | -                   |
| Chapila        | <i>Gudusia chapra</i>                 | NO                         | -                   | -                   | -                   | -                   | +                   | +                   | +                   | -                   | +                   | +                   | -                   | +                   | +                   | +                   | +                   | -                   |
| Kuchia         | <i>Monopterusuchia</i>                | DD                         | +                   | +                   | +                   | +                   | +                   | +                   | -                   | +                   | +                   | -                   | +                   | +                   | -                   | +                   | +                   | +                   |
| Loitta         | <i>Harpodon nehereus</i>              | NO                         | +                   | -                   | +                   | -                   | -                   | -                   | -                   | +                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
| Motka Chingri  | <i>Macrobrachium villosimanusless</i> | DD                         | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | -                   | -                   | +                   | +                   | -                   |
| Mud Crab       | <i>Scylla serrata</i>                 | NO                         | +                   | +                   | +                   | +                   | -                   | +                   | +                   | +                   | -                   | +                   | +                   | -                   | -                   | -                   | -                   | -                   |
| Tular Dandi    | <i>Sillaginopsis panijus</i>          | NO                         | -                   | +                   | -                   | -                   | -                   | +                   | +                   | +                   | +                   | -                   | -                   | -                   | +                   | -                   | +                   | -                   |
| Paicha Chanda  | <i>Scatophagus argus</i>              | DD                         | -                   | -                   | -                   | -                   | -                   | -                   | +                   | -                   | -                   | -                   | -                   | -                   | -                   | +                   | -                   | -                   |
| Paissa         | <i>Liza parsia</i>                    | NO                         | +                   | +                   | +                   | +                   | -                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   |
| Pangas         | <i>Pangasius pangasius</i>            | CR                         | -                   | -                   | -                   | -                   | -                   | +                   | +                   | +                   | +                   | +                   | -                   | -                   | -                   | -                   | -                   | +                   |
| Tak Chanda     | <i>Leiognathus equulus</i>            | NO                         | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
| Pheksa         | <i>Setipinna phasa</i>                | NO                         | +                   | +                   | -                   | +                   | -                   | -                   | +                   | +                   | +                   | +                   | +                   | -                   | +                   | -                   | +                   | +                   |
| Teli Pheksa    | <i>Setipinna phasa</i>                | DD                         | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | +                   | -                   | -                   |
| Poma           | <i>Poma poma</i>                      | NO                         | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   |
| Potka          | <i>Chelonodon patoca</i>              | NO                         | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | -                   | -                   | -                   | -                   | -                   | +                   | +                   | +                   |
| Shilong        | <i>Silonia silondia</i>               | EN                         | +                   | +                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | +                   | -                   | +                   | -                   | -                   | -                   | +                   |
| Tailla         | <i>Eleutheronema tetradactylum</i>    | DD                         | -                   | -                   | -                   | -                   | -                   | +                   | -                   | +                   | +                   | -                   | -                   | -                   | +                   | +                   | -                   | +                   |
| Tapse          | <i>Polynemus paradiseus</i>           | DD                         | -                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | +                   | -                   | +                   | +                   | +                   | -                   | -                   | +                   |
| Daitna         | <i>Acanthopagrus latus</i>            | DD                         | -                   | +                   | +                   | +                   | -                   | +                   | +                   | +                   | -                   | -                   | +                   | -                   | +                   | +                   | -                   | -                   |
| Shole          | <i>Channa striatus</i>                | DD                         | -                   | +                   | +                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | +                   | -                   | -                   |
| Magur          | <i>Clarias batrachus</i>              | DD                         | -                   | +                   | +                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
| Koi            | <i>Anabas testudineus</i>             | DD                         | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
| Vetki          | <i>Lates calcarifer</i>               | DD                         | +                   | +                   | +                   | +                   | -                   | +                   | +                   | -                   | +                   | -                   | -                   | -                   | +                   | -                   | -                   | +                   |

D.5: Length-wise species distribution (%) in sampling sites

| Fish Species | Site | L (< 2cm) | L (2 to 3cm) | L (3 to 5cm) | L (5 to 10cm) | L (10 to 20cm) | L (> 25cm) | Brood Fish |
|--------------|------|-----------|--------------|--------------|---------------|----------------|------------|------------|
| Banshpata    | E    | 0.00      | 0.00         | 0.00         | 0.00          | 0.00           | 100.00     | 0.00       |
| Bele         | C    | 0.00      | 0.00         | 0.00         | 0.00          | 100.00         | 0.00       | 0.00       |
| Boiragi      | A    | 0.00      | 0.00         | 1.52         | 89.39         | 9.09           | 0.00       | 0.00       |
| Chaka        | E    | 0.00      | 0.00         | 0.00         | 0.00          | 100.00         | 0.00       | 0.00       |
| Chanda       | H    | 0.00      | 0.00         | 66.67        | 33.33         | 0.00           | 0.00       | 0.00       |
| Chata Bele   | C    | 0.00      | 0.00         | 0.00         | 0.00          | 100.00         | 0.00       | 0.00       |
|              | E    | 0.00      | 0.00         | 0.00         | 0.00          | 50.00          | 50.00      | 0.00       |
| Chewa        | H    | 0.00      | 0.00         | 100.00       | 0.00          | 0.00           | 0.00       | 0.00       |
| Chhuri       | A    | 0.00      | 0.00         | 0.00         | 0.00          | 80.00          | 20.00      | 0.00       |
| Chitra       | C    | 0.00      | 8.33         | 8.33         | 41.67         | 41.67          | 0.00       | 0.00       |
|              | E    | 0.00      | 0.00         | 0.00         | 0.00          | 0.00           | 100.00     | 0.00       |
| Gagra Tengra | E    | 0.00      | 0.00         | 0.00         | 0.00          | 100.00         | 0.00       | 0.00       |
|              | H    | 0.00      | 0.00         | 100.00       | 0.00          | 0.00           | 0.00       | 0.00       |
| Goda Kathali | E    | 0.00      | 0.00         | 7.69         | 84.62         | 7.69           | 0.00       | 0.00       |
| Golda        | E    | 0.00      | 0.00         | 0.00         | 0.00          | 70.00          | 30.00      | 0.00       |
| Ilish        | A    | 0.00      | 0.00         | 0.00         | 0.00          | 0.00           | 100.00     | 0.00       |
|              | H    | 0.00      | 0.00         | 0.00         | 0.00          | 0.00           | 100.00     | 0.00       |
|              | I    | 0.00      | 0.00         | 0.00         | 0.00          | 0.00           | 100.00     | 0.00       |
| Jaba         | C    | 0.00      | 0.00         | 0.00         | 0.00          | 100.00         | 0.00       | 0.00       |
| Kain Magur   | C    | 0.00      | 0.00         | 0.00         | 0.00          | 0.00           | 100.00     | 0.00       |
|              | E    | 0.00      | 0.00         | 0.00         | 0.00          | 30.00          | 70.00      | 0.00       |
| Kalo Bele    | C    | 0.00      | 0.00         | 0.00         | 0.00          | 100.00         | 0.00       | 0.00       |
|              | E    | 0.00      | 0.00         | 5.88         | 35.29         | 58.82          | 0.00       | 0.00       |
| Khoira       | H    | 0.00      | 0.00         | 100.00       | 0.00          | 0.00           | 0.00       | 0.00       |
| Kuchia       | C    | 0.00      | 0.00         | 0.00         | 0.00          | 0.00           | 100.00     | 0.00       |
| Paissa       | E    | 0.00      | 0.00         | 0.00         | 0.00          | 100.00         | 0.00       | 0.00       |
| Pangas       | H    | 0.00      | 0.00         | 100.00       | 0.00          | 0.00           | 0.00       | 0.00       |
| Pata         | H    | 0.00      | 0.00         | 0.00         | 100.00        | 0.00           | 0.00       | 0.00       |
| Pheksa       | A    | 0.00      | 0.00         | 0.00         | 33.33         | 66.67          | 0.00       | 0.00       |
| Poma         | A    | 0.00      | 0.00         | 0.00         | 0.00          | 100.00         | 0.00       | 0.00       |
|              | E    | 0.00      | 0.00         | 0.00         | 0.00          | 20.00          | 80.00      | 0.00       |
|              | H    | 0.00      | 0.00         | 76.92        | 23.08         | 0.00           | 0.00       | 0.00       |
| Potka        | A    | 0.00      | 0.00         | 0.00         | 25.00         | 75.00          | 0.00       | 0.00       |

| Fish Species | Site | L (< 2cm) | L (2 to 3cm) | L (3 to 5cm) | L (5 to 10cm) | L (10 to 20cm) | L (> 25cm) | Brood Fish |
|--------------|------|-----------|--------------|--------------|---------------|----------------|------------|------------|
| Silonda      | H    | 0.00      | 0.00         | 100.00       | 0.00          | 0.00           | 0.00       | 0.00       |
| Tairel       | C    | 0.00      | 0.00         | 0.00         | 0.00          | 33.33          | 0.00       | 66.67      |
| Tiger Meni   | C    | 0.00      | 0.00         | 0.00         | 0.00          | 100.00         | 0.00       | 0.00       |
| Topse        | E    | 0.00      | 0.00         | 0.00         | 0.00          | 100.00         | 0.00       | 0.00       |
| Vetki        | C    | 0.00      | 0.00         | 0.00         | 0.00          | 100.00         | 0.00       | 0.00       |
|              | E    | 0.00      | 0.00         | 0.00         | 0.00          | 0.00           | 100.00     | 0.00       |

Source: CEGIS field survey, November 2020

#### D.6: Purpose, timing and extent of migration for different year-class of migratory fish species

| Migratory Fish Species | Sampling Sites            | Year Class*                | Migration Purpose   |                     |                       |        |        |         |                      |         |        |         |                     |         |
|------------------------|---------------------------|----------------------------|---------------------|---------------------|-----------------------|--------|--------|---------|----------------------|---------|--------|---------|---------------------|---------|
|                        |                           |                            | 1st QM              | 2nd QM              | 3rd QM                | 4th QM | 5th QM | 6th QM  | 7th QM               | 8th QM  | 9th QM | 10th QM | 11th QM             | 12th QM |
| Tapsi                  | Haldikhali                | Juvenile and Age-1 adult   | Feeding and Growing | -                   | Feeding and Growing   | -      | -      | -       |                      | -       | -      |         | -                   | -       |
|                        | Akram Point               | Juvenile and Age-1 adult   | Feeding and Growing | -                   | -                     | -      | -      | -       | Feeding              | -       | -      |         | -                   | -       |
|                        |                           | Adult                      | -                   | -                   | -                     | -      | -      | -       | -                    | Feeding | -      |         | -                   | -       |
|                        | Chalna Point              | Age-1 adult and Brood fish | Feeding and Growing | Spawning            | -                     | -      | -      | Feeding | Feeding and Spawning | -       | -      |         | Feeding and Growing | -       |
|                        |                           | Adult                      | -                   | -                   | Feeding and Growing   | -      | -      | Feeding | Feeding              | -       | -      |         |                     | -       |
|                        | Harbaria                  | Juvenile and Age-1 adult   | Feeding and Growing | Feeding and Growing |                       | -      | -      | -       | -                    | -       | -      |         | -                   | Feeding |
|                        |                           | Adult and Brood Fish       | -                   | -                   | Breeding and Spawning | -      | -      | -       | -                    | -       | -      |         | -                   | -       |
|                        | Chandpai                  | Juvenile                   | -                   | -                   | Feeding and Growing   | -      | -      | -       | Feeding              | -       | -      |         | Feeding             | -       |
|                        | Mongla Point              | Adult                      | -                   | -                   | -                     | -      | -      | -       | -                    | -       | -      |         |                     | -       |
|                        | South-west of the Project | Age-1 adult                | Feeding and Growing | Feeding and Growing | Feeding and Growing   | -      | -      | Feeding | -                    | -       | -      |         | -                   | -       |

| Migratory Fish Species | Sampling Sites            | Year Class*              | Migration Purpose     |                       |                     |         |                     |                       |        |                     |        |         |         |         |
|------------------------|---------------------------|--------------------------|-----------------------|-----------------------|---------------------|---------|---------------------|-----------------------|--------|---------------------|--------|---------|---------|---------|
|                        |                           |                          | 1st QM                | 2nd QM                | 3rd QM              | 4th QM  | 5th QM              | 6th QM                | 7th QM | 8th QM              | 9th QM | 10th QM | 11th QM | 12th QM |
|                        |                           | Brood Fish               | -                     | -                     | -                   | -       | -                   | Breeding and Spawning | -      | -                   | -      |         | -       | -       |
| Bairagi                | Haldikhali                | Juvenile and Age-1 adult | Feeding and Growing   | -                     | Feeding and Growing | -       | -                   | -                     | -      | -                   | -      |         | -       | -       |
|                        | Akram Point               | Juvenile and Age-1 adult | Feeding and Growing   | -                     | -                   | -       | Feeding and Growing | -                     | -      | -                   | -      |         | -       | -       |
|                        |                           | Juvenile and Adult       | -                     | -                     | -                   | -       | -                   | -                     | -      | Growing and Feeding | -      |         | -       | -       |
|                        | Chandpai                  | Fry                      | Breeding and Spawning | Breeding and Spawning | Feeding and Growing | Feeding | -                   | Feeding               | -      | -                   | -      |         | -       | -       |
|                        |                           | Juvenile                 | -                     | -                     | -                   | -       | -                   | -                     | -      | -                   | -      |         | -       | -       |
|                        | Chalna Point              | Juvenile and Age-1 adult | Feeding and Growing   | -                     | -                   | -       | Feeding and Growing | -                     | -      | -                   | -      |         | -       | -       |
|                        |                           | Fry                      | -                     | -                     | -                   | -       | -                   | -                     | -      | -                   | -      |         | -       | Nursing |
|                        | Harbaria                  | Juvenile                 | Feeding and Growing   | -                     | -                   | -       | -                   | Feeding               | -      | -                   | -      |         | -       | -       |
|                        | Mongla Point              | Fry                      | -                     | Nursing               | -                   | Feeding | -                   | -                     | -      | -                   | -      |         | -       | Nursing |
|                        |                           | Juvenile                 | -                     | -                     | -                   | -       | -                   | -                     | -      | Feeding             | -      |         | -       | -       |
|                        | South-west of the Project | Juvenile                 | -                     | Feeding and Growing   | -                   | -       | -                   | -                     | -      | -                   | -      |         | -       | -       |
|                        |                           | Fry                      | -                     | -                     | -                   | -       | -                   | -                     | -      | -                   | -      |         | -       | Nursing |
| Chapila                | Haldikhali                | Juvenile                 | Feeding and Growing   | -                     | -                   | -       | -                   | -                     | -      | -                   | -      |         | -       | -       |
|                        | Akram Point               | Juvenile                 | Feeding and Growing   | -                     | -                   | -       | -                   | -                     | -      | -                   | -      |         | -       | -       |
|                        | Mongla Point              | Fry                      | -                     | Nursing               | -                   | -       | -                   | -                     | -      | -                   | -      |         | -       | -       |
|                        | South-west of the Project | Age-1 adult              | -                     | Feeding and           | -                   | -       | -                   | -                     | -      | -                   | -      |         | -       | -       |

| Migratory Fish Species | Sampling Sites | Year Class*                   | Migration Purpose     |                              |                     |         |                     |         |                     |                     |         |         |                     |         |
|------------------------|----------------|-------------------------------|-----------------------|------------------------------|---------------------|---------|---------------------|---------|---------------------|---------------------|---------|---------|---------------------|---------|
|                        |                |                               | 1st QM                | 2nd QM                       | 3rd QM              | 4th QM  | 5th QM              | 6th QM  | 7th QM              | 8th QM              | 9th QM  | 10th QM | 11th QM             | 12th QM |
|                        |                |                               |                       | Growing                      |                     |         |                     |         |                     |                     |         |         |                     |         |
| Loitta                 | Haldikhali     | Juvenile and Age-1 adult      | Feeding and Growing   | -                            | Feeding and Growing | -       | -                   | -       | -                   | -                   | -       |         | -                   | -       |
|                        | Akram Point    | Juvenile                      | Feeding and Growing   | -                            | -                   | -       | Feeding and Growing | -       | -                   | -                   | -       |         | -                   | -       |
|                        | Akram Point    | Age-1 adult                   | -                     | -                            | Feeding and Growing | -       | Feeding and Growing | -       | -                   | -                   | -       |         | -                   | -       |
|                        | Chandpai       | Juvenile                      | Feeding and Growing   | -                            | -                   | -       | -                   | -       | -                   | -                   | -       |         | -                   | -       |
|                        | Harbaria       | Fry, Juvenile and Age-1 adult | -                     | Nursing, Feeding and Growing | -                   | -       | -                   | -       | -                   | -                   | -       |         | -                   | -       |
|                        | Chalna Point   | Age-1 adult                   | -                     | Feeding and Growing          | -                   | -       | Feeding and Growing | -       | -                   | -                   | -       |         | -                   | -       |
|                        |                | Fry                           | -                     | -                            | -                   | -       | -                   | -       | -                   | -                   | Nursing |         | -                   | -       |
| Poma                   | Haldikhali     | Juvenile                      | Feeding and Growing   | -                            | -                   | Feeding | -                   | -       | -                   |                     | -       |         | -                   | -       |
|                        | Akram Point    | Juvenile                      | Feeding and Growing   | -                            | -                   | -       | -                   | -       | -                   | Growing and Feeding | -       |         | -                   | -       |
|                        |                | Age-1 adult                   | -                     | -                            | Feeding and Growing | -       | -                   | -       | Feeding             | Feeding             | -       |         | -                   | -       |
|                        |                | Adult                         | -                     | -                            | -                   | -       | -                   | -       |                     |                     | -       |         | -                   | -       |
|                        | Chandpai       | Fry and Juvenile              | Breeding and Spawning | Nursing                      | -                   | -       | -                   | Feeding | -                   | -                   | -       |         | -                   | -       |
|                        |                | Juvenile                      | -                     | -                            | Feeding and Growing | Feeding | Feeding and Growing | -       | Feeding and Growing |                     | -       |         | Feeding and Growing |         |
|                        |                | Adult                         | -                     | -                            | -                   | -       | -                   | -       | Feeding             |                     | -       |         |                     |         |

| Migratory Fish Species | Sampling Sites            | Year Class*                    | Migration Purpose     |                     |                               |         |                     |                      |                     |         |                     |         |                               |         |
|------------------------|---------------------------|--------------------------------|-----------------------|---------------------|-------------------------------|---------|---------------------|----------------------|---------------------|---------|---------------------|---------|-------------------------------|---------|
|                        |                           |                                | 1st QM                | 2nd QM              | 3rd QM                        | 4th QM  | 5th QM              | 6th QM               | 7th QM              | 8th QM  | 9th QM              | 10th QM | 11th QM                       | 12th QM |
|                        |                           | Brood Fish                     | -                     | -                   | -                             | -       | -                   | -                    | -                   | -       | -                   |         | Spawning                      | -       |
|                        | Haldikhali                | Fry and Juvenile               | -                     | -                   | Nursing                       | -       | -                   | -                    | -                   | -       | -                   |         | -                             | -       |
|                        | Harbaria                  | Adult and Brood Fish           | -                     | -                   | Breeding and Spawning         | -       | -                   | -                    | -                   | -       | -                   |         | Feeding and Spawning          | -       |
|                        |                           | Adult                          | -                     | -                   | -                             | -       | -                   | -                    | Feeding             |         | -                   |         | -                             | Feeding |
|                        |                           | Fry and Juvenile               |                       |                     |                               |         |                     | Spawning and Nursery | -                   | -       | Feeding and Growing |         | -                             | -       |
|                        | Mongla Point              | Fry, Juvenile and Age-1 adult  | -                     | -                   | Spawning, Feeding and Growing | -       | -                   | -                    | -                   | Nursing | -                   |         | -                             | Nursing |
|                        |                           | Juvenile                       | -                     | -                   | -                             | -       | -                   | -                    | Feeding and Growing |         | -                   |         | -                             | -       |
|                        |                           | Age-1 Adult                    | -                     | -                   | -                             | -       | -                   | -                    | Feeding             | Feeding | -                   |         | -                             | -       |
|                        |                           | Adult                          | -                     | -                   |                               | Feeding | -                   | Feeding              | -                   | -       | -                   |         | Feeding                       | -       |
|                        |                           | Brood Fish                     | -                     | -                   | -                             | -       | -                   | -                    | -                   | -       | -                   |         | Spawning                      | -       |
|                        | South-west of the Project | Adult                          | -                     | -                   | Feeding                       | Feeding | -                   | Feeding              | -                   | -       | -                   |         | -                             | -       |
|                        | Chalna Point              | Juvenile, Adult and Brood Fish | Breeding and Spawning | -                   | -                             | -       | -                   | -                    | -                   | -       | -                   |         | Feeding, Growing and Spawning | -       |
|                        |                           | Juvenile and Adult             | -                     | -                   | Feeding and Growing           | Feeding | Feeding and Growing | -                    | Feeding and Growing | -       | -                   |         | -                             | -       |
|                        |                           | Fry                            | -                     | -                   | -                             | -       | -                   | -                    | -                   | -       | Nursery             |         | -                             | Nursing |
| Chhuri                 | Haldikhali                | Adult                          | Feeding               | -                   | Feeding                       | -       | -                   | -                    | -                   | -       | -                   |         | -                             | -       |
|                        | Akram Point               |                                | Feeding               | -                   | Feeding                       | -       | -                   | -                    | -                   | -       | -                   |         | -                             | -       |
| Chela                  | Haldikhali                | Adult                          | Feeding               | -                   | Feeding                       | -       | -                   | -                    | -                   | -       | -                   |         | -                             | -       |
|                        | Akram Point               | Juvenile and Adult             | Feeding and Growing   | -                   | -                             | -       | -                   | -                    | -                   | -       | -                   |         | -                             | -       |
|                        | Harbaria                  | Fry and Juvenile               | -                     | Feeding and Growing | -                             | -       | -                   | Nursery              | -                   | -       | -                   |         | -                             | -       |

| Migratory Fish Species | Sampling Sites | Year Class*              | Migration Purpose    |                     |                     |         |                     |         |                     |                     |         |         |                     |         |
|------------------------|----------------|--------------------------|----------------------|---------------------|---------------------|---------|---------------------|---------|---------------------|---------------------|---------|---------|---------------------|---------|
|                        |                |                          | 1st QM               | 2nd QM              | 3rd QM              | 4th QM  | 5th QM              | 6th QM  | 7th QM              | 8th QM              | 9th QM  | 10th QM | 11th QM             | 12th QM |
|                        | Chandpai       |                          | -                    | -                   | -                   | -       | -                   | -       | -                   | Growing and Feeding | Nursery |         | -                   | -       |
| Gang Tengra            | Haldikhali     | Adult                    | Feeding              | -                   | Feeding             | Feeding | -                   | -       | -                   | -                   | -       |         | -                   | -       |
|                        | Akram Point    | Adult                    | Feeding And Breeding | -                   | -                   | Feeding | -                   | -       | -                   | -                   | -       |         | -                   | -       |
|                        | Harbaria       | Adult                    | -                    | -                   | Feeding             | -       | -                   | -       | -                   | -                   | -       |         | -                   | -       |
|                        | Chandpai       | Adult                    | -                    | -                   | Feeding             | Feeding | -                   | -       | -                   | -                   | -       |         | -                   | -       |
| Gagra Tengra           | Chandpai       | Juvenile and Age-1 adult | -                    | Feeding and Growing | -                   | -       | Feeding and Growing | -       | -                   | -                   | -       |         | -                   | -       |
|                        | Chalna Point   | Age-1 adult              | -                    | -                   | -                   | -       | Feeding and Growing | -       | -                   | -                   | -       |         | -                   | -       |
|                        | Mongla Point   | Age-1 adult              | -                    | Feeding And Growing | -                   | -       | -                   | -       | -                   | -                   | -       |         | -                   | -       |
|                        | Akram Point    | Juvenile and Adult       | -                    | -                   | Feeding and Growing | -       | -                   | -       | -                   | -                   | -       |         | -                   | Feeding |
|                        |                | Adult                    | -                    | -                   | -                   | -       | -                   | -       | Feeding             | -                   | -       |         | -                   | -       |
|                        | Haldikhali     | Juvenile                 | -                    | -                   | -                   | -       | -                   | -       | Feeding and Growing | -                   | -       |         | -                   | -       |
|                        | Harbaria       | Adult                    | -                    | -                   | Feeding             | -       | Feeding and Growing | -       | -                   | -                   | Feeding |         | Feeding             |         |
| Gulsha Tengra          | Haldikhali     | Adult                    | Feeding and Breeding | -                   | -                   | -       | -                   | -       | -                   | -                   | -       |         | -                   | -       |
|                        | Akram Point    | Adult                    |                      | -                   | -                   | -       | -                   | -       | -                   | -                   | -       |         | -                   | -       |
|                        | Chandpai       | Age-1 adult              | -                    | -                   | -                   | Feeding | -                   | Feeding | Feeding and Growing | -                   | -       |         | -                   | Feeding |
|                        |                | Juvenile                 | -                    | -                   | -                   | -       | -                   | -       | Feeding and Growing |                     | -       |         | Feeding and Growing | -       |

| Migratory Fish Species | Sampling Sites | Year Class*              | Migration Purpose     |                      |                     |                     |        |                     |                     |                     |                     |         |                     |         |
|------------------------|----------------|--------------------------|-----------------------|----------------------|---------------------|---------------------|--------|---------------------|---------------------|---------------------|---------------------|---------|---------------------|---------|
|                        |                |                          | 1st QM                | 2nd QM               | 3rd QM              | 4th QM              | 5th QM | 6th QM              | 7th QM              | 8th QM              | 9th QM              | 10th QM | 11th QM             | 12th QM |
|                        | Mongla Point   | Age-1 adult              | -                     | Feeding and Growing  | -                   | Feeding and Growing | -      | Feeding and Growing |                     | -                   | Feeding and Growing |         | -                   | -       |
|                        |                | Juvenile                 | -                     | -                    | -                   | -                   | -      | -                   | Feeding and Growing |                     | -                   |         | Feeding and Growing | -       |
|                        | Harbaria       | Juvenile                 | -                     | -                    | -                   | -                   | -      | -                   | Feeding and Growing |                     | -                   |         | Feeding and Growing | -       |
|                        |                | Age-1 adult              | -                     | -                    | -                   | -                   | -      | -                   | -                   | -                   | Feeding and Growing |         | -                   | -       |
|                        | Maidara        | Juvenile and Age-1 Adult | -                     | -                    | -                   | -                   | -      | -                   | Feeding and Growing | -                   | Feeding and Growing |         | -                   | -       |
|                        | Chalna Point   | Juvenile                 | -                     | -                    | -                   | -                   | -      | -                   | -                   | -                   | -                   |         | Feeding and Growing | -       |
| Potka                  | Haldikhali     | Adult                    | Feeding and Breeding  | -                    | -                   | -                   | -      | -                   | -                   | -                   | -                   |         | -                   | -       |
|                        | Chandpai       | Fry                      | Spawning              | Spawning and Nursing | -                   | -                   | -      | -                   | -                   | -                   | -                   |         | -                   | -       |
|                        |                | Juvenile                 | -                     | -                    | -                   | -                   | -      | -                   | -                   | Feeding and Growing | -                   |         | -                   | Feeding |
|                        |                | Adult                    | -                     | -                    | -                   | Feeding             | -      | -                   | -                   | -                   | -                   |         | Feeding             | -       |
|                        | Mongla Point   | Fry                      | Spawning              | -                    | -                   | -                   | -      | -                   | -                   | -                   | -                   |         | -                   | -       |
|                        |                | Juvenile                 | -                     | -                    | -                   | -                   | -      | -                   | -                   | -                   | Feeding and Growing |         | -                   | -       |
|                        | Harbaria       | Fry                      | -                     | -                    | -                   | -                   | -      | Nursery             | -                   | -                   | -                   |         | -                   | -       |
|                        |                | Juvenile                 | -                     | -                    | -                   | -                   | -      | -                   | -                   | Feeding and Growing | -                   |         | -                   | -       |
| Pairst Chanda          | Akram Point    | Adult                    | Feeding               | -                    | -                   | -                   | -      | -                   | -                   | -                   | -                   |         | -                   | -       |
|                        | Chandpai       | Fry                      | Breeding and Spawning | -                    | -                   | -                   | -      | -                   | -                   | -                   | -                   |         | -                   | -       |
| Chewa                  | Akram Point    | Juvenile and Adult       | Feeding               | -                    | Feeding and Growing | -                   | -      | -                   | -                   | -                   |                     |         | -                   | -       |



| Migratory Fish Species | Sampling Sites            | Year Class*                    | Migration Purpose     |                     |                     |         |                     |                     |                     |                     |                     |         |                     |         |
|------------------------|---------------------------|--------------------------------|-----------------------|---------------------|---------------------|---------|---------------------|---------------------|---------------------|---------------------|---------------------|---------|---------------------|---------|
|                        |                           |                                | 1st QM                | 2nd QM              | 3rd QM              | 4th QM  | 5th QM              | 6th QM              | 7th QM              | 8th QM              | 9th QM              | 10th QM | 11th QM             | 12th QM |
|                        | Chandpai                  | Fry and Juvenile               | Spawning              | -                   | Feeding and Growing | -       | Nursing and Grazing | Nursery             | Feeding and Growing | -                   | Nursing             |         | -                   | -       |
|                        |                           | Adult                          | -                     | -                   | -                   | Feeding | -                   | Feeding             | -                   | Feeding             | -                   |         | -                   | -       |
|                        | Haldikhali                | Juvenile and Adult             | -                     | -                   | Feeding and Growing | -       | -                   | -                   | -                   | -                   | -                   |         | -                   | -       |
|                        | Harbaria                  | Juvenile and Adult             | -                     | -                   | Feeding and Growing | -       | -                   | Feeding and Nursery | -                   | Feeding             | -                   |         | -                   | -       |
|                        | Mongla Point              | Juvenile                       | -                     | Feeding and Growing | -                   | -       | -                   | -                   | -                   | -                   | -                   |         | -                   | -       |
|                        | South-west of the Project | Juvenile                       | -                     | Feeding and Growing | -                   | -       | -                   | -                   | -                   | -                   | -                   |         | -                   | -       |
|                        | Chalna Point              | Adult                          | -                     | -                   | -                   | -       | Feeding             | -                   | -                   | -                   | -                   |         | -                   | -       |
|                        |                           | Age-1 Juvenile                 | -                     | -                   | -                   | -       | -                   | -                   | -                   | -                   | Feeding and Growing |         | -                   | -       |
| Bele                   | Akram Point               | Adult                          | Feeding               | -                   | Feeding             | Feeding | -                   | -                   | -                   | -                   | -                   |         | -                   | -       |
|                        |                           | Juvenile                       | -                     | -                   | -                   | -       | -                   | -                   | -                   | Feeding and Growing | -                   |         | -                   | -       |
|                        | Haldikhali                | Juvenile-1, Juvenile and Adult | -                     | -                   | Nursing and Growing | Feeding | -                   | -                   | -                   | -                   | -                   |         | -                   | -       |
|                        | Harbaria                  | Juvenile and Adult             | -                     | -                   | Feeding and Growing | -       | Feeding and Growing | Nursery and Feeding | Feeding and Growing | -                   | -                   |         | -                   | -       |
|                        | Chandpai                  | Fry                            | Breeding and Spawning | Nursing             | -                   | -       | Nursing             | Nursery             | -                   | -                   | Nursery             |         | -                   | -       |
|                        | Chandpai                  | Juvenile and Adult             | -                     | -                   | Feeding and Growing | Feeding | -                   | Feeding             | -                   | Feeding             | -                   |         | Feeding and Growing |         |
|                        | Harbaria                  | Juvenile and Age-1 Adult       | -                     | -                   | -                   | -       | -                   | -                   | Feeding and Growing |                     |                     |         | -                   | -       |

| Migratory Fish Species  | Sampling Sites            | Year Class*                  | Migration Purpose     |                     |                     |         |                     |         |                     |         |                     |         |         |         |
|-------------------------|---------------------------|------------------------------|-----------------------|---------------------|---------------------|---------|---------------------|---------|---------------------|---------|---------------------|---------|---------|---------|
|                         |                           |                              | 1st QM                | 2nd QM              | 3rd QM              | 4th QM  | 5th QM              | 6th QM  | 7th QM              | 8th QM  | 9th QM              | 10th QM | 11th QM | 12th QM |
|                         | Mongla Point              | Fry                          | Breeding and Spawning | -                   | -                   | -       | -                   | Nursery | -                   | -       | -                   |         | -       | -       |
|                         | Mongla Point              | Fry, Juvenile-1 and Juvenile |                       |                     | Nursing and Growing | -       | -                   | -       | -                   | -       | -                   |         | -       | -       |
|                         | Mongla Point              | Juvenile and Adult           | -                     | -                   | -                   | Feeding | Feeding and Growing | Feeding | Feeding and Growing | -       | -                   |         | -       | -       |
|                         | Chalna Point              | Fry                          | Breeding and Spawning | Nursing             | -                   | -       | Nursing             | -       | -                   | Nursing | -                   |         | -       | -       |
|                         | Chalna Point              | Adult                        | -                     | -                   | -                   | Feeding | -                   | -       | -                   | -       | -                   |         | -       | -       |
|                         | Maidara                   | Juvenile and Age-1 adult     | -                     | Feeding and Growing | Feeding and Growing | Feeding | Feeding and Growing | -       | -                   | -       | Feeding and Growing |         | -       | -       |
|                         |                           | Fry                          | -                     | -                   | -                   | -       | -                   | -       | -                   | Nursing | -                   |         | -       | Nursing |
| Tular Dandi (Nona bele) | Akram Point               | Adult                        | Feeding               | -                   | -                   | -       | -                   | -       | -                   | -       | -                   |         | -       | -       |
|                         | South-west of the Project | Adult                        | -                     | -                   | Feeding             | -       | -                   | -       | -                   | -       | -                   |         | Feeding | -       |
|                         | Chalna Point              | Adult                        | Feeding               | -                   | Feeding             | -       | Feeding             | -       | Feeding             | -       | -                   |         | -       | -       |
| Tairel                  | Akram Point               | Adult                        | Feeding               | -                   | -                   | -       | -                   | -       | -                   | Feeding | -                   |         | -       | -       |
|                         | Harbaria                  | Age-1 Adult                  | -                     | -                   | -                   | -       | -                   | -       | -                   | -       | Feeding and Growing |         | -       | -       |
|                         | Mongla Point              | Juvenile                     | Feeding               | -                   | -                   | -       | -                   | -       | -                   | -       | -                   |         | -       | -       |
| Pheksa                  | Akram Point               | Adult                        | Feeding               | -                   | -                   | -       | -                   | -       | -                   | Feeding | -                   |         | -       | -       |
|                         |                           | Juvenile                     | -                     | -                   | Feeding and Growing | -       | -                   | -       | -                   | -       | -                   |         | -       | -       |
|                         | Haldikhali                | Juvenile                     | -                     | -                   | Feeding and Growing | -       | -                   | -       | -                   | -       | -                   |         | -       | -       |
|                         | Haldikhali                | Adult                        | -                     | -                   | -                   | Feeding | -                   | -       | -                   | -       | -                   |         | -       | -       |
|                         | Harbaria                  | Juvenile                     | -                     | -                   | -                   | -       | -                   | -       | -                   | -       | -                   |         | -       | -       |
|                         | Chalna Point              | Juvenile and Adult           | Feeding               | Feeding and Growing | -                   | -       | -                   | -       | Feeding and Growing | -       | Feeding And Growing |         | -       | -       |

| Migratory Fish Species | Sampling Sites | Year Class*             | Migration Purpose     |                     |                     |         |                     |                     |                     |                     |         |         |                     |          |
|------------------------|----------------|-------------------------|-----------------------|---------------------|---------------------|---------|---------------------|---------------------|---------------------|---------------------|---------|---------|---------------------|----------|
|                        |                |                         | 1st QM                | 2nd QM              | 3rd QM              | 4th QM  | 5th QM              | 6th QM              | 7th QM              | 8th QM              | 9th QM  | 10th QM | 11th QM             | 12th QM  |
|                        |                | Adult                   | -                     | -                   | Feeding             | Feeding | Feeding             | -                   | Feeding             | -                   | -       |         | -                   | -        |
|                        | Mongla Point   | Adult                   | -                     | -                   | Feeding             | Feeding | -                   | -                   | Feeding and Growing | -                   | -       |         | Feeding             | -        |
|                        | Chandpai       | Juvenile and Adult      | Feeding               | Feeding and Growing | -                   | -       | Feeding and Growing | -                   |                     | -                   | -       |         | -                   | -        |
|                        | Maidara        | Juvenile and Adult      | Feeding               | Feeding and Growing | -                   | -       | -                   | -                   | -                   | -                   | -       |         | -                   | -        |
|                        |                | Juvenile                | -                     | -                   | -                   | -       | -                   | -                   | Feeding and Growing | -                   | -       |         | -                   | -        |
|                        |                | Adult                   | -                     | -                   | Feeding             | Feeding | -                   | Feeding             | -                   | -                   | -       |         | -                   | -        |
| Paissa                 | Akram Point    | Juvenile and Adult      | Feeding               | -                   | Feeding and Growing | Feeding | -                   | -                   | -                   | Feeding and Growing | -       |         | -                   | Feeding  |
|                        |                | Brood                   | -                     | -                   | -                   | -       | -                   | -                   | -                   | -                   | -       |         | -                   | Spawning |
|                        |                | Juvenile                | -                     | -                   | -                   | -       | -                   | -                   | Feeding and Growing |                     |         | -       | -                   | -        |
|                        | Haldikhali     | Juvenile and Adult      | Feeding               | -                   | Feeding And Growing | Feeding | -                   | -                   | -                   | -                   | -       |         | -                   | -        |
|                        |                | Juvenile                | -                     | -                   | -                   | -       | -                   | -                   | Feeding and Growing | -                   | -       |         | -                   | -        |
|                        | Harbaria       | Juvenile-1 and Juvenile | -                     | -                   | Feeding             | -       | Feeding and Growing | -                   | Feeding and Growing | -                   | -       |         | -                   | -        |
|                        |                | Adult                   | -                     | -                   | -                   | -       | -                   | -                   | -                   | Feeding             | -       |         | -                   | -        |
|                        | Chandpai       | Fry                     | Breeding and Spawning | -                   | -                   | -       | Nursing             | -                   | -                   | -                   | Nursery |         | -                   | -        |
|                        | Chandpai       | Juvenile and Adult      | -                     | -                   | Feeding and Growing | -       | -                   | Nursery and Feeding | -                   | -                   | -       |         | Feeding and Growing | Feeding  |
|                        | Harbaria       | Juvenile                | -                     | -                   | -                   | -       | -                   | -                   | Feeding and Growing | -                   | -       |         |                     | -        |
|                        | Mongla Point   | Fry                     | Breeding and          | -                   | -                   | -       | -                   | Nursery             | -                   | -                   | Nursery |         | -                   | -        |

| Migratory Fish Species | Sampling Sites | Year Class*                              | Migration Purpose     |                     |                     |         |                     |                       |                              |         |                     |         |                       |         |
|------------------------|----------------|--|-----------------------|---------------------|---------------------|---------|---------------------|-----------------------|------------------------------|---------|---------------------|---------|-----------------------|---------|
|                        |                |  | 1st QM                | 2nd QM              | 3rd QM              | 4th QM  | 5th QM              | 6th QM                | 7th QM                       | 8th QM  | 9th QM              | 10th QM | 11th QM               | 12th QM |
|                        |                |  | Spawning              |                     |                     |         |                     |                       |                              |         |                     |         |                       |         |
|                        |                | Age-1 Juvenile                           | -                     | -                   | -                   | -       | -                   | -                     | Nursing, Feeding and Growing | -       | Feeding and Growing |         | -                     | -       |
|                        |                | Age-1 Adult                              | -                     | -                   | -                   | -       | Feeding and Growing | Feeding               | -                            | -       |                     |         | -                     | -       |
|                        | Maidara        | Fry, Juvenile and Age-1 adult            | Breeding and Spawning | Feeding and Growing | -                   | -       | Feeding and Growing | -                     | -                            | -       |                     |         | -                     | -       |
|                        |                | Age-1 Juvenile, Juvenile and Age-1 Adult | -                     | -                   | -                   | -       | -                   | -                     | Nursing, Feeding and Growing | -       | -                   |         | Feeding and Growing   | -       |
|                        |                | Adult                                    | -                     | -                   | -                   | -       | -                   | Feeding               | -                            | -       | -                   |         | -                     | -       |
|                        |                |  |                       |                     |                     |         |                     |                       |                              |         |                     |         |                       |         |
| Banshpata              | Chandpai       | Juvenile                                 | Feeding               | -                   | -                   | -       | -                   | -                     | -                            | -       | -                   | -       | -                     | -       |
|                        |                | Adult                                    | -                     | -                   | -                   | Feeding | -                   | Feeding               | -                            | -       | -                   | -       | -                     | -       |
|                        |                |  |                       |                     |                     |         |                     |                       |                              |         |                     |         |                       |         |
|                        | Akram Point    | Juvenile                                 | -                     | -                   | -                   | -       | -                   | -                     | Feeding and Growing          | -       | -                   |         | -                     | -       |
|                        |                | Adult                                    | -                     | -                   | -                   | -       | -                   | -                     | -                            | Feeding | -                   |         | -                     | -       |
|                        | Haldikhali     | Juvnile and adult                        | -                     | -                   | Feeding and Growing | Feeding | -                   | -                     | Feeding and Growing          | -       | -                   |         | -                     | -       |
|                        | Harbaria       | Adult                                    | -                     | -                   | -                   | -       | -                   | -                     | -                            | Feeding | Feeding             |         | Feeding               | -       |
|                        | Mongla Point   | Fry and Adult                            | Feeding               | Nursing             | -                   | -       | -                   | -                     | -                            | -       | -                   |         | -                     | -       |
|                        |                | Adult                                    | -                     | -                   | -                   | Feeding | -                   | -                     | -                            | -       | Feeding             |         | -                     | -       |
|                        | Maidara        | Adult                                    | -                     | -                   | Feeding             | Feeding | -                   | Breeding and Spawning | -                            | -       | -                   |         | -                     | -       |
| Chalna Point           | Adult          | -  | -                     | Feeding             | Feeding             | -       | -                   | -                     | -                            | -       |                     | -       | -                     |         |
| Hilsa                  | Akram Point    | Brood Fish                               | -                     | -                   | -                   | -       | -                   | -                     | -                            | -       | -                   |         | Breeding and Spawning | -       |
|                        | Haldikhali     | Brood Fish                               | -                     | -                   | -                   | -       | -                   | -                     | -                            | -       | -                   |         | Breeding and Spawning | -       |
|                        |                | Juvenile                                 | -                     | -                   | Feeding and Growing | -       | -                   | -                     | -                            | -       | -                   | -       |                       | -       |

| Migratory Fish Species | Sampling Sites | Year Class*          | Migration Purpose |        |                     |        |        |                       |                      |         |        |         |                       |         |
|------------------------|----------------|----------------------|-------------------|--------|---------------------|--------|--------|-----------------------|----------------------|---------|--------|---------|-----------------------|---------|
|                        |                |                      | 1st QM            | 2nd QM | 3rd QM              | 4th QM | 5th QM | 6th QM                | 7th QM               | 8th QM  | 9th QM | 10th QM | 11th QM               | 12th QM |
|                        | Harbaria       | Brood Fish           | -                 | -      | -                   | -      | -      | -                     | -                    | -       | -      |         | Breeding and Spawning | -       |
|                        | Chandpai       | Adult and Brood Fish | -                 | -      | -                   | -      | -      | -                     | Feeding and Breeding | -       | -      |         | -                     | -       |
|                        | Mongla Point   | Adult                | -                 | -      | Feeding             | -      | -      | -                     | -                    | -       | -      |         | -                     | -       |
|                        |                | Brood Fish           | -                 | -      | -                   | -      | -      | -                     | -                    | -       | -      |         | Breeding and Spawning | -       |
|                        | Maidara        | Age-1 Adult          | -                 | -      | -                   | -      | -      | -                     | -                    | -       | -      |         | Feeding               | -       |
|                        | Chalna Point   | Brood fish           | -                 | -      | -                   | -      | -      | Breeding and Spawning | -                    | -       | -      |         | -                     | -       |
| Pangas                 | Haldikhali     | Juvenile             | -                 | -      | Feeding and Growing | -      | -      | -                     | -                    | -       | -      |         | -                     | -       |
|                        | Harbaria       | Adult                | -                 | -      | -                   | -      | -      | -                     | -                    | Feeding | -      |         | -                     | -       |
|                        | Mongla Point   | Juvenile and Adult   | -                 | -      | Feeding             | -      | -      | -                     | -                    | -       | -      |         | -                     | -       |

| Migratory Fish Species | Sampling Sites | Year Class*                | Migration Purpose   |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|------------------------|----------------|----------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                        |                |                            | 13 <sup>th</sup> QM | 14 <sup>th</sup> QM | 15 <sup>th</sup> QM | 16 <sup>th</sup> QM | 17 <sup>th</sup> QM | 18 <sup>th</sup> QM | 19 <sup>th</sup> QM | 20 <sup>th</sup> QM | 21 <sup>st</sup> QM | 22 <sup>nd</sup> QM | 23 <sup>rd</sup> QM | 25 <sup>th</sup> QM | 26 <sup>th</sup> QM | 27 <sup>th</sup> QM | 28 <sup>th</sup> QM | 29 <sup>th</sup> QM |
| Tapsi                  | Haldikhali     | Juvenile and Age-1 adult   | -                   | -                   | Grazing             | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Akram Point    | Juvenile and Age-1 adult   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Adult                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Chalna Point   | Age-1 adult and Brood fish | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Adult                      | -                   | Feeding             | -                   | -                   | Feeding             | -                   | -                   | Feeding             | Feeding             |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Harbaria       | Juvenile and Age-1 adult   | Feeding             | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | Feeding             |
|                        |                | Adult and Brood Fish       | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Chandpai       | Juvenile                   | -                   | Feeding and Growing | -                   | Feeding and Growing | Feeding and Growing | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Mongla Point   | Juvenile                   | -                   | -                   | -                   | -                   | -                   | -                   | Feeding and Growing | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Adult                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | Feeding             | -                   | -                   | -                   | -                   | -                   |
|                        |                | Age-1 adult                | -                   | -                   | -                   | -                   | Feeding and Growing | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Fry                        | -                   | -                   | Nursing             | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | Nursing             | -                   | -                   | -                   | -                   |
|                        | Maidara        | Age-1 adult                | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Juvenile                   | -                   | -                   | -                   | -                   | -                   | Maturation          | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Adult                      | -                   | -                   | -                   | -                   | Feeding             | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Brood Fish                 | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
| Bairagi / Amadi        | Haldikhali     | Juvenile and Age-1 adult   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Akram Point    | Juvenile and Age-1 adult   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | Feeding             |
|                        |                | Juvenile and Adult         | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Chandpai       | Fry                        | -                   | Nursing             | -                   | Nursing             | -                   | -                   |                     | Nursing             | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Juvenile                   | -                   | Feeding and Growing | Feeding and Growing | Feeding and Growing | -                   | Maturation          | Feeding and Growing | -                   | Nursing             |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Chalna Point   | Juvenile and Age-1 adult   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Feeding             | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Fry                        | Nursing             | -                   | -                   | -                   | -                   | Nursing             | -                   | Nursing             | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Harbaria       | Juvenile                   | -                   | -                   | Feeding and Growing | -                   | Feeding and Growing | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                   | -                   | -                   | -                   |

| Migratory Fish Species | Sampling Sites | Year Class*                   | Migration Purpose   |                     |                     |                     |                     |                        |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|------------------------|----------------|-------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                        |                |                               | 13 <sup>th</sup> QM | 14 <sup>th</sup> QM | 15 <sup>th</sup> QM | 16 <sup>th</sup> QM | 17 <sup>th</sup> QM | 18 <sup>th</sup> QM    | 19 <sup>th</sup> QM | 20 <sup>th</sup> QM | 21 <sup>st</sup> QM | 22 <sup>nd</sup> QM | 23 <sup>rd</sup> QM | 25 <sup>th</sup> QM | 26 <sup>th</sup> QM | 27 <sup>th</sup> QM | 28 <sup>th</sup> QM | 29 <sup>th</sup> QM |
|                        | Mongla Point   | Fry                           | Nursing             | -                   | Nursing             | -                   | -                   | -                      | -                   | -                   | -                   | -                   | Nursing             | Nursing             | -                   | -                   | -                   | -                   |
|                        |                | Juvenile                      | -                   | -                   | -                   | -                   | Feeding and Growing | -                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Maidara        | Juvenile                      | -                   | -                   | -                   | -                   | -                   | Maturation             | -                   | -                   | -                   | Feeding and Growing | -                   | -                   | -                   | -                   | Feeding and Growing | -                   |
|                        |                | Fry                           | Nursing             | -                   | Nursing             | -                   | -                   | Nursing                | -                   | Nursing             | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Charaputia     | Adult                         | -                   | -                   | -                   | -                   | -                   | -                      | -                   | Feeding             | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Jongra         | Fry                           | -                   | -                   | -                   | -                   | -                   | -                      | -                   | Nursing             | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
| Chapila                | Haldikhali     | Juvenile                      | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Akram Point    | Juvenile                      | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Harbaria       | Juvenile                      | -                   | -                   | -                   | -                   | Feeding and Growing | -                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Mongla Point   | Fry                           | -                   | -                   | -                   | -                   | Nursing             | -                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Juvenile                      | -                   | -                   | -                   | -                   | Feeding and Growing | -                      | -                   | -                   | -                   | -                   | -                   | Feeding and Growing | -                   | -                   | -                   | -                   |
|                        |                | Adult                         | -                   | -                   | -                   | -                   | Feeding             | -                      | Maturation          | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Chalna Point   | Adult                         | -                   | -                   | -                   | -                   | Feeding             | -                      | Maturation          | -                   | Maturation          | Feeding             | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Jongra         | Fry                           | -                   | -                   | -                   | -                   | -                   | Nursing                | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Maidara        | Juvenile to Age-1 adult       | -                   | -                   | -                   | -                   | -                   | Growing and Maturation | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
| Loitta                 | Haldikhali     | Juvenile and Age-1 adult      | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Akram Point    | Juvenile                      | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Akram Point    | Age-1 adult                   | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Chandpai       | Juvenile                      | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Jongra         | Fry                           | -                   | -                   | -                   | -                   | -                   | -                      | -                   | Nursing             | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Harbaria       | Fry, Juvenile and Age-1 adult | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Mongla Point   | Fry                           | -                   | -                   | Nursing             | -                   | -                   | -                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Chalna Point   | Age-1 adult                   | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
| Poma                   | Akram Point    | Juvenile                      | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Juvenile                      | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Age-1 adult                   | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Maturation          |

| Migratory Fish Species | Sampling Sites | Year Class*                   | Migration Purpose   |                     |                     |                     |                     |                        |                        |                     |                        |                     |                        |                        |                     |                        |                     |                     |
|------------------------|----------------|-------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------|------------------------|---------------------|------------------------|---------------------|------------------------|------------------------|---------------------|------------------------|---------------------|---------------------|
|                        |                |                               | 13 <sup>th</sup> QM | 14 <sup>th</sup> QM | 15 <sup>th</sup> QM | 16 <sup>th</sup> QM | 17 <sup>th</sup> QM | 18 <sup>th</sup> QM    | 19 <sup>th</sup> QM    | 20 <sup>th</sup> QM | 21 <sup>st</sup> QM    | 22 <sup>nd</sup> QM | 23 <sup>rd</sup> QM    | 25 <sup>th</sup> QM    | 26 <sup>th</sup> QM | 27 <sup>th</sup> QM    | 28 <sup>th</sup> QM | 29 <sup>th</sup> QM |
|                        |                | Adult                         | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                   | -                   |
|                        | Charaputia     | Brood Fish                    | -                   | -                   | -                   | Spawning            | -                   | -                      | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                   | -                   |
|                        |                | Juvenile and Adult            | -                   | -                   | -                   | Feeding             | -                   | -                      | Growing and Maturation | Feeding             | -                      | -                   | Growing and Maturation | -                      | -                   | Growing and Maturation | Maturation          | -                   |
|                        | Chandpai       | Fry and Juvenile              | -                   | -                   | -                   | Nursing             | -                   | -                      | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                   | -                   |
|                        |                | Fry                           | -                   | -                   | -                   | -                   | Nursing             | -                      | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                   | -                   |
|                        |                | Juvenile                      | Feeding and Growing | -                   | -                   | Feeding and Growing | -                   | -                      | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                   | -                   |
|                        |                | Adult                         | -                   | Feeding             | Feeding             | Feeding             | -                   | -                      | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | Feeding             | -                   |
|                        |                | Brood Fish                    | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                   | -                   |
|                        | Jongra         | Fry                           | -                   | -                   | -                   | -                   | -                   | -                      | -                      | Nursing             | -                      | -                   | -                      | -                      | -                   | -                      | -                   | -                   |
|                        | Haldikhal      | Fry and Juvenile              | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                   | -                   |
|                        | Harbaria       | Adult and Brood Fish          | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                   | Maturation          |
|                        |                | Adult                         | Feeding             | -                   | -                   | -                   | -                   | Feeding                | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                   | -                   |
|                        |                | Fry and Juvenile              | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      | -                   | Nursing                | -                      | -                   | -                      | -                   | -                   |
|                        | Mongla Point   | Fry, Juvenile and Age-1 adult | Nursing             | -                   | -                   | -                   | Nursing             | -                      | Feeding and Growing    | -                   | -                      | -                   | Nursing and Maturation | -                      | -                   | -                      | -                   | -                   |
|                        |                | Fry                           | -                   | Nursing             | -                   | -                   | -                   | -                      | -                      | -                   | -                      | -                   | -                      | Nursing                | -                   | -                      | -                   | -                   |
|                        |                | Juvenile                      | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | Nursing                | -                   | -                      | -                      | -                   | -                      | -                   | Maturation          |
|                        |                | Age-1 Adult                   | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                   | -                   |
|                        |                | Adult                         | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                   | -                   |
|                        |                | Brood Fish                    | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                   | -                   |
|                        | Maidara        | Adult                         | -                   | Feeding             | -                   | -                   | -                   | -                      | Maturation and Feeding | -                   | -                      | -                   | Feeding                | -                      | -                   | -                      | -                   | -                   |
|                        |                | Juvenile                      | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      | -                   | -                      | Maturation and Feeding | -                   | -                      | -                   | -                   |
|                        |                | Fry                           | -                   | -                   | -                   | -                   | -                   | Nursing                | -                      | -                   | -                      | Nursing             | -                      | -                      | -                   | -                      | -                   | -                   |
|                        | Chalna Point   | Juvenile and Adult            | -                   | Feeding and Growing | -                   | -                   | -                   | Maturation and Feeding | Maturation and Feeding | -                   | Maturation and Feeding | -                   | -                      | Maturation and Feeding | -                   | -                      | -                   | -                   |
|                        |                | Fry                           | Nursing             | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                   | Feeding             |
| Chhuri                 | Haldikhal      | Adult                         | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                   | -                   |
|                        | Akram Point    |                               | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                   | -                   |



| Migratory Fish Species | Sampling Sites | Year Class*              | Migration Purpose   |                     |                     |                     |                     |                     |                        |                     |                        |                        |                     |                        |                        |                        |                     |                     |
|------------------------|----------------|--------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------|---------------------|------------------------|------------------------|---------------------|------------------------|------------------------|------------------------|---------------------|---------------------|
|                        |                |                          | 13 <sup>th</sup> QM | 14 <sup>th</sup> QM | 15 <sup>th</sup> QM | 16 <sup>th</sup> QM | 17 <sup>th</sup> QM | 18 <sup>th</sup> QM | 19 <sup>th</sup> QM    | 20 <sup>th</sup> QM | 21 <sup>st</sup> QM    | 22 <sup>nd</sup> QM    | 23 <sup>rd</sup> QM | 25 <sup>th</sup> QM    | 26 <sup>th</sup> QM    | 27 <sup>th</sup> QM    | 28 <sup>th</sup> QM | 29 <sup>th</sup> QM |
| Chela                  | Haldikhali     | Adult                    | -                   | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                      | -                      | -                   | -                   |
|                        | Akram Point    | Juvenile and Adult       | -                   | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                      | Maturation and Feeding | -                   | -                   |
|                        | Harbaria       | Fry and Juvenile         | -                   | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                      | -                      | -                   | -                      | Nursing and Maturation | -                      | -                   | -                   |
|                        | Chalna Point   |                          | -                   | -                   | -                   | Nursing and Feeding | -                   | -                   | -                      | -                   | -                      | Nursing and Maturation | -                   | Nursing and Maturation | -                      | -                      | -                   | -                   |
|                        | Chandpai       |                          | -                   | -                   | Feeding and Growing | -                   | -                   | -                   | -                      | Nursing             | Nursing                | -                      | -                   | -                      | Nursing and Maturation | -                      | Feeding and Growing | -                   |
|                        | Mongla Point   |                          | -                   | Nursing             | -                   | -                   | -                   | -                   | -                      | -                   | -                      | Nursing and Maturation | -                   | -                      | -                      | -                      | -                   | -                   |
| Gang Tengra            | Haldikhali     | Adult                    | -                   | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                      | -                      | -                   | -                   |
|                        | Akram Point    | Adult                    | -                   | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                      | -                      | -                   | -                   |
|                        | Harbaria       | Adult                    | -                   | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                      | -                      | -                   | -                   |
|                        | Chandpai       | Adult                    | -                   | -                   | -                   | -                   | Feeding             | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                      | -                      | -                   | -                   |
|                        | Mongla Point   | Fingerling               | -                   | -                   | -                   | -                   | Nursing             | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                      | -                      | -                   | -                   |
|                        |                | Fingerling               | -                   | -                   | -                   | -                   | Nursing             | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                      | -                      | -                   | -                   |
|                        |                | Age-1 Adult              | -                   | -                   | -                   | -                   | Feeding and Growing | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                      | -                      | -                   | -                   |
| Ghagra Tengra          | Chandpai       | Juvenile and Age-1 adult | -                   | -                   | -                   | -                   | -                   | Maturation          | -                      | -                   | -                      | -                      | -                   | -                      | Maturation             | -                      | Maturation          | -                   |
|                        |                | Brood Fish               | -                   | -                   | Breeding            | -                   | -                   | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                      | -                      | -                   | -                   |
|                        |                | Fry                      | -                   | -                   | -                   | -                   | Nursing             | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                      | -                      | -                   | -                   |
|                        | Chalna Point   | Age-1 adult              | -                   | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                      | -                      | -                   | Nursing             |
|                        | Mongla Point   | Age-1 adult              | -                   | -                   | -                   | -                   | -                   | -                   | Maturation and Feeding | -                   | Maturation and Feeding | -                      | -                   | -                      | -                      | -                      | -                   | -                   |
|                        |                | Juvenile                 | -                   | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                      | -                      | -                   | Feeding and Growing    | -                      | -                      | -                   | -                   |
|                        | Akram Point    | Juvenile and Adult       | Feeding             | -                   | -                   | -                   | -                   | -                   | -                      | Feeding and Growing | -                      | -                      | -                   | -                      | Maturation             | -                      | -                   | -                   |
|                        |                | Adult                    | -                   | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                      | -                      | -                   | Feeding             |
|                        | Haldikhali     | Juvenile                 | -                   | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                      | -                      | -                   | -                      | -                      | -                      | -                   | -                   |

| Migratory Fish Species | Sampling Sites | Year Class*              | Migration Purpose   |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
|------------------------|----------------|--------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                        |                |                          | 13 <sup>th</sup> QM | 14 <sup>th</sup> QM | 15 <sup>th</sup> QM | 16 <sup>th</sup> QM | 17 <sup>th</sup> QM | 18 <sup>th</sup> QM | 19 <sup>th</sup> QM | 20 <sup>th</sup> QM | 21 <sup>st</sup> QM | 22 <sup>nd</sup> QM | 23 <sup>rd</sup> QM | 25 <sup>th</sup> QM | 26 <sup>th</sup> QM | 27 <sup>th</sup> QM | 28 <sup>th</sup> QM | 29 <sup>th</sup> QM |
|                        | Harbaria       | Adult                    | Feeding             | Breeding            | -                   | -                   | -                   | -                   | Feeding             | -                   | -                   | -                   | -                   | -                   | Maturation          | -                   | Maturation          | -                   |
|                        |                | Juvenile                 | -                   | -                   | -                   | -                   | Maturation          | -                   | Maturation          | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Charaputia     | Juvenile and Age-1 adult | -                   | -                   | -                   | -                   | -                   | Maturation          | -                   | -                   | -                   | Maturation          | -                   | -                   | Maturation          | -                   | Maturation          | -                   |
| Gulsha Tengra          | Haldikhali     | Adult                    | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Akram Point    | Adult                    | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Chandpai       | Age-1 adult              | Feeding             | -                   | Feeding and Growing | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Juvenile                 | -                   | Feeding and Growing | -                   | Feeding and Growing | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Charaputia     | Juvenile                 | -                   | -                   | -                   | -                   | -                   | -                   | Feeding and Growing | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Age-1 adult              | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Maturation          | -                   | -                   |
|                        | Mongla Point   | Age-1 adult              | -                   | -                   | -                   | -                   | Feeding and Growing | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Juvenile                 | -                   | -                   | -                   | -                   | Feeding and Growing | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Harbaria       | Juvenile                 | -                   | -                   | -                   | -                   | Feeding and Growing | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Age-1 adult              | -                   | -                   | -                   | -                   | Feeding and Growing | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Maidara        | Juvenile and Age-1 Adult | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Chalna Point   | Juvenile                 | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Feeding and Growing | -                   | -                   | -                   | -                   |
| Potka                  | Haldikhali     | Adult                    | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Chalna Point   | Fry                      | -                   | -                   | -                   | -                   | -                   | Nursing             | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        | Chandpai       | Fry                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Nursing             | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |
|                        |                | Juvenile                 | Feeding             | -                   | -                   | -                   | -                   | -                   | Feeding and Growing | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Feeding and Growing | -                   |

| Migratory Fish Species | Sampling Sites | Year Class*        | Migration Purpose   |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                        |                     |                     |                     |
|------------------------|----------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------|---------------------|---------------------|---------------------|
|                        |                |                    | 13 <sup>th</sup> QM | 14 <sup>th</sup> QM | 15 <sup>th</sup> QM | 16 <sup>th</sup> QM | 17 <sup>th</sup> QM | 18 <sup>th</sup> QM | 19 <sup>th</sup> QM | 20 <sup>th</sup> QM | 21 <sup>st</sup> QM | 22 <sup>nd</sup> QM | 23 <sup>rd</sup> QM | 25 <sup>th</sup> QM | 26 <sup>th</sup> QM    | 27 <sup>th</sup> QM | 28 <sup>th</sup> QM | 29 <sup>th</sup> QM |
|                        |                | Adult              | -                   | Feeding and Growing | Feeding             | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                      | -                   | -                   | -                   |
|                        | Jongra         | Fry                | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Nursing             | -                   |                     | -                   | -                   | -                      | -                   | -                   | -                   |
|                        | Mongla Point   | Fry                | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                      | -                   | -                   | -                   |
|                        | Maidara        | Juvenile           | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                      | -                   | -                   | -                   |
|                        |                | Fry                | -                   | -                   | -                   | Nursing             | -                   | Nursing             | -                   | Nursing             | -                   |                     | -                   | -                   | -                      | -                   | -                   | -                   |
|                        | Harbaria       | Juvenile           | -                   | -                   | -                   | -                   | -                   | Maturation          | -                   | -                   | -                   |                     | -                   | -                   | -                      | -                   | -                   | -                   |
|                        |                | Fry                | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                      | -                   | -                   | -                   |
|                        | Charaputia     | Juvenile and adult | -                   | -                   | -                   | -                   | -                   | -                   | Feeding and Growing | -                   | -                   |                     | -                   | -                   | -                      | Feeding and Growing | -                   | -                   |
| Paira Chanda           | Akram Point    | Adult              | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                      | -                   | -                   | -                   |
| Chewa                  | Akram Point    | Juvenile and Adult | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                      | -                   | -                   | -                   |
|                        | Chandpai       | Fry and Juvenile   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Nursing             | -                   |                     | -                   | -                   | -                      | -                   | Feeding and Growing | -                   |
|                        |                | Juvenile           | -                   | Feeding and Growing | -                   | -                   | -                   | -                   | -                   | -                   | Feeding and Growing |                     | -                   | -                   | -                      | -                   | -                   | -                   |
|                        |                | Adult              | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                      | -                   | -                   | -                   |
|                        | Jongra         | Fry                | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Nursing             | -                   |                     | -                   | -                   | -                      | -                   | -                   | Feeding             |
|                        |                | Fry and Juvenile   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Nursing             | -                   | -                      | -                   | -                   | -                   |
|                        | Chandpai       | Juvenile-1         | -                   | -                   | -                   | -                   | Feeding and Growing | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                      | -                   | -                   | -                   |
|                        | Mongla Point   | Juvenile           | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Nursing             | Maturation          | Maturation          | -                   | -                      | -                   | -                   | -                   |
|                        |                | Fry                | -                   | -                   | -                   | -                   | Nursing             | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                      | -                   | Maturation          | -                   |
|                        | Maidara        | Juvenile           | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Maturation          | -                   | -                   | -                      | -                   | -                   | -                   |
|                        |                | Fry                | -                   | -                   | Nursing             | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                      | -                   | -                   | -                   |
|                        | Chalna Point   | Adult              | -                   | -                   | -                   | -                   | Feeding             | -                   | -                   | -                   | -                   | Feeding             | -                   | Feeding             | -                      | -                   | -                   | -                   |
|                        |                | Age-1 Juvenile     | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | Maturation          | -                   | -                      | -                   | -                   | -                   |
| Bele                   | Akram Point    | Adult              | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                      | -                   | -                   | -                   |
|                        |                | Juvenile           | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                   |                     | -                   | -                   | -                      | Feeding             | Maturation          | -                   |
|                        | Chandpai       | Fry                | -                   | -                   | -                   | Nursing             | Nursing             | -                   | -                   | Nursing             | -                   | Nursing             | -                   | -                   | -                      | -                   | -                   | -                   |
|                        |                | Juvenile and Adult | Feeding and Growing | -                   | Feeding and Growing | -                   | -                   | -                   | -                   | Feeding and Growing | -                   | -                   | -                   | -                   | Maturation and Feeding | -                   | -                   | -                   |
|                        | Jongra         | Fry                | -                   | -                   | -                   | -                   | -                   | -                   | Nursing             | -                   |                     | -                   | -                   | -                   | -                      | -                   | -                   | -                   |

| Migratory Fish Species  | Sampling Sites | Year Class*              | Migration Purpose   |                     |                     |                     |                     |                     |                     |                        |                        |                        |                        |                        |                        |                     |                        |                     |
|-------------------------|----------------|--------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|---------------------|------------------------|---------------------|
|                         |                |                          | 13 <sup>th</sup> QM | 14 <sup>th</sup> QM | 15 <sup>th</sup> QM | 16 <sup>th</sup> QM | 17 <sup>th</sup> QM | 18 <sup>th</sup> QM | 19 <sup>th</sup> QM | 20 <sup>th</sup> QM    | 21 <sup>st</sup> QM    | 22 <sup>nd</sup> QM    | 23 <sup>rd</sup> QM    | 25 <sup>th</sup> QM    | 26 <sup>th</sup> QM    | 27 <sup>th</sup> QM | 28 <sup>th</sup> QM    | 29 <sup>th</sup> QM |
|                         | Harbaria       | Juvenile and Age-1 Adult | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                      | -                      | -                      | -                      | -                   | -                      | -                   |
|                         | Mongla Point   | Fry                      | -                   | Nursing             | -                   | -                   | Nursing             | -                   | -                   | -                      | -                      | -                      | -                      | -                      | -                      | -                   | -                      | -                   |
|                         |                | Juvenile and Adult       | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                      | Maturation and Feeding | -                      | -                      | -                      | -                      | -                   | -                      | -                   |
|                         | Chalna Point   | Fry                      | -                   | -                   | Nursing             | Nursing             | -                   | -                   | -                   | -                      | -                      | -                      | Nursing                | Nursing                | -                      | -                   | -                      | -                   |
|                         |                | Fingerling               | -                   | -                   | -                   | -                   | Nursing             | -                   | -                   | -                      | -                      | -                      | Nursing                | Nursing                | -                      | -                   | -                      | -                   |
|                         |                | Juvenile and Age-1 adult | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                      | -                      | Maturation and Feeding | -                      | -                   | Feeding and Growing    | Maturation          |
|                         | Maidara        | Juvenile and Age-1 adult | -                   | -                   | Feeding and Growing | -                   | Feeding and Growing | Feeding and Growing | -                   | -                      | Maturation and Feeding | Maturation and Feeding | Maturation and Feeding | -                      | -                      | -                   | -                      | -                   |
|                         |                | Fry                      | Nursing             | -                   | Nursing             | -                   | -                   | -                   | -                   | -                      | -                      | -                      | -                      | -                      | -                      | -                   | -                      | -                   |
| Tular Dandi (Nona bele) | Charaputia     | Juvenile and Age-1 adult | -                   | -                   | -                   | -                   | -                   | Maturation          | -                   | -                      | -                      | -                      | -                      | -                      | -                      | -                   | -                      | -                   |
|                         | Akram Point    | Adult                    | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Feeding and Maturation | -                      | -                      | -                      | -                      | -                      | -                   | -                      | -                   |
|                         |                | Age-1 Adult              | -                   | -                   | Feeding             | -                   | -                   | -                   | -                   | -                      | -                      | -                      | -                      | -                      | -                      | -                   | -                      | -                   |
|                         | Chandpai       | Juvenile                 | -                   | -                   | -                   | -                   | -                   | Growing             | -                   | -                      | -                      | -                      | -                      | -                      | -                      | -                   | -                      | -                   |
|                         |                | Fry                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Nursing                | -                      | -                      | -                      | -                      | -                      | -                   | -                      | -                   |
|                         | Jongra         | Fry                      | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Nursing                | -                      | -                      | -                      | -                      | -                      | -                   | -                      | -                   |
|                         | Maidara        | Adult                    | -                   | Feeding             | -                   | -                   | -                   | -                   | Maturation          | -                      | -                      | -                      | -                      | -                      | -                      | -                   | Maturation and Feeding | -                   |
| Tairael                 | Chalna Point   | Adult                    | -                   | -                   | -                   | -                   | -                   | -                   | Maturation          | Maturation             | Maturation and Feeding | -                      | -                      | -                      | Maturation and Feeding | -                   | -                      | -                   |
|                         | Akram Point    | Adult                    | -                   | -                   | -                   | Feeding             | -                   | -                   | -                   | -                      | -                      | -                      | -                      | -                      | -                      | -                   | -                      | -                   |
|                         |                | Age-1 Adult              | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                      | -                      | -                      | -                      | Maturation          | -                      | -                   |
|                         | Charaputia     | Juvenile                 | -                   | -                   | -                   | -                   | -                   | -                   | -                   | Maturation             | -                      | -                      | -                      | -                      | -                      | -                   | -                      | -                   |
|                         | Harbaria       | Age-1 Adult              | -                   | Feeding and Growing | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                      | -                      | -                      | -                      | -                   | -                      | -                   |
|                         | Chandpai       | Juvenile                 | -                   | -                   | -                   | -                   | -                   | Growing             | -                   | -                      | Feeding and Growing    | -                      | -                      | -                      | -                      | -                   | -                      | Maturation          |
|                         | Chalna Point   | Juvenile                 | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                      | Growing                | -                      | -                      | -                      | -                      | -                   | -                      | -                   |
| Phekasa                 | Akram Point    | Juvenile                 | -                   | -                   | -                   | -                   | -                   | Growing             | -                   | -                      | -                      | -                      | -                      | -                      | -                      | -                   | -                      | -                   |
|                         |                | Adult                    | -                   | -                   | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                      | -                      | -                      | -                      | -                   | -                      | -                   |

| Migratory Fish Species | Sampling Sites | Year Class*                   | Migration Purpose   |                     |                     |                     |                     |                        |                     |                        |                     |                     |                     |                     |                     |                        |                     |                     |
|------------------------|----------------|-------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------|---------------------|------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------|---------------------|---------------------|
|                        |                |                               | 13 <sup>th</sup> QM | 14 <sup>th</sup> QM | 15 <sup>th</sup> QM | 16 <sup>th</sup> QM | 17 <sup>th</sup> QM | 18 <sup>th</sup> QM    | 19 <sup>th</sup> QM | 20 <sup>th</sup> QM    | 21 <sup>st</sup> QM | 22 <sup>nd</sup> QM | 23 <sup>rd</sup> QM | 25 <sup>th</sup> QM | 26 <sup>th</sup> QM | 27 <sup>th</sup> QM    | 28 <sup>th</sup> QM | 29 <sup>th</sup> QM |
|                        | Charaputia     | Juvenile and Adult            | -                   | -                   | -                   | -                   | -                   | -                      | -                   | Feeding and Maturation | -                   |                     |                     | -                   | -                   | -                      | Maturation          | -                   |
|                        | Chalna Point   | Juvenile and Adult            | -                   | -                   | -                   | Feeding and Growing | -                   | -                      | -                   | Maturation             | Maturation          |                     |                     | -                   | Maturation          | -                      | -                   | -                   |
|                        |                | Adult                         | -                   | Feeding             | -                   | -                   | -                   | -                      | Maturation          | -                      | -                   | Feeding             |                     | -                   | -                   | -                      | -                   | -                   |
|                        | Mongla Point   | Adult                         | -                   | -                   | -                   | -                   | -                   | -                      | Maturation          | -                      | -                   |                     | Feeding             | -                   | -                   | -                      | -                   | -                   |
|                        |                | Juvenile                      | -                   | -                   | -                   | Growing             | -                   | -                      |                     | -                      | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                   |
|                        | Chandpai       | Juvenile and Adult            | -                   | -                   | -                   | Feeding and Growing | -                   | -                      | Maturation          | --                     | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                   |
|                        | Maidara        | Adult                         | -                   | Feeding             | -                   | -                   | -                   | -                      | -                   | -                      | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                   |
| Paissa                 | Akram Point    | Juvenile and Adult            | Feeding             | -                   | -                   | -                   | -                   | Growing and Maturation | -                   | -                      | -                   | -                   | -                   | -                   | -                   | Growing and Maturation | -                   | -                   |
|                        |                | Brood                         | Spawning            | -                   | -                   | -                   | -                   | -                      | -                   | -                      | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                   |
|                        | Charaputia     | Brood Fish                    | -                   | -                   | -                   | Spawning            | -                   | -                      | -                   | -                      | -                   | -                   | -                   | -                   | -                   | -                      | -                   | Feeding             |
|                        |                | Juvenile and Adult            | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                      | -                   | -                   | -                   | -                   | -                   | Feeding                | -                   | -                   |
|                        |                | Fry                           | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                      | -                   | -                   | Nursing             | -                   | -                   | -                      | -                   | -                   |
|                        | Harbaria       | Juvenile-1 and Juvenile       | -                   | Feeding and Growing | -                   | -                   | -                   | -                      | -                   | -                      | -                   |                     | -                   | -                   | Feeding and Growing | -                      | -                   | -                   |
|                        |                | Adult                         | -                   | Feeding             | -                   | -                   | -                   | -                      | -                   | -                      | -                   |                     | -                   | -                   | -                   | -                      | -                   | -                   |
|                        | Chalna         | Fry                           | -                   | -                   | -                   | -                   | -                   | -                      | Feeding and Growing | -                      | Feeding and Growing |                     | Nursing             | Nursing             | -                   | Feeding                | Feeding and Growing | -                   |
|                        | Chandpai       | Fry                           | -                   | -                   | -                   | Nursing             | -                   | -                      | Feeding and Growing | Nursing                | Nursing             | Nursing             | Nursing             | -                   | Feeding and Growing | Feeding                | -                   | -                   |
|                        |                | Juvenile and Adult            | Feeding             | Feeding and Growing | -                   | Feeding and Growing | -                   | Maturation             | -                   | -                      |                     |                     | -                   | -                   | -                   | -                      | -                   | -                   |
|                        | Jongra         | Fry                           | -                   | -                   | -                   | -                   | -                   | -                      | -                   | Nursing                |                     |                     | -                   | -                   | -                   | -                      | -                   | -                   |
|                        | Harbaria       | Juvenile                      | -                   | -                   | Feeding and Growing | -                   | -                   | Maturation             | -                   | -                      |                     |                     | -                   | -                   | Feeding and Growing | -                      | -                   | -                   |
|                        | Mongla Point   | Fry                           | -                   | -                   | Nursing             | -                   | -                   | -                      | -                   | -                      |                     |                     | -                   | -                   | -                   | -                      | -                   | -                   |
|                        |                | Age-1 Adult                   | -                   | -                   | -                   | -                   | -                   | -                      | -                   | -                      |                     | Maturation          | -                   | -                   | -                   | -                      | -                   | -                   |
|                        | Maidara        | Fry, Juvenile and Age-1 adult | -                   | -                   | -                   | -                   | -                   | -                      | Feeding and Growing | -                      | Feeding and Growing |                     | -                   | -                   | Feeding and Growing | -                      | -                   | -                   |

| Migratory Fish Species | Sampling Sites | Year Class*              | Migration Purpose   |                     |                     |                     |                     |                        |                        |                     |                        |                     |                     |                        |                     |                        |                     |                     |
|------------------------|----------------|--------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------|------------------------|---------------------|------------------------|---------------------|---------------------|------------------------|---------------------|------------------------|---------------------|---------------------|
|                        |                |                          | 13 <sup>th</sup> QM | 14 <sup>th</sup> QM | 15 <sup>th</sup> QM | 16 <sup>th</sup> QM | 17 <sup>th</sup> QM | 18 <sup>th</sup> QM    | 19 <sup>th</sup> QM    | 20 <sup>th</sup> QM | 21 <sup>st</sup> QM    | 22 <sup>nd</sup> QM | 23 <sup>rd</sup> QM | 25 <sup>th</sup> QM    | 26 <sup>th</sup> QM | 27 <sup>th</sup> QM    | 28 <sup>th</sup> QM | 29 <sup>th</sup> QM |
| Banshpata              |                | Juvenile                 | -                   | -                   | -                   | -                   | -                   | Growing                | -                      | -                   | -                      |                     | Maturation          | -                      | -                   | -                      | -                   | -                   |
|                        | Chandpai       | Juvenile                 | -                   | -                   | -                   | Growing             | Feeding and Growing | -                      | -                      | -                   | -                      |                     | -                   | -                      | -                   | -                      | -                   | -                   |
|                        |                | Adult                    | -                   | Feeding             | Feeding             | -                   | -                   | -                      | -                      | -                   | -                      |                     | -                   | -                      | -                   | -                      | -                   | -                   |
|                        | Jongra         | Juvenile                 | -                   | -                   | -                   | -                   | -                   | -                      | -                      | Maturation          | -                      |                     | -                   | -                      | -                   | -                      | -                   | -                   |
|                        | Charaputia     | Juvenile and Age-1 Adult | -                   | -                   | -                   | Feeding             | -                   | -                      | Growing and Maturation | -                   | -                      |                     | -                   | -                      | -                   | Growing and Maturation | -                   | -                   |
|                        | Akram Point    | Juvenile                 | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      |                     | -                   | -                      | -                   | -                      | -                   | -                   |
|                        | Haldikhali     | Juvenile and adult       | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      |                     | -                   | -                      | -                   | -                      | -                   | -                   |
|                        | Harbaria       | Adult                    | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      |                     | -                   | -                      | -                   | -                      | -                   | -                   |
|                        | Mongla Point   | Juvenile                 | -                   | -                   | -                   | -                   | Feeding and Growing | -                      | -                      | -                   | -                      |                     | -                   | -                      | -                   | -                      | -                   | -                   |
|                        | Maidara        | Juvenile and Age-1 Adult | -                   | -                   | -                   | -                   | -                   | Growing and Maturation | Growing and Maturation | -                   | -                      |                     | -                   | -                      | Maturation          | -                      | -                   | Maturation          |
|                        |                | Adult                    | -                   | Feeding             | -                   | -                   | -                   | Feeding                | -                      | -                   | -                      |                     | -                   | -                      | -                   | -                      | -                   | Maturation          |
|                        | Chalna Point   | Juvenile and Age-1 Adult | -                   | -                   | -                   | -                   | -                   | -                      | Growing and Maturation | Feeding             | Growing and Maturation |                     | -                   | Growing and Maturation | -                   | -                      | -                   | -                   |
| Hilsa                  | Akram Point    | Brood Fish               | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      |                     | -                   | -                      | -                   | -                      | -                   | -                   |
|                        | Maidara        | Age-1 Adult              | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      | Maturation          | -                   | -                      | -                   | -                      | -                   | -                   |
|                        | Chalna Point   | Adult                    | -                   | -                   | -                   | -                   | -                   | Maturation             | -                      | -                   | -                      | Feeding             | -                   | -                      | -                   | -                      | -                   | Nursining           |
| Pangas                 | Haldikhali     | Juvenile                 | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      |                     | -                   | -                      | -                   | -                      | -                   | -                   |
|                        | Charaputia     | Adult                    | -                   | -                   | -                   | -                   | -                   | -                      | -                      | Feeding             | -                      |                     | -                   | -                      | -                   | -                      | -                   | -                   |
|                        | Mongla Point   | Juvenile                 | -                   | -                   | -                   | -                   | -                   | -                      | Feeding and Growing    | -                   | Feeding and Growing    |                     | -                   | -                      | -                   | -                      | -                   | -                   |
|                        | Maidara        | Juvenile and Age-1 Adult | -                   | -                   | -                   | -                   | -                   | -                      | -                      | -                   | -                      | Feeding and Growing | -                   | -                      | -                   | -                      | -                   | -                   |

Source: Field findings at different times

\*Only Age-1 to Brood fish was allowed to interpret the migration purpose; F = Feeding; Sp = Spawning

## D.7: The Present Catch in Three Sampling Ghers

| Sampling Site | Total Catch (ton): 2014-2015 |       |                     |       |                |       |         |     |
|---------------|------------------------------|-------|---------------------|-------|----------------|-------|---------|-----|
|               | 1st QM (April, 2014)         |       | 2nd QM (July, 2014) |       | 3rd QM         |       | 4th QM  |     |
|               | Species                      | ton   | Species             | ton   | Species        | ton   | Species | ton |
| 1             | Bagda                        | 5     | Bagda               | 6.42  | Bagda          | 4.8   | -       | -   |
|               | Vetki                        | 1.57  | Bele                | 0     | Gusha Chingri  | -     | -       | -   |
|               | Bele                         | 0.98  | Cheng               | 0     | Harina Chingri | -     | -       | -   |
|               | Harina Chingri               | 0.78  | Bhangan             | 0     | Rui (kg)       | -     | -       | -   |
|               | Chali Chingri                | 0.11  | Chali Chingri       | 0     | Catla (kg)     | -     | -       | -   |
|               | Chaka Chingri                | 0.08  | -                   | -     | -              | -     | -       | -   |
| Sub-total =   |                              | 8.52  |                     | 6.42  |                | 4.8   | -       | -   |
| 2             | Bagda                        | 4     | Bagda               | 1     | Bagda          | 7     | -       | -   |
|               | Harina Chingri               | 2     | Harina Chingri      | 0.33  | Vetki          | 1     | -       | -   |
|               | Chali Chingri                | 0.18  | Chali Chingri       | 0.08  | Paissa         | 10    | -       | -   |
|               | -                            | -     | Golda Chingri       | 0.01  | Phessa         | 2.4   | -       | -   |
|               | -                            | -     | Bele                | 0.08  | Bhangan        | 1.7   | -       | -   |
|               | -                            | -     | Tengra&Paissa       | 0.04  | Golda Chingri  | 0.9   | -       | -   |
|               | -                            | -     | -                   |       | Gulsha Tengra  | 0.2   | -       | -   |
| Sub-total =   |                              | 6.00  |                     | 2.00  |                | 23    |         | -   |
| 3             | Bagda                        | 1.38  | Bagda               | 2.4   | Bagda          | 1.5   | -       | -   |
|               | Harina Chingri               | 0.34  | Harina Chingri      | 0.34  | Paissa         | 10    | -       | -   |
|               | Chali Chingri                | 0.17  | Chali Chingri       | 0.17  | Tengra         | 10    | -       | -   |
|               | -                            | -     | -                   | -     | Bele           | 20    | -       | -   |
|               | -                            | -     | -                   | -     | Tilapia        | 22    | -       | -   |
|               | -                            | -     | -                   | -     | Rui            | 28    | -       | -   |
|               | -                            | -     | -                   | -     | Vetki          | -     | -       | -   |
|               | -                            | -     | -                   | -     | Harina Chingri | -     | -       | -   |
|               | -                            | -     | -                   | -     | Chami Chingri  | -     | -       | -   |
|               | -                            | -     | -                   | -     | Catla          | 56    | -       | -   |
| Sub-total =   |                              | 1.89  |                     | 2.91  |                | 197.5 | -       | -   |
| Grand-total = |                              | 17.00 |                     | 11.33 |                | 226.5 | -       | -   |

Source: CEGIS Field Survey, 2014-2015

| Sampling Site | Total Catch (ton): 2015-2016 |     |                |      |                |       |                |     |
|---------------|------------------------------|-----|----------------|------|----------------|-------|----------------|-----|
|               | 5th QM                       |     | 6th QM         |      | 7th QM         |       | 8th QM         |     |
|               | Species                      | ton | Species        | ton  | Species        | ton   | Species        | ton |
| 1             | Bagda                        | -   | Bagda          | 1.6  | Bagda          | 2     | Catla          | 2   |
|               | Horina Chingri               | 1   | Horina Chingri | 1    | Horina Chingri | 3.2   | Glass Carp     | 0.1 |
|               | Tengra                       | -   | Chali Chingri  | 0.5  | Gusha Chingri  | 0.8   | Horina Chingri | 0.8 |
|               | Paissa                       | -   | Paissa         | 0.25 | Paissa         | 24    | Minar Carp     | 0.1 |
|               | Chela                        | -   | Bele           | 0.25 | Vetki          | 0.2   | Nilotica       | 1.6 |
|               | Vetki                        | -   | -              | -    | Kailla         | 0.4   | Paissa         | 0.6 |
|               | -                            | -   | -              | -    | Bele           | 0     | Rui            | 3   |
|               | -                            | -   | -              | -    | Tilapia        | 0     | Vetki          | 0.8 |
|               | -                            | -   | -              | -    | Catla          | 0     | -              | 0   |
|               | -                            | -   | -              | -    | Minar Carp     | 0     | -              | 0   |
|               | -                            | -   | -              | -    | Glass Carp     | 0     | -              | 0   |
|               | -                            | -   | -              | -    | Kakra          | 0.4   | -              | 0   |
| Sub-total=    | -                            | 1   | -              | 3.06 | -              | 31    | -              | 9   |
| 2             | Bagda                        | -   | Bagda          | 1.67 | Bagda          | 0     | -              | 0   |
|               | -                            | -   | Chali Chingri  | 0.30 | Horina Chingri | 0     | -              | 0   |
|               | -                            | -   | Horina Chingri | 0.50 | Chali Chingri  | 0     | -              | 0   |
|               | -                            | -   | Bele           | 0.30 | Tilapia        | 0     | -              | 0   |
|               | -                            | -   | Paissa         | 0.25 | Vetki          | 0     | -              | 0   |
|               | -                            | -   | -              | -    | Tengra         | 0     | -              | 0   |
|               | -                            | -   | -              | -    | Paissa         | 0     | -              | 0   |
| Sub-total=    | -                            | 0   | -              | 3.02 | -              | 0     | -              | 0   |
| 3             | Bagda                        | -   | Bagda          | 3.5  | Bagda          | 0.4   | -              | 0   |
|               | -                            | -   | -              | -    | Paissa         | 3.2   | -              | 0   |
|               | -                            | -   | -              | -    | Vetki          | 0.4   | -              | 0   |
|               | -                            | -   | -              | -    | Tilapia        | 0.06  | -              | 0   |
|               | -                            | -   | -              | -    | Horina Chingri | 0.35  | -              | 0   |
|               | -                            | -   | -              | -    | Chali Chingri  | 0.6   | -              | 0   |
|               | -                            | -   | -              | -    | Chaka Chingri  | 0.1   | -              | 0   |
|               | -                            | -   | -              | -    | Tengra         | 0     | -              | 0   |
|               | -                            | -   | -              | -    | Bele           | 0     | -              | 0   |
|               | -                            | -   | -              | -    | Tairel         | 0.06  | -              | 0   |
|               | -                            | -   | -              | -    | Bhangan        | 0     | -              | 0   |
| Sub-total =   | -                            | -   | -              | -    | -              | 5.17  | -              | 0   |
| Grand-total = | -                            | 1   | -              | 3.5  | -              | 36.17 | -              | 9   |

Source: CEGIS Field Survey, 2015-2016



| Sampling Site        | Total Catch (ton): 2016-2017 |             |         |     |                |           |                |             |
|----------------------|------------------------------|-------------|---------|-----|----------------|-----------|----------------|-------------|
|                      | 9th QM                       |             | 10th QM |     | 11th QM        |           | 12th QM        |             |
|                      | Species                      | ton         | Species | ton | Species        | ton       | Species        | ton         |
| 1                    | -                            | 0           | -       | -   | Bagda          | 3         | -              | 0           |
|                      | -                            | 0           | -       | -   | Tengra         | 0.1       | -              | 0           |
|                      | -                            | 0           | -       | -   | Horina Chingri | 0.8       | -              | 0           |
|                      | -                            | 0           | -       | -   | Paissa         | 0.1       | -              | 0           |
|                      | -                            | 0           | -       | -   | Vetki          | 2         | -              | 0           |
|                      | -                            | 0           | -       | -   | -              | 0         | -              | 0           |
|                      | -                            | 0           | -       | -   | -              | 0         | -              | 0           |
|                      | -                            | 0           | -       | -   | -              | 0         | -              | 0           |
|                      | -                            | 0           | -       | -   | -              | 0         | -              | 0           |
|                      | -                            | 0           | -       | -   | -              | 0         | -              | 0           |
|                      | -                            | 0           | -       | -   | -              | 0         | -              | 0           |
|                      | -                            | 0           | -       | -   | -              | 0         | -              | 0           |
| <b>Sub-total =</b>   | -                            | <b>0</b>    | -       | -   | -              | <b>6</b>  | -              | <b>0</b>    |
| 2                    | Bagda                        | 1           | -       | -   | Bagda          | 2         | Bagda          | 0.0035      |
|                      | Horina                       | 0.14        | -       | -   | Bele           | 1.6       | Horina Chingri | 0.288       |
|                      | -                            | 0           | -       | -   | Chali Chingri  | 4         | Paissa         | 0.22        |
|                      | -                            | 0           | -       | -   | Horina Chingri | 8         | Tengra         | 0.305       |
|                      | -                            | 0           | -       | -   | Paissa         | 0.28      | Chela          | 0.45        |
|                      | -                            | 0           | -       | -   | Tengra         | 0.8       | Tilapia        | 0.53        |
|                      | -                            | 0           | -       | -   | Tilapia        | 8         | Vetki          | 0.06        |
| <b>Sub-total =</b>   | -                            | <b>1.14</b> | -       | -   | Vetki          | 2.4       | Bele           | 0.15        |
| 3                    | Bagda                        | 2           | -       | -   | -              | <b>9</b>  | -              | <b>0</b>    |
|                      | -                            | 0           | -       | -   | Bagda          | 0.4       | -              | 0           |
|                      | -                            | 0           | -       | -   | Horina Chingri | 0.35      | -              | 0           |
|                      | -                            | 0           | -       | -   | Paissa         | 0.06      | -              | 0           |
|                      | -                            | 0           | -       | -   | Tengra         | 0.4       | -              | 0           |
| <b>Sub-total =</b>   | -                            | <b>2</b>    | -       | -   | Tilapia        | 3.2       | -              | 0           |
| <b>Grand-total =</b> | -                            | <b>3.14</b> | -       | -   | -              | <b>4</b>  | -              | <b>2.01</b> |
|                      |                              |             |         |     | -              | <b>19</b> | -              | <b>2.01</b> |

Source: CEGIS Field Survey, 2016-2017

| Sampling Site | Total Catch (ton): 2017-2018 and 2018-19 |     |            |     |         |     |               |      |         |       |             |      |         |     |
|---------------|--|-----|------------|-----|---------|-----|---------------|------|---------|-------|-------------|------|---------|-----|
|               | 13th QM                                  |     | 14th QM    |     | 15th QM |     | 16th QM       |      | 17th QM |       | 18th QM     |      | 19th QM |     |
|               | Species                                  | ton | Species    | ton | Species | ton | Species       | ton  | Species | ton   | Species     | ton  | Species | ton |
| 1             | Bagda                                    | 0   | Bagda      | 3   | -       | -   | Bagda         | 2.00 | Bagda   | 0.76  | Bagda       | 0    | Bagda   | -   |
|               | Horina Chingri                           | 1   | Rui (kg)   | 1.3 | -       | -   | Golda         | 0.10 | Bele    | 0.20  | Catla       | 1.2  | Paissa  | -   |
|               | Tengra                                   | 0   | Catla (kg) | 1   | -       | -   | Rui           | 0.12 | Chali   | 1.20  | Common Carp | 0.3  | -       | -   |
|               | Paissa                                   | 0   | -          | -   | -       | -   | Grass Carp    | 0.20 | Golda   | 0.00  | Grass Carp  | 0.3  | -       | -   |
|               | Chela                                    | 0   | -          | -   | -       | -   | Catla         | 0.30 | Horina  | 1.60  | Rui         | 4.2  | -       | -   |
|               | Vetki                                    | 0   | -          | -   | -       | -   | Tilapia       | 0.45 | Paissa  | 0.00  |             |      | -       | -   |
|               |  |     |            |     |         |     | Horina        | 0.10 | Tilapia | 12.80 |             |      | -       | -   |
|               |  |     |            |     |         |     | Gusha         | 0.00 |         |       |             |      | -       | -   |
|               |  |     |            |     |         |     | Paissa        | 0.00 |         |       |             |      | -       | -   |
|               |  |     |            |     |         |     | Khorulla      | 0.00 |         |       |             |      | -       | -   |
|               |  |     |            |     |         |     | Vetki         | 0.00 |         |       |             |      | -       | -   |
|               |  |     |            |     |         |     | Gulsha        | 0.00 |         |       |             |      | -       | -   |
|               |  |     |            |     |         |     | Bele          | 0.00 |         |       |             |      | -       | -   |
| Sub-total =   | -  | 1   | -          | 3.6 | -       | -   | =             | 3.27 | =       | 16.56 | =           | 6    | -       | -   |
| 2             | Bagda                                    | 0   | Bagda      | 5   | -       | -   | Bagda         | 3.93 | Bagda   | 1.48  | Bagda       | 5    | Bagda   | -   |
|               | -  | -   | Vetki      | 0.5 | -       | -   | Golda         | 0.13 | Bele    | 0.06  | Bhangan     | 0.05 | Paissa  | -   |
|               | -  | -   | Paissa     | 7   | -       | -   | Rui           | 8.41 | Bhangan | 0.01  | Catla       | 3    | Datina  | -   |
|               | -  | -   | Phessa     | 1   | -       | -   | Tilapia       | 5.90 | Catla   | 0.00  | Chali       | 0.4  |         |     |
|               | -  | -   | Bhangan    | 0.7 | -       | -   | Nilotica      | 0.00 | Chali   | 0.04  | Golda       | 0.08 |         |     |
|               |  |     |            |     |         |     | Khorulla      | 0.00 | Chel    | 0.01  | Horina      | 1.8  |         |     |
|               |  |     |            |     |         |     | Mrigel        | 0.00 | Golda   | 0.00  | Paissa      | 0.8  |         |     |
|               |  |     |            |     |         |     | Catla         | 0.00 | Horina  | 0.50  | Rui         | 3    |         |     |
|               |  |     |            |     |         |     | Grass Carp    | 0.11 | Motka   | 0.05  | Tengra      | 0.8  |         |     |
|               |  |     |            |     |         |     | Common Carp   | 5.55 | Paissa  | 0.03  | Tilapia     | 8    |         |     |
|               |  |     |            |     |         |     | Sarpunti      | 0.53 | Rui     | 0.00  | Vetki       | 2    |         |     |
|               |  |     |            |     |         |     | Horina        | 1.91 | Tengra  | 0.13  |             |      |         |     |
|               |  |     |            |     |         |     | Chali Chingri | 1.16 | Tilapia | 0.41  |             |      |         |     |
|               |  |     |            |     |         |     | Bele          | 0.43 | Vetki   | 0.01  |             |      |         |     |
|               |  |     |            |     |         |     | Vetki         | 1.96 |         |       |             |      |         |     |
|               |  |     |            |     |         |     | Tengra        | 4.20 |         |       |             |      |         |     |

| Sampling Site | Total Catch (ton): 2017-2018 and 2018-19 |     |         |      |         |     |                |       |                |      |         |     |                     |     |
|---------------|--|-----|---------|------|---------|-----|----------------|-------|----------------|------|---------|-----|---------------------|-----|
|               | 13th QM                                  |     | 14th QM |      | 15th QM |     | 16th QM        |       | 17th QM        |      | 18th QM |     | 19 <sup>th</sup> QM |     |
|               | Species                                  | ton | Species | ton  | Species | ton | Species        | ton   | Species        | ton  | Species | ton | Species             | ton |
|               |  |     |         |      |         |     | Paissa         | 0.14  |                |      |         |     |                     |     |
|               |  |     |         |      |         |     | Tairel         | 0.003 |                |      |         |     |                     |     |
|               |  |     |         |      |         |     | Pheksa         | 0.001 |                |      |         |     |                     |     |
| Sub-total =   |  | 0   |         | 14.2 | -       | -   | =              | 34.38 | =              | 2.75 | =       | 25  |                     |     |
| 3             | Bagda                                    | 0   | Bagda   | 2    | -       | -   | Bagda          | 0.50  | Bagda          | 0.10 | -       | 0   | Bagda               | -   |
|               | -  | -   | Paissa  | 8    | -       | -   | Tilapia        | 1.50  | Horina Chingri | 0.00 |         |     | Golda               | -   |
|               | -  | -   | Tengra  | 2    | -       | -   | Tengra         | 0.12  | Paissa         | 0.00 |         |     | Paissa              | -   |
|               | -  | -   | Tilapia | 5    | -       | -   | Paissa         | 0.00  | Tengra         | 0.00 |         |     | Nilotica            | -   |
|               | -  | -   | Rui     | 3    | -       | -   | Horina Chingri | 0.60  | Tilapia        | 0.20 |         |     | Khorsul             | -   |
|               | -  | -   | Vetki   | 2    | -       | -   |                |       |                |      |         |     |                     |     |
|               | -  | -   | Catla   | 10   | -       | -   |                |       |                |      |         |     |                     |     |
| Sub-total =   | -  | 0   | -       | 32   | -       | -   |                |       |                |      |         |     |                     |     |
| Grand-total = | -  | 1   | -       | 49.8 | -       | -   | =              | 2.72  | =              | 0.30 | =       | 0   |                     |     |

Source: CEGIS Field Survey, 2017-18 and 2018-19

| Sampling Site/<br>Location | Total Catch (ton): 2019-20 and 2020-21 |                        |                     |                        |                     |                        |                     |                        |                     |                        |                     |                        |                     |                        |                     |                        |                     |                        |
|----------------------------|--|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|------------------------|
|                            | 20 <sup>th</sup> QM                    |                        | 21 <sup>st</sup> QM |                        | 22 <sup>nd</sup> QM |                        | 23 <sup>rd</sup> QM |                        | 25 <sup>th</sup> QM |                        | 26 <sup>th</sup> QM |                        | 27 <sup>th</sup> QM |                        | 28 <sup>th</sup> QM |                        | 29 <sup>th</sup> QM |                        |
|                            | Fish Species                           | Total Production (ton) | Fish Species        | Total Production (ton) | Fish Species        | Total Production (ton) | Fish Species        | Total Production (ton) | Fish Species        | Total Production (ton) | Fish Species        | Total Production (ton) | Fish Species        | Total Production (ton) | Fish Species        | Total Production (ton) | Fish Species        | Total Production (ton) |
| Bhekatkhali Khal, Rajnagar | Bagda                                  | 32                     | Bagda               | 2.72                   | Bagda               | 0.8                    | Harina              | 0.02                   | Bagda               | 1.2                    | Patari              | 0.2                    | -                   | -                      | Bagda               | 0.7                    | Bagda               | 0.5                    |
|                            | Horina                                 | 48                     | Harina              | 3.44                   | Harina              | 1.0                    | -                   | -                      | Harina              | 2.0                    | Tilapia             | 0.5                    | -                   | -                      | Harina              | 0.15                   | Harina              | 0.6                    |
|                            | -                                      | -                      | Tilapia             | 0.7                    | Chali               | 0.2                    | -                   | -                      | Tilapia             | 1.0                    | Paissa              | 0.05                   | -                   | -                      | -                   | -                      | Paissa              | 0.05                   |
|                            | -                                      | -                      | Parse               | 0.17                   | Patari              | 0.3                    | -                   | -                      | -                   | -                      | Harina              | 0.2                    | -                   | -                      | -                   | -                      | Tilapia             | 2.0                    |
|                            | -                                      | -                      | -                   | -                      | Tairel              | 0.03                   | -                   | -                      | -                   | -                      | Carp                | 1.0                    | -                   | -                      | -                   | -                      | Chali               | 0.3                    |
|                            | -                                      | -                      | -                   | -                      | Tilapia             | 0.5                    | -                   | -                      | -                   | -                      | Rui                 | 0.05                   | -                   | -                      | -                   | -                      |                     |                        |
|                            | -                                      | -                      | -                   | -                      | Datina              | 0.02                   | -                   | -                      | -                   | -                      | Grass Carp          | 0.05                   | -                   | -                      | -                   | -                      |                     |                        |
|                            |  |                        |                     |                        |                     |                        |                     |                        |                     |                        | Golda               | 0.02                   | -                   | -                      | -                   | -                      |                     |                        |
|                            |  |                        |                     |                        |                     |                        |                     |                        |                     |                        | Bagda               | 0.3                    | -                   | -                      | -                   | -                      |                     |                        |
|                            | <b>Sub-total =</b>                     | <b>80</b>              |                     | <b>7.0</b>             |                     | <b>2.8</b>             |                     | <b>0.02</b>            |                     | <b>4.2</b>             |                     | <b>2.37</b>            | -                   | -                      |                     |                        |                     |                        |
| Kapashtdanga Muralia       | Bagda                                  | 1.41                   | Bagda               | 6.74                   | Bagda               | 3.42                   | Harina              | 0.01                   | Bagda               | 4.84                   | Bagda               | 1.45                   | -                   | -                      | Bagda               | 0.04                   | Bagda               | 2.73                   |
|                            | Paissa                                 | 0.60                   | Golda               | 0.01                   | Harina              | 3.96                   | -                   | -                      | Hatina              | 0.92                   | Hatina              | 1.08                   | -                   | -                      | Hatina              | 0.14                   | Harina              | 0.96                   |
|                            | Crab                                   | 0.00                   | Harina              | 0.65                   | Chali               | 0.38                   | -                   | -                      | Chali               | 0.20                   | Chali               | 0.30                   | -                   | -                      | Chali               | 0.03                   | Chali               | 0.11                   |
|                            | Tilapia                                | 0.30                   | Chali               | 0.04                   | Bele                | 2.11                   | -                   | -                      | Bele                | 0.27                   | Bele                | 0.19                   | -                   | -                      |                     |                        | Bele                | 0.44                   |
|                            | Golda                                  | 0.10                   | Bele                | 0.09                   | Paissa              | 2.62                   | -                   | -                      | Paissa              | 0.04                   | Paissa              | 1.80                   | -                   | -                      |                     |                        | Paissa              | 0.2                    |
|                            | Horina Chingri                         | 2.92                   | Tilapia             | 0.22                   | Tilapia             | 9.85                   | -                   | -                      | Tilapia             | 3.87                   | Tilapia             | 6.93                   | -                   | -                      |                     |                        | Tilapia             | 12.9                   |
|                            | Chali Chingri                          | 1.52                   | Tengra              | 0.57                   | Golda               | 0.04                   | -                   | -                      | Golda               | 0.03                   | Golda               | 0.03                   | -                   | -                      |                     |                        | Tengra              | 0.01                   |
|                            | Bele                                   | 1.35                   | Bhangan             | 0.08                   | Tengra              | 0.17                   | -                   | -                      | Tengra              | 0.01                   | Tengra              | 0.17                   | -                   | -                      |                     |                        |                     |                        |
|                            | Tengra                                 | 0.27                   | -                   | -                      | Patari              | 2.25                   | -                   | -                      | Patari              | 0.11                   | Patari              | 0.25                   | -                   | -                      |                     |                        |                     |                        |
|                            | Major Carp                             | 0.55                   | -                   | -                      | Chemo               | 0.02                   | -                   | -                      | Datna               | 0.01                   | Catol               | 0.04                   | -                   | -                      |                     |                        |                     |                        |
|                            | -                                      | -                      | -                   | -                      | Datina              | 1.01                   | -                   | -                      | Rui                 | 0.47                   | Chemo               | 0.32                   | -                   | -                      |                     |                        |                     |                        |
|                            | -                                      | -                      | -                   | -                      | Rui                 | 1.27                   | -                   | -                      | Chaka               | 0.05                   |                     |                        | -                   | -                      |                     |                        |                     |                        |
|                            | -                                      | -                      | -                   | -                      | Chaka               | 0.01                   | -                   | -                      | -                   | 1.56                   |                     |                        | -                   | -                      |                     |                        |                     |                        |
|                            | -                                      | -                      | -                   | -                      | Kailla              | 0.96                   | -                   | -                      | -                   | -                      |                     |                        | -                   | -                      |                     |                        |                     |                        |
|                            | -                                      | -                      | -                   | -                      | Nundi Bele          | 0.02                   | -                   | -                      | -                   | -                      |                     |                        | -                   | -                      |                     |                        |                     |                        |
|                            | -                                      | -                      | -                   | -                      | Kakra               | 0.49                   | -                   | -                      | -                   | -                      |                     |                        | -                   | -                      |                     |                        |                     |                        |
|                            | <b>Sub-total =</b>                     | <b>9</b>               |                     | <b>8.0</b>             |                     | <b>29</b>              |                     | <b>0.01</b>            |                     | <b>12.38</b>           |                     | <b>12.57</b>           | -                   | -                      |                     |                        |                     |                        |
| Chunkuri-2                 | Bagda                                  | 0.04                   | Patari              | 0.01                   | Tilapia             | 0.02                   | -                   | -                      | Paissa              | 0.05                   | Sada Chingri        | 0.03                   | -                   | -                      | Bagda               | 0.01                   | Paissa              | 0.12                   |
|                            | Paissa                                 | 0.00                   | Tair/Tailla         | 0.01                   | Paissa              | 0.066                  | -                   | -                      | Golda               | 0.03                   | Paissa              | 0.03                   | -                   | -                      | Harina              | 0.06                   | Bagda               | 0.04                   |
|                            | Khorsula                               | 0.00                   | Bhangan             | 0.01                   | Khorsul             | 0.009                  | -                   | -                      | Kharulla            | 0.01                   | Patari              | 0.02                   | -                   | -                      | Kakra               | 0.01                   | Tilapia             | 0.08                   |
|                            | Horina Chingri                         | 0.10                   | Datina              | 0.03                   | Bagda               | 0.015                  | -                   | -                      | Bagda               | 0.10                   | Tengra              | 0.01                   | -                   | -                      |                     |                        | Harina              | 0.06                   |
|                            | Motka                                  | 0.04                   | Bagda               | 0.02                   | Golda               | 0.006                  | -                   | -                      | Bele                | 0.03                   | Datina              | 0.02                   | -                   | -                      |                     |                        | Kakra               | 0.12                   |
|                            | Chali Chingri                          | 0.03                   | Golda               | 0.03                   | Patari              | 0.015                  | -                   | -                      | Harina              | 0.15                   | Ilish               | 0.005                  | -                   | -                      |                     |                        | Patari              | 0.02                   |
|                            | Chaka Chingri                          | 0.01                   | Faissa              | 0.01                   | Harina              | 0.008                  | -                   | -                      | Tengra              | 0.02                   | Golda               | 0.01                   | -                   | -                      |                     |                        | Kala Icha           | 0.04                   |
|                            | Bele                                   | 0.01                   | Chaka Chingri       | 0.01                   | Chali               | 0.009                  | -                   | -                      | Tairu               | 0.03                   | Nilotica            | 0.06                   | -                   | -                      |                     |                        | Sada Icha           | 0.04                   |

| Sampling Site/<br>Location | Total Catch (ton): 2019-20 and 2020-21 |                        |                     |                        |                     |                        |                     |                        |                     |                        |                     |                        |                     |                        |                     |                        |                     |                        |
|----------------------------|--|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|------------------------|---------------------|------------------------|
|                            | 20 <sup>th</sup> QM                    |                        | 21 <sup>st</sup> QM |                        | 22 <sup>nd</sup> QM |                        | 23 <sup>rd</sup> QM |                        | 25 <sup>th</sup> QM |                        | 26 <sup>th</sup> QM |                        | 27 <sup>th</sup> QM |                        | 28 <sup>th</sup> QM |                        | 29 <sup>th</sup> QM |                        |
|                            | Fish Species                           | Total Production (ton) | Fish Species        | Total Production (ton) | Fish Species        | Total Production (ton) | Fish Species        | Total Production (ton) | Fish Species        | Total Production (ton) | Fish Species        | Total Production (ton) | Fish Species        | Total Production (ton) | Fish Species        | Total Production (ton) | Fish Species        | Total Production (ton) |
|                            | Crab                                   | 0.03                   | Harina              | 0.02                   | China Punti         | 0.047                  | -                   | -                      | Chaka               | 0.01                   | Baila               | 0.004                  | -                   | -                      |                     |                        | Bele                | 0.01                   |
|                            | -                                      | -                      | -                   | -                      | Tengra              | 0.008                  | -                   | -                      | Datina              | 0.02                   | Goda Chingri        | 0.001                  | -                   | -                      |                     |                        | Golda               | 0.01                   |
|                            | -                                      | -                      | -                   | -                      | Baila               | 0.003                  | -                   | -                      | -                   | -                      | Chaka Chingri       | 0.2                    | -                   | -                      |                     |                        |                     |                        |
|                            | -                                      | -                      | -                   | -                      | Datina              | 0.02                   | -                   | -                      | -                   | -                      | Harina              | 0.02                   | -                   | -                      |                     |                        |                     |                        |
|                            |  |                        |                     |                        |                     |                        |                     |                        |                     |                        | Chitra              | 0.004                  | -                   | -                      |                     |                        |                     |                        |
|                            |  |                        |                     |                        |                     |                        |                     |                        |                     |                        | Pheksa              | 0.01                   | -                   | -                      |                     |                        |                     |                        |
|                            |  |                        |                     |                        |                     |                        |                     |                        |                     |                        | Bhangan             | 0.004                  | -                   | -                      |                     |                        |                     |                        |
|                            |  |                        |                     |                        |                     |                        |                     |                        |                     |                        | Tairel              | 0.01                   | -                   | -                      |                     |                        |                     |                        |
|                            |  |                        |                     |                        |                     |                        |                     |                        |                     |                        | Golda               | 0.01                   | -                   | -                      |                     |                        |                     |                        |
|                            |  |                        |                     |                        |                     |                        |                     |                        |                     |                        | Bagda               | 0.02                   | -                   | -                      |                     |                        |                     |                        |
| Sub-total =                |  | 0.24                   |                     | 0.15                   |                     | 0.46                   |                     | 0.00                   |                     | 0.44                   |                     | 0.25                   | -                   | -                      |                     | 0.008                  |                     |                        |

Source: CEGIS Field Survey, 2019-2020 and 2020-2021

### (E) Traffic Survey data

Table E.1: Traffic Volume Survey at Khulna Mongla Road (Khudir Bottola)

Date: September 05, 2021 (Sunday)

| Vehicles      |        | 7:00 AM to 10:00AM |                  |     | 12:00 PM to 2:00PM |                  |     | 17:00 PM to 19:00PM |                  |     |
|---------------|--------|--------------------|------------------|-----|--------------------|------------------|-----|---------------------|------------------|-----|
| Direction     | Factor | Khulna to Mongla   | Mongla to Khulna | PCU | Khulna to Mongla   | Mongla to Khulna | PCU | Khulna to Mongla    | Mongla to Khulna | PCU |
| Pedestrian    | 0      | 21                 | 13               | 0   | 40                 | 34               | 0   | 44                  | 23               | 0   |
| Auto Rickshaw | 0.8    | 16                 | 10               | 20  | 21                 | 23               | 35  | 2                   | 20               | 18  |
| Van           | 0.6    | 100                | 74               | 104 | 110                | 101              | 126 | 18                  | 121              | 83  |
| Cycle         | 0.2    | 18                 | 24               | 8   | 12                 | 17               | 6   | 1                   | 28               | 6   |
| Human Howler  | 0.6    | 5                  | 10               | 8   | 9                  | 7                | 9   | 9                   | 10               | 11  |

| Vehicles     |     | 7:00 AM to 10:00AM |              |            | 12:00 PM to 2:00PM |     |            | 17:00 PM to 19:00PM |     |            |
|--------------|-----|--------------------|--------------|------------|--------------------|-----|------------|---------------------|-----|------------|
| CNG          | 0.5 | 4                  | 2            | 3          | 4                  | 2   | 3          | 0                   | 2   | 1          |
| Private Car  | 1   | 13                 | 21           | 34         | 27                 | 23  | 50         | 4                   | 26  | 30         |
| Motor Cycle  | 0.3 | 137                | 187          | 97         | 154                | 176 | 99         | 9                   | 214 | 67         |
| Jeep         | 1   | 4                  | 4            | 8          | 5                  | 6   | 10         | 0                   | 7   | 7          |
| Pick-up      | 2   | 9                  | 7            | 31         | 18                 | 10  | 55         | 2                   | 16  | 35         |
| Micro        | 1   | 9                  | 21           | 30         | 18                 | 20  | 38         | 1                   | 15  | 16         |
| Bus          | 2.5 | 32                 | 56           | 219        | 47                 | 37  | 209        | 3                   | 29  | 79         |
| Light Truck  | 2   | 15                 | 17           | 63         | 22                 | 12  | 68         | 3                   | 17  | 39         |
| Medium Truck | 2   | 19                 | 30           | 98         | 23                 | 67  | 180        | 3                   | 70  | 145        |
| Heavy Truck  | 2   | 8                  | 6            | 28         | 7                  | 7   | 26         | 10                  | 22  | 63         |
|              |     |                    | <b>Total</b> | <b>751</b> |                    |     | <b>913</b> |                     |     | <b>599</b> |

Table E.2: Traffic Volume Survey at Khulna Mongla Road (Gonai Bridge)

Date: September 04, 2021 (Saturday)

| Vehicles      |        | 7:00 AM to 10:00AM     |                        |     | 12:00 PM to 2:00PM     |                        |     | 17:00 PM to 19:00PM    |                        |     |
|---------------|--------|------------------------|------------------------|-----|------------------------|------------------------|-----|------------------------|------------------------|-----|
| Direction     | Factor | Babubari to Plant site | Plant site to Babubari | PCU | Babubari to Plant site | Plant site to Babubari | PCU | Babubari to Plant site | Plant site to Babubari | PCU |
| Pedestrian    | 0      | 8                      | 8                      | 0   | 3                      | 15                     | 0   | 10                     | 14                     | 0   |
| Auto Rickshaw | 0.8    | 3                      | 3                      | 4   | 3                      | 4                      | 5   | 2                      | 3                      | 4   |
| Van           | 0.6    | 28                     | 25                     | 32  | 16                     | 13                     | 17  | 18                     | 14                     | 19  |
| Cycle         | 0.2    | 2                      | 5                      | 1   | 2                      | 2                      | 1   | 1                      | 8                      | 2   |
| Human Howler  | 0.6    | 10                     | 9                      | 11  | 9                      | 6                      | 9   | 9                      | 4                      | 8   |
| CNG           | 0.5    | 0                      | 2                      | 1   | 0                      | 1                      | 1   | 0                      | 1                      | 0   |
| Private Car   | 1      | 6                      | 1                      | 7   | 3                      | 0                      | 3   | 4                      | 3                      | 7   |
| Motor Cycle   | 0.3    | 30                     | 21                     | 15  | 22                     | 24                     | 14  | 9                      | 19                     | 8   |
| Jeep          | 1      | 1                      | 1                      | 2   | 0                      | 0                      | 0   | 0                      | 1                      | 1   |
| Pick-up       | 2      | 3                      | 2                      | 11  | 2                      | 4                      | 10  | 2                      | 10                     | 24  |
| Micro         | 1      | 5                      | 2                      | 7   | 3                      | 1                      | 3   | 1                      | 4                      | 5   |
| Bus           | 2.5    | 0                      | 0                      | 2   | 1                      | 1                      | 3   | 3                      | 3                      | 13  |

| Vehicles     |        | 7:00 AM to 10:00AM     |                        |            | 12:00 PM to 2:00PM     |                        |           | 17:00 PM to 19:00PM    |                        |            |
|--------------|--------|------------------------|------------------------|------------|------------------------|------------------------|-----------|------------------------|------------------------|------------|
| Direction    | Factor | Babubari to Plant site | Plant site to Babubari | PCU        | Babubari to Plant site | Plant site to Babubari | PCU       | Babubari to Plant site | Plant site to Babubari | PCU        |
| Light Truck  | 2      | 2                      | 0                      | 3          | 2                      | 1                      | 5         | 3                      | 1                      | 8          |
| Medium Truck | 2      | 1                      | 0                      | 2          | 1                      | 2                      | 5         | 3                      | 2                      | 10         |
| Heavy Truck  | 2      | 0                      | 0                      | 1          | 1                      | 0                      | 2         | 10                     | 11                     | 42         |
|              |        |                        | <b>Total</b>           | <b>100</b> |                        |                        | <b>76</b> |                        |                        | <b>150</b> |

Table E.3: Traffic Volume Survey at Power Plant access road (Gonabelai Bridge)

Date: September 03, 2021 (Friday)

| Vehicles      |        | 7:00 AM to 10:00AM |                  |            | 12:00 PM to 2:00PM |                  |            | 17:00 PM to 19:00PM |                  |            |
|---------------|--------|--------------------|------------------|------------|--------------------|------------------|------------|---------------------|------------------|------------|
| Direction     | Factor | Khulna to Mongla   | Mongla to Khulna | PCU        | Khulna to Mongla   | Mongla to Khulna | PCU        | Khulna to Mongla    | Mongla to Khulna | PCU        |
| Pedestrian    | 0      | 14                 | 10               | 0          | 43                 | 9                | 0          | 37                  | 40               | 0          |
| Auto Rickshaw | 0.8    | 5                  | 2                | 6          | 5                  | 6                | 8          | 4                   | 4                | 6          |
| Van           | 0.6    | 25                 | 23               | 29         | 23                 | 37               | 36         | 37                  | 44               | 48         |
| Cycle         | 0.2    | 4                  | 4                | 1          | 6                  | 7                | 3          | 8                   | 6                | 3          |
| Human Howler  | 0.6    | 17                 | 17               | 20         | 12                 | 30               | 25         | 18                  | 43               | 36         |
| CNG           | 0.5    | 5                  | 0                | 3          | 12                 | 2                | 7          | 28                  | 2                | 15         |
| Private Car   | 1      | 6                  | 3                | 8          | 5                  | 9                | 14         | 6                   | 8                | 14         |
| Motor Cycle   | 0.3    | 30                 | 23               | 16         | 36                 | 59               | 28         | 72                  | 73               | 43         |
| Jeep          | 1      | 2                  | 2                | 3          | 2                  | 0                | 2          | 1                   | 2                | 2          |
| Pick-up       | 2      | 4                  | 4                | 15         | 6                  | 2                | 15         | 5                   | 4                | 16         |
| Micro         | 1      | 5                  | 3                | 8          | 5                  | 5                | 10         | 7                   | 7                | 14         |
| Bus           | 2.5    | 9                  | 7                | 40         | 9                  | 8                | 43         | 8                   | 10               | 44         |
| Light Truck   | 2      | 2                  | 4                | 12         | 4                  | 5                | 17         | 3                   | 4                | 13         |
| Medium Truck  | 2      | 5                  | 6                | 22         | 17                 | 7                | 47         | 18                  | 9                | 52         |
| Heavy Truck   | 2      | 6                  | 5                | 21         | 11                 | 5                | 32         | 9                   | 4                | 25         |
|               |        |                    | <b>Total</b>     | <b>205</b> |                    |                  | <b>285</b> |                     |                  | <b>330</b> |

**(F) Monitoring Results**  
**Air and water quality parameter analysis result**

**Adroit Environment Consultants Ltd.**  
 A House of Complete Environmental Management Solutions

**AECL LABORATORY ANALYSIS REPORT**  
**AMBIENT AIR QUALITY TEST REPORT**

Memo # AECL  
 Project Title : 2x660 MW Maitree Super Thermal Project  
 Project Location : Rampal, Bagherhat

Description of Sample : Ambient Air  
 Sample Collector : Adroit Environment Consultants Ltd. (Monitoring team)  
 Sampling date : 30<sup>th</sup> August to 12<sup>th</sup> September, 2021  
 Reporting date : 10<sup>th</sup> October, 2021

**Description of analysis**

| Sample Location ID | Concentration present of different parameter in ambient air |                   |        |                 |                 |     |                | Remarks    |
|--------------------|---|-------------------|--------|-----------------|-----------------|-----|----------------|------------|
|                    | PM <sub>10</sub>  | PM <sub>2.5</sub> | SPM    | SO <sub>2</sub> | NO <sub>x</sub> | CO  | O <sub>3</sub> |            |
| AQ1                | 59.16   | 94.56             | 158.28 | 19.72           | 27.29           | 1   | 92             | Not comply |
| AQ2                | 52.18   | 96.05             | 151.29 | 13.26           | 20.11           | 2   | 16             | Not comply |
| AQ3                | 38.25   | 59.17             | 99.44  | 14.49           | 19.87           | 1   | 42             | Complies   |
| AQ4                | 41.20   | 64.28             | 116.48 | 11.77           | 21.94           | 1   | 28             | Complies   |
| AQ5                | 22.66   | 48.19             | 77.19  | 13.58           | 20.49           | 1   | 17             | Not comply |
| AQ6                | 33.27   | 61.90             | 104.29 | 15.98           | 18.66           | 0.8 | 11             | Complies   |
| AQ7                | 21.80   | 50.26             | 83.20  | 14.44           | 19.48           | 0   | 18             | Not comply |
| AQ8                | 29.47   | 64.44             | 101.85 | 12.73           | 20.45           | 4   | 21             | Not comply |
| AQ9                | 25.54   | 54.86             | 85.20  | 10.28           | 19.73           | 2   | 23             | Not comply |
| AQ10               | 34.94   | 61.53             | 108.74 | 14.75           | 23.28           | 1   | 9              | Complies   |
| AQ11               | 25.30   | 59.70             | 94.70  | 13.92           | 20.06           | 0   | 14             | Complies   |
| AQ12               | 39.16   | 76.18             | 123.59 | 16.55           | 21.18           | 2   | 11             | Complies   |
| AQ13               | 32.45   | 74.89             | 118.40 | 14.61           | 20.27           | 1   | 10             | Complies   |

| Units                     | µg/m <sup>3</sup> | µg/m <sup>3</sup> | µg/m <sup>3</sup> | µg/m <sup>3</sup> | µg/m <sup>3</sup>  | mg/m <sup>3</sup> | µg/m <sup>3</sup>    |
|---------------------------|-------------------|-------------------|-------------------|-------------------|--------------------|-------------------|----------------------|
| Test Duration (hours)     | 24                | 24                | 8                 | 8                 | 8                  | 8                 | 8                    |
| Method of Analysis        | Gravimetric       | Gravimetric       | Gravimetric       | West-Gaeke        | Jacob & Hochheiser | CO Meter          | O <sub>3</sub> Meter |
| Bangladesh (DoE) Standard | 65                | 150               | 200               | 365               | 100                | 10                | 157                  |
| WHO Standard              | 75                | 150               | NF                | 125               | 200                | NF                | 160                  |

(NF – not found, DoE – Department of Environment.)

Note: This monitoring report was usually accomplished by - Respirable Dust Sampler (Model-Envirotech India APM-460BL) and Fine Particulate Sampler (Model-Envirotech India AAS-127BL).

1. Fine Particulate Matter (PM<sub>2.5</sub>).
2. Respirable Dust Content (PM<sub>10</sub>).
3. Suspended Particulate Matter (SPM).
4. Oxides of Nitrogen (NO<sub>x</sub>).
5. Oxides of Sulfur (SO<sub>2</sub>).
6. Carbone Mono-Oxide (CO).

Comment: All three locations show higher PM<sub>10</sub>, PM<sub>2.5</sub> and SPM concentrations. Ozone (O<sub>3</sub>) concentrations at location AQ1 & AQ3 also fluctuate from allowable limit by an extent.

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Sr. Chemist

Md. Saiful Islam  
Chief Operating Officer

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জীবনের জন্য বিজ্ঞান

শেখ হাসিনার দর্শন সব মানুষের উন্নয়ন

বাংলাদেশ বিজ্ঞান ও শিল্প গবেষণা পরিষদ (বিসিএসআইআর)  
 BANGLADESH COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH (BCSIR)

Institute Name: Institute of National Analytical Research & Service (INARS)

**Analysis Report**

Analytical Service Cell Ref No: Jun2021031001 Unit (Lab/Inst.) Ref No: A-552-556  
 Lab ID: INS-552-556 Sample Receiving Date: 02/06/2021  
 Sample ID: A-552-556 Submission Date: 02 Jun 2021  
 Report Delivery Date: 20/06/2021

Sample Description: (1) Power Plant Jetty, (2) Mongla Confluence, (3) Herbaria, (4) Akram Point, (5) Moldara  
 Client's Details: Mahadi Hassan  
 Center For Environmental And Geographic Information Services  
 House#House No. 06, Road No. 23/C, Dhaka-1216  
 Number of Sample: 5

Report Details:

| Lab ID | Particulars of supplied sample | Parameters   | Concentration      | Test Method (APHA) |
|--------|--------------------------------|--------------|--------------------|--------------------|
| A-552  | Water (Power Plant jetty)      | Oil & Grease | Less than 2.0 mg/L | 5520.B             |
| A-553  | Water (Mongla Confluence)      | Oil & Grease | Less than 2.0 mg/L | 5520.B             |
| A-554  | Water (Herbaria)               | Oil & Grease | Less than 2.0 mg/L | 5520.B             |
| A-555  | Water (Akram point)            | Oil & Grease | Less than 2.0 mg/L | 5520.B             |
| A-556  | Water (Moldara)                | Oil & Grease | 3.2 mg/L           | 5520.B             |

Dr. Sabina Yasmin  
Senior Scientific Officer  
Institute of National Analytical Research & Service (INARS)  
BCSIR, Dhaka-1205

Section/Division In-Charge

মোঃ শহিদুল আলম  
উপ-পরিচালক (অতিরিক্ত)  
জৈবিক ও পরিবেশিক অধিদপ্তর  
বিসিআইআর (জাইএনআইআর)  
বিসিআইআর, ঢাকা

Shamim Ahmed  
Director (In-Charge)  
Institute of National Analytical Research & Service (INARS)  
BCSIR, Dhaka-1205



Note:  
 a. The results reported here pertained to the sample received in this laboratory only.  
 b. Complain and/or query regarding delivered test report should be lodged within one month of report delivery date.  
 c. The laboratory is not responsible for the data quality affected due to sampling, transporting and storage conditions of the sample(s) maintained before received in the laboratory.  
 d. The report shall not be reproduced/published partly or fully without prior approval of the authority.

Analytical Service Cell  
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20th of June 2021 11:07 AM



|   |  |   |
|---|--|---|
|  | <b>Government of the People's Republic of Bangladesh</b><br><b>Office of the Chief Chemist</b><br><b>Department of Public Health Engineering</b><br><b>Central Lab, 38-39, Mohakhali C/A, Dhaka-1212</b><br>Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com |  |
| Lab Memo: 157/ CC, DPHE, CL., Dhaka   |  | Date: 20-09-2021  |

## Physical /Chemical/ Bacteriological Analysis of Water Sample

|  |  |
|--|--|
| Sample ID: CEN2021090217   | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021            | Sample Source: Surface Water           |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212. | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : SW-01)                                      | Union:, Vill.:                         |
| Sample Collection date:  | Date of Testing: 30/05/2021-02/08/2021 |

## LABORATORY TEST RESULTS:

| Sl.# | Water quality parameters                      | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ     |
|------|---|---------------------|-----------------------|------|--------------------|---------|
| 1    | Arsenic (As)                                  | 0.05                | 0.003                 | mg/L | AAS                | 0.001   |
| 2    | Cadmium (Cd)                                  | 0.005               | 0.0044                | mg/L | AAS                | 0.00015 |
| 3    | Calcium (Ca)                                  | 75                  | 239                   | mg/L | AAS                | 0.17    |
| 4    | Chemical Oxygen Demand (COD)                  | 4.0                 | 508                   | mg/L | CRM                | -       |
| 5    | Chloride                                      | 150-600             | 8100                  | mg/L | Titrimetric        | -       |
| 6    | Silica (SiO <sub>2</sub> )                    | 0.0                 | 9.9                   | mg/L | UVS                | -       |
| 7    | Bi-Carbonate (HCO <sub>3</sub> <sup>-</sup> ) | 0.0                 | 115                   | mg/L | Titrimetric        | -       |
| 8    | Cr (Total)                                    | 0.05                | 0.021                 | mg/L | AAS                | 0.0003  |
| 9    | Hardness                                      | 200-500             | 4500                  | mg/L | Titrimetric        | -       |
| 10   | Iron (Fe)                                     | 0.3-1               | 2.88                  | mg/L | AAS                | 0.05    |
| 11   | Lead (Pb)                                     | 0.05                | 0.029                 | mg/L | AAS                | 0.001   |
| 12   | Magnesium (Mg)                                | 30-35               | 652                   | mg/L | AAS                | 0.05    |
| 13   | Nitrogen (Nitrate)                            | 10.0                | 3.3                   | mg/L | UVS                | 0.10    |
| 14   | Phosphate                                     | 6.0                 | 4.9                   | mg/L | UVS                | 0.10    |
| 15   | Potassium (K)                                 | 12.0                | 200                   | mg/L | AAS                | -       |
| 16   | Sodium (Na)                                   | 200                 | 5920                  | mg/L | AAS                | 0.34    |
| 17   | Sulphate                                      | 400                 | 1                     | mg/L | UVS                | 1.0     |
| 18   | Total Dissolved Solid (TDS)                   | 1000                | 12500                 | mg/L | Multimeter         | -       |
| 19   | Total Suspended Solid (TSS)                   | 10                  | 15                    | mg/L | Gravimetric Method | -       |
| 20   | Turbidity                                     | 10                  | 97.1                  | NTU  | Turbidity Meter    | -       |
| 21   | Carbonate (CO <sub>3</sub> )                  | -                   | 0.14                  | mg/L | Titrimetric        | -       |


Comments: Sample was collected &amp; supplied by client.


N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.


Page 1 of 2

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|  | জীবনের জন্য বিজ্ঞান<br>"শেখ হাসিনার দর্শন সব মানুষের উদয়ন"<br><b>বাংলাদেশ বিজ্ঞান ও শিল্প গবেষণা পরিষদ ( বিসিএসআইআর )</b><br>BANGLADESH COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH (BCSIR) |
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|       |   |              |                      |        |
|-------|---|--------------|----------------------|--------|
| A-566 | Surface water (Sample ID-10)                    | Mercury (Hg) | Less than 0.001 mg/L | 3112.B |
| A-567 | Surface water (Sample ID-11)                    | Mercury (Hg) | Less than 0.001 mg/L | 3112.B |
| A-568 | Surface water (Sample ID-12, Mongla Confluence) | Mercury (Hg) | Less than 0.001 mg/L | 3112.B |
| A-569 | Surface water (Sample ID-13, Harbaria)          | Mercury (Hg) | Less than 0.001 mg/L | 3112.B |
| A-570 | Surface water (Sample ID-14, Akram Point)       | Mercury (Hg) | Less than 0.001 mg/L | 3112.B |
| A-571 | Surface water (Sample ID-15, Rajnagar)          | Mercury (Hg) | Less than 0.001 mg/L | 3112.B |
| A-572 | Surface water (Sample ID-16, Kapashdangha)      | Mercury (Hg) | Less than 0.001 mg/L | 3112.B |
| A-573 | Surface water (Sample ID-17, Power Plant)       | Mercury (Hg) | Less than 0.001 mg/L | 3112.B |

  
 20.06.2021  
 Analyst  
**Aynun Nahar**  
 Scientific Officer  
 Institute of National Analytical  
 Research & Service (INARS)  
 BCSIR, Dhaka-1205



  
 20/6/21  
 Section/Division In-Charge

  
 20/6/21  
 In-Charge/Director  
**Shamim Ahmed**  
 Director (In-Charge)  
 Institute of National Analytical  
 Research & Service (INARS)  
 BCSIR, Dhaka-1205

## Note:

- The results reported here pertained to the sample received in this laboratory only.
- Complain and/or query regarding delivered test report should be lodged within one month of report delivery date.
- The laboratory is not responsible for the data quality affected due to sampling, transporting and storage conditions of the sample(s) maintained before received in the laboratory.
- The report shall not be reproduced/published partly or fully without prior approval of the authority.

| Sl.#   | Water quality parameters | Bangladesh Standard | Concentration present | Unit | Analysis Method | LOQ |
|--|--------------------------|---------------------|-----------------------|------|-----------------|-----|
| <b>Test Performed by:</b> <u>Signature</u><br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br><u>20.09.2021</u>  |                          |                     |                       |      |                 |     |
| <b>Countersigned/Approved by:</b> <u>Signature</u><br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br><u>20/09/2021</u><br>2.) Name: Md. Biplab Hossain<br>Designation: Chief Chemist<br><u>20/09/2021</u><br><b>Md. Biplab Hossain</b><br>Chief Chemist<br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |                          |                     |                       |      |                 |     |

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| Lab Memo: 157/ CC, DPHE, CL, Dhaka  |  | Date: 20-09-2021  |

## Physical /Chemical/ Bacteriological Analysis of Water Sample

|   |  |
|---|--|
| Sample ID: CEN2021090218  | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021           | Sample Source: Surface Water           |
| Sent by: Md. Mutasim Billah, Project Leader, CFGIS, Gulshan-1, Dhaka-1212 | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : SW-02)                                     | Union:, Vill.:                         |
| Sample Collection date:   | Date of Testing: 30/05/2021-02/08/2021 |



## LABORATORY TEST RESULTS:

| Sl.# | Water quality parameters     | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ     |
|------|------------------------------|---------------------|-----------------------|------|--------------------|---------|
| 1    | Arsenic (As)                 | 0.05                | 0.004                 | mg/L | AAS                | 0.001   |
| 2    | Cadmium (Cd)                 | 0.005               | 0.0036                | mg/L | AAS                | 0.00015 |
| 3    | Chemical Oxygen Demand (COD) | 4.0                 | 404                   | mg/L | CRM                | -       |
| 4    | Cr (Total)                   | 0.05                | 0.025                 | mg/L | AAS                | 0.0003  |
| 5    | Hardness                     | 200-500             | 4200                  | mg/L | Titrimetric        | -       |
| 6    | Lead (Pb)                    | 0.05                | 0.029                 | mg/L | AAS                | 0.001   |
| 7    | Nitrogen (Nitrate)           | 10.0                | 2.1                   | mg/L | UVS                | 0.10    |
| 8    | Phosphate                    | 6.0                 | 2.0                   | mg/L | UVS                | 0.10    |
| 9    | Sulphate                     | 400                 | 5                     | mg/L | UVS                | 1.0     |
| 10   | Total Dissolved Solid (TDS)  | 1000                | 12700                 | mg/L | Multimeter         | -       |
| 11   | Total Suspended Solid (TSS)  | 10                  | 23                    | mg/L | Gravimetric Method | -       |

Comments: Sample was collected &amp; supplied by client.

N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.

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| <b>Test Performed by:</b> <u>Signature</u><br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br><u>20.09.2021</u><br>2.) Name: Taslima Akhter<br>Designation: Sample Analyzer<br><u>20.09.21</u> |  | <b>Countersigned/Approved by:</b> <u>Signature</u><br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br><u>20/09/2021</u><br>2.) Name: Md. Biplab Hossain<br>Designation: Chief Chemist<br><u>20/09/2021</u><br><b>Md. Biplab Hossain</b><br>Chief Chemist<br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |  |
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|  | <b>Government of the People's Republic of Bangladesh</b><br><b>Office of the Chief Chemist</b><br><b>Department of Public Health Engineering</b><br><b>Central Lab, 38-39, Mohakhali C/A, Dhaka-1212</b><br>Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com |  |
| Lab Memo: 157/ CC, DPHE, CL, Dhaka  |  | Date: 20-09-2021   |

## Physical /Chemical/ Bacteriological Analysis of Water Sample

|  |  |
|--|--|
| Sample ID: CEN2021090219   | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021            | Sample Source: Surface Water           |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212. | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : SW-03)                                      | Union:, Vill.:                         |
| Sample Collection date:  | Date of Testing: 30/05/2021-02/08/2021 |



## LABORATORY TEST RESULTS:

| Sl.# | Water quality parameters     | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ     |
|------|------------------------------|---------------------|-----------------------|------|--------------------|---------|
| 1    | Arsenic (As)                 | 0.05                | 0.003                 | mg/L | AAS                | 0.001   |
| 2    | Cadmium (Cd)                 | 0.005               | 0.0012                | mg/L | AAS                | 0.00015 |
| 3    | Chemical Oxygen Demand (COD) | 4.0                 | 400                   | mg/L | CRM                | -       |
| 4    | Cr (Total)                   | 0.05                | 0.021                 | mg/L | AAS                | 0.0003  |
| 5    | Hardness                     | 200-500             | 4300                  | mg/L | Titrimetric        | -       |
| 6    | Lead (Pb)                    | 0.05                | 0.036                 | mg/L | AAS                | 0.001   |
| 7    | Nitrogen (Nitrate)           | 10.0                | 1.3                   | mg/L | UVS                | 0.10    |
| 8    | Phosphate                    | 6.0                 | 1.9                   | mg/L | UVS                | 0.10    |
| 9    | Sulphate                     | 400                 | 2                     | mg/L | UVS                | 1.0     |
| 10   | Total Dissolved Solid (TDS)  | 1000                | 12300                 | mg/L | Multimeter         | -       |
| 11   | Total Suspended Solid (TSS)  | 10                  | 20                    | mg/L | Gravimetric Method | -       |

Comments: Sample was collected &amp; supplied by client.

N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.

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| <b>Test Performed by:</b><br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br><br>20.09.2021<br>2.) Name: Taslima Akhter<br>Designation: Sample Analyzer<br><br>20.09.21 | <b>Countersigned/Approved by:</b><br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br><br>20.09.2021<br>2.) Name: Md. Biplab Hossain<br>Designation: Chief Chemist<br><br>20.09.2021<br><b>Md. Biplab Hossain</b><br>Chief Chemist<br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |
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| Lab Memo: 157/ CC, DPHE, CL, Dhaka  |  | Date: 20-09-2021  |

## Physical /Chemical/ Bacteriological Analysis of Water Sample

|  |  |
|--|--|
| Sample ID: CEN2021090220   | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021            | Sample Source: Surface Water           |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212. | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : SW-04)                                      | Union:, Vill.:                         |
| Sample Collection date:  | Date of Testing: 30/05/2021-02/08/2021 |

## LABORATORY TEST RESULTS:

| Sl.# | Water quality parameters                      | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ     |
|------|---|---------------------|-----------------------|------|--------------------|---------|
| 1    | Arsenic (As)                                  | 0.05                | 0.002                 | mg/L | AAS                | 0.001   |
| 2    | Cadmium (Cd)                                  | 0.005               | 0.0060                | mg/L | AAS                | 0.00015 |
| 3    | Calcium (Ca)                                  | 75                  | 304                   | mg/L | AAS                | 0.17    |
| 4    | Chemical Oxygen Demand (COD)                  | 4.0                 | 456                   | mg/L | CRM                | -       |
| 5    | Chloride                                      | 150-600             | 8250                  | mg/L | Titrimetric        | -       |
| 6    | Silica (SiO <sub>2</sub> )                    | 0.0                 | 3.2                   | mg/L | UVS                | -       |
| 7    | Bi-Carbonate (HCO <sub>3</sub> <sup>-</sup> ) | 0.0                 | 105                   | mg/L | Titrimetric        | -       |
| 8    | Cr (Total)                                    | 0.05                | 0.006                 | mg/L | AAS                | 0.0003  |
| 9    | Hardness                                      | 200-500             | 4100                  | mg/L | Titrimetric        | -       |
| 10   | Iron (Fe)                                     | 0.3-1               | 1.99                  | mg/L | AAS                | 0.05    |
| 11   | Lead (Pb)                                     | 0.05                | 0.016                 | mg/L | AAS                | 0.001   |
| 12   | Magnesium (Mg)                                | 30-35               | 610                   | mg/L | AAS                | 0.05    |
| 13   | Nitrogen (Nitrate)                            | 10.0                | 2.1                   | mg/L | UVS                | 0.10    |
| 14   | Phosphate                                     | 6.0                 | 2.3                   | mg/L | UVS                | 0.10    |
| 15   | Potassium (K)                                 | 12.0                | 205                   | mg/L | AAS                | -       |
| 16   | Sodium (Na)                                   | 200                 | 5830                  | mg/L | AAS                | 0.34    |
| 17   | Sulphate                                      | 400                 | 1                     | mg/L | UVS                | 1.0     |
| 18   | Total Dissolved Solid (TDS)                   | 1000                | 12800                 | mg/L | Multimeter         | -       |
| 19   | Total Suspended Solid (TSS)                   | 10                  | 13                    | mg/L | Gravimetric Method | -       |
| 20   | Turbidity                                     | 10                  | 54.3                  | NTU  | Turbidity Meter    | -       |
| 21   | Carbonate (CO <sub>3</sub> )                  | -                   | 0.32                  | mg/L | Titrimetric        | -       |



Comments: Sample was collected &amp; supplied by client.

N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation

|  |             |
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| Sl.#  | Water quality parameters | Bangladesh Standard | Concentration present | Unit | Analysis Method | LOQ |
|---|--------------------------|---------------------|-----------------------|------|-----------------|-----|
| <b>Test Performed by:</b> Signature<br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br>20.09.2021   |                          |                     |                       |      |                 |     |
| <b>Countersigned/Approved by:</b> Signature<br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br>20.09.2021<br>2.) Name: Md. Biplab Hossain<br>Designation: Chief Chemist<br>20.09.2021<br><b>Md. Biplab Hossain</b><br>Chief Chemist<br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |                          |                     |                       |      |                 |     |

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|  | <b>Government of the People's Republic of Bangladesh</b><br><b>Office of the Chief Chemist</b><br><b>Department of Public Health Engineering</b><br><b>Central Lab, 38-39, Mohakhali C/A, Dhaka-1212</b><br>Phone: 88-02-9881927, Fax: 88-02-9882503, Email: wqmsc_central_lab@yahoo.com |  |
| Lab Memo: 157/ CC, DPHE, CL, Dhaka  |  | Date: 20-09-2021  |

## Physical /Chemical/ Bacteriological Analysis of Water Sample

|  |  |
|--|--|
| Sample ID: CEN2021090221   | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021            | Sample Source: Surface Water           |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212. | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : SW-05)                                      | Union:, Vill.:                         |
| Sample Collection date:  | Date of Testing: 30/05/2021-02/08/2021 |



## LABORATORY TEST RESULTS:

| Sl.# | Water quality parameters     | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ     |
|------|------------------------------|---------------------|-----------------------|------|--------------------|---------|
| 1    | Arsenic (As)                 | 0.05                | 0.002                 | mg/L | AAS                | 0.001   |
| 2    | Cadmium (Cd)                 | 0.005               | 0.0041                | mg/L | AAS                | 0.00015 |
| 3    | Chemical Oxygen Demand (COD) | 4.0                 | 412                   | mg/L | CRM                | -       |
| 4    | Cr (Total)                   | 0.05                | 0.003                 | mg/L | AAS                | 0.0003  |
| 5    | Hardness                     | 200-500             | 4500                  | mg/L | Titrimetric        | -       |
| 6    | Lead (Pb)                    | 0.05                | 0.014                 | mg/L | AAS                | 0.001   |
| 7    | Nitrogen (Nitrate)           | 10.0                | 3.0                   | mg/L | UVS                | 0.10    |
| 8    | Phosphate                    | 6.0                 | 5.7                   | mg/L | UVS                | 0.10    |
| 9    | Sulphate                     | 400                 | 3                     | mg/L | UVS                | 1.0     |
| 10   | Total Dissolved Solid (TDS)  | 1000                | 13100                 | mg/L | Multimeter         | -       |
| 11   | Total Suspended Solid (TSS)  | 10                  | 12                    | mg/L | Gravimetric Method | -       |

Comments: Sample was collected &amp; supplied by client.

N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.

|   |  |   |  |
|---|--|---|--|
| <b>Test Performed by:</b> Signature<br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br>20.09.2021<br>2.) Name: Taslima Akhter<br>Designation: Sample Analyzer<br>20.09.21 |  | <b>Countersigned/Approved by:</b> Signature<br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br>20.09.2021<br>2.) Name: Md. Biplab Hossain<br>Designation: Chief Chemist<br><b>Md. Biplab Hossain</b><br>Chief Chemist<br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |  |
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|  | <b>Government of the People's Republic of Bangladesh</b><br><b>Office of the Chief Chemist</b><br><b>Department of Public Health Engineering</b><br><b>Central Lab, 38-39, Mohakhali C/A, Dhaka-1212</b><br>Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com |  |
| Lab Memo: 157/ CC, DPHE, CL, Dhaka  |  | Date: 20-09-2021   |

## Physical /Chemical/ Bacteriological Analysis of Water Sample



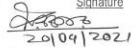
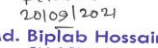
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| Sample ID: CEN2021090222   | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021            | Sample Source: Surface Water           |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212. | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : SW-06)                                      | Union:, Vill.:                         |
| Sample Collection date:  | Date of Testing: 30/05/2021-02/08/2021 |



## LABORATORY TEST RESULTS:

| Sl.# | Water quality parameters     | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ     |
|------|------------------------------|---------------------|-----------------------|------|--------------------|---------|
| 1    | Arsenic (As)                 | 0.05                | 0.004                 | mg/L | AAS                | 0.001   |
| 2    | Cadmium (Cd)                 | 0.005               | 0.0046                | mg/L | AAS                | 0.00015 |
| 3    | Chemical Oxygen Demand (COD) | 4.0                 | 390                   | mg/L | CRM                | -       |
| 4    | Cr (Total)                   | 0.05                | 0.007                 | mg/L | AAS                | 0.0003  |
| 5    | Hardness                     | 200-500             | 4000                  | mg/L | Titrimetric        | -       |
| 6    | Lead (Pb)                    | 0.05                | 0.012                 | mg/L | AAS                | 0.001   |
| 7    | Nitrogen (Nitrate)           | 10.0                | 1.5                   | mg/L | UVS                | 0.10    |
| 8    | Phosphate                    | 6.0                 | 4                     | mg/L | UVS                | 0.10    |
| 9    | Sulphate                     | 400                 | 2                     | mg/L | UVS                | 1.0     |
| 10   | Total Dissolved Solid (TDS)  | 1000                | 13200                 | mg/L | Multimeter         | -       |
| 11   | Total Suspended Solid (TSS)  | 10                  | 16                    | mg/L | Gravimetric Method | -       |

Comments: Sample was collected &amp; supplied by client.

N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.

|   |   |
|---|---|
| <b>Test Performed by:</b><br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br>Signature: <br>20.09.2021<br>2.) Name: Taslima Akhter<br>Designation: Sample Analyzer<br>Signature: <br>20.09.21 | <b>Countersigned/Approved by:</b><br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br>Signature: <br>20/09/2021<br>2.) Name: Md. Biplob Hossain<br>Designation: Chief Chemist<br>Signature: <br>20/09/2021<br><b>Md. Biplob Hossain</b><br>Chief Chemist<br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |
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| Lab Memo: 157/ CC, DPHE, CL, Dhaka  |  | Date: 20-   |

## Physical /Chemical/ Bacteriological Analysis of Water Sample


|  |  |
|--|--|
| Sample ID: CEN2021090223   | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021            | Sample Source: Surface Water           |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212. | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : SW-07)                                      | Union:, Vill.:                         |
| Sample Collection date:  | Date of Testing: 30/05/2021-02/08/2021 |

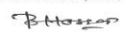
## LABORATORY TEST RESULTS:

| Sl.# | Water quality parameters                      | Bangladesh Standard | Concentration present | Unit | Analysis Method    |
|------|---|---------------------|-----------------------|------|--------------------|
| 1    | Arsenic (As)                                  | 0.05                | 0.003                 | mg/L | AAS                |
| 2    | Cadmium (Cd)                                  | 0.005               | 0.0051                | mg/L | AAS                |
| 3    | Calcium (Ca)                                  | 75                  | 280                   | mg/L | AAS                |
| 4    | Chemical Oxygen Demand (COD)                  | 4.0                 | 408                   | mg/L | CRM                |
| 5    | Chloride                                      | 150-600             | 8400                  | mg/L | Titrimetric        |
| 6    | Silica (SiO <sub>2</sub> )                    | 0.0                 | 10                    | mg/L | UVS                |
| 7    | Bi-Carbonate (HCO <sub>3</sub> <sup>-</sup> ) | 0.0                 | 110                   | mg/L | Titrimetric        |
| 8    | Cr (Total)                                    | 0.05                | 0.004                 | mg/L | AAS                |
| 9    | Hardness                                      | 200-500             | 4400                  | mg/L | Titrimetric        |
| 10   | Iron (Fe)                                     | 0.3-1               | 8.97                  | mg/L | AAS                |
| 11   | Lead (Pb)                                     | 0.05                | 0.014                 | mg/L | AAS                |
| 12   | Magnesium (Mg)                                | 30-35               | 705                   | mg/L | AAS                |
| 13   | Nitrogen (Nitrate)                            | 10.0                | 1.7                   | mg/L | UVS                |
| 14   | Phosphate                                     | 6.0                 | 1.2                   | mg/L | UVS                |
| 15   | Potassium (K)                                 | 12.0                | 205                   | mg/L | AAS                |
| 16   | Sodium (Na)                                   | 200                 | 5670                  | mg/L | AAS                |
| 17   | Sulphate                                      | 400                 | 3                     | mg/L | UVS                |
| 18   | Total Dissolved Solid (TDS)                   | 1000                | 13100                 | mg/L | Multimeter         |
| 19   | Total Suspended Solid (TSS)                   | 10                  | 14                    | mg/L | Gravimetric Method |
| 20   | Turbidity                                     | 10                  | 38.5                  | NTU  | Turbidity Meter    |
| 21   | Carbonate (CO <sub>3</sub> )                  | -                   | 0.24                  | mg/L | Titrimetric        |



Comments: Sample was collected &amp; supplied by client.

N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.



| Sl.#   | Water quality parameters | Bangladesh Standard | Concentration present | Unit | Analysis Method | LOQ |
|--|--------------------------|---------------------|-----------------------|------|-----------------|-----|
| <b>Test Performed by:</b> <u>Signature</u><br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br><u>20.09.2021</u>  |                          |                     |                       |      |                 |     |
| <b>Countersigned/Approved by:</b> <u>Signature</u><br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br><u>20.09.2021</u><br>2.) Name: Md. Biplab Hossain<br>Designation: Chief Chemist<br><b>Md. Biplab Hossain</b><br><b>Chief Chemist</b><br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |                          |                     |                       |      |                 |     |

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| Lab Memo: 157/ CC, DPHE, CL, Dhaka  |  | Date: 20-09-2021  |

## Physical /Chemical/ Bacteriological Analysis of Water Sample

|   |  |
|---|--|
| Sample ID: CEN2021090224  | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021           | Sample Source: Surface Water           |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212 | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : SW-08)                                     | Union:, Vill.:                         |
| Sample Collection date:   | Date of Testing: 30/05/2021-02/08/2021 |

## LABORATORY TEST RESULTS:



| Sl.# | Water quality parameters     | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ     |
|------|------------------------------|---------------------|-----------------------|------|--------------------|---------|
| 1    | Arsenic (As)                 | 0.05                | 0.003                 | mg/L | AAS                | 0.001   |
| 2    | Cadmium (Cd)                 | 0.005               | 0.0024                | mg/L | AAS                | 0.00015 |
| 3    | Chemical Oxygen Demand (COD) | 4.0                 | 424                   | mg/L | CRM                | -       |
| 4    | Cr (Total)                   | 0.05                | 0.003                 | mg/L | AAS                | 0.0003  |
| 5    | Hardness                     | 200-500             | 4100                  | mg/L | Titrimetric        | -       |
| 6    | Lead (Pb)                    | 0.05                | 0.003                 | mg/L | AAS                | 0.001   |
| 7    | Nitrogen (Nitrate)           | 10.0                | 2.0                   | mg/L | UVS                | 0.10    |
| 8    | Phosphate                    | 6.0                 | 2.4                   | mg/L | UVS                | 0.10    |
| 9    | Sulphate                     | 400                 | 1                     | mg/L | UVS                | 1.0     |
| 10   | Total Dissolved Solid (TDS)  | 1000                | 13300                 | mg/L | Multimeter         | -       |
| 11   | Total Suspended Solid (TSS)  | 10                  | 15                    | mg/L | Gravimetric Method | -       |

Comments: Sample was collected &amp; supplied by client.

N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.

|  |  |  |  |
|--|--|--|--|
| <b>Test Performed by:</b> <u>Signature</u><br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br><u>20.09.2021</u><br>2.) Name: Taslima Akhter<br>Designation: Sample Analyzer<br><u>20.09.21</u> |  | <b>Countersigned/Approved by:</b> <u>Signature</u><br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br><u>20.09.2021</u><br>2.) Name: Md. Biplab Hossain<br>Designation: Chief Chemist<br><b>Md. Biplab Hossain</b><br><b>Chief Chemist</b><br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |  |
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| Lab Memo: 157/ CC, DPHE, CL, Dhaka  |  | Date: 20-09-2021   |

## Physical /Chemical/ Bacteriological Analysis of Water Sample



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| Sample ID: CEN2021090225  | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021           | Sample Source: Surface Water           |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212 | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : SW-09)                                     | Union:, Vill.:                         |
| Sample Collection date:   | Date of Testing: 30/05/2021-02/08/2021 |



## LABORATORY TEST RESULTS:

| Sl.# | Water quality parameters     | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ     |
|------|------------------------------|---------------------|-----------------------|------|--------------------|---------|
| 1    | Arsenic (As)                 | 0.05                | 0.003                 | mg/L | AAS                | 0.001   |
| 2    | Cadmium (Cd)                 | 0.005               | 0.0051                | mg/L | AAS                | 0.00015 |
| 3    | Chemical Oxygen Demand (COD) | 4.0                 | 448                   | mg/L | CRM                | -       |
| 4    | Cr (Total)                   | 0.05                | 0.003                 | mg/L | AAS                | 0.0003  |
| 5    | Hardness                     | 200-500             | 4400                  | mg/L | Titrimetric        | -       |
| 6    | Lead (Pb)                    | 0.05                | 0.014                 | mg/L | AAS                | 0.001   |
| 7    | Nitrogen (Nitrate)           | 10.0                | 2.3                   | mg/L | UVS                | 0.10    |
| 8    | Phosphate                    | 6.0                 | 6.3                   | mg/L | UVS                | 0.10    |
| 9    | Sulphate                     | 400                 | 2                     | mg/L | UVS                | 1.0     |
| 10   | Total Dissolved Solid (TDS)  | 1000                | 13200                 | mg/L | Multimeter         | -       |
| 11   | Total Suspended Solid (TSS)  | 10                  | 13                    | mg/L | Gravimetric Method | -       |

Comments: Sample was collected &amp; supplied by client.

N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.

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| <b>Test Performed by:</b><br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br><br>20.09.2021<br>2.) Name: Taslima Akhter<br>Designation: Sample Analyzer<br><br>20.09.21 | <b>Countersigned/Approved by:</b><br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br><br>20/09/2021<br>2.) Name: Md. Biplob Hossain<br>Designation: Chief Chemist<br><br>20/09/2021<br><b>Md. Biplob Hossain</b><br>Chief Chemist<br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |
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| Lab Memo: 157/ CC, DPHE, CL, Dhaka  |  | Date: 20-09-2021  |

## Physical /Chemical/ Bacteriological Analysis of Water Sample





|   |  |
|---|--|
| Sample ID: CEN2021090226  | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021           | Sample Source: Surface Water           |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212 | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : SW-10)                                     | Union:, Vill.:                         |
| Sample Collection date:   | Date of Testing: 30/05/2021-02/08/2021 |



## LABORATORY TEST RESULTS:

| Sl.# | Water quality parameters     | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ     |
|------|------------------------------|---------------------|-----------------------|------|--------------------|---------|
| 1    | Arsenic (As)                 | 0.05                | 0.003                 | mg/L | AAS                | 0.001   |
| 2    | Cadmium (Cd)                 | 0.005               | 0.0040                | mg/L | AAS                | 0.00015 |
| 3    | Chemical Oxygen Demand (COD) | 4.0                 | 400                   | mg/L | CRM                | -       |
| 4    | Cr (Total)                   | 0.05                | 0.002                 | mg/L | AAS                | 0.0003  |
| 5    | Hardness                     | 200-500             | 4200                  | mg/L | Titrimetric        | -       |
| 6    | Lead (Pb)                    | 0.05                | 0.013                 | mg/L | AAS                | 0.001   |
| 7    | Nitrogen (Nitrate)           | 10.0                | 4.2                   | mg/L | UVS                | 0.10    |
| 8    | Phosphate                    | 6.0                 | 8.0                   | mg/L | UVS                | 0.10    |
| 9    | Sulphate                     | 400                 | 3                     | mg/L | UVS                | 1.0     |
| 10   | Total Dissolved Solid (TDS)  | 1000                | 12500                 | mg/L | Multimeter         | -       |
| 11   | Total Suspended Solid (TSS)  | 10                  | 17                    | mg/L | Gravimetric Method | -       |

Comments: Sample was collected &amp; supplied by client.

N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.

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| <b>Test Performed by:</b><br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br><br>20.09.2021<br>2.) Name: Taslima Akhter<br>Designation: Sample Analyzer<br><br>20.09.21 | <b>Countersigned/Approved by:</b><br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br><br>20/09/2021<br>2.) Name: Md. Biplob Hossain<br>Designation: Chief Chemist<br><br>20/09/2021<br><b>Md. Biplob Hossain</b><br>Chief Chemist<br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |
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Lab Memo: 157/ CC, DPHE, CL, Dhaka

Date: 20-09-2021

**Physical /Chemical/ Bacteriological Analysis of Water Sample**



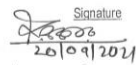

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| Sample ID: CEN2021090227   | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021            | Sample Source: Surface Water           |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212. | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : SW-11)                                      | Union:, Vill.:                         |
| Sample Collection date:  | Date of Testing: 30/05/2021-02/08/2021 |

**LABORATORY TEST RESULTS:**



| Sl.# | Water quality parameters     | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ     |
|------|------------------------------|---------------------|-----------------------|------|--------------------|---------|
| 1    | Arsenic (As)                 | 0.05                | 0.004                 | mg/L | AAS                | 0.001   |
| 2    | Cadmium (Cd)                 | 0.005               | 0.0018                | mg/L | AAS                | 0.00015 |
| 3    | Chemical Oxygen Demand (COD) | 4.0                 | 380                   | mg/L | CRM                | -       |
| 4    | Cr (Total)                   | 0.05                | 0.010                 | mg/L | AAS                | 0.0003  |
| 5    | Hardness                     | 200-500             | 4100                  | mg/L | Titrimetric        | -       |
| 6    | Lead (Pb)                    | 0.05                | 0.015                 | mg/L | AAS                | 0.001   |
| 7    | Nitrogen (Nitrate)           | 10.0                | 1.0                   | mg/L | UVS                | 0.10    |
| 8    | Phosphate                    | 6.0                 | 0.76                  | mg/L | UVS                | 0.10    |
| 9    | Sulphate                     | 400                 | 15                    | mg/L | UVS                | 1.0     |
| 10   | Total Dissolved Solid (TDS)  | 1000                | 11800                 | mg/L | Multimeter         | -       |
| 11   | Total Suspended Solid (TSS)  | 10                  | 12                    | mg/L | Gravimetric Method | -       |

Comments: Sample was collected &amp; supplied by client.

N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.

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|---|---|
| <b>Test Performed by:</b><br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br>Signature: <br>20.09.2021<br>2.) Name: Taslima Akhter<br>Designation: Sample Analyzer<br>Signature: <br>20.09.21 | <b>Countersigned/Approved by:</b><br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br>Signature: <br>20.09.2021<br>2.) Name: Md. Biplab Hossain<br>Designation: Chief Chemist<br>Signature: <br>20.09.2021<br><b>Md. Biplab Hossain</b><br>Chief Chemist<br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |
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Lab Memo: 157/ CC, DPHE, CL, Dhaka

Date: 20-09-2021

**Physical /Chemical/ Bacteriological Analysis of Water Sample**



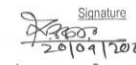

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| Sample ID: CEN2021090228   | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021            | Sample Source: Surface Water           |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212. | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : SW-12)                                      | Union:, Vill.: Mongla Confluence       |
| Sample Collection date: 06-04-2021   | Date of Testing: 30/05/2021-02/08/2021 |

**LABORATORY TEST RESULTS:**

| Sl.# | Water quality parameters     | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ     |
|------|------------------------------|---------------------|-----------------------|------|--------------------|---------|
| 1    | Arsenic (As)                 | 0.05                | 0.002                 | mg/L | AAS                | 0.001   |
| 2    | Cadmium (Cd)                 | 0.005               | 0.0053                | mg/L | AAS                | 0.00015 |
| 3    | Chemical Oxygen Demand (COD) | 4.0                 | 472                   | mg/L | CRM                | -       |
| 4    | Cr (Total)                   | 0.05                | 0.0003                | mg/L | AAS                | 0.0003  |
| 5    | Hardness                     | 200-500             | 4200                  | mg/L | Titrimetric        | -       |
| 6    | Lead (Pb)                    | 0.05                | 0.014                 | mg/L | AAS                | 0.001   |
| 7    | Nitrogen (Nitrate)           | 10.0                | 1.7                   | mg/L | UVS                | 0.10    |
| 8    | Phosphate                    | 6.0                 | 0.79                  | mg/L | UVS                | 0.10    |
| 9    | Sulphate                     | 400                 | 13                    | mg/L | UVS                | 1.0     |
| 10   | Total Dissolved Solid (TDS)  | 1000                | 12100                 | mg/L | Multimeter         | -       |
| 11   | Total Suspended Solid (TSS)  | 10                  | 3                     | mg/L | Gravimetric Method | -       |



Comments: Sample was collected &amp; supplied by client.

N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.

|   |   |
|---|---|
| <b>Test Performed by:</b><br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br>Signature: <br>20.09.2021<br>2.) Name: Taslima Akhter<br>Designation: Sample Analyzer<br>Signature: <br>20.09.21 | <b>Countersigned/Approved by:</b><br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br>Signature: <br>20.09.2021<br>2.) Name: Md. Biplab Hossain<br>Designation: Chief Chemist<br>Signature: <br>20.09.2021<br><b>Md. Biplab Hossain</b><br>Chief Chemist<br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |
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| Lab Memo: 157/ CC, DPHE, CL, Dhaka  |  | Date: 20-09-2021   |



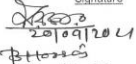

## Physical /Chemical/ Bacteriological Analysis of Water Sample



|  |  |
|--|--|
| Sample ID: CEN2021090229   | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021            | Sample Source: Surface Water           |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212. | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : SW-13)                                      | Union:, Vill.: Harbaria                |
| Sample Collection date: 07-04-2021   | Date of Testing: 30/05/2021-02/08/2021 |

## LABORATORY TEST RESULTS:

| Sl.# | Water quality parameters     | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ     |
|------|------------------------------|---------------------|-----------------------|------|--------------------|---------|
| 1    | Arsenic (As)                 | 0.05                | 0.002                 | mg/L | AAS                | 0.001   |
| 2    | Cadmium (Cd)                 | 0.005               | 0.0030                | mg/L | AAS                | 0.00015 |
| 3    | Chemical Oxygen Demand (COD) | 4.0                 | 424                   | mg/L | CRM                | -       |
| 4    | Cr (Total)                   | 0.05                | 0.002                 | mg/L | AAS                | 0.0003  |
| 5    | Hardness                     | 200-500             | 4400                  | mg/L | Titrimetric        | -       |
| 6    | Lead (Pb)                    | 0.05                | 0.014                 | mg/L | AAS                | 0.001   |
| 7    | Nitrogen (Nitrate)           | 10.0                | 2.6                   | mg/L | UVS                | 0.10    |
| 8    | Phosphate                    | 6.0                 | 0.60                  | mg/L | UVS                | 0.10    |
| 9    | Sulphate                     | 400                 | 5                     | mg/L | UVS                | 1.0     |
| 10   | Total Dissolved Solid (TDS)  | 1000                | 12400                 | mg/L | Multimeter         | -       |
| 11   | Total Suspended Solid (TSS)  | 10                  | 14                    | mg/L | Gravimetric Method | -       |

Comments: Sample was collected & supplied by client.  
 N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.

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| <b>Test Performed by:</b><br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br>Signature: <br>20.09.2021<br>2.) Name: Taslima Akhter<br>Designation: Sample Analyzer<br>Signature: <br>20.09.21 | <b>Countersigned/Approved by:</b><br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br>Signature: <br>20.09.2021<br>2.) Name: Md. Biplob Hossain<br>Designation: Chief Chemist<br>Signature: <br>20.09.2021<br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |
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|  | <b>Government of the People's Republic of Bangladesh</b><br><b>Office of the Chief Chemist</b><br><b>Department of Public Health Engineering</b><br><b>Central Lab, 38-39, Mohakhali C/A, Dhaka-1212</b><br>Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com |  |
| Lab Memo: 157/ CC, DPHE, CL, Dhaka  |  | Date: 20-09-2021  |



## Physical /Chemical/ Bacteriological Analysis of Water Sample



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| Sample ID: CEN2021090230   | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021            | Sample Source: Surface Water           |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212. | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : SW-14)                                      | Union:, Vill.: Akram Point             |
| Sample Collection date: 09-04-2021   | Date of Testing: 30/05/2021-02/08/2021 |

## LABORATORY TEST RESULTS:

| Sl.# | Water quality parameters     | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ     |
|------|------------------------------|---------------------|-----------------------|------|--------------------|---------|
| 1    | Arsenic (As)                 | 0.05                | 0.002                 | mg/L | AAS                | 0.001   |
| 2    | Cadmium (Cd)                 | 0.005               | 0.0025                | mg/L | AAS                | 0.00015 |
| 3    | Chemical Oxygen Demand (COD) | 4.0                 | 392                   | mg/L | CRM                | -       |
| 4    | Cr (Total)                   | 0.05                | 0.0003                | mg/L | AAS                | 0.0003  |
| 5    | Hardness                     | 200-500             | 4300                  | mg/L | Titrimetric        | -       |
| 6    | Lead (Pb)                    | 0.05                | 0.018                 | mg/L | AAS                | 0.001   |
| 7    | Nitrogen (Nitrate)           | 10.0                | 2.8                   | mg/L | UVS                | 0.10    |
| 8    | Phosphate                    | 6.0                 | 3.0                   | mg/L | UVS                | 0.10    |
| 9    | Sulphate                     | 400                 | 5                     | mg/L | UVS                | 1.0     |
| 10   | Total Dissolved Solid (TDS)  | 1000                | 18500                 | mg/L | Multimeter         | -       |
| 11   | Total Suspended Solid (TSS)  | 10                  | 11                    | mg/L | Gravimetric Method | -       |

Comments: Sample was collected & supplied by client.  
 N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.

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| <b>Test Performed by:</b><br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br>Signature: <br>20.09.2021<br>2.) Name: Taslima Akhter<br>Designation: Sample Analyzer<br>Signature: <br>20.09.21 | <b>Countersigned/Approved by:</b><br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br>Signature: <br>20.09.2021<br>2.) Name: Md. Biplob Hossain<br>Designation: Chief Chemist<br>Signature: <br>20.09.2021<br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |
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|  | <b>Government of the People's Republic of Bangladesh</b><br><b>Office of the Chief Chemist</b><br><b>Department of Public Health Engineering</b><br><b>Central Lab, 38-39, Mohakhali C/A, Dhaka-1212</b><br>Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com |  |
| Lab Memo: 157/ CC, DPHE, CL, Dhaka  |  | Date: 20-09-2021   |

## Physical /Chemical/ Bacteriological Analysis of Water Sample


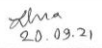
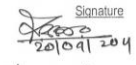

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| Sample ID: CEN2021090231   | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021            | Sample Source: Ground Water            |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212. | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : GW-01)                                      | Union:, Vill.: Rajnagar                |
| Sample Collection date:  | Date of Testing: 30/05/2021-02/08/2021 |



## LABORATORY TEST RESULTS:

| Sl.# | Water quality parameters     | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ   |
|------|------------------------------|---------------------|-----------------------|------|--------------------|-------|
| 1    | Arsenic (As)                 | 0.05                | 0.003                 | mg/L | AAS                | 0.001 |
| 2    | Chemical Oxygen Demand (COD) | 4.0                 | 32                    | mg/L | CRM                | -     |
| 3    | Hardness                     | 200-500             | 1600                  | mg/L | Titrimetic         | -     |
| 4    | Lead (Pb)                    | 0.05                | 0.008                 | mg/L | AAS                | 0.001 |
| 5    | Nitrogen (Nitrate)           | 10.0                | 1.0                   | mg/L | UVS                | 0.10  |
| 6    | Phosphate                    | 6.0                 | 0.98                  | mg/L | UVS                | 0.10  |
| 7    | Sulphate                     | 400                 | 1                     | mg/L | UVS                | 1.0   |
| 8    | Total Dissolved Solid (TDS)  | 1000                | 450                   | mg/L | Multimeter         | -     |
| 9    | Total Suspended Solid (TSS)  | 10                  | 1                     | mg/L | Gravimetric Method | -     |

Comments: Sample was collected &amp; supplied by client.

N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.

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| <b>Test Performed by:</b><br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br><br>20.09.2021<br>2.) Name: Taslima Akhter<br>Designation: Sample Analyzer<br><br>20.09.21 | <b>Countersigned/Approved by:</b><br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br><br>20.09.2021<br>2.) Name: Md. Biplab Hossain<br>Designation: Chief Chemist<br><br>20.09.2021<br><b>Md. Biplab Hossain</b><br>Chief Chemist<br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |
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|  | <b>Government of the People's Republic of Bangladesh</b><br><b>Office of the Chief Chemist</b><br><b>Department of Public Health Engineering</b><br><b>Central Lab, 38-39, Mohakhali C/A, Dhaka-1212</b><br>Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com |  |
| Lab Memo: 157/ CC, DPHE, CL, Dhaka  |  | Date: 20-09-2021  |

## Physical /Chemical/ Bacteriological Analysis of Water Sample


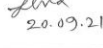
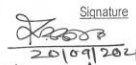
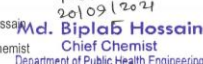
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| Sample ID: CEN2021090232   | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021            | Sample Source: Ground Water            |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212. | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : GW-02)                                      | Union:, Vill.: Karpasdanga             |
| Sample Collection date:  | Date of Testing: 30/05/2021-02/08/2021 |

## LABORATORY TEST RESULTS:

| Sl.# | Water quality parameters     | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ   |
|------|------------------------------|---------------------|-----------------------|------|--------------------|-------|
| 1    | Arsenic (As)                 | 0.05                | 0.058                 | mg/L | AAS                | 0.001 |
| 2    | Chemical Oxygen Demand (COD) | 4.0                 | 8                     | mg/L | CRM                | -     |
| 3    | Hardness                     | 200-500             | 1200                  | mg/L | Titrimetic         | -     |
| 4    | Lead (Pb)                    | 0.05                | 0.002                 | mg/L | AAS                | 0.001 |
| 5    | Nitrogen (Nitrate)           | 10.0                | 2.0                   | mg/L | UVS                | 0.10  |
| 6    | Phosphate                    | 6.0                 | 4.0                   | mg/L | UVS                | 0.10  |
| 7    | Sulphate                     | 400                 | 1                     | mg/L | UVS                | 1.0   |
| 8    | Total Dissolved Solid (TDS)  | 1000                | 570                   | mg/L | Multimeter         | -     |
| 9    | Total Suspended Solid (TSS)  | 10                  | 1                     | mg/L | Gravimetric Method | -     |

Comments: Sample was collected &amp; supplied by client.

N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.

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| <b>Test Performed by:</b><br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br><br>20.09.2021<br>2.) Name: Taslima Akhter<br>Designation: Sample Analyzer<br><br>20.09.21 | <b>Countersigned/Approved by:</b><br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br><br>20.09.2021<br>2.) Name: Md. Biplab Hossain<br>Designation: Chief Chemist<br><br>20.09.2021<br><b>Md. Biplab Hossain</b><br>Chief Chemist<br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |
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|  | <b>Government of the People's Republic of Bangladesh</b><br><b>Office of the Chief Chemist</b><br><b>Department of Public Health Engineering</b><br><b>Central Lab, 38-39, Mohakhali C/A, Dhaka-1212</b><br>Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com |  |
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Lab Memo: 157/ CC, DPHE, CL, Dhaka

Date: 20-09-2021

**Physical /Chemical/ Bacteriological Analysis of Water Sample**





|   |  |
|---|--|
| Sample ID: CEN2021090233  | Sample Receiving date: 30-05-2021      |
| Ref. Memo No: 42.06.2626.119.37.001.21-0317 & Dated: 30-05-2021           | Sample Source: Ground Water            |
| Sent by: Md. Mutasim Billah, Project Leader, CEGIS, Gulshan-1, Dhaka-1212 | Dist: Bagerhat, Upa: Rampal            |
| Care Taker: CEGIS (Sample ID : GW-03)                                     | Union:, Vill.: Project Site            |
| Sample Collection date:   | Date of Testing: 30/05/2021-02/08/2021 |

**LABORATORY TEST RESULTS:**

| Sl.# | Water quality parameters     | Bangladesh Standard | Concentration present | Unit | Analysis Method    | LOQ   |
|------|------------------------------|---------------------|-----------------------|------|--------------------|-------|
| 1    | Arsenic (As)                 | 0.05                | 0.002                 | mg/L | AAS                | 0.001 |
| 2    | Chemical Oxygen Demand (COD) | 4.0                 | 16                    | mg/L | CRM                | -     |
| 3    | Hardness                     | 200-500             | 1400                  | mg/L | Titrimetric        | -     |
| 4    | Lead (Pb)                    | 0.05                | 0.003                 | mg/L | AAS                | 0.001 |
| 5    | Nitrogen (Nitrate)           | 10.0                | 1.0                   | mg/L | UVS                | 0.10  |
| 6    | Phosphate                    | 6.0                 | 1.4                   | mg/L | UVS                | 0.10  |
| 7    | Sulphate                     | 400                 | 1                     | mg/L | UVS                | 1.0   |
| 8    | Total Dissolved Solid (TDS)  | 1000                | 810                   | mg/L | Multimeter         | -     |
| 9    | Total Suspended Solid (TSS)  | 10                  | 1                     | mg/L | Gravimetric Method | -     |

Comments: Sample was collected &amp; supplied by client.

N.B: AAS- Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ- Limit of Quantitation.

|  |  |
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| <b>Test Performed by:</b><br>1.) Name: Md. Saiful Alam Khosru<br>Designation: Sample Analyzer<br><br>20.09.2021<br>2.) Name: Taslima Akhter<br>Designation: Sample Analyzer<br><br>20.09.21 | <b>Countersigned/Approved by:</b><br>1.) Name: Mita Sarker<br>Designation: Senior Chemist<br><br>20.09.2021<br>2.) Name: Md. Biplab Hossain<br>Designation: Chief Chemist<br><br>20.09.2021<br><b>Md. Biplab Hossain</b><br><b>Chief Chemist</b><br>Department of Public Health Engineering<br>Central Laboratory Mohakhali, Dhaka |
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