Environmental Impact Assessment
of

Coal Transportation for the Proposed 2X660 MW Coal Based Maitree Super Thermal Power Project at Rampal, Bagerhat, Bangladesh

Volume lll: Annexure

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Annex 1-1: Approved ToR for EIA of the Coal Transportation for the Proposed 2X660 MW Coal based Maitree STPP, Rampal, Bagerhat

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

Memo No: DoE/Clearance/5532/2016/37

Date: 12/01/2016

Subject: Approval of Terms of Reference for EIA of the Coal Transportation for the proposed Khulna 1320 MW coal based thermal power plant construction project at Rampal Upazila under Bagerhat district.

Ref: Your Application dated 06/12/2015.

With reference to your letter dated 06/12/2015 for the subject mentioned above, the Department of Environment hereby gives approval of TOR for Environmental Impact Assessment (EIA) of the proposed construction of Coal Transportation for the proposed Khulna 1320 MW coal based thermal power plant construction project at Rampal Upazila under Bagerhat district subject to fulfilling the following terms and conditions.

I. The project authority shall submit a comprehensive Environmental Impact Assessment (EIA) Report considering the overall activity of the proposed Project in accordance with the TOR and time schedule submitted to the Department of Environment (DOE).
II. The EIA report should be prepared in accordance with following indicative outlines:

Executive Summary

1.0 Introduction
- 1.1 Background
- 1.2 Rationale of the Project
- 1.3 Importance of the Project
- 1.4 Objective of the Study
- 1.5 Scope of EIA Study
- 1.6 Approach and Methodology
- 1.7 The EIA Team

2.0 Legal and Legislative Framework, Regulations and Policy Considerations Legislative, regulation and policy consideration (covering the potential legal, administrative, planning and policy framework within which the EIA will be prepared)

3.0 Project Data Sheet
- 3.1 Project Proponent
- 3.2 Project location and area
- 3.3 Nature of the Project
- 3.4 Project Components
- 3.5 Project Activities
- 3.6 Project schedule
- 3.7 Resources and utilities demand

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4.0 Project Description
4.1 Project Objective
4.2 Project Site
4.3 Project Layout
4.4 Land Requirement
4.5 Project Options

5.0 Analysis of different alternatives of coal transportation plans, transshipment, etc. (this analysis shall be performed, among other approaches, in a GIS based Spatial Decision Support System (SDSS) presenting the suitability of different options for both the interventions)

6.0 Detail description of the study area (with all the existing resource classes along with area coverages shall be shown in the respective maps derived from updated image of proper spatial and spectral resolution. Basic information (name of satellite, date and time of acquisition with atmospheric condition, spatial resolution, color composite etc.) of the image data to be used for making such maps shall be mentioned)

7.0 Environmental and Social Baseline : Component and methodology (Seasonal Variation should be covered)

7.1 Meteorology
- 7.1.1 Temperature
- 7.1.2 Humidity
- 7.1.3 Rainfall
- 7.1.4 Evaporation
- 7.1.5 Wind Speed
- 7.1.6 Sun Shine Hours

7.2 Water Resources
- 7.2.1 Surface Water System
- 7.2.2 Tropical Cyclones and Tidal Flooding
- 7.2.3 Salinity
- 7.2.4 Drainage Congestion and Water Logging
- 7.2.5 Erosion and Sedimentation
- 7.2.6 River Morphology
- 7.2.7 Navigation
- 7.2.8 Ground Water System

7.3 Land Resources
- 7.3.1 Agroecological Regions
- 7.3.2 Land Types
- 7.3.3 Soil Texture
- 7.3.4 Land Use

7.4 Agriculture Resources
- 7.4.1 Farming Practice
- 7.4.2 Cropping Pattern and Intensity
- 7.4.3 Cropped Area
- 7.4.4 Crop Production
- 7.4.5 Crop Damage
- 7.4.6 Main Constraints of Crop Production

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7.5 Fisheries
- 7.5.1 Introduction
- 7.5.2 Problem and Issues
- 7.5.3 Habitat Description
- 7.5.4 Fish Production and Effort
- 7.5.5 Brakish Water and Pond Aquaculture
- 7.5.6 Fish Migration
- 7.5.7 Fish Biodiversity
- 7.5.8 Fisheries Management

7.6 Ecological Resources
- 7.6.1 Bio-ecological Zone
- 7.6.2 Common Flora and Fauna
- 7.6.3 Ecosystem Services and Function

7.7 Socio Economic Condition
- 7.7.1 Socio Economic Condition
- 7.7.2 Quality of Life Indicators
- 7.7.3 Income and Poverty
- 7.7.4 Gender and Women
- 7.7.5 Common Property Resources
- 7.7.6 Conflict of Interest and Law and Order Situation
- 7.7.7 Historical, Cultural and Archaeological Sites

8.0 Identification and Analysis of Key Environmental Issues (Analysis shall be presented with Scenarios, Maps, Graphics, etc. for the Case of Anticipated Impacts on Baseline)
- 8.1 Environmental Sensitivity Investigation
- 8.2 Environmental Asset
- 8.3 Environmental Hot Spots
- 8.4 Likely Beneficial Impacts
- 8.5 Community Recommendations
- 8.6 Alternate Analysis

9.0 Environmental and Social Impacts
- 9.1 Introduction
- 9.2 Impact on Water Resources
- 9.3 Impact on Land Resources
- 9.4 Impact on Naval Traffic
- 9.5 Impact on Agriculture Resources
- 9.6 Impact on Fisheries
- 9.7 Impact on Eco System and Biodiversity
- 9.8 Impact on River Bank
- 9.9 Impact on Water, Air and Soil Quality
- 9.10 Socio Economic Impact

10.0 Evaluation of Impacts

The impacts should be evaluated in terms of their local, regional and national importance. The impact should be assessed in terms of the magnitude, significance, frequency of the occurrence, duration and probability. Modeling of Noise and Air emission from ships engaged in coal transshipment and transportation should be incorporated. The confidence level in the prediction must be stated. The judgment of significance of impacts can be based on one or more of the following, depending on the environmental factor being evaluated. These are :

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ii. conformance with laws, regulation or accepted practices or prescribed standards

iii. reference to pre-set criteria such as conservation or protected status of a site, feature or species

iii. consistency with pre-set policy objectives

iv. consultation and acceptability with the relevant decision makers, civil society, local community or the general public.

11.0 Cumulative Impacts

i. future Projection for activities related to Coal transportation
ii. transshipment and movement of other Water vessels
iii. traffic volume and air emission in the surrounding environment

12.0 Mitigation of Impacts

Mitigation measures which may be of the following categories and coverages:

i. changing project layout, transport routes, disposal routes or locations, timing or engineering design
ii. introducing pollution controls, waste treatment, phased implementation and construction, engineering measures, monitoring, social services or public education;
iii. rehabilitation, compensation to restore, relocate or provision of concession for damage

13.0 Environmental Management Plan

13.1 EMP during Construction Phase
13.2 EMP during Operation Phase
13.3 Greenbelt Development
13.4 Budget for EMP
13.5 Contingency Plans

14.0 Risk Assessment

14.1 Consequence Analysis
14.2 Emergency Response Plan
14.3 Risk Mitigation Measures

15.0 Environment Monitoring Plan

15.1 Monitoring Plan
15.1.1 Ambient Air Monitoring
15.1.2 Meteorological Monitoring
15.1.3 Ambient Noise Monitoring
15.1.4 Surface Water & Waste Water Monitoring
15.1.5 Ground Water Monitoring
15.1.6 Solid & Hazardous Waste Monitoring
15.1.7 Flora and Fauna Monitoring
15.1.8 Workers Health and Safety Monitoring
15.1.9 Monitoring of Disaster Management Plan (DMP)
15.2 Action During Abnormal Operating conditions
15.3 Budgets for Monitoring
15.4 Reporting

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16.0 Public Consultation and Disclosure
- 16.1 Introduction
- 16.2 Objectives of Public Consultation and Disclosure Meeting
- 16.3 Approach and Methodology of Public Consultation and Disclosure Meeting
- 16.4 Public Consultation Meetings (PCMs)
- 16.5 Public Disclosure Meetings (PDMs)

17.0 Conclusion and Recommendation

III. Without obtaining approval of EIA report by the Department of Environment, the project authority shall not be able to start the physical activity of the project and also not be able to open L/C in favor of importable machineries.

IV. Rehabilitation of human settlement or compensation for any sort of activity which will incur damage or loss of public or private property shall be addressed as per Government of Bangladesh rules and regulations.

V. The project authority shall submit the EIA along with a filled-in application for Environmental Clearance in prescribed form, the applicable fee in a treasury Chalan, the Feasibility Report, the No Objection Certificates (NOCs) from the local authority, NOCs from forest department (if it is required in case of cutting any forested plant, private or public) and NOC from other relevant agencies for operational activity etc. to the Bagerhat District Office of DOE with a copy to the Head Office of DOE in Dhaka.

VI. A soft copy of the image data as well as the maps to be generated from the image shall be submitted to DOE Head Office along with the EIA.

12.01.2016

(Syed Nazmul Ahsan)
Director (Environmental Clearance. c.c)
Phone # 8181778

Project Director
Chittagong & Khulna 1320 MW X 2 Coal Based
Power Station Construction Project
Bangladesh Power Development Board (BPDB), Dhaka.

Copy Forwarded to :

1. PS to Secretary, Ministry of Environment and Forests, Bangladesh Secretariat, Dhaka.
2. Director, Department of Environment, Khulna Divisional Office, Khulna.
3. Deputy Director/Office in charge, Department of Environment, Bagerhat District office, Bagerhat.
4. Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

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Section 6. Terms of Reference

1.0 Introduction:

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 intends to construct a coal based power plant named 2X660 MW Maitree Super Thermal Power Plant 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:

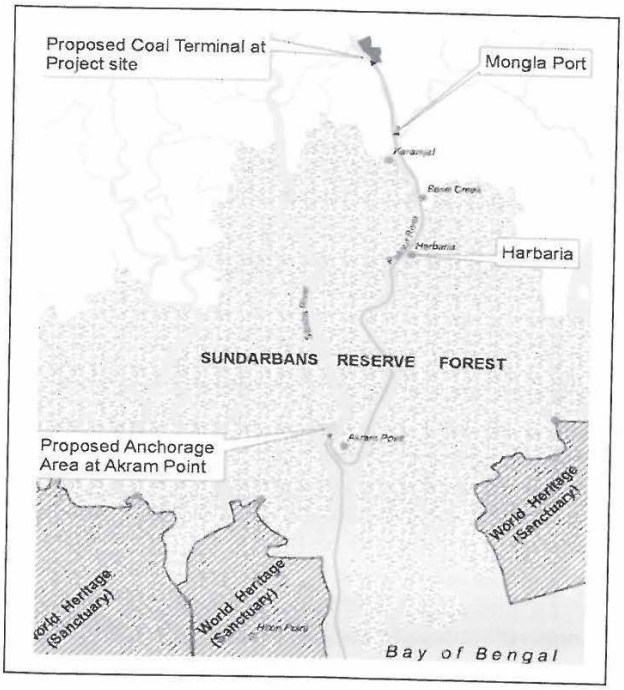
Project Location:	Upazila: Rampal, District: Bagerhat Site is located at 23 kms Southward of Khulna City and 14 kms. North-Eastward from Mongla Port. 
Project Capacity:	1320 MW (2x660 MW), based on Super-critical Technology
Mode of Operation:	Base Load
Fuel:	Imported Coal, having GCV as 5400-6300kCal/Kg with Max.18% ash and Max. 1 % sulphur. Approx. 4.47 MTPA coal may be required for the project annually. A Consultant is being appointed by the BIFPCL for recommendation on sourcing of coal and logistics.
Fuel Transportation:	It is envisaged that imported coal from countries like Indonesia, Australia shall be transported through bigger ships, up to trans-shipment point (Akram 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.

Land& Land Development:	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 and about 100Acres of land for ash disposal). As per the survey data received, the levels of the natural ground vary between RL (+) 0.75 to RL (+) 1.25M. The HFL of the area is about RL (+) 4.5M. Hence, RL (+) 5.0M is proposed as plant formation level. To achieve the desired formation level land filling has been carried out at the site by dredging from the nearby river.
Evacuation of power:	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.
Expected Timeline for project implementation	The first unit of capacity 660 MW is scheduled to be synchronised in 41 months from the date of award to the EPC contractor for the Power project. Commissioning of the second unit of capacity 660 MW is envisaged at an interval of 5 months thereafter.

2.0 Background

The project will require around 4.7 Million metric Tons of coal per Annum which will be imported from the outside source countries. Generally, thermal coal is primarily transported in Bulk Carriers which is specially designed to maximize the capacity, safety, and efficiency. Apparently, Substantial progress has been made at international and regional level regarding these bulk carriers. But, at the same time these vessels have drawn great attention as it passes through the Passur River inside the Sundarbans for carrying coal for the Rampal project. The coal transportation route is presented in the Map-1.

The EIA for this power plant project has been conducted after two years of comprehensive study which includes the activities like land development, plant construction, coal transportation and plant operation etc. The coal sourcing, transportation and handling system for this power plant project had discussed in the volume-V appended with the EIA report *(Environmental Impact Assessment of 1320 MW Coal Based Thermal Power Plant to be constructed at the location of Khulna)*. Accordingly, Department of Environment (DoE) has approved the EIA report on 5th August 2013 under certain (59) conditions that will be complied at different stages of the project life. As per the condition of (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." It may be noted that, a separate EIA study has been conducted for dredging activities of Passur River by the Mongla Port Authorities and that has already been submitted to DoE for final approval. Moreover, the coal logistic study has been carried out for this power plant. The proponent is monitoring the social and environmental parameters quarterly in the study area through third party for nearly two years.

Under the above circumstances, this present ESIA study is limited to the coal transportation for the project to develop sound environmental management plan towards conservation of ecosystem and biodiversity including Sundarbans for complying the 53rd conditions of DoE approval.

3.0 Objective of the Assignment

The objectives of this consultancy service are to carry out Environmental Impact Assessment (EIA) of coal transportation for the proposed Bangladesh-India maitree super thermal power plant

The specific objectives are:

i. Reviewing the earlier reports, relevant to the present study

ii. Preparing an comprehensive environmental baseline on the basis of the data collected so far under the ongoing Environmental Monitoring Study being carrying out by CEGIS and earlier EIA study, logistic studies of PWC, India and other studies.

iii. Identifying environmental and other regulatory requirements of DoE, DOF, BIWTA, Mongla Port Authority, Navy, Coast Guard and other relevant organization within Bangladesh, and International Organizations (such as IMO), and conventions like MARPOL, SOLAS, Convention on Facilitation of International Maritime Traffic, London, 1965, Load lines Convention, 1986 etc. and IFC performance standards/ World Bank guideline for coal transportation, UNESCO, RAMSAR etc.

iv. Assessing weather, sea conditions and other factors that limit the use of barges for coal transportation.

v. Assessing all the potential environmental and socio-economic impact of the proposed coal transportation and associated transshipment.

vi. Preparing an comprehensive Environmental Management Plan for coal transportation to ensure saveguarding to the Sundarbans and its surrounding environment.

4.0 Scope of the Environmental Impact Assessment (EIA)

The scope of works includes carrying out Environmental Impact Assessment of the proposed coal transportation (which will be called as 'the project' later on) that will satisfy the applicable environmental requirements, including the laws, bylaws and rules of Bangladesh and safety guidelines. The impacts assessment needs to be carried out for the coal transportation and transshipment activities to be happening between Fairway Buoy to Power Plant Site Jetty. The scope as specified here (which will be called the ToR for the proposed study)is to be submitted to DoE for their approval and it is the responsibility of the consultant to get the approval of DoE. The scope of work is described below:

Task 1. Describe the proposed Activities

From the reviewing and understanding of the existing available documents, a brief description on coal transportation planning, routes, voyage planning, infrastructure planning, coal jetty facilities, coal management etc. should be prepared.

Task 2. Description of the Environment(baseline conditions)

An environmental baseline needs to be prepared on the basis of the available data collected during environmental monitoring study, earlier EIA studies and coal logistic study. The baseline should cover description of biodiversity and ecosystem of the study area , Health of trees in the monitored location of Sundarbans, Dolphin sanctuaries in the Passur river, (Other rare, endangered and threatened species as per Bangladesh Law as well as IUCN Red List) should be clearly identified and mapped with respect to the coal handling and transportation route. Fisheries resources in Passur river up to Bay of Bengal confluences, change in hydro-morphological condition of the Passur river based on available secondary data, socio-economic condition of the Sundarbans dependent livelihoods group, existing river traffic in Passur river, ambient environmental quality (Air, noise, water, soil, etc.) will also be considered. The critical habitats of the floral and faunal diversity based on the observed monitoring locations need to be mapped and the assessed in line with the critical habitat assessment as specified in the IFC PS 6.

Baseline study should provide a sensitivity analysis of the entire coal transportation route and identify sensitive locations / hotspots. Social receptors like fishing and transportation should also be identified.

Baseline study locations need to be selected based on the sensitivity and by taking uniform grids along the coal transportation route. Monitoring should include relevant parameters required by relevant sector specific guidelines.

Task 3. Legislative and Regulatory Considerations

The pertinent policies, laws, regulations and standards relevant or applicable law of Bangladesh and International Organizations (such as IMO), and conventions like MARPOL, SOLAS, Convention on Facilitation of International Maritime Traffic, London, 1965, Load lines Convention, 1986 etc. and IFC performance standards/ World bank guideline for coal transportation, UNESCO, RAMSAR etc. Habitatquality, protection of biological diversity particularly of ECA sites, World Heritage, RAMSAR sites, protected areas, sanctuaries and all other sensitive and ecologically fragile locationsas should be reviewed. The study would also cover health and safety aspects related to coal transport and transhipment . The possible implications of the policies, laws, regulations and standards on the proposed activities need to be covered under this study.

Task 4. Determination of the Potential Impacts of the Proposed Project

The consultant will assess potential significant impacts due to coal transportation traffic volume likely to generate, in quantitative and qualitative terms as far as possible. These may include::

- Pollution (ambient air, water and noise) from the coal carrying ships and their impacts on surrounding study area
- Impacts of coal transportation on aquatic habitats including Dophins, based on expert judgement
- Qualitative assessment of impacts that may occur due to accidental events as well as the impacts that are unavoidable or irreversible.
- Qualitative risk analysis of accidental events keeping in views the adequacies of exiting accident prevention, surveillance, monitoring, enforcement and contingency measures

by Mongla port Authority, BIWTA/BIWTC, Bangladesh Navy and Coast Guard to design adequate risk avoidance , prevention and mitigation measures

- Modeling of noise propagation from project related ships (Above water only)
- Dispersion Modeling of Air emission from ships engaged in coal transshipment and transportation
- Qualitative impact assessment of dredging on sensitive receptors and biodiversity (on the basis of the EIA of dredging carrying out by Mongla Port Authority);
- Impact on livelihood in relation to fishing activities along the coal transportation route
- Impact assessment (qualitative basis) due to wave generated from the project related ships

Task 5. Analysis of Alternatives to the Proposed Project

EIA should cover environmental analysis of different alternatives of coal transportation routes, plans, transshipment options, etc. as described in the Coal logistic study.

Task 6. Cummulative Impact Assessment

The consultant will carry out the impact assessment along with future projection for activities related to coal transportation and associated transshipment as well as movement of other vessels to identify cumulative impacts of all of them on the traffic volume including air emission in the surrounding environment (within the 10 km reach on both banks of the Passur river along the coal transportation route).

Task 7. Hazard Identification and Risk Assessment

The EIA should cover an assessment of environmental risk associated with the coal transportation. The risk assessment should include accidental events like sunken of vessel, collision, natural calamities etc. The study should also include emergency response plan, necessary risk management plan, safety procedures for ship operation, coal transshipment, operation of floating transfer vessel, ship anchoring etc.

Task 8. Environmental Management Plan:

The consultant will recommend feasible and cost-effective measures to prevent or reduce significant negative impacts of coal transportation and transshipment to acceptable levels. This will include measures to address the emergency response requirements for accidental events and occupational health & safety as well as surveillance, monitoring and enforcement requirements.

Prepare a management plan including proposed work programs, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures.

Provide environmental protection measures to be applicable for coal transportation contractor, Mongla Port Authority and the project proponent as well. If necessary recommend plans for biodiversity offsets, safeguarding measures for protecting surrounded ecosystem and safeguarding measures for wildlife.

The consultant will prepare a detail plan to monitor the implementation of mitigating measures and other project activities (such as training and institutional strengthening) needed to conduct it during construction and operation phase. This will include an estimation of capital and operating costs needed to implement the plan.

Task 9 Holding public consultation with all the stake holders in line with DoE guide lines and all other associated work dimmed necessary as per law of Bangladesh for obtaining the Approval of the ESIA study for Coal Transportation from DoE

Task 10 Obtaining the Approval of the ESIA study for Coal Transportation from DoE

5.0 Terms of Payment:

5.1 Advance Payment

- 10% Advance Payment (phase wise) shall be made to the Consultant. The Advance Payment shall be made against the provision of a Bank Guarantee by the Consultant which shall:

  (a) Remain effective until 100 percent (100%) Advance Payment has been adjusted as specified; and
  (b) Be in the format specified in the RFP Document

- Advance Payments will be adjusted by the Client on pro-rata basis during each interim payment and final payment.

5.2 Payment Schedule

Interim Payment and Final payment

Sl. No.	Payment schedule and conditions to be fulfilled	% of the contract price
1	Submission of Draft Report on ESIA Study	30
2	Submission of Final Report on ESIA Study after incorporation of comments of BIFPCL/BPDB	30
3	Acceptance of Final Report of ESIA for Coal Transportation Study by DoE	40

6.0 Resources Requirement/Qualification of Professionals

The consulting services should be completed by a team of multidisciplinary experts capable of undertaking the study in line with scope of work & as mentioned in the table below:

Table 1: Qualification and Experience required for the Firm

Sl. No.	Criteria	Requirements
1	General / overall experience.	Minimum 15 (Fifteen) years overall experience in IEE, ESIA and other relevant fields.
2	Specific Experience.	Project experience in the field of: Coal based Power Plant, Coal Transportation and Logistics Study, Coal Transshipment, Marine Biology, River morphology, Modeling , ecology, sundarban expert

Annex 1-2: Approval Letter of EIA Report for Proposed 2X660 MW Coal based Maitree STPP, Rampal, Bagerhat

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

Memo No : DoE/Clearance/5062/2011/206 Date:05 /08/2013

Subject: **Approval of Environmental Impact Assessment (EIA) Report for Proposed Khulna 1320 MW Coal Based Thermal Power Plant Construction Project at Rampal Upazila under Bagerhat district..**

Ref: Your Application dated 27/10/2011, 28/11/2011, 29/04/2012, 15/07/2012, 05/08/2012, 05/09/2012, 16/ 01/2013, 02/06/2013 and 09/07/2013.

With reference to the above, the Department of Environment (DOE) is pleased to approve Environmental Impact Assessment (EIA) Report for Proposed Khulna 1320 MW Coal Based Thermal Power Plant Construction Project at Rampal Upazila under Bagerhat district. This approval authorizes and regulates the following activities:

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.
2. The coal specification and power plant technology should be maintained as per EIA Report. In case of any changes in design the proponent must obtain consent from DoE.
3. Project Proponent may undertake activities for land development and infrastructural development of the project.
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.
5. The activity under Proposed Khulna 1320 MW Coal Based Thermal Power Plant Construction Project shall not release any pollutant that affect human health or will have damaging impact on the environment or natural resources.
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.
7. Any heritage sight, ecologically critical area, and other environmentally, religious and archeologically sensitive places shall be kept protected during project construction phase.
8. Environment friendly construction and development practices shall be followed that minimize loss of habitats and fish breeding, feeding & nursery sites.

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9. Construction works shall be restricted to day time hours so as to avoid/mitigate the disturbance of local lives as well as implementation schedules of the works shall be notified in advance to nearby residents.
10. Proper and adequate sanitation facilities shall be ensured in labor camps throughout the proposed project period.
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.
12. No solid waste can be burnt in the project area. An environment friendly solid waste management system should be in place during the whole period of the project in the field.
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.
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.
15. To control dust, spraying of water over the earthen materials should be carried out from time to time.
16. Storage area for soils and other construction materials shall be carefully selected to avoid disturbance of the natural drainage.
17. Adequate considerations should be given to facilitate drainage system for run off water from rain/tidal surge.
18. Adequate facilities should be ensured for silt trap to avoid clogging of drain/canal/water bodies.
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 dust extraction and bag filters at unloading areas and at each transfer points on the conveyor system.
20. Coal plant should have high-efficiency bag filter for arresting dust emissions.
21. Coal should be stored in a covered storage yard.
22. The entire coal stockyard should be covered with water sprinkler provided with automated moisture sensor to control self-combustion.
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.
24. Integrated dry ash handling, loading, unloading and transportation system should be established.
25. There should be adequate and properly sized and designed dry ash silo with appropriate conveying system.
26. Bottom ash should be extracted, crashed and stored in silos for utilization with proper collection and conveying system.

27. Resettlement and Rehabilitation of the displaced population (including those who do not own land) should be done properly.
28. Resettlement plan should be properly implemented and people should be adequately compensated.
29. Construction material should be properly disposed off after the construction work is over.
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.
31. All activities (pre-construction, construction and post-construction stage) should be implemented according to EMP clearly listed in the EIA report.
32. A third party/independent monitoring bodies excluding JVC/BPDB 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.
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
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.
35. There should be regularly disclosure of the report through workshops and websites and responses should be taken care accordingly.
36. Online air and water quality monitoring system should be made functional throughout the life of the plant.
37. Management Information System (MIS) are 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 Department of Environment, BPDB and other concern 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
39. No ground water should be allowed to use for plant purposes.
40. Conduct stakeholder meetings on regular basis for better performance the project as a whole
41. Additional Environmental baseline data to be collected as suggested in the EIA report and conveyed to DOE and other concern authorities.

42. The Environmental Management Plan under the EIA study shall strictly be implemented and kept functioning on a continuous basis.

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 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.

45. The following records must be kept in respect of any samples required to be collected for the purposes of environmental monitoring activities :
(a) the date(s) on which the sample was taken;
(b) the time(s) at which the sample was collected;
(c) the point at which the sample was taken; and
(d) the name of the person who collected the sample.

46. The results of any monitoring required to be conducted under this EIA report must be recorded.

47. 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
a) Nature of incident (oil spill, fire, accident, collision, land slide etc.)
b) Personnel affected (injured, missing, fatalities, etc.)
c) Emergency support available and its location (standby transport, medical facilities, etc.)
d) Weather conditions
e) Current operations (abandoning the site, fire fighting, etc.)

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.

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.

50. Appropriate permission would require to be obtained from the Forest Department in favor of cutting/felling of any plant/tree/sapling forested by any individual or government before doing such type of activity.

51. Re-vegetation and replantation under green belt activities shall be undertaken in consultation with the Forest Department according to those mentioned in the EIA report.

52. Climate Change impacts and maximum storm surge height shall have to consider at the design and construction phase.

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 ecosystems and biodiversity.

54. A full-fledged institutional setup for EHS and CSR must be put in place before operation of the power plant.
55. The project authority shall extend active cooperation to DOE officials to facilitate their visit to the site as and when necessary.
56. Violation of any of the above conditions shall render this approval void.
57. Any injunction on this project from the Honorable Supreme Court/High Court Division shall render this approval void.
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.
59. This EIA Approval has been issued with the approval of the appropriate authority.

05.08.2013

(Syed Nazmul Ahsan)
Deputy Director (Environmental Clearance)
&
Member Secretary
Environmental Clearance Committee
Phone # 02-8181778

Project Director (Additional Chief Engineer)
Chittagong and Khulna 1300 MW Coal Based Thermal Power Plant Project
Bangladesh Power Development Board (BPDB)
Biddyut Bhaban (8th Floor)
1, Abdul Goni Road, Dhaka-1000, Bangladesh.

Copy Forwarded to :

1) Secretary, Ministry of Environment and Forests, Bangladesh Secretariat, Dhaka.
2) Secretary, Power Division, Ministry of Power, Energy & Mineral Resources, Bangladesh Secretariat, Dhaka.
3) Chairman, Bangladesh Power Development Board, Biddyut Bhaban, 1, Abdul Goni Road, Dhaka.
4) Director, Department of Environment, Khulna Divisional Office, Khulna.
5) Deputy Director, Department of Environment, Bagerhat District Office, Bagerhat.
6) Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

5/5

Annex 1-3: Brief Outline of the Conventions for Maritime Vessel

Sl. No.	Name of Conventions	Brief Outline of the Convention
1	International Maritime Organization (IMO)	The International Maritime Organization (IMO), known as the Inter-Governmental Maritime Consultative Organization (IMCO) until 1982, is a specialised agency of the United Nations responsible for regulating shipping. The IMO was established in Geneva in 1948 and came into force ten years later, meeting for the first time in 1959. Headquartered in London, United Kingdom, the IMO has 172 Member States and three Associate Members. The IMO's primary purpose is to develop and maintain a comprehensive regulatory framework for shipping and its remit today includes safety, environmental concerns, legal matters, technical co-operation, maritime security and the efficiency of shipping. IMO is governed by an assembly of members and is financially administered by a council of members elected from the assembly. The work of IMO is conducted through five committees and these are supported by technical subcommittees. Other UN organisations may observe the proceedings of the IMO. Observer status is granted to qualified non-governmental organisations.
2	Safety of Life at Sea (SOLAS), 1974	SOLAS Convention's main objective is to specify minimum standards for the construction, equipment and operation of ships, compatible with their safety. The convention includes; • regulations concerning the survey of the various types of ships and the issuing of documents signifying that the ship meets the requirements of the Convention; • provisions for the control of ships in ports of other Contracting Governments; • detailed fire safety provisions for all ships and specific measures for passenger ships, cargo ships and tankers; • requirements for watertight integrity and bilge pumping arrangements for passenger ships are also laid down as well as stability requirements for both passenger and cargo ships; • requirements on how to install machinery and electrical instruments/ equipments on the ship in order to maintain safety of the ship, passengers and crews; • requirements for life-saving appliances and arrangements, including requirements for life boats, rescue boats and life jackets according to type of ship; • regulations on the provision of radio communication services as well as ship requirements for carriage of radio communications equipment; • regulations for safe navigation; • regulations on safe carriage of hazardous and/ or dangerous cargoes; • detailed code of safety for Nuclear Merchant Ship;

Sl. No.	Name of Conventions	Brief Outline of the Convention
		• management for the Safe Operation of Ships, which includes an establishment of a safety management system for the ship; • safety measures for high-speed craft; • special measures to enhance maritime security; • additional safety measures for bulk carriers over 150 m in length and; • safety measures for ships operating in polar waters.
3	Prevention of Pollution from Ships (MARPOL), 1997 (amended)	The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention that covers regulations aimed at preventing and minimizing pollution from ships - both accidental pollution and that from routine operations. The Convention includes six technical Annexes: • **Annex I: Regulations for the Prevention of Pollution by Oil**, which covers prevention of pollution by oil from operational measures as well as from accidental discharges; • **Annex II Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk**, which details the discharge criteria and measures for the control of pollution by noxious liquid substances carried in bulk; • **Annex III Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form**, which contains general requirements for the issuing of detailed standards on packing, marking, labeling, documentation, stowage, quantity limitations, exceptions and notifications; • **Annex IV Prevention of Pollution by Sewage from Ships**, which contains requirements to control pollution of the sea by sewage; • **Annex V Prevention of Pollution by Garbage from Ships**, which deals with different types of garbage and specifies the distances from land and the manner in which they may be disposed of and; • **Annex VI Prevention of Air Pollution from Ships**, which sets limits on sulphur oxide and nitrogen oxide emissions from ship exhausts and prohibits deliberate emissions of ozone depleting substances.
4	International Maritime Solid Bulk Cargoes (IMSBC) Code	IMSBC code is an extension of “Chapter VI – the mandatory provisions governing the carriage of solid bulk cargoes” of the SOLAS, 1974 Convention. IMSBC Code replaces the Code of Safe Practice for Solid Bulk Cargoes (BC Code). The prime hazards associated with the shipment of solid bulk cargoes are those relating to structural damage due to improper cargo distribution, loss or reduction of stability during a voyage and chemical reactions of cargoes. Therefore, the primary aim of the IMSBC Code is to facilitate the safe stowage and shipment of solid bulk cargoes by providing information on the dangers associated with the shipment of certain types of solid bulk cargoes and instructions on the procedures to be adopted when the shipment of solid bulk cargoes is contemplated.

Annex 2-1: Environmental Quality Standards of Bangladesh: Schedule 2 to 11 of ECR, 1997, 2005, 2006

SCHEDULE – 2

Standards for Air
[See Rule 12]

Density in microgram per cusec meter

Sl. No.	Categories of Area	Suspended Particulate Maters (SPM)	Sulphur-dioxide	Carbon Monoxide	Oxides Nitrogen
a.	Industrial and mixed	500	120	5000	100
b.	Commercial and mixed	400	100	5000	100
c.	Residential and rural	200	80	2000	80
d.	Sensitive	100	30	1000	30

Notes:

(1) At national level, sensitive area includes monuments, health center, hospital, archeological site, educational institution, and government designated areas (if any).

(2) Industrial units located in areas not designated as industrial areas shall not discharge pollutants which may contribute to exceeding the standard for air surrounding the areas specified at Sl. nos. c and d above.

(3) Suspended Particulate Matter means airborne particles of a diameter of 10 micron or less.

SCHEDULE – 3

Standards for Water

[See Rule 12]

(A) Standards for inland surface water

Best Practice based classification	Parameter			
	pH	BOD mg/l	DO mg/l	Total Coliform number/100
a. Source of drinking water for supply only after disinfecting:	6.5-8.5	2 or less	6 or above	50 or less
b. Water usable for recreational activity :	6.5 – 8.5	3 or less	5 of more	200 or less
c. Source of drinking water for supply after conventional treatment :	6.5 – 8.5	6 of less	6 or more	5000 or less
d. Water usable by fisheries:	6.5 – 8.5	6 of less	5 or more	---
e. Water usable by various process and cooling industries :	6.5 – 8.5	10 or less	5 or more	5000 or less
f. Water usable for irrigation:	6.5 – 8.5	10 or less	5 or more	1000 or less

Notes:

1. In water used for pisiculture, maximum limit of presence of ammonia as Nitrogen is 1.2 mg/l.
2. Electrical conductivity for irrigation water – 2250 µmhoms/cm (at a temperature of 25°C); Sodium less than 26%; boron less than 0.2%.

(B) Standards for drinking water

Sl. No.	Parameter	Unit	Standards
1	2	3	4
1.	Aluminum	mg/l	0.2
2.	Ammonia (NH_3)	,,	0.5
3.	Arsenic	,,	0.05
4.	Balium	,,	0.01
5.	Benzene	,,	0.01

1	2	3	4
6.	BOD_5 20°C	,,	0.2
7.	Boron	,,	1.0
8.	Cadmium	,,	0.005
9.	Calcium	,,	75
10.	Chloride	,,	150 – 600*
11.	Chlorinated alkanes		
	carbontetrachloride	,,	0.01
	1.1 dichloroethylene	,,	0.001
	1.2 dichloroethylene	,,	0.03
	tetrachloroethylene	,,	0.03
	trichloroethylene	,,	0.09
12.	Chlorinated phenols		
	- pentachlorophenol	mg/l	0.03
	- 2.4.6 trichlorophenol	,,	0.03
13.	Chlorine (residual)	,,	0.2
14.	Chloroform	,,	0.09
15.	Chromium (hexavalent)	,,	0.05
16.	Chromium (total)	,,	0.05
17.	COD	,,	4
18.	Coliform (fecal)	n/100 ml	0
19.	Coliform (total)	n/100 ml	0
20.	Color	Hazen unit	15
21.	Copper	mg/l	1
22.	Cyanide	,,	0.1
23.	Detergents	,,	0.2
24.	DO	,,	6
25.	Fluoride	,,	1
26.	Hardness (as $CaCO_3$)	,,	200 – 500
27.	Iron	,,	0.3 – 1.0
28.	Kjeldhl Nitrogen (total)	,,	1
29.	Lead	,,	0.05

1	2	3	4
30.	Magnesium	,,	30 – 35
31.	Manganese	,,	0.1
32.	Mercury	,,	0.001
33.	Nickel	,,	0.1
34.	Nitrate	,,	10
35.	Nitrite	,,	<1
36.	Odor	,,	Odorless
37.	Oil and grease	,,	0.01
38.	pH	,,	6.5 – 8.5
39.	Phenolic compounds	,,	0.002
40.	Phosphate	,,	6
41.	Phosphorus	,,	0
42.	Potassium	,,	12
43.	Radioactive materials (gross alpha activity)	Bq/l	0.01
44.	Radioactive materials (gross beta activity)	Bq/l	0.1
45.	Selenium	mg/l	0.01
46.	Silver	,,	0.02
47.	Sodium	,,	200
48.	Suspended particulate matters	,,	10
49.	Sufide	,,	0
50.	Sulfate	,,	400
51.	Total dissolved solids	,,	1000
52.	Temperature	°C	20-30
53.	Tin	mg/l	2
54.	Turbidity	JTU	10
55.	Zinc	mg/l	5

SCHEDULE – 4

Standards for Sound
[See Rule 12]

Sl. No.	Category of areas	Standards determined at dBa unit Day	Night
a.	Silent zone	45	35
b.	Residential area	50	40
c.	Mixed area (mainly residential area, and also simultaneously used for commercial and industrial purposes)	60	50
d.	Commercial area	70	60
e.	Industrial area	75	70

Notes:

1. The time from 6 a.m. to 9 p.m. is counted as daytime.

2. The time from 9 p.m. to 6 a.m. is counted as night time.

3. Area up to a radius of 100 meters around hospitals or educational institutions or special institutions/ establishments identified/to be identified by the Government is designated as Silent Zones where use of horns of vehicles or other audio signals, and loudspeakers are prohibited.

SCHEDULE – 5

Standards for Sound originating from Motor Vehicles or Mechanized Vessels
[See Rule 12]

Category of Vehicles	Unit	Standards	Remarks
*Motor Vehicles (all types)	dBa	85	As measured at a distance of 7.5 meters from exhaust pipe.
		100	As measured at a distance of 0.5 meter from exhaust pipe.
Mechanized Vessels	dBa	85	As measured at a distance of 7.5 meters from the vessel which is not in motion, not loaded and is at two thirds of its maximum rotating speed.
		100	As measured at a distance of 0.5 meter from the vessel which is in the same condition as above.

* At the time of taking measurement, the motor vehicle shall not be in motion and its engine conditions shall be as follows:-

(a) Diesel engine – maximum rotating speed.

(b) Gasoline engine –at two thirds of its maximum rotating speed and without any load.

(c) Motorcycle – If maximum rotating speed is above 5000 rpm; two-thirds of the speed, and if maximum rotating speed is less than 5000 rpm, three-fourth of the speed.

SCHEDULE – 6

Standards for Emission from Motor Vehicles
[See Rule 12]

Parameter	Unit	Standard Limit
Black Smoke	Hartridge Smoke Unit (HSU)	65
Carbon Monoxide	gm/k.m. percent area	24 04
Hydrocarbon	gm/k.m. ppm	02 180
Oxides of Nitrogen	gm/k.m. ppm	02 600

* As measured at two thirds of maximum rotating speed.

SCHEDULE – 7

Standards for Emission from Mechanized Vessels
[See Rule 12]

Parameter	Unit	Standard Limit
Black Smoke*	Hartridge Smoke Unit (HSU)	65

* As measured at two thirds of maximum rotating speed.

SCHEDULE – 8

Standards for Odor

[See Rule 12]

Parameter	Unit	Standard Limit
Acetaldehyde	ppm	0.5 – 5
Ammonia	,,	1 – 5
Hydrogen Sulfide	,,	0.02 – 0.2
Methyl Disulfide	,,	0.009 – 0.1
Methyl Sulfide	,,	0.01 – 0.2
Styrene	,,	0.4 – 2.0
Trim ethylamine	,,	0.005 – 0.07

Notes :

(1) Following regulatory limit shall be generally applicable to emission/exhaust outlet pipe of above 5 meter height:

$Q = 0.108 \times He^2 Cm$ (Where Q = Gas Emission rate Nm^3/hour)
He = Height of exhaust outlet pipe (m)
Cm = Above mentioned limit (ppm)

(2) In cases where a special parameter has been mentioned, the lower limit shall be applicable for warning purposes, and the higher limit shall be applicable for prosecution purpose or punitive measure.

SCHEDULE – 9

Standards for Sewage Discharge
[See Rule 12]

Parameter	Unit	Standard Limit
BOD	miligram/l	40
Nitrate	,,	250
Phosphate	,,	35
Suspended Solids (SS)	,,	100
Temperature	Degree Centigrade	30
Coliform	number per 100 ml	1000

Notes :

(1) This limit shall be applicable to discharges into surface and inland waters bodies.
(2) Sewage shall be chlorinated before final discharge.

SCHEDULE – 10

Standards for Waste From Industrial Units or Projects Waste
[See Rule 13]

Sl. No.	Parameter	Unit	Places for determination of standards		
			Inland Surface Water	Public Sewerage system connected to treatment at second stage	Irrigated Land
1	2	3	4	5	6
1	Ammonical Nitrogen (as elementary N)	mg/l	50	75	75
2	Ammonia (as free ammonia)	,,	5	5	15
3	Arsenic (as)	,,	0.2	0.05	0.2
4	BOD_5 at 20^oC	,,	50	250	100
5	Boron	,,	2	2	2

1	2	3	4	5	6
6	Cadmium (as CD)	,,	0.50	0.05	0.05
7	Chloride	,,	600	600	600
8	Chromium (as total Cr)	,,	0.5	1.0	1.0
9	COD	,,	200	400	400
10	Chromium (as hexavalent Cr)	,,	0.1	1.0	1.0
11	Copper (as Cu)	,,	0.5	3.0	3.0
12	Dissolved Oxygen (DO)	,,	4.5 – 8	4.5 – 8	4.5 – 8
13	Electro-conductivity (EC)	micro mho/ cm	1200	1200	1200
14	Total Dissolved Solids	,,	2,100	2,100	2,100
15	Fluoride (as F)	,,	2	15	10
16	Sulfide (as S)	,,	1	2	2
17	Iran (as Fe)	,,	2	2	2
18	Total Kjeldahl Nitrogen (as N)	,,	100	100	100
19	Lead (as Pb)	,,	0.1	1.0	0.1
20	Manganese (as Mn)	,,	5	5	5
21	Mercury (as Hg)	,,	0.01	0.01	0.01
22	Nickel (as Ni)	,,	1.0	2.0	1.0
23	Nitrate (as elementary N)	mg/l	10.0	Not yet Fixed	10
24	Oil and Grease	,,	10	20	10
25	Phenolic Compounds (as C_6H_5OH)	,,	1.0	5	1
26	Dissolved Phosphorus (as P)	,,	8	8	15
27	Radioactive substance	To be specified by Bangladesh Atomic Energy Commission			
28	pH		6 – 9	6 – 9	6 – 9
29	Selenium (as Se)	mg/l	0.05	0.05	0.05
30	Zinc (as Zn)	Degree	5	10	10

1	2	3	4	5	6
31	Total Dissolved Solids	,,	2,100	2,100	2,100
32	Temperature	Centigrade	40	40	40-Summer
			45	45	45-Winter
33	Suspended Solids (SS)	mg/l	150	500	200
34	Cyanide (as Cn)	,,	0.1	2.0	0.2

Notes:

(1) These standards shall be applicable to all industries or projects other than those specified under the heading "Standards for sector-wise industrial effluent or emission."

(2) Compliance with these standards shall be ensured from the moment an industrial unit starts trial production, and in other cases, from the moment a project starts operation.

(3) These standards shall be inviolable even in case of any sample collected instantly at any point of time. These standards may be enforced in a more stringent manner if considered necessary in view of the environmental conditions of a particular situation.

(4) Inland Surface Water means drains/ponds/tanks/water bodies/ ditches, canals, rivers, springs and estuaries.

(5) Public sewerage system means treatment facilities of the first and second stage and also the combined and complete treatment facilities.

(6) Irrigable land means such land area which is sufficiently irrigated by waste water taking into consideration the quantity and quality of such water for cultivation of selected crops on that land.

(7) Inland Surface Water Standards shall apply to any discharge to a public sewerage system or to land if the discharge does not meet the requirements of the definitions in notes 5 and 6 above.

SCHEDULE – 11

Standards for Gaseous Emission from Industries or Projects
[See Rule 13]

Sl.No.	Parameters	Standard present in a unit of mg/Nm^3
1	2	3
1.	Particulate	
(a)	Power plant with capacity of 200 Megawatt or above.	150
(b)	Power plant with capacity less than 200 Megawatt.	350
2.	Chlorine	150
3.	Hydrochloric acid vapor and mist	350
4.	Total Fluoride F	25
5.	Sulfuric acid mist	50
6.	Lead particulate	10
7.	Mercury particulate	0.2
8.	Sulfur dioxide	kg/ton acid
(a)	Sulfuric acid production (DCDA* process)	4
(b)	Sulfuric acid production (SCSA* process)	10

(* DCDA: Double Conversion, Double Absorption;

SCSA: Single Conversion, Single Absorption.)

Lowest height of stack for dispersion of sulfuric acid (in meter).

(a)	Coal based power plant		
	(1)	500 Megawatt or above	275
	(2)	200 to 500 Megawatt	220
	(3)	Less than 200 Megawatt	$14(Q)^{0.3}$
(b)	Boiler		
	(1)	Steam per hour up to 15 tons	11
	(2)	Steam per hour more that 15 tons	$14(Q)^{0.3}$

[Q = Emission of Sulfur dioxide (kg/hour)].

1	2	3
9.	Oxides of Nitrogen	
(a)	Nitric acid production	3 kg/ton acid
(b)	Gas Fuel based Power Plant	50 ppm
	(1) 500 Megawatt or above	50 ppm
	(2) 200 to 500 Megawatt	40 ppm
	(3) Below 200 Megawatt	30 ppm
(c)	Metallurgical oven	200 ppm
10.	Kiln soot and dust	mg/Nm^3
(a)	Blast Furnace	500
(b)	Brick Kiln	1000
(c)	Coke oven	500
(d)	Lime Kiln	250

রেজিস্টার্ড নং ডি এ-১

বাংলাদেশ গেজেট

অতিরিক্ত সংখ্যা
কর্তৃপক্ষ কর্তৃক প্রকাশিত

মঙ্গলবার, জুলাই ১৯, ২০০৫

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

পরিবেশ ও বন মন্ত্রণালয়

পরিকল্পনা শাখা-৫

প্রজ্ঞাপন

তারিখ, ১ শ্রাবণ ১৪১২/১৬ জুলাই ২০০৫

এস, আর, ও নং ২২০-আইন/২০০৫—বাংলাদেশ পরিবেশ সংরক্ষণ আইন, ১৯৯৫ (১৯৯৫ সনের ১ নং আইন) এর ধারা ২০ এ প্রদত্ত ক্ষমতাবলে সরকার পরিবেশ সংরক্ষণ বিধিমালা, ১৯৯৭ এর নিম্নরূপ সংশোধন করিল, যথা ঃ—

উপরি-উক্ত বিধিমালার—

(ক) তফসিল ২ এর পরিবর্তে নিম্নরূপ তফসিল ২ প্রতিস্থাপিত হইবে, যথা ঃ—

"তফসিল-২

বায়ুর মানমাত্রা (Air Quality Standards)"

[বিধি ১২ দ্রষ্টব্য]

বায়ু দূষণ	মানমাত্রা	গড় সময়
১	২	৩
কার্বন মনোঅক্সাইড	১০ মিলিগ্রাম/ঘনমিটার (৯ পিপিএম) (ক)	৮ ঘন্টা
	৪০ মিলিগ্রাম/ঘনমিটার (৩৫ পিপিএম) (খ)	১ ঘন্টা
লেড	০.৫ মাইক্রোগ্রাম/ঘনমিটার	বার্ষিক

(৭৫৬৭)
মূল্য ঃ টাকা ৪.০০

১		৩
নাইট্রোজেনের অক্সাইড	১০০ মাইক্রোগ্রাম/ঘনমিটার (০.০৫৩ পিপিএম)	বার্ষিক
প্রলম্বিত বস্তুকণা (এস পি এম)	২০০ মাইক্রোগ্রাম/ঘনমিটার	৮ ঘণ্টা
বস্তুকণা ১০	৫০ মাইক্রোগ্রাম/ ঘনমিটার (খ)	বার্ষিক
	১৫০ মাইক্রোগ্রাম/ ঘনমিটার (গ)	২৪ ঘণ্টা
বস্তুকণা ২.৫	১৫ মাইক্রোগ্রাম/ ঘনমিটার	বার্ষিক
	৬৫ মাইক্রোগ্রাম/ ঘনমিটার	২৪ ঘণ্টা
ওজোন	২৩৫ মাইক্রোগ্রাম/ঘনমিটার (০.১২ পিপিএম) (ঘ)	১ ঘণ্টা
	১৫৭ মাইক্রোগ্রাম/ঘনমিটার (০.০৮ পিপিএম)	৮ ঘণ্টা
সালফার ডাইঅক্সাইড	৮০ মাইক্রোগ্রাম/ঘনমিটার (০.০৩ পিপিএম)	বার্ষিক
	৩৬৫ মাইক্রোগ্রাম/ঘনমিটার (০.১৪ পিপিএম) (গ)	২৪ ঘণ্টা

শব্দ সংক্ষেপ ঃ

পিপিএম ঃ পার্টস পার মিলিয়ন।

নোট ঃ * এই তফসিলে বায়ুর মানমাত্রা বলিতে পরিবেষ্টক বায়ুর মানমাত্রা (Ambient Air Quality Standards) কে বুঝাইবে।

(ক) প্রতি বৎসরে একবারের বেশী অতিক্রম করিবে না।

(খ) বার্ষিক গড় মান ৫০ মাইক্রোগ্রাম/মি^{৩} হইতে কম বা উহার সমান হইতে পারিবে।

(গ) ২৪ ঘণ্টার গড় মান বৎসরে ১ (এক) দিন ১৫০ মাইক্রোগ্রাম/ মি^{৩} হইতে কম বা উহার সমান হইতে পারিবে।

(ঘ) প্রতি ঘণ্টার সর্বোচ্চ গড় মান বৎসরে ১ (এক) দিন ০.১২ পিপিএম হইতে কম বা উহার সমান হইতে পারিবে।

(খ) তফসিল ৬ এর পরিবর্তে নিম্নরূপ তফসিল ৬ প্রতিস্থাপিত হইবে, যথা ঃ—

"তফসিল-৬

[বিধি ৪ এবং ১২ দ্রষ্টব্য]

অংশ-ক

(রেজিস্ট্রেশনের জন্য আবেদনের সময় ডিজেল ইঞ্জিনচালিত মোটরযানের নিঃসরণ মানমাত্রা)

বাংলাদেশ-১ (টেবিল-১)

মোটরযানের ধরণ	নিঃসরণ মানমাত্রা (গ্রাম/কি.মি.)			পরীক্ষণ পদ্ধতি
	কার্বন মনো অক্সাইড	হাইড্রোকার্বন + নাইট্রোজেনের অক্সাইডসমূহ	বস্তুকণা	
১	২	৩	৪	৫
হালকা (চালক ব্যতীত ৮ আসনের বেশী নয় এবং সর্বোচ্চ ওজন ২.৫ টন পর্যন্ত)				
নতুন টাইপ এপ্রোভাল (টি এ)	২.৭২	০.৯৭	০.১৪	
কনফরমিটি অফ প্রোডাকশন (সিওপি)	৩.১৬	১.১৩	০.১৮	৯১/৪৪১/ইইসি
আমদানীকৃত ব্যবহৃত	৩.১৬	১.১৩	০.১৮	
ভারী (চালক ব্যতীত ৮ আসনের বেশী কিন্তু ১৫ আসনের বেশী নয় এবং সর্বোচ্চ ওজন ২.৫ টনের অধিক কিন্তু ৩.৫ টন পর্যন্ত)				
নতুন টিএ	৬.৯	১.৭	০.২৫	
সিওপি	৮.০	২.০	০.২৯	৯৩/৫৯/ইসি
আমদানীকৃত ব্যবহৃত	৮.০	২.০	০.২৯	

বাংলাদেশ-১ (টেবিল-২)

মোটরযানের ধরণ	নিঃসরণ মানমাত্রা (গ্রাম/কিলোওয়াট-ঘণ্টা)				পরীক্ষণ পদ্ধতি
	কার্বন মনো অক্সাইড	হাইড্রোকার্বন	নাইট্রোজেনের অক্সাইডসমূহ	বস্তুকণা*	
ভারী (চালক ব্যতীত ১৫ আসনের বেশী এবং ওজন ৩.৫ টনের অধিক)					
নতুন টিএ	৪.৫	১.১	৮.০	০.৩৬	৯১/৫৪২/ইইসি এবং ইসিই আর ৪৯.০২
নতুন সিওপি	৪.৯	১.২৩	৯.০	০.৪	
আমদানীকৃত ব্যবহৃত	৪.৯	১.২৩	৯.০	০.৪	

* ৮৫ কিলোওয়াট অথবা উহা হইতে কম শক্তির ডিজেলচালিত ইঞ্জিনের ক্ষেত্রে এই মাত্রা ১.৭ গুন হারে বৃদ্ধি পাইবে।

শব্দ সংক্ষেপঃ

কি মিঃ কিলোমিটার
ইসি ঃ ইউরোপিয়ান কাউন্সিল
টিএ ঃ টাইপ এপ্রোভাল
সিওপিঃ কনফরমিটি অফ প্রোডাকশন
ইইসিঃ ইউরোপিয়ান ইকোনমিক কমুনিটি
ইসিই ঃ ইকোনমিক কমিশন ফর ইউরোপ

অংশ-খ

(রেজিস্ট্রেশনের জন্য আবেদনের সময় পেট্রোল ও গ্যাস ইঞ্জিনচালিত মোটরযানের নিঃসরণ মানমাত্রা)

বাংলাদেশ-২ (টেবিল-১)

মোটরযানের ধরণ	নিঃসরণ মানমাত্রা (গ্রাম/কি.মি.)		বাষ্পজনিত নিঃসরণ (গ্রাম/টেস্ট)	পরীক্ষণ পদ্ধতি
	কার্বন মনো অক্সাইড	হাইড্রোকার্বন+ নাইট্রোজেনের অক্সাইডসমূহ		
১	২	৩	৪	৫
(দুই ও তিন চাকাবিশিষ্ট) চার স্ট্রোক	৪.৫	৩.০	-	ইসিই-৪০
হালকা (চালক ব্যতীত ৮ আসনের বেশী নয় এবং সর্বোচ্চ ওজন ২.৫ টন পর্যন্ত)	২.২	০.৫	২.০	৯৪/১২/ইসি
ভারী (চালক ব্যতীত ৮ আসনের বেশী কিন্তু ১৫ আসনের বেশী নয় এবং সর্বোচ্চ ওজন ২.৫ টনের অধিক কিন্তু ৩.৫ টন পর্যন্ত)	৫.০	০.৭	২.০	৯৬/৩৯/ইসি

বাংলাদেশ-২ (টেবিল-২)

মোটরযানের ধরণ	নিঃসরণ মানমাত্রা (গ্রাম/কিলোওয়াট-ঘণ্টা)			বাষ্পজনিত নিঃসরণ (গ্রাম/টেস্ট)	পরীক্ষণ পদ্ধতি
	কার্বন মনোঅক্সাইড	হাইড্রোকার্বন/ নন-মিথেন হাইড্রোকার্বন*	নাইট্রোজেনের অক্সাইডসমূহ		
ভারী (চালক ব্যতীত ১৫ আসনের বেশী এবং ওজন ৩.৫ টনের অধিক)					৯১/৫৪২ ইইসি এবং ইসিই আর ৪৯.০২ এবং *১৩-মুড টেস্ট সাইকেল
নতুন টিএ (পেট্রোল/ সিএনজি)	৪.৫	১.১	৮.০	২.০	
নতুন সিওপি(পেট্রোল/ সিএনজি)	৪.৯	১.২৩	৯.০	২.০	
অমনানীতব্য ব্যবহৃত (পেট্রোল/ সিএনজি)	৪.৯	১.২৩	৯.০	২.০	

* সিএনজিচালিত মোটরযানের ক্ষেত্রে প্রযোজ্য হইবে।

শব্দ সংক্ষেপ :
কি মি : কিলোমিটার
ইসি : ইউরোপিয়ান কাউন্সিল
টিএ : টাইপ এপ্রোভাল
সিওপি : কনফরমিটি অফ প্রোডাকশন
ইইসি : ইউরোপিয়ান ইকোনমিক কমুনিটি
ইসিই : ইকোনমিক কমিশন ফর ইউরোপ
সিএনজি : কমপ্রেসড ন্যাচারাল গ্যাস

অংশ-গ

(রেজিস্ট্রেশনের প্রাক্কালে অংশ-ক এবং অংশ-খ তে উল্লিখিত মানমাত্রা পরিমাপের পরীক্ষণ পদ্ধতি)

মোটরযানের ধরণ	স্থিতি মাপ	নিঃসরণ মানমাত্রা
১	২	৩
অন্যূন তিন চাকাবিশিষ্ট পেট্রোল ও সিএনজিচালিত যান	আইডল (Idle) কার্বন মনোক্সাইড আইডল (Idle) হাইড্রোকার্বন	০.৫% আয়তন/আয়তন ১২০০ পিপিএম
	বোঝাবিহীন (No Load)— ২৫০০ থেকে ৩০০০ আরপিএম কার্বন মনোক্সাইড হাইড্রোকার্বন স্যামডা	০.৩% আয়তন/আয়তন ৩০০ পিপিএম ১±০.০৩
	ভিজুয়াল পরীক্ষা	নির্গমন পথে যুক্ত থ্রি-ওয়ে-ক্যাটালাইটিক কনভার্টার
ডিজেল ন্যাচারালি অ্যাসপিরেটেড	ফ্রি অ্যাক্সিলারেশন স্মোক (Free acceleration smoke)	১.২ মি.$^{-১}$ ধোঁয়ার ঘনত্ব (৪০ এইচএসইউ)
ডিজেল টার্বোচার্জড	ফ্রি অ্যাক্সিলারেশন স্মোক (Free acceleration smoke)	২.২ মি.$^{-১}$ ধোঁয়ার ঘনত্ব (৬১ এইচএসইউ)

শব্দ সংক্ষেপ :

পিপিএম : পার্টস পার মিলিয়ন

আরপিএম : রিভোলিউশন পার মিনিট

মি $^{-১}$: মিটার $^{-১}$

এইচএসইউ : হার্টরিজ স্মোক ইউনিট

অংশ-ঘ

[১লা সেপ্টেম্বর ২০০৪ এর পূর্বে রেজিস্ট্রেশনকৃত ডিজেলচালিত মোটরযান (In-use diesel driven vehicles) এর নিঃসরণ মানমাত্রা]

মোটরযানের ধরণ	পরীক্ষা	স্মোক অপাসিটি (Smoke opacity)		
		কার্যকর ১ সেপ্টেম্বর ২০০৪ ৩১ ডিসেম্বর ২০০৬	কার্যকর ১ জানুয়ারী ২০০৭ ৩১ ডিসেম্বর ২০০৮	কার্যকর ১ জানুয়ারী ২০০৯
বাস	ফ্রি অ্যাক্সিলারেশন (Free acceleration)	৮০ এইচএসইউ অথবা ৩.৭ মি.$^{-১}$	৭০ এইচএসইউ অথবা ২.৮ মি.$^{-১}$	৬৫ এইচএসইউ অথবা ২.৪ মি.$^{-১}$
ট্রাক এবং অন্যান্য ডিজেলচালিত যান	ফ্রি অ্যাক্সিলারেশন (Free acceleration)	৯০ এইচএসইউ অথবা ৫.৩ মি.$^{-১}$	৮০ এইচএসইউ অথবা ৩.৭ মি.$^{-১}$	৬৫ এইচএসইউ অথবা ২.৪ মি.$^{-১}$

অংশ-ঘ

(১লা সেপ্টেম্বর ২০০৪ এর পূর্বে রেজিস্ট্রেশনকৃত পেট্রোল এবং সিএনজিচালিত মোটরযান এর নিঃসরণ মানমাত্রা)

মোটরযানের ধরণ	পরীক্ষা	কার্বন মনোঅক্সাইড (% আয়তন)	হাইড্রোকার্বন (পিপিএম)
১	২	৩	৪
চার চাকাবিশিষ্ট পেট্রোলচালিত যান	আইডল স্পীড (Idle speed)	৪.৫	১,২০০
সিএনজিচালিত সকল যান	আইডল স্পীড (Idle speed)	৩.০	-
পেট্রোলচালিত দুই স্ট্রোকবিশিষ্ট ২ এবং ৩ চাকার যান	আইডল স্পীড (Idle speed)	৭.০	১২,০০০
পেট্রোলচালিত দুই স্ট্রোকবিশিষ্ট ২ এবং ৩ চাকার যান	আইডল স্পীড (Idle speed)	৭.০	৩,০০০

নোট : আইডল স্পিড (Idle speed) আরপিএম প্রস্তুতকারক কর্তৃক নির্ধারিত হইবে।

অংশ-চ

(১লা সেপ্টেম্বর ২০০৪ এর পর রেজিস্ট্রেশনকৃত মোটরযানের নিঃসরণ মানমাত্রা)

মোটরযানের ধরণ	পরীক্ষা	কার্বন মনোঅক্সাইড (%আয়তন)	হাইড্রোকার্বন (পিপিএম)	ল্যামডা (λ)	ধোঁয়া
১	২	৩	৪	৫	৬
চার চাকাবিশিষ্ট পেট্রোল ও সিএনজি চালিত যান	আইডল স্পীল (Idle speed)	১.০	১২০০	-	-
	বোঝাবিহীন (No-load)- ২৫০০ থেকে ৩০০০ আরপিএম	০.৫	৩০০	১.০± ০.০৩	-
দুই ও তিন চাকা বিশিষ্ট চার স্ট্রোক পেট্রোলচালিত যান	আইডল স্পীল (Idle speed)	৪.৫	১২০০	-	-
তিন চাকাবিশিষ্ট সিএনজিচালিত যান	আইডল স্পীল (Idle speed)	৩.০	-	-	-

১	২	৩	৪	৫	৬
ন্যাচারলি অ্যাসপিরেটেড ডিজেল চালিত যান	ফ্রি অ্যাক্সিলারেশন (Free acceleration)	-		-	৬৫এইচ এসইউ বা ২.৪ মি.$^{-1}$
টার্বোচার্জযুক্ত ডিজেল চালিত যান	ফ্রি অ্যাক্সিলারেশন (Free acceleration)	-	-	-	৭২এইচ এসইউ বা ৩.০ মি.$^{-1}$

নোট : আইডল স্পিড (Idle speed) আরপিএম প্রস্তুতকারক কর্তৃক নির্ধারিত হইবে"।

রাষ্ট্রপতির আদেশক্রমে

জাকির আহমেদ চৌধুরী
সচিব।

মোঃ নূর-নবী (উপ-সচিব), উপ-নিয়ন্ত্রক, বাংলাদেশ সরকারী মুদ্রণালয়, ঢাকা কর্তৃক মুদ্রিত।
মোঃ আমিন হুবেরী আলম, উপ-নিয়ন্ত্রক, বাংলাদেশ ফরম ও প্রকাশনা অফিস,
তেজগাঁও, ঢাকা কর্তৃক প্রকাশিত।

তফসিল-১

[বিধি ৫(২) দ্রষ্টব্য]

এলাকাভিত্তিক শব্দের মানমাত্রা

ক্রমিক নং	এলাকার শ্রেণী	মানমাত্রা ডেসিবল dB(A)Leq* একক	
		দিবা	রাত্রি
১।	নীরব এলাকা	৫০	৪০
২।	আবাসিক এলাকা	৫৫	৪৫
৩।	মিশ্র এলাকা	৬০	৫০
৪।	বাণিজ্যিক এলাকা	৭০	৬০
৫।	শিল্প এলাকা	৭৫	৭০

ব্যাখ্যা ঃ

(ক) ভোর ৬টা হইতে রাত্রি ৯টা পর্যন্ত ব্যাপ্ত সময় দিবাকালীন সময় হিসাবে চিহ্নিত।

(খ) রাত্রি ৯টা হইতে ভোর ৬টা পর্যন্ত ব্যাপ্ত সময় রাত্রিকালীন সময় হিসাবে চিহ্নিত।

*dB(A)Leq দ্বারা মানুষের শ্রবণেন্দ্রিয়ের সহিত সম্পর্কিত নির্দিষ্ট সময়ব্যাপী শব্দের গড় মাত্রাকে বুঝাইবে (time weighted average) যাহা ডেসিবল অ-স্কেলে নিরূপিত।

তফসিল-২

মোটরযান বা যান্ত্রিক নৌযানজনিত শব্দের অনুমোদিত মানমাত্রা।

[বিধি ৫(২) দ্রষ্টব্য]

ক্রমিক নং	যানবাহনের শ্রেণী	মানমাত্রা ডেসিবল dB(A) এককে	মন্তব্য
১।	সকল মোটরযান (সকল প্রকার)	৮৫	নির্গমন নল (silencer pipe) হইতে সরাসরি ৭.৫ মিটার দূরত্বে পরিমাপকৃত।
		১০০	নির্গমন নল (silencer pipe) হইতে ০.৫ মিটার দূরত্বে ৪৫ ডিগ্রী কৌণিক রেখায় পরিমাপকৃত।
২।	আভ্যন্তরীন জলপথে চলিত যান্ত্রিক নৌযান	৮৫	স্থির অবস্থায় ভারশূন্য সর্বোচ্চ ঘূর্ণন বেগের দুই-তৃতীয়াংশে নৌযান হইতে ৭.৫ মিটার দূরত্বে পরিমাপকৃত।
		১০০	একই অবস্থায় ০.৫ মিটার দূরত্বে পরিমাপকৃত।

ব্যাখ্যা।—পরিমাপকালে মোটরযানটি স্থির অবস্থায় থাকিবে এবং ইহার ইঞ্জিনের শর্তাদি নিম্নরূপ হইবে ঃ

(ক) ডিজেল ইঞ্জিন-সর্বোচ্চ ঘূর্ণনবেগের দুই-তৃতীয়াংশে ভারশূন্য ত্বরণ;

(খ) গ্যাসোলিন/সিএনজি চালিত ইঞ্জিন-সর্বোচ্চ ঘূর্ণনবেগের দুই-তৃতীয়াংশে ভারশূন্য ত্বরণ;

(গ) মোটর সাইকেলে-সর্বোচ্চ ঘূর্ণনবেগ ৫০০০ rpm অধিক হইলে উহার দুই-তৃতীয়াংশে এবং সর্বোচ্চ ঘূর্ণনবেগ ৫০০০ rpm এর নিম্নে হইলে উহার তিন-চতুর্থাংশে।

Annex 7-1: Ambient Air Quality Monitoring Results

Monitoring Parameters	Locations of Sampling	1st QM	2nd QM	3rd QM	4th QM	5th QM	6th QM	7th QM	8th QM	Standard	
										WB	ECR, 1997
Weather		Sunny	Rainy/ Cloudy	Sunny	Sunny	Sunny	Rainy/ Cloudy	Sunny to Rainy	Sunny		
Wind Direction		SE	SE	SE	NW	SE to NW	SW to NE	SW to NE	NW to SE		
$PM_{2.5}$ (µg/m^3)	SW Corner of PP Area	24.3	27.2	18.4	24.3	34.6	18.4	16.2	25.0	75^{24hr} (IT-1)	65 ^{24hr}
	Proposed Township area of the PP	28.7	35.3	35.3	28.7	25.0	13.2	12.5	25.7		
	NW Corner of PP Area	27.2	32.3	14.0	30.9	43.4	20.6	14.0	17.6		
	Barni, Gaurambha	28.7	34.6	41.9	28.7	30.1	25.0	8.1	21.3		
	Chunkuri-2, Dacope	25.7	28.7	33.8	27.2	24.3	25.7	20.6	22.8		
	Pankhali, Dacope	34.6	36.0	41.9	30.1	28.7	-	18.4	34.6		
	Mongla Port area	34.6	40.4	28.7	30.1	19.1	24.3	14.0	25.0		
	Harbaria, the Sundarbans	14.0	16.2	24.3	19.9	17.6	19.9	17.6	19.1		
	Akram Point, the Sundarbans	12.5	14.0	16.9	13.2	36.0	-	18.4	13.2		
	Hiron Point, the Sundarbans	11.0	16.9	14.0	12.5	20.6	-	19.9	-		
	Khan Jahan Ali Bridge at Khulna City	39.7	28.7	38.2	30.9	40.4	33.8	14.0	25.7		
PM_{10} (µg/m^3)	SW Corner of PP Area	57.3	56.6	39.0	58.1	61.0	25.7	38.2	99.3	150^{24hr} (IT-1)	150 ^{24hr}
	Proposed Township area of the PP	65.4	66.2	54.4	75.0	71.3	22.8	35.3	85.3		
	NW Corner of PP Area	49.3	57.3	41.2	72.0	66.9	70.6	21.3	91.9		
	Barni, Gaurambha	75.7	89.7	49.3	71.3	60.3	47.8	19.1	71.3		

Monitoring Parameters	Locations of Sampling	1st QM	2nd QM	3rd QM	4th QM	5th QM	6th QM	7th QM	8th QM	Standard	
										WB	ECR, 1997
Weather		Sunny	Rainy/ Cloudy	Sunny	Sunny	Sunny	Rainy/ Cloudy	Sunny to Rainy	Sunny		
Wind Direction		SE	SE	SE	NW	SE to NW	SW to NE	SW to NE	NW to SE		
	Chunkuri-2, Dacope	56.6	63.2	50.7	50.0	44.8	80.1	36.0	72.0		
	Pankhali, Dacope	87.5	93.4	102.2	74.3	77.2	105.9	45.6	94.1		
	Mongla Port area	102.2	127.9	56.6	60.3	25.7	38.2	24.3	97.0		
	Harbaria, the Sundarbans	30.1	28.7	43.4	41.2	36.0	30.9	36.8	60.3		
	Akram Point, the Sundarbans	28.7	32.3	23.5	28.7	56.6	-	23.5	56.6		
	Hiron Point, the Sundarbans	32.3	27.9	25.0	30.1	44.1	-	33.1	-		
	Khan Jahan Ali Bridge at Khulna City	102.2	86.0	66.9	61.8	55.1	65.4	36.0	82.3		
SPM ($\mu g/m^3$)	SW Corner of PP Area	207.0	239.0	190.0	200.0	177.0	42.0	91.0	175.0	-	200 ^{8hr}
	Proposed Township area of the PP	217.0	263.0	217.0	274.0	266.0	47.0	79.0	192.0		
	NW Corner of PP Area	234.0	217.0	157.0	310.0	244.0	321.0	66.0	187.0		
	Barni, Gaurambha	233.0	244.0	183.0	277.0	236.0	79.0	112.0	176.0		
	Chunkuri-2, Dacope	117.0	113.0	162.0	183.0	188.0	175.0	94.0	167.0		
	Pankhali, Dacope	297.0	266.0	254.0	208.0	299.0	339.0	183.0	198.0		
	Mongla Port area	288.0	303.0	197.0	217.0	214.0	118.0	65.0	189.0		
	Harbaria, the Sundarbans	111.0	117.0	129.0	139.0	109.0	70.0	73.0	159.0		
	Akram Point, the Sundarbans	114.0	133.0	97.0	88.0	102.0	-	51.0	128.0		
	Hiron Point, the Sundarbans	101.0	119.0	107.0	97.0	110.0	-	88.0	-		

Monitoring Parameters	Locations of Sampling	1st QM	2nd QM	3rd QM	4th QM	5th QM	6th QM	7th QM	8th QM	Standard	
										WB	ECR, 1997
Weather		Sunny	Rainy/ Cloudy	Sunny	Sunny	Sunny	Rainy/ Cloudy	Sunny to Rainy	Sunny		
Wind Direction		SE	SE	SE	NW	SE to NW	SW to NE	SW to NE	NW to SE		
	Khan Jahan Ali Bridge at Khulna City	301.0	287.0	239.0	219.0	222.0	181.0	101.0	181.0		
SO_2 (µg/m^3)	SW Corner of PP Area	15.4	17.6	14.0	16.9	11.0	38.2	25.7	10.3	125^{24hr} (IT-1)	365 ^{24hr}
	Proposed Township area of the PP	14.0	20.6	16.2	15.4	16.2	42.6	19.9	9.6		
	NW Corner of PP Area	172.0	159.5	115.4	227.9	179.4	236.0	48.5	137.5		
	Barni, Gaurambha	15.4	16.9	12.5	16.2	18.4	30.1	22.8	11.8		
	Chunkuri-2, Dacope	14.0	17.6	15.4	13.2	8.1	40.4	24.3	15.4		
	Pankhali, Dacope	20.6	22.8	22.8	17.6	22.1	42.6	26.5	13.2		
	Mongla Port area	19.9	20.6	19.1	17.6	10.3	33.1	26.5	11.8		
	Harbaria, the Sundarbans	6.6	7.4	10.3	8.8	11.8	37.5	25.0	11.0		
	Akram Point, the Sundarbans	5.1	6.6	8.8	9.6	15.4	-	19.9	10.3		
	Hiron Point, the Sundarbans	5.9	5.1	9.6	10.3	11.0	-	20.6	-		
	Khan Jahan Ali Bridge at Khulna City	24.3	21.3	24.3	20.6	22.8	43.4	20.6	11.8		
NO_x (µg/m^3)	SW Corner of PP Area	46.5	51.9	48.3	55.5	51.9	62.7	51.9	32.2	200^{1hr} *(G)* 40 ^{Annual} (G)	100 ^{Annual}
		3.7	4.1	3.8	4.4	4.1	4.9	4.1	2.5		
	Proposed Township area of the PP	51.9	69.8	48.3	46.5	43.0	82.3	44.8	28.6		
		4.1	5.5	3.8	3.7	3.4	6.5	3.5	2.3		
	NW Corner of PP Area	41.2	50.1	39.4	57.3	69.8	77.0	37.6	32.2		

Monitoring Parameters	Locations of Sampling	1st QM	2nd QM	3rd QM	4th QM	5th QM	6th QM	7th QM	8th QM	Standard	
										WB	ECR, 1997
Weather		Sunny	Rainy/ Cloudy	Sunny	Sunny	Sunny	Rainy/ Cloudy	Sunny to Rainy	Sunny		
Wind Direction		SE	SE	SE	NW	SE to NW	SW to NE	SW to NE	NW to SE		
		3.2	3.9	3.1	4.5	5.5	6.1	3.0	2.5		
	Barni, Gaurambha	44.8	50.1	39.4	46.5	48.3	78.8	57.3	37.6		
		3.5	3.9	3.1	3.7	3.8	6.2	4.5	3.0		
	Chunkuri-2, Dacope	41.2	46.5	48.3	43.0	32.2	87.7	41.2	28.6		
		3.2	3.7	3.8	3.4	2.5	6.9	3.2	2.3		
	Pankhali, Dacope	73.4	69.8	64.4	46.5	48.3	84.1	41.2	26.9		
		5.8	5.5	5.1	3.7	3.8	6.6	3.2	2.1		
	Mongla Port area	78.8	69.8	59.1	48.3	30.4	71.6	35.8	23.3		
		6.2	5.5	4.7	3.8	2.4	5.6	2.8	1.8		
	Harbaria, the Sundarbans	34.0	39.4	48.3	32.2	39.4	60.9	39.4	25.1		
		2.7	3.1	3.8	2.5	3.1	4.8	3.1	2.0		
	Akram Point, the Sundarbans	30.4	34.0	39.4	30.4	48.3	-	34.0	26.9		
		2.4	2.7	3.1	2.4	3.8	-	2.7	2.1		
	Hiron Point, the Sundarbans	32.2	32.2	34.0	39.4	35.8	-	41.2	-		
		2.5	2.5	2.7	3.1	2.8	-	3.2	-		
	Khan Jahan Ali Bridge at Khulna City	87.7	73.4	69.8	64.4	59.1	68.0	46.5	28.6		
		6.9	5.8	5.5	5.1	4.7	5.4	3.7	2.3		
	SW Corner of PP Area	120	188	140	190	144	146	88	74	-	10000 *8hr*

Monitoring Parameters	Locations of Sampling	1st QM	2nd QM	3rd QM	4th QM	5th QM	6th QM	7th QM	8th QM	Standard	
										WB	ECR, 1997
Weather		Sunny	Rainy/ Cloudy	Sunny	Sunny	Sunny	Rainy/ Cloudy	Sunny to Rainy	Sunny		
Wind Direction		SE	SE	SE	NW	SE to NW	SW to NE	SW to NE	NW to SE		
CO µg /m^3	Proposed Township area of the PP	165	210	230	164	136	127	102	77		
	NW Corner of PP Area	110	178	110	210	140	133	87	77		
	Barni, Gaurambha	175	210	190	150	196	96	96	81		
	Chunkuri-2, Dacope	190	205	170	170	33	133	75	70		
	Pankhali, Dacope	230	217	250	188	177	125	105	101		
	Mongla Port area	230	320	220	211	24	110	84	71		
	Harbaria, the Sundarbans	65	58	70	64	56	112	81	62		
	Akram Point, the Sundarbans	49	60	50	46	163	-	92	64		
	Hiron Point, the Sundarbans	52	62	65	60	60	-	93	-		
	Khan Jahan Ali Bridge at Khulna City	330	370	330	296	101	89	94	98		
O_3 µg/m^3	SW Corner of PP Area	27	26	19	22	26	12	5	4	100^{8hr}*(G)*	157^{8hr}
	Proposed Township area of the PP	33	26	26	23	21	16	1	1		
	NW Corner of PP Area	25	19	17	36	44	11	8	2		
	Barni, Gaurambha	26	29	22	19	15	9	6	4		
	Chunkuri-2, Dacope	27	24	18	22	41	21	2	1		
	Pankhali, Dacope	49	38	36	27	11	13	5	2		
	Mongla Port area	57	52	37	26	9	15	8	3		

Monitoring Parameters	Locations of Sampling	1st QM	2nd QM	3rd QM	4th QM	5th QM	6th QM	7th QM	8th QM	Standard	
										WB	ECR, 1997
Weather		Sunny	Rainy/ Cloudy	Sunny	Sunny	Sunny	Rainy/ Cloudy	Sunny to Rainy	Sunny		
Wind Direction		SE	SE	SE	NW	SE to NW	SW to NE	SW to NE	NW to SE		
	Harbaria, the Sundarbans	13	12	13	11	14	12	4	2		
	Akram Point, the Sundarbans	13	12	13	11	14	12	4	2		
	Hiron Point, the Sundarbans	14	13	11	9	23	-	2	-		
	Khan Jahan Ali Bridge at Khulna City	59	67	57	39	21	7	4	2		

Note(s):

- *IT- Interim Target*
- *G- Guidelines*
- *Concentrations are in µg/m^3 ;*
- *DoE- Department of Environment, NF – Not found;*
- *Fine Particulate Matter ($PM_{2.5}$), Respirable Dust Content (PM_{10}), Suspended Particulate Matter (SPM), Oxides of Nitrogen (NO_X). Sulfur dioxide (SO_2), Carbone Monoxide (CO) & Ozone (O_3);*
- *All Standards within parentheses "()" are calculated for 8hr or collected directly from standard guidelines for 8hr;*
- *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).*

Annex 7-2: Annual Fuel Estimation for Vessel to be used for coal transportation for Rampal Power Plant

Anchorage Point	Duration (Months)	Months	Annual Coal Req. of Plant (Ton)	Coal Req per month (Ton)	Coal (Ton)		Vessel Capacity (Ton)	No. of Mother Vessel Required	vessel Type	Distance from Fairway Buoy (km)	Round trip (km)	Speed (km/hr)	Steaming Time round trip (Hr)	Fuel Consumption (Lit/hr)	Fuel Consumption (Lit)	Regulatory time (Day)	Operational Time (Day)	Anchorage Stay (Day)	Generator Engine (hr)	Fuel Consumption (Lit)*	Total fuel (Lit)	Total fuel (Ton)	Trans-shipper Capacity (ton/hr)	Yearly Fuel Consumption (ton)	Lighterage
Fairway Buoy	5	Nov-Mar	5,000,000	416,667	2083333	2,080,000	80000	26	Capsize	0	0		0		0	3	3.17460317	6	144	24000	24000	24	1200	624	208
Harbaria (Mazhar Point)	7	Apr-Oct			2916667	2,920,000	25000	117	Handymax	91	181	19	8	1000	8000	2	0.99206349	3	72	6000	14000	14	1200	1,638	292
Fairway to Plant Jetty					5000000					143	285	15	20	600	12000						12000	12		2,496	
Harbaria-Plant Jetty										56	111	15	8	600	4800						4800	4.8		1,402	
Trans-shipper																	340							1,390	
																							Total	**7,550**	

Annex 7-3: Detail list of floral and faunal composition of the SRF

a. Flora Composition

Scientific name	Family name	Local/ vernacular name	Life form	IUCN Global Status, 2016
Abrus precatorious	Leguminosae	Kuch lata	Climber, plants best known for its seeds	NE
Acanthus ilicifolius	Acanthaceae	Hargaza	Scrambling, woody, thorny herb	LC
Acrostichum aureum	Pteridiaceae	Hodo, tiger fern	Gregarious fern	LC
Aegialitis rotundifolia	Plumbaginaceae	Dhalchaka	Small tree	NT
Aegicerascorniculatum	Myrsinaceae	Khalisha, khalshi	Shrub or small tree	LC
Amoora cucullata	Meliaceae	Amur	Small tree	NE
Asplenium nidus	Pteridiaceae	–	Large epiphytic fern	NE
Asplenium polyodon	Pteridiaceae	–	Epiphytic fern	NE
Avicennia alba	Avicenniaceae	Maricha Baen	Medium size tree	LC
Avicennia marina	Avicenniaceae	Sada baen	Small to big tree	LC
Avicennia officinalis	Avicenniaceae	Baen	Big tree	LC
Brownlowia tersa	Tiliaceae	Sundri lota, Lota Sundri	Scan dent shrub	NT
Bruguieragymnorrhiza	Rhizophoraceae	Kankra	Small to large tree, red calyx 'cap'	NE
Caesalpinia crista	Leguminosae	Kutum katta	Scan-dent, armed shrub	NE
Ceriops decandra	Rhizophoraceae	Goran	Shrub or small tree, usually coppices	NT
Clerodendruminerme	Verbenaceae	Sitka, sitki	Scan-dent shrub	NE
Cynodon dactylon	Graminae	Durba gash	Grass	NE
Cynometra ramiflora	Leguminosae	Shingra	Shrub	NE
Cyperus javanicus	Cyperaceae	Kucha gash	Grass-like herb (sedge)	NE
Dalbergiacandenatensis	Leguminosae	Chanda lota/Sitki	Scrambling climber	NE
Dalbergiamelanoxylon	Leguminosae	Kata bohoi	Small tree, branch with spine	NT
Dalbergia spinosa	Leguminosae	Chanda katta	Scan-dent, armed shrub	NE
Dendrobiumstriolatum	Orchidaceae	Parachula	Epiphytic orchid with needle like leaf	NE
Dendrophthoe falcata	Loranthaceae	Dhoripata, Pargasa	Woody parasite in tree crowns	NE

Scientific name	Family name	Local/ vernacular name	Life form	IUCN Global Status, 2016
Derris indica	Leguminosae	Kali lota	Climber, flower pinkish white	NE
Derris trifoliata	Leguminosae	Kali lota	Climber, flower whitish	NE
Entada scandens	Leguminosae	Gila lota	A large woody twisted climber	NE
Eriochloa procera	Gramineae	Nol gash	Grass	LC
Eugenia fruticosa	Myrtaceae	Ban jam, jam	Small tree	NE
Excoecaria agallocha	Euphorbiaceae	Gewa	Tree	LC
Finlaysonia obovata	Asclepiadaceae	Dudhi lata	Climber	NE
Flagellaria indica	Flagellariaceae	Abetaa	Climber	NE
Heritiera fomes	Sterculiaceae	Sundri	Tree	EN
Hibiscus tiliaceous	Malvaceae	Bhola	Shrub	NE
Hoya species	Asclepiadaceae	Agusha, Pudipata	Climber	NE
Imperata cylindrica	Gramineae	Chan gash	Grass	NE
Kandelia candel	Rhizophoraceae	Gura, gural, Bhatkathi	Small tree	LC
Lannea coromandelica	Anacardiaceae	Jiga, Bhadi, kapila	Medium size tree	NE
Lumnitzera racemosa	Combretaceae	Kirpa, kripa	Small tree	LC
Myriostachyawightiana	Gramineae	Dhanshi	Grass, common on new accretions	NE
Nypa fruticans	Palmae	Golpata	Palm with underground stem	LC
Pandanus foetidus	Pandanaceae	Kewa katta	Prickly succulent screw-pine	NE
Petunga roxburghii	Rubiaceae	Narikili/Naholi	Small tree	NE
Phoenix paludosa	Palmae	Hantal	Thorny palm	NT
Phragmites karka	Gramineae	Nol kagra	Grass	LC
Pongamia pinnata	Leguminosae	Karanja	Small tree	LC
Premna corymbosa	Verbenaceae	Serpoli, Setpoli, kunail	Shrub or small tree	NE
Rhizophoramucronata	Rhizophoraceae	Garjan, Jhanna	Tree with stilt roots	LC
Rhizophora apiculata	Rhizophoraceae	Garjan, Jhanna	Tree with stilt roots	LC
Saccharumcylindricum	Gramineae	Eli ghas	Grass	NE
Salacia chinensis	Celastraceae	Choyt barai	Small tree	NE

Scientific name	Family name	Local/ vernacular name	Life form	IUCN Global Status, 2016
Sapium indicum	Euphorbiaceae	Urmui	Tree	NE
Sarcolobus globosus	Asclepiadaceae	Bawali lata	Climber	NE
Sonneratiacaseolaris	Sonneratiaceae	Choyla, ora, soyla	Small tree	LC
Sonneratia apetala	Sonneratiaceae	Keora	Tree	LC
Stenochlaenapalustris	Blechnaceae	Deki lota	Climbing fern	NE
Taimrix indica	Tamaricaceae	Jhao, nona jhao.	Small tree	NE
Typlophora spp.	Apocynaceae	Mohazani lata	Slender climber, leaf thin/papery, opposite with long petiole	NE
Viscum monoicum	Loranthaceae	Shamu lota	Woody parasite in tree crown of *Excoecariaagallocha*	NE
Vittaria sp.	Pteridiaceae	–	Tape fern, common epiphytic fern	NE
Vittaria sp.	Pteridiaceae	–	Epiphyte, leaf base cushion like	NE
Xylocarpusgranatum	Meliaceae	Dhundul	Small tree	LC
Xylocarpusmekongensis	Meliaceae	Passur	Tree	LC

b. Faunal Composition

Common Name	Scientific Name	Class	IUCN Global Status	IUCN Local Status, 2016
Green frog	*Euphlyctis hexadactylus*	Amphibia	NE	LC
Pintail	*Anas acuta*	Aves	NE	LC
Gery lag goose	*Anser anser*	Aves	NE	LC
Northern Shoveler	*Spatula clypeata*	Aves	NE	LC
Mallard	*Anas platyrhynchos*	Aves	NE	LC
Purple heron	*Ardea purpurea*	Aves	NE	LC
Gargany	*Spatula querquedula*	Aves	NE	LC
Gadwall	*Mareca strepera*	Aves	NE	LC
Ruddy crake	*Larus fuscus*	Aves	NE	LC
Openbill stork	*Anastomus oscitans*	Aves	LC	LC
Darter	*Anhinga melanogaster*	Aves	LC	LC
Barheaded goose	*Anser indicus*	Aves	LC	LC
Common teal	*Anas crecca*	Aves	NE	LC
Grey heron	*Ardea cinerea*	Aves	LC	LC
Pond heron	*Ardeola grayii*	Aves	LC	LC
Tufted duck	*Aythya fuligula*	Aves	LC	LC
Brown fish owl	*Ketupa zeylonensis*	Aves	NE	LC

Common Name	Scientific Name	Class	IUCN Global Status	IUCN Local Status, 2016
Cattle egret	*Bubulcus ibis*	Aves	LC	LC
Little Stint	*Calidris minuta*	Aves	NE	LC
Little Ring Plover	*Charadrius dubius*	Aves	LC	LC
Wihiskered tern	*Chlidonias hybrida*	Aves	LC	LC
Lesser whistling teal	*Dendrocygna javanica*	Aves	LC	LC
Racket tailed drongo	*Dicrurus paradiseus*	Aves	LC	LC
Black bittern	*Ixobrychus flavicollis*	Aves	LC	NT
Little egret	*Egretta garzetta*	Aves	NE	LC
Intermediate egret	*Ardea intermedi*	Aves	NE	LC
Lagre egret	*Ardea alba*	Aves	LC	LC
Blackwinged kite	*Elanus caeruleus*	Aves	LC	LC
Swamp partridge/Francolin	*Francolinus gularis*	Aves	VU	RE
Coot	*Fulila atra*	Aves	NE	LC
Water Cock	*Gallicrex cinerea*	Aves	NE	LC
Pintail Snipe	*Gallingo sp.*	Aves	NE	LC
Red jungle Fowl	*Gallus gallus*	Aves	LC	LC
Moorhen	*Gallinula chloropus*	Aves	NE	LC
Gullbilled tern	*Gelochelidon nilotica*	Aves	LC	LC
Small pratincle	*Glareola lactea*	Aves	LC	LC
Tiger bittern	*Gorsachius melanolophus*	Aves	NE	LC
White Rumped Vulture	*Gyps bengalensis*	Aves	EN	CR
Griffon vulture	*Gyps fulvus*	Aves	LC	NF
White collared kingfisher	*Haliaeetus chloris*	Aves	NE	NF
Pallas's fishing eagle	*Haliaeetus leucoryphus*	Aves	VU	EN
Blackcapped kingfisher	*Halcyon pileata*	Aves	LC	LC
Whitebellied sea eagle	*Haliaeetus leucogaster*	Aves	NE	LC
Pheasant Tailed Jacana	*Hydrophasianus Chirurgus*	Aves	NR	LC
Painted stork	*Mycteria leucocephala*	Aves	NT	CR
Greyheaded fishing eagle	*Ichthyophaga ichthyaetus*	Aves	NR	NT
Chestnut bittern	*Ixobrychus cinnamomeus*	Aves	LC	LC
Brownheaded gull	*Leptoptilos burnnicephalus*	Aves	NR	LC
Greater adjutant stock	*Leptoptilos dubius*	Aves	EN	RE
Great gull	*Larus ichthyaetus*	Aves	NR	LC
Blackheaded gull	*L. ridibundus*	Aves	NR	LC
Lesser adjutant stock	*Leptoptilos javanicus*	Aves	VU	VU
Bronze Winged Jacana	*Metopidius indicus*	Aves	LC	LC
Redheaded pochard	*Netta rufina*	Aves	LC	LC
Eurasian Curlew	*Numeneus arquata*	Aves	NT	NT

Common Name	Scientific Name	Class	IUCN Global Status	IUCN Local Status, 2016
Night heron	*Nycticorax nycticorax*	Aves	LC	LC
Little cormorant	*Microcarbo niger*	Aves	LC	LC
Osprey	*Pandion haliaetus*	Aves	LC	LC
Little Grebe	*Tachybaptus ruficollis*	Aves	LC	LC
Storkbilled kingfisher	*Pelargopsis amauroptera*	Aves	NT	LC
Lagre cormorant	*Phalacrocorax carbo*	Aves	LC	LC
Greenbilled malkoha	*Phaenicophaeus tristis*	Aves	LC	LC
Water rail	*Rallus aquaticus*	Aves	LC	LC
Avocet	*Recurvirostra avosetta*	Aves	LC	LC
Indian Skimmer	*Rynchops albicolis*	Aves	VU	CR
Black Billed Tern	*Sterna acuticauda*	Aves	EN	CR
Little tern	*Sternula albifrons*	Aves	LC	LC
River turn	*Sterna aurantia*	Aves	NT	NT
Crested Serpent Eagle	*Spilornis cheela*	Aves	LC	LC
Brahminy duck	*Tadorna ferruginea*	Aves	NR	LC
Green Shank	*Tringa nebularia*	Aves	LC	LC
Red Shank	*Tringa totanus*	Aves	LC	LC
Grey Headed Lapwing	*Vanellus cinereus*	Aves	LC	LC
Red Watlled Lapwing	*Vanellus indicus*	Aves	LC	LC
Yellow Waltled Lapwing	*Vanellus malabaricus*	Aves	LC	NT
Asian Small-clawed Otter	*Aonyx cinerea*	Mammalia	VU	EN
Spotted deer	*Axis axis*	Mammalia	LC	LC
Bandicot rat	*Bandicota indica*	Mammalia	LC	LC
Lesser bandicot rat	*Bandicota bengalensis*	Mammalia	LC	LC
Jackal	*Canis aureus*	Mammalia	LC	LC
Shortnosed fruit bat	*Cynopterus sphinx*	Mammalia	LC	LC
Jungle cat	*Felis chaus*	Mammalia	LC	NT
Fishing cat	*Prionailurus viverrinus*	Mammalia	EN	EN
Small mongoose	*Herpestes auropunctatus*	Mammalia	NR	LC
Common Mongoose	*Herpestes edwardsii*	Mammalia	LC	LC
Tockell's bat	*Hesperoptenus tickelli*	Mammalia	LC	DD
Indian Porcupine	*Hystrix indica*	Mammalia	LC	LC
Rufoustailed hare	*Lepus nigricollis*	Mammalia	LC	LC
Smooth-coated otter	*Lutrogale perspicillata*	Mammalia	VU	CR
Rhesus macaque	*Macaca mulatta*	Mammalia	LC	VU
False vampire	*Megaderma lyra*	Mammalia	LC	LC
Barking deer	*Muntiacus muntjak*	Mammalia	LC	EN
House rat	*Mus musculus*	Mammalia	LC	LC
Finless porpoise	*Neophocaena phocaenoides*	Mammalia	VU	NT
Irrawaddy Dolphin	*Orcaella brevirostris*	Mammalia	VU	NT

Common Name	Scientific Name	Class	IUCN Global Status	IUCN Local Status, 2016
Royal Bengal Tiger	*Panthera tigris*	Mammalia	EN	CR
Palm civet	*Paradoxurus hermaphroditus*	Mammalia	LC	LC
Indian Flying fox	*Pteropus giganteus*	Mammalia	LC	LC
Indian Pipistrelle	*Pipistrellus coromandra*	Mammalia	LC	LC
Ganges river Dolphin	*Platanista gangetica*	Mammalia	EN	VU
Common rat	*Rattus rattus*	Mammalia	LC	LC
Fulvous fruit bat	*Rousettus leschenaultii*	Mammalia	LC	LC
Wild boar	*Sus scrofa*	Mammalia	LC	LC
Large civit	*Viverra zibetha*	Mammalia	NT	NT
Smmal Indian civet	*Viverricula indica*	Mammalia	LC	NT
Bengal Fox	*Vulpes bengalensis*	Mammalia	LC	VU
Common vine snake	*Ahaetulla nasutus*	Reptilia	NR	LC
River terrapin	*Batagur baska*	Reptilia	NE	CR
Common Krait	*Bungarus caeruleus*	Reptilia	NE	LC
Banded Krait	*Bungarus fasciatus*	Reptilia	NE	LC
Dog-faced water snake	*Cerberus rhynchops*	Reptilia	NE	LC
Asiatic Softshell turtle	*Chitra indica*	Reptilia	EN	CR
Estuarine crocodile	*Crocodylus porosus*	Reptilia	LC	EN
Common Bronzeback Tree snake	*Dendrelaphis tristis*	Reptilia	NE	LC
Hawksbill turtle	*Dermochelys coriacea*	Reptilia	CR	CR
Wall Lizard	*Gekko geko*	Reptilia	NE	LC
Black pond turtle	*Geoclemys hamiltonii*	Reptilia	VU	EN
Roofed turtle	*Pangshura tecta*	Reptilia	LR	LC
Olive ridley turtle	*Lepidochelys olivacea*	Reptilia	VU	VU
Spotted Flashshell tutle	*Lissemys punctata*	Reptilia	LR	LC
Three-keeled land Tortoise	*Melanochelys tricarinata*	Reptilia	VU	VU
Yellow Turtle	*Melanochelys petersi*	Reptilia	VU	NT
Monocellate cobra	*Naja kaouthia*	Reptilia	LC	NT
King cobra	*Ophiophagus hannah*	Reptilia	VU	VU
Rock pithon	*Python molurus*	Reptilia	VU	DD
Spot-tailed Pit Viper	*Trimeresurus erythrurus*	Reptilia	LC	LC
Ganges softshell turtle	*Nilssonia gangetica*	Reptilia	VU	EN
Bangal monitor	*Varanus bengalensis*	Reptilia	LC	NT
Yellow monitor	*Varanus flavescens*	Reptilia	LR	NT
Ring lizard	*Varanus salvator*	Reptilia	LC	VU
Russels Viper	*Daboia russelii*	Reptilia	NE	NT
Dark-bellied Marsh Snake	*Xenochrophis piscator*	Reptilia	NE	LC

Note: 'EN'=Endangered; 'VU'=Vulnerable; 'CR'=Critically Endangered; 'NE'=Not Evaluated; 'LC'=Leased Concern; 'LR'=Lower Risk; 'NT'=Near Threatened.

c. Butterflies

Family	English Name	Scientific Name	IUCN Global Status	IUCN Local Status 2016
Nymphalidae	Common leopard	*Phalanta phalantha Drury, 1773*	NE	LC
	Peacock pansy	*Junonia almana Linnaeus, 1758*	LC	LC
	Grey pansy	*Junonia atlitesLinnaeus, 1763*	NE	LC
	Blue pansy	*Junonia orithya Linnaeus, 1758*	NE	VU
	Great eggfly	*Hypolimnas bolina Linnaeus, 1758*	NE	LC
	Tree nymph	*Idea agamarschana Felder & Felder, 1865*	NE	VU
	Leopard lacewing	*Cethosia cyane Drury, 1770*	NE	LC
	Chestnut streaked sailor	*Neptis jumbah Moore, 1857*	NE	LC
Danaidae	Plain tiger	*Danaus chrysippus Linnaeus, 1758*	NE	LC
	Striped tiger	*Danaus genutia Cramer, 1779*	NE	LC
	White tiger	*Danaus melanippus indicus Fruhstorfer, 1899*	NE	EN
	Blue tiger	*Tirumala limniace Cramer, 1775*	NE	LC
	Common crow	*Euploea core Cramer, 1780*	LC	LC
	Sundarbans crow	*Euploea crameri nicevillei Moore, 1890*	NE	CR
Papilionidae	Crimson rose	*Pachliopta hector Linnaeus, 1758*	NE	EN
	Common rose	*Pachliopta aristolochiae Fabricius, 1775*	NE	NF
	Lime	*Papilio demoleus Linnaeus, 1758*	NE	LC
Pieridae	Common grass yellow	*Eurema hecabe hecabe Linnaeus, 1758*	NE	NF
	Common jezebel	*Delias eucharis Drury, 1773*	NE	LC
	Red spot jezebel	*Delias descombesi Boisduval, 1836*	NE	LC
	Common emigrant	*Catopsilia pomona Fabricius, 1775*	NE	LC
	Mottled emigrant	*Catopsilia pyranthe Linnaeus, 1758*	NE	LC
Lycaenidae	Tiny grass blue	*Zizula hylax Fabricius, 1775*	NE	LC
	Scarlet flash	*Rapala dieneces dieneces Hewitson, 1878*	NE	EN
	Common cerulean	*Jamides celeno celeno Cramer, 1775*	NE	LC
	Common pierrot	*Castalius rosimon Fabricius, 1775*	NE	LC
	Lesser grass blue	*Zizina otis otis Fabricius, 1787*	NR	LC
	Dark grass blue	*Zizeeria karsandra Moore, 1865*	NE	LC
	Shot silverline	*Spindasis ictis Hewitson, 1865*	NE	EN
	Common ciliate blue	*Anthene emolus Godart, 1823*	NE	VU
Satyridae	Common evening brown	*Melanitis leda Linnaeus, 1758*	NE	LC
	Dark-branded bushbrown	*Mycalesis mineus Linnaeus, 1758*	NE	LC

Family	English Name	Scientific Name	IUCN Global Status	IUCN Local Status 2016
	Common bushbrown	*Mycalesis perseus blasius Fabricius, 1798*	NE	VU
	Common fourring	*Ypthima huebneri Kirby, 1871*	NE	LC
	Common palmfly	*Elymnias hypermnestra Drury, 1773*	NE	LC
Hesperidae	Common awl	*Hasora badra badra Moore, 1857*	NE	VU
	Obscure branded swift	*Pelopidas agna agna Moore, 1865*	NE	LC

Source: Journal of Entomology and Zoology Studies 2014; 2 (1): 29-32;

http://www.iucnredlistbd.org/Species/Group?code=BU

Note: 'NE'=Not Evaluated; 'LC'=Leased Concern.

Annex 7-4: Species composition of benthos and planktons in the Passur River

a. Benthos

Species	Harbaria	Akram Point	Hiron Point	Passur-Maidara Confluence
	Dry Season	Dry Season	Dry Season	Dry Season
Order: Coleoptera				
Dubiraphia vittata	++	-	++	++
Helichus basalis	+	+	+	-
Promoresia tardella	-	-	-	+
Order: Crustacea				
Gammarus fasciatus	+++	++	+	+++
Palaemonetes paludosus	++	++	++	++
Order: Diptera				
Ablabesmyia mallochi	+++	++	++	+++
Brillia flavifrons	-	+	+	-
Cricotopus vierriensis	+	-	-	+
Cryptochironomus fulvus	++	+	++	++
Dicrotendipes fumidus	-	+++	-	-
Microtendipes pedellus	-	-	-	+
Orthocladius dorenus	-	-	-	++
Polypedilum flavum	+	+	+	+
Sublettea coffmani	+	-	-	-
Tribelos jucundum	-	-	-	++
Order: Ephemeroptera				
Acentrella Alachua	+	+	-	+
Baetis Pluto	+	+	+	+
Drunella lata	-	-	-	+
Heterocloeon amplum	-	+	+	-
Iswaeon anoka	+	+	-	+
Plauditus cestus	+	+	+	-
Order: Gastropoda				
Cerithidea cingulata	+	+	+	++
Clithon ocualamensis	-	+	+	-
Helisoma anceps	+	+	+	+
Laevapex fuscus	++	+	++	++
Micromenetus dilatatus	+++	+	+	+++
Plicarcularia leptospera	-	++	++	-
Belostoma sp.	+++	+++	+++	+++
Corydalus cornutus	+	+	+	+
Nigronia fasciatus	+	+	+	-
Nigronia serricornis	-	+	-	-

Species	Harbaria	Akram Point	Hiron Point	Passur-Maidara Confluence
	Dry Season	Dry Season	Dry Season	Dry Season
Order: Odonata				
Boyeria grafiana	+	-	+	+
Epicordulia princeps	++	++	++	+++
Lanthus parvulus	-	+	-	-
Order: Oligochaeta				
Limnodrilus hoffmeisteri	+++	+	++	+++
Limnodrilus profundicola	-	-	-	+
Tubifex heterochaetus	+	-		+
Tubifex tubifex	+	+	+	+++
Order: Bivalvia				
Corbicula fluminea	-	+	+	-
Elliptio complanata	-	+	-	-
Order: Plecoptera				
Eccoptura xanthenes	+	-	-	+
Haploperla brevis	-	-	-	+
Leuctra hippopus	-	-	-	-
Order: Trichoptera				
Brachycentrus lateralis	+	-	-	-
Ceratopsyche alhedra	-	-	+	-
Ithytrichia lamellaris	-	-	-	-
Micrasema bennetti	+	-	-	+
Molanna blenda	-	-	-	+
Total nos. of present species	28	29	26	31

b. Planktons

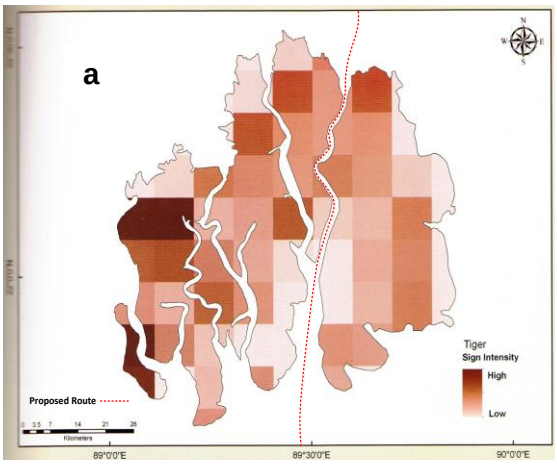
Phytoplankton Species Name	Class	Harbaria		Akram Point		Passur-Maidara		Hironpoint	
		D	W	D	W	D	W	D	W
Chaetoceros pendulus	Bacillariophyceae	33	3	21	2	30	3	-	NS
Chaetoceros socialis	Bacillariophyceae	25	5	20	1	28	2	-	NS
Coscinodiscus stellaris	Bacillariophyceae	**19**	-	18	-	10	-	15	NS
Coscinodiscus excentricus	Bacillariophyceae	19	2	18	2	20	4	19	NS
Coscinodiscus granii	Bacillariophyceae	30	-	31	-	32	1	34	NS
Coscinodiscus lineatus	Bacillariophyceae	44	1	39	1	40	2	47	NS
Coscinodiscus marginatus	Bacillariophyceae	21	-	16	-	24	1	18	NS
Coscinodiscus tumidus	Bacillariophyceae	**10**	-	17	8	15	9	6	NS
Cyclotella bodanica	Bacillariophyceae	**14**	-	-	17	-	15	12	NS
Cymbella gracilis	Bacillariophyceae	28	3	22	2	31	3	20	NS
Gyrsigma distortum	Bacillariophyceae	20	2	24	3	19	1	23	NS
Melosira arenaria	Bacillariophyceae	20	4	23	2	25	2	20	NS
Melosira granulata	Bacillariophyceae	**34**	-	30	-	25	-	35	NS
Melosira moniliformis	Bacillariophyceae	36	1	33	1	45	3	39	NS
Melosira sol	Bacillariophyceae	18	-	23	-	26	2	20	NS
Melosira undulate	Bacillariophyceae	27	2	20	1	30	4	25	NS
Melosira varians	Bacillariophyceae	28	1	25	-	29	1	22	NS
Navicula bacillum	Bacillariophyceae	16	-	24	2	19	-	21	NS
Navicula brekkaensis	Bacillariophyceae	25	3	22	1	28	3	14	NS
Navicula grimmei	Bacillariophyceae	10	-	13	2	8	-	11	NS
Nitzschia acicularis	Bacillariophyceae	17	1	10	-	20	1	13	NS
Nitzschia sigma	Bacillariophyceae	25	3	-	2	-	3	-	NS
Surirella fastuosa	Bacillariophyceae	29	5	-	3	-	5	-	NS
Surirella robusta	Bacillariophyceae	**22**	-	-	17	-	16	15	NS
Synedra ulna	Bacillariophyceae	**25**	-	-	28	-	26	21	NS
Chlorella vulgaris	Chlorophyceae	**7**	-	-	6	-	10	8	NS
Closteriumcostatum	Chlorophyceae	16	2	-	1	-	3	-	NS
Closterium lagoense	Chlorophyceae	10	3	-	2	-	4	-	NS
Calothrix fusca	Cyanophyceae	-	2	-	-	15	3	-	NS
Calothrixcastellii	Cyanophyceae	-	8	-	5	9	-	7	NS
Lyngbya lutea	Cyanophyceae	-	2	-	1	10	3	-	NS
Lyngbya lutea	Cyanophyceae	-	9	-	6	-	10	10	NS
Lyngbya confervoides	Cyanophyceae	-	3	-	1	15	4	-	NS
Lyngbyacorticicola	Cyanophyceae	-	1	-	-	9	2	-	NS

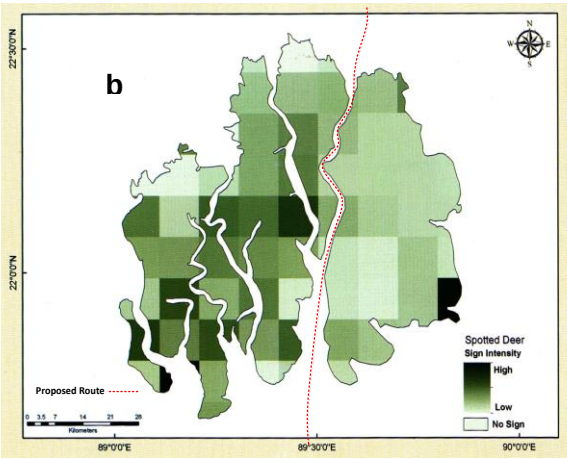
Phytoplankton Species Name	Class	Harbaria		Akram Point		Passur-Maidara		Hironpoint	
		D	W	D	W	D	W	D	W
Microcoleus chthonoplastes	Cyanophyceae	-	2	-	-	10	-	-	NS
Oocystis pusilla	Cyanophyceae	-	2	-	2	12	3	-	NS
Oscillatoria amoena	Cyanophyceae	-	2	-	2	18	3	-	NS
Oscillatoria limosa	Cyanophyceae	-	-	-	1	10	2	-	NS
Oscillatoriaprinces	Cyanophyceae	-	1	-	-	4	-	-	NS
Oscillatoria subbrevis	Cyanophyceae	-	3	-	4	12	2	-	NS
Oscillatoria tenuis	Cyanophyceae	-	3	-	3	21	5	-	NS
Schizothrix lamyi	Cyanophyceae	-	5	-	3	2	-	3	NS
Spirulina major	Cyanophyceae	-	1	-	-	8	1	-	NS
Spirulina subsalsa	Cyanophyceae	-	-	-	-	6	-	-	NS
Ceratium dens	Dinophyceae	-	13	-	21	9	-	19	NS
Ceratium extensum	Dinophyceae	-	9	-	15	7	-	13	NS
Ceratium furca	Dinophyceae	-	2	-	3	4	-	-	NS
Ceratium horridum	Dinophyceae	-	-	-	2	6	-	-	NS
Ceratium massiliense	Dinophyceae	-	-	-	1	3	-	-	NS
Ceratium tripods	Dinophyceae	-	18	-	29	10	-	28	NS
Peridinium granni	Dinophyceae	-	1	-	2	10	-	-	NS
Centritractus belanophorus	Xanthophyceae	-	-	-	-	15	2	-	NS
Total Population: Unit/liter		**628**	**128**	**449**	**205**	**729**	**164**	**538**	**-**
Total Species Count: 51		28	35	20	38	43	36	28	

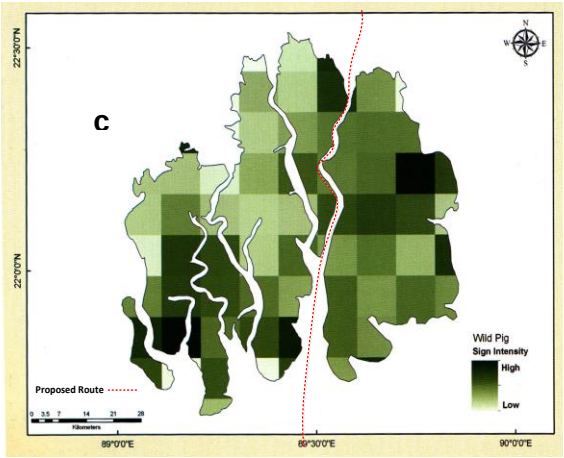
Annex 7-5: Maps of Abundance of Major Wildlife

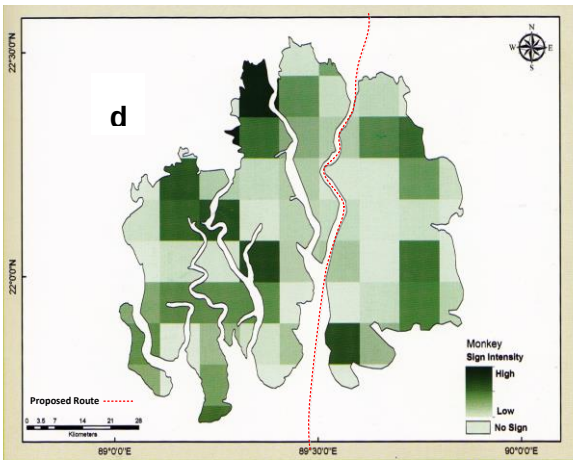
Map (a-h) is showing important locations for wildlife along the proposed coal transportation route.

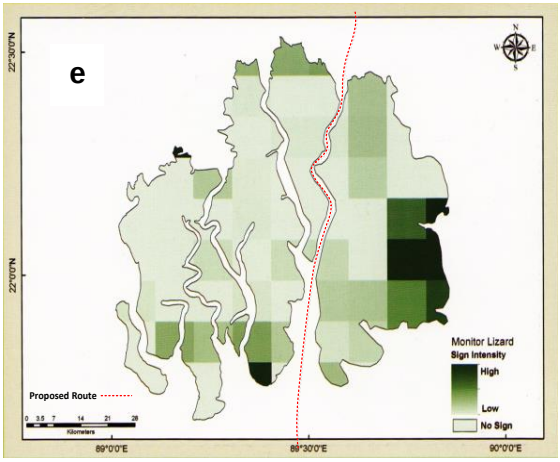
(a.Royal Bengal Tiger, b. Spotted Deer, c. Wild Pig, d. Rhesus macaque, e. Monitor Lizard, f. Lesser Adjutant, g. Estuarine Crocodile and h. Smooth-coated Otter)











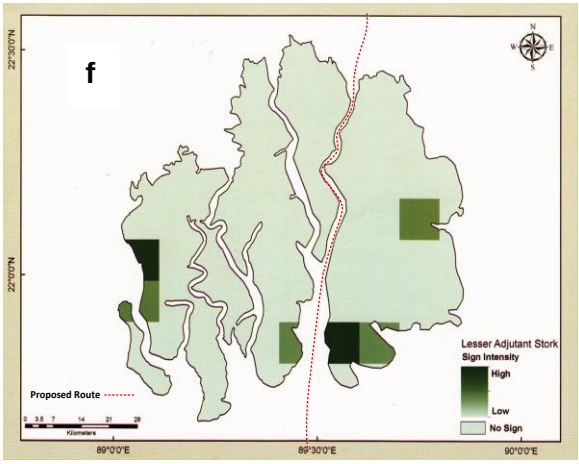


Figure (a-h): Maps of Abundance of Major Wildlife

Annex 7-6: Fish Diversity and Status of the Sundarbans Forest

a. General fish species diversity

Category	Local name	English name	Scientific name	Distribution	IUCN Status, 2016
Inland Water Fish	GhagraTengra	Gagora catfish	Clupisoma garua	Estuaries and rivers	EN
	Bagh air	Gangetic goonch	Bagarius bagarius	Estuaries and rivers	CR
	Chaka	Squarehead catfish	Chaca chaca	Rivers	EN
	Chanda	Elongate glass perch	Chanda nama	Rivers and estuaries	LC
	Gazar	Giant snakehead	Channa marulius	Rivers and estuaries	EN
	Cheng	Asiatic snakehead	Channa orientalis	Closed water bodies	LC
	Taki	Spotted snakehead	Channa punctatus	Rivers and estuaries	LC
	Shol	Banded snakehead	Channa striatus	Rivers and estuaries	LC
	Chital	Humped featherback	Chitala chitala	Rivers and estuaries	EN
	Magur	Air breathing catfish	Clarias batrachus	Closed water body	LC
	Kachki	Ganga river sprat	Corica soborna	Rivers	LC
	Kuli	Dusky sleeper	Elotris fusca	Estuaries and rivers	LC
	Bele	Tank goby	Glossogobius giuris	Rivers and estuaries	LC
	Chapila	Indian river shad	Gudusia chapra	Rivers and estuaries	VU
	Ekthota	Halfback	Hyporhamphus limbatus	Rivers and estuaries	LC
	Bata	Bata labeo	Labeo bata	Rivers	LC
	Bhetki/ Koral	Barramundi/Seabass	Lates calcarifer	Estuaries and rivers	NT
	Parsia	Goldspot mullet	Liza parsia	Estuaries	LC
	Tara baim	One –striped spiny eel	Macrognathus aculeatus	Rivers and estuaries	NT
	Baim/Guchi	Striped spiny eel	Macrognathus pancalus	Rivers and estuaries	LC
	Salbaim	Zig Zag eel	Mastacembalus armatus	Rivers	EN
	Kuicha	Gangetic mud eel	Monopterus cuchia	Rivers and estuaries	VU
	Golshatengra	Gangetic tengra	Mystus cavasius	Rivers and estuaries	NT
	Kalobujuri	Tengramystus	Mystus tengara	Rivers	LC

Category	Local name	English name	Scientific name	Distribution	IUCN Status, 2016
	Tengra	Striped dwarf catfish	Mystus vittatus	Estuaries and rivers	LC
	Bheda/Meni	Mud perch	Nandus nandus	Rivers and estuaries	NT
	Poa	Pama	Otolithoides pama	Estuaries and rivers	LC
	Rup chanda	Chinese pomfret	Pampus chinensis	Estuaries	LC
	Pangus	River pungus	Pangasius pangasius	River/estuaries	EN
	Choukka	Indian pellona	Pellonadit chela	Estuaries	LC
	Kanimagur	Canine catfish eel	Plotosus canius	Estuaries and rivers	NT
	Lakhua	Indian threadfin	Polydactylus indicus	Estuaries	EN
	Tapasi/muni	Paradise threadfin	Polynemous paradiseus	Estuaries and rivers	LC
	Sarpunti	Olive barb	Puntius sarana	Rivers and estuaries	NT
	Jatpunti	Spotfin swamp barb	Puntius sophore	Rivers	LC
	Tit punti	Ticto barb	Puntius ticto	Rivers	VU
	Darkina	Rasbora	Rasbora rasbora	Rivers and estuaries	NT
	Khorsola	Corsula mullet	Rhinomugil corsula	Estuaries and rivers	LC
	Rita	Rita	Rita rita	Estuaries and rivers	EN
	Phasa	Gangetic hairfin anchovy	Setipinna phasa	Estuaries and rivers	LC
	Tulardandi	Gangetic sillago	Silloginopsis panijus	Estuaries and rivers	LC
	Silong	Silond catfish	Silonia silondia	Estuaries and rivers	LC
	Aor	Long-whiskered catfish	Sperata aor	Rivers and estuaries	VU
	Potka	Gangaetic puffer fish	Chelonodon patoka	Tidal rivers and estuaries	DD
	Churi	-	Trichiurus mutica	Estuaries and rivers	
	Boal	Freshwater shark	Wallago attu	Rivers and estuaries	VU
	Kakila	Needle fish	Xenentodon cancila	Rivers and estuaries	LC
	Bacha		Eutropiichthys vacha	Marine, River and Estuaries	LC
	GulshaTengra		Mystus bleekeri	Marine, River and Estuaries	LC
	KabashiTengra		Mystus cavasius	Marine, River and Estuaries	NT
	Koi		Anabas testudineus	Marine, River and Estuaries	LC
Marine	Shankhachil	Banded eagle ray	Aetomylaeus nichofii	Marine	VU
	Gongonia	Grunting toadfish	Allenbatrachus grunniens	Marine	EN
	Katabukha	Beardless sea catfish	Batrachocephalus mino	Marine	LC

Category	Local name	English name	Scientific name	Distribution	IUCN Status, 2016
	Kuli	Duckbill sleeper	Butis butis	Marine	LC
	Kamothangor	Requiem shark	Carcharhinus gangeticus	Marine	CR
	Potka	-	Chelonodon patoca	Marine	LC
	Amadi	Pointed tail anchovy	Coilia dussumieri	Marine	DD
	Kamila	Indian pike conger	Congresox talabonoides	Marine	LC
	Rekha	Four barred finger fish	Corius quadrifasciatus	Marine	DD
	Maitya	Jack and pompanos	Cybium guttatum	Marine	NT
	Kukurjiv	Sole	Cynoglossus macrostomus	Marine	NT
	Haturihangor	Hammerhead shark	Eusphyra blochii	Marine	NT
	Bommaitta	Tuna	Euthynnus affinis	Marine	NT
	-	Shovelnose ray	Glaucostegus typus	Marine	VU
	Ghagrabele	-	Gobius personatus	Marine	LC
	Loitta	Bombay duck	Harpadon nehereus	Marine	LC
	Shaplapata/Haush	String ray	Himantura uarnak	Marine	LC
	Lal poa/Vola	Silver jew	Johnius argentatus	Marine	LC
	Med	Gaint sea cat fish	Katengus typus	Marine	LC
	Rupsha	Skipjack tuna	Katsuwonus pelamis	Marine	LC
	Somudra koi	Tripletail	Lobotes surinamensis	Marine	NT
	Takchanda	Common pony fish	Leiognathus equulus	Marine	NT
	-	John's snapper	Lutjanus johnii	Marine	NT
	Kawa	Hard tail	Megalapsis cordyla	Marine	NT
	Bhangan	Mullet	Mugil cephalus	Marine	EN
	Ruppan	Thread fun bream	Nemipterus japonicas	Marine	EN
	Sadapoa	Silver jew	Otolithes argentatus	Marine	NT
	Folichanda	Silver pomfret	Pampus argenteus	Marine	LC
	Bhutbele	-	Paragobiodon echinocephalus	Marine	EN
	Konkon	-	Pelamys chiliensis	Marine	NT
	Choukha	Indian pellona	Pellona indica	Marine	NT
	Kanimagur	Canine eeltail catfish	Plotosus lineatus	Marine	LC
	Lakhua	Indian salmon	Polynemus indicus	Marine	EN
	Ramchosh/Taposi	Paradise threadfin	Polynemus paradiseus	Marine	NT
	Datina/Sadadatina	Silver bream	Pomadasys hasta	Marine	EN
	Dahuk	Walking goby	Scartelaos histophorus	Marine	EN

Category	Local name	English name	Scientific name	Distribution	IUCN Status, 2016
	Chitra/Bistara	Spotted butterfish	Scatophagus argus	Marine	EN
	Lambu/Bara poa	Long jewfish	Sciaenoides brunneus	Marine	EN
	Fotonmaach	King mackerel	Scomberomorus guttatus	Marine	EN
	Java	-	Siganus javus	Marine	NT
	Tulardandi	Lady fish	Sillago domina	Marine	NT
	Cheowa	Torpedo trevally	Taeniodes anguillaris	Marine	EN
	Ilish	Hilsa shad	Tenualos ailisha	Marine, River and Estuaries	LC
	Chandanilish	Toli shad	Tenualosa toli	Marine, River and Estuaries	LC
	Barguni	Jarbuaterapon	Terapon jarbua	Marine	EN
	Phasa	Anchovies	Thryssa mystax	Marine	EN
	Somudrachela	-	Thryssa purava	Marine	NT
	Tuna	Yellowfin tuna	Thunnus albacores	Marine	NT
	Churi	Ribbon fish	Trichiurus haumela	Marine	LC
	Banspata		Brachypleura novaezeelandiae	Marine, River and Estuaries	NT
	Boiragi		Coiliadus sumieri	Marine, River and Estuaries	NT
	Ghora Chela		Securicula gora	Marine, River and Estuaries	-
	Lal Chewa		Odontamblyopus rubicundus	Marine, River and Estuaries	NT
	Paira Chanda		Scatophagus argus	Marine, River and Estuaries	DD
	Purabi Chela		Thryssa purava	Marine, River and Estuaries	LC
	Sada Chewa		Trepauchen vagina	Marine, River and Estuaries	NT
	Sagor Chela		Megalops cyprinoids	Marine, River and Estuaries	NT
	Tailla		Eleutheronema tetradactylum	Marine, River and Estuaries	-
	Tak Chanda		Leiognathus equulus	Marine, River and Estuaries	NT
Prawn	Chatkachingri	Birma river prawn	Macrobrachium malcolmsonii	Estuaries and rivers	LC
	Golda chingri	Fresh water prawn	Macrobrachium rosenbergii	Estuaries and rivers	LC
	Gurachingri	Spider prawn	Nematopalaemon tenuipes	Estuaries and rivers	DD
Shrimp	Sagorkakra	Horseshoe crab	Carsinoscorpius rotundicauda	Estuaries and rivers	
	Horinachingri	Brown shrimp	Metapenaeus monoceros	Estuaries and rivers	LC

Category	Local name	English name	Scientific name	Distribution	IUCN Status, 2016
	Zajikakra	Blue swimmer crab	Neptunus pelagicus	Estuaries and rivers	
	Satarukakra	Swimmer crab	Neptunus sanguinolenta	Estuaries and rivers	
	Chalichingri	Indian white shrimp	Penaeus indicus	Estuaries and rivers	LC
	Bagdachingri	Giant tiger shrimp	Penaeus monodon	Estuaries and rivers	LC
	Chaprachingri	Oriental shrimp	Penaeus orientalis	Estuaries and rivers	
	Shelakakra	Mud crab	Scylla serrata	Estuaries and rivers	LC
	ChammuChingri		Metapenaeus brevicornis	Marine, River and Estuaries	LC
	HarinaChingri		Metapenaeus ensis	Marine, River and Estuaries	DD

***Status code**: CR-Critically Endangered, EN-Endangered, VU- Vulnerable, LR-Lower Risk, NT- Near Threatened, DD-data Deficient.*

a. Ornamental fish species in the Sundarbans

No	Scientific name	Local name	Order	Family
1	Scatophagus argus (Linnaeus)	Pairatoli/Paira Chanda	Perciformes	Scatophagidae
2	Monodactylus argenteus (Linnaeus)	Chanda	Perciformes	Monodactylidae
3	Hemiramphus far (Forsskal)	Bak	Atheriniformes	Hemiramphidae
4	Therapon jarbua (Forsskal)	Kath koi	Perciformes	Teraponidae
5	Leiognathus splendens (Cuvier)	Bhola	Perciformes	Leognathidae
6	Periophthalmus weberi Eggert	Daku macch	Perciformes	Gobiidae
7	Chelanodon patoca (Hamilton-Buchanan)	Patoka	Tetraodontiformes	Tetraodontidae
8	Chelanodon fluviatilis (Hamilton-Buchanan)	Patoka	Tetraodontiformes	Tetraodontidae
9	Tetraodon cutcutia Hamilton- Buchanan	Tapa	Tetraodontiformes	Tetraodontidae
10	Mystus gulio (Hamilton- Buchanan)	Nona tangra	Siluriformes	Bagridae
11	Toxotes chataeus (Hamilton- Buchanan)	Rucho/uchoo	Perciformes	Toxotidae
12	Brachygobius nunus (Hamilton-Buchanan)	Nona Bele	Perciformes	Gobiidae
13	Triacanthus biacculeatus (Bloch)	Helicopter	Tetraodontiformes	Triacanthidae
14	Glossogobius guiris (Hamilton-Buchanan)	Bele	Perciformes	Gobiidae
15	Etropus macculeatus (Bloch)	Bele	Perciformes	Cichlidae
16	Etropus suratensis (Bloch)	Bele	Perciformes	Cichlidae
17	Drepane punctatus (Linnaeus)	Baul Pomfret	Perciformes	Ephippidae
18	Pisodonophis boro (Hamilton-Buchanan)	Sona Bam	Anguilliformes	Ophichthidae
19	Arius dussumieri Valenciennes	Med kanta	Siluriformes	Ariidae
20	Lutjanus johni (Bloch)	Koi bhola/Chanda koi	Perciformes	Lutjanidae
21	Pterotolithus macculatus	Madhu bhola	Perciformes	Sciaenidae
22	Leognathus blochii (Valenciennes)	Chhoto Chanda	Perciformes	Leognathidae
23	Secotor ruconius (Hamilton- Buchanan)	Baro Chanda	Perciformes	Leognathidae
24	Sillaginopsis panijus (Hamilton)	Tul bele	Perciformes	Sillaginidae
25	Bregmaceros maccleandi Thompson	Rule	Gadiformes	Bregmacerotidae
26	Dasciaena albida (Cuvier)	Surungi Bhola	Perciformes	Sciaenidae

No	Scientific name	Local name	Order	Family
27	Stigmatogobius javanicus (Bleeker)	Sabuj chhap Bele	Perciformes	Gobiidae
28	Stigmatogobius sadanundio (Hamilton-Buchanan)	Kalo chhapBele	Perciformes	Gobiidae
29	Odontamplyophus rubicondus (Hamilton- Buchanan)	Pithuli	Perciformes	Gobioidae
30	Taeniodae anguillaris (Linnaeus)	Cheoa	Perciformes	Gobioidae
31	T. buchanani (Dey)	Lal Cheoa	Perciformes	Gobioidae
32	Megalops cyprinoids (Broussonet)	Omlet	Elopiformes	Megalopidae
33	Boleopthalmus boddarti (Pallas)	Menu machh	Perciformes	Gobiidae
34	Gobiopterus chuno (Hamilton-Buchanan)	Gang chuno	Perciformes	Gobiidae
35	Polymenus paradiseus Linnaeus	Topse	Perciformes	Polymenidae
36	Coilia ramcarti (Hamilton- Buchanan)	Jat Amude	Clupeiformes	Engraulidae
37	C. reynaldi Valnciennes	Rupoli Amude	Clupeiformes	Engraulidae
38	C. dussumieri Valnciennes	Amude	Clupeiformes	Engraulidae
39	Pampus chinensis (Euphrasen)	Pomphret	Perciformes	Stromateidae
40	Anguilla bengalensis (Gray and Hardwicke)	Bam	Anguilliformes	Anguillidae
41	Mene maculate (Bloch)	Chanda	Perciformes	Menidae
42	Pseudorhombus arsius (Hamilton-Buchanan)	Bhoot pata	Perciformes	Bothidae
43	Cynoglossus lingua Hamilton - Buchanan	Salfish	Pleuronectiformes	Cynoglossidae
44	Platycephalus indicus (Linnaeus)	Chota bele	Scorpaeniformes	Platicephalidae
45	Protonibea diacanthus (Lacepede)	Kat Bhola	Perciformes	Lutjanidae
46	Mystus bleekeri (Day)	Gang tangra	Siluriformes	Bagridae
47	Paraplagusia bilineata (Bloch)	Pata machh	Pleuronectiformes	Cynoglossidae
48	Mugil cephalus Linnaeus	Parse	Perciformes	Mugilidae
49	Alepes djedaba	Kane Poka	Perciformes	Carangidae
50	Hilsa toli	Kokila	Clupeiformes	Clupeidse
51	Pterotolithus maculatus	Tika Bhola	Perciformes	Sciaenidae
52	Periopthalmus variabilis	Menu	Perciformes	Gobiidae
53	Periopthalmodon schlosseri	Menu	Perciformes	Gobiidae
54	Eleutheronema tetradactylym	Gurjali	Perciformes	Polynemidae
55	Lutjanus johni	Pankhai	Perciformes	Lutjanidae
56	Protonibea diacanthus	Kalo Bhola	Perciformes	Sciaenidae
57	Johnius coitor	Lal Bhola	Perciformes	Sciaenidae
58	Muraenosox talaban	Nona bam	Anguilliformes	Muraenesocidae
59	Zenarchopterus ectunio	Bak	Cyprinodontiformes	Hemiramphidae
60	Strongylura strongylura	Bak	Atheriniformes	Belonidae
61	Brachygobius nunas	Nona Bele	Perciformes	Gobiidae
62	Atropus atropus	Taka	Perciformes	Carangidae
63	Bregmaceros maccleandii	Rule	Gadiformes	Bregmacerotidae
64	Toxotes chatereus	Baishnab chuno	Perciformes	Toxotidae
65	Butis butis	Bhut Bele	Perciformes	Eleotrididae
66	Panna microdon	Surungi Bhola	Perciformes	Sciaenidae
67	Moringua raitaborua	Nona Bam	Anguilliformes	Moringuanidae

Source:B. Mandal, 2012

Annex 7-7: Purpose, Timing and Extent of Migration for Different Year-Class of Major Fish Species

Migratory Fish Species	Sampling Sites	Year Class*	April	July	October	January
Tapsi	Haldikhali	Juvenile and Age-1 adult	Feeding and Nursing	-	Feeding and Nursing	-
	Akram Point	Juvenile and Age-1 adult	Feeding and Nursing	-	-	-
		Adult	-	-	-	-
	Chalna Point	Age-1 adult and Brood fish	Feeding and Nursing	Spawning	-	-
		Adult	-	-	Feeding and Nursing	-
	Harbaria	Juvenile and Age-1 adult	Feeding and Nursing	Feeding and Nursing		-
		Adult and Brood Fish	-	-	Breeding/ Spawning	-
	Chandpai	Juvenile	-	-	Feeding and Nursing	-
	South-west of the Project	Age-1 adult	Feeding and Nursing	Feeding and Nursing	Feeding and Nursing	-
		Brood Fish	-	-	-	-
Bairagi	Haldikhali	Juvenile and Age-1 adult	Feeding and Nursing	-	Feeding and Nursing	-
	Akram Point	Juvenile and Age-1 adult	Feeding and Nursing	-	-	-
		Juvenile and Adult	-	-	-	-
	Chandpai	Fry	Breeding/ Spawning	Breeding/ Spawning	Feeding and Nursing	Feeding
		Juvenile	-	-	-	-
	Chalna Point	Juvenile and Age-1 adult	Feeding and Nursing	-	-	-
	Harbaria	Juvenile	Feeding and Nursing	-	-	-
	Mongla Point	Fry	-	Nursing	-	Feeding
		Juvenile	-	-	-	-
	South-west of the Project	Juvenile	-	Feeding and Nursing	-	-
Chapila	Haldikhali	Juvenile	Feeding and Nursing	-	-	-
	Akram Point	Juvenile	Feeding and Nursing	-	-	-
	Mongla Point	Fry	-	Nursing	-	-
	South-west of the Project	Age-1 adult	-	Feeding and Nursing	-	-

Migratory Fish Species	Sampling Sites	Year Class*	April	July	October	January
Loitta	Haldikhali	Juvenile and Age-1 adult	Feeding and Nursing	-	Feeding and Nursing	-
	Akram Point	Juvenile	Feeding and Nursing	-	-	-
	Akram Point	Age-1 adult	-	-	Feeding and Nursing	-
	Chandpai	Juvenile	Feeding and Nursing	-	-	-
	Harbaria	Fry, Juvenile and Age-1 adult	-	Feeding and Nursing	-	-
	Chalna Point	Age-1 adult	-	Feeding and Nursing	-	-
Poma	Haldikhali	Juvenile	Feeding and Nursing	-	-	Feeding
	Akram Point	Juvenile	Feeding and Nursing	-	-	-
		Age-1 adult	-	-	Feeding and Nursing	-
		Adult	-	-	-	-
	Chandpai	Fry and Juvenile	Breeding/ Spawning	Nursing	-	-
		Juvenile	-	-	Feeding and Nursing	Feeding
		Adult	-	-	-	-
	Haldikhali	Fry and Juvenile	-	-	Nursing	-
	Harbaria	Adult and Brood Fish	-	-	Breeding/ Spawning	-
		Adult	-	-	-	-
		Fry and Juvenile				
	Mongla Point	Fry, Juvenile and Age-1 adult	-	-	Spawning, Feeding and Nursing	-
		Juvenile	-	-	-	-
		Age-1 Adult	-	-	-	-
		Adult	-	-		Feeding
	South-west of the Project	Adult	-	-	Feeding	Feeding
	Chalna Point	Juvenile, Adult and Brood Fish	Breeding/ Spawning	-	-	-
		Juvenile and Adult	-	-	Feeding and Nursing	Feeding
Chhuri	Haldikhali	Adult	Feeding	-	Feeding	-
	Akram Point		Feeding	-	Feeding	-
Chela	Haldikhali	Adult	Feeding	-	Feeding	-

Migratory Fish Species	Sampling Sites	Year Class*	April	July	October	January
	Akram Point	Juvenile and Adult	Feeding and Nursing	-	-	-
	Harbaria	Juvenile	-	Feeding and Nursing	-	-
	Chandpai		-	-	-	-
Gang Tengra	Haldikhali	Adult	Feeding	-	Feeding	Feeding
	Akram Point	Adult	Feeding and Breeding	-	-	Feeding
	Harbaria	Adult	-	-	Feeding	-
	Chandpai	Adult	-	-	Feeding	Feeding
GagraTengra	Chandpai	Juvenile and Age-1 adult	-	Feeding and Nursing	-	-
	Chalna Point	Age-1 adult	-	-	-	-
	Mongla Point	Age-1 adult	-	Feeding and Nursing	-	-
	Akram Point	Juvenile and Adult	-	-	Feeding and Nursing	-
		Adult	-	-	-	-
	Haldikhali	Juvenile	-	-	-	-
	Harbaria	Adult	-	-	Feeding	-
GulshaTengra	Haldikhali	Adult	Feeding and Breeding	-	-	-
	Akram Point	Adult	Feeding and Breeding	-	-	-
	Chandpai	Age-1 adult	-	-	-	Feeding
		Juvenile	-	-	-	-
	Mongla Point	Age-1 adult	-	Feeding and Nursing	-	Feeding
		Juvenile	-	-	-	-
	Harbaria	Juvenile	-	-	-	-
	Maidara	Juvenile and Age-1 Adult	-	-	-	-
Potka	Haldikhali	Adult	Feeding and Breeding	-	-	-
	Chandpai	Fry	Spawning	Spawning and Nursing	-	-
		Juvenile	-	-	-	-
		Adult	-	-	-	Feeding
	Mongla Point	Fry	Spawning	-	-	-
	Harbaria	Fry	-	-	-	-
		Juvenile	-	-	-	-
Paira Chanda	Akram Point	Adult	Feeding	-	-	-

Migratory Fish Species	Sampling Sites	Year Class*	April	July	October	January
	Chandpai	Fry	Breeding/ Spawning	-	-	-
Chewa	Akram Point	Juvenile and Adult	Feeding	-	Feeding and Nursing	-
	Chandpai	Fry and Juvenile	Spawning	-	Feeding and Nursing	-
	Chandpai	Adult	-	-	-	Feeding
	Haldikhali	Juvenile and Adult	-	-	Feeding and Nursing	-
	Harbaria	Juvenile and Adult	-	-	Feeding and Nursing	-
	Mongla Point	Juvenile	-	Feeding and Nursing	-	-
	South-west of the Project	Juvenile	-	Feeding and Nursing	-	-
	Chalna Point	Adult	-	-	-	-
Bele	Akram Point	Adult	Feeding	-	Feeding	Feeding
		Juvenile	-	-	-	-
	Haldikhali	Juvenile-1, Juvenile and Adult	-	-	Nursing and Nursing	Feeding
	Harbaria	Juvenile and Adult	-	-	Feeding and Nursing	-
	Chandpai	Fry	Breeding/ Spawning	Nursing	-	-
	Chandpai	Juvenile and Adult	-	-	Feeding and Nursing	Feeding
	Harbaria	Juvenile and Age-1 Adult	-	-	-	-
	Mongla Point	Fry	Breeding/ Spawning	-	-	-
	Mongla Point	Fry, Juvenile-1 and Juvenile			Nursing and Nursing	-
	Mongla Point	Juvenile and Adult	-	-	-	Feeding
	Chalna Point	Fry	Breeding/ Spawning	Nursing	-	-
	Chalna Point	Adult	-	-	-	Feeding
	South-west of the Project	Juvenile and Age-1 adult	-	Feeding and Nursing	Feeding and Nursing	Feeding
		Fry	-	-	-	-
TularDandi (Nona bele)	Akram Point	Adult	Feeding	-	-	-
	South-west of the Project	Adult	-	-	Feeding	-

Migratory Fish Species	Sampling Sites	Year Class*	April	July	October	January
	Chalna Point	Adult	Feeding	-	Feeding	-
Tairel	Akram Point	Adult	Feeding	-	-	-
	Mongla Point	Juvenile	Feeding	-	-	-
Pheksa	Akram Point	Adult	Feeding	-	-	-
		Juvenile	-	-	Feeding and Nursing	-
	Haldikhali	Juvenile	-	-	Feeding and Nursing	-
	Haldikhali	Adult	-	-	-	Feeding
	Chalna Point	Juvenile and Adult	Feeding	Feeding and Nursing	-	-
	Chalna Point	Adult	-	-	Feeding	Feeding
	Mongla Point	Adult	-	-	Feeding	Feeding
	Chandpai	Juvenile and Adult	Feeding	Feeding and Nursing	-	-
	South-west of the Project	Juvenile and Adult	Feeding	Feeding and Nursing	-	-
		Juvenile	-	-	-	-
		Adult	-	-	Feeding	Feeding
Pairsa	Akram Point	Juvenile and Adult	Feeding	-	Feeding and Nursing	Feeding
		Juvenile	-	-	-	-
	Haldikhali	Juvenile and Adult	Feeding	-	Feeding and Nursing	Feeding
		Juvenile	-	-	-	-
	Harbaria	Juvenile-1 and Juvenile	-	-	Feeding	-
		Adult	-	-	-	-
	Chandpai	Fry	Breeding/ Spawning	-	-	-
	Chandpai	Juvenile and Adult	-	-	Feeding and Nursing	-
	Harbaria	Juvenile	-	-	-	-
	Mongla Point	Fry	Breeding/ Spawning	-	-	-
		Age-1 Juvenile	-	-	-	-
		Age-1 Adult	-	-	-	-
	South-west of the Project	Fry, Juvenile and Age-1 adult	Breeding/ Spawning	Feeding and Nursing	-	-
		Age-1 Juvenile,	-	-	-	-

Migratory Fish Species	Sampling Sites	Year Class*	April	July	October	January
		Juvenile and Age-1 Adult				
		Adult	-	-	-	-
Banshpata	Chandpai	Juvenile	Feeding	-	-	-
		Adult	-	-	-	Feeding
	Akram Point	Juvenile	-	-	-	-
		Adult	-	-	-	-
	Haldikhali	Juvnile and adult	-	-	Feeding and Nursing	Feeding
	Harbaria	Adult	-	-	-	-
	Mongla Point	Fry and Adult	Feeding	Nursing	-	-
	Mongla Point	Adult	-	-	-	Feeding
	South-west of the Project	Adult	-	-	Feeding	Feeding
	Chalna Point	Adult	-	-	Feeding	Feeding
Hilsa	Haldikhali	Juvenile	-	-	Feeding and Nursing	-
	Chandpai	-	-	-	-	-
	Mongla Point	Adult	-	-	Feeding	-
	Chalna Point	Brood fish	-	-	-	-
Pangas	Haldikhali	Juvenile	-	-	Feeding and Nursing	-
	Harbaria	Adult	-	-	-	-
	Mongla Point	Juvenile and Adult	-	-	Feeding	-

Annex 7-8: Methodology Multidimensional Poverty Index

Indicators and the threshold for defining poverty

Dimension	Indicator	Definitions/ threshold	Deprivation per indicator (%)	Contribution of deprivation in dimension to overall poverty	Data Source	Factor H[1]	Factor A[2]	MPI= H x A
Health	Child Mortality	A child has died in the household within the five years prior to the survey	4	3.78	Progoti Pathey, MICS, 2009	0.43	0.85	0.37
Education	Years of schooling	No household member has completed six years of schooling.	43	34.53	Housing and Population Census, BBS 2011			
	School attendance	No child is attending school up to the age at which they should finish class 6.	30		Housing and Population Census, BBS 2011			
Living Standards	Cooking fuel	The household cooks with dung, wood or charcoal.	90	61.68	CEGIS fieldwork, 2016			
	Toilet	The household's sanitation facility is not improved or it is improved but shared with other households.	21		Housing and Population Census, BBS 2011			
	Water	The household does not have access to safe drinking water or safe drinking water is more than a 30-minute walk from home, roundtrip.	60		Housing and Population Census, BBS 2011			
	Electricity	The household has no electricity.	69		Housing and Population Census, BBS 2011			
	Floor	The household has a dirt, sand or dung floor.	86		Housing and Population Census, BBS 2011			

[1]H= Percentage of people who are MPI poor (incidence of poverty)

[2]A= Average intensity of MPI poverty across the poor (%)

Methodology of Multidimensional Poverty Index (MPI)

The Multidimensional Poverty Index (MPI) identifies multiple deprivations at the individual level in education, health and standard of living. Each person is assigned a deprivation score according to his or her household's deprivations in each of the 8 component indicators. The maximum score is 100%, with each dimension equally weighted; thus the maximum score in each dimension is 33.3%. The education and health dimensions have two indicators each, so each component is worth 33/2, or 16.7%. The standard of living dimension is followed by thefive indicators, so each component is worth 33.6/ 5, or 6.6%. The thresholds are as follows:

- Education: having no household member who has completed five years of schooling and having at least one school-age child (up to grade 6) who is not attending school.
- Health: having at least one household member who is malnourished and having had one or more children die.
- Standard of living: Not having electricity, not having access to clean drinking water, not having access to adequate sanitation, using "dirty" cooking fuel (dung, wood or charcoal) and having a home with a dirt floor.

To identify the poor in multidimensional way, the deprivation scores for each household are summed to obtain the household deprivation, c. A cut-off of 33.3%, which is the equivalent of one-third of the weighted indicators, is used to distinguish between the poor and non-poor. If c is 33.3% or greater, that household (and everyone in it) is poor in a multidimensional way. Households with a deprivation score greater than or equal to 20% but less than 33.3% are vulnerable to or at risk of becoming multidimensional poor. Households with a deprivation score of 50% or higher are severely multidimensional poor. The MPI value is the mean of deprivation scores c (above 33.3%) for the population and can be expressed as a product of two measures: the multidimensional headcount ratio and the intensity (or breadth) of poverty.

The headcount ratio, H, is the proportion of the population who are multidimensional poor:

$$H = \frac{q}{n}$$

[Where *q* is the number of people who are poor in a multidimensional way and *n* is the total population].

The intensity of poverty, A, reflects the proportion of the weighted component indicators in which, on average, poor people are deprived. For poor households only (*c* greater than or equal to 33.3%), the deprivation scores are summed and divided by the total number of poor persons:

$$\mathrm{A} = \frac{\sum_i^q c}{q}$$

[Where *c* is the deprivation score that the poor experience. The deprivation score c of a poor person can be expressed as the sum of deprivations in each dimension j (j = 1, 2, 3), c = c1 + c2 + c3.]

The contribution of dimension j to multidimensional poverty can be expressed as

$$\mathrm{Contrib}j = \frac{\left(\sum_i^q c\,j\right)/n}{MPI}$$

Detail calculation of MPI

HH no/ ID[1]	Indicators								Weighted score	Status	Factor =H	Factor =A	MPI= H*A
	Health	Education		Living standard									
	Child Mortality	Years of school	Children enrolled	Cooking fuel	Sanitation	Water	Electricity	Housing					
weight[2]	0.33	0.17	0.17	0.07	0.07	0.07	0.07	0.07					
1	0	0	0	0	0	0	0	0	0.00	Not MPI Poor	0.43	0.85	0.37
2	0	0	0	0	0	0	0	0	0.00	Not MPI Poor			
3	0	0	0	0	0	0	0	0	0.00	Not MPI Poor			
4	0	0	0	0	0	0	0	0	0.00	Not MPI Poor			
5	0	0	0	0	0	0	0	0	0.00	Not MPI Poor			
6	0	0	0	0	0	0	0	0	0.00	Not MPI Poor			
7	0	0	0	0	0	0	0	0	0.00	Not MPI Poor			
8	0	0	0	0	0	0	0	0	0.00	Not MPI Poor			
9	0	0	0	0	0	0	0	0	0.00	Not MPI Poor			
10	0	0	0	0	0	0	0	0	0.00	Not MPI Poor			
11	0	0	0	1	0	0	0	0	0.06	Not MPI Poor			
12	0	0	0	1	0	0	0	0	0.06	Not MPI Poor			
13	0	0	0	1	0	0	0	0	0.06	Not MPI Poor			
14	0	0	0	1	0	0	0	0	0.06	Not MPI Poor			
15	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
16	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
17	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
18	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
19	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
20	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
21	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
22	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
23	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
24	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
25	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
26	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
27	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
28	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
29	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
30	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
31	0	0	0	1	0	0	0	1	0.11	Not MPI Poor			
32	0	0	0	1	0	0	1	1	0.17	Not MPI Poor			
33	0	0	0	1	0	0	1	1	0.17	Not MPI Poor			
34	0	0	0	1	0	0	1	1	0.17	Not MPI Poor			
35	0	0	0	1	0	0	1	1	0.17	Not MPI Poor			
36	0	0	0	1	0	0	1	1	0.17	Not MPI Poor			
37	0	0	0	1	0	0	1	1	0.17	Not MPI Poor			
38	0	0	0	1	0	0	1	1	0.17	Not MPI Poor			
39	0	0	0	1	0	0	1	1	0.17	Not MPI Poor			
40	0	0	0	1	0	0	1	1	0.17	Not MPI Poor			
41	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			

[1] Total households/populations are considered 100

[2] Here weight is presented at maximum value 1

HH no/ ID[1]	Indicators								Weighted score	Status	Factor =H	Factor =A	MPI= H*A
	Health	Education		Living standard									
	Child Mortality	Years of school	Children enrolled	Cooking fuel	Sanitation	Water	Electricity	Housing					
weight[2]	0.33	0.17	0.17	0.07	0.07	0.07	0.07	0.07					
42	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
43	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
44	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
45	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
46	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
47	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
48	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
49	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
50	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
51	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
52	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
53	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
54	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
55	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
56	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
57	0	0	0	1	0	1	1	1	0.23	Not MPI Poor			
58	0	1	0	1	0	1	1	1	0.39	MPI Poor			
59	0	1	0	1	0	1	1	1	0.39	MPI Poor			
60	0	1	0	1	0	1	1	1	0.39	MPI Poor			
61	0	1	0	1	0	1	1	1	0.39	MPI Poor			
62	0	1	0	1	0	1	1	1	0.39	MPI Poor			
63	0	1	0	1	0	1	1	1	0.39	MPI Poor			
64	0	1	0	1	0	1	1	1	0.39	MPI Poor			
65	0	1	0	1	0	1	1	1	0.39	MPI Poor			
66	0	1	0	1	0	1	1	1	0.39	MPI Poor			
67	0	1	0	1	0	1	1	1	0.39	MPI Poor			
68	0	1	0	1	0	1	1	1	0.39	MPI Poor			
69	0	1	0	1	0	1	1	1	0.39	MPI Poor			
70	0	1	0	1	0	1	1	1	0.39	MPI Poor			
71	0	1	1	1	0	1	1	1	0.56	MPI Poor			
72	0	1	1	1	0	1	1	1	0.56	MPI Poor			
73	0	1	1	1	0	1	1	1	0.56	MPI Poor			
74	0	1	1	1	0	1	1	1	0.56	MPI Poor			
75	0	1	1	1	0	1	1	1	0.56	MPI Poor			
76	0	1	1	1	0	1	1	1	0.56	MPI Poor			
77	0	1	1	1	0	1	1	1	0.56	MPI Poor			
78	0	1	1	1	0	1	1	1	0.56	MPI Poor			
79	0	1	1	1	0	1	1	1	0.56	MPI Poor			
80	0	1	1	1	1	1	1	1	0.62	MPI Poor			
81	0	1	1	1	1	1	1	1	0.62	MPI Poor			
82	0	1	1	1	1	1	1	1	0.62	MPI Poor			
83	0	1	1	1	1	1	1	1	0.62	MPI Poor			
84	0	1	1	1	1	1	1	1	0.62	MPI Poor			
85	0	1	1	1	1	1	1	1	0.62	MPI Poor			
86	0	1	1	1	1	1	1	1	0.62	MPI Poor			
87	0	1	1	1	1	1	1	1	0.62	MPI Poor			

HH no/ ID[1]	Indicators								Weighted score	Status	Factor =H	Factor =A	MPI= H*A
	Health	Education		Living standard									
	Child Mortality	Years of school	Children enrolled	Cooking fuel	Sanitation	Water	Electricity	Housing					
weight[2]	**0.33**	**0.17**	**0.17**	**0.07**	**0.07**	**0.07**	**0.07**	**0.07**					
88	0	1	1	1	1	1	1	1	0.62	MPI Poor			
89	0	1	1	1	1	1	1	1	0.62	MPI Poor			
90	0	1	1	1	1	1	1	1	0.62	MPI Poor			
91	0	1	1	1	1	1	1	1	0.62	MPI Poor			
92	0	1	1	1	1	1	1	1	0.62	MPI Poor			
93	0	1	1	1	1	1	1	1	0.62	MPI Poor			
94	0	1	1	1	1	1	1	1	0.62	MPI Poor			
95	0	1	1	1	1	1	1	1	0.62	MPI Poor			
96	0	1	1	1	1	1	1	1	0.62	MPI Poor			
97	1	1	1	1	1	1	1	1	0.95	MPI Poor			
98	1	1	1	1	1	1	1	1	0.95	MPI Poor			
99	1	1	1	1	1	1	1	1	0.95	MPI Poor			
100	1	1	1	1	1	1	1	1	0.95	MPI Poor			

Annex 8-1: Good Practices of River Transport & Transshipment of Coal

Job Health & Safety Aspect	Associated Hazards
1. Working at height Working at height is one of the biggest causes of work-related fatalities and major injuries. Many of the activities carried out in docks could lead to a fall from height. These activities may be during routine operations, maintenance activities or unexpected or unplanned activities. In docks, the added hazard of working near water means a fall may lead to the risk of drowning.	a) access to and from vessels by accommodation ladders, quayside ladders and gangways; b) container working – lashing and unlashing; c) loading and unloading some types of cargo, such as pipe-work, timber packs etc., can result in open edges from ships' decks, and from the cargo itself; d) access to and from places of work onboard vessels (holds, hatches, decks etc.); e) falls from vehicles and trailers during loading/unloading and sheeting; f) maintenance and unplanned work; g) working adjacent to open edges of docks, wharves etc.; h) falls from plant and machinery; i) mooring points (e.g. 'dolphins'). Other risks to consider include: a) prevailing environmental conditions (e.g. high winds, rain, snow, poor visibility etc.) that may present additional hazards when working at height; b) changes to cargo condition; c) cargo movement; d) vessel movement due to tide, loading or unloading.

Measures to Reduce the Risk

Before any work is carried out at height the risk should be determined and appropriate control measures put in place.

Access to ships

- Access should generally be provided by the ship's accommodation ladder or by the ship's gangway in accordance with MCA's Marine Guidance Note 533 Means of Access.
- Accommodation ladders or gangways should be properly rigged and secure. All necessary facilities and arrangements should be provided onshore to enable this to be done.
- Shore-based equipment which is at least as safe as a properly rigged and secured ship's accommodation ladder or gangway should be provided and used where the use of ships' equipment is impossible or unsafe, especially where ships' decks are significantly below or above the level of the quay, wharf, dock or jetty.
- Each end of a gangway or accommodation or other ladder should provide safe access to a safe place, or to an auxiliary safe access. Where necessary, bulwark ladders should be provided, securely rigged and used.
- Where no safer means of access can be provided, a system of fixed-ladders should be provided onshore where there is regular need for them. Any such ladders should be adequately protected from damage by ships, by recessing, fendering or otherwise.
- Where means of access passes over water and there is a significant risk of a person falling into the water and drowning from or at either end of the means of access, or from the quayside or ships' deck immediately adjacent to the means of access, suitable safety nets should be securely rigged to minimize this risk. Suitable and sufficient attachment points for nets should be provided.

- A safe means of access to workplaces and working positions should be provided. This includes access on to plant onshore, afloat and to ships and ships' holds.
- Where such access is provided by the ship, the shore-side employer should also ensure that it is safe for their employees to use.
- Where access is provided by the shore, the duty to rig and maintain access remains with the person providing it.
- If a gangway or other physical means of access is lent or loaned by ashore-side employer to the master for use as ships' equipment, then access will be deemed to have been provided by the ship, and the rigging and maintenance of that access will fall to the ships' master. The shore-side supplier still retains a duty under section 6 of the HSW Act to supply the equipment in a safe condition.
- Consider emergency evacuation and rescue procedures, for example where a person works in an isolated position such as a deep cargo hold or a crane cab. See chapter 'Emergency planning' for more detail.

Access between ships

- Where access between ships is necessary, the access should generally be provided by the ship lying outboard, unless there is a great disparity in freeboard when access should be provided by the ship with the higher freeboard.
- Pilot ladders should only be used to provide access between a ship with high freeboard and a barge or similar ship with low freeboard.
- A safe means of access to workplaces and working positions should be provided.
- Pilot ladders should only be used in exceptional circumstances where no other practicable means of access are possible. Ladders should be secured so that they are firmly held against twist, turnover or tilt.
- Consider emergency evacuation and rescue procedures.
- Other risks to consider include extreme weather (e.g. high winds, rain, snow, poor visibility etc.) that may present additional hazards when working at height.

Cargo

- No ships' hold should be left open for dock operations for longer than is required.
- Except where adequate precautions have been taken to prevent injury, no work should be performed adjacent to an open edge or hatchway if the work involves someone being in a position where they could fall or be struck by a falling object.
- Where cargo is built up in the hold or on deck and there is a risk of people falling or being struck by moving cargo, suitable safety measures should be taken to protect them against such a fall or being struck by moving cargo.
- When container ships are not equipped with suitable lashing platforms then suitable platforms or cages, lifted by crane and designed for use between container aisles, should where reasonably practicable be provided and used.

Administrative control to reduce work at height risks

- All work at height should be properly planned and organized.
- Use risk assessment as a means of identifying and determining the safe distance from open edges.
- When loading or unloading cargo, risk assessment will determine if safe by virtue of position away from any open edge is an appropriate control measure. In certain circumstances, this may only be adequate when used in conjunction with other control measures such as soft landing systems.
- Workers involved in work at height should be competent.
- Avoid work at height where possible, for example working from the ground using a long-handled tool.
- If work at height cannot be avoided, use work equipment or other measures to prevent falls, eg guardrails, mobile elevating working platforms (MEWPs).

- Select and use suitable work equipment which may include container top safety frames and restraint devices.
- Equipment for work at height must be properly inspected and maintained.
- Where access to the workplace requires a worker to pass over cargo, then a safe means of access must be provided.
- A safe means of access to workplaces and working positions should be provided. This includes access on to plant onshore and to ships and ships' holds.
- If there is still a risk of falls, use work equipment that minimizes the distance and consequences of a fall, e.g. nets, airbags, fall arrest systems.
- Adverse weather may pose additional hazards that should be taken into account.
- If there is still a risk of falls, use work equipment that minimizes the distance and consequences of a fall, eg nets, airbags, fall arrest systems.
- Adverse weather may pose additional hazards that should be taken into account.

Fencing at dock edges

- Except for straight and level quaysides, fencing should be provided at all dock, wharf, quay or jetty edges from which people may fall into water, and where they must pass within 1 m of the edge, or the configuration of the quay or the arrangement of walkways is such that they are more than ordinarily liable to fall over such an edge.
- Fencing should be provided throughout every open side of narrow access ways, whether the fall would be into water or not.
- These provisions do not apply to areas where there is no work activity being undertaken, subject to any foreseeable risk to members of the public.
- Secure and adequate fencing should be provided where risk assessment has found this to be needed.
- Particular consideration should be given to:
  - every break, dangerous corner and other part or edge of a dock, wharf, jetty or quay;
  - open sides of a gangway, footway over a bridge, caisson or dock gate; and
  - any other place where someone working or passing might fall.
- Secure fencing should consist of an upper rail and an intermediate rail. In certain circumstances, e.g. the presence of children, a higher standard of protection will be required. The rails may where necessary consist of taut wire, taut chain or
- quay edge, people should wear suitable PPE, e.g. lifejackets or buoyancy aids.
- Dock premises should be provided with adequate other taut material.
- Where the work involves being within 1 m of an unprotected and suitable rescue and lifesaving equipment and means to escape from danger, e.g. handholds on the quayside at water level, ladders on quay walls and life-saving appliances.
- Take into account the risks to lone workers.
- Take into account the risks to members of the public where public access is possible or foreseeable, even if there is no dock work activity being undertaken (to comply with section 3 of the HSW Act).

Job Health & Safety Aspect	Associated Hazards
2. Lifting operations Loading and unloading at docks involves the use of a wide range of lifting equipment. This may include gantry cranes, slewing cranes, forklift trucks or other similar machinery. Poorly planned lifting operations can create significant risks to people working in the area.	a) failure of lifting equipment; b) falling loads; and c) workers being crushed by a moving load or lifting equipment.

Measures to Reduce the Risk

Planning and organizing lifting operations

- Where loads are not marked with their weight, and the weight is not easy to estimate, the loads should be check-weighed, unless accurate information is available to determine their weight by reference to the cargo manifest or otherwise.
- A safe system of work for lifting operations should include adequate arrangements for any necessary checking, inspection or examination of goods, including arrangements to ensure that the movement of the goods, or any plant carrying them, does not put any person performing such an operation in a position of danger.
- Where two or more items of lifting equipment are working the same ship, additional control methods will be required.
- Operations which include the use of ships' equipment or plant must be planned and executed safely. Duty-holders should make pre-use checks concerning the safety of the plant, so far as it is within their control. In particular, before any employer of shore workers authorizes their employees to use ships' equipment and accessories, they should arrange for it to be checked before use, and check any associated certificates of test or thorough examination.
- Walkways leading to ships should wherever practicable reach the ships' access without having to pass beneath overhead operations.
- Loads should not be placed on hatch coverings, unless specifically designed for that purpose, without the authority of the ships' master or their authorized/competent representatives.
- When planning and organizing lifting operations, ensure employees and supervisors are trained, competent and experienced in safe lifting operations.
- Ensure lifting plans address the foreseeable risks involved in the lifting operation and identify contingencies, e.g.:
  - shifted loads;
  - changes to the center of gravity of the load;
  - jammed containers or failure of twist-locks;
  - bad weather;
  - movement of the ship, e.g. when carrying out tandem or simultaneous lifts.
- Items with a center of gravity significantly away from their apparent centers in any plane should be appropriately marked to facilitate safe slinging, lifting and securing.
- Operational procedures should include means for establishing the gross weight of each load to be lifted. Where reasonably practicable, this information should be marked on the load together with any other information necessary for its safe handling.
- Lifting equipment must be suitable for the proposed use, including any unexpected forces to which the lifting equipment might be subjected. The equipment used should provide an appropriate 'factor of safety' against foreseeable risks, particularly where people are being lifted.
- Take all practical steps to avoid people being struck by loads or lifting equipment and minimize the need to lift over people. Lifts should not take place over areas where people are likely to be working or passing where this can be avoided. Loads should not be suspended over occupied areas.
- Where these situations cannot be avoided, the risks to people must be minimized by safe systems of work and appropriate precautions. Where loads are suspended, the area below them should be classed as a hazard zone and access restricted.
- No hold should be left open for dock operations for longer than is required.
- Operational procedures should include adequate arrangements for landing cargo and for storage of goods including safe stacking. Goods should be stowed on board ship in such a way that they do not obstruct any regular means of access unless an alternative means of access is provided.

Use of lifting equipment

- Where cranes and equipment are rail mounted or guided, those rails should be securely jointed, anchored and supported.
- Crane rails should generally be straight, and should be provided with suitable crane arresting devices, including end stops, which should be properly maintained.
- Cranes should have an efficient braking mechanism to stop the motion along the rails when the crane is in service. An effective system should also be provided to prevent inadvertent movement of the crane where it is exposed to high winds; for example, storm pins at sufficient intervals along the track, or some other suitable device which enables the crane to be securely anchored when not in use.
- Cranes liable to be affected by high winds should be fitted with an accurate device to indicate to the driver, and at ground level or terminal control, actual wind speed.
- Lifting operations should be stopped if wind conditions make it unsafe to continue them.
- For rail-guided lifting equipment, always ensure that there are facilities to minimize the consequences of collision, where there is more than one rail-mounted item in motion at the same time. Adequate devices should be provided for braking and stopping in the event of emergency or failure.
- Always use suitable lifting equipment to securely lift cargo. Lifting equipment and accessories should be suitable for their intended use, eg paper reels should be handled with equipment such as reel clamps.
- If a ships' lifting equipment is to be used, ensure that it is suitable and subject to a pre-use examination. Check the ships' documentation of thorough examination.
- Cargo handling equipment, for example a forklift truck, that is lifted on to or off ships by crane or derrick should be provided with suitable points for the attachment of lifting gear. Such equipment should be marked with its gross weight.
- Tank containers should not be lifted directly with the forks of forklift trucks, because of the risks of instability and of damaging the container with the ends of the forks. Tank containers may be lifted using forklift trucks fitted with suitably designed side or top lifting attachments, but care must be exercised due to the risk of surge in partly filled tanks.
- The following also need to be considered:
  - impact of climatic conditions, e.g. high winds, ice or unduly cold or hot weather, on the performance of lifting equipment and accessories;
  - mist, fog and other conditions that reduce visibility;
  - the impact of the prevailing weather on people involved in the lifting operation(crane driver, slinger, banks-man etc).

Lifting equipment used for lifting people

- If lifting people cannot be avoided, then lifting plant used for raising or lowering people should include:
  - a suitable platform or cage of good construction, sound material and adequate strength, which is properly maintained;
  - except in the case of ships' cargo lifts which only carry drivers at the controls of their vehicles, fencing around the platform or cage up to a height of at least 1 m, constructed and arranged to prevent someone falling out or being trapped;
  - an adequate secure foothold and handhold for someone travelling on the platform or cage;
  - arrangements to prevent the platform or cage tipping or spinning in a manner dangerous to any occupant, or from becoming accidentally displaced.
- When lifting people, ensure that the correct type of equipment is used for the task and that it provides an appropriate 'factor of safety' against foreseeable risk.
- Specially designed equipment for lifting people should be used where possible. The use of lifting equipment which has not been specifically designed for lifting people should only occur in exceptional circumstances (e.g. for rescue purposes). In these cases, additional safety precautions may need to be taken.

- Lifting equipment used to lift people should be thoroughly examined at six-monthly intervals, or in accordance with the examination scheme.

Maintenance of lifting equipment and accessories

- The employer should check the condition of all lifting equipment and accessories so far as reasonably practicable to do so, and consider the use to which they are to be put.
- This applies to all lifting equipment and accessories including multi-trip and one-trip slings, intermediate bulk containers (IBCs) and also rope, webbing or chains used in pre-slung loads.
- So that the shore-side employer may comply with their obligations, they should provide and maintain a system of work which in the case of wire rope slings includes checking the test certificates for the wire rope from which the slings were made, where these are available. Where they are not available, the employer should, where possible, otherwise verify that a test has been carried out.
- One-trip slings should be disposed of at the end of the trip and should never be reused.
- Lifting appliances should not be used to drag loads.
- All lifting equipment and accessories should be inspected and examined by suitably trained and competent people. This includes equipment such as crane anemometers, which should be regularly maintained and calibrated.
- People who use lifting equipment should carry out pre-use checks on the equipment and accessories they use, as well as ongoing, regular checks as part of an overall maintenance program (e.g. the checks undertaken by an operator on their crane). Operators may be best placed to identify faults or damage to equipment. A suitable system should be in place to ensure that any defect identified is reported and action taken to prevent the lifting equipment/accessory being used until properly investigated and remedied.
- The nature and frequency of thorough examinations should take account of any manufacturer's recommendations or otherwise take place every 6 months for lifting equipment and associated accessories used to lift people; every 6 months for lifting accessories, and every 12 months for all other lifting equipment.
- Where one-trip slings are used in lifting operations, the employer in control of the operation should ensure, so far as reasonably practicable, that the slings are not used again for lifting operations.

Cranes used in dock operations

- Duty-holders should have in place robust, proactive planned maintenance regimes for cranes, including an assessment of design life, post-supply structural modifications and actual use patterns.
- Safety critical parts of the crane should be identified and have maintenanceand testing regimes in place to monitor such parts, in line with suggested testing and maintenance intervals.
- Duty-holders should consider 'foreseeable misuse', such as overloading or use in high winds. This should include consideration of dynamic and static overloading that may occur from the following and how to reduce and mitigate its effects:
  - snagging where a container gets caught up during movement and creates significant momentary forces in ropes and parts of structure;
  - trying to lift the ship where a container has not been released from those beneath it but the crane driver believes that it has and the crane attempts to lift, creating significant forces for a short time;
  - jammed containers or twist-locks where a container is still partially connected to those beneath it but the crane driver believes that it has been freed and the crane attempts to lift, creating significant forces for a short time;
  - twin lifting situations where the originally specified safe working load (SWL) is exceeded, reducing the factor of safety.
- Duty-holders must consider the role, scope, time and access afforded to companies carrying out thorough examinations of cranes, particularly with regard to how schemes are determined and how it can be ensured that necessary safety critical parts are included in such schemes.

Duty-holders must consider how to proceed where conflicting expert advice is received and keep records of such conflicts.

- Duty-holders must consider the importance of involving crane operators and maintenance staff in plans for new purchase and/or modifications to existing cranesand crane working practices.

Job Health & Safety Aspect	Associated Hazards
3. Slips-trips-falls Over a quarter of all reportable accidents in docks are due to slips or trips. These can be serious, resulting in broken or dislocated bones and long periods off work. They should not be accepted as 'one of those things' and often simple measures can be taken to prevent them happening.	a) working on uneven, wet / slippery surfaces on loads; b) adverse weather conditions; c) badly stowed mooring ropes, lashing gear and other equipment; d) use of inappropriate flooring or surfaces on walkways, ramps and access steps; e) discarded packaging and pallets; f) deck fittings and pipe-work on ship; g) poor or unsuitable lighting in work areas.

Measures to Reduce the Risk

All parts of dock premises which are used for working ships should, so far as reasonably practicable, be kept clear of loose material. In addition such materials should be cleared at appropriate intervals in the course of cargo handling.

- Good housekeeping–encourage a 'see it, sort it' culture and appropriate monitoring and reporting systems. Report and follow up where a work area has been left untidy by employees from other companies.
- Loose lifting accessories should be adequately stored.
- Specify appropriate flooring/surfaces. Slopes and ramps should have a suitable surface which should where necessary be ribbed or coated so as to be slip-resistant.
- Maintain floors, steps and walkways in a good condition.
- Where surfaces do become slippery due to adverse weather or tidal conditions then they should be maintained to ensure that vehicles and pedestrians can move about safely.
- Beware of oil spillages, spilt bulk cargo and trip hazards across walkways.
- Where a vessel is a frequent visitor, work with the master to make sure trip hazards are painted a conspicuous color.
- Consider the type of load, weather conditions and likely contaminants when selecting suitable footwear. For example, studs or chains may be required if accessing cargoes covered in ice.
- Plan pedestrian and vehicle routes to avoid contaminated areas.
- Provide adequate lighting.
- Maintain plant to prevent contamination, e.g. oil getting onto the floor.

Lighting

- Many docks operate on a 24-hour basis so the need for suitable lighting in the workplace is particularly important. The quicker and easier it is to see a hazard, the more easily it is to avoid. The types of hazard present in the workplace will determine the lighting requirements for safe operation.
- Each part of the dock premises that is being used for dock operations should be suitably and adequately lit. Lighting should be properly maintained.
- The following should be provided:
  - well-lit stairs, pedestrian and vehicle access routes;
  - well-lit outside areas – for pedestrians and to help with activities such as loading/unloading at night, checking cargo and access to vessels;
  - well-lit areas for working on board ship (e.g. in holds);
  - adequate lighting to allow safe access to small vessels;
  - good light – use natural light where possible but try to avoid glare;

- suitable forms of emergency lighting.
- Obstacles and hazards which are likely to be dangerous when vehicles, lifting equipment or people move should be made conspicuous through suitable lighting and/or marking.

Job Health & Safety Aspect	Associated Hazards
4. Shipping over deep water ways	a) Personnel may fall into the water and drown. b) Personnel may get attacked by underwater animals c) Ship/Vessel may sink with personnel

Rescue and life-saving from water

Given the nature of dock premises, it is important to ensure that there are adequate and suitable provisions in place to facilitate the rescue of anyone who falls into the water from the quayside. This section does not apply to disused or redundant docks but employers may have duties under section 3 of the HSW Act in respect of these.

Unfenced quay edges

At jetties and quay edges where the edges are unfenced, means should be provided to help people to rescue themselves from drowning, and also provision for other people to rescue those in danger without endangering themselves. The means should include:

- handholds on the quayside at water level (at any state of the tide);
- ladders on quay walls;
- life-saving equipment.

Fenced quay edges

At jetties or quays where the edges are fenced throughout, the provision of life-saving equipment alone is sufficient unless:

- the public has access to the quay edge; or
- the duty-holder is made aware of a risk of people falling over a fenced edge that is comparable to the risk of people falling over an unfenced edge (whether or not by means of risk assessment).

In these situations additional measures will be required such as handholds and/or ladders.

Pontoons and ship-to-ship operations

Where a fixed quay is not involved, e.g. ship-to-ship operation or the use of pontoons, adequate and suitable lifesaving equipment should be provided.

Handholds

Handholds should be suitable for use and be protected where possible to avoid damage both to and from ships.

Some quays may be constructed so that the actual structure provides handholds. In deciding whether these are adequate, remember that someone in the water is likely to be cold, shocked, exhausted and possibly injured. Handholds should therefore be suitable for use in such a situation. They may take the form of chains, fiber ropes, rubber tires, fenders or other suitable material hung from the quayside. All handholds should be properly maintained.

Ladders on quay walls

217 Each ladder should be suitably protected against accidental damage, and should enable someone who reaches it to climb from the water to the quay. It should extend to 1 m below the

water line at any foreseeable state of the tide (or to the sea/river bed where there is less than 1 m of water at the foot of the quay at low water). Suitable hand-grips will need to be provided on the quayside, designed so that they are not readily obstructed by ice or dirt. They should also be recessed or positioned to prevent tripping hazards. All ladders should be properly maintained.

Positioning of handholds and ladders on quay walls

At all quays constructed or reconstructed after 1 January 1989, handholds and ladders should each be at intervals not exceeding 30 m, with handholds approximately midway between each pair of ladders, so that there is either a handhold or ladder at least every 15 m.

At all quays constructed before 1 January 1989, the following may be

considered reasonable intervals for the provision of ladders and handholds:

- where the design of the quay provides convenient protected positions for ladders, they should be installed at intervals which do not exceed 50 m and intermediate handholds should provide a means of support at intervals not exceeding 25 m; or
- where the quay is not so designed, ladders should be installed at intervals not exceeding 85 m and intermediate handholds should provide a means of support at intervals of approximately 30 m; or
- where dock operations are not normally carried out, or only infrequently, and the quay is not equipped with ladders to the above standards, suitable portable ladders should be provided and securely placed fore and aft of each ship when it has moored to work.

Life-saving equipment

Life-saving equipment should be conspicuous, properly maintained and provided at appropriate intervals.

Life-saving equipment will include lifebuoys, throwing lines and rescue poles.

What is suitable life-saving equipment will depend on the circumstances. In some situations, particularly where there is a strong tide or current, a throwing line may be appropriate either in addition to or in place of a conventional lifebuoy. Instructions for the use of each piece of life-saving equipment should be given or displayed.

Life-saving equipment should be provided at intervals no greater than 100 m. A suitable lifeline of a length adequate for the dock should be attached to each lifebuoy or a separate throwing line should be provided. All such equipment should be kept readily accessible. Draglines are not rescue equipment.

Transport by water

- All vessels that are used to carry people from one part of the dock to another to enable them to participate in dock operations should be safe for use.
- Vessels used for this purpose should be of a sound and suitable construction, properly maintained and properly equipped for their intended use. Vessels should be in the charge of a competent person, who should hold a boat-masters' license issued by the Maritime and Coastguard Agency or equivalent.
- This ACOP applies to vessels used to carry people from one part of the dock premises to another, specifically to enable them to take part in dock operations. It does not apply to vessels such as tugs, conservancy launches and vessels carrying pilots.
- Vessels used should not be undermanned, overloaded or overcrowded. Vessels should provide adequate and sufficient shelter, should have seating, heating and ventilation sufficient for safety, appropriate navigational equipment according to the conditions prevailing and the length of the journey, and should always be equipped with adequate life-saving, firefighting and first-aid equipment.

- Manning levels for such vessels should be determined by reference to Annex 11 of The Safety of Small Workboats & Pilot Boats (The Brown Code).
- Vessels that are used for work (such as tugs, dredgers, crane barges and pilot vessels that operate in protected waters, such as docks, harbors and estuaries) should meet the minimum mandatory regulatory requirements as outlined in the Maritime and Coastguard Agency (MCA) Marine Guidance Note 469.
- Certain Royal Yachting Association and Scottish Qualifications Agency qualifications are accepted in place of a boat-masters' license for masters of commercial vessels under 24 m and carrying no more than 12 passengers.
- Annex 1 of MCA Merchant Shipping Notice 1808 provides further advice on these and other alternative qualifications.

Job Health & Safety Aspect	Associated Hazards
5. Dusty cargoes / Coal dust Handling coal cargoes can create large quantities of dust. In cases, e.g. coal and aggregates, the dust is simply small particles of the material itself. These substances will have specific workplace exposure limits (WELs) and may also be classified as dangerous substances.	a) Different dusts have different adverse effects on health, but the most important effects of dusty cargoes are on the lungs. Some of these dusts can act as a respiratory sensitizer, that is, they can be a cause of occupational asthma. Other dusts may cause chronic obstructive pulmonary disease (COPD). b) Under certain conditions the dusts given off by some cargoes may form an explosive and/or flammable mixture with air.

Measures to Reduce the Risk

Health risks

Exposure to dust should be avoided. If this is not possible then it should be adequately controlled. The level of control of exposure required will depend on the potential health effects of the dust. Some ways to control exposure include:

- design tasks to reduce the amount of dust generated;
- restrict staff entry to dusty areas such as warehouses especially during tipping, loading and pushing activities;
- use totally enclosed, continuous handling systems – these usually provide the best control and should be used whenever reasonably practicable;
- suppress dust with sprays of water;
- ensure all equipment used to reduce dust exposure is properly maintained and in efficient working order;
- provide suitable air-filtration systems to the cabs of all vehicles used to handle dusty cargoes;
- provide and use respiratory protective equipment (RPE) – this should be suitable for its purpose, maintained and compatible with other protective equipment worn. This should only be as a last resort after other measures have been taken;
- provide adequate information, instruction and training to workers so that they are aware of the health risks and are able to use control measures properly; and
- provide health surveillance for workers.

Explosion risks

Possible control measures include:

- maintaining good housekeeping, i.e. avoiding or minimizing the build-up or release of dust;
- the use of suitably maintained local exhaust ventilation systems;
- excluding or controlling any sources of ignition, e.g. use of protected lighting;
- the use of permit to work systems for activities such as hot work in affected areas.

Job Health & Safety Aspect	Associated Hazards
6. Musculo-skeletal disorders (MDS) / Repetitive Stress Injuries (RSI)	Dock workers carry out a number of activities which, if not properly managed, may lead to a variety of musculoskeletal disorders (MSDs). MSDs include back pain and muscle injuries, and are often the result of poor handling techniques or tasks involving repetitive movements and/or excessive force. Injuries can also be caused by the vibration created by some vehicles – this is known as whole-body vibration. Some people may not fully recover from MSDs and they can greatly affect an individual's quality of life. Where MSD hazards can be found in docks: a) manual maneuvering of lifting gear and attachments or slung loads; b) handling of twist-locks and unlocking poles; c) lifting/maneuvering of lashing bars; d) breaking out pre-packed or pelleted loads; e) storage and warehousing activities; f) hauling mooring ropes; g) vibration transmitted through the seat or feet of employees who drive mobile machines, such as tugs and other similar vehicles, over uneven ground or on rails; h) use of pneumatic lashing systems.

Measures to Reduce the Risk

For manual handling:

- Use mechanical aids such as motorized winches for hauling mooring ropes of large ships, vehicle-mounted hydraulic hoists, portable roller conveyors, pallet trucks, scissor lifts and customized trolleys.
- Consider whether a load can be changed to make it easier to carry, for example smaller packages, providing handles or handholds.
- Adopt safe lifting techniques.
- Consider the ergonomics of dock machinery and equipment when specifying and purchasing.
- Ensure sufficient provision of training and instruction in manual handling techniques.

For whole-body vibration:

- Select and use appropriate machinery for the job.
- Maintain plant and equipment, e.g. cranes and lift trucks. Maintenance should include seats, suspension and visibility through windows.
- Maintain roadways, quays, container park surfaces and rails.
- Take account of vibration information when buying or hiring equipment.
- Reduce exposure, e.g. through job rotation.
- Provide health surveillance for workers where appropriate.
- Provide drivers with information on how to reduce risks to their health.

Job Health & Safety Aspect	Associated Hazards
7. Confined spaces & entry People are killed or seriously injured in confined spaces each year in the UK. This happens in a wide range of industries, from those involving complex plant to simple storage vessels.	Confined spaces may pose a significant risk because they are enclosed, either largely or completely and they have a clearly foreseeable risk of serious injury or death caused by one of the following:

Those involved in these incidents include not just people working in a confined space, but also those who try to rescue them without proper training and equipment. A confined space can be any space of an enclosed nature where there is a risk of death or serious injury from hazardous substances or dangerous conditions (e.g. lack of oxygen). Confined spaces can be found in a variety of places within the dock environment including some ships' holds, warehouses, silos and freight containers. In addition, some places may only become confined spaces when particular work is carried out, e.g. fumigation. Further guidance on where confined spaces may be found in docks can be found in SIP015 Guidance on confined spaces in ports.	a) lack of oxygen – this can occur in ships' holds, freight containers, lorries etc. as a result of the cargo or contents consuming the oxygen inside the space; b) fire and explosion (e.g. from flammable vapor/dust, excess oxygen etc.); c) buildup of poisonous gas, fume or vapor – possibly due to decomposing, leaking or oxidation of cargo (e.g. wood pellets), incomplete fumigation, inadequate cleaning processes, or welding/vehicle fumes; d) incomplete ventilation of fumes in containers, e.g. due to incomplete fumigation or buildup of fumes given off by contents of containers while in transit; e) discharge of gases, fume or vapor from pieces of equipment including some fire suppression systems, exhaust fumes etc.; f) liquids and solids which can suddenly fill the space causing drowning, or release gases into it, when disturbed, e.g. grain; g) hot conditions leading to a dangerous increase in body temperature.

Measures to Reduce the Risk

Where a confined space on a ship is involved, co-operation between the shore-side employer and master is essential to ensure that all relevant risks are managed and duties are adequately discharged.

Avoid carrying out tasks in confined spaces but, if this not possible, the risks will need to be assessed and control measures implemented.

Items to consider will include:

a) testing for noxious fumes or flammable atmospheres and how these can be vented or removed;
b) the risk of liquids or gases flooding in and how to stop or limit this, e.g. lock valves shut;
c) the lack of oxygen and the need to provide breathing apparatus;
d) the job being done and the equipment being used, e.g. welding gear that will reduce the amount of oxygen in the room, chemical cleaners that may require ventilation, gases released when disturbing residues, using appropriate electrical equipment in ignition risk areas etc.;
e) the person identified to do the job, e.g. training, physical ability, pre-existing medical conditions and any personal protective equipment (PPE) needs etc.;
f) the need for rescue arrangements – this should cover the necessary equipment, training and practice drills. Ensure that the equipment provided is actually suitable for the space;
g) the use of permit-to-work systems – these are a formal check to ensure that all elements of the safe system of work are in place before people are allowed to enter the confined space;
h) communications– ensure workers inside a confined space have a mechanism for communicating with others inside and those outside, especially if they cannot be physically monitored.

On each occasion for the same confined space the risks will need to be reassessed as things may have changed, the task and equipment being used maybe different and it may not be the same person doing the work.

Job Health & Safety Aspect	Associated Hazards
8. Lone working Lone workers are those who work by themselves without close or direct supervision so additional controls may be needed to reduce risks to acceptable levels. Think about and deal with any health and safety risks before people work alone.	a) whether there is a need to assess areas of risk (including violence, manual handling), the medical suitability of the individual to work alone and any risks arising from the nature of the workplace itself; b) whether there are any particular requirements for training and the levels of experience needed; c) what systems might be needed to supervise and keep in touch with lone workers.
Measures to Reduce the Risk Establishing a healthy and safe working environment for lone workers can be different from organizing the health and safety of other employees. There are no absolute restrictions on working alone but it will depend on the risks faced by the individual. It will often be safe to work alone. However, the law requires employers to think about and deal with any health and safety risks before people are allowed to-do so. There are some high-risk activities where at least one other person may need to be present. Examples include: crane operators; engineering staff and security staff; some high-risk confined space working where a supervisor may need to be present, as well as someone dedicated to a rescue role; and electrical work at or near exposed live conductors where at least two people are sometimes required. Depending on the risks, some lone workers may require extra control measures, which may include instruction, training, supervision, protective equipment, rescue procedures etc. Employers should check that control measures are used and procedures reviewed from time to time to ensure they are still adequate.	

Personal Protective Equipment (PPE)

Making the workplace safe includes providing instructions, procedures, training and supervision to encourage people to work safely and responsibly. Even where engineering controls and safe systems of work have been applied, some hazards might remain. In these cases, employers have duties concerning the provision and use of PPE at work, and employees have a duty to use PPE correctly and in accordance with instructions.

PPE must only be used as a last resort. If PPE is still needed after implementing other controls, employers must provide this for their employees free of charge.

PPE is equipment that will protect the user against health or safety risks artwork. It can include items such as life jackets, safety helmets, gloves, eye protection, high-visibility clothing, safety footwear and safety harnesses. It also includes respiratory protective equipment (RPE).

When selecting suitable PPE, consider:

- Who is exposed and to what?
- How long are they exposed for?
- How much are they exposed to?

To ensure the suitability of PPE:

- Choose products which are CE marked in accordance with the Personal Protective Equipment Regulations 2002 – suppliers can advise. If in doubt, seek further advice from a specialist adviser and explain the job to them.
- Choose equipment that suits the user – consider the size, fit and weight of thePPE and the health of the user. If the users help choose it, they will be more likely to use it.
- Make sure that if more than one item of PPE is being worn they can be used together, e.g. wearing safety glasses may disturb the seal of a respirator, causing air leaks.
- Instruct and train people how to use it. Explain why it is needed, when to use it, what its limitations are and know how to detect and report any faults.
- Ensure that the right replacement parts that match the original are used, e.g. respirator filters, and have replacement PPE available.
- Clarify who is responsible for maintenance and how it is to be done.
- Ensure PPE is properly looked after and stored when not in use. If it is reusable it must be cleaned and kept in good condition.

Never allow exemptions from wearing PPE for those jobs that 'only take a few minutes'.

First Aid

There is a legal duty to make arrangements to ensure employees receive immediate attention if they are injured or take ill at work. The first aid needs and arrangements will depend on the particular circumstances in the dock.

As a minimum, there must be:

- a suitably stocked first-aid box;
- an appointed person to take charge of first-aid arrangements;
- information for all employees giving details of first-aid arrangements.

Make an assessment of the hazards and risks in the workplace and establish an appropriate level of first-aid provision. The assessment may also indicate that a first-aid room should be provided.

Decide if you need a first-aider, i.e. someone trained by an approved organization, and who holds a qualification in first aid at work or emergency first aid at work.

Qualified first-aiders must have the right training and a certificate valid for three years – after that a refresher course and re-examination is necessary.

Accident Reporting

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR) require employers, or in certain circumstances others who control or manage the premises, to report to the relevant enforcing authority and keep records of:

- work-related deaths;
- specified injuries to people at work, which are listed in RIDDOR, such as fractures, amputations and serious burns;

- all ‘over-seven-day injuries’ to workers, which are those where a person who is injured from a workplace accident is incapacitated for more than seven consecutive days;
- cases of certain occupational diseases as listed in RIDDOR;
- certain ‘dangerous occurrences’ (near-miss accidents);
- injuries to a person who is not at work, such as a member of the public, which are caused by an accident at work and which result in the person being taken to hospital from the site for treatment.

The reporting and recording of accidents/incidents are legal requirements. The report tells the enforcing authorities for occupational health and safety (HSE and local authorities) about serious incidents and cases of disease. This means they can identify where and how risks arise and whether they need to be investigated.

It also allows HSE and local authorities to target their work and provide advice on how to avoid work-related deaths, injuries, ill health and accidental loss.

Information on accidents, incidents and ill health can be used by companies as an aid to risk assessment, helping to develop solutions to potential risks. Records also help to prevent injuries and ill health, and control costs from accidental loss.

Annex 9-1: Vessel Navigation Lights

International Regulations on Vessel Navigation Lights

The Marine Safety Act requires that lights must be displayed from sunset to sunrise and in times of restricted visibility during daylight hours. Minimum ranges at which lights can be seen refer to conditions on a dark night with a clear atmosphere. The information in this chapter is based on the International Regulations for Preventing Collisions at Sea 1972 (COLREGS), Marine Safety Act and Marine Safety Regulations.

Minimum Visibility for Length of Vessel

Vessel length in metres = m

Distance in nautical miles = nm

Light	Vessel Length		
	< 12 m	12 m up to 50 m	50 m and over
Masthead lights	2nm	5nm*	6nm
Sidelight	1nm	2nm	3nm
Sternlight	2nm	2nm	3nm
Towing light	2nm	2nm	3nm
All-round lights (white, red, yellow, green)	2nm	2nm	3nm

*Note: * Where the length of a vessel is 12m or more, but less than 20m, the masthead light visibility is 3 nautical miles.*

Instruction of the Mongla Port Authority (MPA) to the Mariners

General

- Navigation hours: Berthing and sailing during daylight is subject to tide. Pilotage is compulsory;
- Night Navigation is not permitted

Night Navigation

a. Vessels having LOA up to 135.00M with draught, 0.30M less than the day's permissible draught will be allowed to take berth at the Jetty No. 8 & 9.

b. Vessels with Bridge on the Bow & Vessels having containers on deck obstructing clear view forward will not be handled during night.

Source: https://autoliners2.hoegh.com/web/basic/hal_commoncontacts.nsf/docId/1FB7AE392A163F8DC1257C23003DADC2?open&Close=True&docMode=internettPreview

Annex 10-1: Scope of Work for Habitat Impact Assessment

Introduction

The route traverses and the concerned study area traverse over the Sundarbans Reserve Forest (SRF) and/or RAMSAR site, Ecologically Critical Area (ECA), passes by the Sundarbans South Wildlife Sanctuary (SWS), which is also a World Heritage Site (WHS). This area is supporting various wildlife. Passur River and its tributaries in the Sundarbans is an ideal habitat for dolphins and numerous brackish water fishes. River water is the driving force of all types of vegetation in SRF as well as all aquatic biota. Any kind of change of water quality may affect habitat condition. An additional study is recommended in the EMP to assess the magnitude and intensity of the impact of the transhipment activitieson the aquatic habitat.

Purpose

The purpose of this additional study is to provide Power Plant Authority a high level conceptual strategy and opportunity to keep important role in the conservation of nature under the enterprise of Corporate Social Responsibility (CSR) as a measure of beyond compliance.

Regulatory Context

This additional study is consistence with Wildlife (Conservation and security) Act 2012 (Chapter IV: Protected Areas; Article 16. Management of Sanctuary, 2c: improve habitat, protect breeding ground, prevent disturbance during breeding for the protection of wildlife, and raise plantation suitable for wildlife in limited scale for ensuring food security" ;2d: "take necessary steps, in consultation with the co-management committee, for the protection of fresh water or salt water aquatic animals such as tortoise, crocodile, dolphin, porpoise, etc. through control or prohibition of fishing activities or movement of watercrafts":). It will promote better understanding of aquatic life forms and their impacts from various sources. Consequently, the activities related to conservation of nature will abate the disturbance and threats to the cetacean community influenced by additional navigational traffic for transportation of coal.

It also supports Integrated Resource Management Plan (IRMP) Goal 1: "Protect, restore, sustain and enhance the biodiversity of the SRF and its interface landscape".

This study also support National Biodiversity Strategy Action Plan (NBSAP)''s strategies2: ("Conserve ecosystems, species and genetic pool of the country to ensure that the present and future wellbeing of the country and its people are secure") and 3: ("Restore ecosystems and rehabilitate endangered species").

Scope of Work

The EMP has considered and incorporated the mitigative sequence, as required by Environment, Forest and Fisheries Departments. Where possible, the EMP has planned to avoid deterioration of river habitat, and impacts will be minimized during the coal transportation and transshipment phases of the Project. However, there may be some impacts on the adjacent environment from the Projet activities.

This is a draft conceptual aquatic habitat impact assessment study for facilitating the conservation of habitat to support the EMPas required by the ECA, 1995 (as amended in 2010)

and IFC Performance Standards, PS 6- Biodiversity Conservation and Sustainable Management of Living Natural Resources.

An independent consulting firm with multidisciplinary team of experts led by a Conservation Specialist will conduct the study by reviewing available secondary data, field visits, consultation with various stakeholders, collection of primary data and analysis. This will include, reports, maps, surveys conducted so far, Environmental, ecological and species surveys and habitat management and mitigation measures and analysis, etc.

The specific tasks will include, but not limited to:

1. Assessment of project area ecological overview
2. Longterm monitoring of coal spillage and dust dispersion
3. Sediment and water quality checking for knowing the physical properties
4. Find out the geometric overview of the impact area and reference habitat
5. Based on the result of the laboratory analysis and monitoring results impact area will be delineated
6. Find out similar type of habitat for conservation
7. Implementation arrangement and management measures for habitat conservation activities
8. Involvement mechanism of local communities in the proposed interventions
9. Selection of beneficiary groups
10. Analysis of Regulatory bindings
11. Establish future monitoring plan
12. Financing mechanism

Stakeholder engagement

Detailed river habitat impact assessment and conservation planning will include stakeholder engagement with governmental and non-governmental groups. The main governmental agency will be Forest Department (FD), but the Department of Fisheries (DoF) and Department of Environment (DoE) may also be engaged. Non-governmental groups will likely include the IUCN, Wildlife Conservation Society, Bangladesh (WCS) and other local NGOs who are involvedin biodiversity conservation of the Sundarbans. Other local community stewardship groups with an interest in river may also be involved as appropriate.

Mongla Port Authority (MPA) will be engaged in this regards as they are the authority for overseas vessel management. The detailed River Habitat Conservation Plan will incorporate relevant stakeholder input and will be submitted to Forest Department for review and approval.

Duration of the Assignment

The study will need at least 14 months to cover dry and wet seasons of the year. Within this time frame, 2 months is allocated for report preparation and 12 months is for survey, stakeholder consultation, data collection and data assimilation.

Team Composition

The study will be carried out by following experts and professionals:

- Team Leader and Conservation Specialist
- Hydrologist
- Cetacean Specialist
- Fishery Specialist
- Field Researcher (Cetacean)
- Field Researcher (Fisheries)
- Community and Livelihood Specialists

Budgeting

Estimated budget for the consultancy services are presented below:

Position Name	Man Months	Rate (USD)	Total Cost (USD)
Team Leader and Conservation Specialist	4	4,000	16,000
Hydrologist	1	3,000	3,000
Cetacean Specialist	2	3,000	6,000
Fishery Specialist	2	3,000	6,000
Community and Livelihood Specialist (2)	6	2,500	15,000
Field Researcher (Cetacean) (2)	6	1,500	9,000
Field Researcher (Fisheries) (2)	6	1,500	9,000
Sub-total			*64,000*
Other Costs			
Items	**Unit Cost**	**Number**	**Total**
Communications and travel costs (Land Portion)	LS		5,000
Boat Fare	LS		7,500
Other Logistics	LS		6,000
Report Preparation	LS		1,500
Sub-total			*20,000*
Total			**84,000**

Deliverables

Sl. No.	Report Type	Timing
1	Inception Report	end of 1st Month
2	Report on identification of habitat conservation area	end of 3rd month
3	Design of habitat area and recommended management measures	end of 5th Month
4	Draft Final Report	end of 8th Month
5	Final Report	end of 9th Month

References:

1. Alom, Z. 2013. Waterways of the Sundarbans: Home to Freshwater Cetecean. In Reza Khan (editor): The Sundarbans: *Rediscovering Sundarbans, The Mangrove Beauty of Bangladesh*. Dhaka: Nymphea Publication. 178pp
2. Hossain, A. 2013. Fisheries of the Sundarbans. In Reza Khan (editor): Sundarbans: *Rediscovering Sundarbans, The Mangrove Beauty of Bangladesh*. Dhaka: Nymphea Publication. 185pp

Annex 11-1: Environmental Code of Practices

Introduction

The objective of the Environmental Code of Practices (ECPs) is to address all potential and general construction related impacts during dredging and plant jetty construction, and preparation of coal stock yard. The ECPs will provide guidelines for best operating practices and environmental management guidelines to be followed by the contractors for sustainable management of all environmental issues. These ECPs shall be annexed to the general conditions of all the contracts, including subcontracts, carried out under the Project.

The list of ECPs prepared for the Project is given below.

ECP 1: Waste Management

ECP 2: Fuels and Hazardous Goods Management

ECP 3: Water Resources Management

ECP 4: Drainage Management

ECP 5:Soil Quality Management

ECP 6: Erosion and Sediment Control

ECP 7: Protection of Flora

ECP 8: Protection of Fauna

ECP 9: Protection of Fisheries

ECP 10: Traffic Management (Road and Inland Navigation)

ECP 11: Construction Camp Management

ECP 12: Cultural and Religious Issues

ECP 13: Workers Health and Safety

ECP 14: Construction and Operation Phase Security

Contractors will prepare site specific management plans, namely Construction Environmental Action Plan (CEAP), in compliance with the Environmental Conservation Rules, 1997 of Bangladesh, World Bank Group Guidelines, and IFC Performance Standards and based on the guidance given in the ECPs. The CEAP will form the part of the contract documents and will be used as monitoring tool for compliance. It is mandatory for the contractors procured directly by the project to include these ECPs in their subcontracts. Violation of these requirements will be treated as non-compliance leading to the corrections or otherwise issuance of non-compliance certificates to the contractors.

ECP 1: Waste Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
General Waste	Soil and water pollution from the improper management of wastes and excess materials from the construction sites.	The Contractor shall • Develop site specific waste management plan for various waste streams (e.g., reusable waste, flammable waste, construction debris, food waste etc.) prior to commencing of construction and submit to supervision consultant for approval. • Organize disposal of all wastes generated during construction in the designated disposal sites approved by the Project authority. • Minimize the production of waste materials by 3R (Reduce, Recycle and Reuse) approach. • Segregate all wastes, wherever practical. • Vehicles transporting solid waste shall be totally confined within an enclosed vehicle or is fully covered with a tarp to prevent spilling waste along the route. • Tarp must be undamaged (not torn or frayed) properly secured to the body of the vehicle or trailer with ropes, chains, straps, or cords so that no waste is exposed. The edges of the tarps shall extend 12 inches over the permanent sides and back of the open top vehicle or trailer and must be secured to the permanent vehicle. All loads must be tarped from the point of origin of the waste to the tipping area of the final disposal/landfill. • Train and instruct all personnel in waste management practices and procedures as a component of the environmental induction process. • Provide refuse containers at each worksite. • Request suppliers to minimize packaging where practicable. • Place a high emphasis on good housekeeping practices. • Maintain all construction sites clean, tidy and safe and provide and maintain appropriate facilities as temporary storage of all wastes before transporting to final disposal. • Potable water should be supplied in bulk containers to reduce the quantity of plastic waste (plastic bins). Plastic bag use should be avoided.
Hazardous Waste	Health hazards and environmental impacts	The Contractor shall • Collect chemical wastes in 200 liter drums (or similar sealed container), appropriately

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	due to improper waste management practices	labeled for safe transport to an approved chemical waste depot. • Store, transport and handle all chemicals avoiding potential environmental pollution. • Store all hazardous wastes appropriately in bunded areas away from water courses. • Make available all Material Safety Data Sheets (MSDS) for hazardous materials on-site during construction. • Collect hydrocarbon wastes, including lube oils, for safer transport off-site to reuse, recycle, treatment or disposal at approved locations. • Construct concrete or other impermeable hard-stand to prevent seepage in case of spills. • Keep sufficient stock of absorbents for generally used chemicals or for petrochemicals (e.g., dirt, sawdust, etc.) within the storage area to contain accidental spills.

ECP 2: Fuels and Hazardous Goods Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Fuels and hazardous goods.	Materials used in construction have a potential to be a source of contamination. Improper storage and handling of fuels, lubricants, chemicals, hazardous goods/materials on-site, wash down of plant and equipment, and potential spills may harm the environment or health of construction workers.	The Contractor shall • Prepare spill control procedures and submit them for supervision consultant for approval. • Train the relevant construction personnel in handling of fuels and spill control procedures. • Refueling shall occur only within bunded areas. • Store dangerous goods in bunded areas on top of a sealed plastic sheet away from watercourses. Store all liquid fuels in fully bunded storage containers, with appropriate volumes, a roof, a collection point and appropriate filling/decanting point. • Store and use fuels in accordance with material safety data sheets (MSDS). Make available MSDS for chemicals and dangerous goods on-site.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Store hazardous materials at above storm surge level, determined for construction. • Make sure all containers, drums, and tanks that are used for storage are in good condition and are clearly labeled with expiry date. Any container, drum, or tank that is dented, cracked, or rusted might eventually leak. Check for leakage regularly to identify potential problems before they occur. • Set containers and drums in temporary storages in clearly marked areas, where they will not be run-over by vehicles or heavy machinery. The area shall preferably drain to a safe collection area in the event of a spill. • Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution. • All machineries are to be stored and away from any water body, drainage inlets or natural drainage area, where practical. Environmental control measures such as appropriate barriers (i.e. bunding, sediment fence, etc.) will be considered and/or implemented to control runoff away from the machinery and prevent any washout in to adjacent water body, drainage inlets or natural drainage area. • Transport waste of dangerous goods, which cannot be recycled, to an approved waste disposal facility. Safe transport of fuel or other hazardous liquids to and from the storage container will be facilitated through the provision detailed within the Material Safety Data Sheets (MSDS). • Wash down of jetty platform and equipment and vehicle servicing will be performed only in isolated impervious areas away from drainage inlets, connecting the drainage with an oil interceptor. Pits/bunds located away from waterways will be provided for concrete wash near construction areas. The contractor's environmental officer with assistance from supervisors is to

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		ensure that pits/bunds are available, maintained at capacity and drivers instructed regarding the location and required procedures. • Keep stock of absorbent and containment material (e.g., absorbent matting, dirt, sawdust, etc.) where hazardous material are used and stored; and ensure staffs are trained in their correct use. • Oil and chemical spills and washouts shall be cleaned up and collected immediately, where safety permits. Disposal of remediated / cleanup/ washout materials shall be to an approved waste disposal facility. Materials shall be transported by an approved / licensed transporter. Contaminated Material to be removed from site as soon as reasonably practical after the incident. • Provide appropriate personal protective equipment (protective clothing, safety boots, helmets, masks, gloves, goggles, etc.) to the construction personnel, depending on the materials handled. • Avoid the use of material with greater potential for contamination by substituting them with more environmentally friendly materials. • Siting of fuel and hazardous material storage sites, including refuelling facilities, batching plants and construction yards are to be located inside the embankments and at least 500 m away from any residential area. • Preparing inventories of chemicals that will be used, or have the potential to be used onsite. Inventories should include anticipated volumes and types of materials and MSDS. • Outdoor storage will be secured when unmanned, and storage of hazardous or potentially hazardous materials will ideally be arranged so that stored products are away from vegetated areas and there is ≥6 m between stored products, uncontrolled grasses or weeds, and fuel dispensers.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Personnel will avoid mixing chemicals unless specified by the manufacturer, and will use chemicals as specified on labels, in well ventilated areas. • Corrosive materials will be stored away from flammables. • Re-useable or recycled degreasers will be used where possible or appropriate to machinery and equipment. • Exposed stockpiles of materials will be covered with tarpaulin or impervious sheets before rainstorm occurs.

ECP 3: Water Resources Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Hazardous material and Waste	Water pollution from the storage, handling and disposal of hazardous materials and general construction waste, and accidental spillage	The Contractor shall • Follow the management guidelines proposed in ECP 1and ECP 2: Fuels and Hazardous Goods Management. • Minimize the generation of spoils, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways or storm water systems.
Discharge from construction sites	Construction activities, sewerages from construction sites and work camps may affect the surface water quality. The construction works will modify groundcover and topography, changing the surface water drainage patterns of the area. These changes in hydrological regime lead to increased rate of runoff, increase in sediment and contaminant loading, increased flooding, and affect habitat of	The Contractor shall • Develop temporary drainage networks (channels and check dams) in areas where sediment and erosion control is required for protecting storage areas for construction materials. • Install temporary sediment lagoons, where appropriate, to capture sediment-laden run-off from work site. • Divert runoff from undisturbed areas around the construction site. • Stockpile materials away from drainage lines. • Prevent all solid and liquid wastes entering waterways by collecting spoils, oils, chemicals, bitumen spray waste and wastewaters from brick, concrete and asphalt cutting where possible and transport to an approved waste disposal site or recycling depot. • Wash out ready-mix concrete agitators and concrete handling equipment at washing facilities off site or into approved bunded areas on site. Ensure that tires of construction

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	fish and other aquatic biology.	vehicles are cleaned in the washing bay (constructed at the entrance of the construction site) to remove the mud from the wheels. This should be done in every exit of each construction vehicle to ensure the local roads are kept clean.
Soil erosion and siltation	Soil erosion and dust from the material stockpiles will increase the sediment and contaminant loading of surface water bodies.	The Contractor shall • Stabilize the cleared areas not used for construction activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion. • Ensure that roads used by construction vehicles are swept regularly to remove dust and sediment. • Water the loose material stockpiles, access roads and bare soils on an as needed basis to minimize dust. Increase the watering frequency during periods of high risk (e.g. high winds).
Construction activities in water bodies	Dredging/ excavation activities associated with construction of pipelines, bulkheads and river training works, and buildings for a facility can cause turbidity and sedimentation in nearby waters, degraded water quality, and substrate alterations. Under water noise from the piling and other sources may compel dolphin, fish and other aquatic organisms leaving the area; sound pressure waves may also adversely affect riverine organisms including vocalization and behavior of fish, dolphins and other animals.	The Contractor Shall • Dewater sites by pumping water to a sediment basin prior to release off site – do not pump directly off site. • Monitor the water quality in the runoff from the site or areas affected by dredge/excavation plumes, and improve work practices as necessary. • Protect water bodies from sediment loads by silt screen or other barriers. • Minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways or storm water systems. • Do not discharge cement and water curing used for cement concrete directly into water courses and drainage inlets. • Set a large bubble curtain consists of a hose with drilled holes, supplied with compressed air. The hose is placed on the river bed and the air escaping from the holes forms the bubble screen. • Conduct pile driving during low tides in intertidal and shallow in subtidal areas.
	Highly motile adult and juvenile life stages of most fishes could flee	The Contractor shall • Avoid dredged material disposal activities in areas containing sensitive or unique benthic habitats (e.g., spawning and feeding sites).

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	when construction is ongoing, however, egg and larval stages as well as non-motile benthic organisms will likely not be able to avoid impacts. As a general rule, the severity of adverse effects tends to be greatest for early life stages and for adults of some highly sensitive species.	• Restrict construction during December-February and May-July when appropriate to avoid temporary impacts to habitat during critical life history stages (e.g., spawning, egg and embryo development, and juvenile growth). • Control of sediment flow from the construction activities • Silt curtains along river training works and/or other industry good practice management controls will be used to restrict the spread of sediment released during construction of Terminal/Jetty/Materials Offloading Facility earthen causeway. • Minimize and restrict clearing of river slope and river bank vegetation as much as possible.
Drinking water	Untreated surface water is not suitable for drinking purposes due to presence of suspended solids and E. coli.	The Contractor Shall • Provide drinking water that meets National and WHO Drinking Water standards. Drinking water to be chlorinated at source, and ensure presence of residual chlorine 0.1 ~ 0.25 ppm as minimum after 30 minutes of chlorine contact time.

ECP 4: Drainage Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Excavation and earth works, and construction yards	Lack of proper drainage for rainwater/liquid waste or wastewater owing to the construction activities harms environment in terms of water and soil contamination, and mosquito growth.	The Contractor shall • Prepare drainage management procedures and submit them for supervision consultant for approval. • Prepare a program to prevent/avoid standing waters, which supervision consultant will verify in advance and confirm during implementation. • Provide alternative drainage for rainwater if the construction works/earth-fillings cut the established drainage line. • Establish local drainage line with appropriate silt collector and silt screen for rainwater or wastewater connecting to the existing established drainage lines already there. • Rehabilitate road drainage structures immediately if damaged by contractors' road transports. • Build new drainage lines as appropriate and required for wastewater from construction yards connecting to the available nearby recipient water bodies. Ensure wastewater quality conforms to National Standards, before it is being discharged into the recipient water bodies.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Ensure that there will be no water stagnation at the construction sites and camps. • Provide appropriate silt collector and silt screen at the inlet and manholes and periodically clean the drainage system to avoid drainage congestion. • Protect natural slopes of drainage channels to ensure adequate storm water drains. • Regularly inspect and maintain all drainage channels to assess and alleviate any drainage congestion problem.
Ponding of water	Health hazards due to mosquito breeding	• Do not allow ponding of water especially near the waste storage areas and construction camps. • Discard all the storage containers that are capable of storing of water, after use or store them in inverted position.

ECP 5: Soil Quality Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Storage of hazardous and toxic chemicals	Spillage of hazardous and toxic chemicals will contaminate the soils.	The Contractor shall • Strictly maintain the wastes management plans proposed in ECP 1and storage of materials and ECP 2: Fuels and Hazardous Goods Management. • Construct appropriate spill containment facilities for all fuel storage areas. • Establish and maintain a hazardous material register detailing the location and quantities of hazardous substances including the storage, and their disposals. • Train personnel and implement safe work practices for minimizing the risk of spillage. • Identify the cause of contamination, if it is reported, and contain the area of contamination. The impact may be contained by isolating the source or implementing controls around the affected site. • Remediate the contaminated land using the most appropriate available method. • Confine the contaminants immediately after such accidental spillage. • Collect contaminated soils and washouts containing petroleum products treat and dispose them in environment friendly manner. • All areas intended for storage of hazardous materials to be quarantined and provided

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		with adequate facilities to combat emergency situations complying all the applicable statutory stipulation.
Construction material stock piles	Erosion from construction material stockpiles may contaminate the soils	The Contractor shall • Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds.
Impact on top soil	Earthworks will impact the fertile top soils that are enriched with nutrients required for plant growth	The contractor shall • Strip the top soil to a depth of 35 cm and store in stock piles of height not exceeding 2m. • Remove unwanted materials from top soil like grass, roots of trees and others. • Spread the topsoil to maintain the physico-chemical and biological activity of the soil. The stored top soil will be utilized for covering all disturbed area and along the proposed plantation sites.

ECP 6: Erosion and Sediment Control

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Clearing of construction sites	Cleared areas and slopes are susceptible for erosion of top soils, which affects the growth of vegetation and causes ecological imbalance.	The Contractor shall • Prepare site specific erosion and sediment control measures and submit them for supervision consultant for approval. • Reinstate and protect cleared areas as soon as possible. • Cover unused area of disturbed or exposed surfaces immediately with mulch/grass turf/tree plantations.
Construction activities and material stockpiles	The impact of soil erosion are (i) Increased run off and sedimentation causing a greater flood hazard to the downstream and silt accumulation and (ii) destruction of aquatic environment by erosion and/or deposition of sediment damaging the spawning grounds of fish	The Contractor shall • Locate stockpiles away from drainage lines. • Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds. • Remove debris from drainage paths and sediment control structures. • Cover the loose sediments of construction material and water them if required. • Divert natural runoff around construction areas prior to any site disturbance. • Install protective measures on site prior to construction, for example, sediment traps. • Install 'cut off drains' on large cut/fill batter slopes to control water runoff speed and hence erosion. • Observe the performance of drainage structures and erosion controls during rain and modify as required.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Restrict construction during December-February and May-July in the river when appropriate to avoid temporary impacts to habitat during critical life history stages (e.g., spawning, egg and embryo development, and juvenile growth).
Soil erosion and siltation	Soil erosion and dust from the material stockpiles will increase the sediment and contaminant loading of surface water bodies.	The Contractor shall • Stabilize the cleared areas not used for construction activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion. • Ensure that roads used by construction vehicles are swept regularly to remove sediment. • Water the material stockpiles, access roads and bare soils on an as required basis to minimize dust. Increase the watering frequency during periods of high risk (e.g. high winds).
Erosion and sedimentation from dredging	Dredging in combination with erosion and sedimentation caused by the wakes of large vessels, will adversely affect priority habitat for freshwater dolphins and other aquatic species, such as the critically endangered Batagur turtle (*Batagur baska*) and endangered small clawed otter (*Aonyx cinerea*).	The contractor shall • Use seasonal restrictions when appropriate to avoid temporary impacts to habitat during critical life history stages. • Dredging will be restricted during breeding and spawning season to avoid hindrance or blockage of fish, Dolphin and other aquatic species breeding and spawning. • Measures indicated earlier will be implemented

ECP 7: Protection of Flora

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Vegetation clearance	Local flora is important habitats for birds, provide fruit harvest, timber/fire wood, protect soil from erosion and overall keep the natural balance for human-living. As such damage to flora has wide range of adverse environmental impacts.	The Contractor shall • Prepare a plan to protect flora and submit the plan for supervision consultant's approval. • Minimize disturbance to surrounding vegetation. • Use appropriate type and minimum size of machine to avoid disturbance to adjacent vegetation. • Get approval from supervision consultant for clearance of vegetation. • Make selective and careful pruning of trees where possible to reduce need of tree removal. • Control noxious weeds by disposing of at designated dumping site or burn on site.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Clear only the vegetation that needs to be cleared in accordance with the engineering plans and designs. These measures are applicable to both the construction areas as well as to any associated activities such as sites for stockpiles, disposal of fill, etc. • Not burn off cleared vegetation – where feasible, chip or mulch and reuse it for the rehabilitation of affected areas, temporary waterman and valve access or landscaping. Mulch provides a seed source, can limit embankment erosion, retains soil moisture and nutrients, and encourages re-growth and protection from weeds. • Return topsoil and mulched vegetation (in areas of native vegetation) to approximately the same location from where it came from. • Avoid work within the drip-line of trees to prevent damage to the tree roots and compacting the soil. • Minimize the length of time the ground is exposed or excavation left open by clearing and re-vegetate the area at the earliest practically possible. • Ensure excavation works occur progressively and re-vegetation done at the earliest. • Provide adequate knowledge to the workers regarding nature protection and the need of avoid felling trees during construction • Supply appropriate fuel in the work camps to prevent fuel wood collection. • Include environmental management and awareness as part of training for employees during construction. • Avoid felling of tree species of conservation significance and those that are protected, even those that act as nesting and breeding sites. • Tree planation will be carried out in and other suitable areas near the river training works of the plant jetty at a ratio of 5 new trees per each tree felt.

ECP 8: Protection of Fauna

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities	The location of construction activities can result in the loss of wild life habitat and habitat quality.	The Contractor shall • Prepare a plan for protection of fauna and submit the plan for supervision consultant approval. • Limit the construction works within the designated sites allocated to the contractors.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Check the site (especially trenches) for trapped animals, and rescue them by the help of a qualified person. • Provide temporary access to the animals to cross the trenches. • Use of existing access road and limit the width of new access roads.
	Impact on local and migratory birds, their habitats and active nests	The Contractor shall • Not be permitted to destruct active nests or eggs of birds. • Minimize the tree removal during the bird breeding season. If works must be continued during the bird breeding season, a nest survey will be conducted by a qualified biologist prior to commence of works to identify and locate active nests. • If bird nests are located/ detected within the right-of-way and roadside embankments then those areas should be avoided. • Petroleum products should not come in contact with the natural and sensitive ecosystems. Contractor must minimize the release of oil, oil wastes or any other substances harmful to migratory birds' habitats, to any waters, wetlands or any areas frequented by migratory birds.
	Loss of temporary breeding pools and pans due to refilling of such pools by construction soil or gravel.	The contractor shall • Schedule construction during dry season to reduce impact since the amphibian populations will be low during non-breeding season • Fence off the trenches with nets to prevent amphibians falling into the trap.
	Movement of dredgers, dredging operation, discharge pipelines, and dredged material disposal may have a negative impact on the surrounding the Sundarbans Ecosystem (including, terrestrial wildlife, aquatic fauna and nearby UNESCO World Heritage site).	The contractor shall • Ensure enforcement of ECA, 1995 (as amended in 2010) and ECR, 1997 (as amended in 2005), Forest • Protection Act, and other rules, regulation and treaties for conserving the Sundarbans and Ecological Critical Areas • Ensure zero disposal of ballast water, zero oil spillage, zero discharge of waste water, zero dredged material disposals in WHS. • Restrict outside lighting of the dredgers during navigation and dredging operation within the Sundarbans, especially within close proximity of South Sanctuary. • Restrict the beaming of searchlight in Forest area/Sea Shores/Protected Areas

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	Above water noise and vibration can create nuisance to local community, disturb birds	The contractor shall • Reduce the dredger noise at source by isolation of exhaust systems, by keeping engine room doors shut and by additional measures such as shielding. • Equip the dredger with efficient and effective silencer for limiting the generation of noise. • Limit the noisy dredging activity to daylight hours, where possible, rather than at sunrise or sunset (significant for wildlife). Where unavoidable, the contractor should ramp up the levels of engines or other noise producing sources, so that the noise slowly increases. This will encourage riverine and terrestrial fauna to move away from the source area prior to significant noise emissions. • Inspect and maintain equipment in good working condition.
	Excavation works will impact on the loss of habitats especially the terrestrial invertebrates that live in the ground.	The contractor shall • Avoid construction during rainy season • Minimize digging of trenches and vegetation clearance to minimum required level.
Vegetation clearance	Clearance of vegetation may impact shelter, feeding and/or breeding and/or physical destruction and severing of habitat areas	The Contractor shall • Restrict the tree removal to the minimum numbers required. • Relocate hollows, where appropriate. • Fell the hollow bearing trees in a manner which reduces the potential for fauna mortality. Felled trees will be inspected after felling for fauna and if identified and readily accessible will be removed and relocated or rendered assistance if injured. After felling, hollow bearing trees will remain unmoved overnight to allow animals to move of their own volition. Care should be taken to make sure bird habitats are not destroyed. If there is no option available, rehabilitate them in other neighboring trees. Also protect and rehabilitate injured or orphaned birds.
Night time lighting	Lighting from construction sites and construction camps may affect the visibility of night time migratory birds that use the moon and stars for navigation during their migrations.	The Contractor shall • Use lower weightage flat lens fixtures that direct light down and reduce glare, thus reducing light pollution, • Avoid flood lights unless they are absolutely required. • Use motion sensitive lighting to minimize unneeded lighting.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Use, if possible, green lights that are considered as bird's friendly lighting instead of white or red colored lights. • Install light shades or plan the direction of lights to reduce light spilling outside the construction area.
Construction camps	Illegal poaching	The Contractor shall • Provide adequate knowledge to the workers regarding protection of flora and fauna, and relevant government regulations and punishments for illegal poaching. • Ensure that staff and Subcontractors are trained and empowered to identify, address and report potential environmental problems. • Provide sufficient food allowance to the workers so that they don't engage in illegal poaching or hunting.

ECP 9: Protection of Fisheries

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities (dredging) in River	The main potential impacts to fisheries are dredging, dumping of dredged spoil, hydrocarbon spills and leaks from riverine transport, and disposal of wastes into the river.	The Contractor shall • Prepare procedures for protection of fish and submit them for supervision consultant approval. • Restrict dredging and piling in the intake area during fish breeding and spawning season (December-February) and May-July to avoid hindrance or blockage of fish breeding and spawning. • Ensure the construction equipment used in the river are well maintained and do not have oil leakage to contaminate river water. • Contain oil immediately on river in case of accidental spillage from equipment; make an emergency oil spill containment plan (under the Fuels and Hazardous Substances Management Plan) to be supported with enough equipment, materials and human resources. • Do not dump wastes, be it hazardous or non-hazardous into the nearby water bodies or in the river. • Control of sediment flow from the dredging activities. • Restrict dredging to design section only where required by avoiding sensitive areas (dolphin and Batagur turtle and small-clawed otter, fish spawning areas). No dredging will be carried out

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		within one hundred meter of these sensitive areas. • During dry season no disposal of dredged materials in the scour holes. Scour holes are used as a refuge by some large fishes, dolphins and aquatic animals during dry season/winter. • Follow Biodiversity Management Plan. • Follow IFC's PS 6- Biodiversity Conservation and Sustainable Management of Living Natural Resources. • Implementation of ECPs, including ECP 1 Waste Management, ECP 2 Fuels and Hazardous Goods Management, and Noise Management Plan.
	Underwater noise and vibration may disrupt fish and dolphins	The contractor shall • Reduce the dredger noise at source by isolation of exhaust systems, by keeping engine room doors shut and by additional measures such as shielding. • Equip the dredger with efficient and effective silencer for limiting the generation of noise. • Limit the noisy dredging activity to daylight hours, where possible, rather than at sunrise or sunset (significant for wildlife). Where unavoidable, the contractor should ramp up the levels of engines or other noise producing sources, so that the noise slowly increases. This will encourage riverine and terrestrial fauna to move away from the source area prior to significant noise emissions. • Inspect and maintain equipment in good working condition.
	Risk of collision of construction boats with dolphins and other wildlife	The contractor shall • Limit the motor boat speed to ≤15 km/h in accordance with the best international practices and to avoid any collision with dolphins.
Construction activities on the land	The main potential impacts on river are increased suspended solids from earthworks erosion, sanitary discharge from work camps, and hydrocarbon spills	The Contractor shall • Follow mitigation measures proposed ECP 3: Water Resources Management and ECP 4: Drainage Management.

ECP 10: Traffic Management (Road and Inland)

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Increased traffic use of road by construction vehicles will affect the movement of normal road traffics and the safety of the road-users.	The Contractor shall • Prepare a traffic management plan and submit the plan for supervision consultant approval. • Strictly follow the Project's 'Traffic Management Plan' and work with close coordination with the Traffic Management Unit. • Prepare and submit additional traffic plan, if any of his traffic routes are not covered in the Project's Traffic Management Plan, and requires traffic diversion and management. • Include in the traffic plan to ensure uninterrupted traffic movement during construction: detailed drawings of traffic arrangements showing all detours, temporary road, temporary bridges, temporary diversions, necessary barricades, warning signs / lights, road signs, construction schedule etc. • Provide signs at strategic locations of the roads complying with the schedules of signs contained in the National Traffic Regulations.
	Accidents and spillage of fuels and chemicals and damage to infrastructures and properties due to vibration	The Contractor shall • Restrict truck deliveries, where practicable, to day time working hours. • Restrict the transport of oversize loads. • Operate vehicles, if possible, to non-peak periods to minimize traffic disruptions. • Enforce on-site speed limit, especially close to the sensitive receptors, schools, health centers, etc. • Inspect structures within the close proximity of construction site for damages.

ECP 11: Construction Camp Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Siting and location of construction camps	Camp sites for construction workers are the important locations that have significant impacts such as health and safety hazards on local resources and infrastructure of nearby communities.	The Contractor shall • Prepare a construction camp management plan and submit the plan to supervision consultant for approval. • Locate the construction camps within the designated sites or at areas which are acceptable from environmental, cultural or social point of view and approved by the supervision consultant or the Client.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Conduct consultation with communities including local government institutes bodies (Ward Member of Union Parishad and Village Head) prior to set-up the camp. • Consider the location of construction camps away from communities in order to avoid social conflict in using the natural resources such as water or to avoid the possible adverse impacts of the construction camps on the surrounding communities. • Submit to the supervision consultant for approval a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of access roads, fuel storage areas (for use in power supply generators), solid waste management and dumping locations, and drainage facilities, prior to the development of the camps. • Local authorities responsible for health, religious and security shall be duly informed on the set up of camp facilities so as to maintain effective surveillance over public health, social, and security matters.
Construction Camp Facilities	Lack of proper infrastructure facilities, such as housing, water supply, and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.	Contractor shall provide the following facilities in the campsites • Adequate housing for all workers. • Follow IFC's Performance Standard PS2: Labor and Working Conditions for creating congenial environment for the labor's living. • Safe and reliable water supply, which should meet national/WHO standards. Drinking water to be chlorinated at source, and ensure presence of residual chlorine 0.1 ~ 0.25 ppm as minimum after 30 minutes of chlorine contact time (WHO guideline). • Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females with total isolation by location. The minimum number of toilet facilities required is one toilet for every ten persons. • Treatment facilities for sewerage of toilet and domestic wastes. • Storm water drainage facilities. • Paved internal roads. • Provide child crèches for women working at construction site. The crèche should have facilities for dormitory, kitchen, indoor and outdoor play area. Schools should be attached to these crèches so that children are

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		not deprived of education whose mothers are construction workers. • Provide in-house community/common entertainment facilities. Dependence of local entertainment outlets by the construction camps to be discouraged/prohibited to the extent possible.
Disposal of waste	Management of wastes is crucial to minimize impacts on the environment	The Contractor shall • Ensure proper collection and disposal of solid wastes within the construction camps. • Insist waste separation by source; organic wastes in one container and inorganic wastes in another container at household level. • Store inorganic wastes in a safe place within the household and clear organic wastes on daily basis to waste collector. Establish waste collection, transportation and disposal systems with the manpower and equipment/vehicles needed. • Do not establish site specific landfill sites. All solid waste will be collected and removed from the work camps and disposed in approved waste disposal sites.
Fuel supplies for cooking purposes	Illegal sourcing of fuel wood by construction workers will impact the natural flora and fauna	The Contractor shall • Provide fuel to the construction camps for their domestic purpose, in order to discourage them to use fuel wood or other biomass. • Made available alternative fuels like natural gas or kerosene on ration to the workforce to prevent them using biomass for cooking. • Conduct awareness campaigns to educate workers on preserving the protection of biodiversity and wildlife of the project area, and relevant government regulations and punishments on wildlife protection.
Health and Hygiene	There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. There will be an increased risk of work crews spreading sexually transmitted infections and HIV/AIDS.	The Contractor shall • Follow the IFC's Performance Standard PS4: Community Health, Safety, and Security • Provide adequate health care facilities within construction sites. • Provide first aid facility round the clock. Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. • Provide ambulance facility for the laborers during emergency to be transported to nearest hospitals. • Initial health screening of the laborers coming from outside areas. • Train all construction workers in basic sanitation and health care issues and safety matters, and on the specific hazards of their work.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Provide HIV awareness programming, including STI (sexually transmitted infections) and HIV information, education and communication for all workers on regular basis. • Provide adequate drainage facilities throughout the camps to ensure that disease vectors such as stagnant water bodies and puddles do not form. Regular mosquito repellant sprays during rainy season in offices and construction camps and yards. • Not dispose food waste openly as that will attract rats and stray dogs. • Carryout short training sessions on best hygiene practices to be mandatorily participated by all workers. Place display boards at strategic locations within the camps containing messages on best hygiene practices.
Security and Safety	Inadequate security and safety provision in construction camps may create security and safety problems of workforces and assets and fire hazards. Security risks for workers and project staffs, especially from pirates and bandits who are known to roam the area and carry-out kidnappings for ransoms.	The Contractor shall • Follow the IFC's Performance Standard PS4: Community Health, Safety, and Security • Provide appropriate security personnel (police or private security guards) and enclosures to prevent unauthorized entry in to the camp area. • Employ night watchman and security personnel from forest department for periods of dredging, significant on-site storage or when the area necessitates. • Consult with the local leaders and local community representatives on security matters. • Maintain register to keep a track on a head count of persons present in the camp at any given time. • Pre-employment screening investigations should be used to verify the applicants relating to their employment, education and criminal history background. • Issuance of Identification Cards to workers and checking them properly when get into the workplace. • Encourage use of flameproof material for the construction of labor housing / site office. Also, ensure that these houses/rooms are of sound construction and capable of withstanding wind storms/cyclones. • Provide appropriate type of firefighting equipment suitable for the construction camps. • All construction material storage should be sit a visible location secured with fence or solid walls with locks to avoid theft and vandalism. • Display emergency contact numbers clearly and prominently at strategic places in camps.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Communicate the roles and responsibilities of laborers in case of emergency in the monthly meetings with contractors.
Site Restoration	Restoration of the construction camps to original condition requires demolition of construction camps.	The Contractor shall • Dismantle and remove from the site all facilities established within the construction camp including the perimeter fence and lockable gates at the completion of the construction work. • Dismantle camps in phases and as the work gets decreased and not wait for the entire work to be completed. • Give prior notice to the laborers before demolishing their camps/units. • Maintain the noise levels within the national standards during demolition activities. • Different contractors should be hired to demolish different structures to promote recycling or reuse of demolished material. • Reuse the demolition debris to a maximum extent. Dispose remaining debris at the designated waste disposal site. • Handover the construction camps with all built facilities as it is if agreement between both parties (contactor and land-owner) has been made so. • Restore the site to its condition prior to commencement of the works or to an agreed condition with the landowner.

ECP 12: Cultural and Religious Issues

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities near religious and cultural sites	Disturbance from construction works to the cultural and religious sites, possible cultural conflicts between communities and workers and contractors lack of knowledge on cultural issues cause social disturbances.	The Contractor shall • Communicate to the public through community consultation regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restriction. • Not block access to cultural and religious sites, wherever possible. • Restrict all construction activities within the foot prints of the construction sites. • Stop construction works that produce noise (particularly during prayer time) should there be any church/mosque/religious/educational institutions and health center close to the construction sites and users make objections. • Take special care and use appropriate equipment when working next to a cultural/religious center.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Stop work immediately and notify the site manager, if during construction, an archaeological or burial site is discovered. It is an offence to recommence work in the vicinity of the site until 'approval to continue' is obtained by the archaeological authority. • It is imperative to develop a procedure for management of 'Chance Finds'. IFC's PS 8-Cultural Heritage should be followed by the Contractor. • Provide independent prayer facilities to the construction workers. • Show appropriate behavior with all construction workers especially women and elderly people. • Allow the workers to participate in praying during construction time, if there is a request. • Resolve cultural issues in consultation with local leaders and supervision consultants. • Conduct awareness campaign and develop Code of Conduct for workers on local cultural. • Develop and function the grievance redressal mechanism. • Develop and implement strong community participation plan. • Establish a mechanism that allows local people to raise grievances arising from the construction process. • Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works so as to maintain effective surveillance over public health, social, and security matters.

ECP 13: Workers Health and Safety

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Best practices	Construction works may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths. The population in the proximity of the construction site and the construction workers will be exposed to a number of (i) biophysical health risk factors, (e.g., noise, dust, chemicals, construction material, solid waste, waste water, vector	The Contractor shall • Prepare an Occupational Health and Safety plan and submit the plan for supervision consultant's approval. • Implement suitable safety standards for all workers and site visitors, with sufficient provisions to comply with international standards (e.g. International Labor Office guideline on 'Safety and Health in Construction; World Bank Group's 'Environmental Health and Safety Guidelines') and contractor's own safety standards, in addition to complying with national standards.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	transmitted diseases, etc.), (ii) risk factors resulting from human behavior (e.g., STD, HIV/AIDS, etc.) and (iii) road accidents from construction traffic.	• Implement Emergency Preparedness Plan (EPP).Provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas. • Provide personal protective equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing the damaged ones. • Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job. • Appoint an environment, health and safety manager to look after the health and safety of the workers. • Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works and establishment of construction camps so as to maintain effective surveillance over public health, social and security matters.
	Child and pregnant labor	The Contractor shall • Not hire children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks.
Accidents	Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims	The Contractor shall • Ensure health care facilities and first aid facilities are readily available. Appropriately equipped first-aid stations should be easily accessible throughout the place of work. • Document and report occupational accidents, diseases, and incidents. • Prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, so far as reasonably practicable, the causes of hazards, in a manner consistent with good international industry practice. • Identify potential hazards to workers, particularly those that may be life-threatening and provide necessary preventive and protective measures. • Provide awareness to the construction drivers to strictly follow the driving rules. • Provide adequate lighting in the construction area, inside the tunnels, inside the powerhouse cavern and along the roads. • Follow relevant IFC Performance Standard (PS) like PS-2 on Labor and Working Conditions; PS-3 on Resource Efficiency and Pollution Prevention and PS-4 on Community Health, Safety, and Security.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction Camps	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.	The Contractor shall provide the following facilities in the campsites to improve health and hygienic conditions as mentioned in ECP 11: Construction Camp Management: • Adequate ventilation facilities • Safe and reliable water supply. • Hygienic sanitary facilities and sewerage system. • Treatment facilities for sewerage of toilet and domestic wastes • Storm water drainage facilities. • Recreational and social facilities • Safe storage facilities for petroleum and other chemicals in accordance with ECP 2 • Solid waste collection and disposal system in accordance with ECP1. • Arrangement for trainings • Paved internal roads. • Security fence at least 2 m height and security guards at entrances and every corner of the facility. • Sick bay and first aid facilities
Water and sanitation facilities at the construction sites	Lack of Water sanitation facilities at construction sites cause inconvenience to the construction workers and affect their personal hygiene.	The contractor shall • Provide portable toilets at the construction sites with workforce size 25 people or more, work the whole day for a month. Location of portable facilities should be at least 6 m away from storm drain system and surface waters. These portable toilets should be cleaned once a day and all the sewerage should be pumped from the collection tank once a day and should be brought to the common septic tank for further treatment. • Provide safe drinking water facilities to the construction workers at all the construction sites.
Other ECPs	Potential risks on health and hygiene of construction workers and general public	The Contractor shall follow the following ECPs to reduce health risks to the construction workers and nearby community • ECP 2: Fuels and Hazardous Goods Management • ECP 4: Drainage Management • Air Quality Management Plan • Noise and Vibration Management Plan • ECP 10: Traffic Management
Trainings	Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	The Contractor shall • Train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria, transmission of sexually transmitted infections (STI), and HIV/AIDS. • Train all construction workers in general health and safety matters, and on the specific hazards of their work. Training should consist of basic hazard awareness, site specific hazards, safe work practices, and

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		emergency procedures for fire, evacuation, and natural disaster, as appropriate. • Implement malaria, HIV/AIDS and STI education campaign targeting all workers hired, international and national, female and male, skilled, semi- and unskilled workforces, at the time of recruitment and thereafter pursued throughout the construction phase on ongoing and regular basis. This should be complemented by easy access to condoms at the workplace as well as to voluntary counseling and testing.

ECP 14: Construction and Operation Phase Security

Project Activity/ Impac Source	Impacts /Concerns	Mitigation Measures/ Management Guidelines
Construction Phase	Inadequate construction site security poses a significant risk to assets, construction materials and property. Theft/vandalism of assets, materials and property would increase construction costs and cause delays in project completion.	The Contractor shall: • Follow IFC's Performance Standard PS4: Community Health, Safety, and Security • Provide appropriate security personnel (i.e. security guards) to prevent unauthorized entry into the camp area. • Employ night watchman for periods of significant on-site storage or when the area necessitates. • Ensure all assets (i.e., tools, equipment, etc.) and construction materials at construction site are identified, inventoried and tracked as closely as possible. All assets should be clearly labeled and marked. Keep records of tool serial numbers and check inventory on a regular basis. • All tools and equipment should have a check out/in system, if not in use should be secured and stored in a proper place to prevent theft or loss. Provide storage sheds for the secure storage of equipment and tools when not in use. • Ensure there is proper fencing around construction site perimeter. Fencing should be chain-link at least 2.4 m high and secured with a steel chain and lock. If possible the entire site should be fenced; if this is not possible, make sure construction trailer and any equipment storage areas are fenced. • Ensure construction site has controlled access points (one or two entry points at most), allowing for close monitoring of comings and goings from the site. • Workers should be easily identified and have credentials that indicate site access. • No trespassing signs should be posted in conspicuous areas throughout the job site.

Project Activity/ Impac Source	Impacts /Concerns	Mitigation Measures/ Management Guidelines
		• List of employees who have after hour access to the property should be available to the BWB PMU and local authorities. • Ensure job site is properly lighted at night. Well-lit areas should include any office trailers and equipment storage trailers. Floodlights operated by sensors should also be installed where appropriate. • Pre-employment screening investigations should be used to verify the applicants relating to their employment, education and criminal history background.
	Improper security measures may pose security risk for construction workers and especially foreign staff on construction sites.	The Contractor shall: • Prepare site specific security plan. • Maintain register to keep track of number of persons present in the camp at any given time. • Provide appropriate security personnel at job sites as mentioned above. • Ensure proper fencing as mentioned above. • Ensure controlled access points to job site as mentioned above. • Ensure works have easily identified credentials as mentioned above. • Ensure job sites are properly lighted at night, as mentioned above.
Operation Phase	Vandalism/damage (including use of explosives) of water transmission mains, transfer stations Plant, Gas Pipelines, RMS, control stations and storage reservoirs. Theft of infrastructure (i.e. metals and etc.) is also of concern.	• Patrol Men and Pipeline Community Policing Forum shall routinely conduct patrols and inspections of transmission mains Plant area and facilities. • They shall monitor suspicious activity and notify local authorities and BWB GPS along with VH/GVH/TA's in event of any such occurrence/incident. • Ensure strategic infrastructure sites such as reservoirs RMS, Gas Pipelines, and main Plant transfer stations are secure and fenced with controlled access points. Fencing should be chain-link at least 2.4 m high and secured with a steel chain and lock.

Annex 11-2: Terms of Reference of EHS Consultants of Owner's Engineer (Jetty Construction)

A. Objective

The primary objectives of the consulting services of supervising environmental and health and safety management during jetty construction are to:

- ensure that the construction methods as proposed by the contractor for carrying out the works are satisfactory, with particular references to the technical requirements of sound environmental standards on the basis of safeguard requirements (proposed in the EIA, this includes Government and the IFC's EHS guidelines), inspection of contractors' construction equipment, review contractor's health and safety standards, inspect construction yards and work camps, interview contractors' personnel and general public;
- Prepare checklist of monitoring factoring IFC's EHS Guidelines on occupational health and safety procedure and practice, sanitation condition, implementation of EMP, and waste management practices and efficiency.
- Supervise contractor in implementing EMP, environmental monitoring plan, and ensuring environmental social safeguarding during construction activities.
- Ensure that the recommendations of the environmental management plan (EMP), environmental monitoring plan and environmental code of practices (ECPs) are strictly followed by the contractors;
- prepare quarterly environmental and health and safety monitoring and annual reports of implementing these plans as part of project implementation report, and carry out environmental management seminars for contractors and BIFPCL staffs; and
- monitor the implementation of the health and safety program at work site including the information and education campaign on sexually-transmitted diseases and HIV/AIDS (human immunodeficiency virus/acquired immunodeficiency syndrome) as required by the civil works contracts.

Annex 11-3: Cyclone Disaster Preparedness Plan

Cyclone Preparedness Plan

Types of alert (warning):

There will be four types of Alerts and Actions to be taken in each case are appended below:

Alert no.1

This alert will be announced after storm warning Signal No-3 (local cautionary) has been hoisted. Cyclone warning Signal No-3 is meant for taking precautionary measures for depression located in the Bay.

Meteorological data for signal no-3:

(a) Depression in Bay.

(b) Rainfall intensity exceeding 20 cm in 24 hrs.

Alert no. 2

This alert will be announced if the storm warning Signal (local warning) No-4 is hoisted (Storm warning Signal No-3 is first signal that directly concerns the port) and it indicates that the port is threatened by squally weather.

Meteorological data for signal no. 4:

(a) Depression Cyclone North of 16° N and/or East of 85° E or wind velocity upto 40 Knots.

(b) Rainfall 30 c. m. in 24 hours

Alert no. 3:

This will be announced when the storm warning DANGER SIGNAL NO. 5, 6 or 7 is hoisted. These Signals indicate that the port will experience severe weather from a storm of moderate intensity and precautionary measures must be taken by all ships and crafts and shore installations in order 10 protect themselves and ensure minimum damage.

Meteorological data for signal no. 5, 6 & 7:

(a) Cyclone North of 20° N and East of 87° E with wind velocity up to 60 Knots.

(b) Rainfall 30 c. m. in 24 hours.

Alert no. 4:

This will be announced after the storm warning GREAT DANGER SIGNAL NO. 8, 9 or 10 have been hoisted. These signals indicate that the port will experience severe weather from a storm of great intensity and exhaustive precautionary measures must be taken at once by all concerned

Meteorological data for signal no. 8, 9 & 10:

(a) Cyclone, Severe Cyclone, wind velocity 70 Knots or over North of 21° & East of 88° moving over Mongla.

(b) Speed of advance 20 Knots.

(c) Storm surge warning

Actions to be taken

Action on alert no. 1:

On receipt of this warning, vessels in the port shall be brought on two hours notice for engine readiness and power on all machineries and all concerned should be warned against probable further signals.

Action: Harbor Master

Master Pilot, Sr. Pilot, Pilot should be available on telephone Asstt. Harbor Master (OP), Asstt. Harbor Master (Con) and emergency Pilot in office (Harbor control). Harbor Master Deputy Harbor Master will prepare and circulate necessary duty roster to man the Harbor control round the clock, Dredgers any, to continue normal routines and all duty officers and crews should be on board. Dredger Master and Chief Engineer (Dredger) shall be available on telephone.

Tug	:	Normal, Open VHF for weather messages
Pilot Vessel	:	Routine, open VHF for the messages
Mooring boats	:	Routine, but keep in touch with Harbor Control
Survey Vessel	:	Routine, Open VHF for weather messages
Survey boats	:	Routine, keep in touch with Mother Vessel for weather messages
Ferry boats & other Crafts	:	Routine, but keep in touch with Harbor Control

All stevedores, Carrying contractors, Firms and Departments like BIWTC BADC, Food etc. connected with river traffic and all Head of the Departments/ Cells of the MPA should be intimated about the situation by the wireless Officer/Supervisor, Old Mongla/New Port Control.

Action: Harbor Master

In addition to the precautionary action taken by the Harbor Master/Dy Harbor Master, the Chief Engineer/Deputy Chief Engineer (Marine) Executive Engineer (Marine). Asstt, Harbor Master (Operation), Asstt Harbor Master (Con.), Marine Officer, Asstt. Engineer (Marine) Conservancy Officer and Sub-Asstt. Engineer (Marine) should also check up all the Crafts and barges and those under repairs. Chief Engineer (Marine), Deputy Chief Engineer (M) & Executive Engineer (Marine) should be available on telephone.

Action: Harbor Master, Chief Engineer (Marine)

All overhead water tanks in the residential area should be replenished to its full capacity when the warning signal No-3 is hoisted. One Trailer with water filled in should report to Central Control Room. Fifty nos. of Aluminum pitchers should be made available in the Central Control Room by Store Officer on requisition from Harbor Master/Deputy Harbor Master.

Action: Harbor Master, Chief Engineer (M&E)

The 'On Duty' Officials of the Traffic Department should continue operational work in the port area. Asstt. Traffic Manager/Traffic Officer should be available on office /residence telephone. Foreshore work will continue. For safe custody of cargo both inside the sheds and outside, additional precautionary steps should be taken against storm and rain.

Action: Traffic Manager

All officers of Mechanical & Electrical Department should be available on office/residence telephone for operation of proper electric supply to all installation including Cranes through emergency Generators.

Action: Chief Engineer (M&E)

Security arrangement should be tightened up and FIRE FIGHTING STAFF should be alerted by the Chief Security Officer.

Action: Chief Security Officer

Notes: Action indicated against Alert No. 1 will cover the emergencies arising out of storm warning signal (local cautionary) No-3 if hoisted.

Action on alert no. 2:

In addition to Actions in Alert No-1, Master Pilot/Sr. Pilots/Pilots on telephone. Tugs to have full power. Radio control to inform all Heads of the Department/Cells and alert all concerned. Asstt. Harbor Master/Pilots must be on one tug each. They are to check all ships ropes, Chains and wires and double-up or run out extra lines, warn all ships, check warning signals, clear and remove all barges/lighters from the channel and from alongside the vessels. Lighting Office r/Light House Mechanic to check all channel lights. Harbor Master will issue necessary instructions to all concerned.

Pilotage operation and movement of Harbor crafts be stopped. However, emergency mooring boats and terry services will continue.

Chairman & Members to be informed about the progress of the storm by the Harbor Master. Meeting to be held by the Cyclone Committee. All messages in connection with cyclone, must be read and explained by the Harbor Master/Deputy Harbor Master.

Action: Harbor Master

All MPA vessels including vessels under repair with Marine Engineering Department be kept alert, properly manned, adequately secured and if necessary, endeavor should be made to bring them to a safer place.

Action: Harbor Master, Chief Engineer (Marine)

In addition to the precautionary action taken by the Harbor Master/Deputy Harbor Master, the Chief Engineer (Marine)/Deputy Chief Engineer (Marine) of Mongla Port Authority must make sure that all the vessels on slipway, if any and under repairs/laid-up, are properly secured. The Department concerned should, however, endeavor to tow such vessels to a safer place. All crew should be on board of all the small vessels.

The vehicles earmarked for emergency services should remain standby under the direct control of Executive Engineer (W & E) /Asstt. Manager (CS) assisted by car supervisor until clearance signal is announced. Telephone/Intercom be kept operational day and night. One jeep/truck should remain standby at workshop Building. The Vehicles which are in operation should be centralized in Mechanical workshop and should remain standby to attend any emergency call. One transport should be provided to Traffic Departmentfor patrol duty.

Action: Director (Administration), Chief Engineer (M & E)

The foreshore work on the jetty will continue. Continuance of lighterage/Cargo work should be decided by the Harbor Master/Deputy Harbor Master and should be stopped if necessary as per prevailing storm condition. Shed loading, loading and unloading of cargo from shed to barge may be decided by the Traffic Manager/Deputy Traffic Manager, Asstt. Traffic Manager, Traffic Officer personally. Roster duty should be introduced for Officers of the Traffic department for patrolling the entire jetty area.

Action: Traffic Manager, Harbor Master

The Chief Security Officer, Security Officer, Assistant Security Officer, inspector/Sub-inspector will allow without any hindrance, entry of departmental materials under a memo issued by the concerned departmental officials within the port protected area and the shed officer will arrange safe custody of those materials. If however, any such material is to be taken outside the gate from one port protected area to another port protected area, if any, such departmental materials should be allowed on memo to be issued by the officer concerned or from the officer of the shed concerned.

Action: Traffic Manager, Chief Security Officer

Crane will work if not raining, but with great caution. Otherwise, all the jetty shed shore cranes should be fixed in the marked idle places with safety devices. All storm hooks should be fixed and hand breakers (travelling) full on. Chief Engineer (M & E) will however, decide about the continuance of work or otherwise in accordance with the storm condition prevailing at that time in consultation with the Harbor Master.

Action: Traffic Manager, Chief Engineer (M & E)

As soon as storm signal No-4 is hoisted, Executive Engineer (Marine)/Executive Engineer (M&E) should keep sufficient hand standby at the main jetty area for undertaking any emergency work during and immediately after cyclone.

Action: Chief Engineer (M&E), Chief Engineer (Marine)

Note: Actions indicated against alert No-2 will cover the emergencies arising out of storm warning Signal No. 4.

<u>Action on alert no. 3</u>

In addition to action on alert 1 & 2, Deputy Harbor Master will report to Harbor Control & after clearance of the Channel and ships side by the smaller Crafts, the Tugs shall be secured in safer place and Assistant Harbor Masters and all Pilots will report to the Harbor Control at old Mongla. The Harbor Master's office situated in the Operational/Administrative Building will function as Central Control Room (see Chapter-Ill, item No-7).

Action: Harbor Master

Dredgers:All Officer & Engineer should be on board the Dredgers if any.

All Crafts:Full power, properly manned, either adequately secured or taken away to a safer sheltered water and warn all ships in port. Tide Watchers and Light Keepers be evacuated from low lying areas by the Master Pilot I Assistant Harbor Master (Op) & Assistant Harbor Master (Con.).

Action: Harbor Master

One covered Pick up / Jeep should be provided at the disposal of Chief Security Officer for standby duty during Signal No-5 and above.

Action: Director (Administration)

All works will be stopped in the yards and sheds. All lighterage/Cargo works be stopped. Port Security be informed by the Chief Security Officer to man the gates and other main points if there is a failure of electricity. All security measures should tighten up. Except the gangs specially requisitioned by the stevedores, all other unauthorized persons should be cleared out of the jetty area. The Container stacking should be reduced. To one height as far as practicable.

Action: Traffic Manager, Chief Security Officer

Roster duty should be introduced from officers of the Traffic Department for patrolling the entire jetty area.

Action: Traffic Manager

The Fire place in- the workshop, such as Foundry and smith-shop hearth should be kept well extinguished. The Workshop in-charge with his mechanicsand helpers should be detained to attend emergency work.

Action: Chief Engineer (Marine)

All Cranes/Cargo handling equipment to cease operation and all cranes to be made fast with hand breakers full on and all storm hooks fastened firm. All feeders supplying power to overhead mains switched off. Vehicle with Electrical Foremen/Electrician should be ready at sub-station 2 & 3 in case of emergency.

Mobile equipment under operation at the jetties should be brought back to the Garage and stabled in a safer manner.

Action: Traffic Manager, Chief Engineer (M&E)

When DANGER SIGNAL No. 5 is hoisted no leave will be granted to any Officer or Staff. Also official duties outside port jurisdiction to be cancelled by all officers, Department/Cell Heads & Members by themselves in consultation with the appropriate Authority. Members and Department/Cell Heads will not leave office/station/Head quarter until signal is lowered and normally restored.

Action: Director (Admin)

Note: Action indicated against Alert No-3 will cover emergencies arising out of storm warning DANGER SIGNAL No. 5, 6 & 7.

<u>Action on alert no. 4</u>

In addition to actions on alert No. 1, 2 & 3 other actions are:

(a) Secure cranes, warehouse etc, Man VHF, R/T and hand Mobile set.

Action: Traffic Manager, Harbor Master

(b) In case of unavoidable circumstances, Officers must get permission from their respective Heads of the Department/Cells in case they leave residences or offices during storm. In the absence of the Heads of the department their immediate junior officer available will take

charge. Residential addresses of essential staff should be kept handy by the respective department so that, it necessary, they canbe made available at short notice.

Action: All Heads of the Department.

(c) In case of failure of Electric supply in the port area, Hazak light, Hand search lights, Torch lights and Gas lights should be kept with all the Control Room Duty Officer. These are to be arranged by store section as per requisition from Control Rooms.

Action: Director (Admin), Harbor Master, Deputy Harbor Master

The above articles will be kept and preserved by the Chief Security Officer in the Fire store. The same will be supplied to Central Control Room when storm warning signal No-5 is hoisted.

Action: Chief Security Officer

(d) In case of Alert No-3 & 4 the Director (Admin) will keep two Dispatcher (M. L. S. S.) as standby under Central Control Room.

Action: Director (Admin)

(e) Assistant Manager (CS)/ Welfare Officer will organize Canteen service for crew etc. at various points. Chief Security Officer will organize fire service and security of Docks, workshop etc. As in 3 plus all equipment and cargo handling staff to evacuate and remain in respective sheds.

Action: ·Director (Admin), Traffic Manager, Chief Security Officer

(f) Chief Engineer (M&E)/ Deputy Chief Engineer (M&E)/ Executive Engineers of Mongla Port Authority will organize light/heavy transport.

Action: Chief Engineer (M&E)

(g) Senior Medical Officer, Medical Officers and Doctors to remain standby with medical staff, ambulance and ancillary arrangements.

Action: Director (Admin)

(h) Chief Finance & Accounts Officer is to keep sufficient cash in hand for meeting any emergency/contingency as normal banking may not be available in the event of cyclone. This cash will be utilized/spent under the instruction of Harbor Master & other In-charges of various Control Rooms for various Contingent/Misc. expenses including tiffin/fooding of Officer/Staff members on cyclone duty. However, proper Accounts is to be maintained and submitted to Accounts for adjustments, later on.

Accounts Department is to make Budget provisions for this plan.

Action: Harbor Master, Chief Finance & Accounts off

N.B. Actions indicate against Alert No. 4 will cover the emergencies arising out of storm warning signal GREAT DANGER No. 8,9 & 10.

Annex 11-4: Emergency Preparedness and Response Plan

Introduction

An Emergency Preparedness and Response Plan (EPRP) can be defined as a plan that encompasses organizing, coordinating and implementing a range of procedures to prepare, prevent, mitigate, respond to and recover from the consequences of an emergency event.

A well-constructed EPRP will prepare in advance and prevent a minor incident from becoming a disaster, save lives, prevent injuries and minimize damage to property and the environment. It facilitates a rapid and effective emergency response and recovery, provides assistance to emergency and security services, implements an effective evacuation plan if required and communicates vital information to all relevant persons involved in the transport emergency (both internal personnel and external agencies) with minimum delay.It outlines the necessary resources, personnel, and logistics, which allow for a prompt, coordinated, and rational approach to a transport emergency. The plan will support the formation of emergency response group, contain sufficient detail to define responsibilities of the people involved and train themselves to effectively carry out their duties during an emergency.

An effective EPRP prepares for the unexpected by identifying response mechanisms to a variety of potential crises that may arise. Possible emergency events that have been identified for this project aremedical emergencies, fire and explosion at the plant and jetty, spontaneous combustion of coal, grounding or stranding, collision (with oil tanker or other vessel), oil spillage, coal spillage,cyclone and storm surge,civil unrest/terrorist threat or riot.

Purpose of the Plan

This EPRP is intended to provide information, strategies and procedures relating to all aspects of emergency management during operation, which comprise:

a. Prevention of emergencies,

b. Preparation for emergencies,

c. Response to an emergency, and

d. Recovery following an emergency.

It includes emergency management procedures and administrative structures to be established and nominates functional roles and responsibilities for the management of emergencies across various possible incidents in project activities.

Prevention is one of the most important elements of the plan. Averting an emergency event from ever taking place is always the top priority. Effective prevention techniques such as preventative measuresspontaneous combustion of coal and subsequent corrosion of metals.

Preparedness is ensuring that personnel are adequately trained and equipment is properly functioning for an effective response and recovery to an emergency event. For unexpected and unpreventable events like a terrorist attack, preparedness can be the deciding factor that prevents an isolated incident from becoming a major disaster.

Response is actions taken to minimize the effects of an emergency. An effective and quick response is important in all cases of emergency events in order to minimize casualties and injuries.

Recovery is defined as measures which are taken after an emergency event. Recovery measures include but are not limited to, support of affected individuals, damage assessment, containment, clean-up and investigation.

EPRP Management Structure

The Emergency Preparedness and Response Group (EPRG)

The ERG, will be headed by the Harbor Master of Mongla Port and he will be responsible for providing tactical response, support, assistance and advice to all incident and emergency situations at site/location and for providing operational response to any emergency situation there. The function of the EPRG is to coordinate and oversee arrangements to ensure that the Incident Response Team (IRT) meets its emergency management obligations. EPRG should develop a plan, in consultation with an appointed Occupational Health Safety and Environment Coordinator, where it should describe how to handle crises e.g. fire, explosion, oil spill, illness, injury, kidnap, civil unrest etc.EPRG shall form different teams considering specific emergency scenarios with the required division/department/institutional head and people from MPA which would be mobilized during the specific emergencies.

The EPRG is also responsible for defining and controlling strategy for major incidents within the jurisdiction of Mongla Port Authority (MPA). However, general strategies to manage any emergency incident must be pre-determined. When the EPRG is formed and mobilized due to an incident or emergency situation the Chairman of the Mongla Port have to be notified immediately.

The Incident Response Team (IRT)

The Incident response team will be responsible for dealing with specific incident and emergency situation that may occur atinland water and land within the jurisdiction of MPA. In cases when additional support - in terms of gathering resources and manpower – is required, this will be requested through and provided by the EPRG. In an event when the remote IRT is mobilized (due to an incident or emergency situation), the EPRG Leader must be notified immediately.

The IRT will be divided into different sub-team based on the type of emergency incident. The proposed members for incident based IRT sub-teams are listed in Figure-1. The responsible members of the IRT sub-team would be selected by the respective divisional/departmental/institutional head from EPRG. These sub-teams must be formally established for the effective implementation of the EPRP, so that they can be mobilized immediately after an incident without jeopardizing the essence of EPRP in responding an emergency, while deciding on the selection of team.

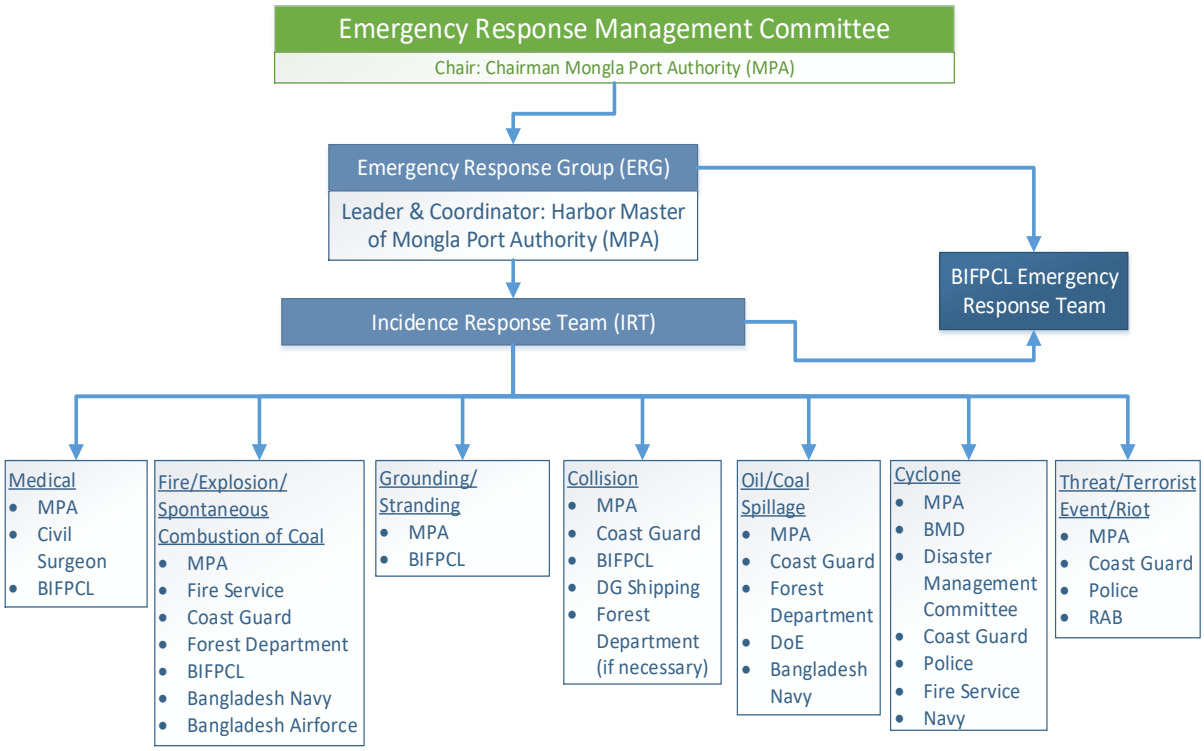


Figure 1: EPRP Management Structure

Duty of EPRG

The EPRG Leader will activate and direct relevant organizationas appropriate to respond to an emergency event. The EPRG Leader will also notify and liaise with the Chairman.

The primary responsibilities of the EPRG are:

- Ensure liaison with Government, key stakeholders and local authorities in accordance with legal and legislative requirements;
- Ensure appropriate representation in the IRT;
- Coordinate during the emergency situation;
- Provide emergency support, resources, advice and assistance to all operations;
- Prepare and release media holding statement; and
- Coordinate the arrangement of the reception and treatment for all personnel evacuated from the emergency site.

In addition, the EPRG will attend to the following duties:

- Regular meetings of the EPRG and meetings with IRT personnel;
- Organize and conduct training sessions for the EPRG members and duty personnel so that both formal and informal team members are aware of the response mechanism during an emergency event;
- Regularly review and update the Emergency Risk Register/Log book;
- Initiate programs, procedures and activities to mitigate the risk to life and property within the project jurisdiction, including increasing public awareness;
- Seek funding support for emergency management related projects and programs;

- Coordinate emergency training, drills and mock rescue operations.
- Ensure that IRT members are appropriately trained and are competent in specific emergency management;
- Review the EPRP on a regular basis and update it as necessary;
- Send requisition of additional human resources and equipment periodically to the government to effectively managing emergency events;
- Review the effectiveness of the IRT; and
- Ensure that all members of the EPRG andIRT are informed their responsibilities and have access to EPRP documentation.

The actions of the EPRG will vary depending on the nature of the emergency and it is the EPRG Leader's responsibility to determine the extent of the response required. The EPRG may call on additional staffs to assist them in responding to any emergency or incident situation.

Maintenance of Contact Details

Responsible person nominated by the EPRG Leader will maintain and update the emergency contact list (Table 1) and distribute to all concerned departments.

Table 1: Emergency Contact List

Contact Category	Emergency Number (internal extension numbers, hotline numbers, land line numbers, mobile numbers etc.)	Alternative Contact Details (alternate mobile numbers, landline numbers, emails, fax numbers etc.)
Emergency Control Center		
Chairman		
Harbor Master		
Deputy Harbor Master (DHM)		
Assistant Harbor Master (Operation)		
Assistant Harbor Master (Conservancy)		
Assistant Harbor Master (Emergency Response)		
Aerodromes Section, Dhaka Airport		
Bangladesh Meteorological Department		
Bangladesh Navy		
Police Station		
Fire Services		
Ambulance Services		
Coast Guard		
Forest Department		
RAB Control Center		

Contact Category	Emergency Number (internal extension numbers, hotline numbers, land line numbers, mobile numbers etc.)	Alternative Contact Details (alternate mobile numbers, landline numbers, emails, fax numbers etc.)
Hospital 1[5]		
Hospital 2		
Updated by: Comments:		Signature Date:

The duty EPRG and Support Personnel will be available round the clock. It is essential that people on duty fully understand their responsibilities and can be contacted at any time. IRT members are responsible for maintaining a list of contact details of the personnel they would call out to support in the event of the EPRG requiring assistance. It is the responsibility of EPRG to activate, inform, and direct any support personnel they consider necessary to provide them with the appropriate level of assistance. The respective EPRG members are also responsible for briefing activated support personnel about the incident and giving them direction. Although office, home and mobile telephone numbers are given in the weekly contact list, the policy is to contact EPRG and Support members via their mobile/land phone first.

Call Out and Delegation of Authority

In the event of an emergency, after formation of IRT sub-team by the EPRG leader, individual members of the IRTare to ensure that their emergency response function is delegated to amember of the same nominated group, when they are unavailable. They must ensure nominated member is appropriately briefed and s/he remains within contact. In case of any change in the member of IRT sub-team, the newly assigned member should inform of this change to the leader of the IRT sub-team who will update and reissue the contact list. At the end of duty period, the responsible member must handover their duty in person thus ensuring the next on duty has acknowledged the responsibility. A record of the duty person would be sent weekly to the EPRG.

Public Relations and Media

The EPRG Leader is responsible for approving all thestatements to media**.**The EPRG Leader will, in consultation with the Chairman of MPA, nominate a spokesperson for interviews and conferences.All personnel must be instructed to direct external telephone calls requesting media comment on any incident to the nominated EPRG spokesperson.

It is important that the EPRG maintains a record of all the external communications and liaises effectively to ensure overall co-ordination and to ensure they speak in one voice.

Required Equipment

Requirement of equipment during emergencies and their total cost (approximate) is presented in Table 2.

[5]Hospitals with air ambulance facility will be chosen.

Table 2: Emergency Response Equipment and Cost

Emergency Type	Equipment	Quantity	Unit Cost (USD)	Total Cost (USD)
Medical Emergencies	Marine Ambulance (with all emergency support services)	2	230,000	460,000
	Road Ambulance	1	45,000	45,000
	First Aid Facilities	50	100	5,000
	Mobile Defibrillators	5	1,000	5,000
	Mobile Oxygen resuscitation equipment	20	50	1,000
	Stretchers	5	300	1,500
Fire/Explosion/	Fire Fighting Tug	1	Available at Mongla Port	
Spontaneous Combustion of Coal	Dry Powder Extinguisher (4 kg)	36	100	3,600
	CO_2 Fire Extinguisher (5 kg)	36	100	3,600
	Commercial Fire Blankets	100	20	2,000
	Personal Fire Blankets	100	20	2,000
Grounding/ Stranding	Survey Vessel	1	Available at Mongla Port	
Collision	Rescue Vessel (may also require during fire/explosion/spontaneous combustion of coal/grounding/stranding emergencies)	1	120,000	120,000
Oil Spillage	Oil Sweeper Vessel	1	5,000,000	5,000,000
	Wildlife Rescue and Rehabilitation Center	LS	25,000	25,000
Cyclone	Life Buoy	100	200	20,000
	Life Jacket	100	50	5,000
	Immersion suits	25	250	6,250
	Walk—e-Talky	25	50	1,250
	Safety Helmet	100	10	1,000
	Rain Coat	100	30	3,000
	Safety Boots	100	100	10,000
	Rescue Tools	2	1,000	2,000
	Water-proof Torch Light	50	25	1,250
Total				**5,723,450**

Prevention

Prevention and mitigation activates work toward eliminating or reducing the impact of an event and increasing the resilience of an affected community to recover from the consequences of an emergency event.

Typical prevention and mitigation actions will include:

- Setting, coordinating and reviewing the emergency management policy and programs for the project assets;
- Management and monitoring of project asset conditions;
- Liaise between different response agencies and emergency managers (through the ERT);

- Review and update the risk register, taking into account any new or emerging risks to project assets;
- Seeking government funding support to mitigate identified risks.

Emergency Risk Management

Emergency planning requires an identification and assessment of the hazards likely to cause an emergency. Emergency risk management should be carried out in accordance with nationallaws and guidelines to identify and set priorities to be addressed within an emergency management program.

Emergency Risk Management focuses on reducing risk by modifying aspects of the source of the risk, the community or the environment- because it is impossible to completely prevent emergency situations from occurring.

The main benefits of emergency risk management process are:

- The process focuses on the causes of risk instead of emergencies that may result from the risk;
- The process uses tools and approaches that are common to other risk management and planning approaches, enabling appropriate prioritisation of treatments for action (e.g., such as capital works or maintenance); and,
- Provides a proper basis to access funding/grants, monitor insurance costs, and minimise opportunity for litigation and legal action

Prevention through Mitigation Measures

Project risks are prevented through implementation of risk mitigation measures to address events such as; medical emergencies, fire or explosion; spontaneous combustion, grounding or capsizing; collision, oil/coal spillage; cyclone emergency, civil unrest/war threat/bomb threat and so on. The potential risks and measures to reduce each type of risk are discussed briefly in Table

Table 3: Risk and Mitigation Measures

Risk	Preventative Mitigation Measure
Medical Emergencies	• Designated officers on board should possess sufficient skills to perform first aid treatment, CPR etc. • Facilities to transfer officials/crew members to nearby hospital depending on the seriousness of the injury.
Fire and Explosion	• Fire Department personnel in the emergency response team on board should have sufficient skills to respond fires • All the officers/crew members must perform fire drill regularly
Spontaneous Combustion of Coal	*During Carriage* • Regular monitoring of the temperature, CO, CH_4 and O_2 level inside the cargo, enclosed areas and in the space above the cargo in each cargo space • Under no circumstances, except in emergency, shall the hatches be opened or the cargo space be ventilated or entered during the voyage • Fire suppression system • Training onsite personnel in required site maintenance procedures and early detection of spontaneous combustion (e.g., observations of steam, localized white smoke)

Risk	Preventative Mitigation Measure
	• Ongoing weather and dust monitoring, visual inspections of operating systems and surrounding areas and routine site cleaning and equipment maintenance at all parts of the operation to limit the buildup of loose coal. • Restricting the residence time of stockpiled coal onsite and treating with a sealant, for example, as described above to limit air movement into and inside of the pile • Routine visual inspections of the stockpile will be conducted and in some cases, (e.g., depending on weather conditions and the length of time the pile remains onsite), pile moisture and temperature readings may need to be taken.
	During Unloading • During unloading, attention shall be paid to the cargo for signs of hot spots (i.e., steaming). If a hot spot is detected, the area shall be sprayed with fine water spray and the hot spot shall be removed immediately to prevent spreading. The hot spot cargo shall be spread out on the wharf away from the remainder of the cargo. • Prior to suspending the unloading of cargo for more than eight hours, the hatch covers and all other ventilation for the cargo space shall be closed. • After unloading of the cargo, the bilge wells and the scuppers of the cargo spaces shall be checked and any blockage in the bilge wells and the scuppers shall be removed.
Grounding or Stranding	• Following the rules of IMO for safe navigation • Regularly checking with the visibility • Routine bathymetric survey • Regularly checking the condition of navigational equipment and engines
Collision	• Following the rules of IMO and Rules of the Road (RoR)
Oil Spillage	• Regular inspection and preventive maintenance according to Operation and Maintenance Manual • Following MARPOL 73/78 (and subsequent amendments)
Cyclone Emergencies	• Regularly following the weather updates • In case of cyclone alert, following the instructions provided by the Mongla Port Authority
Civil unrest/terrorist threat or event/riot	• Regular contact and updates from National intelligence agencies regarding threats • Appropriately trained security force (e.g., coast guard, navy, police etc.) to quickly respond the emergency events • International Ship and Port Security (ISPS Code)

Review of Risks

The EPRG will review the risk/hazard register bi-annually or following an incident. The review will:

- Take into account of any new or emerging risks that relate to emergency management and project assets. This may include consideration of:
  - Any new developments;
  - Changes in maritime activities;
  - Hazard mapping studies;
  - Resource availability.
- Identifying opportunities and mechanisms to treat and mitigate risks;

- Take account of new or changed risk controls; and,
- Identifying the resources required to control risks, and identify the means to attain those resources.

Preparedness

Preparedness Activities

Preparedness ensures that arrangements and resources are maintained in a state of readiness to be mobilized and deployed for response and recovery to an emergency event.

The EPRG will oversee the adequacy of preparedness in case of an emergency event and will undertake the following preparedness activities:

- Review and update the ERP, any sub-plans and Response Procedures;
- Ensure all officers/crew members are aware of, and hold sufficient competency to perform their emergency management roles and responsibilities;
- Arrange training and education programs for all the relevant personnel;
- Conduct exercises to test specific aspects of the ERP, and its sub-plans or procedures;
- Establishing processes for lessons learned including conducting debriefs and reviews of other emergency events or exercises that are relevant to the project;
- Maintain working relationships for emergency management and refreshing any specific response and recovery support arrangements with other agencies;
- Have supporting systems in place for response and recovery e.g., cost capture and documents and records management;
- Ensure the EPRG and IRT is adequate, accessible and properly resourced to meet needs during an emergency; and,
- Continual review, evaluation and auditing of emergency management arrangements, identifying and promoting opportunities for improvement.

Exercises

The EPRG will prepare sub-plans and procedures for IRT sub-teamon conducting test (mock) runs/exercises. The EPRG will also determine the effectiveness and efficiency of emergency management arrangements and identify opportunities for improvement. Sample exercises will cover.

- Field exercises – where the scenario is created (e.g., fire, explosion, emergency medical treatment, emergency evacuation etc.) and emergency responders approach the scenario as though it were a real situation;
- Class room exercise – Where the scenario is described and participants discuss their roles and can examine various aspects and alternatives. This can include testing a procedure or process.

The EPRG will develop and execute the exercise schedule. In determining what aspect of the emergency management process will be exercised, consideration will be given to:

- Any new or emerging risks;
- Those sections of the EPRP that hasn't recently been tested (whether in operations or an exercise);
- Where there has been specific changes in the emergency management roles or the personnel;

If a field exercise is being planned independently of other emergency response agencies, it is especially important to advise the local emergency services of the exercise details, so the exercise does not disrupt their response to genuine emergency calls. The EPRG shall conduct debriefs following the exercise to identify what worked well, and what are the opportunities for improvement.

A nominated administrative staff member by theEPRG Leader will be responsible for updating the EPRP (including contact telephone numbers) and informing all plan holders of any changes. A record of plan amendments will be maintained, the plan will be updated at least annually.

Records will be maintained of all exercises and drills and will include but not limited to the following information; (i) Response times, (ii) Adequacy of responding personnel, (iii) Adequacy of equipment; and (iv)Improvements needed.

Updating the Emergency Contact List

The emergency contact information will be reviewed and updated on a regular basis. Both an electronic and hard copy of the Emergency contact list will be maintained and readily available within the EPRG and IRT. Records will be kept indicating the date each time the Emergency contact list is updated and the electronic file location should also be kept available.

Response

Response means effectively coordinating a response to an emergency event, limiting threat to life, property, and the environment. Response covers:

- On-Site Management of the situation;
- Initial assessment and reporting of the event and location;
- Identification of communication methods;
- Coordination of resources (off-site coordination) to support the on-site management;
- Providing advice and reports of the situation to Officers higher in the chain of command;
- Ending response actions when the situation is resolved.

Emergencies and Response Agencies

Table 4 shows the identified emergency events that may potentially affect the operation of the coal transportation and the responding agencies are described below.

Table 4: Emergencies and Responding Agencies

Emergency Event	Lead Agencies
Medical	Mongla Port Authority District Civil Surgeon Office and Designated Hospital Local Agent of the ship BIFPCL
Fire/Explosion/ Spontaneous Combustion of Coal	Mongla Port Authority Coast Guard and Bangladesh Navy Fire Service Local Agent of the ship Forest Department BIFPCL
Grounding/Stranding	Mongla Port Authority Local Agent of the ship BIFPCL
Collision	Mongla Port Authority Local Agent of the ship Coast Guard BIFPCL DG Shipping Forest Department (depending on the severity)
Oil/Coal Spillage	Mongla Port Authority Local Agent of the ship Coast Guard and Bangladesh Navy DC, Bagerhat Forest Department Department of Environment
Cyclone	Mongla Port Authority Bangladesh Meteorological Department District Disaster Management Committee DC, Bagerhat Police Fire Service Coast Guard Navy
Terrorist Event/Threat/Riot	Mongla Port Authority* Local Agent of the ship Coast Guard DC, Bagerhat Police RAB

**Has to follow the International Ship and Port Security (ISPS) Code*

Medical Emergencies

Medical emergencies are not uncommon to have during the transportation process via seaway. Providing first aid treatment andevacuation of the affected person/people on-board (if necessary) to the nearby hospital would be the main concern.

Fire/Explosion

Fire and subsequent explosion on the ship is one of the most dangerous event that can happen on-board. Moreover, as the ship in concern will carry flammable material *viz.* coal, the risk is

comparatively higher. However, the risk could be highly minimized by following all the preventive measures accordingly.

Spontaneous Combustion of Coal

The process of self-heating of coal due to auto oxidation resulting in ignition of the coal is termed as spontaneous combustion of coal. During the transportation of coal, friction due to wave activities can be one of the major risk factors for stimulating spontaneous combustion of coal. Though, spontaneous combustion of coal during transportation in ship is a rare incident, it might result in huge fire and/or explosion if left unmonitored.

Grounding/Stranding

Stranding/grounding of ship can occur for different reasons such as bad navigation, faulty navigation instruments, bad weather, engine breakdown etc. (Maritime know how, 2014). In cases of severe grounding, the ship structure may receive severe load/damage whereas in less severe case, only the hull of the ship may get damaged.

Collision

Ship collision is an extremely dangerous accident which can lead to disastrous consequences. In cases of collision, no matter what the outcome is, several actions should be followed which is described in the following table.

Oil/Coal Spillage

As the ship would run on oil and they are going to carry coal, there is always risk of spillage of oil and coal. Oil spillage can also take place if a collision occurs between coal carrying vessel and oil tanker. However, oil spillage would have more severe impacts than coal. Another concern with oil spillage is that the spillage may be difficult to contain and may quickly spread over a large area which would eventually threaten a huge population of various flora and fauna.

Cyclone

Due to geographical location of Bangladesh, it is highly susceptible to the attack of tropical cyclone. Though the frequency of devastating cyclone is not very high, it takes enormous toll on both the lives and property when occurs.

Terrorist Event/Threat/Riot:

A Terrorist attack is always a real and credible danger. Moreover, unauthorized protest, marches and assemblies have the potential to affect the safe operation of coal transportation.

The response procedures, probability for each type of emergency event is given in the following table. Also, the lead agencies as well as other coordinating agencies are specified for each such emergency event.

Table 5: Emergency and Response

Emergency Event	Probability	Response/Action	Principal Response Agencies	Other Coordinating Agencies
Medical	Low	Minor Incident: • Perform first aid treatment • If required, request for assistance from harbor authority Major Incident: • Perform first aid treatment • Request assistance from harbor authority. • If in doubt, the casualty should not be moved and the casualty should be kept as comfortable as possible. • Evacuation route should be prepared for taking the casualty ashore • If doctor cannot attend the casualty on-board or the casualty cannot be moved, than the instruction from radio should be followed • The casualty should be monitored continuously • In case of fatality, the body should not be moved and should be covered with blanket until emergency services, police, marine ambulance brigade arrives	• Mongla Port Authority (MPA)	• Local Agent of the ship • BIFPCL
Fire and Explosion	Low	• Sound alarm immediately • In case of fire and explosion the following priorities should exist: ▪ Communicate with MPA ▪ Rescuing lives ▪ Limiting the damage/ danger to the ship, cargo and Passur channel ▪ Preventing environmental pollution • Consider the options available for casualty evacuation, pilot boat, helicopter etc. and best position for transferring the casualty. Prepare the tug accordingly. • Monitor casualties • If the fire cannot be extinguished, ▪ Have a copy of fire /safety plan available for fire brigade. ▪ Anchor tug to avoiding drifting into danger.	• MPA • Local Agent of the Ship	• Coast Guard • Bangladesh Airforce • Fire Service • BIFPCL

Emergency Event	Probability	Response/Action	Principal Response Agencies	Other Coordinating Agencies
		• In case of fatality, try not to move the body and cover it with blanket until emergency services arrives		
Spontaneous Combustion of Coal	Very Low	• Isolating the zone of combustion • Digging out the affected area and moving the coal to a location where it can be spread out for cooling, saturated with water or compacted and covered with an inert material	• Local Agent of the Ship	• MPA • Coast Guard
Grounding/ Stranding	Low	• Stop engines, sound emergency alarm and headcount • Receiving information about the damage as soon as possible to determine the level of damage and respective remedial action • The depth of water should be determined • Determining the tidal condition (rising or falling) • Communicate with the MPA • Tugs position should be ascertained • Carrying out detailed internalinspection of tugs hull • Determine whether there is any pollution incident both over side and in engine room bilges from pipe fracture • Display lights or shapes for a vessel aground • Inform all the parties interested and ask for assistance • After tugs condition has been stabilised, plan for re-floating in consultation with the duty harbor master	• MPA	• Local Agent of the Ship • BIFPCL
Collision	Low	• Identify the extent of damage • General alarm should be sounded immediately • Communicate with MPA *If collision takes place whilst towing:* • Speed should be reduced if possible but not at a level where steerage way is lost • Advise pilot/ship of incident • If tow is connected and position cannot be recovered, request permission to let go • Advise duty harbor master as soon as practicable	• Ship Master • MPA	• Local Agent of the Ship • DG Shipping

Emergency Event	Probability	Response/Action	Principal Response Agencies	Other Coordinating Agencies
		• After regaining the control, identify the extent of damage and check for crew injury • Reconnect if applicable *If collision takes place whilst on passage* • Summon the crew • All the watertight doors/hatches should be closed • Watertight integrity of the tug should be checked • Fix position of the tug • Inform all the interested parties and ask for assistance • Identify the extent of damage and isolate the damaged compartments • If practicable, consider using engine movements to keep vessels together to stop sinking *Note: This guideline is not steadfast guideline. In case of collision, one's knowledge, seamanship and personal competence comes into play in handling the situation and in saving lives*		
Oil Spillage	Low	• Operation should be stopped • Extinguish all unprotected lights and naked flames • Follow the requirements of shipboard oil pollution emergency plans • Communicate with MPA or other vessels, or closest port to make an action in coordination with ERG. • Identify the quantity and nature of spill • Try to contain the spill within the boundary of the tug by blocking scuppers and other overboard discharges on the deck • Use PPE while dealing with the spilled oil • Responses and actions are to be taken in line with NOSCOP of Ministry of Environment and Forest.	• Ship Master • MPA	• Local Agent • DG Shipping • Forest Department • Department of Environment, Khulna • DC Office
Coal Spillage	Very Low	• Operation should be stopped • Communicate with MPA • Identify the released volume of coal in and determine whether the released material can be effectively recovered	• Ship Master • MPA	• Local Agent • DG Shipping • Forest Department

Emergency Event	Probability	Response/Action	Principal Response Agencies	Other Coordinating Agencies
		• In the event of larger spill, determine in consultation with the DOM and MPA whether a suction dredge or similar needs should be mobilized		• Department of Environment, Khulna • DC Office
Cyclone	Low	• Keep updated about the weather condition and cyclone signal • Follow the instruction provided by the Mongla Port Authority	• BMD • MPA	• Coast Guard • Fire Service • Police
Civil unrest/terrorist threat or event/riot	Very Low	Civil Unrest/Riot: • Follow the instructions of MPA • Follow the guidelines of ISPS code Credible Terrorist Threat: • Increased security • Stop operation • Follow the guidelines of ISPS code Actual Terrorist Event: • Stop Operation • Notify MPA • If evacuation required, start the process • Alarm should not be operated and radio communication should be suspended • Follow the instructions of the emergency controller • After receiving "All Clear" from emergency services, initiate recovery, reporting and notification process according to local procedures and regulations *Note: International Ship and Port Security Code should be followed*	• MPA	• Local Agent of the Ship • Coast Guard • Police • RAB

Annex 11-5: Responsibilities of MPA

A Memorandum of Agreement (MoA) between MPA and BIFPCL has been signed on 16th August, 2017 to facilitate smooth operations/movement of coal carrying ships and barges/vessels through the Passur navigational channel upto the Project Jetty. Part of the responsibilities of MPA (Mongla Port Authority) with regard to emergency preparedness and response are given below:

Part of Responsibilities of MPA

a. To develop a comprehensive Emergency Response Plan (ERP) with appropriate resources, management structure, and effective communication, as per EIA study for coal transportation, in order to manage any emergency events associated with coal transportation.

b. MPA shall provide required assistance and shall provide adequate budgetary provision to implement ERP with due diligence. List of such emergency response equipment is attached herewith and marked as Annex- D to this Agreement.

c. MPA shall form an Emergency Preparedness and Response Group ("EPRG"), headed by the Harbor Master of Mongla Port and shall communicate the updated EPRG to BIFPCL from time to time.

d. The EPRG shallalso be responsible for defining and controlling strategy for major incidents within the jurisdiction of MPA. However, general strategies to manage any emergency incident must be pre-determined. When the EPRG is formed and mobilized due to an incident or emergency situation the Chairman of the Mongla Port must be notified immediately.

e. MPA cyclone disaster preparedness plan provides details on the actions to be taken for all 4 alerts. It is recommended that an Emergency Response Team (ERT) sub-committee for cyclone comprising of all Heads of the Department/Cell of MPA will be formed when alert no. 4 is hoisted and a cyclone hits in the MPA's area of jurisdiction. The Harbor Master will act as convener ("Convener") of the sub-committee.

f. Ensure adequate port reception facilities for the collection of dry residues / wash water from mother vessels and lighterage vessels.

g. MPA shall scientifically develope pit for collection of dry residues and the wash and bilge water that contains residues form mother vessels and lighterage vessels.

h. To facilitate disposal of hazardous material following environment friendly and international safety management system of International Maritime Organization ("IMO").

i. To conduct bathymetric survey of the transportation route to be carried out routinely.

j. To routinely monitor erosion on both sides of the route and to suggest measures to be taken accordingly.

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

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DEED OF AGREEMENT

THIS DEED OF AGREEMENT (the "**Agreement**") is entered into this 16th August, 2017 (the "**Effective Date**") by and between

Bangladesh-India Friendship Power Company (Pvt.) Ltd, ("**BIFPCL**") incorporated in Bangladesh under the Companies Act 1994 and registered on 31st October, 2012 with the Office of Registrar of Joint Stock Companies and Firms (RJSC), Dhaka having its registered office at Level 17, Borak Unique Heights, 117 Kazi Nazrul Islam Avenue, hereinafter referred to as the "**Party#1**".

And

Mongla Port Authority ("**MPA**"), under Ministry of Shipping located at about 131 km inland from the Bay of Bengal on Pussur River, hereinafter referred to as the "**Party#2**".

Party#1 and Party#2 hereinafter collectively referred to as the "Parties" and individually as the "Party".

WHEREAS, Party#1 is a 50:50 joint venture company of Bangladesh Power Development Board (BPDB), Bangladesh and NTPC Limited, India. Party#1 intends to set up a 1320 MW (2 x 660 MW) coal based thermal power plant at Rampal in Bagerhat district of Khulna division, Bangladesh. The power plant will be located along Pussur River at approximately 7.6 Nautical miles from Mongla Port (tentative location map is attached herewith and marked as "Annex- A" to this Agreement).The power plant is envisaged to be based on ultra super critical technology and fuel envisaged for power generation is imported coal.

AND WHEREAS, Party#1 entered into an Implementation Agreement ("**IA**") with the Government of Bangladesh on 20th April, 2013. Party#1 also entered into a Power Purchase Agreement ("**PPA**") with BPDB on 20th April, 2013 for a period of 25 years from Commercial Operation Date (**COD**) of the plant.

Bangladesh-India Friendship Power Company (Pvt.) Ltd. BIFPCL

Mongla Bagerhat MONGLA PORT AUTHORITY

"দেশপ্রেমের শপথ নিন, দুর্নীতিকে বিদায় দিন"

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

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AND WHEREAS, around 4.00 million tons per annum (MTPA) of imported coal shall be required for the plant which amounts to approximately 15,000 tons (average) of coal movement per day through Pussur River channel.

AND WHEREAS, Party#1 in consultation with Party#2 has prepared its coal logistics plan for procuring coal from Indonesia or Australia or South Africa or elsewhere and bringing the same up to its Jetty at Maitree Super Thermal Power Project site (the "Project Jetty") using the Pussur River channel. The coal will be brought to Bangladesh in partly/fully loaded mother vessels of approximately upto 55,000 dwt (based on availability). Due to draft restriction in Pussur channel up till the Project Jetty, the coal will be transshipped into smaller barges/vessels of 10,000 to 12,000 dwt at Akram point and/or Harbaria anchorage and/or Mongla Fairway Buoy using a floating transfer station for temporary stock for loading to barges/vessels or otherwise by direct transshipment to barges/vessels.

AND WHEREAS, Party#2 will facilitate smooth operations/movement of coal carrying ships and barges/vessels through the Pussur navigational channel upto the Project Jetty at Rampal, Bagerhat District (the route map is attached herewith and marked as Annex-B to this Agreement) during the entire Term (defined below) of this Agreement by way of:

- One time capital dredging from Mongla Port to the Project Jetty (2x660 MW);
- One time capital dredging at outer bar and other areas as may be required;
- Maintenance dredging of the entire Pussur Channel from Project Jetty to Mongla Fairway Buoy, as may be required from time to time;
- Provide navigational facility and support for movement of ships/ transshippers/ barges/ vessels throughout the Pussur channel to & from the Project Jetty to open sea.

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"দেশপ্রেমের শপথ নিন, দুর্নীতিকে বিদায় দিন"

NOW, THEREFORE, in consideration of the mutual covenants set forth herein and other good and valuable consideration, the receipt and sufficiency of which are acknowledged hereby, the Parties agree as follows:

1. **Statement of Business:**

   a. Party#1 may undertake transshipment operations at Akram point anchorage for 6 months in a year starting from 1st October up to 31st March and at Harbaria Anchorage for remaining 6 months when transshipment at Akram point will not be possible due to rough weather conditions disrupting the stable discharge of coal into barges/vessels. Party#1 may also undertake transshipment operations at Mongla Fairway buoy as per suitability.

   b. However, Party#1 may at its discretion use the Harbaria anchorage point round the year, as per its operational requirements and coal logistics strategies to ensure round the year operation of the aforesaid 1320 MW power plant.

   c. In the meeting held on 14th December, 2015 at Secretariat, Dhaka, it was confirmed and agreed among Hon'ble Minister of Shipping, Hon'ble Minister of State for Power, Energy & Mineral Resources, and the Parties that a MOU shall be signed between the Parties for the purpose of dredging, permissions, tariff and other supports as may be required by Party#1 from Party#2 to set up Maitree STPP and operate the same optimally. Pursuant to the said agreement, the Parties enter into this Agreement subject to the terms and conditions of this Agreement.

2. **Fees, Payments, etc:**

   Party#1 agrees to pay Party#2, the timely payment of dues, as applicable to Party#2 towards -

   a) Port & pilotage,
   b) Berthing & anchorage,
   c) River dues, landing charges,
   d) All other charges which will be applicable according to the tariff of Party#2. VAT and Taxes will be applicable as per rules of National Board of Revenue (NBR), Bangladesh.

3. **Term and Termination:**

   The initial term of this Agreement will be for 30 (Thirty) years from the Effective date of this Agreement or date of start of commercial generation of 2x660 MW Maitree STPP or PPA period, whichever is later (hereinafter called the "**Term**"). The Term of this Agreement will automatically renew for successive 5 (Five) years after expiry of the initial term thereafter until terminated by either Party to this Agreement. This Agreement cannot be terminated before expiry of its initial term (or any renewal term) is completed, by either Party at any time, for any reason whatsoever. After expiry of the Term (initial term or any renewal thereafter) either Party may terminate this Agreement by giving 1 (One) year prior written notice to the other Party.

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4. **Performance**:

Each Party will perform their respective duties and responsibilities under this Agreement fairly and in good faith.

Duties and Responsibilities of Party#1:-

a) To procure coal overseas and arrange mother vessels/ ships, transshipment facilities and barges/vessels (upto 12,000 dwt) for shipment of requisite quantum of coal and supply the same to the Project Jetty (2x660 MW) throughout the year. Party#1 will use Bangladeshi/ foreign mother vessels, carry out transshipment at Harbaria and/or Akram point and/or Mongla Fairway Buoy and thereafter undertake inland water movement to the Project Jetty in barges/vessels;

b) To comply with all rules & regulation of Party#2, as applicable during the Term of this Agreement.

c) To provide Party#2 with basic information and sketch/layout of further facilities to be created for drawl of water from Pussur channel by Party#1.

d) To arrange the maintenance dredging at the Project Jetty front through Party#2 at a mutually agreed reasonable cost.

Duties and Responsibilities of Party#2:-

a) Permit Party#1 for drawl of water from Pussur River as per project requirement and discharge in Pussur River as per already accorded permission vide dated 11.01.2016.

b) To accord permission to Party#1 for usage of Pussur channel for coal transportation for the entire life of the project.

c) Party#2 shall carry out outer bar dredging to ensure draft of minimum 8.5m CD throughout upto Harbaria. Dredging will be subject to approval by Government of Bangladesh ("GoB"). Dredging to be completed within the mutually agreed time frame, meeting requirement of Project.

d) To identify and allocate captive anchorages at Mongla fairway buoy, Akram point anchorage and Harbaria anchorage (with a minimum chart datum draft of 8.5 meters) for Party#1.

e) To Permit Party#1 to use the allocated anchorages at Mongla Fairway Buoy/Akram point/Harbaria for anchoring mother vessel and transshipment operations into smaller barges/vessels.

f) To undertake capital dredging of Pussur River from Mongla port to the Project Jetty (2x660 MW) after approval of project by GoB to ensure minimum draft of 5.5m CD from

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Mongla port to the Project Jetty (2x660 MW), including facility for turning of barges/vessels.

g) To allow for construction of the Project Jetty and construction of intake channel from Pussur River as per the No Objection Certificate (NOC) / approval accorded to Party#1 for the same vide dated 18.05.2016.

h) To facilitate smooth operations of coal movement for the entire PPA period by undertaking maintenance dredging of Pussur channel upto Party#2 Jetty. But if capital dredging is required it will be subject to approval of project by GoB.

i) Undertake Maintenance Dredging from Party#2 Jetty to Party#1 Jetty. The cost of this maintenance dredging will be recovered by imposing surcharge on the vessels plying in this route i.e from Party#2 Jetty to Party#1 Jetty and upstream.

j) To provide piloting/ tugging facilities to coal carrying ships/barges/vessels of Party#1 as and when requested by Party#1 for smooth movement of coal as per existing practice of Party#2.

k) To support Party#1 in getting approvals for registration of barges/vessels, floating transfer station etc. for use in Bangladesh.

l) To support Party#1 in getting customs clearances for the imported coal to be used for power generation as per existing practice of Party#2.

m) To develop a comprehensive Emergency Response Plan (ERP) with appropriate resources, management structure, and effective communication, as per ESIA study for coal transportation, in order to manage any emergency events associated with coal transportation.

n) Party#2 shall provide required assistance and shall provide adequate budgetary provision to implement ERP with due diligence.

o) Party#2 shall form an Emergency Preparedness and Response Group ("EPRG"),headed by the Member (H&M) of Mongla Port and shall communicate the updated EPRG to Party#1 from time to time.

p) The EPRG shall also be responsible for defining and controlling strategy for major incidents within the jurisdiction of Party#2. However, general strategies to manage any emergency incident must be pre-determined. When the EPRG is formed and mobilized due to an incident or emergency situation the Chairman of the Mongla Port must be notified immediately.

q) Party#2 cyclone disaster preparedness plan provides details on the actions to be taken for all 4 alerts. It is recommended that an Emergency Response Team (ERT) sub-committee for cyclone comprising of all Heads of the Department/Cell of Party#2 will be formed

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when alert no. 4 is hoisted and a cyclone hits in the Part#2's area of jurisdiction. The Harbor Master will act as convener ("Convener") of the sub-committee.

r) Ensure adequate port reception facilities for the collection of dry residues / wash water from mother vessels and lighterage vessels.

s) Party#2 shall scientifically develope pit for collection of dry residues and the wash and bilge water that contains residues form mother vessels and lighterage vessels.

t) To facilitate disposal of hazardous material following environment friendly and international safety management system of International Maritime Organization ("IMO").

u) To conduct bathymetric survey of the transportation route to be carried out routinely.

v) To routinely monitor erosion on both sides of the route and to suggest measures to be taken accordingly.

w) Duties of Party#2 mentioned in serial no. *m, n, r, s and t* will subject to the approval of Project by GoB.

5. Confidentiality:

a)"**Confidential Information**" means all information, not generally known to the public, that relates to the business, technology, customers, finances, plans, drawings, specifications and technical data, business information, proposals or practices of the Parties, market strategy and it includes (without limitation) the products, operations, processes and services, including information and data relating to business and financial opportunities, research and development, manufacturing, purchasing, accounting, engineering, operating, marketing, merchandising, pricing and selling, the provisions of this Agreement and all information the Parties designate as "**Confidential**" including the written communications between the Parties.

b) All Confidential Information of one Party shall be considered to be the trade secrets of that Party and they shall be entitled to all protections given by the law of trade secrets.

c) The Parties covenant and agree to keep confidential and secret, whether stated to be confidential or not, all verbal and written communications and all other information that the Parties came to know pursuant to the relationship created under this Agreement.

d) Both the Parties hereto agree hereby to keep strictly secret and confidential and not to use for its own benefit or disclose to any outside party, any Confidential Information acquired from the other Party hereto or from any entity directly or indirectly affiliated with such Party.

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6. **Force Majeure:**

a) Neither Party shall be liable for non-performance or delay in performance hereunder if caused by factors not reasonably foreseeable and which occurrence could not be limited, prevented or controlled including but is not limited to fire, floods, tsunami, earthquake, striking by lighting, typhoon, whirlwind, epidemic disease, exploding, mechanical accident, war, rebellion, punishing, labor's dispute or policy action of government, etc.

b) Either party shall notify the other as soon as practicable of any anticipated delay due to force majeure in which event both Parties' obligations under this Agreement shall be suspended for the period of the delay due to the force majeure. Upon cessation of the force majeure, the party affected shall promptly notify the other of such cessation and resume performance of work under the Agreement.

7. **Applicable Law; Construction:**

This Agreement will be governed by and construed in accordance with the laws of Bangladesh. Subject to the provisions set forth in this Agreement for the severability and reformation of any invalid or unenforceable provisions, this Agreement will at all times and in all events be construed as a whole, according to its fair meaning, and not strictly for or against any Party.

8. **Venue:**

The duties and obligations of the Parties to this Agreement can or will be performed, in whole or in part, in Bangladesh. The Parties agree that although there may be other venues that are proper under applicable law, Bangladesh is a proper venue for the resolution of any dispute relating to or arising out of this Agreement.

9. **Number and Gender of Words:**

Except where the context indicates otherwise, words in the singular number will include the plural and words in the masculine gender will include the feminine and neuter, and vice versa, when they should so apply.

10. **Invalid Provisions:**

If any provision of this Agreement is held to be illegal, invalid or unenforceable under present or future laws effective during the Term hereof, such provision will be fully severable; this Agreement will be construed and enforced as if such illegal, invalid or unenforceable provision had never comprised a part of this Agreement, and the remaining provisions hereof will remain in full force and effect and will not be affected by the illegal, invalid or unenforceable provision or by its severance from this Agreement. Furthermore, in lieu of such illegal, invalid or unenforceable provision there will be added automatically as a part of this Agreement a provision as similar in terms to such illegal, invalid or unenforceable provision as may be possible and be legal, valid and enforceable.

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11. Waiver:

No consent or waiver, expressed or implied, by any Party to or of any breach or default by the other Party in the performance of obligations hereunder will be deemed or construed to be a consent or waiver to or of any other breach or default in the performance by such other Party of the same or any other obligation under this Agreement. Failure on the part of a Party to complain of any act or failure to act of the other Party or to declare the other Party in default, irrespective of how long such failure continues, will not constitute a waiver by such Party of its rights under this Agreement.

12. Indemnification:

Each Party ("**Breaching Party**") shall at all times hereafter indemnify and keep the other Party ("**Non-Breaching Party**") fully indemnified and harmless against all losses, damages, costs, charges, expenses, interests and suits of any nature whatsoever arising out of third party claims, demands, actions or proceedings, which the Non-Breaching Party may pay, incur, suffer or sustain or be liable to pay, incur, suffer or sustain as a result or consequence, direct or indirect, of any breach or failure to perform any of the provisions of this Agreement by the Breaching Party or by its employees and/or representatives.

13. Counterparts; Exhibits:

This Agreement may be executed in counterparts, with the same effect as if both Parties had signed the same document. All such counterparts will be deemed an original, will be construed together and will constitute one and the same instrument. Any exhibits, annexes, schedules, or appendices attached to this Agreement and any amendments to such exhibits, schedules, or appendices are specifically incorporated into and made an integral part of this Agreement for all purposes.

14. Entire Agreement; Amendment:

This Agreement constitutes the entire understanding between the Parties and supersedes all proposals, commitments, writings, negotiations, and understandings, oral and written, and all other communications between the Parties relating to the subject matter hereof. This Agreement may not be amended or otherwise modified except in writing duly executed by all of the Parties.

15. Representations and Warranties:

Each Party represents and warrants in relation to the other Party that:

a) It has all requisite corporate power and authority to execute, deliver and perform its obligations under this Agreement and has been fully authorized by all requisite corporate actions to do so;

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b) The person(s) representing this Agreement has/have all requisite power and authority to represent the respective Party and execute this Agreement;

c) It has all necessary statutory and regulatory permissions, approvals, permits and license(s) for the running and the operation of its establishment and for the conduct of its business, more particularly, for performing its obligations under this Agreement;

d) The execution of this Agreement and the performance of its obligations under this Agreement and the implementations of the terms and conditions contemplated hereby do not constitute a breach of any agreement, arrangement or understanding, oral or written, entered into by it with any third party;

e) The execution of this Agreement and the performance of its obligations under this Agreement and implementation of terms and conditions contemplated hereby are not violation of applicable laws or any other restriction of any government agency or court of law or of any regulatory authority to which it is subject or of any of the provisions of its constitutional documents; and

f) All representations, warranties, covenant and conditions not expressly contained herein or not necessarily implied by operation of law are hereby expressly excluded.

16. Relationship:

Nothing in this Agreement creates a joint venture, relationship of partnership or agency between the Parties. Accordingly, neither Party has authority to execute any contract on behalf of the other Party. No staff of either Party shall be construed as being an employee of the other Party by virtue only of this Agreement or the performance of the obligations under this Agreement.

17. Third Party Beneficiaries:

The terms and conditions of this Agreement, express or implied, exist only for the benefit of the Parties to this Agreement and their respective successors and assigns. No other person or entity will be deemed to be a third party beneficiary of this Agreement.

18. Parties Bound:

This Agreement will be binding upon, and inure to the benefit of, each of the Parties hereto to the extent applicable to them and their respective executors, administrators, successors and assigns as per existing practice of Party#2.

19. Remedies:

Each Party to this Agreement is entitled to enforce its rights under this Agreement specifically, to recover damages by reason of any breach of any provision of this Agreement, and to exercise all other rights existing in its favor. The Parties agree and acknowledge that

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money damages may not be an adequate remedy for any breach of the provisions of this Agreement and that any Party may, in its sole discretion, apply to any court of competent jurisdiction for injunctive relief (including temporary restraining orders, temporary injunctions, and permanent injunctions) in order to enforce or prevent any violation of the terms of this Agreement. The remedies of the Parties under this Agreement are cumulative and will not exclude any other remedies to which any Party may be lawfully entitled.

20. Further Actions:

Whether or not specifically required under the terms of this Agreement, each Party will execute and deliver such documents and take such further actions as may be necessary in order for such Party to perform all of his, her, or its obligations specified herein or reasonably implied from the terms hereof.

21. Notice:

Except as expressly provided to the contrary herein, any notice required or permitted under this Agreement will be deemed sufficiently given if in writing and personally delivered, transmitted by facsimile, email, or sent by certified/recorded mail (postage prepaid/signature required) to the Party at the address set forth below or at such other address as the Party may subsequently designate in writing from time to time.

To Party#1	To Party#2
Name: Mr.U.K.Bhattacharya	Name: Cadre. A K M Faruque Hassan
Address :Managing Director, Bangladesh-India Friendship Power Company (Pvt.) Limited, Borak Unique Heights (Level-17) , 117 Kazi Nazrul Islam Avenue, Dhaka 1000,Bangladesh	Address: Chairman, Mongla Port Authority Mongla, Bagerhat
Telephone: 02-9341805 E-mail: md@bifpcl.com	Telephone: 04662-75215 E-mail: chairman@mpa.gov.bd

22. Binding Arbitration:

Each Party to this Agreement agrees that any dispute or controversy arising between the Parties to this Agreement, or any person or entity in privity therewith, out of the transactions effected and relationships created pursuant to this Agreement and each other agreement created in connection herewith, including any dispute or controversy regarding the formation, terms, or construction of this Agreement, regardless of kind or character, shall be referred to the nominated senior representatives of both the Parties for resolution through conciliation. In case, any such difference or dispute is not amicably resolved within forty five (45) days of such referral, it shall be resolved through Arbitration, in Dhaka, in accordance with the

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provisions of the Arbitration Act, 2001 of Bangladesh prevailing then. For the purpose of such arbitration, the Parties shall appoint 1 (One) arbitrator each within 15 (Fifteen) days of receipt of the written notice to refer to arbitration and thereafter the 2 (Two) arbitrators so appointed shall jointly appoint an additional arbitrator within the next 30 (Thirty) days who shall be the chairman of the arbitration tribunal consisting of 3 (Three) members. All arbitration proceedings shall be conducted in the English language. The decision of the arbitral tribunal shall be regarded as final and binding on the Parties to this Agreement. Each Party shall bear its own costs, charges and fees of such arbitration. Any Party to this Agreement may bring an action, including a summary or expedited proceeding, to compel arbitration of any such dispute or controversy in a court of competent jurisdiction and, further, may seek provisional or ancillary remedies, including temporary or injunctive relief in connection with such dispute or controversy in a court of competent jurisdiction, provided that the dispute or controversy is ultimately resolved through binding arbitration conducted in accordance with the terms and conditions of this clause.

23. Recital:

The recitals contained in this Agreement shall constitute an integral and operative part of this Agreement.

24. Heading:

The headings and titles in this Agreement are indicative and shall not be deemed part of this Agreement or taken into consideration in the construction of this Agreement.

25. Survival of Clauses:

The clauses that shall survive after the expiry or termination of the Agreement are as follows: "Confidentiality", "Applicable Law; Construction", "Representations and Warranties", "Binding Arbitration", "Survival of Clauses" and any other clauses which explicitly indicate that those shall survive the termination of this Agreement.

26. Mutual Understanding:

Each Party has read this entire Agreement, fully understands the contents hereof, has had the opportunity to obtain independent advice as to its legal effect, and is under no duress or obligation of any kind to execute it. This Agreement reflects the mutual understanding of the Parties with respect to all subject matter addressed herein and will be construed accordingly.

Bangladesh-India Friendship Power Company (Pvt) Ltd. BIFPCL

Mongla Bagerhat MONGLAPORT AUTHORITY

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

৳১০০ ৳১০০

কড ৬৮৭০২০০

IN WITNESS WHEREOF, the Parties have executed this Agreement effective as of the date first above written.

			For the Party#1	For Party#2
	Signature	:		
	Name	:	Mr. U.K.Bhattacharya	Commodore AKM Faruque Hassan, BN
	Title	:	Managing Director, Bangladesh-India Friendship Power Company (Pvt.) Limited, Borak Unique Heights (Level-17) , 117 Kazi Nazrul Islam Avenue, Dhaka 1000,Bangladesh	Chairman Mongla Port Authority Mongla, Bagerhat, Bangladesh
In the presence of :				
01.	Signature	:		
	Name & Address	:	Mr. Arun Choudhary AGM,BIFPCL	Md. Altaf Hossain Khan Member (E&D) Mongla Port Authority
02.	Signature	:		
	Name & Address	:	Mr. Mohit Atrey DGM,BIFPCL	Commander M. Waliullah Harbour Master Mongla Port Authority
03.	Signature	:	16/08/2018	
	Name & Address	:	Mr. Vinod Bhayan DGM, BIFPCL	Engr. Sk. Sowkat Ali Chief Engineer (C&H) Mongla Port Authority

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"দেশপ্রেমের শপথ নিন, দুর্নীতিকে বিদায় দিন"

Annex 11-6: Water Treatment Systems

B6

Water Treatment Systems

B6. Water Treatment Systems

B6.1 General

This specification covers the design, manufacturing, supply, erection, commissioning and handing over of the complete water treatment systems for the entire specified power plant. The configuration shall cater for all units, with number of units and capacities as specified in **Section B0**. If not mentioned otherwise, the given numbers of equipment is per unit.

It is to be emphasized, that this specification does not enumerate or describe all the materials and equipment to be supplied and all the services to be performed. However, the water treatment systems shall be complete in every respect and shall ensure safe and reliable operation of the Plant. This means, all material and equipment shall be provided as required to make a complete, properly functioning installation and shall conform to the highest standards of engineering design and workmanship.

The water treatment systems of this section include the following parts:

- plant water pre-treatment to reduce suspended solids of river water
- biocide and disinfection system like electrochlorination plants for chlorination of river water, cooling water, potable water and sanitary waste water
- raw water storage and supply
- desalination plant based on Reverse Osmosis (RO) technology including pre-treatment
- potable water storage with potabilisation
- demineralization plant with demin water storage
- condensate Polishing Plant (CPP)
- flue gas desulfurization waste water treatment plant (FGDWWTP)
- process waste water treatment facilities
- sewage treatment plant for sanitary wastes
- chemical supply, handling and storage facilities
- water/steam cycle conditioning and
- monitoring system for the water/steam cycle.

The Contractor shall base the design and sizing of all treatment systems on the minimum and maximum values of relevant parameters of the raw water analysis, see **Section B0**.

The raw water shall be taken from Passur River, see **Section B0**.

The Passur River has two different qualities typical with a low tidal impact:

- brackish water with a TDS of about 15,000 ppm and SS of about 200 to 300 mg/l and
- river water with a TDS of 200 ppm and SS of about 60 mg/l.

Annex 12-1: Terms of Reference of the Consultancy Services of Independent Monitoring Agency

A. Background

The Bangladesh-India Friendship Power Company Ltd. (BIFPCL), a joint venture of Bangladesh and India for the construction of 2x660 MW Maitree Super Thermal Power Project at Rampal, Bagerhat, Bangladesh. The present study is the EIA of Coal Transportation for the Maitree Power Plant. The major components of the coal transportation are, e.g., mother vessel, trans-shipper, lighterage, jetty, etc.

The ECR 1997 of MoEF and World Bank Group EHS guideline require detail environmental monitoring during design, implementation and operation of the Plant. Auditing in the implementation and operation phases is also a prerequisite of the guideline. The monitoring includes environmental and social compliance monitoring for environmental quality and auditing of various facilities and equipment associated with the coal transportation will be needed to evaluate the performance of the management and enhancement measures and monitoring programs proposed under the EIA study.

B. Objectives

A detailed EMP has been prepared as part of the present EIA study. One of the key recommendations of the EMP is to conduct two-tier monitoring programs comprising compliance monitoring, and independent monitoring. The main purpose of the monitoring program is to ensure that the various tasks detailed in the EMP particularly the mitigation and enhancement measures are implemented in an effective manner, and also to evaluate Project's impacts on the key environment and social parameters. The aims of the auditing during implementation and operation phases are to make aware the labor, technician and the officer involved in the Project about environmental occupational health and safety issue and how to cope with the situation. Implementation phase monitoring will be conducted by the environmental health and safety specialists of the EHSU of BIFPCl.

An Independent Monitoring Agency (IMA) is proposed to be recruited by BIFPCL to carry out monitoring and auditing implementation and validation of the different components of the EMP at the first five years of operation phase of the Project and submit independent monitoring and auditing report to BIFPCL, DoE and Forest Department. The main purpose of the independent monitoring- the second tier of the monitoring program will ensure that all the key entities including Shippers, O/M and EHSU of BIFPCL are effectively and adequately fulfilling their designated role for EMP implementation, and that all the EMP requirements are being implemented in a timely and effective manner. The primary objective for engaging an IMA is to review the efficacy of EMP implementation as well as independent monitoring, and conduct periodic third party monitoring and auditing and provide feedback to BIFPCL, DoE, Forest Department, and may submit to lender on policy improvement and enhancement of implementation process. The Independent Monitoring Agency (IMA) will review EHS and audit various Plant operation as per set procedures and tasks given in the EMP and assess the achievement of overall environmental management objectives.

C. Scope of Work

The Physical, Biological and Socio-economical aspects are being monitored on quarterly basis and the quarterly monitoring reports are furnished accordingly. The continuation of such independent monitoring shall be up to operational phase. 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 include 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.

Terms of References (ToR) of Independent Monitoring Agency:

As per ECA 1995 and ECR 1997, the proposed Project falls under red category; needs proper monitoring and documenting of environmental (physical and biological) and socio-economic parameters.

Accordingly, the EIA study of the proposed Plant has already been conducted. The EIA of the proposed Power Plant briefly describes the monitoring plan. The ToR has been prepared for engaging Engineering, environmental and social Contractor for monitoring the environmental and socio-economic parameters during pre-construction and construction phases along with the engineering consideration of the site development and construction of the Project so that the monitoring plan suggested in the EIA is properly followed and satisfies the requirement of ECR 1997 and ECR 2005.

The monitoring works have been divided into two major components:

Work A: Monitoring of Engineering activities of site development and others.

Work B: Monitoring of Social and Environmental parameters for updating the baseline and Implementation of the Project.

Work A: The main objective of this component is to monitoring the engineering activities of site development and others during pre-construction and construction phase for installation of the Power Plant.

The specific objectives of the monitoring program are:

- To establish baseline environmental conditions;
- To detect adverse environmental impacts for river dredging and land filling activities for site development;

- 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.

Landfill monitoring is an interactive process of incorporating the findings of the site investigation, the environmental impact assessment, environmental monitoring results, risk assessment and the conclusions reached in the investigations.

Work B: The main objective of this component is to monitor the environmental parameters and implementation of environmental management plan during pre-construction and construction phase for installation of the Power Plant. The specific objectives of the monitoring program are:

- Update baseline data as per monitoring schedule and location.
- Monitor and provide the environmental parameters during pre construction activities.
- Provide technical assistance to the client for implementation of the EMP at different sector of construction activities.
- Monitor the environmental aspects during construction of the Project.
- 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.
- Render any other related services as and when requested.

The scope of the services can be specified as bellows:

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

Monitoring Parameter	Indicators
	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
	Total Hardness, Hg, NO_3 and PO_4
	River Morphology,
	Tidal inundation
	Drainage Network
	Erosion and Accretion
	Ground water quality
Air quality	SOx
	NOx
	SPM (PM_{10} and $PM_{2.5}$)
	CO

Reporting Requirements:

Publish Report on each quarter after each monitoring mission.

Annex 13-1: List of Participants Attended in Focus Group Discussions

সুন্দরবন নির্ভর বিভিন্ন পেশা জীবি দলের আর্থ-সামাজিক উন্নয়নের লক্ষ্যে
মতবিনিময় সভায় অংশগ্রহনকারীদের তালিকা

স্থান ঃ জয়মনি, বিলা তারিখঃ

ক্রমিক নং	নাম	ঠিকানা	পেশা	মোবাইল নং
	মো: বাবু খান	জয়মনি	কৃষিকাজ	০১৯৪৭৪৪১৭৪৭
	মো: মেহবুব হোসেন	"	"	০১৯২২১১০৪১১
	মো: আলি আহমেদ	"	চাকুরী	-
	মো: মজীব খান	"	ব্যবসা	-
	মো: জুয়েল খান	"	"	-
	মো: খবির খান	"	শিক্ষকতা	-
	মো: কামাল গাজী	"	কৃষিকাজ	০১৯৮২৪৫১১৯
	মো: মুসা সরকার	"	চাকুরী	-
	রতন বল্লব	"	ব্যবসা	

সুন্দরবন নির্ভর বিভিন্ন পেশা জীবি দলের আর্থ-সামাজিক উন্নয়নের লক্ষ্যে
মতবিনিময় সভায় অংশগ্রহনকারীদের তালিকা

স্থান ঃ সুতারখালী, দাকোপ, খুলনা তারিখঃ

ক্রমিক নং	নাম	ঠিকানা	পেশা	মোবাইল নং
	গোলাম মোস্তফা	সুতারখালী, দাকোপ	চুরিজীবি	-
	মো: বাছিল হক	"	মৎস্যজীবি	-
	প্রকাশ মালদার	"	"	-
	মোহন মিস্ত্রি	"	"	-
	রতন বর্মন		"	-
	রহিম শেখ	"	শিক্ষক	-
	মো: মামুন শেখ	"	-	-
	রবিউল ইসলাম	"	ব্যবসায়ী	
	রাসেল শিকদার	"	"	

সুন্দরবন নির্ভর বিভিন্ন পেশা জীবি দলের আর্থ-সামাজিক উন্নয়নের লক্ষ্যে
মতবিনিময় সভায় অংশগ্রহনকারীদের তালিকা

স্থান ঃ জয়েমনি, ছিলা

তারিখঃ

ক্রমিক নং	নাম	ঠিকানা	পেশা	মোবাইল নং
	সাহেব আলী শেখ	জয়েমনি, ছিলা	মৎস্যজীবি	[illegible]
	মো: খাবির হোসেন	"	কৃষিশ্রমিক	–
	মো: লাল মিয়া	"	"	—
	মো: নুরুজ্জামান	"	আড়তদার	[illegible]
	মো: জহিমান শেখ	"	মৎস্যজীবি	[illegible]
	মো: শফিকুল শেখ	"	–	[illegible]
	মোছা: বিউটি বেগম	"	–	–
	মো: হজরত আলী	"		[illegible]
	ইয়াছিন খান	"	মৎস্যজীবি	–

স্থান ঃ বৈদ্যমারী, চাঁদপাই

তারিখঃ

ক্রমিক নং	নাম	ঠিকানা	পেশা	মোবাইল নং
	মো: বাদশা শেখ	বৈদ্যমারী, চাঁদপাই	চাকুরী	[illegible]
	মো: মনিরুজ্জামান	"	মৃত	–
	মো: রুবেল	"	ব্যবসা	[illegible]
	রুহুল আমীন	"	চাকুরী	[illegible]
	আনভীর হোসেন	"	কৃষক	–
	সিরাজুল ইসলাম	"	শিক্ষক	–
	মো: সোহেল শেখ	"	ব্যবসা	[illegible]
	মো: ইসমাইল শেখ	"	কৃষক	–
	মো: আলী আকবর	"	মৌয়ালী	—
	আবাসেদ	"	"	–
	চাঁদ সরদার	"	"	—

Annex 13-2: List of Participants Attended in PDM Held at Mongla

<u>অবহিতকরণ সভা</u>

বাংলাদেশ-মৈত্রী সুপার তাপ বিদুৎ প্রকল্পের কয়লা পরিবহন কার্যক্রমের পরিবেশগত ও সামাজিক সমীক্ষা

ভেন্যু: সম্মেলন কক্ষ, মোংলা বন্দর কর্তৃপক্ষ, মোংলা তারিখ: ১৮ আগস্ট, ২০১৬

Sl No	Name	Organization/Designation	Mobile no.	Signature
	Nabanita Dutta	Upazilla Women Affairs Officer	01716245388	
	SK. Abdul Jalil	Dy. Commnr, District Mukti Joddha Sangsad	01789929118	
	Md Belayet Hossain	OC Rampal PS	01733741130	
	SK LUTFOR RAHMAN	OC MONGLA	01713374129	
	Md. A Hamid	Chief Medical Officer	01717[illegible]	
	Md. Ruhul Amin	Medical officer.	01711965683	
	Md. Tawhidul	Physical Teacher Rampal college.	01711739832	
	Abdul Hadi	Reporter Rampal	01947828148	A Hadi
	Sarder Abdul Hamid	Chairman, 5N: Rajnagar U.P.	01711-309951.	
	Md. Mazrur Rahman	Principal Rampal College	01717-405307	
	Monirul Islam Dulo	GTV; Correspondent	01920061588	
	Sumed Sarafat	Correspondent The daily Bottom-Line	01711-677688	
	NIZAM UDDIN	ATN NEWS	01718403890	
	U.K. Bhattacharya	MD, BIFPCL	01678582811	
	Cdr Waliullah	HM MPA	01711139363	
	NABENDU LODH	BIFPCL	01678582812	
	Mwk Fida A. Khan	CEGIS	01819261274	
	Md. Azizul Haque	CEGIS	01789399977	
	[illegible]	CEGIS	01713063744	
	Eng. Khandakar Bijur Rahman.	BPDB. Consultant	01711831358	
	Eng. Jalal Ahmed Choudhury	CEGIS/Power plant Expert	01938242281	
	Engr. SK Sowkat Ali	chief engineer (C&A) Mongla port	01715-144296	18/08/2016
	Md. Farugul Islam	Chief Hydrographer Mongla port authority	01676885476	18/8/16
	Md. Bazlul Rahman	Deputy chief Engineer MPA	01912958875	
	Mehefuzur Rahman	Executive Engineer, MPA	01681481831	
	Motin Rahman	Executive Engineer, MPA	01948901970	

Sl No	Name	Organization/Designation	Mobile no.	Signature
	Md. Abdullah Al-Mamun	UAO, DAE, Mongla	01917877037	
	Dr. S.M. Masum Iqbal	UHFPO, Rampal Bagerhat	01712091233	
	MD ZAHIDUR RAHMAN	ULO, Rampal	01919813656	
	Shankar Kumar Mazumder	UAO, Rampal	01715508814	
	Howlader A. Hadi	Reporter Rampal	01911402030	A Hadi
	Md Emran Hassan DGM (Comml)	Meghna Cement Mills Ltd. Bashundhara Group.	01711830877	
	K.M. Shahidul Islam	SAE, Mongla	01748-908182	
	SK Khalid Ahmed	Principal Sundarbangiri College	01711452187	
	Helena Bheri	CSNP-WVB	01729842654	Bheri
	Roushonara Keya	CSNP. WVB	01951517200	
	Cdr Rezaul Hasan	Commanding Officer Coast Guard Base MONGLA	01766690411 rhasan936@gmail.com	
	Md. Mohiuddin	Admin & Finance Officer (CREL)	01713395060	
	Mahamud Hassan	Correspondent Samoy TV	01711.265236	
	Md. Guljer Hossen	UE, LGED, Rampal	01717695917	
	Ajit Kumar Mondal	XEN, PDB	01755590251	
	Shaikh Mohidul Haque	DOE, Bagerhat	01824444435	
	Emdadul Haque	DOE Bagerhat	01672581170	
	Imdad	DM, BIFPCL	01678582822	
	Engr. Md. Abdus Salam	RE, Rampal power plant connecting Road Project	01712931044	
	S.K. Motahar Rahman	Principal Dazdag College Morrelganj	01718773996	
	S.M. Habizur Rahman	Principal Bangabandhu Model College	01712632634	

Sl No	Name	Organization/Designation	Mobile no.	Signature
	Md. Noor ALAM SK	Journalist Independent TV	01711058226	
	Nazmul Haque	BAPA	01980088260	
	Pallab Roy	Nabolok (NGO)	01716779250	
	Mostafa Kamal	Dhaka Ashariamission (NGO)	01728885645	
	Dr. Muhammad Bazlul Karim	Upazila Livestock Office	01711-000738	
	S.M. Kaes.	Asstt. Engineer, DPHE	01715-292287	
	BISHWAJIT KUMAR DEV	SENIOR UPAZILA FISHERIES OFFICER	01777-403353	

Annex 13-3: List of Participants Attended in PDM Held at Bagerhat

অবহিতকরণ সভা

বাংলাদেশ-ভারত মৈত্রী সুপার তাপ বিদ্যুৎ প্রকল্পের
কয়লা পরিবহন কার্যক্রমের পরিবেশগত ও সামাজিক সমীক্ষা

ভেন্যু: সম্মেলন কক্ষ, ডিসি অফিস, বাগেরহাট তারিখঃ ২৩ আগস্ট, ২০১৬

নাম	প্রতিষ্ঠান/পদবী	মোবাইল নম্বর	স্বাক্ষর
ডঃ মোঃ সাইফুজ্জামান	জেলা প্রাণিসম্পদ কার্যালয় বাগেরহাট	01712-02980	
অধ্যাপক মোবাশ্বের হাসান	সদস্য, জাতীয় সংসদ, জাতীয় সংসদ	01711-137209	
প্রফেসর সুকৃতি কুমার মণ্ডল	অধ্যক্ষ (ভারপ্রাপ্ত), সরকারি মহিলা কলেজ	01716-561866	
[illegible]	[illegible]	01712-658302	
এমদাদুল হক	সহকারী পরিচালক পরিবেশ অধিদপ্তর	01672-581170	
মোঃ আবুল কালাম সরদার	উপ-সহকারী প্রকৌশলী বিবিবিবা, ও জোপাডিশোনিঃ	01917-722134	
নজির সিদ্দিকুল হক	দৈনিক সুন্দরবন, বাগেরহাট জেলা প্রতিনিধি	01911-[illegible]	
জহিরুল ইসলাম জলী	দৈনিক আমাদের সময় জেলা প্রতিনিধি	01928-[illegible]	
খন্দকার আকমল উদ্দিন	জেলা প্রতিনিধি/বাংলাদেশ প্রেস	01678806666	
মোল্লা আবদুর রব	জেলা প্রতিনিধি দৈনিক সমকাল ও দৈঃ খবরপত্র	01711366057	
মোহাম্মদ কামরুজ্জামান	তথ্য কর্মকর্তা জেলা তথ্য অফিস	01911-079373	
মীর জহুরুল সাইদ তপু	সম্পাদক বাগেরহাট টাইমস	01711-340284	
বিশ্বজিৎ চন্দ্র	একাত্তর টিভি, সংবাদ প্রতিনিধি	01711284458	
মোঃ কামরুল হাসান	সহকারী সম্পাদক কালবিকাল পত্রিকা	01812078181	
মীর জাহেদী আমানুল্লা জেমস	দৈনিক কল্যাণ-জেলা প্রতিনিধি	01712069402	
এস. হোসেন হোসাইন মিঠু	দৈনিক দিন কাল জেলা প্রতিনিধি	01711-325561	
এ. বারি তালুকদার	দৈনিক দেশ সংযোগ জেলা প্রতিনিধি	01928170824	
এডভোকেট পারভীন খানম	ভাইস-চেয়ারম্যান (সদর)	01711398824	
বাবুল সিকদার	সহকারী রিপোর্টার দৈনিক বনকণ্ঠ	01711399528	
অরিন্দম দেবনাথ	জেলা প্রতিনিধি দৈনিক [illegible]	01911-942564	
[illegible]	[illegible]	01748833636	
[illegible]	[illegible]	01710-029046	

নাম	প্রতিষ্ঠান/পদবী	মোবাইল নম্বর	স্বাক্ষর
বিকাশ চন্দ্র পাল	ভারপ্রাপ্ত কর্মকর্তা, যদুনাথ মডেল স্কুল এন্ড কলেজ	01718-017522	
মোঃ রফিকুল ইসলাম	চেয়ারম্যান বোরালাহাট ইউ.পি.	01711340182	
আজিজুর রহমান পিকলু	সাধারণ সম্পাদক, বাগেরহাট জেলা আওয়ামী লীগ	01711016910	
মোঃ নুরুজ্জামান	উপ প্রকল্প সমন্বয়কারী — বাগেরহাট পৌরসভা	01711271924	
মোঃ আবু ২ - [illegible]	চেয়ারম্যান, উপজেলা পরিষদ [illegible]	01711-179512	
মোঃ নুরুল আলম	সচিব, বাগেরহাট চেম্বার অব কমার্স	01716169876	
PRATEEK SRIVASTAV	BIFPCL /DGM	01678582854	
Rizia Parven	Rupantar Project Coordinator	01733224826	
MD ZIAUL ALAM	ASP SADOR CIRCLE	01713374119	
MOAZZEM HOSSAIN MAZNU	[illegible] বাগেরহাট	01714429907	
মোঃ মাসুদুল হক	জেলা সংবাদদাতা বাংলাভিশন	01711171315	
ইসরাত জাহান	জেলা প্রতিনিধি [illegible]	01716661961	
তানিয়া খাতুন	কাউন্সিলর, ৪, ৫, ৬ নং ওয়ার্ড বাগেরহাট পৌরসভা	01731696047	
[illegible]	[illegible]	01711361074	
আবু সাঈদ খান	উপজেলা [illegible] বাগেরহাট জেলা প্রতিনিধি	01712-404138	
রবীন্দ্র নাথ [illegible]	[illegible]	[illegible]	
Dinesh Ch. Mistry	DGM, BIFPCL	01678-582808	
[illegible]	[illegible]	[illegible]	
নাহার হোসেন সুমন	জেলা প্রতিনিধি বাংলাদেশ টেলিভিশন	01711-340148	
এ এফ এম ইরফান উদ্দীন	সহকারী কমিশনার, DC অফিস, বাগেরহাট	01719432698	
[illegible]	সহকারী কমিশনার DC office, বাগেরহাট	01721-116331	
হিমাদ্রী ঘোষ	সহকারী কমিশনার DC অফিস, বাগেরহাট	0964771936	
Mohammad Shahariar Murshid	Assistant Commissioner, DC office, Bagerhat	01680-017847	
প্রনব কুমার বিশ্বাস	সংসদ অধিদপ্তর	01712270549	
মো. এ. মান্নান তালুকদার	[illegible] পরিচালক, [illegible] ও নিউ [illegible] কোম্পানী, বাগেরহাট বাংলাদেশ।	01712-100643	

নাম	প্রতিষ্ঠান/পদবী	মোবাইল নম্বর	স্বাক্ষর
মো: তরিকুল আলম চিশতি	ইঞ্জিনিয়ার বাগেরহাট জোনাল অফিস	01922-654711	
শেখ আবু সাঈদ	উপ-পরিচালক, জেলা প্রতিনিধি	01711-065571	
মো: মাহবুবুর ইসলাম	উপ-পরিচালক, পি: প: বাগেরহাট	01716457825	
আরাফুল হক	জেলা প্রতিনিধি, দৈ: সংবাদ	01712-613554	
এম, এ, মতিন.	চেয়ারম্যান যশবাড়ীয়া	[illegible]	
ইউ. কে. ভট্টাচার্য	MD, BIFPCL	01678582811.	
মো: জাহাংগীর আলম	জেলা প্রশাসক, বাগেরহাট	01720460406	
মো: তরুণ কান্তি মণ্ডল	সিনিয়র সাংবাদিক	01711455624	
খন্দকার মোজিবুর রহমান	বিভাগীয় চেয়ারম্যান, পরামর্শক	01711-831358	
মোঃ আব্দুল মজিদ	প্রকল্প ব্যবস্থাপক (সহ: প্র: প্রকৌ) বিভাগীয় কার্যালয়	01730359677	22.4.22
মো: আবু আলম মুন্সি	সহকারী কমিশনার (ল্যান্ড) বাগেরহাট জেলা প্রশাসন	01790707090	22/04/22
অজিত কুমার মন্ডল	XEN, BPDB	01755590251	22/4/22
বিবি মোরশেদা খানম	বুদ্ধি প্রতিবন্ধী স্কুল এবং চিকিৎসা	01717530321	22/4/22
ড. মো: [illegible]	[illegible]	01712103281	
শেখ [illegible]	[illegible]	01716803881	
রবীন্দ্র নাথ বিশ্বাস	প্রতিনিধি (সংসদ সদস্য)	[illegible]	
এ.টি.এম. [illegible]	জেলা [illegible] বাগেরহাট	01720222848	
সরদার আবুল কাশেম	সহকারী, বনবিভাগের মা:বিভাগ জেলা প্রতিনিধি, দৈনিক [illegible]	[illegible]	
সৈয়দ ইমামুল হক	সীনিয়র কন্সালটেন্ট বা; লাইফ 28. রাস্তা	01924-202627 imamam.net@gmail.com	
ইমরুল কায়েস	জেলা প্রতিনিধি বাংলাদেশ 24. রাস্তা	01911-979971 i9Pantho@gmail.com	
আলী আকবর টুটুল	সময় টি.ভি. জেলা প্রতিনিধি	01712844063 Tutulbg@gmail.com	
মো: মতিউল ইসলাম	জি.ই.জি. এইচএস	01911-806208	
এস. এম সামসুর রহমান	জেলা প্রতিনিধি দি ডেইলি ডাকা ট্রিবিউন	01718-455026	

নাম	প্রতিষ্ঠান/পদবী	মোবাইল নম্বর	স্বাক্ষর
মো: মোতাহার হোসেন	সি.এম, [illegible]	01769400011	[illegible]
সরদার আ: হান্নান	চেয়ারম্যান, রাজনগর ইউ.পি.	01911300000	[illegible]
মোহাম্মদ আহিদ উল্লা রাজী	[illegible]	01911-607068	[illegible]
শেখ জসীম উদ্দীন	পরিবহন ব্যবসায়ী	01719455288	[illegible]
মাসুদ জামান	NGO, ব্যবসায়ী	01765685849	[illegible]
মো. ইয়ামিন আলী	স্থানীয় প্রতিনিধি যমুনা টিভি 3	01811002288	[illegible]
মো: এনামুল ইসলাম	স্থানীয় প্রতিনিধি দীপ্ত টেলিভিশন	01718051428	[illegible]
মোহাম্মদ শেখ বুলবুল কবীর	[illegible]	01711821005	[illegible]

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Annex 13-4: List of Participants Attended in PDM Held at Khulna

অবহিতকরণ সভা

বাংলাদেশ-ভারত মৈত্রী সুপার তাপ বিদ্যুৎ প্রকল্পের
কয়লা পরিবহন কার্যক্রমের পরিবেশগত ও সামাজিক সমীক্ষা

ভেন্যু: সম্মেলন কক্ষ, ডিসি অফিস, খুলনা — তারিখঃ ২৩ আগস্ট, ২০১৬

নাম	প্রতিষ্ঠান/পদবী	মোবাইল নম্বর	স্বাক্ষর
মোঃ লিয়াকত আলী	সহকারী পরিচালক লাগাব-আইএ সিটি কিকেয়া, খুলনা	01817008680	
এম. এম. মফিজুল্লাহ	অতি: পুলিশ সুপার খুলনা রেঞ্জ।	01713374076	
বুদ্ধ. কে. ভট্টাচার্য	MD, BIFPCL.	01678582811.	
শেখ আবুল মজিদ	প্রকল্প পরিচালক (অতি: সচিব) বাংলাদেশ রিনিউএবল এনার্জি	01730359677	
মো: মোহসিন রানা	জাতীয় সাংবাদিক	01913-555915	
হেলাল	জাতীয় সাংবাদিক	01910-314995	
[illegible]	সাংবাদিক	[illegible]	
ড. [illegible]	পরিচালক, [illegible]	01776802091	
[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	
দেবব্রত রায়	সাংবাদিক / দৈনিক [illegible]	01711248327	
প্রাবেশক, [illegible]	[illegible]	01755833420	
জয়নাল দরজী	[illegible]	01934718601	
মোঃ আদিক আল আযিম	ভিরিয়েন্টাল ফিস, আল-নিয়ন্ত্রন বাস্তবতা	01715-855858	
মো: রবিউল হক	নির্বাহী পরিচালক	[illegible]	
মহেন্দ্র নাথ সেন	একুশে টেলিভিশন	0591২-২৮৪২৬	
[illegible]	[illegible]	01921104647	
মো: আ: রাজ্জাক	দৈনিক প্রবর্তন ফার্মে সাংবাদিক	01717-964852	
[illegible]	দৈনিক [illegible]	[illegible]	
মো: হুমায়ুন কবীর	[illegible] কে.সি.সি.	01717006711	
[illegible]	[illegible]	01972023520	
[illegible]	দৈনিক [illegible]	01912-848285	

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নাম	প্রতিষ্ঠান/পদবী	মোবাইল নম্বর	স্বাক্ষর
ড. মো: হারুনর রশিদ	প্রধান বৈজ্ঞানিক কর্মকর্তা বাংলাদেশ বন গবেষণা ইনস্টিটিউট	01731-800267	
[illegible]	[illegible] খুলনা [illegible]	01911-085524	
[illegible]	[illegible] খুলনা	01711-324104	
শচীন্দ্র নাথ বিশ্বাস	প্রধান বৈজ্ঞানিক কর্মকর্তা মৃত্তিকা গবেষণা উইংস ইনস্টি	01718691666	
জহির উদ্দিন [illegible]	বন সংরক্ষক, খুলনা	01711581409	
Faki, Abdur Rob	S.E. RHD	01730782755	
[illegible]	[illegible]	01718-051547	
মো: [illegible]	ADC (General) Khulna	01718784860	
নির্মল কুমার পাল	বিভাগীয় বন কর্মকর্তা ব্যবস্থাপনা পরিকল্পনা বিভাগ, খুলনা	01712744223	
মো: আরিফ [illegible]	মানুষ মানুষের জন্য (প্রতিনিধি)	01714-515415	
[illegible] ইসলাম বাচ্চু	পরামর্শক ট্যুরিজম এন্ড ট্রাভেলস	0191-0374980	
লুৎফুন্নেসা হীরা	পরামর্শক, মুকশিলন	01759814519	
মো: শামীম হায়দার	জেলা মৎস্য অফিসার খুলনা	01712-066118	
মো: [illegible]	[illegible]	01712-110219	
[illegible]	[illegible]	0179778[illegible]8	
[illegible]	[illegible]	01711331304	
Md. MOIN UDDIN	PROPRITOR, KHULNA TOURISM	01936-001878	
মো: [illegible]	[illegible]	01715246379	
Md. Sayed Ali	Divisional Forest Officer (DFO) Sundarbans West Forest Div. Khulna	01819-810303	
Ujjwal Kumar Roy	ED, SAFE, Khulna	01712622811	
Gouranga Nandy	[illegible]	01766394461	
Engr. R. A. Howlader	AE, WZPDCL Khulna	01955-510337	
Engr. Md. [illegible]	Chief Engineer (Civil) Mongla Port Authority	01718249927	
[illegible]	[illegible]	01711238800	
মো: [illegible]	[illegible] খুলনা	01795549707	

নাম	প্রতিষ্ঠান/পদবী	মোবাইল নম্বর	স্বাক্ষর
মিলারা খেতম	খুলনা মহানগর মহিলা আওয়ামীলীগ কৃষি সম্পাদক	01672972698	মিলারা
[illegible]	[illegible]	01715-568361	
[illegible]	মুক্তি [illegible] CDO, নবলোক	01718067726	
মো: মাকসুদ আলম	সুন্দরবন পাবলিকেশন বিভাগ/সহকারী সম্পাদক	01715246379	
বম এম ইকবাল হোসেন বিপ্লব	সমন্বয়কারী, সি ডি পি সদস্য – বাংলাদেশ পত্রিকা [illegible]	01712-449843 01911-509053	
মো. মতিনুল ইসলাম	[illegible] বন কর্মকর্তা [illegible], খুলনা	01718783323	23/8/16
[illegible]	[illegible]	01710-029046	
সেলিম রেজাউল	[illegible]	01740-625736	
ওয়াহেদুজ্জামান বুলু	দৈনিক [illegible], খুলনা	01799424259	
মো: আমিরুল আজাদ	[illegible] খুলনা	01717-272431	
মো: খালেকুজ্জামান হোসেন	উপ-পরিচালক, BIWTA	01990926401	
মো: কাজী [illegible] হোসেন	পরিকল্পনা কর্মকর্তা	01711-156984	
দীপংকর রায়	কোডিপ, খুলনা		
দীপংকর রায়	খুলনা প্রতিনিধি [illegible]	01966955422	
মো: আব্দুর সাত্তার	[illegible]	029729[illegible]	
বিপ্লব কুমার [illegible]	[illegible] বাংলাদেশ [illegible], খুলনা	01712-100678	
মো: মোস্তাফিজুল হক	বিপিডিবি উপ-সহকারী প্রকৌ:	01245-665444	
অজিত কুমার মণ্ডল	XEN, BPDB	01755590251	
PRATEEK SRIVASTAV	DGM, BIFPCL	01678582834	
[illegible]	[illegible]	01678582841	
[illegible]	[illegible]	01671-608041	
[illegible]	[illegible] / [illegible]	01712680606	
কাজী মাহমুদ আলম ([illegible])	মুক্তিযোদ্ধা	01813643671	
[illegible]	[illegible]	01224[illegible]	
[illegible]	[illegible]	01924-188431	

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নাম	প্রতিষ্ঠান/পদবী	মোবাইল নম্বর	স্বাক্ষর
মো: খায়রুল আলম	সাংবাদিক/চ্যানেল ২৪	[illegible]	
প্রকৌ: মো: শফিকে উদ্দিন	ব্যবস্থাপনা পরিচালক ও কোপাডেক	01713001424	
প্রকৌ: [illegible]	নির্বাহী পরিচালক (প্রকৌ:) ও কোপাডেক	01713-001425	
মো: মোস্তাফা [illegible]	সাধারণ সম্পাদক K.D.S	01711192260	
কাজী মনিরুদ্দীন আহমেদ		01715434046	
মো: [illegible]	[illegible]	[illegible]	
MD. MITHU	MAYOR KUNMAN	01712532037	
মো: [illegible]	মেয়র [illegible]	01711-339013	

নাম	প্রতিষ্ঠান/পদবী	মোবাইল নম্বর	স্বাক্ষর
মো: মিনতু মোল্লা	এম. বি.	[illegible]	
নাজমুল আহসান	মেয়র প্রশাসক, খুলনা	[illegible]	
শেখ মোস্তাফিজুর রহমান	[illegible] ৪২৮ [illegible] ৪২৩০ খুলনা [illegible]	01711840670	
[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]		
[illegible]			