



Department of Fisheries
Ministry of Fisheries and Livestock

Environmental and Social Impact Assessment

for Government Shrimp Estate Chakaria, Cox's Bazar;
BFDC; BMC and Canals

Volume II: Annexures of Main Report



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CEGIS

Center for Environmental and
Geographic Information Services

**Environmental and
Social Impact Assessment
for Government Shrimp Estate Chakaria, Cox's Bazar
BFDC; BMC and Canals**

Volume II: Annexes of Main Report

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Annex 1: Methodology of ESIA Study

A. Reviewing Policies and Legal Issues

Legislative, Regulation, and Policy Consideration

The ESIA Report outlines the pertinent regulations and standards governing environmental quality, safety, and health, social issues, including those which are related to Indigenous People, protection of sensitive areas, protection of endangered species, siting and land use control at the local and state levels. Additionally, the national policies, acts, regulations and guidelines as well as development partner's/project financier's policies have been reviewed and examined the applicability of the same.

National and International Policies, Acts, Regulations, and Guidelines

According to Bangladesh Environmental Conservation Act (BECA, 1995), "No industrial unit or project shall be established or undertaken without obtaining, in the manner prescribed by rules, an Environmental Clearance Certificate from the Director General of DoE". The procedure for obtaining Environmental Clearance Certificate (ECC) has been detailed in the Environmental Conservation Rule (ECR) 2023. As per this rule, some of the activities under the four sub-projects as mentioned in **Section 3.1** in the **Volume I: Main Report** briefly, the whole Project combinedly fall under 'RED Category', which requires an ESIA Study to obtain the SCC and ECC accordingly from DoE based on which the Client would start the Project implementation works.

The pertinent policies, laws, regulations and standards governing environmental quality, health and safety have been reviewed and explained the possible implication of the policies, laws, regulations and standards on the proposed Project. This report has been prepared in compliance with all the applicable national policies, rules, regulations and the IFC Performance Standards on Environmental and Social Sustainability, 2012 and related Environmental, Health, and Safety General Guidelines, etc. In addition, the study team has identified the required permits, licenses and approvals to be obtained from different agencies in relation to health, safety, environmental and social requirements for implementation of the Project.

The Study has followed the applicable national policy, legal and regulatory framework; such as: EIA Guidelines for Industries, 2021, the Bangladesh Environmental Conservation Act 1995 and its successive amendments; the Environment Court Act, 2010; National Environment Policy 2018; the Environmental Conservation Rules 2023; Air Pollution (Control) Rules 2022; Noise Pollution (Control) Rules 2006; The National Water Policy (1999); the Bangladesh Water Act 2013; the Bangladesh Water Rules 2018; the Solid Waste management Rules 2021; The Protection and Conservation of Fish Rules, 1985; Shrimp Cultivation Tax Act 1992; Shrimp Policy 2014; Fish and Fish Products (Inspection and Quality Control) Rules 1997; Fish and Fish Products (Inspection and Quality Control), Ordinance, 1983; National Fisheries Policy, 1998; the Bangladesh Labor Act 2006; the Immovable Property Acquisition and Possession Act 2017 etc.

Furthermore, in context of establishing sustainable coastal and marine fisheries, various international conventions including available protocols, treaties and agreements have been reviewed and addressed (Ref. to **Section 3** of the **Annex E: Legislative Framework, Guidelines, and Standards**) for safeguarding the natural resources like fisheries and aquaculture and associated manpower from the exploitation.

Lender's Guidelines and Standards

Being the World Bank as the lender of this Project, WBG policies and guidelines have been reviewed and followed. Although, WB moved from Operation Policy (OP) to Environmental and Social Standards (ESS), as per lender's requirement, this ESIA study has followed the Operation Policy; OP/ BP and IFC Performance Standards.

The proposed sub-projects have been classified as 'Category B', as the potential impacts of most of the activities are limited and largely mitigable and reversible according to the guideline of the WBG. However, since some of the activities are deemed to require further assessment for better understanding whether the project activities could be implemented or not, and the level of Environmental Assessment required. This information is expected to be obtained as an output of the present Environmental and Social Screening Study. Therefore, ESIA is recommended in accordance with OP 4.01.

The World Bank's Operational Policies (OPs) and Bank Procedures (BPs) which include the environment assessment (OP/BP 4.01), natural habitats (OP/BP 4.04), pest management (OP/BP 4.09), involuntary resettlement (OP/BP 4.12) and Indigenous Peoples (OP 4.10) have been followed. These OP/BPs have also been checked whether they are triggered for the proposed Sub-Projects or not. Relevant OP and Directives of The World Bank are given in **Annex 2** under the **Volume II: Annexures of Main Report**.

B. Screening

As the 1st stage of the environmental assessment for the proposed intervention, an Environmental and Social (ES) Screening Study has been conducted to sort out the critical issues which needs detailed investigation.

Based on the study outcomes, it has been ascertained that the Project needs to conduct a detailed E/SIA Study for assessing the potential impacts on environment and society and suggest corresponding mitigation and enhancement measures including Environmental and Social Management Plan (ESMP) and Environmental and Social Monitoring Plan (ESMoP) with relevant budgets.

C. Bounding

During the ES screening Study, in consideration with the information of the baseline scenario and potential preliminary risks and impacts, the boundary of the study area has been finalized. In this stage, following issues have been considered: (i) spatial extent of the potential impact of the sub-projects (ii) habitation of dependent livelihood; (iii) accessibility; (iv) wildlife habitat, (v) position of the sensitive receptors etc.

D. Project Interventions

The proposed interventions of the sub-project have been demonstrated under the major sub-projects with the following information:

- Location of the proposed project sites with the layout plan and the extent of facilities;
- Envisaging sub-projects/activities through maps and diagrams;
- Designs of the sub-projects will be shown on project layouts after being obtained from the Feasibility Study/ Project Management Unit (PMU);
- Study area, project area and its Area of Influence (AoI);
- Preparation of detail specifications of the sub-project activities;

- Preparation of project implementation time schedule.

E. Analysis of Alternatives

Weighted Scores of Alternatives

An analysis has been carried out by using scoring/normalization technique and finalizing through summation of the weighted scores for selecting a suitable location for BMC implementation. In this regard, Delphi Method has been applied for identifying and selecting indicators for analyzing the alternatives of routes.

Weightage factors have been allotted for each criterion through consulting with the team members and their expert judgements. The weightage factors were normalized to add up to 1. Weightage factors of each criterion will be different for each feature as their relative importance varies from feature to feature.

A score has been given on the scale of 1 to 10 to each of the parameters for various options. The maximum score 10 represents 'most favorable' and the minimum score 1 represents 'least favorable'. Then, the weighted scores have been computed for each criterion by multiplying its weightage with its respective score.

The alternative sites were then compared on a weighted summation of scores and the option which secures the highest total weighted score has been selected as the preferred option.

Site Selection

After taking suitable site options from DoF for implementing BMC, site selection method considered the Physical, Biological, Socio-Economic, and Management aspects.

Normalization

Step-1: Normalization of Indicators Using Functional Relationship

The indicators used in this alternative study are in different units and scales. The methodology used in United Nations Development Programme (UNDP)'s Human Development Index (HDI) (UNDP, 2006)¹ has been followed to normalize them. For obtaining the figures which are free from the units and standardizing their values, the indicators are normalized so that they all lie between 0 and 1. Before doing this, it is important to identify the functional relationship between the indicators and the performance (significance) of the two (02) site options. Two types of functional relationship are possible: performance increases with increase (decrease) in the value of the indicator. Assume that higher the value of the indicator more is the performance. In this case, it means that the variables have positive functional relationship with performance and the normalization is done using the following formula:

$$x_{ij} = \frac{X_{ij} - \text{Min}_i \{X_{ij}\}}{\text{Max}_i \{X_{ij}\} - \text{Min}_i \{X_{ij}\}}$$

All these scores lie between 0 and 1. The value 1 corresponds to that the option with maximum value and 0 will corresponds to the option with minimum value.

¹ United Nations Development Programme (UNDP)'s Human Development Index (HDI) (UNDP, 2006)-Reference Iyengar, N.S. and Sudarshan, P. (1982) A Method of Classifying Regions from Multivariate Data. Economic and political weekly, 17, 2048-2052.

On the other hand, higher the value of the indicator less is the performance. In this case, against the performance the indicator has negative functional relationship. In such case, the normalization is done using the below formula:

$$y_{ij} = \frac{\text{Max}_i \{x_{ij}\} - x_{ij}}{\text{Max}_i \{x_{ij}\} - \text{Min}_i \{x_{ij}\}}$$

Step-2: Iyengar and Sudarshan’s method

Iyengar and Sudarshan (1982) developed a method to work-out a composite index from multivariate data and this methodology is statistically sound. A brief discussion of the methodology is given below.

It is assumed that there are K indicators of feasibility and X_{ij} , $i = 1, 2, \dots, M$; $j = 1, 2, \dots, K$ are the normalized scores (calculated from the above mentioned formula). The level of performance of i^{th} option, \bar{y}_i , is assumed to be a linear sum of X_{ij} as:

$$\bar{y}_i = \sum_{j=1}^K w_j x_{ij}$$

$$w_j \text{ s (} 0 < w < 1 \text{ and } \sum_{j=1}^K w_j = 1)$$

Where, are the weights. In Iyengar and Sudarshan’s method the weights are assumed to vary inversely as the variance over the alternative options in the respective indicators of their performance. That is, the weight w_j is determined by

$$w_j = c / \sqrt{\text{var}_i(x_{ij})}$$

Where, c is a normalizing constant such that

$$c = \left[\sum_{j=1}^K \frac{1}{\sqrt{\text{var}_i(x_{ij})}} \right]^{-1}$$

The indicators have been identified and selected based on the significance and the criteria a multi-criteria-based matrix has been prepared. Scoring has been given considering the Multi criteria in terms of physical, biological and socio-economic and management aspects. Based on the highest score, the best or most suitable site for implementing BMC has been selected.

F. Description of Environmental and Social Baseline

After screening the activities and identifying the environmental issues, the project influence area has been determined for detailed baseline investigation. The contemporary and world standard tools and techniques such as physical observation, questionnaire survey, active sampling for water quality, ambient air quality, noise level measurement, Key Informant Interview (KII), stakeholder consultation, analysis of satellite image, etc. have been used for baseline preparation.

The baseline for each sub-project has been delineated based on the Physical environment, biological environment, and socio-economic environment. The detailed method of the data collection and analysis and delineation of baseline scenario have been provided below:

Table A1.1: Site Specific Baseline Data Sources and Collection Methods

Environmental Sectors	Data Type	Data Sources	Tools and Approach
Physical Environment			
Meteorology and Climate	Rainfall, temperature, evaporation, wind speed & direction, humidity, sunshine hour	Nearest BMD Station(s): <ul style="list-style-type: none"> • Chakaria Shrimp Estate: Kutubdia BMD Station (Station ID: 11925) and Cox's Bazar (Station ID: 11927) • Chattogram BFDC: Patenga, Chattogram (Station ID: 11921) • Selected Canals under coastal districts: <ul style="list-style-type: none"> ○ Canals under Bagerhat and Khulna District: Khulna (Station ID: 11604) ○ Canals under Satkhira District: Satkhira (Station ID: 11610) 	<ul style="list-style-type: none"> • Collecting data from NWRD-CEGIS archive; • Data purchasing from BMD
Land cover and land use	Land cover and land use classification	Most recent (as available in CEGIS Archive) high resolution (0.3 m) multispectral satellite images (World View 3)	<ul style="list-style-type: none"> • Satellite Image collection from CEGIS Archive and image analysis; • Onscreen digitization through RS/GIS tools and techniques; and • Ground truthing
Environmental quality (water, air, noise)	i. Water quality: pH, Temperature, EC, TDS, Turbidity, Salinity, DO, Ammonia, Arsenic, TSS, Nitrate, Phosphate, Silica, Fluoride, Iron, Cd, Pb, Hg, COD, SO ₄ , Chloride, Hardness, Oil and Grease, Salinity, DO, TDS, pH, Turbidity, temperature, etc. ii. Air quality: PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , CO iii. Noise Level: dBA	i. Horiba multi-meter water quality monitoring system (In-situ) and/or Lab test ii. AirSENCE Sensor based air quality monitoring device iii. Kanomax handheld ANSI Type II noise meter	<ul style="list-style-type: none"> • In-situ and Laboratory testing • Air Quality: Sample collection from ambient air and generate results from the reading in the machine • Noise Level: in-situ • Water Quality (In-Situ): pH, Temperature, EC, TDS, Turbidity, Salinity, DO: In-situ • Water Quality (Laboratory Testing): Ammonia, Arsenic, TSS, Nitrate, Phosphate, Silica, Fluoride, Iron, Cd, Pb, Hg, COD, SO₄, Chloride, Hardness, Oil and Grease (Laboratory

Environmental Sectors	Data Type	Data Sources	Tools and Approach
			testing will be done only for specific locations)
Water Resources	i. Hydrological data (water discharge, water level, seasonality of canals, water depth during high and low tide, etc.) ii. Water availability or dependable flow iii. Engineering design of structures (inlet, outlets)	i. Ground Water level station (Station ID: COX001, COX002, COX004, THA001, THA002); field observation; sediment and water sampling ii. BWDB TWL (Station ID: 163-Kobadak River, 242- Rupsa-Pasur River, 01- Alaipur Khaldar, 153- Karnaphuli River, 200- Maheshkhali Channel, 204 Matamuhuri River) iii. PMU of DoF	<ul style="list-style-type: none"> Available and existing data collection from NWRD-CEGIS archive; Data purchasing from BWDB; Field observation and sampling
Soil and Land Resources	Land type, land use pattern	SRDI, SOLARIS	<ul style="list-style-type: none"> Available and exiting updated data collection from NWRD-CEGIS archive and data analysis; Field observation
	Soil quality	SRDI	Soil Quality Maps (B, Ca, Mg, Organic Matter, pH, P for upland and wetland, K for upland and wetland, S for upland and wetland, Zn)
Agriculture	i. Agriculture practices ii. Crop diversity and Cropping intensity iii. Agricultural input iv. Irrigation status	i. Primary: Stakeholder consultation, Entrepreneurs, Seed/Fertilizer dealers ii. Secondary: DAE-UAO, SAAO	<ul style="list-style-type: none"> Field observation; Interview; Questionnaire survey; Institutional survey; Active sampling
Biological Environment			
Fisheries and Aquaculture	i. Habitat type and characteristics ii. Fish biodiversity iii. Fish migration status iv. Aquaculture pattern v. Fish production vi. Market chain vii. Antibiotics, antimicrobial and fertilizers (current and projected)	i. Primary: Field investigation, Stakeholder consultation, KII, FGD, CAS, FMS, etc. ii. Secondary: UFO, DFO, DD, DoF, HO, FSO, Community Organization (Shrimp Hatchery Association of Bangladesh-SHAB, White Fish Exporters' Association,	<ul style="list-style-type: none"> Land use and Land cover data analysis; Field observation; Interview; Questionnaire survey; Institutional survey; Active sampling

Environmental Sectors	Data Type	Data Sources	Tools and Approach
		Bangladesh Trawlers Owners' Association, Bangladesh Small Boat Owners Association, etc.), WorldFish, IUCN	
Ecology	i. Ecosystem patterns ii. Vegetation composition including exotic and aquatic weeds. iii. Wildlife biodiversity iv. Species conservation significance (i.e., Threatened status of species). v. Existence of protected or national/international designated area. vi. Biological connectivity [i.e., sanctuaries, reserves, etc.). vii. Potential vector for diseases. viii. A plantation program with the site specific native and suitable tree species under a Plantation Journal and maps.	i. Satellite image and land use map ii. Field survey data iii. Review of literatures iv. BFD, DoE	<ul style="list-style-type: none"> • Land use and Land cover data analysis; • Visual observation; • Sample Quadrature survey; • Public consultation; • Information collection from IUCN Red Data Book, 2015 • Interpretation of Geospatial data of Protected Area on the project Geospatial shape

The baseline data for the physical, biological, and socio-economic characteristics within the study area boundary has been assembled and evaluated. The samples were collected, measured, and presented in such ways which are consistent with applicable environmental standards, norms, and requirements of both national (i.e., ECR 2023) and Bank's ESF requirements. Secondary data have been used if they precisely covered the project influence area. Details of the baseline scenario development are stated below:

Physical Environment

a) Meteorology and Climate

Meteorological data of at least last thirty (30) years' have been analyzed to analyze the climatic condition of that area. The nearest meteorological station (**Table A1.1**) was considered for respective sub-projects. The following meteorological conditions were analyzed:

- Wind speed and direction
- Sunshine hours
- Rainfall
- Relative humidity
- Temperature

b) Land cover and Land use analysis

Most recent high resolution multispectral satellite images (**Table A1.1**) were collected from the CEGIS Archive to identify the existing land use within the study area. The land features have been identified and extracted from the images by on-screen digitization techniques and a comprehensive GIS layer of the land use data have been prepared utilizing advanced tools and techniques in the Remote Sensing (RS) platform. To ensure accuracy, the derived land use data have been validated through the collection of ground truth data during field visits. The final results are presented in both tabular and map formats within the study area.

c) Landscape, Hydrology and Geology

A description of the existing landscape, geology, aesthetic values, hydrology and the distribution of soil type including storm water run-off, drainage patterns, river flow and aquifer characteristics of the specific locations where ground water might be withdrawn within the study area of each component have been provided in this Report. The description of the items has been focused on the geology of the proposed site, the distribution of soil types in the proposed study as using appropriate soil survey procedures and implications of environmental effects on ecosystems' insatiability. Where applicable the paleontological, architectural, archeological, and cultural features have been examined.

d) Environmental Quality

In this section, the baseline condition of environmental quality of considering all the sub-project sites have been described based on the field information and expert opinions. The apparent sources of existing pollution (if any) and the extent of contamination affecting the physical environment have been described in this report. To check the seasonal variation of the environmental quality samples for each parameter (ambient air quality, acoustic noise, surface and ground water quality) were collected during monsoon and dry period. Under this section following quality issues are covered:

Water Quality

Water Samples from the existing canals, rivers, or other surface water sources in the vicinity of the sub-project sites and surroundings have been collected. From the Chakaria Shrimp Estate surface and ground water samples were collected from five (05) locations and one (01) location respectively. From BFDC, only one sample for surface water and one sample for ground water was collected. From DFTC, Teknaf two surface water samples and one ground water sample were collected for checking the water quality parameters as mentioned in the **Table A1.1**.

For the sub-project, "rehabilitation of canals under Khulna, Bagerhat, and Satkhira Districts", surface water samples were collected from each canal as selected under the three Districts. However, two ground water samples from Chitalmari, Bagerhat and Debhata, Satkhira were collected as ground water is used here for irrigation purpose.

Water quality parameters have been selected depending on the ambient water use and potential polluting agents from the project after the reconnaissance field visit and consulting with the local people and relevant other stockholders. The selected parameters for checking water quality are given in the **Table A1.1**.

Air Quality Assessment

Considering the direction of wind, wind speed and velocity, the air quality sampling locations have been selected for each sub-project sites and surroundings. Air samples for Chakaria Shrimp Estate were- collected from two (02) locations; whereas the same for BFDC, and BMC were collected from one (01) location of each case. However, from Upazila Tala at Satkhira District near the Mahinda Khal

one (01) sample; from Digholia Upazila at Khulna District near Nagkati Khal one (01) sample; and from Chitalmari Upazila at Bagerhat District near Gajdurer Khal one (01) sample were collected to monitor the criteria pollutants of the ambient air of those areas. Before selecting the locations, the location of the sensitive receptors has also been considered.

Acoustic Environment

Based on the sub-project activities during various stages of the Project implementation, which might affect noise levels and the potential for increased noise at the sub-project sites and the surrounding areas. Before, measuring the acoustic noise from various locations in and around each sub-projects, some considerations were taken into account:

i. Factors considered are as follows:

- Sound level or loudness;
- Magnitude;
- Frequency; and
- Duration and time of day.

ii. Source of noise

The sources of noise propagation i.e., Point, line, area sources, and the distance² from the settlement area have been considered during the sampling site selection. For example, monitoring at locations close to the major site activities which are likely to have noise impacts, with proper position/siting and orientation of the monitoring equipment were ensured.

iii. Distance from sensitive receptor and obstruction

Considering Article No. 11 (1) of the Noise Pollution (Control) Rule, 2006 “No use of brick or stone breaking/crushing machine within the 500 m from the boundary of the residential area for construction work of this area”, the noise monitoring locations have been selected.

As referred in Environmental Noise Management under Environmental, Health, and Safety (EHS) Guidelines of IFC, monitors were set up approximately at 1.5 m above the ground and no closer than 3 m to any reflecting surface (e.g., wall).

iv. Noise Sensitive Receiver

Noise monitoring locations have been chosen based on the criteria referred in Schedule- 1 of Noise Pollution (Control) Rule, 2006. The criteria are:

- Silent Area, which covers hospital, medical clinic, educational institution, place of public worship, library, office and court of law, etc. and 100 m radial area around them.
- Residential Area, which covers human habitations.
- Commercial Area, which covers commercial facilities, shops, hat-bazaar, etc.
- Mixed Area, which covers residential, commercial or industrial area.
- Industrial Area, which covers industries and factories.

² Based on the Article No. 11 (1) of the Noise Pollution (Control) Rule, 2006 “No use of brick or stone breaking/crushing machine within the 500m from the boundary of the residential area for construction work of this area”, the noise monitoring locations have been selected.

v. Disturbance to Occupants

A number of monitoring locations located in the vicinity of the sensitive receivers, henceforth care has been taken to cause minimal disturbance to the occupants during monitoring.

vi. Noise Level Monitor, Duration and Timing

Noise level has been monitored and recorded at each of the pre-selected locations once in a day during day time only as the locations were under very remote areas and considering the security issues during 9:00 am to 5:00 pm. The baseline acoustic environment has been monitored using portable ANSI Type II noise level meter (Kanomax) for 15 minutes time span with 5 minutes intervals, which is also aligned with rule no. 06 of the Noise Pollution (Control) Rules, 2006 and the IFC guidelines. The noise sampling locations including the acoustic noise levels are provided in the Baseline section (**Section 4.7.3**) under **Chapter 4 of Volume I: Main Report**. During taking acoustic noise level at the pre-selected sites, the noise level meter was set up approximately 1.5 m above the ground and no closer than 3m³ to any reflecting surface (e.g., wall).

Depending on the site condition and acoustic environment, the noise meter was set up and calibrated each time following the manufacturer's instruction manual.

- Noise levels of undeveloped sites and the ambient noise in the AoI have been assessed by:
 - Providing representative baseline noise levels and a description of the measurement/prediction methods used;
 - Identifying sub-projects of the Project that have the potential for creating increased noise levels at sensitive receptors and discuss the implications and measures to mitigate;
- Presenting the results of a noise assessment, which includes:
 - Potentially-affected people and wildlife;
 - An estimate of the potential for increased noise resulting from the development;
 - The implications of any increased noise levels; and
 - Proposed mitigation measures and their anticipated effectiveness.

A glimpse of field data collection process is shown in the photos in **Figure A1.1**.



Ambient Air Quality
Monitoring



Acoustic Noise Level Monitoring



In-situ Water Quality Testing

Figure A1.1: Glimpse of Field Data Collection Process

³ As referred in Environmental Noise Management under Environmental, Health, and Safety (EHS) Guidelines of IFC.

Soil Quality and Land Resources Study

Soil Quality information has been taken from the SRDI Maps for Soil Quality of Bangladesh. The soil quality parameters are mentioned in the **Table A1.1**. On the other hand, using the SOLARIS tools of SRDI, the soil and land resources data have been extracted for supporting the primary data. This tool was developed by CEGIS for SRDI. The SOLARIS stores all the data related to land and soil management for agricultural purposes which includes soil quality, texture, land type, deposition type, flooding depth, drainage, moisture content, etc. to check the soil quality within the Study areas of each sub-project in respect to shrimp farming.

e) Analysis of Climate Resilience and Natural Disaster

Various literature has been reviewed to assess the vulnerability to natural disasters for each sub-project. In this regard, the frequency and magnitudes of the hazards and disasters have been analyzed based on the historical evidences. Sensitivity of each sub-project site including magnitude has been drawn through the picture of potential risk for the sub-project, as derived from the historical analysis. Necessary information regarding natural events has been taken from the Feasibility Report.

In connection with the proposed project, different perspectives of socio-economic condition, environment, disaster and climate change, ecological condition have been determined and reflected as project impact. Corresponding measures are also suggested to counter the potential environmental and social impacts in this section.

The hazard assessment has been carried out to identify the potential hazard associated with or inherent in the design process and to identify possible measures to avoid the hazard along with the safety plan for minimizing the risk. The following steps were involved in the assessment process:

- i. Identification of potential hazards
- ii. Identification of causes and consequences and
- iii. Risk management.

The basic hazard related information and their causes and consequences were collected during field visit and from available secondary data sources (BMD, BWDB, DRIP portal etc.). Based on the information from field and secondary sources, the possible impacts of climate change and natural disasters on the proposed Project and appropriate risk reduction measures have been identified and presented likewise the following **Table A1.2**.

Table A1.2: Assessment of Potential Disaster Impact

Sl. No.	Natural Disaster	Potential Impact	Disaster Risk Reduction/Management
1			
2			

Moreover, the hazard and risk related information for the major disasters in the area were collected and utilized from the Disaster and Climate Risk Information Platform (DRIP) (<http://drip.plancomm.gov.bd/>) prepared by the Planning Commission.

The climate change risk analysis for the study is carried out through following activities:

Trend analysis of recent climate

Historical meteorological or microclimatic data of the study area has been collected from the nearest station of Bangladesh Meteorological Department (BMD) (as mentioned in **Table A1.1**). Besides, water level, discharge etc. have been collected and analyzed to assess the highest flood level and storm

surge height through water level data of nearest water level stations of BWDB (**Table A1.1**) and historical analysis. Based on the data, trend of recent climate has been analyzed for understanding the pattern of climate in the study area.

Future Climate Projection

The future climatic condition for the study area has been assessed in line with the overall methodology. The possible future scenario has been utilized in this section based on available information from secondary sources and DRIP website.

Potential Impacts of climate change

The various impacts of climate change on the study area and the proposed Project activities have been analyzed based on available secondary data and technical analyses. The major impacts on flood, inundation, cyclone, storm surge and erosion have been assessed for the study area based on the relevant information from available secondary information and literatures and consulting with local people. Vulnerability as well as risk have been analyzed for the proposed project to geo-hazards such as earthquakes, landslides (if any) and soil erosion.

Biological Environment

a) Ecosystem, Flora, and Fauna

At the initial stage of delineating the baseline of the ecological resources, land use and land cover data has been used to identify the land use classes within the study area boundary of each sub-project. A distance map has been generated showing the distances of the protected areas, ecologically critical areas (ECA), reserve/ planted forest etc. from the sub-project sites. In addition, a brief description of Bio-Ecological Zone (BEZ) that covers the study area of each sub-project have also been provided in this Report.

The site-specific detailed description of existing terrestrial and aquatic flora & fauna, and biological diversity of that area as observed during field visit, have been provided in this section. An initial identification for wildlife habitat has been analyzed accordingly. Migratory species were considered in this case. Several informal consultations have been carried out while collecting information during field visit. Secondary ecological data and relevant other information have been collected from various local authorities such as: Local Range office, Department of Environment (DoE) etc.; and from other secondary sources. Overall perceptions of the local people about biodiversity and ecosystem will be gathered through transect survey, public consultation meetings (PCM), KII, FGD and RRA method. Wildlife habitat types, roosting habitat wetland and shoreline birds along with migratory species and other threatened species will be identified through field investigation and secondary information. Breeding habitat and migratory routes of the threatened wildlife species will be identified through public consultation, physical investigation, and secondary information. IUCN Red List 2015 will be used for identifying the threatened status of flora and fauna as applicable.

Plankton Analysis

The plankton has been recorded through sampling water from water column of the selected water bodies of the project area or adjacent open water bodies and five (05) of the locations from Chakaria Shrimp Estate, two (02) locations from BMC, DFTC, Teknaf; one location from BFDC, Chattogram, and each canal (18 nos.) under Khulna, Bagerhat, and Satkhira Districts. These collected samples were tested through the recognized labs from the academic institutes like University of Dhaka. For this, fine-meshed sampling gear was used to collect samples. Surface microlayers (top 250-440

micrometers) has been introduced for sampling such data by using fine nets (Estep and Remsen 1985). Besides, sample processing and species proportional counts (assuming 500 individuals and it usually take 2-3 hours per sample) (Stevenson and Lowe 1986) have also been introduced in the most plankton communities.

Benthos Analysis

Surface sediment (mud, silt, or sand) have been collected using a grab sampler from all those locations where plankton were collected. Each sample has been analyzed by counting cells. Stones and small rocks were removed and then washed in freshwater to remove the algae. More tenacious algae were also removed by scrubbing with a brush or scraping with a scalpel. Lumps of algae were broken up by shaking or with a spatula. Bedrock and other immovable objects were scrubbed or scraped in situ and the dislodged algae were then collected.

Benthic macro invertebrate samples were collected and studied following the method of SWAMP (2007) and APHA (1989) Laboratory.

b) Fisheries and Aquaculture

Fisheries Resources related information has been collected from both primary and secondary sources. Prior to data collection, a checklist/questionnaire has been developed by considering the context of the study area. Primary data has been collected by investigating the fisher's community, fish farmers and supply chain actors. For better understanding of the species diversity spot catch assessment has been surveyed. The secondary data has been collected from Department of Fisheries (DoF) and concerned Upazila Fisheries Offices during field visits. Following indicators are considered for fisheries Resources assessment.

Habitat Identification

Land use data, as extracted from high resolution has been considered as the basis of fish habitat identification and area delineation. The identified fish habitat has been categorized into open water (capture fisheries) and closed water (aquaculture).

Habitat Characterization

Habitat in the study area has been assembled through identifying different habitats by considering habitat pattern, seasonality, water flow, connectivity, depth zone, river bank condition, river bed vegetation, erosion etc.

Habitat Connectivity

The connectivity of the habitat has been investigated through satellite imagery and physical observation during field survey.

Fish Species Diversity and Composition: Fish species diversity has been identified through discussion with the fishers and elderly local knowledgeable person and fish market observation. The data has been analyzed by Shannon-Weiner Species Diversity Index.

$$H = - \sum_{i=1}^s P_i \ln P_i$$

Where,

H is the species diversity index,

s is the number of species

P_i is the proportion of individuals of each species belonging to the species of the total number of individuals.

Fish Migration

The migration route has been identified by using habitat suitability parameters, habitat connectivity and discussion with fishers.

Fish Production

Fish production has been assessed by blending the primary and secondary information. The secondary data has been collected from the FRSS of DoF. The district level data in FRSS has been down scaled to upazila level through a method, which applies hydrological nodal point having influence on the local fisheries and aquaculture. The nodal point possessed water level and discharge data. Then the upazila level data is down scaled to project level based on the expert judgement and primary data collected from the site, different literature have also consulted in this regard.

Fisheries Management

Fisheries management practices has been identified through KII and discussion with Upazila Fisheries Office and local knowledgeable person respectively.

Primary productivity

It has been estimated by the oxygen measurement method and the rate of changes in oxygen level were determined by the classical "Light and dark bottle" technique (Gaarder and Gran 1927).

The indicators with the data source are given in the following **Figure A1.2**:

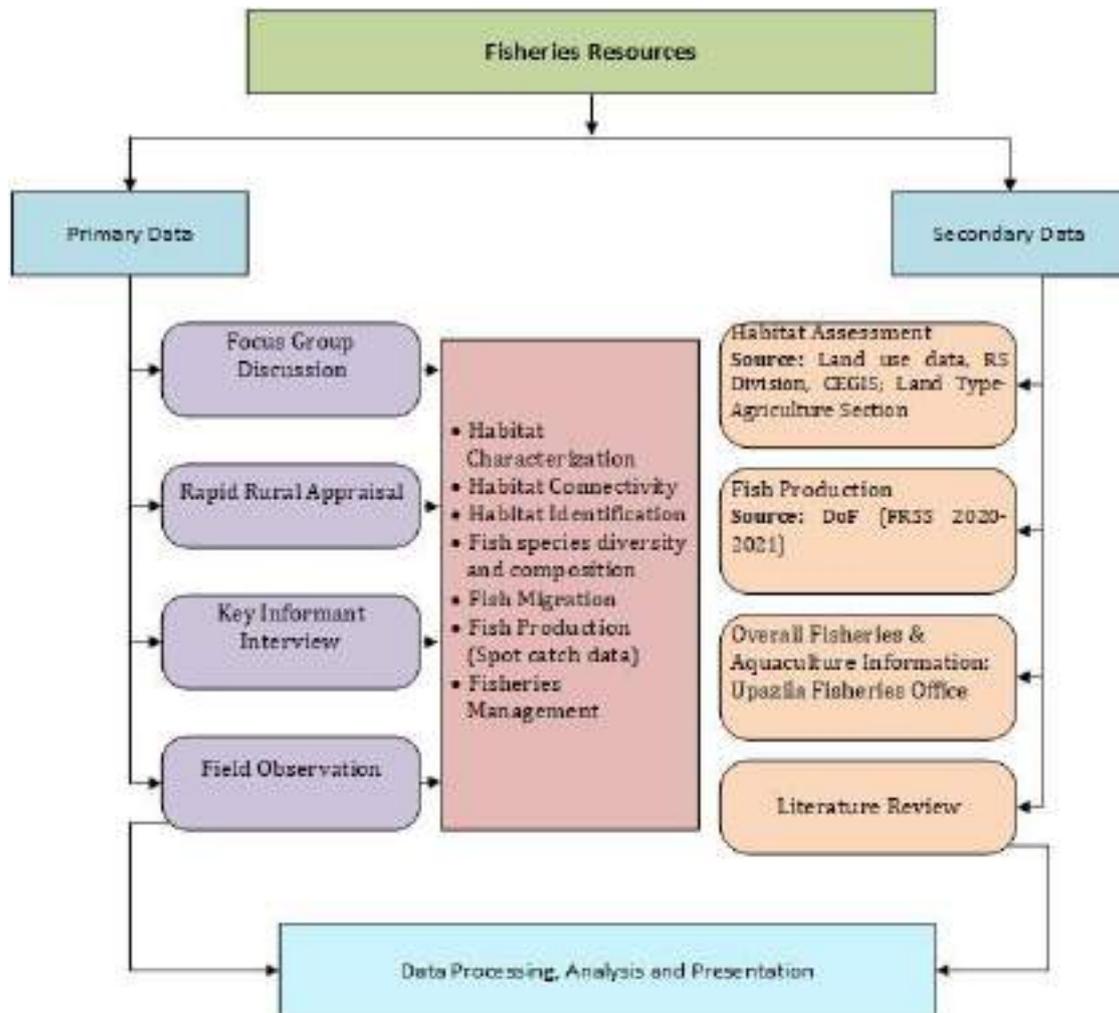


Figure A1.2: Fisheries Resource Indicators and the Source of Data

c) Agriculture and Livestock Assessment

To prepare the baseline information on agriculture, various agricultural parameters such as farming practices, existing major cropping patterns, cropped area, yield rate, crop production, crop damage and various inputs used (availability of irrigation water, fertilizers, pesticides, seeds, labor etc.) have been collected from both primary and secondary sources.

Information on existing cropping patterns and cropping intensity have been collected from secondary sources (UAE Office) and from primary sources through field level survey in consultation with concerned farmers through FGD, dealers of fertilizer and pesticides, officials of DAE and BADC etc. The average yield value (ton/ha) of different crops in the study area have been calculated based on this information. High resolution recent image was used for computation of NCA. The total existing crop production has been estimated using the formula: Total crop production = damaged free area × normal yield + damaged area × damaged yield.

Present statistics of livestock (Cow/Bullock, Buffalo, Goat and Sheep) and poultry (Duck and Chicken) including their numbers and information on grazing land, fodder availability and disease infestation status of the study area have been evaluated during field level survey in consultation with the local people through PRA, RRA and KII. Secondary data sources have been used for analysing the Livestock resources for the study areas for each sub-project. Secondary sources were: District/Upazila Livestock office or both.

Socio-Economic and Cultural Environment

a) Socio-Economic Profile

Baseline condition of important socio-economic and cultural indicators have been explored in the study area. Socio-economic data has been collected following both qualitative and quantitative methods. The qualitative method includes Key Informant Interviews (KIIs) and Focus group discussion; whereas quantitative method includes Population and Housing Census and Agricultural Census published by BBS; and other relevant secondary literatures.

To address the socio-economic conditions, detailed socio-economic survey techniques have been applied to understand a precise coexisting social and economic situation of the study area. Considering the activities under each sub-project, simple checklists were used for identifying the potential impacts of the project interventions. Data from Bangladesh Bureau of Statistics (BBS), local and regional government and non-government organizations were collected for better understanding about the following (**Table A1.3**).

Table A1.3: Data collected for Socio-Economic baseline information

Area of Studies	Indicators	Secondary Sources	Primary Data Acquisition Process
Demographic Profile	<ul style="list-style-type: none"> • Sex ratio • Households and population • Age structure • Population density • Age and workforce distribution • Gender 	BBS, 2011	Field observation, KII, FGD, RRA, group discussion
Living of standard	<ul style="list-style-type: none"> • Housing structure, • Housing tenancy, • Vulnerability and disasters • Displacement or migration 	BBS, 2011	Field observation, KII, FGD, RRA, group discussion
Poverty and livelihood asset	<ul style="list-style-type: none"> • Gender based Occupation and employment, dependency ratio • Labor market, • Household income and expenditure, • Land price, • Poverty status 	BBS, 2011	Field observation, KII, FGD, RRA, group discussion
Ethnicity	<ul style="list-style-type: none"> • Ethnic people 	BBS, 2011	-
Cultural heritage and others	<ul style="list-style-type: none"> • Archeological sites 		Field observation, KII, FGD, RRA, group discussion
Social Facilities/ Utility Services	<ul style="list-style-type: none"> • Electricity coverage, • Sanitation, • Drinking water, • Communication facilities (Traffic and transport) 	BBS, 2011	Field observation, KII, FGD, RRA, group discussion
Literacy status	<ul style="list-style-type: none"> • Overall literacy rate • Women literacy status 	BBS, 2011	-

Area of Studies	Indicators	Secondary Sources	Primary Data Acquisition Process
Stakeholder Consultation	<ul style="list-style-type: none"> Suggestions/ Consent from the local people, officials from GOs and NGOs, other stakeholders 	KII, RRA, Information/ Data from various relevant officials	Stakeholder engagement using following social tools and techniques: <ul style="list-style-type: none"> FGD, KII, RRA, etc. Public Consultation Meeting (PCM) and Public Disclosure Meeting (PDM))

b) Tentative indicators of each of these thematic areas

Socio-economic data were analysed following both qualitative and quantitative methods. The qualitative method includes informal interview and Focus group discussion; whereas quantitative method includes Housing and Population Census and Agricultural Census published by BSS; and other relevant secondary literatures. Tentative indicators of each of these thematic areas are shown in the following **Figure A1.3**.



Figure A1.3: Indicator of Each Thematic Areas for Socio-Economic Data Collection

The primary data collection tools/methods used are briefly described below:

Focus Group Discussion (FGD)

FGDs with different occupational groups (shrimp farmers, women, fish traders/aratdar, cluster members of canal rehabilitation project) have been carried out to understand their views on the proposed project, their affectedness brought out by the project, and their suggestion to be considered in the project planning, etc. Six focus group discussions were held during the fieldwork. Participants were invited in advance and the FGDs were arranged in accordance with the guidelines of FGD.

Informal interview/Rapid Rural Appraisal (RRA)

In the study region, a number of informal interviews have been carried out. During the field visit, a variety of stakeholders, including farmers, fishers, cluster cultivators, and small business owners, were randomly interviewed. This technique refers to informal discussion about project related issues, and using this technique a lot of information has been gathered about the study area.

Key Informant Interviews (KIIs)

A number of interviews with locally knowledgeable people were conducted using the checklist. Locally knowledgeable persons, Respective District Fisheries Officers of Cox's Bazar, Khulna, Bagerhat and Satkhira district, relevant Upazila Fisheries Officers, Upazila Nirbahi Officer of Chakoria upazila, Officer in charge of Chakoria thana, representative of fisheries associations, representative of aratdar associations, fisherman, farmers, personnel of fish processing industry, Executive Engineer of BFDC, local government representatives, representatives from different institutions, etc. has been carried out.

Public Consultation/Disclosure Meeting (PCM/PDM)

Following the preparation of the draft ESIA report, a formal public consultation meeting of large scale will be organized in accordance with ECR 2023. It will be based on the EIA study's findings. Officers at the upazila level, prominent and knowledgeable local figures, and pertinent stakeholders will be invited in this meeting. The participants will receive a power point presentation, and comments from the participants will be collected. Their opinions will be incorporated in the final ESIA report while finalizing report.

G. Stakeholder Consultation

Consultation Approach: Versatile participatory approaches including 'Bottom – Up' and 'Top – Down' have been followed in identifying and engaging both primary and secondary stakeholders for conducting consultations of the project. The study team consulted with the project proponent (DoF) for understanding the project brief and identifying the potential stakeholders.

Three FGDs have been conducted with Fishermen and salt farmer community, Aratdar and women group at CSE. The agenda of these meetings was to know people's understanding about the Project, their concerns and their suggestions for implementing the project. Besides, some informal consultations with cluster farmers, fishermen, fish traders, elite persons, local people, interested groups, etc. whose activities are likely to be impacted due to implementation of the proposed project were also conducted during various stages of ESIA Study. KII with Upazila level officials, medial representatives and DoF officials were also conducted.

Four FGDs have been conducted in three coastal Districts within the catchment areas of the selected cluster shrimp farming canals. Here, the main agenda of the meetings was to know the local people's

concern about the re-excavation of canals, management of re-excavated soil and to engage local people in various works under the project.

A formal public consultation meeting (PCM) has been held at Chakaria Upazila Auditorium and the findings of the PCM along with the participants has been incorporated in **Chapter 7** of the **Volume I: Main Report**.

H. Selection of Valued Environmental and Social Components (VESCs)

Based on the baseline condition of each sub-project, considering potential risks and impacts on the environment of the proposed sub-project site and surroundings, and considering the stage-wise activities of each sub-projects, VESCs have been selected.

I. Determination of Potential Risks and Impacts and Corresponding Mitigation Measures

A comprehensive methodology has been strictly followed according to the Environmental and Social Framework of the SCMFP (World Bank). After screening the impacts, the negative impacts have been identified and evaluated according to the High to Low category for each stage of the sub-project implementation. Project benefits and other beneficial impacts have been excluded from the impact assessment. The degree of significance of an impact or risk is defined by a five-point Likert Scale and evaluated by its magnitude and sensitivity.

The detailed method of the risk and impact analysis has been provided in **Annex 3** under the **Volume II: Annexures of Main Report**. Based on the significance of the impacts a detailed description and mitigation measures have been detailed out for the “high”, “substantial”, and “moderate” impacts. A brief discussion on residual impacts has also been provided for the mentioned significance values.

Mitigation Hierarchy: The World Bank’s OP 4.01 recommended a mitigation hierarchy, which consists of four steps to manage an impact:

- Avoidance is the most preferred form of mitigation where technical options are proposed to be adopted within the project design to completely avoid the impact.
- Where avoidance is not possible, specific actions to minimize or reduce risks and impacts to acceptable level.
- Mitigate the impacts, through minimizing or reducing the risks and impacts; and
- Lastly, where avoidance, minimization, and mitigation are not adequate to manage the potential risks, significant residual impacts remain, compensate for, or offset them, where technically and financially feasible.

J. Formulation of Environmental and Social Management Plan (ESMP)

In this section, set of mitigation and management measures to be adopted, to avoid, reduce, mitigate, or compensate for adverse environmental impacts (in that order of priority) has been discussed. It may include multiple management plans, sub plans and actions which have covered impact specific ESMP (i.e., ESMP for air quality, noise level, water quality etc.), site specific ESMP (i.e., for construction site, special location, important, etc.) and special ESMP (i.e., grievance redress mechanism, ecosystem management plan, green belt management plan, fisheries management plan etc.) as well as Environmental Code of Practice. Mitigation measures have also been outlined considering different stages of Project cycle (pre-construction, land development and operation). The ESMP has been formulated in a manner so that the implementing agency can easily follow it and well placed to the contract of the Contractor as well as can reduce the collective environmental and social issues of the study area. The detail of the water quality management plan, air quality management plan, noise level management plan, fisheries management plan, waste management plan, biodiversity action plan,

emergency response plan, occupational health etc. have been elaborated in the EIA report as per best practices. The detailed methodology has been provided in **Annex 4** under the **Volume II: Annexures of Main Report**.

The contents, addressed in the EMP in general are discussed below:

- Identify and summarize anticipated significant adverse environmental impacts and risks;
- Describe each mitigation measure with technical details, including the type of impact to which it relates and the conditions under which it is required (for instance, continuously or in the event of contingencies), as well as implementing agencies;
- Provide links to any other mitigation plans (for example, for involuntary resettlement) required for the Project.

K. Various Mitigation and Control Measures

The ESMP includes different types of mitigation and control measures and sub plans for significant impacts and risks: (i) general and non-site-specific measures in the form of environmental and social codes of practices (ESCOPs- Ref. to the **Annex 34** of the **Volume II: Annexures of Main Report**) presented in **Section 3.1** to address general construction and operation matters identified as medium and minor/low in significance prior to mitigation and prevention.

One of the key purposes of impact assessment is to ensure that mitigation measures are defined and implemented to manage significant impacts. DoF would implement a mitigation hierarchy (**Figure A1.4**) seeking to first avoid potential impacts. If avoidance is not possible, would minimize potential impacts through design alternatives and/or implementation of standard controls and mitigation. Residual impacts where are higher than the acceptable level, compensation and/or offsetting measures would be provided.

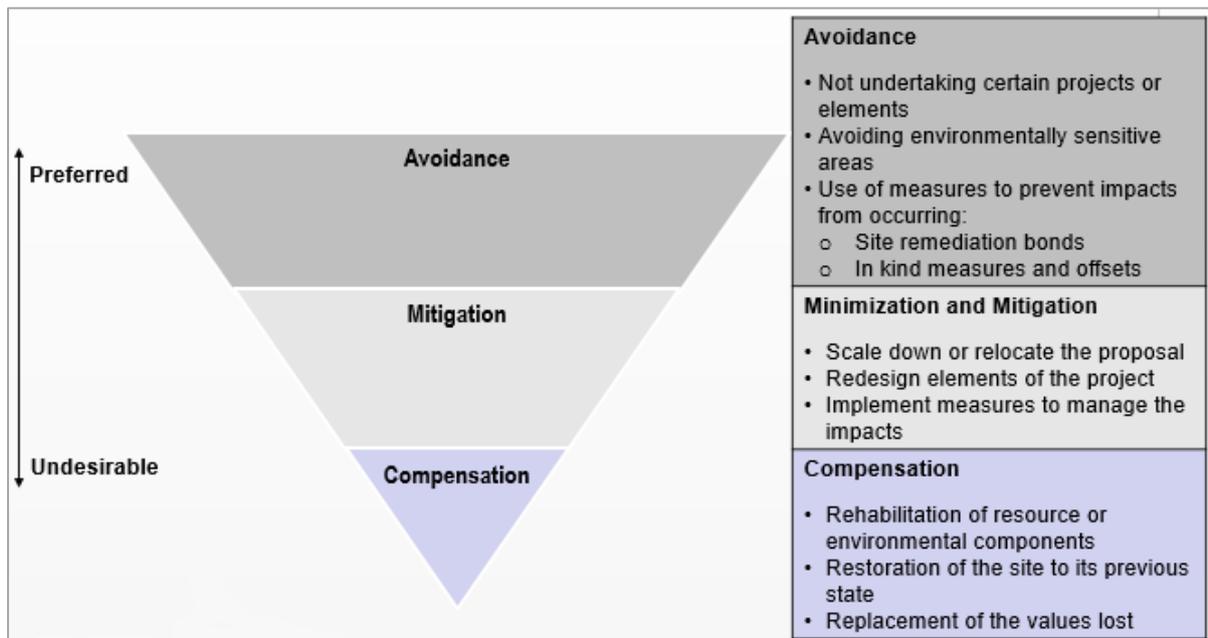


Figure A1.4: Mitigation Hierarchy

a) *Environmental and Social Code of Practices for Construction*

The environmental and social codes of practice (ESCOPs) are generic, non-site-specific guidelines for the construction stage. The ESCOPs consist of environmental and social management guidelines and OHS practices which were identified and prescribed for the Contractors to follow meticulously to comply the conditions of DoE and WB for sustainable management of all environmental, social, health and safety issues. The tentative ESCOPs listed below are to be matched with the project activities and appended in details in **Annex 34** of the **Volume II: Annexures of Main Report**.

- ESCOP 1: Waste Management
- ESCOP 2: Fuels and Hazardous Substances Management
- ESCOP 3: Water Resources Management
- ESCOP 4: Drainage Management
- ESCOP 5: Soil Quality Management
- ESCOP 6: Erosion and Sediment Control
- ESCOP 7: Top Soil Management
- ESCOP 8: Topography and Landscaping
- ESCOP 9: Air Quality Management
- ESCOP 10: Noise and Vibration Management
- ESCOP 11: Protection of Flora
- ESCOP 12: Protection of Fauna
- ESCOP 13: Protection of Fisheries
- ESCOP 14: Road Transport and Road Traffic Management
- ESCOP 15: River Transport Management (if applicable)
- ESCOP 16: Construction Camp Management
- ESCOP 17: Cultural and Religious Issues
- ESCOP 18: Workers Health and Safety
- ESCOP 19: Construction and Operation Phase Security
- ESCOP 20: Operation of Heavy Equipment Management
- ESCOP 21: Excavation/Dredging
- ESCOP 22: Lifting and Material handling
- ESCOP 23: Hazardous Waste

b) *Construction Environmental and Social Action Plan*

The ESMP to be produced as per ECR 2023 for this study during ESIA Study would be used as the C-ESMP for the contractor. The Contractor would prepare a 'Construction Environmental and Social Action Plan' (CESAP) demonstrating the way they would comply with the requirements of site-specific management plans, ESCOPs and the mitigation measures proposed in the ESMP of this ESIA Report. The CESAP would be submitted within 90 days of Contractor's mobilization and would have to be approved by the Engineer before commencing any works. CESAP would form part of the contract documents and would be used as monitoring tool for compliance. Violation of the compliance requirements would be treated as non-compliance leading to corrective actions or otherwise imposing penalty on the contractor.

c) Job Hazard Analysis (JHA)

Job hazard analysis (JHA) have been conducted for each construction component focusing on job tasks to identify hazards before they occur. It has focused on the relationship between the workers, the tasks, the tools, workers and community, and the work environment. Ideally, after identifying uncontrolled hazards, steps should be taken to utilize hierarchy of control: elimination, substitution, engineering controls, administrative controls, and personal protective equipment, to minimize them to an acceptable risk level. Many workers are injured and killed at the worksite every day. The JHA would be one of the components of the larger commitment of the Contractor's health and safety management system. The study has identified the job hazards related with this project may include:

- Jobs with the highest injury or illness rates;
- Jobs with the potential to cause severe or disabling injuries or illness, even if there is no history of previous accidents;
- Jobs in which one simple human error could lead to a severe accident or injury;
- Jobs that are new or complex to the construction or have undergone changes in construction processes and procedures; and
- Jobs complex enough to require written instructions.

d) EHS in Method Statement

The Contractor would include an EHS Chapter in each Method Statement. This EHS section would be based on the JHA and environmental and social issues of the site and specific to construction methods to be followed by the Contractor. This section would be reviewed by the EHS Specialists of the Engineer/Construction Supervision Consultant (CSC) and confer approval along with other technical parameters to be reviewed by the engineering team of the CSC. Each revision of the method statement should also be reviewed by the EHS Specialists, and their concurrence would be required to get them approved.

e) Request for Inspection

Poor temporary structures such as scaffolds, stairs, cofferdam, and ladders are the major causes of the accidents in construction stage. For technical verifications of the temporary structures, specifications in the bidding documents define the material, stability, strength, and deflections of each temporary structure. However, this clause is often ignored in the construction industry as the focus is the permanent structures. Therefore, a Request for Inspection (RFI) for temporary structures would be required, as a pre-requisite for the readiness of site. This study has identified the structures those are required to be requested for inspection.

f) Environmental Monitoring Plan

Implementation of the ESMP and related sub plans requires monitoring to be conducted throughout each stage of the Project. Some of the measures in the ESMP are straight-forward to monitor while some needs specific parameters and indicators to be measured for monitoring at certain frequencies. Regular monitoring of different indicators would be able to evaluate the impacts.

L. ESMP Compliance and Effect Monitoring

With the aim of identifying the policy gaps between GoB and the World Bank's ESF, the relevant rules, regulation and policies have been critically reviewed for each sub-project interventions. In addition, ToR states to assess a gap on E&S systems among WB ESF, Indian LOC and ADB. It is envisaged that

E&S policies of these organization might have a major gap with ESF. Their policies will be insufficient compared to ESF in different aspects, especially the occupational health and safety, Gender and Sexual Exploitation and Abuse, Sexual Harassment, and biodiversity conservation. The findings can be illustrated in a tabular format for better understanding. The institutional survey and KIIs which are to be conducted for the purpose of capacity assessment shall also be helpful in this case. The findings of the capacity assessment will complement the policy gap analysis as well. The GoB rules, regulation, and policies are to be included in this study are – i) related to environmental conservation and protection, ii) related to water management, iii) related to labor, and occupational health and safety, iv) community health and safety, v) land acquisition and resettlement, vi) gender and gender-based violence, vii) disaster management, viii) navigation, dredging and management of dredged materials, etc. CEGIS has developed a harmonized safeguard policy that would be implemented to prepare the financing.

M. IEE/ESIA, and Environmental Clearance Certificate (ECC)

To obtain the Environmental Clearance Certificate (ECC) for the proposed project, it would be required to apply along with the Initial Environmental Examination (IEE)/ESIA report to the Department of Environment (DoE). According to the Environment Conservation Rules 2023, the Project Proponent should submit the **application**. However, CEGIS would assist the Proponent in preparation of the application package and make necessary presentation on the ESIA report (if requested by the DoE).

Annex 2: Relevant Operational Policies and Directives of The World Bank

OP/BP 4.01 - Environmental Assessment

Operational Policy 4.01 (OP 4.01) is one of the ten safeguard policies of the World Bank, which provides the Environmental Assessment (EA) guidance for the lending operations. The OP 4.01 requires the borrower to screen projects upstream in the project cycle for potential impacts. Thereafter, an appropriate EA approach to assess, minimize / enhance and mitigate potentially adverse impacts is selected depending on nature and scale of project. The EA needs to be integrated in the project development process such that timely measures can be applied to address the identified impacts. The policy requires consultation with affected groups and NGOs to recognize community concerns and the need to address the same as part of EA.

OP 4.04 - Natural Habitats

OP 4.04 sets out the World Bank's policy on supporting and emphasizing the precautionary approach to natural resource management and ensuring opportunities for environmentally sustainable development. As per this policy, the Bank does not support projects that involve significant conversion or degradation of critical natural habitats. As per this policy, the Bank does not support projects that involve significant conversion or degradation of critical natural habitats. Projects involving non-critical habitats are supported if no alternatives are available and if acceptable mitigation measures are in place.

OP 4.09 - Pest Management

The Policy OP 4.09 provides the guidance for supporting a strategy that promotes the use of biological or environmental control methods and reduces reliance on synthetic chemical pesticides. In addition, it promotes and supports safe, effective, and environmentally sound pest management. With respect to the classification of pesticides and their specific formulations, the Bank refers to the World Health Organization's Recommended Classification of Pesticides by Hazard and Guidelines to Classification (Geneva: WHO 1994-95).

The following criteria apply to the selection and use of pesticides in Bank-financed projects:

- a) They must have negligible adverse human health effects.
- b) They must be shown to be effective against the target species.
- c) They must have minimal effect on nontarget species and the natural environment. The methods, timing, and frequency of pesticide application are aimed to minimize any damage to natural enemies. Pesticides used in public health programs must be demonstrated to be safe for inhabitants and domestic animals in the treated areas, as well as for personnel applying them.
- d) Their use must take into account the need to prevent the development of resistance in pests.

OP 4.10 Indigenous Peoples

The World Bank policy on indigenous peoples, OP/BP 4.10, Indigenous Peoples, underscores the need for Borrowers and Bank staff to identify indigenous peoples, consult with them, ensure that they participate in, and benefit from Bank-funded operations in a culturally appropriate way - and that adverse impacts on them are avoided, or where not feasible, minimized or mitigated.

OP 4.12 Involuntary Resettlement

Involuntary Resettlement is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts. It promotes participation of displaced people in resettlement planning and implementation, and its key economic objective is to assist displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement. The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Bank appraisal of proposed projects.

Annex 3: Assessment of Potential Risks and Impacts

Potential risks and impacts would be calculated based on the magnitude and sensitivity. The methodology of assessing potential risks and impacts is given below:

A3.1 Assessing the Magnitude of an Impact and Risk

The magnitude of each identified impact and risk is assessed based on five parameters including: i) duration of the impact (temporal aspect); ii) spatial extent of the potential impact, iii) reversibility of the impact; iv) compliance to national and international standards; and v) likelihood of impact occurring. A qualitative scoring technique of quantification is adopted to assess the magnitude of an impact assessing these five parameters. A Likert scale is developed (**Table A3.1**) to assess the degree of each parameter. The scale had a maximum score “4” which is labelled as “High” and minimum score “1” which is labelled as “Low”. A word scenario was also developed to guide quantification of each parameter. Once the assessment of each parameter is completed for an impact, a composite score for each impact is calculated summing scores of all five parameters.

Table A3.1: Definition of the Magnitude Classes and Parameters

Parameter	Qualitative Scale to Quantify the Parameter (Corresponding Score is in Parenthesis)			
	High (4)	Substantial (3)	Moderate (2)	Low (1)
Duration of potential impact	Long term (More than 15 years)	Medium Term (5 to 15 years)	Limited to construction period	Temporary with no detectable potential impact
Spatial extent of the potential impact	Widespread far beyond project AOI	Beyond immediate project AOI	Within project AOI	Specific location within project component with no detectable potential impact
Reversibility of potential impacts	Permanent, requiring considerable intervention to return to baseline	A year or so + some interventions = baseline	Baseline returns naturally or limited intervention	Baseline remains almost constant
Compliance to Legal Standards before Mitigation Measures	Breaches national standards and or international guidelines/ obligations	Complies with limits given in national standards but breaches international lender guidelines in one or more parameters	Meets minimum national standard limits or international guidelines	Not applicable
Likelihood of potential impacts occurring	Certain	Likely	Occasional	Unlikely to occur

The scoring criteria of the assessment of the magnitude of potential risks and impacts is given in the following **Table A3.2**.

Table A3.2: Scoring Criteria for Magnitude Assessment

Magnitude of Impact	Composite Score to Define Magnitude of an Impact
High (H)	16 – 20
Substantial (S)	11 – 15
Moderate (M)	6 – 10
Low (L)	0 – 5

A3.2 Assessing the Sensitivity of a Receptor

The sensitivity of a receptor for each impact has been assessed based on the capacity or features (including proximity/numbers/vulnerability etc.) of the receptors to handle or tackle an impact. A four-level qualitative scale defining the sensitivity as “low”, “moderate”, “substantial” and “high” is developed to assess the sensitivity. The definitions of the sensitivity classes are outlined in **Table A3.3**.

However, in case of biodiversity risk assessment, the sensitivity has been defined following the ESS6 considering critical habitats or a species triggering CH criteria would have high sensitivity and the moderate habitat would have lower sensitivity.

Table A3.3: Definitions of the Sensitivity Classes

Sensitivity Class	Definition
High (H)	Vulnerable receptor with no capacity to absorb proposed changes or minimal opportunities for mitigation.
	<i>Biodiversity Risk Assessment: If the receptor (species, or biodiversity feature or habitat) is triggering Critical Habitat Criteria</i>
Substantial (S)	Vulnerable receptor with little capacity to absorb proposed changes or limited opportunities for mitigation.
	<i>Biodiversity Risk Assessment: If the receptor (habitat) is categorized as natural habitat and provides supports to vulnerable species (EN and CR)</i>
Moderate (M)	Vulnerable receptor with some capacity to absorb proposed changes or moderate opportunities for mitigation
	<i>Natural or modified habitats with anthropogenic pressure and decreasing trend of habitats (or population) with biodiversity value</i>
Low (L)	Vulnerable receptor with good capacity to absorb proposed changes and/or good opportunities for mitigation
	<i>Modified habitats with occurrence of no important species</i>

A3.3 Assessing Significance of an Impact

The significance of an impact (without mitigation) was assessed by its magnitude and sensitivity. A cross-tabular matrix is developed to assess the magnitude qualitatively.

The significance of an impact was evaluated following a four-level scale which is determined by a cross tabular matrix between magnitude and sensitivity **Table A3.4** and **Table A3.5**.

Table A3.4: Cross-tabular Matrix for Assessing Significance of an Impact

Magnitude of Impact	Sensitivity of Receptors			
	High (H)	Substantial (S)	Moderate (M)	Low (L)
High (H)	High (H)	Substantial (S)	Substantial (S)	Moderate (M)
Substantial (S)	High (H)	Substantial (S)	Moderate (M)	Low (L)
Moderate (M)	Substantial (S)	Moderate (M)	Moderate (M)	Low (L)
Low (L)	Moderate (M)	Low (L)	Low (L)	Low (L)

Table A3.5: Significance of the Impact

Significance Class	Word Description
High (H)	The resource/receptor are highly sensitive to the impacts/risk and would likely experience a high magnitude impact that would endure for a long time, extend over a large area, exceed national/international standards, endangers public health and safety, threatens a species or habitat of national or international significance, and/or exceeds a community’s resilience and ability to adapt changes. The Project may have difficulty in complying with the applicable ESF requirement, and significant mitigation would likely be required.
Substantial (S)	The resource/receptor would experience a clearly evidential change from baseline conditions and would approach but not exceed applicable standards. The Project would comply with the applicable ESF requirement, but mitigation would be required.
Moderate (M)	The resource/receptor would experience a noticeable effect, but the magnitude of the impact is sufficiently small (with or without mitigation) that the overall effect would remain well within applicable standards. The Project would comply with the applicable ESF requirement, but mitigation may be required.
Low (L)	The resource/receptor would experience a noticeable effect, but the magnitude of the impact is sufficiently small (with or without mitigation) that the overall effect would remain well within applicable standards. The Project would comply with the applicable ESF requirement, but mitigation may be required.

Annex 4: Methodology for Development of Environmental and Social Management Plan

Introduction

The ESMP has described the site specific environmental (physical and biological), health, safety, and social management plan of all the sub-Projects which have been prepared based on ESMP implementation practices followed in other World Bank funded projects and good international industry practices (GIIP). The ESMP has been prepared for all the stages of the Project implementation namely: Pre- construction, Construction and Post- construction/ Operation stages.

Objectives of ESMP

The basic objective of the ESMP is to manage the site-specific adverse risks and impacts of the proposed project interventions by applying a mitigation hierarchy that would avoid, minimize, and mitigate these risks and impacts on the environment, workers, and community during all stages of project implementation. Where significant residual risks and impacts remain, compensation/offset has been applied. The specific objectives of the ESMP are to:

- Facilitate the identification and implementation of mitigation measures following the mitigation hierarchy.
- Maximize potential project benefits, mitigate negative impacts, and control risks.
- Address occupational and community health and safety hazards and corresponding control measures during construction and operation stages.
- Identify responsibilities for implementing agencies (BWDB and BIWTA), contractors, consultants, and other members of the project team for the environmental, health, safety, and social management of the Project; and
- Define a monitoring and supervision mechanism and identify monitoring and inspection parameters to:
 - Ensure the complete implementation of all mitigation and control measures,
 - Ensure the effectiveness of the mitigation and control measures.

Environmental Management Plan

A. Fisheries Management Plan

Shrimp farming related impacts have been assessed and necessary mitigation measures have been identified, and corresponding management plan have been given under this study in light of National Shrimp Policy 2014 and Hatchery Act 2010, and Environmental, Health, and Safety Guidelines (Aquaculture) of IFC 2007. By any means the project triggers CH criteria of OP 4.04/ESS6, this study may consider the critical habitat assessment (with the tripartite discussion among DoF, WB and CEGIS) and proposes that the Department of Fisheries would be engaged to explore opportunities for development of mitigation to improve the protection of the concerned fish (if any). An overall risk on shrimp and fisheries have been assessed and accordingly a set of mitigation measures will be proposed by following the OP 4.04/ESS 6.

The fisheries management plan have been developed with the aim of protecting fish. The overall significant loss of fish biodiversity and degradation of riverine habitat condition of the project area for sustaining fisheries resources have been accounted as well.

The following issues but not limited to, were considered for fisheries management:

- The bio-periods like breeding, spawning, nursing, recruitment, and grow-out time of dominant fish species need to be identified and calendared so that their respective grounds can be looked after with due care.
- The fish grazing, breeding, spawning, nursery, and grow-out grounds of the river need to be identified and protected as well.
- Care would be taken to avoid locations of significance and bio-periods for major construction works specially dredging works.
- Ecologically rich river reaches and places like “Kole” (Embankment in the young Char land) and activities for fishing restrictions in those reaches or places, for improving the fish resources of the river will be identified (if any).
- Fishing management modes will be identified near the construction and re-excavation works by modifying aquatic environment to attract the fishes near the structure.
- Change in design of canal, embankment, sluice gate, etc. repair and construction would be considered to allow lateral migration of fish during tides and to make the structures more fish and shrimp friendly.

B. Waste Management Plan

PIU/PMU/Consultant would ensure that all construction wastes from the project are properly managed in accordance with applicable laws and regulations, company policies, and World Bank adopted OP/BP (OP 4.09) and ESS standard. Having a Waste Management Plan (WMP) in place would help to prevent accidental release of wastes by construction interventions and would help to develop disposal methods for each waste generated during Project activities.

The WMP includes:

- Description of the types of wastes which would be generated
- Waste minimization opportunities
- Waste management methods
- Record keeping practices, including manifest and waste tracking forms

As with the above, each subcontractor would have their own WMP, or similar (e.g., Garbage Management Plan), but PIU/PMU/Consultant would ensure that all waste is managed in accordance with the applicable standards.

C. Biodiversity Action Plan

To meet the requirement of OP 4.36/ ESS 6, it is proposed to provide a clear set of actions and responsibilities to minimize and mitigate potential impacts to biodiversity for the project, deliver net gains for Critical Habitat values, and to define required monitoring and evaluation, a Biodiversity Action Plan (BAP) have been developed. The BAP includes a Biodiversity Monitoring and Evaluation Plan (BMEP) and cover all phases of the project life cycle. Development of the plan and monitoring activities include integration of specialist experts who have been studying key biodiversity features in the project influenced area. BAP also includes the suggested actions to support long-term protection of the area.

Wildlife survey in the program influence area is proposed to be carried out to monitor the changes in their status, composition, distribution, and diversity. Especially, survey for sensitive species (e.g., fishing cat) and groups (herpetofauna) is recommended to know the changes or alteration in their

ecology and behaviour. The survey can be performed in the project area through employing a set of methods such as- transect line, plot count, point count, focal animal sampling, setting camera traps etc. and include consultation. The appropriate survey method would be selected by the specialist appointed by the PIU.

This BAP would be implemented by the Contractor that would be monitored by DoF/Consultant, but the consultant would help to develop the plan and take part in the ongoing monitoring and evaluation during the construction phase.

Social Management Plan

A. Compensation Plan to be Covered by RAP

A Resettlement Policy Framework (RPF) have been developed in accordance with OP 4.12 /ESS5 to guide the RAP which will be prepared before implementation of the project. The RAP would detail the compensation plan. National regulations and World Bank ESF would be applied for compensation. Following Project Affected People (PAPs) are eligible for compensation if there is any:

- Persons who have formal legal rights to land or assets;
- Persons who do not have formal legal rights to land or assets, but have a claim to land or assets that is recognized or recognizable under national law; or
- Persons who have no recognizable legal right or claim to the land or assets they occupy or use.

In other words, the compensation plan would be inclusive; all affected persons would be covered, compensated for lost assets, and assisted in relocation and resettlement, following the Resettlement Policy Framework (RPF). The non-titled persons would be provided resettlement assistance in lieu of compensation for the land they occupy and other assistance, if they occupy the project area before the cut-off date, established by the project authority.

Furthermore, all persons of the above categories (a, b, and c) would be compensated for loss of any assets such as land, crops, structures, trees, business, employment, livelihood, accessibility, etc. Thus, PAPs include all categories, irrespective of their status or whether they have formal titles, legal rights or not, squatters or otherwise encroaching illegally on land, are eligible for assistance if they occupied the land or had used of it before the entitlement cut-off date. All PAPs, thus, will receive (i) compensation (as required, to match replacement value), and/or (ii) replacement land, structures, seedlings, other resettlement assistance such as shifting allowance, assistance with rebuilding structures, compensation for loss of workdays/income.

Structures located in GoB land, if displaced, have been entitled for compensation under the policy of the Project as determined in the entitlement matrix of RPF. Vulnerable PAPs were qualified for additional assistance to facilitate relocation and restoration of their livelihoods. Non-vulnerable households with land and/or structures affected would be entitled to compensation for lost assets at replacement costs and assistance for shifting and reconstruction of the structure. Any structure not directly used by a non-vulnerable household i.e., rented-out for income have also been qualified for additional resettlement assistance.

B. Sexual Exploitation and Abuse and Sexual Harassment Risk Mitigation Action Plan

A standalone Sexual Exploitation and Abuse and Sexual Harassment (SEA-SH) Risk Mitigation Action Plan has been prepared for this Project. The SEA-SH Risk Mitigation Action Plan includes the followings:

- Gender Action Plan
- Sensitizing the IAs and Integrating the SEA-SH into the DPP and PAD
- Integrating SEA/SH into the Bidding Documents
- Create awareness on SEA-SH and GBV
- Addressing SEA/SH-related risk in program
- Stakeholder consultations and Disclosure on SEA-SH action plan in the project area SEA-SH prevention and response service mapping
- SEA/SH sensitive channels for reporting in the Grievance Redress Mechanism (GRM)
- Operating Procedures and Response Protocol
- Enforcement of a Code of Conduct

As a part of prevention, training and information campaigns should be put in place for all project personnel and PoC. Training and information campaigns may include the distribution of information sheets, posters and videos, or community meetings, focus group discussions, etc.

Beside that the project includes a general Code of Conduct (CoC) as well as a Labor Code of Conduct, covering the SEA/SH related risks for the contractors, sub-contractors, and all project workers/officials who would be employed under the project.

C. Stakeholder Engagement Plan (SEP)

Since it is essential that stakeholder engagement and consultation is mandatory during the project planning, implementation, and operation stages, a standalone Stakeholder Engagement Plan (SEP) has been prepared alongside the ESIA. The SEP complies with the GOB regulations and the WB's OP 4.04/ESS 10. The SEP outlines the ways in which Project would engage all stakeholders – for example, national/regional stakeholders, PAPs, vulnerable communities, different interested groups, local community people, different occupational groups, women's groups, laborers, and contractors, and provide them with a mechanism through which stakeholders can raise concerns, provide feedback, or make positive and negative comments about project related impacts and benefits.

D. Grievance Redress Mechanism (GRM)

The Implementing Agency (IA) would establish a standalone Grievance Redress Mechanism (GRM) to address the stakeholder complaints and grievances, including resettlement associated with the Project. Under OP 4.12, grievance mechanisms must be appropriate and accessible. The GRM is intended to address issues and complaints in an efficient, timely, and cost-effective manner. The GRM would be two-tiered, i.e., Field level and Project level to receive, evaluate, and facilitate the resolution of affected people's concerns, complaints, and grievances. The GRM aims to provide a time-bound and transparent mechanism to receive and resolve social and environmental concerns linked to the project. The GRM has been elaborated in the SEP prepared for the project.

In addition to this general GRM, a separate standalone Labor GRM and SEA/SH responsible GRM have been suggested. The GRM model is based on the Project Level GRM Model of Good Practice Note of the World Bank. The details of the GRMs have been described in the SEA/SH Action Plan, LMP, RPF and as well as in the SEP prepared as a standalone document alongside this ESIA.

E. Laborer Management Procedure

The Labor Management Procedures (LMP) has been developed to ensure proper working conditions and to manage the main labor requirements and risks under the proposed Project. The LMP has set out the approaches and measures to meet and mitigate the national requirements as well as the objectives of the WB's Environmental and Social Framework, specific objectives of World Bank newly adopted ESS2, ESS4 and also the Equator Principles by Equator Principles Financial Institutions (EPFIs).

This LMP has been developed to achieve the following specific objectives:

- To ensure workplace safety and health.
- To provide sufficient treatment, non-discrimination, and equal opportunity for project workers irrespective of sex, race, or ethnic identity.
- To protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, per National law and the ESS2 of the World Bank ESF) and contracted workers and primary supply workers, as applicable.
- To prevent the use of all forms of forced labor and child labor.
- To provide project workers with accessible means to raise workplace grievances.
- To mitigate the risks of Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH) in the workplace
- The assigned contractor will be responsible to implement the LMP that will be monitored by IA/Consultant.

F. Emergency Response Plan (ERP)

Consultant has prepared a plan to assist Implementing Agency (IA) to develop the ERP that would be implemented by Contractor/subcontractors to respond in a safe, rapid, effective, and efficient manner to the potential incidents that might result from the project activities. Emergency response operations are designed to directly address all emergency situations and their consequences, and establish command and control over the incident scene, ensure the safety of responders, develop plans of action, and facilitate communications.

Emergency situations to be addressed in the ERP includes:

- Spills (diesel, chemical spills, etc.)
- Fire and/or explosion
- Personnel (injuries, fatalities, missing person, etc.)
- Evacuations
- Natural disasters (hurricane, earthquake, etc.)
- Transportation – personnel or equipment (vessel collision, etc.)
- Security (kidnap/extortion, piracy, etc.)
- Media/public relations (could result from any of the incidents above)

The ERP includes:

- Response Procedures
- Key Contacts (within and outside of DoF and Construction Engineer)
- Notification Procedures
- Medical Evacuation Plan (MEDEVAC)

It is likely that each Contractor/subcontractor will have their own specific ERPs, but it would be the responsibility of DoF/Consultant to ensure that all scenarios are covered and each contract is working together in the event of an incident (as necessary).

Annex 5: Specification of Substation, Associated Distribution Line, and Generator

	<p>স্বপ্রজাতন্ত্রী বাংলাদেশ সরকার মন্ত্রণা ও আনিসঙ্গপদ মন্ত্রণালয় চট্টগ্রাম মৎস্য বন্দর বাংলাদেশ মৎস্য উন্নয়ন কর্পোরেশন</p> <p>মৎস্য বন্দর, চট্টগ্রাম, জি.পি.ও বঙ্গ নং ২৯, ফোনঃ০৩১-৬১৩০০৬ www.bfde.gov.bd, E-mail: ctgharbour@gmail.com</p>		
<p>Final Estimate for Supply and Installation of all material to make an overhead H.T cable line, Electric Substation and LT distribution system.</p>			
Sl. No	Descriptions of Items	Measurement Unit	Quantity
01	<p>11 KV SWITCHGEAR (VCB) for 1600 KVA Substation :</p> <p>Sheet steel metal clad, dust and vermin proof, powder coated, free standing, floor mounting induce type HT Switchgear with 11 KV, 50Hz, three phase, 630 A hard drawn electrolytic copper bus bars, provided bottom gland plate and front door gasket and equipped with:</p> <p>1No. 630 A, 11 KV, breaking current 20 KA (3 sec), making current 50 KA, 50 Hz, TP Fixed Type Vacuum Circuit Breaker with motor operated mechanism with closing solenoid shunt releases, auxiliary contacts 5NO + 5NC and limit switch (1 NO + 1 NC) for indication "Closing spring charged" mechanical on/off/trip/indicator.</p> <p>Vacuum Interrupter: EATON/MEM/ Dorman & Smith/ Merlin Gerin/ ABB/Schaeider or equivalent product of UK/ France/ Germany/ Italy/ USA.</p> <p>2Nos. Cast resin insulated, double pole, Potential Transformer, ratio: 11/11 KV, Class 0.5, 50 VA, (In open delta connection).</p> <p>Material Specification:</p> <p>1Set 11KV HRC Fuse for PT primary protection 1No. MCB of adequate rating for PT Secondary protection Made in MEM/ Dorman & Smith/ Merlin Gerin/ ABB or equivalent product of UK/ France/ Germany/ Italy/ USA)</p> <p>3Nos. Cast resin insulated, 11 KV dry type double, 0.5 Class core CT with Ratio: 100/5A. Material Specification:</p> <p>3Nos. Ammeter, 0 - 100 A with selector switch 1No. Voltmeters, 0 - 15 KV, with selector switch</p> <p>1No. Triple pole, digital microprocessor controlled IDMT Relay with adjustable minimum time setting for over current, earth fault and short circuit protection</p> <p>Origin : MEM/ Dorman & Smith/ Merlin Gerin/ ABB/Siemens or equivalent product of UK/ France/ Germany/ Italy/ USA/EU) Material Specification:</p>	Set	01



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বাংলাদেশ মতলা উন্নয়ন কর্পোরেশন



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	<p>2Nos. ON and OFF/TRIP Push Button Switch. 2Nos. Indicating Lamps ON and OFF/TRIP Switch. 1No. Panel Heater. 3Nos. Phase Indicating Lamp (R/Y/B)</p>		
02	<p>OIL IMMERSSED TRANSFORMER- 1600 KVA, 11/0.415 KV : Supply of following oil-immersed, natural air cooled, 3- phase, 50Hz, 11/0.415 KV & 0.24 KAVA indoor type distribution transformer of DYN11 vector group complete with two windings of high conductivity copper having percentage impedance 4- 6.5%, basic impulse insulation level 75 kv, Dielectric strength 28 KV (for 1 min.), HT & LV porcelain bushings, manual 5 position standard tap changer, conservator, thermometer, oil inlet & outlet valves, oil level indicator, dehydrating breather, lifting lugs, earthing Terminals, wheel, data plate etc. Properly painting, suitable for operation at 40° c ambient temperature with maximum temperature rise 60° c, locally manufactured and tested in Bangladesh as per NEMA/VDE/IEC/BS standards. 3 HT Bushing and 4 LT Bushings arranged on tank side and suitable for LT bus duct connection and separate neutral earthing bushing would brought on tank side, conservator, oil level indicator, drain and filling valves, lifting lugs, bi-directional rollers, with first filling of oil in transformer acc. to VDE/IEC/DIN standard. Technical Data: Rated Capacity : 1600 KVA Rated Frequency : 50 Hz Duty : Continuous Rated Voltage : -Primary : 11000 V -Secondary : 415V Cooling : ONAN Connection(HV/LV) : Delta/Star Vector Group : Dyn 11 Tap changer on HT Side : ± 2.5%, -5%, -7.5% Ambient Temperature : 40°C Temperature rise:- in Oil : 60°C (Max) - in Coil : 65°C (Max) Star point brought Insulation Level (HV/LV) : 75/28KV (rms) Auxiliary supply : 220V AC and 110V DC out & loadable up to : 100% Max. service altitude : 1000 Meters Installation : Indoor/outdoor No load losses : 1440 W Full load losses : 17200 W Impedance : 6% (approx)</p> <p>Accessories: Silica gel breather Thermometer</p>	Set	01



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	<p>Off load tap changer Oil Level Indicator Buchholz Relay Material Specification: Core, Insulating Materials, Copper Strip, Off load tap changer Buchholz Relay Origin: Nippon Steel/ Weidman/ Comem SP/ MEM/ Dorman & Smith/ Merlin Gerin/ ABB or equivalent product of UK/ France/ Germany/ Italy/ USA/ Japan/ Switzerland/ Italy.</p>		
03	<p>LT SWITCHGEAR (2500 A): Sheet steel clsd, dust and vermin proof, powder coated, free standing, floor mounting type, 415V, 50 Hz. Indoor type Low Tension Switchgear Panel with 2500A, hard drawn electrolytic copper bus bars, TPN & E equipped with</p> <p>Incoming: 1 No. 2500A, 66KA, TP, ACB with store - energy spring charge operating mechanism (Motor Operated) and microprocessor controlled O/C, and short-circuit Releases and shunt releases.</p> <p>3 Nos. Current Transformer, ratio: 2500/5A, 0.5 Class with suitable burden 1 No. Digital Ammeter, 0 - 2500A, 1 No. Digital Voltmeter, 0- 500 V</p> <p>3 Nos. Phase Indicating Lamp 2 Nos. ACB ON/OFF Indicating Lamp 1 No. DP, MCB for control circuit protection 1 Set Control Fuse</p> <p>Outgoing :</p> <p>1 Nos. 600A, 36KA, TP, MCCB with adjustable thermal overload and adjustable magnetic short-circuit releases</p> <p>8 Nos. 400A, 36KA, TP, MCCB with adjustable thermal overload and adjustable magnetic short-circuit releases</p> <p>2 Nos. 320A, 36KA, TP, MCCB with adjustable thermal overload and adjustable magnetic short-circuit releases</p> <p>3 Nos. 250A, 36KA, TP, MCCB with adjustable thermal overload and adjustable magnetic short-circuit releases</p> <p>3 Nos. 200A, 36KA, TP, MCCB with adjustable thermal overload and adjustable magnetic short-circuit releases</p>	Set	01

	<p>গণপ্রজাতন্ত্রী বাংলাদেশ সরকার মৎস্য ও প্রাণিসম্পদ মন্ত্রণালয় চট্টগ্রাম মৎস্য বন্দর বাংলাদেশ মৎস্য উন্নয়ন কর্পোরেশন</p>	
<p>মৎস্য বন্দর, চট্টগ্রাম, জি.পি.ও বয়ল নং ২৯, ফোন:০৩১-৬১৩০০৬ www.bfdc.gov.bd, E-mail: ctgharbour@gmail.com</p>		
<p>3 Nos. 160A, 16KA, TP, MCCB with adjustable thermal overload and adjustable magnetic short-circuit releases</p> <p>3 Nos. 125 A, 16KA, TP, MCCB with adjustable thermal overload and adjustable magnetic short-circuit releases</p> <p>2 Nos. 63A, 16KA, TP, MCCB with adjustable thermal overload and adjustable magnetic short-circuit releases.</p> <p>3 Nos. 50A, 16KA, TP, MCCB with adjustable thermal overload and adjustable magnetic short-circuit releases</p> <p>3 Nos. 63A, 16KA, DP, MCCB with adjustable thermal overload and adjustable magnetic short-circuit releases</p> <p>3 Nos. 50A, 16KA, DP, MCCB with adjustable thermal overload and adjustable magnetic short-circuit releases</p> <p>3 Nos. 32A, 16KA, DP, MCCB with adjustable thermal overload and adjustable magnetic short-circuit releases</p> <p>3 Nos. 20A, 16KA, DP, MCCB with adjustable thermal overload and adjustable magnetic short-circuit releases</p> <p>3 Nos. 16A, 16KA, DP, MCCB with adjustable thermal overload and adjustable magnetic short-circuit releases</p> <p>3 Nos. 10A, 16KA, DP, MCCB with adjustable thermal overload and adjustable magnetic short-circuit releases</p>		
<p>04 950 KVAR AUTOMATIC PFI PLANT With 1600A, 65KA, TP, ACB : Supply of following 415 volt, 3 phase, 50 Hz, 950 KVAR Indoor type Automatic power factor improvement plant complete with TP bus-bars and earth block, micro processor controlled auto power factor correction relay with digital PF reading display, capacitor bank, contactor, fuse, ON indicators for every stage of capacitor bank (except directly connected one) etc. shall be manufactured & tested as per NEMA/ VDE/ ICE/ JIS/ BSS standard assembled in 16 SWG sheet steel clad dust & vermin proof free standing, floor mounting, epoxy resin powder coat painted cabinet as per relevant IEC standards and as per approval & acceptance of the Engineer.</p> <p>Power Factor Improvement Plant, comprising: 4 nos. 415 V, 750 Amps hard drawn electrolytic copper bus-bar. 1No. 25 KVAR Bank of TP dry type Power Capacitors with built-in discharge resistor (Fixed) Type: MKPG</p>	<p>Sat</p>	<p>01</p>



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<p>1No. 25 KVAR Bank of TP dry type Power Capacitors with built-in discharge resistor Type: MKPG</p> <p>7No. 100(4X25) KVAR Bank of TP dry type Power Capacitors with built-in discharge resistor Type: MKPG</p> <p>4Nos. 50(25*2) KVAR Bank of TP dry type Power Capacitors with built-in discharge resistor Type: MKPG</p> <p>1No. 12 Stage, Automatic Power Factor Correction Relay with interlocking auxiliary relay Type: PFR 120</p> <p>1No. TP magnetic Contactor with unlimited peak current for 25 KVAR, Type: UA 30-30-10 RA</p> <p>4Nos. TP magnetic Contactor with Unlimited peak current for 50 KVAR, Type: UA 75-30-11 RA</p> <p>14 Nos. TP magnetic Contactor with unlimited peak current for 100 KVAR, Type: UA 75-30-11 RA</p> <p>39 Nos. of HRC fuse of adequate rating 12 Nos. Indicating Lamps 1 Set of Control fuses 1 No. 1600A, 65KA, TP, Fixed type ACB with store energy spring charge operating mechanism (Motor Operated) and microprocessor controlled adjustable O/C, and short-circuit releases and shunt releases with 2NO+2NC auxiliary contact FOR PFI INCOMING 1 No. Digital Ammeter, 0 - 1600 A 1 No. Digital Voltmeter, 0 - 500 V 3 Nos. Indicating Lamps</p> <p>Additional: PFC Relay 12 Stage Micro- 2nos HRC Fuse -100/63/25A 72 nos Drof Out Fuse 60A 6 nos CT- 1000/5 6 nos CT- 1200/5 6 nos Multi Meter Selec 4 nos Capacitor 1 KVAR 2 Pcs Capacitor 2 KVAR 2 Pcs Capacitor 3 KVAR 2Pcs Capacitor 5 KVAR 2 Pcs Capacitor 7.5 KVAR 2 Pcs Capacitor 10 KVAR 2 Pcs</p> <p>Origin: Electronicon/ MEM/ Dorman & Smith/ Merlin Gerin/ ABB or</p>		
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	equivalent product of UK/ France/ Germany/USA/ Switzerland/ Italy.		
05	11 KV DROPOUT FUSE ; Technical Specification : Rated Voltage (Nominal) : 11 kV Rated Maximum Voltage : 15 kV Rated Frequency : 50 Hz BIL : 75 kV Rated Current RMS : 100A Interrupting Current RMS : 10 kA Withstand Test Voltage Dry, 1 Min. : 35 kV Wet, 10 sec. :30 kV Supply of outdoor type dropout fuse complete with mounting accessories etc. manufactured by GEM Co. Ltd. Bangladesh or equivalent product of USA/UK/ Germany/ Switzerland/ France origin. (3 nos. in a set)	Set	01
06	11 KV LIGHTING ARRESTOR : Technical Specification : Rated Voltage (RMS) : 9 kV Rated System voltage : 12 kV Frequency : 50 Hz Minimum Spark Over (RMS) : 14 kV Maximum Spark Over (RMS) : 40 kV Maximum Impulse Spark (Crest) : 45 kV Withstand Voltage Wet, 10 sec. : 24 kV Dry, 1 min. : 28 kV Discharge 33 kV (Crest) : 5 kA Impulse Current Withstand : 55 kA Supply of outdoor type lightning arrester complete with mounting accessories etc. manufactured by GEM Co. Ltd. Bangladesh or equivalent product of USA/UK/Germany/ Switzerland/France origin. (3 nos. in a set)	Set	01
07	3-phase outdoor type disconnecting switch; Supply of 11KV, 50 Hz 320A, 3-phase outdoor type disconnecting switch having 75 KV BIL manufactured by GEM Co. Ltd. Bangladesh or energy Pac or equivalent product of USA/EU countries.	Set	01
08	EARTHING FOR SUB-STATION: i) Earthing and electrical installation with 38.10 mm (1.5") dia GI pipe (earth electrode) having 6.35 mm dia holes across the dia at 305 mm interval securely bonded by soldering with 2 nos. of No. 4 SWG HD6C earth lead with washer nut bolts etc. sunk upto under mentioned depth and protection of earth lead by 12.7 mm (1/2") dia GI pipe upto plinth level run at a depth of 609.6 mm (2ft) below GL upto earthing block/ Transformer body to be earthed including necessary connecting copper sockets bolts nut ,including additional vertical run of 12.7 mm GI pipe upto GL from 609.6mm (2ft) depth with blind socket for water pouring facility etc. Complete for maintaining earth resistance within 1 Ohm. Depth of bottom of main electrode at 31.242mm (102.5 ft) and length of the electrode 30,480 mm (100ft).	Sets	08



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বাংলাদেশ মৎস্য উন্নয়ন কর্পোরেশন



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09	Providing & fixing of earthing block with 50mmx300mmx8mm copper bar.	Nos	06
10	TRANSPORTATION AND UNLOADING: Supply all the machines and necessary equipment need to transport and un-load as required to fabricate 1600KVA Sub-station.	Job	01
11	SUB-STATION INSTALLATION: Installation, testing & commissioning of the Transformer /indoor type LT/HT Switchgear/ P.F.I plant and all distribution boards on prepared c.c. foundation with the help of necessary (MS angle bar 2" / 2" ,for DBs) tools & plants, skilled labor & technician as per direction of the E/C.	Job	01
12	PDB LOAD SANCTION: Old Substation Need to Replace By New Substation. Existing Load Sanction 810 KW + Need new Load Sanction 200 KW = 1010 KW Include Everything Like Load approval, demand Note Fee (Security Deposit), Estimate and Fitting- Fixing Charge, File processing or any other hidden charge.	KW	200
13	CT, PT, HT ENERGY METER SUPPLY, WIRING CHARGE (CT, PT, HT METER), HT METERING BOX: Supply and installation of digital H.T. Metering unit assembled in 16 & 18, 20 SWG sheet steel clad, Dust & vermin proof, free standing, floor mounting epoxy resin power coat painted cabinet as per relevant IEC standings (approved by Electric Supply Office) complete with CT/PT/ Bus bar & necessary accessories as required for 1600 KVA sub-station and tested by local electric supply office with connection. Complete in all respect as per direction of the Engineer-in-charge.	Job	01
14	HT CABLE: Supply & lying following HT/LT cable through the prepared trench including connection with cable socket & heat sink for HT cable etc complete as per direction of the Engineer-in-charge. Cables manufactured by Govt. of Bangladesh owned/shared (Eastern Cable Ltd) or equivalent manufactured by the Valid ISO-9001 certified company having test certificate according to relevant IEC standards from BUET/CUET/ DUET /KUET/RUET and from any internationally accredited independent laboratory. 3Cx150 RM (XLPE) HT cable (OH) 11 KV line to HT meter, HT meter to HT switchgear & HT switchgear to Transformer.	Meter	160
15	LT CABLE: Supply & lying following HT/LT cable through the prepared trench including connection with cable socket & heat sink for HT cable etc complete as per direction of the Engineer-in-charge. Cables manufactured by Govt. of Bangladesh owned/shared (Eastern Cable Ltd) or equivalent manufactured by the Valid ISO-9001 certified company having test certificate according to relevant IEC standards from BUET/CUET/ DUET /KUET/RUET and from any internationally accredited independent laboratory. 1Cx300 RM (415V, NYN) LT cable (Transformer to LT panel, LT panel to PFI & Transformer neutral bushing to earthing block)	Meter	200



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16	<p>LT CABLE: Supply & lying following HT/LT cable through the prepared trench including connection with cable socket & heat sink for HT cable etc complete as per direction of the Engineer-in-charge. Cables manufactured by Govt. of Bangladesh owned/shared (Eastern Cable Ltd) or equivalent manufactured by the Valid ISO-9001 certified company having test certificate according to relevant IEC standards from BUET/ CUET/ DUET/ KUET/ RUET and from any internationally accredited independent laboratory. 1Cx35 RM (415V, NYY) (Earthing block to LT/HT panel, PFI, HT meter etc.)</p>	Meter	100
17	<p>LT CABLE: Supply & lying following HT/LT cable through the prepared trench including connection with cable socket & heat sink for HT cable etc complete as per direction of the Engineer-in-charge. Cables manufactured by Govt. of Bangladesh owned/shared (Eastern Cable Ltd) or equivalent manufactured by the Valid ISO-9001 certified company having test certificate according to relevant IEC standards from BUET/ CUET/ DUET /KUET/ RUET and from any internationally accredited independent laboratory. 4Cx240 RM (415V, NYFGBY) cable (LT panel to all DBs cable)</p>	Meter	700
18	<p>LT CABLE: Supply & lying following HT/LT cable through the prepared trench including connection with cable socket & heat sink for HT cable etc complete as per direction of the Engineer-in-charge. Cables manufactured by Govt. of Bangladesh owned/shared (Eastern Cable Ltd) or equivalent manufactured by the Valid ISO-9001 certified company having test certificate according to relevant IEC standards from BUET/ CUET/ DUET /KUET/ RUET and from any internationally accredited independent laboratory. 4Cx150 RM (415V, NYFGBY) cable (LT panel to all DBs cable)</p>	Meter	1450
19	<p>LT CABLE: Supply & lying following HT/LT cable through the prepared trench including connection with cable socket & heat sink for HT cable etc complete as per direction of the Engineer-in-charge. Cables manufactured by Govt. of Bangladesh owned/shared (Eastern Cable Ltd) or equivalent manufactured by the Valid ISO-9001 certified company having test certificate according to relevant IEC standards from BUET/ CUET/ DUET /KUET/ RUET and from any internationally accredited independent laboratory. 4Cx120 RM (415V, NYFGBY) cable (LT panel to all DBs cable)</p>	Meter	100
20	<p>LT CABLE: Supply & lying following HT/LT cable through the prepared trench including connection with cable socket & heat sink for HT cable etc complete as per direction of the Engineer-in-charge. Cables manufactured by Govt. of Bangladesh owned/shared (Eastern Cable Ltd) or equivalent manufactured by the Valid ISO-9001 certified company having test certificate according to relevant IEC standards from BUET/ CUET/ DUET /KUET/ RUET and from any internationally accredited independent laboratory.</p>	Meter	50



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	4Cx95 RM (415V, NYFGGY) cable (LT panel to all DBs cable)		
21	LT CABLE: Supply & lying following HT/LT cable through the prepared trench including connection with cable socket & heat sink for HT cable etc complete as per direction of the Engineer-in-charge. Cables manufactured by Govt. of Bangladesh owned/shared (Eastern Cable ltd) or equivalent manufactured by the Valid ISO-9001 certified company having test certificate according to relevant IEC standards from BUET/CUET/ DUET /KUET/RUET and from any internationally accredited independent laboratory. 4Cx70 RM (415V, NYFGGY) cable (LT panel to all DBs cable)	Meter	2150
22	LT CABLE: Supply & lying following HT/LT cable through the prepared trench including connection with cable socket & heat sink for HT cable etc complete as per direction of the Engineer-in-charge. Cables manufactured by Govt. of Bangladesh owned/shared (Eastern Cable ltd) or equivalent manufactured by the Valid ISO-9001 certified company having test certificate according to relevant IEC standards from BUET/CUET/ DUET /KUET/RUET and from any internationally accredited independent laboratory. 2Cx16 RM (415V, NYFGGY) cable (LT panel to all DBs cable)	Meter	800
23	Cable Installation: Land Excavation, Cable Drain Line(1.5 Ft x 1.5 Ft X 1.5 Ft, Length-200Meter, RCC Slab to Cover The Whole Drain & Bottom Floor CC casting with wall thickness 10 inch) and (1 Ft x 1 Ft X 1 Ft, Length-1200Meter, RCC Slab to Cover The Whole Drain & Bottom Floor CC casting with wall thickness 10 inch)	Meter	1400
24	CROSS ARM SUPPLY FITTING & HT CABLE LYING CHARGE (CABLE LYING FROM POLE TO SUBSTATION).	Job	1
25	INCLUDED ELECTRIC LICENCE BOARD PERMISSION (FOR GROUND FLOOR), ENERGY AUDIT FEE etc.	Job	1
26	INSTALLATION & COMMISSIONING OF ON GRID SOLAR SYSTEM, Supply, installation and commissioning of on grid Solar System as required.	KW	10
27	PC Electric Lighting Pole (Length-30foot, Bottom Dia-8 inch & Top Dia-4inch), Each Pole has Five Nos LED Flood Light-100Watt & Necessary Installation Equipment.	Sets	20
28	Changeover Switch 1000A Complete.	Sets	2
29	Junction Box: Supply of 415V, 3-phase, 50 Hz, Outdoor type with one power indicating lamp per phase (RYB) and following components according to relevant NEMA/VDE/IEC/ JIS/ BS standards and shall have type test certificate according to relevant IEC standard) assembled locally in 14 SWG sheet steel metal clad, dust & vermin proof, free standing floor mounting epoxy resin power coat painted cabinet as per relevant IEC standards and as per Approved & acceptance of the Engineer. Each Junction Box: Size(4Ft X 10Ft X 2 Ft)- 1 Nos Copper Bus bar(Size: 18 Inch X 2 Inch X 10mm, 600-800 Amps)-24 Nos Copper Bus bar(Size: 20 Inch X 2 Inch X 12mm, 900-1000Amps)-4 Nos Need to supply & installation all equipment's Like Nut-bolt, supporter,	Set	1



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	etc.		
30	<p>Junction Box: Supply of 415V, 3-phase, 50 Hz, Outdoor type with one power indicating lamp per phase (RYB) and following components according to relevant NEMA/VDE/IEC/ JIS/ BS standards and shall have type test certificate according to relevant IEC standard) assembled locally in 14 SWG sheet steel metal clad, dust & vermin proof, free standing floor mounting epoxy resin power coat painted cabinet as per relevant IEC standards and as per Approved & acceptance of the Engineer.</p> <p>Each Junction Box: Size(3Ft X 5 Ft X 2 Ft)- Nos Copper Bus bar(Size: 18 Inch X 1.5 Inch X 10mm, 400-500 Amps)-12 Nos Need to supply & installation all equipment's Like Nut-bolt, supporter, etc.</p>	Sets	9
31	<p>DISTRIBUTION BOARDS: Supply of 415V, 3-phase, 50 Hz, indoor type low tension switchgear of following specification complete with one power indicating lamp per phase (RYB) and following components (components such as TP MCCBs shall be manufactured) according to relevant NEMA/VDE/IEC/ JIS/ BS standards and shall have type test certificate according to relevant IEC standard) assembled locally in 14 SWG sheet steel metal clad, dust & vermin proof, free standing floor mounting epoxy resin power coat painted cabinet as per relevant IEC standards and as per Approved & acceptance of the Engineer.</p> <p>Each sets consists below items:</p> <p>PANEL BOARD (6'x8')- 1 Pcs</p> <p>INCOMING: 1 set- 415 V, 500 amp, TP & NE hard drawn electrolytic copper bus bar 1 no. 415 V, 200 Amps TP MCCB for main control with thermal overload & instantaneous electro-magnetic short circuit release.</p> <p>OUTGOING: 1 no. 415 V, 200 Amps TP MCCB for main control with thermal overload & instantaneous electro-magnetic short circuit release. 7 nos. 415V, 125 Amps TP MCCB with thermal overload & instantaneous electro-magnetic short circuit release (for two welding machine each) 3 nos. 415 V, 100 Amps TP MCCB for main control with thermal overload & instantaneous electro-magnetic short circuit release. 1nos. 220V, 25 Amps DP MCB with thermal overload & instantaneous electro-magnetic short circuit release. 1nos. 220V, 10 Amps DP MCB with thermal overload & instantaneous electro-magnetic short circuit release. 3 PHASE METER (CT OPERATED)- 10 pcs (Three Phase Double Tariff Energy Meter have to provide Serial No., KWH, Kvarh) CT-300/5A- 30 pcs (Current Transformer) Each CT Meter output line has a Male-Female Connector (125Amps, 4 Phase).</p>	Sets	20



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	Origin: all MCCB should be MEM/ Dorman & Smith / ABB or equivalent product of UK/ France/ Germany/ USA / Switzerland/ Italy. Assembled by the Valid ISO-9001 certified company having test certificate according to relevant IEC standards from BUET/ CUET/ DUET/ KUET/ RUET.		
32	Junction Box Installation: Land Excavation, Junction Box Foundation & Top Shade by Profile Sheet & Angle.	Sets	10
33	Distribution Board Installation: Land Excavation, Distribution Board Base Foundation & Top Shade by Profile Sheet & Angle.	Sets	20
34	Supply and installation of Split Type AC (2ton) with related all accessories if mention or not.	Sets	02
35	RCC Work: Two Storied Sub-station room (70'x30'x14', Base Height-3 Ft Minimum) & Two Toilets (RCC Room & Roof top (Size- 5 ft x 7 ft x 9ft & Size 6ft x 8ft x 6 inch) with RCC Underground Reserve Tank- 10 ft x 10ft x 10 ft & RCC Water disposal tank- 5ft x5 ft x 10ft) with rcc roof metal doors, Thai aluminum windows with grill and proper painting and HT meter room (10'x10'x12") with rcc roof metal doors and proper painting. Transformer foundation, HT & LT panel foundation(Height-10Inch). HT & LT Drain Line, Lighting, fire extinguisher etc. include fencing of transformer as per FDB demand and other items as per necessary by FDB.	Job	01



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Estimate for Supply of Brand-New Generator (Capacity 750KVA).

Sl. No.	Descriptions of Items	Quantity	Unit
1.0	<p>1. Model and Brand of the Generator: To be mentioned by the bidder. Generator has to be original from OEM's regular manufacturing line, no assembly is acceptable (Preference Brand: MITSUBISHI/ Atlas Copco / Caterpillar / Cummins or other similar categories).</p> <p>2. Country of Origin: Any international reputed country and to be mentioned by Bidder. The bidder must provide Original Equipment Manufacturer (OEM) certificate (mentioning year of product) along with the Generator. The manufacturer must provide their equipment type test license or special Generator manufacturing license along with their ISO certificate and CE Certificate in addition to the OEM certificate.</p> <p>3. Country of Manufacture: Any international reputed country and to be mentioned by Bidder. All items with the Generator must be manufactured within the same country, if country of manufacture of any item is different, then it is to be certified by the manufacturer of Generator and to be mentioned in the offer.</p> <p>4. Year of Manufacture: The Generator as well as its integral components must be brand new, unused and latest product or not earlier than year of 2018 and a certificate in this regard is to be provided by the manufacturer during shipment along with the Generator.</p>	02	Sets
2.0	<p>Package Performance: Genset Power Rating with Fan @ 0.8 Power Factor 600 kW Genset Power Rating 750 kVA Aftercooler (Separate Circuit) N/A</p>	01	Job
3.0	<p>Fuel Consumption: 100% Load with Fan 130.6 L/hr & 34.5 gal/hr 75% Load with Fan 96.9 L/hr & 25.6 gal/hr 50% Load with Fan 67.0 L/hr & 17.7 gal/hr 25% Load with Fan 38.8 L/hr & 10.3 gal/hr.</p>		
4.0	<p>Cooling System Engine Coolant Capacity Not Less than 20.8 L / 5.5 gal. *Cooling System : Forced Water Cooling System.</p>		
5.0	<p>Inlet Air Combustion Air Inlet Flow Rate Not Less than 35.3 m³/min 1246.1 cfm Max. Allowable Combustion Air Inlet Temp 49 ° C 119 ° F</p>		
6.0	<p>Exhaust System: Exhaust Stack Gas Temperature 550.5 ° C or 1022.9 ° F Exhaust Gas Flow Rate 101.2 m³/min or 3572.0 cfm Exhaust System Backpressure (Maximum Allowable) 10.0 kPa or 40.0 in. water</p>	01	Job
7.0	<p>Heat Rejection Heat Rejection to Jacket Water 165 kW or 9375 Btu/min Heat Rejection to Exhaust (Total) 487 kW or 27711 Btu/min</p>		



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	Heat Rejection to Aftercooler 91 kW or 5192 Btu/min Heat Rejection to Atmosphere from Engine 83 kW or 4729 Btu/min Heat Rejection to Atmosphere from Generator 28 kW 1592 Btu/min																					
8.0	<p>Engine:</p> <p>8.1 The engine shall be heavy duty, industrial, diesel operated, four stroke, water cooled, electrical starting and of well proven make. The engine capacity shall be adequate to meet all operational requirements.</p> <p>8.2 The engine shall be equipped with safety protection and alarm devices against high temperature and low oil pressure. The alarms shall be visible /audible to alert the operator.</p> <p>8.3 Fuel tank shall have sufficient capacity for not less than 12 hours continuous operation.</p> <p>8.4 Oil bath type air filter or two stage cyclone type air filter or cyclone type pre-filter with secondary air filter or equivalent shall be provided.</p> <p>8.5 Engine RPM 1500.</p> <p>8.6 Cycle: Four Stroke</p> <p>8.7 Aspiration: Turbocharged.</p> <p>8.8 Compression Ratio: 14.0:1</p> <p>8.9 Speed governor : Electronic</p>																					
9.0	<p>Emissions (Nominal):</p> <p>NOx 3135.1 mg/Nm³ 6.2 g/hp-hr CO 411.8 mg/Nm³ 0.8 g/hp-hr HC 7.2 mg/Nm³ 0.0 g/hp-hr PM 14.2 mg/Nm³ 0.0 g/hp-hr</p>																					
10.0	<p>Alternator:</p> <p>*Motor Starting Capability @ 30% *Voltage Dip 1644 skVA *Current 1038 amps *Excitation AR *Temperature Rise 125 °C *Control System: Digital. * Rated Voltage (V): 400/230 (According to customer requirements)</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Alternator</th> <th>Specifications</th> </tr> </thead> <tbody> <tr> <td>Number of phase</td> <td>3</td> </tr> <tr> <td>Power factor (Cos Phi)</td> <td>0.8</td> </tr> <tr> <td>Poles</td> <td>4</td> </tr> <tr> <td>Insulation type</td> <td>H class</td> </tr> <tr> <td>Winding Pitch</td> <td>2/3</td> </tr> <tr> <td>IP rating</td> <td>IP 23</td> </tr> <tr> <td>Bearing</td> <td>Single bearing</td> </tr> <tr> <td>Voltage regulator</td> <td>AVR</td> </tr> <tr> <td>Coupling</td> <td>Flexible disc</td> </tr> </tbody> </table>	Alternator	Specifications	Number of phase	3	Power factor (Cos Phi)	0.8	Poles	4	Insulation type	H class	Winding Pitch	2/3	IP rating	IP 23	Bearing	Single bearing	Voltage regulator	AVR	Coupling	Flexible disc	
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11.0	<p>Electrical system:</p> <p>11.1 Electrical system shall be 24-volt heavy duty negative earth fully sealed and proofed against breakdowns/ damage due to leakage of rain water.</p>																					



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	<p>11.2 Batteries shall be mounted in a protected position but easily accessible for maintenance.</p> <p>11.3 Electrical system shall be complete with all necessary instruments, gauges and accessories.</p> <p>11.4 Charge alternator: DC 24V</p>		
12.0	<p>Instruments and controls:</p> <p>12.1 Instrument panel shall be of anti-glare type and well positioned to ensure an easy reading of all instruments by the operator and shall contain the following instruments:</p> <p>12.1 Hour meter.</p> <p>12.2 Ammeter / warning lamp.</p> <p>12.3 Engine oil pressure warning lamp/oil pressure gauge.</p> <p>12.4 Engine coolant temperature gauge.</p> <p>12.5 Fuel level gauge.</p> <p>12.6 Any other standard gauges and controls for efficient and safe operation of the Generator.</p> <p>12.7 All instruments, gauge and indicator lights shall be clearly labeled. Self adhesive labels will not be accepted.</p>		
13.0	<p>Installation, Commissioning, Test/ Trial and Acceptance:</p> <p>a. The Supplier's representative(s) will carry out tests and trials of the Generator at the BFDC.</p> <p>b. Provide all types of lubricants, Gear Oil and related accessories to run the system.</p> <p>Chittagong premises in presence of the Representative(s) nominated by the BFDC and hand over the Supplier's representative(s) will carry out tests and trials of the Generator at the BFDC, Chittagong.</p>	02	job
14.0	<p>List of spares and tools:</p> <p>a. Standard set of tools box for Generator : 02 Sets {Bidder is to mention the list of standard the tools with qty}.</p> <p>b. Fuel Filter: 06 pcs</p> <p>c. Air Filter: 06 pcs</p> <p>d. Lubrication filter: 06 pcs</p>	01	job
15.0	<p>Standard Fittings:</p> <p>a. All safety devices are to be incorporated as per the international standard.</p> <p>b. All types of fittings are to be done by the manufacturer as per the requirement of the user.</p> <p>c. Any other things required to operate the Generator smoothly to be provided by the bidder within the quoted price.</p>	01	job
16.0	<p>Warranty and Maintenance:</p> <p>Warranty period 01 (one) year for service, spare parts replacement and maintenance from the date of acceptance.</p> <p>If the Generator or any items is found unserviceable during warranty period, the same must be repaired/ replaced by the supplier at their own expenses. Unserviceable period due to delay in warranty replacement/repair will be added to the total warranty period.</p>	01	job
17.0	<p>Documents:</p> <p>a. Manual covering maintenance and overhauling information of engine, Alternator and also circuit diagram of all electrical system of Generator (In English): Qty-02.</p>	01	job



গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
মৎস্য ও প্রাণিসম্পদ মন্ত্রণালয়
চট্টগ্রাম মৎস্য বন্দর
বাংলাদেশ মৎস্য উন্নয়ন কর্পোরেশন



মৎস্য বন্দর, চট্টগ্রাম, জি.পি.ও বজ্জ নং ২৯, ফোন:০৩১-৬১৩০০৬
www.bfdc.gov.bd E-mail: ctgharbour@gmail.com

	h. Illustrated Parts Catalogue for engine, Hydraulic System and chassis of Truck (in English): Qty-02.		
	c. Driver's/Owner/Operation manual (book type, all in English): Qty-02.		

Annex 6: Specification of Modern Fish Processing Plant with the Capacity of 500 Ton

<u>New 500 tons Capacity Modern Fish Processing Plant With Related Accessories</u>			
(Frozen Store-6 nos(1 50tonx1 Nos,100tonx2 Nos, 50 tonx3Nos), Blast freezer- 2 nos(5ton x1Nos, 3tonx1Nos), Plate freezer- 1 nos, Flake ice plant-1 nos & Processing room).			
SL No	Description of goods	Quantity	Unit
1.	<p>Supply & Installation of Compressor Motor 75kW, Double Stage, Multi cylinder, Cylinder Bore/Stroke-130/100mm, 8 Cylinder with Appropriate Capacity intercooler. Drive: Belt Driven Refrigerant: Ammonia Capacity/ Absorbed Power: 100.6kW / 85.1BkW @ TE-42°C/TC+36°C @1,000 RPM Motor: 75kW, 4Pole, 400V, 50 Hz, 3Phase Three Phase Squirrel Cage Induction Motor Roller bearing type IE-3 Premium Efficiency Motor Motor Protection Class: IP44 Method Of Cooling: IC411 Insulation Class Temp.: 105K (Maximum Coolant Temp.40°C) Standard: IEC (International) Terminal Box with terminal block Color with Tropical treatment. Completing following major accessories: Oil separator, Oil pump, Oil cooler, Gas inlet and Outlet check valve, Suction strainer, Tool kit one set for Three compressor, Suction & Discharge stop valve, Safety Valve, Stop Valve for Safety Valve, Discharge Check/ Non return Valve, Oil cooler (water cooled type), Oil separator, Oil return piping, Gauge board with high, low, Inter and oil pressure gauge Gauges must be vibration protected, High Low and Oil Pressure Cut-out, Capacity Control Solenoid Valve, Minimum Load Start device, Start Pressure equalizing valve, Common base, V-belt & belt cover, Anchor bolts and nuts, Overhauling tool kit. Type Approval Certificate by Bureau Veritas Class.</p>	03	Sets
2.	<p>Supply & Installation of Compressor Motor 55kW, Double Stage, Multi cylinder, Cylinder Bore/Stroke-130/100mm, 6 Cylinder with Appropriate Capacity intercooler Drive: Belt Driven Refrigerant: Ammonia Capacity/ Absorbed Power: 75 kW / 55.1BkW @ TE-42°C/TC+36°C @1,000 RPM Motor: 55kW, 4Pole, 400V, 50 Hz, 3Phase Three Phase Squirrel Cage Induction Motor Roller bearing type IE-3 Premium Efficiency Motor Motor Protection Class: IP44 Method Of Cooling: IC411 Insulation Class Temp.: 105K (Maximum Coollant Temp.40°C) Standard: IEC (International) Terminal Box with terminal block Colour with Tropical treatment Completing following major accessories: Oil separator, Oil pump, Oil cooler, Gas inlet and Outlet check valve, Suction strainer, Tool kit one set for Three compressor, Suction & Discharge stop valve, Safety Valve, Stop Valve for Safety Valve, Discharge Check/ Non return Valve, Oil cooler (water cooled type), Oil separator, Oil return piping, Gauge board with high, low, Inter and oil pressure gauge</p>	03	Sets

	<p>Gauges must be vibration protected, High Low and Oil Pressure Cut-out, Capacity Control Solenoid Valve, Minimum Load Start device, Start Pressure equalizing valve, Common base, V-belt & belt cover, Anchor bolts and nuts, Overhauling tool kit.</p> <p>Type Approval Certificate by Bureau Veritas Class.</p>		
3.	<p>Supply & Installation of Compressor Motor 45 Kilowatt, Double Stage, Multi cylinder, Cylinder Bore/Stroke-130/100mm, 6 Cylinder with Appropriate Capacity Intercooler Drive: Belt Driven Refrigerant: Ammonia Capacity/ Absorbed Power: 60.5kW / 50.1BkW @ TE-42°C/TC+36°C @1,000 RPM Motor: 45 kW, 4Pole, 400V, 50 Hz, 3Phase Three Phase Squirrel Cage Induction Motor Roller bearing type IE-3 Premium Efficiency Motor Motor Protection Class: IP44 Method Of Cooling: IC411 Insulation Class Temp.: 105K (Maximum Coolant Temp.40°C) Standard: IEC (International) Terminal Box with terminal block Colour with Tropical treatment Completing following major accessories: Oil separator, Oil pump, Oil cooler, Gas inlet and Outlet check valve, Suction strainer, Tool kit one set for Three compressor, Suction & Discharge stop valve, Safety Valve, Stop Valve for Safety Valve, Discharge Check/ Non return Valve, Oil cooler (water cooled type), Oil separator, Oil return piping, Gauge board with high, low, Inter and oil pressure gauge Gauges must be vibration protected, High Low and Oil Pressure Cut-out, Capacity Control Solenoid Valve, Minimum Load Start device, Start Pressure equalizing valve, Common base, V-belt & belt cover, Anchor bolts and nuts, Overhauling tool kit.</p> <p>Type Approval Certificate by Bureau Veritas Class.</p>	03	Sets
4.	<p>Supply & Installation of Compressor Motor 22 Kilowatt, Double Stage, Multi cylinder, Cylinder Bore-95mm, 6 Cylinder with Appropriate Capacity Intercooler Drive: Belt Driven Refrigerant: Ammonia Capacity/ Absorbed Power: 30 kW / 22.1BkW @ TE-42°C/TC+36°C @1,000 RPM Motor: 22 kW, 4Pole, 400V, 50 Hz, 3Phase Three Phase Squirrel Cage Induction Motor Roller bearing type IE-3 Premium Efficiency Motor Motor Protection Class: IP44 Method Of Cooling: IC411 Insulation Class Temp.: 105K (Maximum Coolant Temp.40°C) Standard: IEC (International) Terminal Box with terminal block Colour with Tropical treatment Completing following major accessories: Oil separator, Oil pump, Oil cooler, Gas Inlet and Outlet check valve, Suction strainer, Tool kit one set for Three compressor, Suction & Discharge stop valve, Safety Valve, Stop Valve for Safety Valve, Discharge Check/ Non return Valve, Oil cooler (water cooled type), Oil separator, Oil return piping, Gauge board with high, low, Inter and oil pressure gauge</p>	03	Sets

	Gauges must be vibration protected, High Low and Oil Pressure Cut-out, Capacity Control Solenoid Valve, Minimum Load Start device, Start Pressure equalizing valve, Common base, V-belt & belt cover, Anchor bolts and nuts, Overhauling tool kit. Type Approval Certificate by Bureau Veritas Class.		
5.	Supply & Installation of PP GI Sheet/Aluminum Sheet Both side with thickness 0.4mm and PU sandwich panel(Density:45kg/Cubic Meter) Sliding Door (Cold storage & Blast freezer, Size:7'x7'x 8" with Lock and related Accessories)	16	Sets
6.	Supply & Installation of PP GI Sheet/Aluminum Sheet Both side with thickness 0.4mm and PU sandwich panel(Density:45kg/Cubic Meter) Sliding Door (Ice room, Chill Room, Ante room with Size:7'x7'x 8" with Lock and related Accessories)	08	Sets
7	Sandwich Panel Board Supply & Installation: PP GI /Aluminum Sheet Both side with thickness 0.4mm and PU sandwich panel(Density:45kg/Cubic Meter) Zigzag Type(All Cold storage, Blast freezer, Processing Room, Flack Ice room, Chill Room, Ante room with Silicon Gum/Liquid Solution, Cam lock, Screw, Angle fittings and related Accessories).	4500	SQM
8.	Supply & Installation of Thai Aluminum with Swing Glass Door With lock accessories(All Receiving room, Lab room, Processing room, Packing room, Delivery Gate, Entrance room with Size:7'x4' & A Grade Color Glass with Thickness 10mm)	78	Sets
9.	Supply & Installation of Unit Cooler for Frozen store 150 ton: Refrigerant: Ammonia Maker: Thermofin Capacity: 45 kW Type: Ceiling mounted type Water Defrost: Water Tube Material : Stainless Steel 304 Fin Material: Aluminum Motor energy efficiency complies with European Standard ErP 2015; Motor protection class IP54; Fan blade material Aluminum alloy; Three-dimensional die-cast molding fan blade: owl wing blade; Casing Material: Galvanized steel, powder-coated Fan Ring Heater & Related all Accessories.	6	Sets
10.	Supply & Installation of Unit Cooler for Frozen store 100 ton: Refrigerant: Ammonia Maker: Thermofin Capacity: 35 kW Type: Ceiling mounted type Water Defrost: Water Tube Material : Stainless Steel 304 Fin Material: Aluminum Motor energy efficiency complies with European Standard ErP 2015; Motor protection class IP54; Fan blade material Aluminum alloy; Three-dimensional die-cast molding fan blade: owl wing blade; Casing Material: Galvanized steel, powder-coated Fan Ring Heater & Related all Accessories.	8	Sets
11.	Supply & Installation of Unit Cooler for Frozen store 50 ton: Refrigerant: Ammonia Maker: Thermofin Capacity: 25 kW Type: Ceiling mounted type Water Defrost: Water Tube Material : Stainless Steel 304	6	Sets

	<p>Fin Material: Aluminum Motor energy efficiency complies with European Standard ErP 2015; Motor protection class IP54; Fan blade material Aluminum alloy; Three-dimensional die-cast molding fan blade: owl wing blade; Casing Material: Galvanized steel, powder-coated Fan Ring Heater & Related all Accessories.</p>		
12.	<p>Supply & Installation of Unit Cooler for Blast Freezer 05 ton: Refrigerant: Ammonia Maker: Thermofin Capacity: 110 kW Type: Ceiling mounted type Water Defrost: Water Tube Material : Stainless Steel 304 Fin Material: Aluminum Motor energy efficiency complies with European Standard ErP 2015; Motor protection class IP54; Fan blade material Aluminum alloy; Three-dimensional die-cast molding fan blade: owl wing blade; Casing Material: Galvanized steel, powder-coated Fan Ring Heater & Related all Accessories.</p>	02	Sets
13.	<p>Supply & Installation of Unit Cooler for Blast Freezer 03 ton: Refrigerant: Ammonia Maker: Thermofin Capacity: 45 kW Type: Ceiling mounted type Water Defrost: Water Tube Material : Stainless Steel 304 Fin Material: Aluminum Motor energy efficiency complies with European Standard ErP 2015; Motor protection class IP54; Fan blade material Aluminum alloy; Three-dimensional die-cast molding fan blade: owl wing blade; Casing Material: Galvanized steel, powder-coated Fan Ring Heater & Related all Accessories.</p>	02	Sets
14.	<p>Supply & Installation of Unit Cooler for Processing Room: Refrigerant: Ammonia Maker: Thermofin Capacity: 30 kW Type: Ceiling mounted type Water Defrost: Water Tube Material : Stainless Steel 304 Fin Material: Aluminum Motor energy efficiency complies with European Standard ErP 2015; Motor protection class IP54; Fan blade material Aluminum alloy; Three-dimensional die-cast molding fan blade: owl wing blade; Casing Material: Galvanized steel, powder-coated Fan Ring Heater & Related all Accessories.</p>	3	Sets
15.	<p>Supply & Installation of Unit Cooler for Ante Room & Chill Room: Refrigerant: Ammonia Maker: Thermofin Capacity: 20 kW Type: Ceiling mounted type Water Defrost: Water Tube Material : Stainless Steel 304 Fin Material: Aluminum Motor energy efficiency complies with European Standard ErP 2015;</p>	6	Sets

	<p>Motor protection class IP54; Fan blade material Aluminum alloy; Three-dimensional die-cast molding fan blade: owl wing blade; Casing Material: Galvanized steel, powder-coated Fan Ring Heater & Related all Accessories.</p>		
16.	<p>Supply & Installation of Plate Freezer Capacity:500 kg/ 2.5hrs EU Standard Maker: DSI Capacity: 1ton/4hrs Refrigerant: Ammonia</p>	01	Set
17.	<p>Supply & Installation of Open Type Atmospheric Cooling Condensing Unit Brand New Seamless Schedule-40 MS Pipe, Necessary SS Gate Valve, Coil Pipe Length:8500 Running Feet, Dia-1.5", Heat Rejection capacity: 1,000kW @ +40°C TC +28°C CWB, Heat Rejection capacity: 665kW @ +36°C TC +29°C CWB Refrigerant: Ammonia, Automatic Non-Condensable Gas Purger-1set, Pump 5.5kW-6Sets, Fabrication Complete with the basement (RCC) Condenser according to Engineer In charge.</p>	02	Units
18.	<p>Supply & Installation of Cooling Tower: Cooling Capacity: 117000Kcal/H Water Flow: 390L/M Fan Dia: 900mm Motor Power: 0.75KW</p>	02	Sets
19.	<p>Supply & Installation of Flake Ice Plant: Capacity 300 kg/ Hrs EU Standard Refrigerant: Ammonia Maker: Thermofin Capacity: 10kW Type: Ceiling mounted type Defrost: Electrical Heater Fin Material: Aluminum Motor energy efficiency complies with European Standard ErP 2015; Motor protection class IP54; Fan blade material Aluminum alloy; Three-dimensional die-cast molding fan blade: owl wing blade; Casing Material: Galvanized steel, powder-coated Fan Ring Heater</p>	01	Set
20.	<p>Supply & Installation of Instant water chiller: Maker: BUCO Capacity: 2ton/hrs COO: E.U.</p>	01	Set
21	<p>Supply & Installation of High Pressure Receiver: Type: Horizontal and cylindrical type Size: 1,000mm x 5,000mmL Shell Plate: SS400 t12mm End Plate: SS400 19mm Hydraulic Test Pressure: 2.5MPa Color: Rust Proof</p>	02	Sets
22.	<p>Supply & Installation of Low Pressure Receiver: Type: Horizontal and cylindrical type Size: 900mm x 3,500mmL Shell Plate: SS400 19mm End Plate: SS400 19mm Punching Metal: SS400 t3.2mm 10mm</p>	03	Sets

	Hydraulic Test Pressure: 2.0MPa Color: Rust Proof		
23.	Supply & Installation of Oil Purge Drum: Type: Horizontal and cylindrical type Size: 300 mm x 895 mmL Shell Plate: STPG370E t6.4mm End Plate: SS400 t9mm Hydraulic Test Pressure: 2.5MPa Color: Rust Proof	03	Sets
24.	Supply & Installation of Ammonia Liquid Circulation Pump: Type: Canned type Motor: 2.2 kW, 400V, 50 Hz Capacity: 100 liter/min, 27m head With "TEIKOKU ROTARY GUARDIAN" (TRG) meter at Control Panel Casing: SCS13 [Cast Stainless Steel] Impeller: SCS13 [Cast Stainless Steel] Shaft: SUS304 Bearing: Carbon Graphite	08	Sets
25.	Supply & Installation of Water Pump for Oil Cooler: Motor: 2.2kW, 400V, 50 Hz Capacity: 350 liter/min, 15m head Three Phase Induction Motor Motor Protection Class: IP44 Casing: SCS13 [Cast Stainless Steel] Impeller: SCS13 [Cast Stainless Steel] Shaft: SUS304	03	Sets
26.	Supply & Installation of Water Pump for Defrost: Motor: 5.5kW, 400V, 50 Hz Capacity: 350 liter/min, 15m head Three Phase Induction Motor Motor Protection Class: IP44 Casing: SCS13 [Cast Stainless Steel] Impeller: SCS13 [Cast Stainless Steel] Shaft: SUS304	03	Sets
27.	Supply & Installation of Oil Separator: Type: Horizontal and cylindrical type Size: 300 mm x 895 mmL Shell Plate: STPG370E t6.4mm End Plate: SS400 t9mm Hydraulic Test Pressure: 2.5MPa Color: Rust Proof	10	Sets
28.	Supply & Installation of All Ammonia Valves & Controls: Stop valves for the system, Safety valves for High pressure, Low Pressure receiver and Oil Drum, Manual expansion valve for Low pressure receiver, flow regulating valve for Unit cooler, Solenoid valves for Unit cooler NH ₃ Control, Solenoid Valve for Low Pressure receiver NH ₃ Level Control, Float switch for Low Receiver NH ₃ Level control, Float switch for Low Receiver NH ₃ High Level Alarm, Float switch for Low Receiver NH ₃ Low Level Alarm, Float switch for Inter Cooler NH ₃ Level control, Float switch for Inter Cooler NH ₃ High Level Alarm, Pressure gauges, Level gauge for High Pressure receiver & Oil Drum, Pressure sensor for compressor unit control, Room temperature sensors, NH ₃ leak detector, Solenoid valves for Unit cooler water defrost, Check & Stop Valves, Ammonia line Strainer, Pressure Release Valve, Pressure Control Valve with all related accessories.	1	job

29.	<p>Supply & Installation of Central Electric Control System (PLC & manual both system) complete: Controlling: PLC [Programmable Logic Control] With Manual and automatic Operation Type: SelfStand Type. Consisting of the following components and accessories: Main Breaker, Automatic Breaker shut off device during open the control Panel, High and Low voltage protection device, Phase failure protection device, Emergency Stop & reset Button, Individual Breaker for all motors of refrigeration plant, Individual Breaker for control line, Auto/Manual/Stop selector switch for system, Auto/Manual/Stop Selector switch for all motors and solenoid valve, Push Button with indication lamp for compressor start & stop, Ampere meter for all motors, TRG wear Meter for Ammonia Pump (Detect bearing wear), Oil pressure failure of compressors, Abnormal high pressure of compressors, Abnormal low pressure of compressors, Abnormal intermediate pressure of compressors, Abnormal oil pressure of compressors, Temperature sensor for all rooms, NH3 detection System and alarm, Emergency Stop by NH3 Alarm, Protection device for liquid back to compressor, Over current protection for all motor, Automatic Defrost system, NH3 level control for Low pressure receiver, Room temperature control, Automatic exhaust system for control panel Automatic lighting for control Panel, Y-A starter for compressor motor, Starter for other motor, All motor running hour record, Pre alarm for maintenance, All data record & Storage system, All the components/equipment to be mounted and internally connected, Name Plate for all devices, I.E.C. Standard, Encloser Material for Door, Housing is SS, Thickness 2.0mm, Encloser Material for BASE is SS, Thickness 5.0mm, BASE Material is SS C 100mm & 50mm, Open Door holding device, Insulation Cover provided for live parts to be in danger of electric shock during daily operation when door open.</p>		
30.	<p>Supply & Installation of LT CABLE: Supply & lying following HT/LT cable through the prepared trench including connection with cable socket & heat sink for HT cable etc complete as per direction of the Engineer-in-charge. Cables manufactured by Govt. of Bangladesh owned/shared (Eastern Cable Ltd) or equivalent manufactured by the Valid ISO-9001 certified company having test certificate according to relevant IEC standards from BUET/CUET /KUET/RUET and from any internationally accredited independent laboratory. 4Cx150 RM (415V, NYFGBY) cable (LT panel to all DBs cable)</p>	600	Meter
31.	<p>Supply & Installation of Supply & Installation of LT CABLE: Supply & lying following HT/LT cable through the prepared trench including connection with cable socket & heat sink for HT cable etc complete as per direction of the Engineer-in-charge. Cables manufactured by Govt. of Bangladesh owned/shared (Eastern Cable Ltd) or equivalent manufactured by the Valid ISO-9001 certified company having test certificate according to relevant IEC standards from BUET/CUET /KUET/RUET and from any internationally accredited independent laboratory. 4Cx100 RM (415V, NYY) cable (LT panel to all DBs cable)</p>	800	Meter
32.	<p>Supply & Installation of LT CABLE: Supply & lying following HT/LT cable through the prepared trench including connection with cable socket & heat sink for HT cable etc complete as per direction of the Engineer-in-charge. Cables manufactured by Govt. of Bangladesh owned/shared (Eastern Cable</p>	500	Meter

	<p>ltd] or equivalent manufactured by the Valid ISO-9001 certified company having test certificate according to relevant IEC standards from BUET/ CUET /KUET/RUET and from any internationally accredited independent laboratory. 4Cx35 RM (415V, NYY) (Earthing block to LT/HT panel, PFI, HT meter etc.)</p>		
33.	<p>Supply & Installation of LT CABLE: Supply & lying following HT/LT cable through the prepared trench including connection with cable socket & heat sink for HT cable etc complete as per direction of the Engineer-in-charge. Cables manufactured by Govt. of Bangladesh owned /shared (Eastern Cable ltd] or equivalent manufactured by the Valid ISO-9001 certified company having test certificate according to relevant IEC standards from BUET/ CUET /KUET/RUET and from any internationally accredited independent laboratory. 4Cx25 RM (415V, NYFGBY) cable (LT panel to all DBs cable)</p>	300	Meter
34.	<p>Supply & Installation of Seamless MS Pipe-100mm(Schedule 40) Materials: STPG 370S, Sch.40, 5.5 m (seamless pipe) Fabrication for distribution line. Include necessary bend, Insulation, Aluminum Sheet Cover and related accessories.</p>	600	Meter
35.	<p>Supply & Installation of Seamless MS Pipe-88.9 mm(Schedule 40) Materials: STPG 370S, Sch.40, 5.5 m (seamless pipe) Fabrication for distribution line. Include necessary bend, Insulation, Aluminum Sheet Cover and related accessories.</p>	400	Meter
36.	<p>Supply & Installation of Seamless MS Pipe-50mm(Schedule 40) Materials: STPG 370S, Sch.40, 5.5 m (seamless pipe) Fabrication for distribution line. Include necessary bend, Insulation, Aluminum Sheet Cover and related accessories.</p>	880	Meter
37.	<p>Supply & Installation of Seamless MS Pipe-25mm(Schedule 40) Materials: STPG 370S, Sch.40, 5.5 m (seamless pipe) Fabrication for distribution line. Include necessary bend, Insulation, Aluminum Sheet Cover and related accessories.</p>	960	Meter
38.	<p>Supply & Installation of Seamless MS Pipe-20mm(Schedule 40) Materials: STPG 370S, Sch.40, 5.5 m (seamless pipe) Fabrication for distribution line. Include necessary bend, Insulation, Aluminum Sheet Cover and related accessories.</p>	680	Meter
39.	<p>Supply & Installation of All Seamless MS (Schedule 40) fittings for ammonia system. Materials: STPG 370S, Sch.40, 5.5 m (seamless pipe) Size: from 100A to 15A Pipe joints, Elbow, Tee, Reducer and Cap for ammonia pipe line.</p>	1	Lot
40.	<p>Supply & Installation of Water PVC Pipe Line, S.S Gate Valve, S.S Check Valve & Necessary goods including related all fittings.</p>	1	Job
41.	<p>Supply & Installation of Ammonia Gas: 50Kg/Per Cylinder</p>	100	Cylinder
42.	<p>Supply & Installation of Compressor oil: LPT 68 or Gargyle ARCTIC-300 218 Liter per Drum.</p>	6	Drum
43.	<p>Non-Magnetic Mirror Type Stainless Steel (Grade-304) Pipe Rack: All Blast freezer Room needs Rack for Fish Keeping. Size: 12'x 6'x12' with 12 Steps. Pipe Dia-38.1mm Support pillar & 25mm Fish Keeping Area, Thickness-2mm.</p>	8	Nos
44.	<p>Non-Magnetic Mirror Type Stainless Steel (Grade-304) Hatch: All Cold storage needs Hatch for Fish Storage with S.S Stair. Also Movement Floor Area needs to install S.S Floor Mate for footsteps. Size: 10'x 12'x16' with 3 Steps. Pipe Dia-50 mm Support pillar & 38.1mm Fish Keeping Area, Thickness-3mm.</p>	45	Nos

45.	Supply & Installation of All Table, Basin, Trolley And Utensil materials:		
	Non-Magnetic Mirror Type Stainless Steel(Grade-304) Paddle Stand Table(Size: 8'x4'x3', Table Leg Pipe Dia-50mm & Box-50mm with all Thickness 2mm and Footboard Pipe dia-38.1mm, Length-8', 4pcs Each Side)	26	Sets
	Non-Magnetic Mirror Type Stainless Steel(Grade-304) Paddle Stand Basin(Size: 4'x2'x3', Box-38.1mm & Sheet with all Thickness 2mm, Round Tape & Paddle Gate Valve)	15	Sets
	Non-Magnetic Mirror Type Stainless Steel(Grade-304) Double Handle Trolley (Size: Length: 4 Feet, Breadth: 2 Feet, Height: 2Feet with Box-38.1mm & Sheet with all Thickness 2mm, Gate Valve-2").	15	Sets
	Non-Magnetic Mirror Type Stainless Steel(Grade-304) Container (Size: Length: 8 Feet, Breadth: 4 Feet, Height: 3 Feet 2Feet with Box-38.1mm & Sheet with all Thickness 2mm, Gate Valve-2").	20	Sets
	Non-Magnetic Mirror Type Stainless Steel(Grade-304) Balca (Size: Length: 73cm, Breadth: 18cm, Height: 22.5cm with Pipe-38.1mm & Sheet with all Thickness 3mm).	30	Sets
	Plastic Basket (Capacity-10Kg): (Size: Length: 18 Inch, Breadth: 6 Inch, Height: 6 Inch).	1000	Sets
	S.S Knife(12-24Inch) Best Quality.	300	Sets
	S.S Saw(12-24) Best Quality.	200	Sets
	S.S Chopper(12-24) Best Quality.	300	Sets
	Gloves (Best Quality).	600	Pairs
	Digital Weight Scale (Capacity-1000Kg)- (Size: Length: 24-36 Inch, Breadth: 36-48 Inch, Height: 12-20 Inch).	10	Sets
46.	Utensil store with Non-Magnetic Mirror Type Stainless Steel (Grade-304) Floor Rake facilities. Size: 13'x 11'x2". Pipe Dia-38.1mm Support pillar & 25mm Fish Keeping Area, Thickness-2mm.	4	Sets
47.	Utensil wash room: All side Glass partition and Mosaic Floor Geezer, Non-Magnetic Mirror Type Stainless Steel (Grade-304) Basin, Glass Self & Related Accessories.	1	Job
48.	Supply & Installation of FIQC Standard Laboratory: Related all Chemical & Electronics Accessories.	1	Job
49.	Supply & Installation of All Office decoration (Necessary Furniture, Electronics & Others items)	1	Job
50.	Supply & Installation of Cargo Lift(Capacity -1.5 Ton)	1	Set
51.	Full Production Area, Blast Freezer Room need to Falls ceiling.	550	SQM
52.	Full Factory, Pipeline, Plant Machinerics Test trail and commissioning.	1	Job
53.	Safety Equipment: Hand glove 12 Pairs Safety Mask 12 Sets Safety Shoe 12 Pairs Ammonia Charge Hose 4 Sets Valve Ratchet 4 Sets Auto Metal Detector 12 Sets	1	Job
54.	RCC Construction Works For Fish Processing Plant: Three Storied Building with Doors, Thai Aluminum Windows, Railing, Toilets and Necessary Works. Size: Length-70Meter, Breadth- 38 Meter.	1	Job
55.	Ground Floor: Full Floor will be Mosaic.	1	Job

	Second & Third Floor: Full Floor Tiles Work(A grade Tiles, Size-32 Inch x 32 Inch, Glossy Type)		
56.	Toilets: All Toilets will be Floor & Side Wall Full Tiles(A grade Tiles, Size-12 Inch x 24 Inch, Mat Type)	1	Job
57.	Full Factory and Plant Machineries Proper Electric Wiring, Fan Installation, Electrification & Lighting Facilities.	1	Job
58.	Full Factory and Plant Machineries Proper Painting, Plumbing Work, Drainage, Sewerage System and other necessary works.	1	Job

Annex 7: Specification of Water Treatment Plant



গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
মৎস্য ও প্রাণিসম্পদ মন্ত্রণালয়

চট্টগ্রাম মৎস্য বন্দর

বাংলাদেশ মৎস্য উন্নয়ন কর্পোরেশন

মৎস্য বন্দর, চট্টগ্রাম, জি.পি.ও বক্স নং ২৯, ফোন:০৩১-৬১৩০০৬

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Supply & Installation of Complete Water Treatment Plant with related all Accessories.

Sl. No	Descriptions of Items	Quantity	Unit
01	Water Source Pump: Flowing:15T/h, Running speed: 2900 rpm, Suction dia.: Not less than DN 75 mm, Discharge dia.: Not less than DN 75 mm, Insulation: F. Degree of Protection: IP55, Construction, Execution, Horizontal Pump Casing: Bronze (ZCuZn16Si4)/Equivalent, Impeller: Bronze (ZCuZn16Si4)/Equivalent, Shaft: Stainless Steel (1Cr18Ni9Ti)/Equivalent. Material: SUS304 stainless steel.	1	Set
02	Silica Sand filter: Height: 2500mm, Diameter:1200mm, Capacity: 12T/H Material: SUS304 stainless steel (Food grade) Components: Water distributor, water gather, pressure gauge, filter material, valves & so on. Filter medium: Sand Specification: ϕ 2mm, ϕ 1mm, ϕ 0.5mm, ϕ 0.2mm.	1	Set
03	Active carbon filter: Height: 2500mm, Diameter: 1200mm, Capacity: 12T/H Material: SUS304 stainless steel (Food grade) Components: Water distributor, water gather, pressure gauge, filter material, valves and so on. Filter medium: Shuck shape active carbon. Water quality after treatment: need to be accorded with GB5749-85 national standard for living drinking water.	1	Set
04	Sodium ion exchanger: Height: 2500mm, Diameter: 1200mm, Capacity: 12T/H. Material: SUS304 stainless steel (Food grade).	1	Set
05	Precision filter: Height: 1400mm, Diameter: 800mm, Capacity: 40T/H, Filter precision: 5 μ m Material: SUS304 stainless steel, Capacity: 40T/H Filter precision: 5 μ m Material: SUS304 stainless steel Filtrate medium: Polypropylene membrane (PP MEMBRANE) 20 feet & 40 pieces.	1	Set
06	UV sterilizer machine: Total power 2 KW. Flow of Sterilization Water: 10000L, Working Pressure \leq 4 kg/m ² Pass in and out the diameter of the water pipe: DG25 mm, Working Voltage: 220 V Steady Time: 3-6M The life-span of the light tube: 3000H	1	Set



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07	Reverse Osmosis System: 1st Stage RO System: <table border="1"> <thead> <tr> <th>Descriptions</th> <th>Specifications</th> <th>Quantity</th> <th></th> </tr> </thead> <tbody> <tr> <td>Ro high pressure pump</td> <td>Q=16m³/hr.</td> <td>1set</td> <td>St-16</td> </tr> <tr> <td rowspan="4">RO</td> <td>RO membrane: BW30-400</td> <td>8pcs</td> <td></td> </tr> <tr> <td>Shell K8040-3-300PSI</td> <td>4pcs</td> <td>Shell SUS304L</td> </tr> <tr> <td>Flow meter, Gauge</td> <td></td> <td>Tubular type of flow meter, Seismic pressure, gauge, etc</td> </tr> <tr> <td>Structure</td> <td>1nc</td> <td>SUS304</td> </tr> <tr> <td></td> <td>Pipes and valves</td> <td>1nc</td> <td></td> </tr> <tr> <td rowspan="4">Control system (with Low Pressure automatic washing function)</td> <td>Cabinet</td> <td rowspan="4">1unit</td> <td>SUS304</td> </tr> <tr> <td>Frequency converter</td> <td>High pressure pump frequency control</td> </tr> <tr> <td>PLC</td> <td></td> </tr> <tr> <td>Touch-screen</td> <td></td> </tr> <tr> <td></td> <td>Pneumatic systems</td> <td></td> <td></td> </tr> <tr> <td rowspan="2">RO membrane washing system</td> <td>Washing tank(1m³)</td> <td>1set</td> <td>SUS304L</td> </tr> <tr> <td>Washing pump Q=2m³/hr</td> <td>1set</td> <td>ST-10</td> </tr> </tbody> </table>	Descriptions	Specifications	Quantity		Ro high pressure pump	Q=16m ³ /hr.	1set	St-16	RO	RO membrane: BW30-400	8pcs		Shell K8040-3-300PSI	4pcs	Shell SUS304L	Flow meter, Gauge		Tubular type of flow meter, Seismic pressure, gauge, etc	Structure	1nc	SUS304		Pipes and valves	1nc		Control system (with Low Pressure automatic washing function)	Cabinet	1unit	SUS304	Frequency converter	High pressure pump frequency control	PLC		Touch-screen			Pneumatic systems			RO membrane washing system	Washing tank(1m ³)	1set	SUS304L	Washing pump Q=2m ³ /hr	1set	ST-10	1	Set
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08	Ozone sterilizer machine: Capacity: 100g/h Ozonizer thickness: 10-18mg/l Operating pressure: 0.04-0.08mpa Operating temperature: ≤35°C Inlet pressure: 0.5-0.7mpa Air mass flow: 2-3m ³ Air dew point: ≤40°C Cooling water flow: 120-140kg/h Power: 220V/50Hz, 3.2KVA, 15-18KWH/KgO ₃ Weight: 600Kg Dimension: 1760mm*600mm*1350mm	1	Set																																														
09	Finished water tank: Material: Stainless steel 304 Volume: 10000L Size: diameter: 1810mm*2450mm(Plate Thickness-3mm)	4	Sets																																														
10	Air Conveyor Technical parameter: Power fan: 2.20KW/Unit; Flowing capacity: 2800m ³ /h; Full pressure: 1650MPa; Rotation speed: 2840r/min;	1	Set																																														
11	Bottle Unscramble Machine:	1	Set																																														



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	10,000bottles/hour 250ml Mineral Water Production Line, All Parameter: Amount of working position-18, Productivity-12000 bottle/hour for 500ml, Air source- Pressure 0.6Mpa with Air consumption 1500L/Min. Power-380v ,50HZ, 3 phase. Bottle size-Bottle diameter50-96mm,bottle height 165-310mm, Main motor's power: (0.55+1.10+0.37+4.20)KW, Dimension-c2000X2350.		
12	Flat conveyor: Conveyor Height: 250m. Side panel: 304 stainless steel sheet, thickness is 2mm. Supporting leg: 304 stainless steel. Trucking and cover: 304 stainless steel. Lubricant water conservation tank: 304 stainless steel. Chain plate: Domestic high-quality plastic chain plate, poly oxy methylene (POM). Bearing housing: 304 stainless steel cage.	1	Set
13	Washing, Filling, Capping three in one: Number of washing positions: 32, Number of filling positions: 32, Number of capping positions: 8, Capacity at 330~500ml bottles / hour: 12,000~15,000bottles/hour, Application bottle & cap: PET bottle & Screw cap, Suitable bottle height (mm) :160-320mm, Suitable bottle diameter (mm) : ≤ 50 - ≤ 115 , Power of main motor (KW): 4.0, Power of washing pump(KW): 0.37, Power of filling pump(KW): 0.75, Power of cap unscramble(KW): 0.37, Water pressure (Mpa) : > 0.06 MPa ≤ 0.2 Mpa, Filling type: Gravity filling + micro pressure, Filling temperature :Room temperature Thickness of machine frame : 1.5mm Thickness of deck plate :25mm Dimension :L3300*W2450*H2300mm Weight(kg) :6500	1	Set
14	Cap sterilizer with cap feeder Description: Main technical standards: ▲ source voltage: 220V/50HZ ▲ input power: 0.75KW ▲ effective volume: 765L ▲ compress air displacement: 50L/min ▲ ozone generator rate: 700~7000mg/h ▲ insulation resistance: ≥ 1.5 M Ω ▲ ground impedance: $\leq 0.1\Omega$ ▲ Overall dimension : 1200mm \times 550mm \times 1750mm	1	Set
15	Belt type Cap elevator: Material: PP. Type: Plastic Belting. Features: Chemical Resistant.	1	Set



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	Color: White. Application Area: Bottling. Cap Elevator Belts is basically a cleated belt conveyor erected at an angle for loading of caps into the Hopper bowl.		
16	Inspection light: 600 Lumen Foldable Work LED Inspection Light with Flood, Spot, UV Modes and USB Output for Mobile Device Charging, 2 Year Warranty (PILB600UV), Green.	6	Sets
17	Drying machine: Material: SS304 including electrical heating fans Power: 5000W Size: 3 Feet X 5 Feet X 6 Feet.	1	Set
18	Technical parameter hot melt glue labeling machine: Labeling speed 12000 bottles per hour Main engine size 4500l x 1600w x 2000h mm Main engine power supply Ac 3 phase 220-380v Main engine power 8kw Label material Gpp paper Label length 10mm -300mm Bottle diameter 50- 106 mm	1	Set
19	Automatic Pe Film Shrink Wrapping Machine: Technical parameters: -Outline dimension of the equipment: L5050*W3300*H2100mm -The largest dimension of the wrappage:L600*W400*H350mm -Material of shrink film: PE -Thickness of shrink film:0.03-0.15mm -The highest temperature of the heat shrink furnace: 160-260. Can adjust freewill. -The maximum production per minute: 0-12 package -Equipment capacity: 20Kw -Actual power consumption: 15kw/hour -Pressure request: 220V -Equipment weight: 1.2T -Machine required air pressure of the compressor: 0.6-0.8Mpa 1. Packing terms: (1)350/500/550/600ML large package: 4*6, 4*5 Small package: 3*4, 3*5 (2)1L/1.5L/2L/2.5L large package:3*3.3*4 Small Package: 2*2.2*3 2. For the pop can packing, we advise packing with pallet, it will be steady. 3. Packing speed: 8-15 bundles/minute 4. Satisfy the speed of the liquid filling machine. (1)350/500/550/600ML large package: 4*6, 4*5, (12000-15000 bottles/hour) Small package: 2*3,2*2(3000-4000bottles/hour). 5. Material of packing: the width of PE heat shrink film (200-600mm),thickness(0.08-0.12mm)	1	Set
20	Flat Conveyor Specification: 1.Conveyor Height:1050mm 2.Side panel: 304 stainless steel sheet, thickness is 2mm 3.Power: 0.75KW 4.Supporting leg: 304 stainless steel 5.Trunking and cover: 304 stainless steel 6.Lubricant water conservation tank: 304 stainless steel	60	Meter



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	7.Chain plate: High-quality plastic chain plate, poly oxy methylene (POM) 8.Bearing housing: 304 stainless steel cage.																																															
21	Automatic Blow Molding Machine: Theoretical Output : 6000 bottles/hr. Max.Container Volume : 2L Max.neck Diameter : 45mm Max.Container Diameter : 100mm Max.Container Height : 340mm Number Of Cavity : 6 Cavity Total Power : 45kw Working Pressure : 1.0Map Low Pressure Consuming : 16000L/min Blowing Pressure: ≤3.5Mpa High Pressure Consuming : 3600L/min Machine Dimension : 4.2×2.0×2.0m Machine Weight : 5000kg Feeding Machine Dimension : 2.0×1.2×2.2m Feeding Machine : 300kgs	1	Set																																													
22	Semi-Automatic Blow Molding Machine: <table border="1"> <tr> <td>Force of closing mould</td> <td>Kn</td> <td>100KN</td> </tr> <tr> <td>Productive capacity</td> <td>Pcs</td> <td>1(one cavity)250~400</td> </tr> <tr> <td>Max. Bottle Volume</td> <td>L</td> <td>1(one cavity)5~10</td> </tr> <tr> <td>Working Air Pressure of Main Machine</td> <td>Mpa</td> <td>0.8~1.0</td> </tr> <tr> <td>Blowing Air Pressure</td> <td>Mpa</td> <td>1.5~3.0</td> </tr> <tr> <td>Heating Power</td> <td>Kw</td> <td>12</td> </tr> <tr> <td>Max.Stretch Length</td> <td>mm</td> <td>400</td> </tr> <tr> <td>Max.Mould Thickness</td> <td>mm</td> <td>300</td> </tr> <tr> <td>Allowed Mould Thickness</td> <td>mm</td> <td>200~400</td> </tr> <tr> <td>Allowed Mould Width</td> <td>mm</td> <td>400</td> </tr> <tr> <td>Size of Main Pin(L.W.H.)</td> <td>mm</td> <td>120~220</td> </tr> <tr> <td>Weight</td> <td>Kg</td> <td>300+200</td> </tr> <tr> <td>Size of Main Machine(L.W.H.)</td> <td>mm</td> <td>2000x700x1700</td> </tr> <tr> <td>Size of Oven(L.W.H.)</td> <td>mm</td> <td>2600x680x1500</td> </tr> <tr> <td>Voltage(3-phase)(1-phase)</td> <td>V</td> <td>380/220/110</td> </tr> </table>	Force of closing mould	Kn	100KN	Productive capacity	Pcs	1(one cavity)250~400	Max. Bottle Volume	L	1(one cavity)5~10	Working Air Pressure of Main Machine	Mpa	0.8~1.0	Blowing Air Pressure	Mpa	1.5~3.0	Heating Power	Kw	12	Max.Stretch Length	mm	400	Max.Mould Thickness	mm	300	Allowed Mould Thickness	mm	200~400	Allowed Mould Width	mm	400	Size of Main Pin(L.W.H.)	mm	120~220	Weight	Kg	300+200	Size of Main Machine(L.W.H.)	mm	2000x700x1700	Size of Oven(L.W.H.)	mm	2600x680x1500	Voltage(3-phase)(1-phase)	V	380/220/110	4	Sets
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23	Cooling Tower: Cooling Capacity: 117000Kcal/H Water Flow: 390L/M Fan Dia: 900mm Motor Power: 0.75KW	2	Sets																																													
24	Blow Mould: 250ml, 500ml, 1000ml, 2000ml, 5000ml & 20000ml.	6	Sets																																													
25	High pressure air compressor: Power:15-20 HP Capacity: 500 Liters tank Output Pressure: 30 kg	4	Sets																																													



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26	High pressure air compressor: Power:45 KW Capacity: 700 Liters tank Output Pressure: 10 Bar Air Dryer Machine	1	Set																																																																																																																			
27	Low pressure air compressor: Power:10 HP Capacity: 300 Liters tank Output Pressure: 12.3 kg/cm ²	4	Sets																																																																																																																			
28	Injection machine:-	4	Sets																																																																																																																			
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Ejector Tonnage KN	35																																																																																																																					
Ejector Number	5																																																																																																																					
Electrical system																																																																																																																						
Pump motor capacity KW	15.1																																																																																																																					
Heating capacity KW	9.84																																																																																																																					
Machine weight Ton	5.2																																																																																																																					
Others																																																																																																																						
Machine size (LxWxH) m	5.2x1.3x1.8																																																																																																																					
Hopper Capacity	25(kg)																																																																																																																					
Oil Tank Capacity	306(L)																																																																																																																					
29	Air Receiver tank: Capacity: 1500L Pressure Meter, Safety Valves, Six Output Line With Valves, Bottom water remove Valves.	1	Set																																																																																																																			
30	Bottle mould, Cap Mould: 250ml, 500ml, 1000ml, 2000ml, 5000ml & 20000ml with Cup mould details: 28mm, 1.8gm.	6	Sets																																																																																																																			
31	Water Chiller: Nominal Output 42334 BTU/H 10662 kcal/h 3.5 USRT Power input 380-415v,3 phase.50 Hz Compressor Power 3.15 kw Flow regulator Thermo expansion valve	5	Sets																																																																																																																			



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মৎস্য ও প্রাণিসম্পদ মন্ত্রণালয়

চট্টগ্রাম মৎস্য বন্দর

বাংলাদেশ মৎস্য উন্নয়ন কর্পোরেশন

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	Refrigerant	R22					
	Style	Hub pipe type					
	Water flow	2.60 m ³ /h					
	Condenser Diameter of nipple	32 DN					
	Style	Hub pipe type					
	Evaporator Water tank capacity	55 L					
	Standard freezing water capacity	2.20 m ³ /h					
	Diameter of standard nipple	32 DN					
	Built in pump Horsepower	0.5 HP					
	Machine Weight	130 KG					
	Measurement (L*W*H)	910*520*900mm					
31	Hopper Dryer:		5	Sets			
	Capacity	200 kg					
	Heater Power	12 KW					
	Blower Power	350W					
	Power	380v/3phase					
	External Dimension	118*84*176mm					
	Seat Dimension	23*23 phase 115(K*K*)mm					
	Weight	110kg					
32	Auto Loader:		5	Sets			
	Motor specification	Conveying capacity (kg/hr)	Material Barrel volume (L)	Conveying Tube inner dim (mm)			
	1.1 Kw 3 phase	300kg/hr	6	38mm			
33	Crusher		3	Sets			
	Power (kw)	Diameter of rotor	Granulation size	Movable blade	Fixed blade	Crushing ability (kg/h)	Rotary speed (r/min)
	7.5	236	410x235	3x4	2	300~400	585
34	Bottle Inkjet Printer:		3	Sets			
	Permanent Ink up to four line With Led Display & Key Board. conveyor table ss-304						
35	Conveyor for connection Machines:		120	Meter			
	Material -SS 304 Belt PU 10 Air Blower Motor All Electric Conveyor need to Installation as required to Instruction of Engineer In Charge.						
36	Active Carbon best quality.		1000	Kg			
37	Manganese		1000	Kg			
38	Softener resin		1000	Kg			
39	Spare PLC, Monitor, Inverter, Switch (Japan)		6 Pcs Each	Sets			
40	All Pipe Fittings Valve as per required for complete production Process.		1	Lot			
41	Electrical Cable, Cabinet Tray, Fitting box:		1	Lot			
	Electrical Cable 4x300rm=200 mtr 4x175rm=200 mtr 4x150 rm=200 mtr 4x125 rm=200 mtr 4x95rm=200 mtr 4x35rm=300 mtr						



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	4x25rm=200 mtr 4x16rm=200 mtr 4x10rm=250 mtr 4x6rm=200 mtr 4x4 rm=300mtr 4x2.5rm=300 mtr 4x1.5 rm=300 mtr 1x6 rm=300 mtr 1x4rm=300 mtr 1 x2.5 rm= 300 mtr 1 x1.5 rm= 300 mtr Supply & Installation of all Electric Wire as required to Instruction of Engineer in Charge.		
42	Complete Lab Item: Thermometer, Ph Meter, Constant Temperature Water Bath, Visco-metric Bath, Muffle Furnace, Heating Mental, Cooling Cabinets, Dehumidifier, Bulk Density Apparatus, Zone Reader, COD Digester, BOD Incubator, Vacuum Oven, Autoclave, Tablet Hardness Tester, Colony Counter, Friability Test Apparatus, D T Machine, Mikroscope, Analytical Balance, Spectrophotometer Viscometer Polari meter. Melting Point Apparatus, Karl Fisher Titrator, Conductivity Meter, Potentiometric Titrator, Laboratory Centrifuge, Turbidity Meter, Air Sampler Laminar Air Flow, Moisture Balance Electronic Balance, Oil-Less Vacuum Pump, Abbe Re-fracto meter, Powder /Liquid Sampler, Multi Point Magnetic Stirrer With Hotplate, Overhead Stirrer, Sieve Shaker, Griffin Flask Shaker, Shaker Water bath, Fluid Bed Dryer.	1	Job
43	After Complete Water Treatment Plant then produce water have to Test Government Approved Organization with Given BSTI Certificate .	1	Job
44	Water Treatment Plant Production Shade: 15000 SFT Production Shade Steel Structure with Bottom RCC Foundation, Heat Proofing Sheet, Transparent Profile Sheet at least 30% rest Profile sheet thickness-0.8mm, Top exhaust system, Metal Main Sliding Door with Pocket Door(Size-14 Feet X 16 Feet & 5 Feet X 7 Feet), Sufficient Windows(Thai Aluminium), Drain Line, Labour Locker & Changing Room, Lab Room, Office Room, Breast Feeding Room, Three Toilets, Overhead Crane in Production Floor(Capacity-5Ton), Standard Floor due to Contamination hazard with proper painting.	1	Job
Total Amount:			

Annex 8: Specification of Deep Tube Well

	<p>গণপ্রজাতন্ত্রী বাংলাদেশ সরকার মৎস্য ও প্রাণিসম্পদ মন্ত্রণালয় চট্টগ্রাম মৎস্য বন্দর বাংলাদেশ মৎস্য উন্নয়ন কর্পোরেশন মৎস্য বন্দর, চট্টগ্রাম, জি.পি.ও বজা নং ২৯, ফোন:০৩১-৬১৩০০৬ www.bfdc.gov.bd, E-mail: ctgharbour@gmail.com</p>		
<p><u>Estimate for Installation and Commissioning of Deep Tube-Well (500 Meter x 2 Nos):</u></p>			
Sl No.	Descriptions of Items	Quantity	Unit
01	Test boring dia-1.5" (To find out iron free water layer) for Two Pumps	1000.00	Running Meter
02	Submersible pump and control box with all necessary accessories have to provide by the Bidder. Capacity: 44 KW Phase: Three phase, Pump Dia: 8 inch Delivery Dia: 5 inch Pump head: 150m-72m. Discharge Capacity =144 – 60 Cubic Meter/ Hour Binding Wire: S.S wire, wire clamp, S.S Nut-Bolt other necessary equipment's as required. Brand and Origin: Any international reputed country and Origin to be mentioned by Bidder. (Preference Brand & Origin Shall be Italy, Germany, France, Japan, USA and other similar categories of Country)	2.00	Sets
03	Food Pump: Capacity: 30 Hp Phase: Three phase, Suction Dia: 5 inch Delivery Dia: 4 inch Pump head: 35m-35m, Discharge Capacity =60 – 360 Cubic Meter/ Hour Brand and Origin: Any international reputed country and Origin to be mentioned by Bidder. (Preference Brand & Origin Shall be Italy, Germany, France, Japan, USA and other similar categories of Country)	4.00	Sets
04	Over Head Tank (Capacity: 25 Ton) with Permanent Steel Structure. Height: 25- 30 Meter,	1.00	Job
05	One Input & Discharge Pipe to Over Head Tank for Water Storage & Cleaning. GI Pipe Dia - 5 Inch & Thickness-8mm.	100.00	Running Meter
06	Five Discharge Pipe from Over Head Tank for Water Distributions. Each GI Pipe Dia - 4 Inch & Thickness-8mm.	250.00	Running Meter
07	Boring Dia-18 inch for Two Pumps. With necessary accessories as required if mention or not. Also have to Ensure and Supply iron free water.	1000.00	Running Meter
08	All pumps need to electric connections with DB board & 4 Core Cable lengths & Sbz (35 Rm) as required from pump to electric source.	600.00	Meter



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09	Permanent Casing Pipe: 24 inch dia PVC pipe (class - D) including fitting materials.	50.00	Running Meter
10	Permanent Casing Pipe: 16 inch dia PVC pipe (class - E) including fitting materials.	700.00	Running Meter
11	Permanent Filter Casing Pipe: 16 inch dia PVC filter pipe (class-E) including fittings- materials (Brand to be mentioned by the Bidder)	300.00	Running Meter
12	Two Pumps attached Pipe: 5 inch dia GI Flange Type with S.S Nut-bolts system pipe with necessary fittings and accessories.	400.00	Running Meter
13	Test, Trial and commissioning of complete deep tube well to get pure drinking water have to ensure iron free.	1.00	Job
14	Supplier should be provided Test Certificate from Public Health Engineering Department.	1.00	Job
15	S.S Gate Valve (Dia-4 Inch)	24.00	Sets
16	S.S Gate Valve (Dia-5 Inch)	6.00	Sets
17	S.S Gate Valve (Dia-2 Inch)	30.00	Sets
18	S.S Gate Valve (Dia-1.5 Inch)	40.00	Sets
19	Brass Check Valve with Strainer	4.00	Sets
20	GI Suction Pipe (Dia-6/5 inch & Thickness-8mm) with Flange and Necessary Fitting.	50.00	Running Meter
21	PVC Delivery Thread Pipe (Dia-4 Inch & class - E) with Necessary Fitting.	1050.00	Running Meter
22	PVC Delivery Thread Pipe (Dia-2 Inch & class - E) with Necessary Fitting.	1570.00	Running Meter
23	RCC Under Ground Water Storage Tank (Zigzag Eight Partitions). Size: 10 X 10 X 4 Meter. Brick wall Boundary.	1.00	Job
24	Pump Room: RCC Work: One Storied Pump room (40'x20'x12') with rcc roof metal doors, Thai aluminum windows with grill and proper painting. Also Table, Chair, Electric light, Fan & Exhaust Fan with necessary accessories.	1.00	Job
25	All PVC Under Ground Distribution Pipe Line Installation like Land Excavation, Pit Box Fabrication and Pipe Fitting & Fixing)	1.00	Job

Annex 9: Specification of Fork Lifter

	<p>গণপ্রজাতন্ত্রী বাংলাদেশ সরকার মত্যা ও প্রাথমিক মন্ত্রণালয় চট্টগ্রাম মত্যা বন্দর বাংলাদেশ মত্যা উন্নয়ন কর্পোরেশন</p> <p>মত্যা বন্দর, চট্টগ্রাম, জি.পি.ও বজা নং ২৯, ফোন:০৩১-৬১৩০০৬ www.bfdc.gov.bd, E-mail: ctgharbour@gmail.com</p>		
<p><u>Estimate for Supply of Brand New Forklift (Capacity 5 Ton).</u></p>			
Sl. No.	Descriptions of Items	Quantity	Unit
1.1	<p>1. Model and Brand of the Forklift: To be mentioned by the bidder. Forklift has to be original from OEM's regular manufacturing line, no assembly is acceptable (Preference Brand: Toyota/ Komatsu/ HITACHI/ CAT/ HYUNDAI/ KOBELCO/ SUMITOMO/ MITSUBISHI or other similar categories).</p> <p>2. Country of Origin: Any international reputed country and to be mentioned by Bidder. The bidder must provide Original Equipment Manufacturer (OEM) certificate (mentioning year of product) along with the Forklift. The manufacturer must provide their equipment type test license or special Forklift manufacturing license along with their ISO certificate and CE Certificate in addition to the OEM certificate.</p> <p>3. Country of Manufacture: Any international reputed country and to be mentioned by Bidder. All items with the Forklift must be manufactured within the same country. If country of manufacture of any item is different, then it is to be certified by the manufacturer of Forklift and to be mentioned in the offer.</p> <p>4. Year of Manufacture: The Forklift as well as its integral components must be branding new, unused (0 mileage) and latest product or not earlier than year of 2018 and a certificate in this regard is to be provided by the manufacturer during shipment along with the Forklift.</p>	01	Job
2.0	<p>Frame (Chassis)</p> <p>2.1 Shall be rigid, designed to resist loads (Longitudinal, transverse, torsion, twisting etc.), that may cause permanent deformation or cracks or ruptures and of welded steel construction.</p> <p>2.2 Shall be designed to provide easy disassembly and assembly of the mechanical and electrical components fitted on.</p> <p>2.3 Shall be fitted with towing pin at the rear end of the frame.</p>	01	job
3.0	<p>Capacity:</p> <p>3.1 Load capacity without side shifter shall be 5000 kg at 500 mm load centre (safe working load).</p> <p>3.2 Load capacity with side shifter shall not be less than 4500 kg at 500 mm load centre (safe working load).</p>		



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4.0	<p>Mast:</p> <p>4.1 Mast shall be constructed of high tensile steel and stress relieved.</p> <p>4.2 Type: Full free wide view 2 or 3 stage telescopic mast. Supporting mast catalogue shall be submitted with the tender.</p> <p>4.3 Tilt angle (Forward/ backward): Mast tilt angle not less than 5° forward and 6° backward in laden condition.</p> <p>4.4 Mast closed height: Not exceeding 2240 mm from ground level.</p> <p>4.5 Lifting height: About 3000 mm (The requirement is indicative, ± 10% is acceptable).</p> <p>4.6 Free lift: Not less than 850 mm without load backrest.</p> <p>4.7 Cylinders: Minimum 3 lift cylinders and 2 tilt cylinders.</p>		
5.0	<p>Dimensions:</p> <p>5.1 Overall dimensions and unladen weight of the machine shall be kept to a minimum consistent with sound design practice and due regard to the following critical requirements: a) Rated capacity and load centre b) Minimum turning circle c) Operators visibility. d) Load bearing capacity of container floor.</p> <p>5.2 Overall height (mast closed with overhead guard /cab): not exceeding 2240 mm.</p> <p>5.3 Outside turning radius: Not exceeding 3300 mm.</p> <p>5.4 Ground clearance at the lowest point with load: Not less than 125 mm.</p> <p>5.5 Length to fork face: About 2800 mm.</p> <p>5.6 Overall width: Not more than 2000 mm.</p>		
6.0	<p>Performance:</p> <p>6.1 The forklift truck to be supplied under these specifications shall be designed and built to work continuously up to a maximum of 24 hours a day at peak, under all weather conditions of Bangladesh.</p> <p>6.2 Travelling speed: Not less than 17 km/hr with maximum specified load at zero gradient.</p> <p>6.3 Lifting speed: Not less than 300 mm/sec in laden condition.</p> <p>6.4 Gradability: Not less than 15 % (unladen) and not less than 10% (laden).</p>	01	job
7.0	<p>Stability: Complying with relevant international standard.</p>		



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8.0	<p>Engine:</p> <p>8.1 The engine shall be heavy duty, industrial, diesel operated, four stroke, water cooled, electrical starting and of well proven make. The engine capacity shall be adequate to meet all operational requirements.</p> <p>8.2 The engine shall be equipped with safety protection and alarm devices against high temperature and low oil pressure. The alarms shall be visible /audible to alert the operator.</p> <p>8.3 Fuel tank shall have sufficient capacity for not less than 12 hours continuous operation.</p> <p>8.4 Engine speed indicator and operating hours counter shall be fitted in the operator's cab.</p> <p>8.5 Oil bath type air filter or two stage cyclone type air filter or cyclone type pre-filter with secondary air filter or equivalent shall be provided.</p> <p>8.6 The exhaust pipe shall be mounted away from engine, transmission, hydraulic and electrical components etc. and in a way that it will not prevent or hinder repair and maintenance of other components. Weather cap shall be provided on exhaust stack, if vertically mounted.</p> <p>8.7 Complete with all other necessary standard accessories compatible with local conditions.</p>		
9.0	<p>Power transmission:</p> <p>9.1 Power transmission shall be heavy-duty type for forward and reverse direction of travel.</p> <p>9.2 The system shall be effectively sealed to prevent fluid leakages, dust penetration and shall have adequate cooling capacity.</p>		
10.0	<p>Brake system:</p> <p>10.1 Service (Foot) brake: Hydraulic brake on wheels.</p> <p>10.2 Parking cum emergency brake: Mechanical.</p>		
11.0	<p>Steering system:</p> <p>11.1 Power assisted steering system.</p> <p>11.2 Steering system shall be suitably protected against damage.</p> <p>11.3 Steering linkage shall be of robust type and the joint bearing shall be well protected against dust and dirt.</p>		
12.0	<p>Hydraulic system:</p> <p>12.1 Hoisting and lowering shall be hydraulically operated. It is</p>		



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	<p>essential that the movement of hydraulically operated mechanism shall be smooth and infinitely variable within complete range.</p> <p>12.2 The hydraulic oil reservoir shall be cleaned, pickled and primed before installation and of sufficient size to ensure that the oil temperature is not excessive under sustained operating condition. Magnetic sump plugs shall be provided. Covers of at least 50 mm diameter shall be incorporated in the tanks for cleaning purposes. Tank shall be rigidly mounted. Drainage system for cleaning the tank shall be provided.</p> <p>12.3 Hydraulic piping shall be located so that potential physical damage is avoided, individually clipped at sufficient intervals to eliminate vibrations and situated so that future maintenance is simplified.</p> <p>12.4 The hoist motion design and working hydraulic pressure shall be sufficient for the specified hoist speed.</p> <p>12.5 Hydraulic oil filters shall be quickly and readily accessible. The filters shall be full flow filters, about three times the design flow.</p> <p>12.6 All hydraulic components such as hoses, piping, adaptors, etc. shall be rated at twice the design working pressure. All hoses, adaptors, filters shall be standardised on all machines. Fitting locations shall be designed such that maintenance is easy.</p> <p>12.7 Provision shall be made to absorb hydraulic shock generated within the system.</p>		
<p>13.0</p>	<p>Electrical system:</p> <p>13.1 Electrical system shall be 12 volt or 24-volt heavy duty negative earth fully sealed and proofed against breakdowns/ damage due to leakage of rain water.</p> <p>13.2 Batteries shall be mounted in a protected position but easily accessible for maintenance.</p> <p>13.3 Suitable head lights, front and rear lights, tail lights, indicators and stop lights shall be fitted and conveniently located and protected from external shocks/ collision and pilferage etc. Seal beam type of lighting will not be accepted.</p> <p>13.4 Electrical system shall be complete with all necessary instruments, gauges and accessories.</p>		
<p>14.0</p>	<p>Side shifting:</p> <p>14.1 All Forklift trucks shall be fitted with side shifter and the forks shall also be manually adjustable. The capacity of the forklift</p>		



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	trucks should not reduce more than 200 kg (indicative only) for attaching side shifter. Side shifters shall be of detachable type. 14.2 Total shifting of the forks shall not be less than 200 mm (\pm 100 mm).		
15.0	Forks: 15.1 Each forklift truck shall be equipped with standard regular tapered fork for handling general cargo. 15.2 Length: Not less than 1200 mm. 15.3 Width: Not less than 150 mm. 15.4 Thickness: Not less than 60 mm. 15.5 Forks shall be made of forged steel and tapered.		
16.0	Operator's Cabin: 16.1 Each forklift truck shall be equipped with cabin/overhead guard with suitable protection against rain and sun. 16.2 All controls, indicators and signs shall be designed for operators' maximum comfort. All the indicators shall be placed in a prominent position to ensure optimum visibility. Arrangement shall be provided for illumination in the operators' control and over the dashboard to a standard suitable night operations.	01	Job
17.0	Wheels and Tires: 17.1 Pneumatic type. Ply rating must satisfy the loading condition. 17.2 The wheels shall be fitted with " anti-friction bearings". 17.3 The tyre shall be of heavy duty, industrial / off the road type and of standard size.	01	Job
18.0	Instruments and controls: 18.1 Instrument panel shall be of anti-glare type and well positioned to ensure an easy reading of all instruments by the operator and shall contain the following instruments: 18.1 Hour meter. 18.2 Ammeter / warning lamp. 18.3 Engine oil pressure warning lamp/oil pressure gauge. 18.4 Engine coolant temperature gauge. 18.5 Fuel level gauge. 18.6 Any other standard gauges and controls for efficient and safe operation of the forklift truck. 18.7 All instruments, gauge and indicator lights shall be clearly labeled. Self adhesive labels will not be accepted.		



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বাংলাদেশ মৎস্য উন্নয়ন কর্পোরেশন



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19.0	Inspection, Test/ Trial and Acceptance: a. The Supplier's representative(s) will carry out tests and trials of the Forklift at the BFDC, Chittagong premises in presence of the Representative(s) nominated by the BFDC and hand over the Supplier's representative(s) will carry out tests and trials of the Forklift at the BFDC, Chittagong premises in presence of the Representative(s) nominated by the BFDC and hand over the Forklift in fully operational condition to them. b. On completion of successful trials and commissioning, an formal handover certificate will be signed jointly by the Supplier's and BFDC Representative(s) in fully operational condition to them.	01	Job
20.0	List of spares and tools: a. Standard set of tools box for Forklift : 01 Set (Bidder is to mention the list of standard the tools with qty). b. Fuel Filter: 06 pcs c. Air Filter: 06 pcs d. Lubrication filter: 06 pcs	01	Job
21.0	Standard Fittings: a. All safety devices are to be incorporated as per the international standard. b. All types of fittings are to be done by the manufacturer as per the requirement of the user. c. Any other things required to operate the Forklift smoothly to be provided by the bidder within the quoted price.	01	Job
22.0	Warranty and Maintenance: Warranty period 01(one) year for service, spare parts replacement and maintenance from the date of acceptance. If the Forklift or any item is found unserviceable during warranty period, the same must be repaired/ replaced by the supplier at their own expenses. Unserviceable period due to delay in warranty replacement/repair will be added to the total warranty period.	01	Job
23.0	Documents: a. Manual covering maintenance and overhauling information of engine, Hydraulic System, chassis and also circuit diagram of all electrical system of Forklift (in English): Qty-02. b. Illustrated Parts Catalogue for engine, Hydraulic System and chassis of Truck (in English): Qty-02. c. Driver's/Owner/Operation manual (book type, all in English): Qty-02.	01	Job



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Estimate for Supply of Brand New Forklift (Capacity 2 Ton).

Sl. No.	Descriptions of Items	Quantity	Unit
1.1	<p>1. Model and Brand of the Forklift: To be mentioned by the bidder. Forklift has to be original from OEM's regular manufacturing line, no assembly is acceptable (Preference Brand: Toyota/ Komatsu/ HITACHI/ CAT/ HYUNDAI/ KOBELCO/ SUMITOMO/ MITSUBISHI or other similar categories).</p> <p>2. Country of Origin: Any international reputed country and to be mentioned by Bidder. The bidder must provide Original Equipment Manufacturer (OEM) certificate (mentioning year of product) along with the Forklift. The manufacturer must provide their equipment type test license or special Forklift manufacturing license along with their ISO certificate and CE Certificate in addition to the OEM certificate.</p> <p>3. Country of Manufacture: Any international reputed country and to be mentioned by Bidder. All items with the Forklift must be manufactured within the same country. If country of manufacture of any item is different, then it is to be certified by the manufacturer of Forklift and to be mentioned in the offer.</p> <p>4. Year of Manufacture: The Forklift as well as its integral components must be branding new, unused (0 mileage) and latest product or not earlier than year of 2018 and a certificate in this regard is to be provided by the manufacturer during shipment along with the Forklift.</p>	01	Job
2.0	<p>Frame (Chassis)</p> <p>2.1 Shall be rigid, designed to resist loads (Longitudinal, transverse, torsion, twisting etc.), that may cause permanent deformation or cracks or ruptures and of welded steel construction.</p> <p>2.2 Shall be designed to provide easy disassembly and assembly of the mechanical and electrical components fitted on.</p> <p>2.3 Shall be fitted with towing pin at the rear end of the frame.</p>	01	Job
3.0	<p>Capacity:</p> <p>3.3 Load capacity without side shifter shall be 2000 kg at 500 mm load centre (safe working load).</p> <p>3.4 Load capacity with side shifter shall not be less than 1500 kg at 500 mm load centre (safe working load).</p>		
4.0	<p>Mast:</p> <p>4.1 Mast shall be constructed of high tensile steel and stress relieved.</p> <p>4.2 Type: Full free wide view 2 or 3 stage telescopic mast. Supporting mast catalogue shall be submitted with the tender.</p>		



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	<p>4.3 Tilt angle (Forward/ backward): Mast tilt angle not less than 5° forward and 6° backward in laden condition.</p> <p>4.4 Mast closed height: Not exceeding 2240 mm from ground level.</p> <p>4.6 Lifting height: About 3000 mm (The requirement is indicative, ± 10% is acceptable).</p> <p>4.6 Free lift: Not less than 850 mm without load backrest.</p> <p>4.7 Cylinders: Minimum 3 lift cylinders and 2 tilt cylinders.</p>		
5.0	<p>Dimensions:</p> <p>5.1 Overall dimensions and unladen weight of the machine shall be kept to a minimum consistent with sound design practice and due regard to the following critical requirements: a) Rated capacity and load centre b) Minimum turning circle c) Operators visibility. d) Load bearing capacity of container floor.</p> <p>5.2 Overall height (mast closed with overhead guard /cab): not exceeding 2240 mm.</p> <p>5.3 Outside turning radius: Not exceeding 3300 mm.</p> <p>5.4 Ground clearance at the lowest point with load: Not less than 125 mm.</p> <p>5.5 Length to fork face: About 2000 mm.</p> <p>5.6 Overall width: Not more than 2000 mm.</p>		
6.0	<p>Performance:</p> <p>6.1 The forklift truck to be supplied under these specifications shall be designed and built to work continuously up to a maximum of 24 hours a day at peak, under all weather conditions of Bangladesh.</p> <p>6.2 Travelling speed: Not less than 17 km/hr with maximum specified load at zero gradient.</p> <p>6.3 Lifting speed: Not less than 300 mm/sec in laden condition.</p> <p>6.4 Gradability: Not less than 15 % (unladen) and not less than 10% (laden).</p>	01	Job
7.0	<p>Stability: Complying with relevant international standard.</p>		
8.0	<p>Engine:</p> <p>8.1 The engine shall be heavy duty, industrial, diesel operated, four stroke, water cooled, electrical starting and of well proven make. The engine capacity shall be adequate to meet all operational requirements.</p> <p>8.2 The engine shall be equipped with safety protection and alarm devices against high temperature and low oil pressure. The alarms shall be visible /audible to alert the operator.</p>		



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	<p>8.3 Fuel tank shall have sufficient capacity for not less than 12 hours continuous operation.</p> <p>8.4 Engine speed indicator and operating hours counter shall be fitted in the operator's cab.</p> <p>8.5 Oil bath type air filter or two stage cyclone type air filter or cyclone type pre-filter with secondary air filter or equivalent shall be provided.</p> <p>8.6 The exhaust pipe shall be mounted away from engine, transmission, hydraulic and electrical components etc. and in a way that it will not prevent or hinder repair and maintenance of other components. Weather cap shall be provided on exhaust stack, if vertically mounted.</p> <p>8.7 Complete with all other necessary standard accessories compatible with local conditions.</p>		
9.0	Power transmission:		
	<p>9.1 Power transmission shall be heavy-duty type for forward and reverse direction of travel.</p> <p>9.2 The system shall be effectively sealed to prevent fluid leakages, dust penetration and shall have adequate cooling capacity.</p>		
10.0	Brake system:		
	<p>10.1 Service (Foot) brake: Hydraulic brake on wheels.</p> <p>10.2 Parking cum emergency brake: Mechanical.</p>		
11.0	Steering system:		
	<p>11.1 Power assisted steering system.</p> <p>11.2 Steering system shall be suitably protected against damage.</p> <p>11.3 Steering linkage shall be of robust type and the joint bearing shall be well protected against dust and dirt.</p>		
12.0	Hydraulic system:		
	<p>12.1 Hoisting and lowering shall be hydraulically operated. It is essential that the movement of hydraulically operated mechanism shall be smooth and infinitely variable within complete range.</p> <p>12.2 The hydraulic oil reservoir shall be cleaned, pickled and primed before installation and of sufficient size to ensure that the oil temperature is not excessive under sustained operating condition. Magnetic sump plugs shall be provided. Covers of at least 50 mm diameter shall be incorporated in the tanks for cleaning purposes. Tank shall be rigidly mounted. Drainage system for cleaning the tank shall be provided.</p>		

 <p>বাংলা ফর্ক উইং কং</p>	<p>গনপ্রজাতন্ত্রী বাংলাদেশ সরকার মতলা ও এগ্রিসিম্পদ মন্ত্রণালয় চট্টগ্রাম মতলা বন্দর বাংলাদেশ মতলা উন্নয়ন কর্পোরেশন</p>		
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	<p>12.3 Hydraulic piping shall be located so that potential physical damage is avoided, individually clipped at sufficient intervals to eliminate vibrations and situated so that future maintenance is simplified.</p> <p>12.4 The hoist motion design and working hydraulic pressure shall be sufficient for the specified hoist speed.</p> <p>12.5 Hydraulic oil filters shall be quickly and readily accessible. The filters shall be full flow filters, about three times the design flow.</p> <p>12.6 All hydraulic components such as hoses, piping, adaptors, etc. shall be rated at twice the design working pressure. All hoses, adaptors, filters shall be standardised on all machines. Fitting locations shall be designed such that maintenance is easy.</p> <p>12.7 Provision shall be made to absorb hydraulic shock generated within the system.</p>		
<p>13.0</p>	<p>Electrical system:</p> <p>13.1 Electrical system shall be 12 volt or 24-volt heavy duty negative earth fully sealed and proofed against breakdowns/ damage due to leakage of rain water.</p> <p>13.2 Batteries shall be mounted in a protected position but easily accessible for maintenance.</p> <p>13.3 Suitable head lights, front and rear lights, tail lights, indicators and stop lights shall be fitted and conveniently located and protected from external shocks/ collision and pilferage etc. Seal beam type of lighting will not be accepted.</p> <p>13.4 Electrical system shall be complete with all necessary instruments, gauges and accessories.</p>		
<p>14.0</p>	<p>Side shifting:</p> <p>14.1 All Forklift trucks shall be fitted with side shifter and the forks shall also be manually adjustable. The capacity of the forklift trucks should not reduce more than 200 kg (indicative only) for attaching side shifter. Side shifters shall be of detachable type.</p> <p>14.2 Total shifting of the forks shall not be less than 200 mm (\pm 100 mm).</p>		
<p>15.0</p>	<p>Forks:</p> <p>15.1 Each forklift truck shall be equipped with standard regular tapered fork for handling general cargo.</p> <p>15.2 Length: Not less than 1200 mm.</p> <p>15.3 Width: Not less than 150 mm.</p> <p>15.4 Thickness: Not less than 60 mm.</p> <p>15.5 Forks shall be made of forged steel and tapered.</p>		
<p>16.0</p>	<p>Operator's Cabin:</p> <p>16.1 Each forklift truck shall be equipped with cabin/overhead guard</p>	<p>01</p>	<p>Job</p>



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	with suitable protection against rain and sun.		
16.2	All controls, indicators and signs shall be designed for operators' maximum comfort. All the indicators shall be placed in a prominent position to ensure optimum visibility. Arrangement shall be provided for illumination in the operators' control and over the dashboard to a standard suitable night operations.		
17.0	Wheels and Tires: 17.1 Pneumatic type. Ply rating must satisfy the loading condition. 17.2 The wheels shall be fitted with " anti-friction bearings". 17.3 The tyre shall be of heavy duty, industrial / off the road type and of standard size.	01	Job
18.0	Instruments and controls: 18.1 Instrument panel shall be of anti-glare type and well positioned to ensure an easy reading of all instruments by the operator and shall contain the following instruments: 18.1 Hour meter. 18.2 Ammeter / warning lamp. 18.3 Engine oil pressure warning lamp/oil pressure gauge. 18.4 Engine coolant temperature gauge. 18.5 Fuel level gauge. 18.6 Any other standard gauges and controls for efficient and safe operation of the forklift truck. 18.7 All instruments, gauge and indicator lights shall be clearly labeled. Self-adhesive labels will not be accepted.		
19.0	Inspection, Test/ Trial and Acceptance: a. The Supplier's representative(s) will carry out tests and trials of the Forklift at the BFDC, Chittagong premises in presence of the Representative(s) nominated by the BFDC and hand over the Supplier's representative(s) will carry out tests and trials of the Forklift at the BFDC, Chittagong	01	Job
	premises in presence of the Representative(s) nominated by the BFDC and hand over the Forklift in fully operational condition to them. b. On completion of successful trials and commissioning, an formal handover certificate will be signed jointly by the Supplier's and BFDC Representative(s) in fully operational condition to them.		



গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

মত্যা ও প্রাথমিক মন্ত্রণালয়

চট্টগ্রাম মত্যা বন্দর

বাংলাদেশ মত্যা উন্নয়ন কর্পোরেশন

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20.0	List of spares and tools: a. Standard set of tools box for Forklift : 01 Set (Bidder is to mention the list of standard the tools with qty). b. Fuel Filter: 03 pcs c. Air Filter: 03 pcs d. Lubrication filter: 03 pcs	01	Job
21.0	Standard Fittings: a. All safety devices are to be incorporated as per the international standard. b. All types of fittings are to be done by the manufacturer as per the requirement of the user. c. Any other things required to operate the Forklift smoothly to be provided by the bidder within the quoted price.	01	Job
22.0	Warranty and Maintenance: Warranty period 01 (one) year for service, spare parts replacement and maintenance from the date of acceptance. If the Forklift or any item is found unserviceable during warranty period, the same must be repaired/ replaced by the supplier at their own expenses. Unserviceable period due to delay in warranty replacement/repair will be added to the total warranty period.	01	Job
23.0	Documents: a. Manual covering maintenance and overhauling information of engine, Hydraulic System, chassis and also circuit diagram of all electrical system of Forklift (in English): Qty-02. b. Illustrated Parts Catalogue for engine, Hydraulic System and chassis of Truck (in English): Qty-02. c. Driver's/Owner/Operation manual (book type, all in English): Qty-02.	01	Job

Parking Shade for Two Forklift (2 & 5 Ton):

RCC Work:

One Storied Parking Shade (80'x30'x18') & Two Toilets (RCC Room & Roof top (Size- 5 ft x 7 ft x 9ft & Size 6ft x 8ft x 6 inch) with RCC Underground Reserve Tank- 10 ft x 10ft x 10 ft & RCC Water disposal tank- 5ft x5 ft x 10ft) with Steel Structure & RCC Basement with Profile Sheet roof top, Side wall, metal doors, Three aluminum windows with grill and proper painting, Lighting, fire extinguisher etc. include fencing of wall top area for sun light.

Annex 10: Specification of Fire Fighting Arrangement

 <p>বাংলা জি. ডি. কে.</p>	<p>গণপ্রজাতন্ত্রী বাংলাদেশ সরকার মৎস্য ও প্রাণিসম্পদ মন্ত্রণালয় চট্টগ্রাম মৎস্য বন্দর বাংলাদেশ মৎস্য উন্নয়ন কর্পোরেশন</p>		
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<p>Supply & Installation Complete Fire Pump and Distribution Line With related all Accessories</p>			
Sl. No.	Descriptions of Items	Quantity	Unit
01	<p>Each set has three pumps:</p> <p>Electric Driven Fire pump: 01 Set Calpeda N 100-315B/A c/w WEG 132KW, 3ph/400V/50hz, IP55, IE2, 2900rpm motor Mounted on common baseplate. Duty : 1250 US GPM @ 100 m Casing : Cast Iron Impeller : Cast Iron Shaft : AISI 420 Seal : Mechanical Seal Supply with Local Fabricated Electric Fire pump controller 132KW, S/D (Open Transition) – Supplied Loose. Including Export Wooden cases (without fumigation) for both pump set and control panel.</p> <p>Diesel Engine Driven Fire Pump: 01 Set Calpeda N 100-315B/A coupled to FPT radiator cooled electric start diesel engine model N45 NMT F41.11 rated 145KW at 2940rpm mounted on common base plate. Duty : 1250 US GPM @ 100 m Casing : Cast Iron Impeller : Cast Iron Shaft : AISI 430 Seal : Mechanical Seal Scope of Supply Flywheel Housing 24V Starting motor & Alternator Air, Fuel and Oil Filter Standard Muffler Radiator Flexible bellow Manual Control panel complete with key switch, tachometer with hour meter, oil pressure gauge, water temperature gruge, low oil pressure indicating light and battery charging light Auto-shutdown for low oil pressure & high water temperature. Supply with Local Fabricated Diesel Fire pump controller 145KW (one Battery Charger) and also 350 litre Fuel Tank – Supplied Loose. Including Export Wooden cases (without fumigation) for pump set, fuel tank and control panel</p> <p>Jockey Pump: 01 Set Calpeda Vertical Multistage Pump Model: MXV 40-913 c/w 5.5kw, 3ph/400V/50hz, 2900rpm IP55 motor Duty : 40USGPM @ 110 m Casing : AISI 304 Impeller : AISI 304 Shaft : AISI 303 Seal : Mechanical Seal Supply with Local Fabricated Jockey Pump Controller 5.5kw (DOL).</p>	03	Sets
02	<p>MS Pipe-300mm(Schedule 40) Fabrication for Distribution Header. Include necessary bend and related accessories.</p>	30	M
03	<p>MS Pipe-200mm(Schedule 40) Fabrication for Suction line. Include necessary bend and related accessories.</p>	250	M



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04	MS Pipe-150mm (Schedule 40) Fabrication for distribution line. Include necessary bend and related accessories.	1280	M
05	MS Pipe-100mm(Schedule 40) Fabrication for distribution line. Include necessary bend and related accessories.	1850	M
06	MS Pipe-50mm(Schedule 40) Fabrication for Jockey Pump line and related works. Include necessary bend and related accessories.	200	M
07	Fire Hose Box (Class-II): Box Size-(762mmX686mmX300mm) i) 40mm Hose pipe with male Female coupling ii) 40mm Right angle vane iii)38mm Nozzle(Jet & Spray type) iv)Hose rake cabinet v) 65mm Landing Valve Brand: Emaco/Equivalent. UL/FM Origin :USA	35	Sets
	Hose Rail Complete Set: Coil pipe dia-50mm with 38mm Nozzle (Jet & Spray type), coil pipe length-100meter.	10	Sets
08	OS & Y gate: Each sets have below items: 200 mm OS & Y gate valve for common delivery header to System Line Brand :Emaco/Equivalent. UL/FM Origin : USA Quantity-5 Pcs	3	Sets
	150mm OS & Y gate valve for Distribution Line Brand: Emaco/Equivalent. UL/FM Origin :USA Quantity-6 Pcs		
	100mm OS & Y gate valve for Distribution Line Brand: Emaco/Equivalent. UL/FM Origin :USA Quantity-12 Pcs		
	50 mm OS & Y gate valve for jockey pump suction & Delivery Brand : Emaco/Equivalent. UL/FM Origin :USA Quantity-2 Pcs		
09	Y-Strainer: Each sets have below items: 200 mm Y-Strainer for main Pump Suction Brand: Emaco/Equivalent. UL/FM Origin :USA Quantity-2 Pcs	03	Sets
	150 mm Y-Strainer for Distribution Line Brand: Emaco/Equivalent. UL/FM Origin :USA Quantity-6 Pcs		
	100 mm Y-Strainer for Distribution Line Brand: Emaco/Equivalent. UL/FM Origin :USA Quantity-12 Pcs		



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	50 mm Y-Strainer for jockey pump suction Brand: Emaco/Equivalent. UL/FM Origin :USA Quantity-1 Pcs		
10	Non Return Valve: Each sets have below items: 200 mm Non Return Valve for main 2nos Pump Delivery Brand: Emaco/Equivalent. UL/FM Origin :USA Quantity-6 Sets 50 mm Non Return Valve for jockey pump Delivery Brand: Emaco/Equivalent. UL/FM Origin :USA Quantity-3 Sets	1	Job
11	Expansion joint: Each sets have below items: 200 mm Expansion joint for main 2nos Pump suction Line Brand :Emaco/Equivalent. UL/FM Origin :USA Quantity-4 Pcs 150 mm Expansion joint for Distribution Line Brand: Emaco/Equivalent. UL/FM Origin :USA Quantity-8 Pcs 100 mm Expansion joint for Distribution Line Brand: Emaco/Equivalent. UL/FM Origin :USA Quantity- 12 Pcs 50 mm Flexible joint for jockey pump suction & Delivery Line Brand: Emaco/Equivalent. UL/FM Origin :USA Quantity-2 Pcs	03	Sets
12	Check Valve with Brass Strainer: Each sets have below items: 200 mm Check Valve with Brass Strainer for main Pump Suction Brand: Emaco/Equivalent. UL/FM Origin :USA Quantity-6 Sets 50 mm Check Valve with Brass Strainer for jockey pump suction Brand: Emaco/Equivalent. UL/FM Origin :USA Quantity-3 Sets	1	Job
13	Pressure Gauge: Each sets have below items: Quantity-6 Pcs	03	Sets
14	Centrifugal Priming Pump, 5.5KW, Discharge-2.5 Inch, Suction-3 Inch, Three- Phases with Control Box.	1	Set
15	Air Vent : Air Vent Valve 25mm NPT Brand :Quantity-1 Pcs	03	Sets
16	Test Line Set: 150mm Pressure Relief Valve Brand. Quantity-1 Pcs	03	Sets
17	Fire Fighting Pump House: RCC Work: Pump room (100'x30'x14') with rcc roof metal doors. Thai aluminum	03	Units



গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
 মৎস্য ও প্রাণিসম্পদ মন্ত্রণালয়
 চট্টগ্রাম মৎস্য বন্দর
 বাংলাদেশ মৎস্য উন্নয়ন কর্তৃপক্ষ



মৎস্য বন্দর, চট্টগ্রাম, জি.পি.ও ব্লক নং ২৯, ফোন:০৩১-৬১৩০০৬
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	windows with grill and proper painting with rcc pillar with roof(outside extension roof-2' minimum) metal doors and proper painting, Lighting, fire extinguisher etc.		
18	Supply & Installation: Check Valve, Pumps, Automatic Control System and other related accessories. All pipes go through in soil and accessories should Complete Installation.	LS	--
19	Miscellaneous	LS	--

Annex 11: Detail Description of Canals under Three Coastal Districts

A11.1 Description of Canals Under Satkhira District

There are six canals under Satkhira District to be rehabilitate for the cluster farming issues. The administrative location and Geographic location of these canals are given in the **Table 4.3** and **Table 4.4** respectively. **Figure A11.1** shows the location Map of the Canals under Satkhira District, and **Figure A11.2** shows some pictures of the catchment areas of these canals. The detailed description of these canals is given as follows:

a) *Atshobigha Khal*

The canal is located at Debhata Upazila under Satkhira District. The offtake of this canal is Shapmara-Habra (Khutikkhali) River near Shannyashi Chhak area. The canal falls at the floodplain at Jheela. Almost 100% area of its catchment is under shrimp farming. However, some vegetable cultivation was observed at the dyke of this canal. Both the bank of this canal is under khas land. The water of this canal is very salty; hence, local people cannot use this canal water for drinking purpose. In this regard, they collect water from the deep tube well located around 6 km away from the Atshotobigha Primary School. However, sometimes especially during dry period, the water gets very saline and people need to use the water that are carried for drinking purpose. The gher under the catchment area are given as lease to the local people for cluster farming. People give Tk. 2/ decimal/ month for “Bilan” (বিলান ভূমি) class and Tk. 6/ decimal/ month for “Bari” (বাড়ি শ্রেণী) class to the respective authorities. Some squatters (around 3-4 numbers of households) were observed on the dyke of the canal beside the roadside. According to them, they are staying temporarily at this place to have easy access to the Upzalia through the road, and once the excavation activities start, they would shift to their permanent address.

Flood is an unwanted event that occurs almost every year within the catchment due to poor drainage system of the canal which is eventually caused for siltation. The canal is silted up to 1.5m to 1.70m. According to local people, flood water stays for 1-2 months during monsoon, whereas, they do not even get water for daily use during dry season and the surface water got salty.

b) *Kalmegher Khal*

The canal is located at Shyamnagar Upazila under Satkhira District. The offtake of this canal is Madar Gang River near Shoyalia Bridge. This canal has two distributaries; one of them falls into the Madar Gang River near Kallyanpur sluice gate, another one falls into the flood plain. Fresh water scarcity was observed within the catchment area of this canal. Drinking water is to be bought by Tk. 35/ drum (30 liter) from the Shyamnagar Upazila. However, local can also use pond water for other potable purposes. Some squatters (around 2-3 numbers of households), mostly cluster farmers were observed on the dyke of the canal. According to the information as mentioned in the **Appendix 12**, adverse impacts due to canal excavation for those squatters is assumed as remote. According to local people no flood is occurred within the catchment of this canal.

c) *Magra Khal*

The canal is located at Kolaroa Upazila under Satkhira District. The offtake of this canal is Betna River from Berikhali Sluice Gate at Shimnagar, and falls to the flood plain at Koyla. According to the field observation, the canal is full of water hyacinth and not very wide enough to carry sufficient water for the cluster farming. Most of the catchment area of this canal is used for crop cultivation as well as shrimp and fish farming. Rest of the area is used for shrimp and fish farming only. Vegetation such as:

banana, date, and papaya trees, some herbs and grasses would be cleared before starting excavation activity. Local people do not have any objection regarding this issue rather they requested through union chairman for canal excavation by themselves for drainage management.

d) Mahandi Khal, Dakshkathi Khal, and Madhabkhali Khal

These three canals are interconnected with each other and are located at Tala Upazila under Satkhira District. All the three canals are situated under the same catchment area. Dakshkathi khal starts from the Pashchim Salta River near Shishutala. Mahandi khal starts from Dakshkathi khal near Nalta-Prashadpur Bagda Cluster, and Madhabkhali Khal starts near Machhiyara- Prashadpur Bagda-Galda Mixed Cluster location at Masranga Mauza. However, there is a connectivity between Madhabkhali Khal and Pashchim Salta River which could be observed only during monsoon period. The outfall of all the canals is the flood plain. Around 65% of the catchment area is used only for cluster shrimp farming, and rest of the areas are used for both crop cultivation and shrimp farming. In this Upazila including Shrimp, carp fishes are also cultured in the gher.

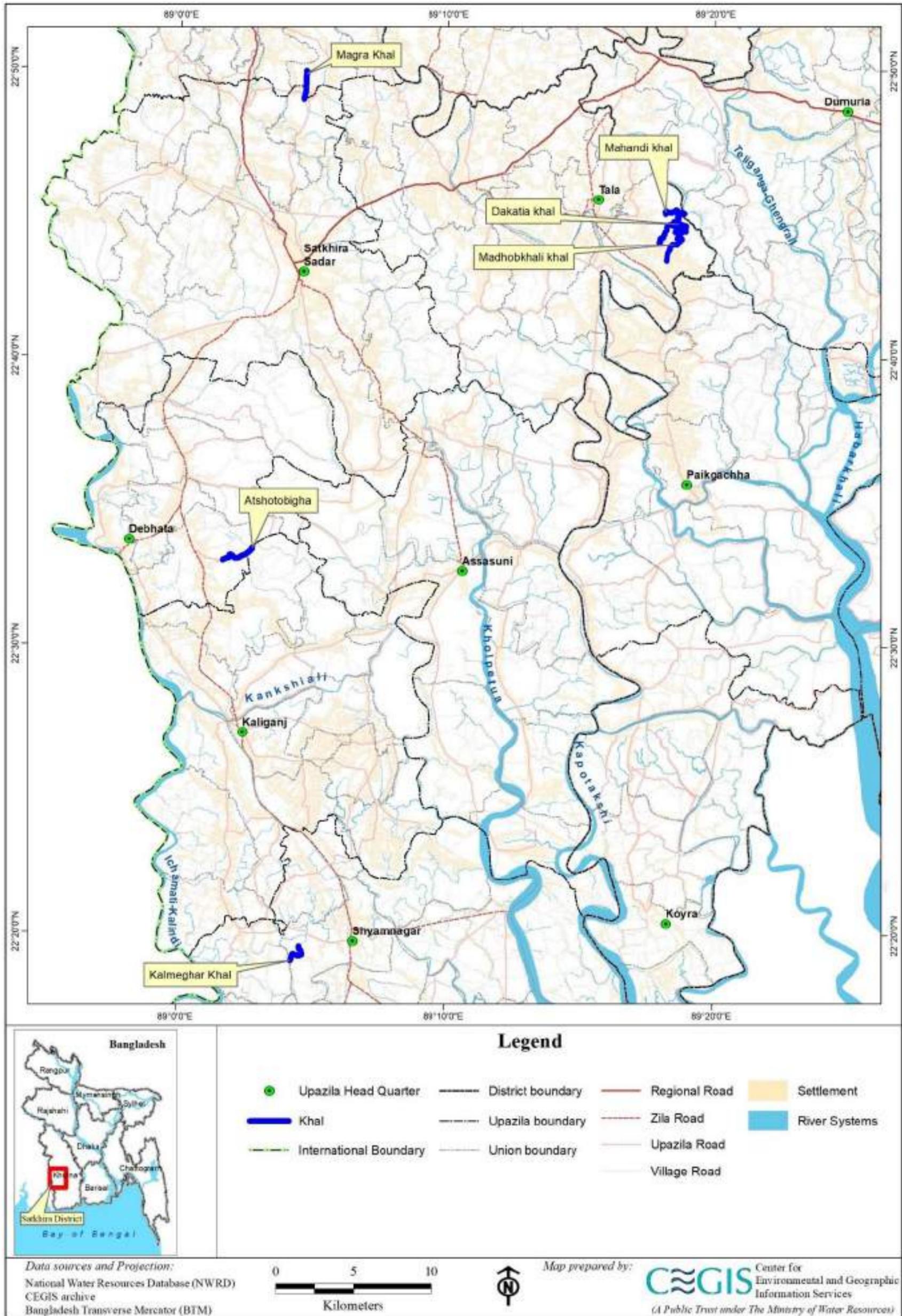


Figure A11.1: Locations of the Canals under Satkhira District



Collecting Plankton and Benthos Sample from the Khal



View of both bank of the khal from the Bridge near Atshotobigha Primary School
Atshotobigha Khal



Cluster Farming within the Catchment Area



Picture of Khal from the Road
Kalmegher Khal



Squatters' settlement on the left bank of the Khal



Khal full of water hyacinth from the bridge near Gharchala Bazar



Boro Crop during the Month of March at the catchment area beside the dyke of the khal

Magra Khal



Cluster Farming area



Khal having little water near Nalta Bazar Bridge



Mid-point of the Khal where it is dried up

Mahandi Khal



Boro Crop Cultivation in the Cluster Farming Area



Connectivity with the Mahandi Khal and Dakshkathi Khal



Boro Crop Cultivation within the Cluster Farming Area



Nalta-Prasadpur Bagda Cluster

Dakshkathi Khal



Crop Cultivation at Cluster Farming Area within the Catchment area of the Khal



Machhiyara- Prashadpur Bagda-Galda Mixed Cluster



Sample Collection from Madhabkhali Khal

Madhabkhali Khal

Figure A11.2: Pictures of the Catchment Areas of the Canals under Satkhira District

A11.2 Description of Canals Under Khulna District

There are five (05) canals under Khulna District to be rehabilitate for the cluster farming issues. The administrative location and Geographic location of these canals are given in the **Table 4.3** and **Table 4.4** respectively. Only three (03) out of five (05) canals have received the No Objection Certificate (NOC) from the local authority for the rehabilitation of the canals. For the two canals: Bollobi, and Rajapur canal NOCs have not been received yet from the respective authority. However, necessary work regarding obtaining NOCs is still ongoing. **Figure A11.3** shows the location Map of the Canals under Satkhira District, and **Figure A11.4** shows some pictures of the catchment areas of these canals. The detailed description of these canals is given as follows:

a) *Mora Jopjopia Nodi*

Mora Jopjopia Nodi is located under Botiaghata Upazila under Khulna District. The offtake of this canal is the Kazibachha River and outfall is the Lower Salta River. The total length of this canal is 9 km. However, excavation work for this canal would be 3.3 km from the Lower Salta River. Excavated soil would be dumped through compaction method on the both dyke of the canal. According to field observation and consulting with local people, they prefer to cultivate crop within the catchment area of this canal. Currently only Aman crop is cultivated within the catchment, but every year around 50% crop is damaged due to salinity. People use ground water sources for drinking and other potable purposes. Around 30% area is used for Bagda farming during dry period. However, most of the cases virus attacks Bagda and productivity may be decreased. On the other hand, Bagda cannot adjust the environment of saline water with sweet water during rainfall and face loss of immunity. Hence, local people found it non-profitable to them. The siltation level of this canal is high and excavation work in this canal have been conducted twice within last fifteen (15) years. Flood occurs especially for heavy rainfall and peak of river water level coincides and water enters the canal and it overflows the banks. Water stays only for seven (07) days.

b) *Bollobi Khal*

This canal is located under Rupsa Upazila under Khulna District and starts from the Attharobaki River and falls to the Old Passur River. The canal is very narrow and most of the areas under its catchment are used for crop cultivation, farming of Galda, Bagda, and Carp fishes. In addition, according to the field observation vegetable are cultivated on the dyke. The depth of water of this canal is around 3 ft during low tide and around 5ft during high tide.

c) *Rajapur Khal*

Rajapur Khal is located under Digholia Upazila under Khulna District. It starts from the Ashifut khal and falls into the flood plain area. Almost 95% areas under its catchment is used as gher for shrimp farming.

d) *Dohar Khal*

This canal is starts from the Atai River and falls into the flood plain area at Digholia Upazila under Khulna District. According to the local people, the excavated soil may be dumped on the both dyke of the canal. However, intension of local people for using this excavated soil was also observed during field visit. Usually, occurrence of flood is remote in this catchment. Carp fishes, Galda, Crops (IRRI, dyke vegetables) are practiced within the catchment areas. According to local people, the excavated soil should be dumped on the dyke and make the dyke wide so that they can use the dyke as rural road to transport crops, shrimps, and fishes from the cluster farming areas.

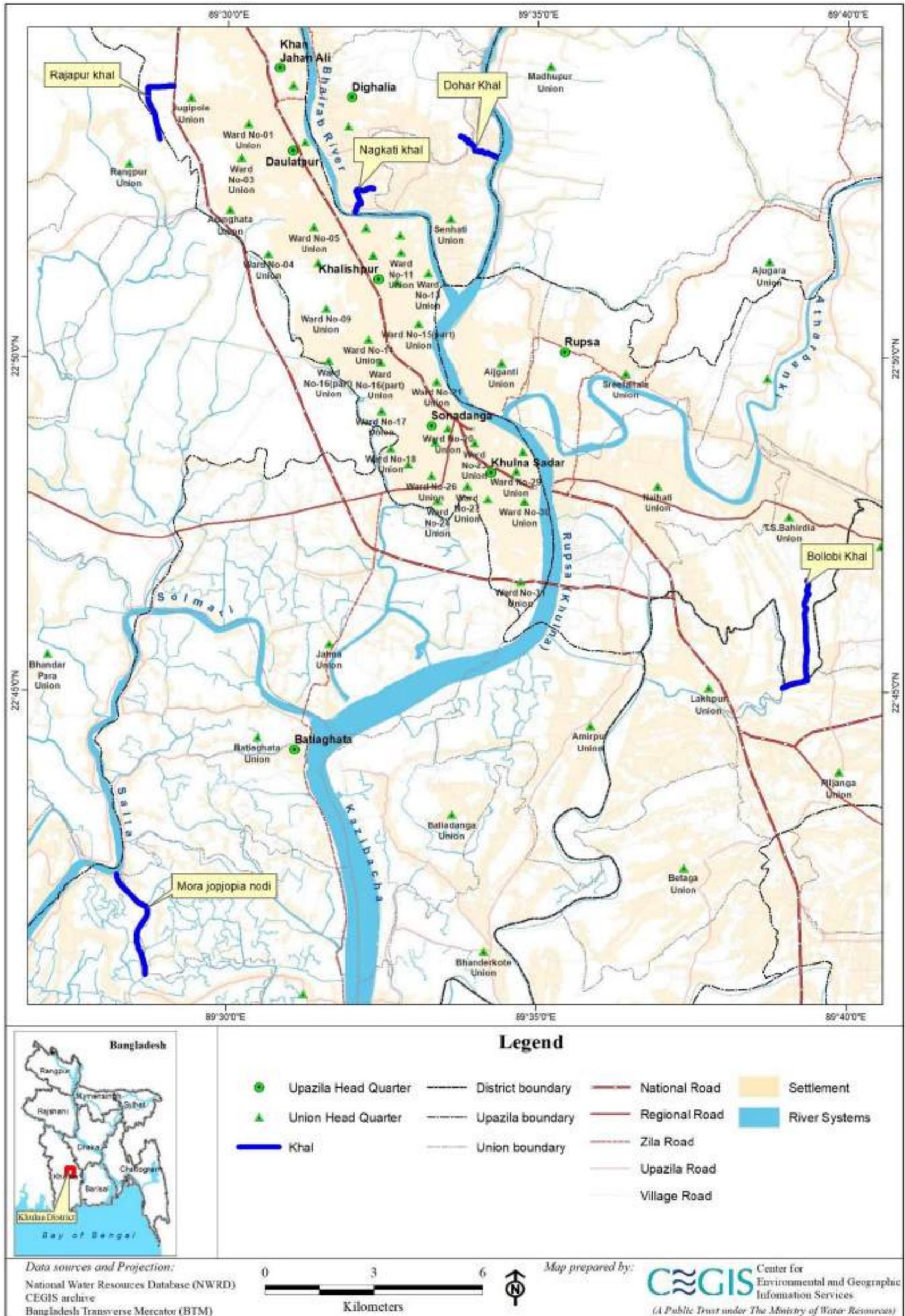


Figure A11.3: Locations of the Canals under Khulna District



Gher Areas remain fallow after harvesting Aman Crop



Information Signboard Setup by BWDB



Gher Area

Mora Jopjopia Nodi



Rural walkway beside Bollobi Khal



Bridge on the Bollobi Khal



Bamboo Bridge connecting settlement areas within the Bank of the Canal

Bollobi Khal



Banana Tree on the Dyke of the Canal



Water Quality of Canal In-Sito Testing



Gher Area beside the dyke

Rajapur Khal



Canal full of Water Hyacinth



Vegetable Cultivation within the Cluster Farming Area



Fish Farming and Boro Crop Cultivation within the Cluster Farming Area

Dohar Khal



Bhashar Beel Area



Bridge at Brahmagati Pashchimpara on the Canal



Cluster Farming Gher within the catchment

Nagkati Khal

Figure A11.4: Pictures of the Catchment Areas of the Canals under Khulna District

a) Nagkati Khal

The offtake of the Nagkati khal is Bhairab River near the Jute Textile Mills Ltd. and outfall is Shahar Beel at Digholia Upazila under Khulna District. The canal is very narrow near the Jute mills due to one vent sluice gate used as culvert as well. 100% areas under the catchment of this canal are used for shrimp & white fish (carp) culture and crop cultivation. The canal has been excavated around 20 years back. Water of this canal is used for irrigation to the cluster farming areas close to this canal. However, for the other part within the catchment ground water is used for irrigation. Water may be got at 220-230ft depth. Livelihood of 90% people within the catchment area is cluster farming (both crop cultivation, and fish farming). Rest of the people are involved in service and business.

There are around 8-10 households beside the canal on the khas land. According to the local people, these squatters do not have any issue to move to other place for living during conducting canal excavation work. Excavated soil might be dumped on the dyke (both side) maintaining the alignment of the canal.

A11.3 Description of Canals Under Bagerhat District

There are seven (07) canals under Khulna District to be rehabilitate for the cluster farming issues. The administrative location and Geographic location of these canals are given in the **Table 4.3** and **Table 4.4** respectively. **Figure A11.5** shows the location Map of the Canals under Satkhira District, and **Figure A11.6** shows some pictures of the catchment areas of these canals. The detailed description of these canals is given as follows:

a) Kumbkhali Khal

Kumbkhali Khal is located at Rampal Upazila under Bagerhat District. Almost 100% of the catchment area is used for shrimp and fish farming. As concentration of salt is observed in surface water sources, Bagda is mostly cultured at this place. The offtake and outfall of the canal is Bogura River.

b) Shoilodubir Khal, and Jibonkhalir Khal

Shoilodubir Khal, and Jibonkhalir Khal are interconnected at Kachua Upazila under Bagerhat District, near Signboard Bazar. The offtake point of the Jibonkhalir Khal is Baleshwar River close to Mir Shakhawat Ali Daru Bridge on the river. On the other hand, the outfall of the Shoilodubir Khal is Daratana-Poylahara River close to Kapali Bandar Government Primary School which offtake is Bhairab (Bagerhat) River. The areas under the catchment of Shoilodubr Khal especially at the outfall locations, are used for Shrimp farming. However, the mid-section of the catchment area is comparatively high land, hence, Aman crops and vegetables (tomato, cauliflower, cabbage, green chili etc.) are grown including shrimp and fish farming based on season.

On the other hand, the whole area under the catchment of Jibonkhalir Khal is used for crop cultivation and shrimp and fish farming.

According to both the DoF official and local people the excavated soil can be managed by dumping soil on the dyke.

c) Burir Khal

This canal is located at Chitalmari Upazila under Bagerhat District. The offtake of this canal is Mora Chitra River close to Babuganj Bazar, and the outfall is another canal near Shantikhali S.S High School and Shantikhali Bazar, which is connected to the river, Madhumati. Most of the areas under the catchment of this canal is used for crop cultivation (only Hybrid Boro) and Shrimp (only Galda) & fish

farming. However, some vegetable cultivations were observed beside the roadside during field visit. Although flood is not a regular phenomenon at this place, once flood occurs water stays for 7-15 days. Sometimes people need to move to a safer place based on the flood forecasting. Water is available in this canal for three- four months a year, and local people use this water for irrigation.

d) Andigram Khal

This canal is located at Mollahat Upazila under Bagerhat District. The canal starts from Atharbanki River near Nagarkandi primary School, and falls into the Naldangi beel. Most of the areas under the catchment is used for IRRI crop cultivation, Galda and carp fish farming. Deep tube well water is used for irrigation purpose. The canal is almost silted up. Around 8-10 number of households were observed along the canal side during field visit. These are squatters and according to other local people and the official of DoF, they are staying here illegally. These squatters would move to other places when the canal excavation work would be started.

e) Dakatia, and Gajdurer Khal

Gajdurer Khal and Dakatia Khal is connected with each other near Garibpur Bazar at Char BanialiChitalmari Upazila under Bagerhat District. Both the canal starts from the river Baleshwar. The lower part of the Dakatia Khal is named as Char Dakatia. The canal excavation work was observed ongoing for Dakatia Khal by the initiatives taken by local people and NGO (Uttaran). They will conduct excavation work up to Dakatia Primary School. The DoF will conduct canal rehabilitation work from Dakatia Government Primary School to the mouth of river Baleshwar.

Both the canals have mostly silted up therefore water scarcity is a major issue for the local people. The canal water is sweet; hence, people may use this water for drinking, potable, and irrigation purposes. Therefore, local people want these canals to be rehabilitated so that they might be beneficial in account of using water.

7-8 numbers of households were observed beside the Dakatia canal on its dyke. People are staying here temporarily at this place.

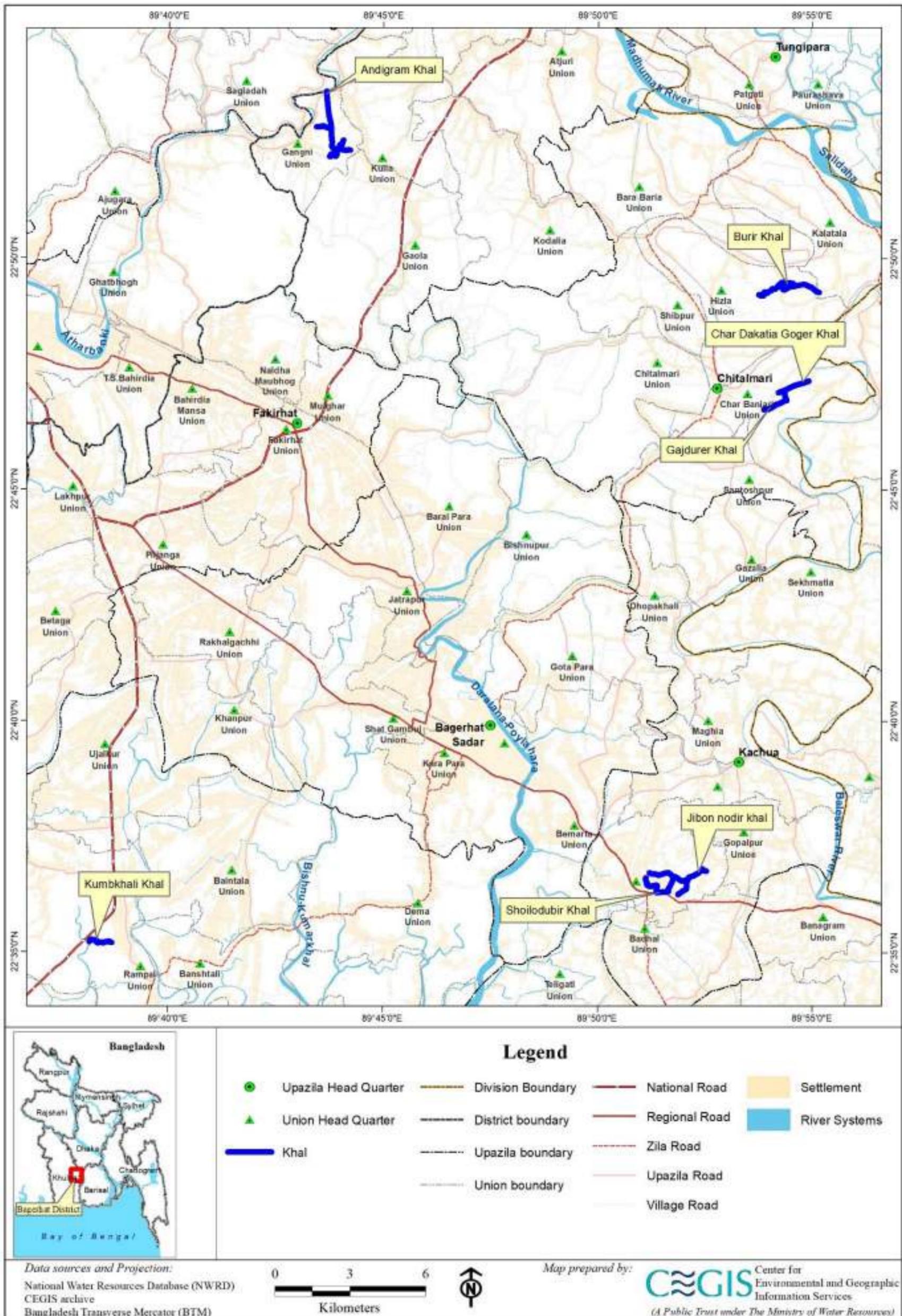


Figure A11.5: Locations of the Canals under Bagerhat District



The Canal Silted up



Gher Areas
Kumbkhali Khal



Settlement Areas beside the Canal



Vegetation to be Cleared from the Dyke of the Canal



Gher Area
Shoildubir Khal



After Aman Crop Harvest at the Highland just beside the Canal



Narrow Dyke of the Canal with vegetations



Boro Crop and Gher Area beside the Canal within the Catchment Area



Banana Trees on the both side Dykes of the Canal



Sample Collection from the Silted-up Canal



Crop Cultivation within the Catchment Area



A walkway for the local people at the between the Canal and the Crop land/ Gher

Burir Khal



Small Dyke



Information Collection through Consulting with
Local People
Andigram Khal



Crop Land within the Catchment Area



Data collection from the Khal



Gajdurer Khal



Dyke Vegetation



Boro Croop Cultivation within the Catchment Area



Silted up Location of the Khal



Excavation ongoing inspiring by Local People and NGO

Dakatia Khal

Figure A11.6: Pictures of the Catchment Areas of the Canals under Bagerhat District

Annex 12: Reference Letter to DoF from BFDC

	<p>গণপ্রজাতন্ত্রী বাংলাদেশ সরকার মৎস্য ও প্রাণিসম্পদ মন্ত্রণালয় চট্টগ্রাম মৎস্য কক্ষ বাংলাদেশ মৎস্য উন্নয়ন কর্পোরেশন মৎস্য কক্ষ, চট্টগ্রাম, বি.পি.ও বঙ্গ নং-২৯, ফোন ০১৭১০-৭১৫১১৬ www.bfdc.gov.bd, E-mail: ctfharbour@gmail.com</p>	
<p>পত্র নংঃ ৩৩.০৩.১৫৫১.০০২.১৩.৩১৭.২৩</p>		<p>তারিখঃ ২১ মার্চ ২০২৪ খ্রিঃ</p>
<p>বিষয়ঃ “সাসটেইনেবল কোস্টাল এন্ড মেরিন ফিশারিজ প্রজেক্ট” কে অধিকতর ত্বরান্বিত করার নিমিত্তে চট্টগ্রাম মৎস্য কক্ষের বেসিন ড্রেজিং পরবর্তী বেসিনড্রেজিং বিষয়ে জরুরী পদক্ষেপ গ্রহণ ও বেসিনড্রেজিংয়ের নিমিত্ত সহায়তা প্রদান প্রসঙ্গে।</p>		
<p>উপর্যুক্ত বিষয়ের প্রেক্ষিতে আপনার সময় অবগতির জন্য জানানো যাচ্ছে যে, চট্টগ্রাম মৎস্য কক্ষের বেসিনটি বাংলাদেশের একমাত্র বেসিন। দেশের মৎস্য শিল্পের উন্নতি ও বিকাশের কথা বিবেচনায় রেখে ১৯৭২-৭৩ খ্রিঃ-এ আপনি করিগরি সহায়তায় বেসিনটি নির্মিত হয়। একইসাথে উক্ত বেসিনকে কেন্দ্র করে গড়ে তোলা হয় দেশের একমাত্র মৎস্য কক্ষ, যা দেশের মৎস্য শিল্পের বিকাশে এক উল্লেখযোগ্য হাইলকলক হিসেবে স্বীকৃত। কালেই, বেসিনের চারপাশে গড়ে উঠা অকশন শেড, হিমাঞ্চর ও মেরিন ওয়ার্কশপ এক অকইয়ার্টের অপারেশনাল কার্যক্রম পরিচালনার বেসিনটির পুনরুদ্ধার কৃমিকা রয়েছে।</p>		
<p>২। বাংলাদেশের অন্যতম ধরপ্রোজা নদী কর্ণফুলীর তীরবেশা হওয়ায় চট্টগ্রাম মৎস্য কক্ষের বেসিনটির সিলট্রেশনের পরিমাণ অস্বাভাবিক। ২০০৭-০৮ খ্রিঃ-এ বাংলাদেশ পানি উন্নয়ন বোর্ড (নিয়ন্ত্রিত/নির্দিষ্ট) কর্তৃক ড্রেজিং করার পর ষাণ্মিন বেসিনটিকে খননকার্য পরিচালনা না করার কীধা ও পলিমালি জমে বেসিনটি ব্যবহার অনুপযোগী হয়ে পড়ে। ফলে ধীরে ধীরে বেসিনের চারপাশে অবস্থিত চমব’র অকশন শেড, হিমাঞ্চরের অপারেশনাল কার্যক্রম বন্ধ হয়ে যায় এবং চমব’র মেরিন ওয়ার্কশপ এক অকইয়ার্টের অপারেশনাল কার্যক্রম ব্যাহত হয়। পরবর্তীতে চমব’র তথা কামটেকের নিম্ন উল্লেখ্য বেসিনটি আংশিক অংশে খনন করতঃ মেরিন ওয়ার্কশপ এক অকইয়ার্টের অপারেশনাল কার্যক্রম চলমান রাখা হয়। কিছু সিলট্রেশন হারের তুলনায় উক্ত খননকার্য অসম্পূর্ণ ছিলো।</p>		
<p>৩। সম্প্রতি মৎস্য অধিদপ্তর কর্তৃক বাস্তবায়নধীন “সাসটেইনেবল কোস্টাল এন্ড মেরিন ফিশারিজ প্রজেক্ট” এর আওতায় অত্যন্ত পুনরুদ্ধার এই বেসিনটি খননকার্য সম্পাদন করা হয়েছে, যা চট্টগ্রাম মৎস্য কক্ষ তথা কামটেক’র অন্য অত্যন্ত আশাবাদক একটি ব্যাপার। এছাড়াও, উক্ত প্রজেক্টের আওতায় চমব’র অকশন শেড রিনোভেশন, আধুনিক প্রসেসিং গ্রাউট, ইটিপি গ্রাউট, ডিপ টিম্বারেল, ওয়ারার ড্রেনেজ গ্রাউট, সার্কিউলেশন, ফায়ার কাইটিং সিস্টেম স্থাপনের কার্যক্রম চলমান রয়েছে। আশা করা যায় যে, বর্নিত রিনোভেশন ও নির্মাণ কার্যগুলো সম্পন্ন করার পর অপারেশনাল কার্যক্রম পুনু হলে আধুনিক সুযোগ-সুবিধাসহ নতুন সেবা প্রদানের সুযোগ সৃষ্টি হবে। এতে করে সহায়ণ জনগণকে মৎস্যশিল্পে আগ্রহী করে তোলার পাশাপাশি সরকারের উল্লেখযোগ্য পরিমাণ রক্ষণ ব্যয় করাও সম্ভব হবে। সর্বোপরি, চট্টগ্রাম মৎস্য কক্ষকে একটি স্বয়ংসম্পূর্ণ মৎস্য কক্ষ হিসেবে গড়ে তোলার সম্ভব হবে।</p>		
<p>৪। সাসটেইনেবল কোস্টাল এন্ড মেরিন ফিশারিজ প্রজেক্ট’র আওতায় নির্মাণধীন আধুনিক প্রসেসিং গ্রাউট ও অকশন শেড (রিনোভেশন) এর কার্যক্রম বেসিনের মাঝে অনেকাংশে সামঞ্জস্যপূর্ণ হওয়ায় উক্ত স্থাপনাগুলো সঠিকভাবে পরিচালনার বেসিনটির পুনরুদ্ধার কৃমিকা রয়েছে। স্থাপনাগুলোর অপারেশনাল কার্যক্রম বেসিনকে কেন্দ্র করেই পরিচালিত হবে। ইতিপূর্বে চমব’র বেসিনটি কীধা ও পলিমালি দিয়ে ভরাট হয়ে যাওয়ায় পূর্বে স্থাপিত অকশন শেড, প্রসেসিং গ্রাউটের অপারেশনাল কার্যক্রম স্থবির হয়ে গিয়েছিলো। কালেই, নবনির্মিত ও মেরামতকৃত স্থাপনাগুলোর কার্যক্রম পরিচালনার বেসিনটি একটি অবিচ্ছেদ্য অংশ হিসেবে কাম করবে এবং স্থাপনাগুলোর সফলতার অনেকটুকুই বেসিনের উপরেই নির্ভর করবে।</p>		
<p>৫। সম্প্রতি সমাপ্ত হওয়া বেসিন খনন কার্যক্রম পরবর্তীতে পরিচালিত হয় যে, চমব বেসিনে প্রতি ৬ (ছয়) মাসে ৩ (তিন) মিটার হারে সিলট্রেশন হয় (জিকিবিগিটি প্লাসিডে উল্লেখিত), যা স্বাভাবিকের তুলনায় অধিক। বেসিনটি ড্রেজিং করার সময় বেসিনের এক অংশে খননকার্য পরিচালনা করা হলে অন্য অংশে পলিমালি জমে ভরাট হয়ে যাওয়ার মত ঘটনা পরিচালিত হয়েছে। ফলত ড্রেজিং কার্যক্রম সম্পাদন হওয়া শেষে বেসিনটি এককভাবে সুকিয়ে দেওয়া সম্ভব হয়নি, বরং ঠিকাদারের উপস্থিতি অনুয়োধে প্রেক্ষিতে উক্ত সমস্যার বাস্তবিকতা অনুভব করতঃ সম্পূর্ণ বেসিন এরিয়াকে ০৪ (চার) অংশে বিভক্ত করে বুকে নেয়া হয়েছে। উল্লেখিত সমস্যাটি বেসিনটি অপারেশনাল রাখার ক্ষেত্রে উদ্বেকজনক ব্যাপার (alarming situation) বলে প্রতীয়মান হয়। কালেই ড্রেজিং কার্যক্রম সম্পন্ন হওয়ার পরে বেসিনটি কামব’রভাবে বেসিনড্রেজিং করাটা একটা বড় চ্যালেঞ্জ হয়ে পড়িয়েছে। বেসিনটি সম্পূর্ণরূপে অপারেশনাল রাখার জন্য স্বয়ংসম্পূর্ণ একটি ব্যবস্থা রাখা প্রয়োজন বলে অত্র দপ্তর মনে করে।</p>		
<p>৬। উপর্যুক্ত অলোচনার প্রতীয়মান হয় যে, মৎস্য অধিদপ্তর কর্তৃক বাস্তবায়নধীন “সাসটেইনেবল কোস্টাল এন্ড মেরিন ফিশারিজ প্রজেক্ট”র আওতায় চলমান স্থাপনাগুলো অপারেশনাল রাখার জন্য চমব’র বেসিনটি সচল রাখা আবশ্যিক এবং বর্তমান পরিস্থিতিকত কর্ণফুলী নদীর অতিরিক্ত সিলট্রেশন হার বিবেচনায় বেসিনটি নিয়মিতভাবে বেসিনড্রেজিং করা ড্রেজিং করা অত্যন্ত পুনরুদ্ধার। অন্যথা, অতিরিক্ত সিলট্রেশনের কারণে বেসিনটি অতিবৃদ্ধি কীধা ও পলিমালি দ্বারা ভরাট হয়ে যাবে এবং নির্মিত স্থাপনাগুলোর অপারেশনাল কার্যক্রম পূর্বে ন্যায় বন্ধ হয়ে রক্ষণ ব্যয় হ্রাস পাবে। ফলে যে উল্লেখ্য নিম্নে স্থাপনাগুলো নির্মিত হচ্ছে তা ব্যাহত হওয়ার আশঙ্কা রয়েছে।</p>		
<p>©/Water Workshop FBR/2020/2 FORM: GOV. DRUGAZZO/2007/8, E.V. Meer (land/land) 2/1/18 & 2/1/18 page 4</p>		

৭। কামেই, সাসটেইনেবল কোর্সস এন্ড মেরিন ফিশারিজ প্রজেক্ট-র আওতায় চলমান স্থাপনাপুলো পূর্ণমাত্রায় অপারেশনাল রাখার জন্য চমব বেসিনটি নিয়মিতভাবে মেইনটেনেন্স করা অবশ্যম্ভাবী, যার সক্ষমতা চমব ভবা বামউকের বেই। নিম্নলিখিত মেশিনারীক ব্যবহার করে উক্ত মেইনটেনেন্স কার্যক্রম পরিচালনা করা সম্ভবঃ

ক। গ্রাব কেন/ক্রাইসার- ২ সেট

খ। পম্প- ২ সেট

গ। ক্রাম ট্রাক- ২ সেট

উল্লেখিত যন্ত্র/বস্তু/সেপুলো সরবরাহ করা হলে চট্টগ্রাম মৎস্য কপরের নিজস্ব ব্যবস্থাপনার বেসিনটির মেইনটেনেন্স কার্যক্রম পরিচালনা করা সম্ভব হবে।

৮। এমতাবস্থায়, উপর্যুক্ত অংশেচনার প্রেক্ষিতে মৎস্য অধিদপ্তর কর্তৃক বাস্তবায়নধীন “সাসটেইনেবল কোর্সস এন্ড মেরিন ফিশারিজ প্রজেক্ট-র আওতায় চলমান স্থাপনাপুলো অপারেশনাল রাখার জন্য চট্টগ্রাম মৎস্য কপরের বেসিনটির ড্রেজিং পথবর্তী মেইনটেনেন্সের পুনরু অনুধাবনপূর্বক উল্লেখিত পদ্ধতিতে বেসিনটির নিয়মিত মেইনটেনেন্স করার সুযোগ সৃষ্টির সহায়তা প্রদানের পদক্ষেপ গ্রহণের জন্য বিশেষভাবে অনুরোধ করা হলো।

প্রকল্প পরিচালক

সাসটেইনেবল কোর্সস এন্ড মেরিন ফিশারিজ প্রজেক্ট
মৎস্য অধিদপ্তর, মৎস্য ভবন, হারনা, ঢাকা।

কমান্ডার মোহাম্মদ মাকহাভুল হক

(ডি), বিএন

মহাব্যবস্থাপক

চমব, বামউক, চট্টগ্রাম।

সদয় অবগতি/অবগতি/কার্যার্থেঃ (জৈষ্ঠতার ক্রমানুসারে নয়)

১। ডেপুটি ম্যান (অডিং সচিব), বামউক, ঢাকা।

২। পরিচালক (অর্থ/বিপণন), বামউক, ঢাকা।

৩। ব্যবস্থাপক (প্রোগ্রামিং/ব্যবহারন), বামউক, ঢাকা।

৪। বিভাগীয় প্রধান (সঞ্চাল), বামউক, চট্টগ্রাম।

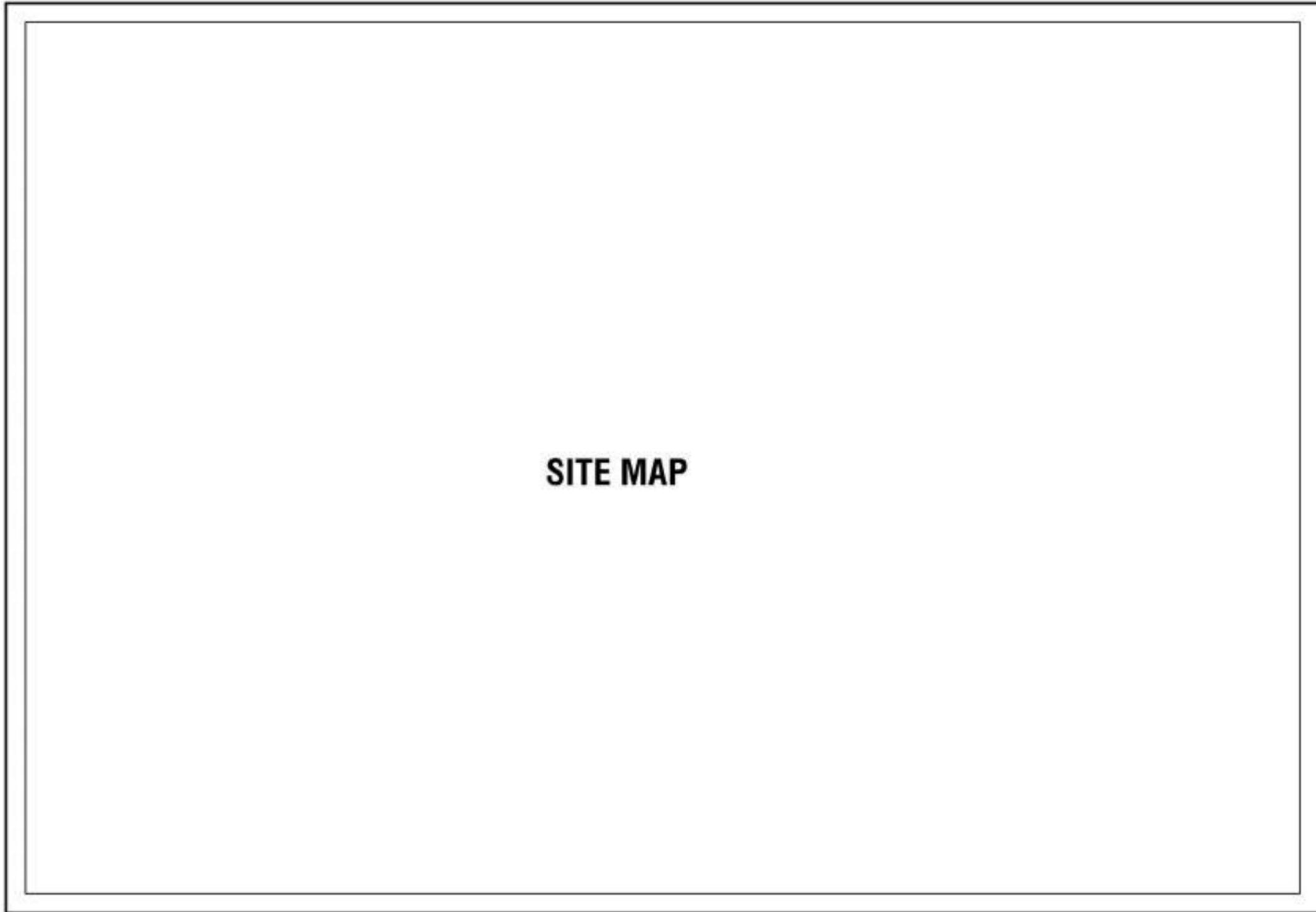
৫। সংশ্লিষ্ট নবি।

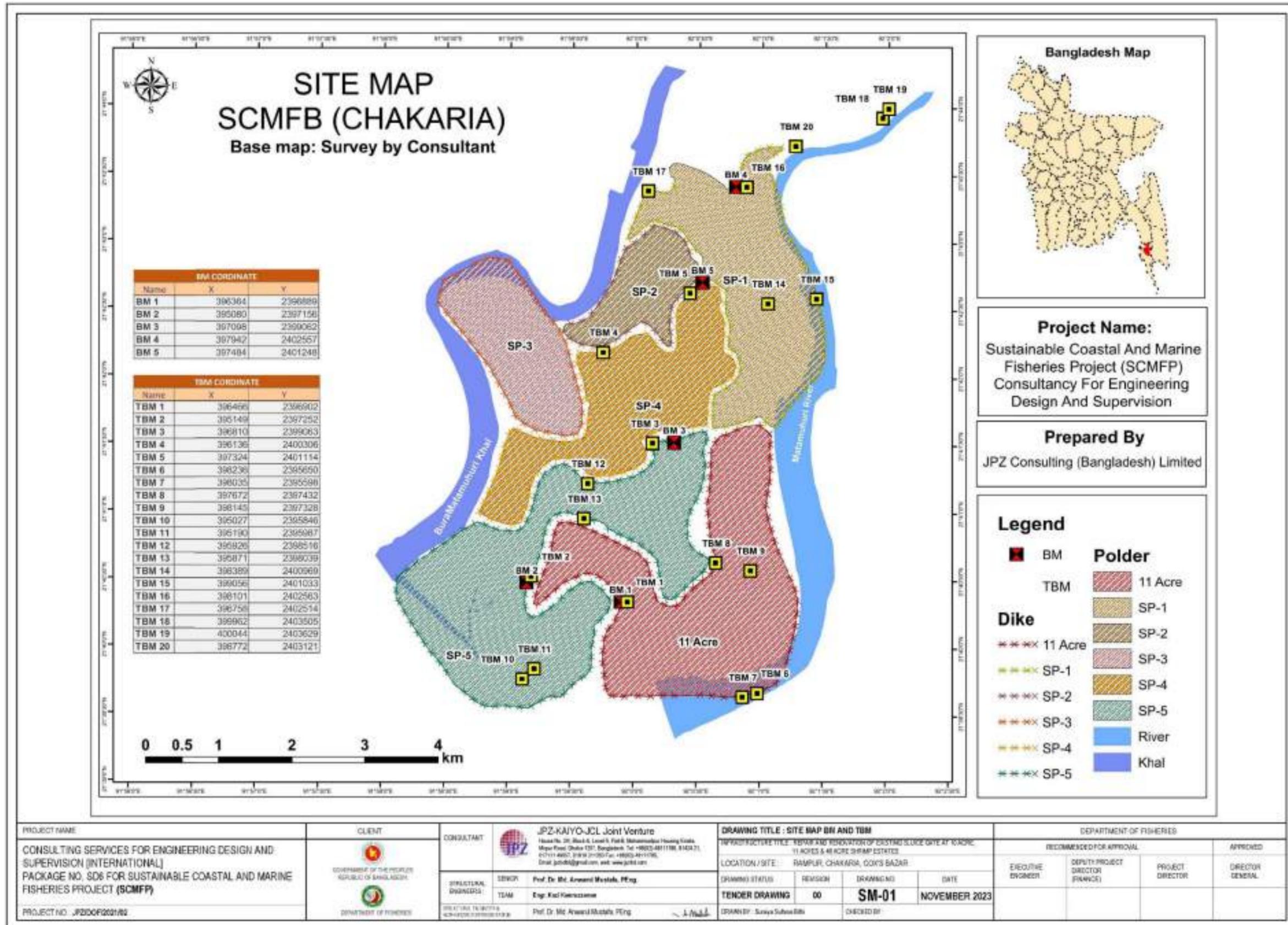
Annex 13: Distances between the Sub-Project sites and the Protected Areas of Bangladesh

Protected Areas	Forest Types	Location (Distance from the Sub-Project Sites)	Area (ha)	Established (Extended)
A. National Parks (IUCN Category V)				
Himchari National Park	Hill Forest	Cox's Bazar (Around 27 km from the Chakaria Shrimp Estate)	1,729	1980
Medha Kachapia National Park	Hill Forest	Cox's Bazar (Around 8 km from the Chakaria Shrimp Estate)	395.92	2004
B. Wildlife Sanctuaries (IUCN Category IV)				
Sundarbans (East) Wildlife Sanctuary (WS)	Natural Mangrove	Bagerhat (More than 70 km from the selected canals under Bagerhat District)	31,226.94	1960 (1996)
Fasiakhali WS	Hill Forest	Fasiakhali (Around 3 km from the Chakaria Shrimp Estate)	2,080	2007
Sangu WS	Hill Forest	Bandarban (Around 13 km from Chakaria Shrimp Estate)	5,973	2010
Chunati WS	Hill Forest	Banshkhali (Around 13 km North from Chakaria Shrimp Estate)	8,493	1986
Dud Pukuria-Dhopachari WS	Hill Forest	Dhopachari (Around 26 km East from BFDC Campus, Chattogram)	4,907	2010
Sundarbans (South) WS	Natural Mangrove	Khulna (More than 80 km from the selected canals under Khulna District)	36,970.45	1996
Sundarbans (West) WS	Natural Mangrove	Satkhira (Kalmeghar Khal is around 40 km North from this WS. This is the nearest distance of the selected Canals under Satkhira District)	71,502.13	1996
C. Game Reserve (IUCN Category: N/A)				
Teknaf Game Reserve (GR)	Hill Forest	Cox's Bazar (Around 56 km South from the Chakaria Shrimp Estate)	11,615	1983

Annex 14: Design and Layout of Chakaria Shrimp Estate and BFDC

SITE MAP





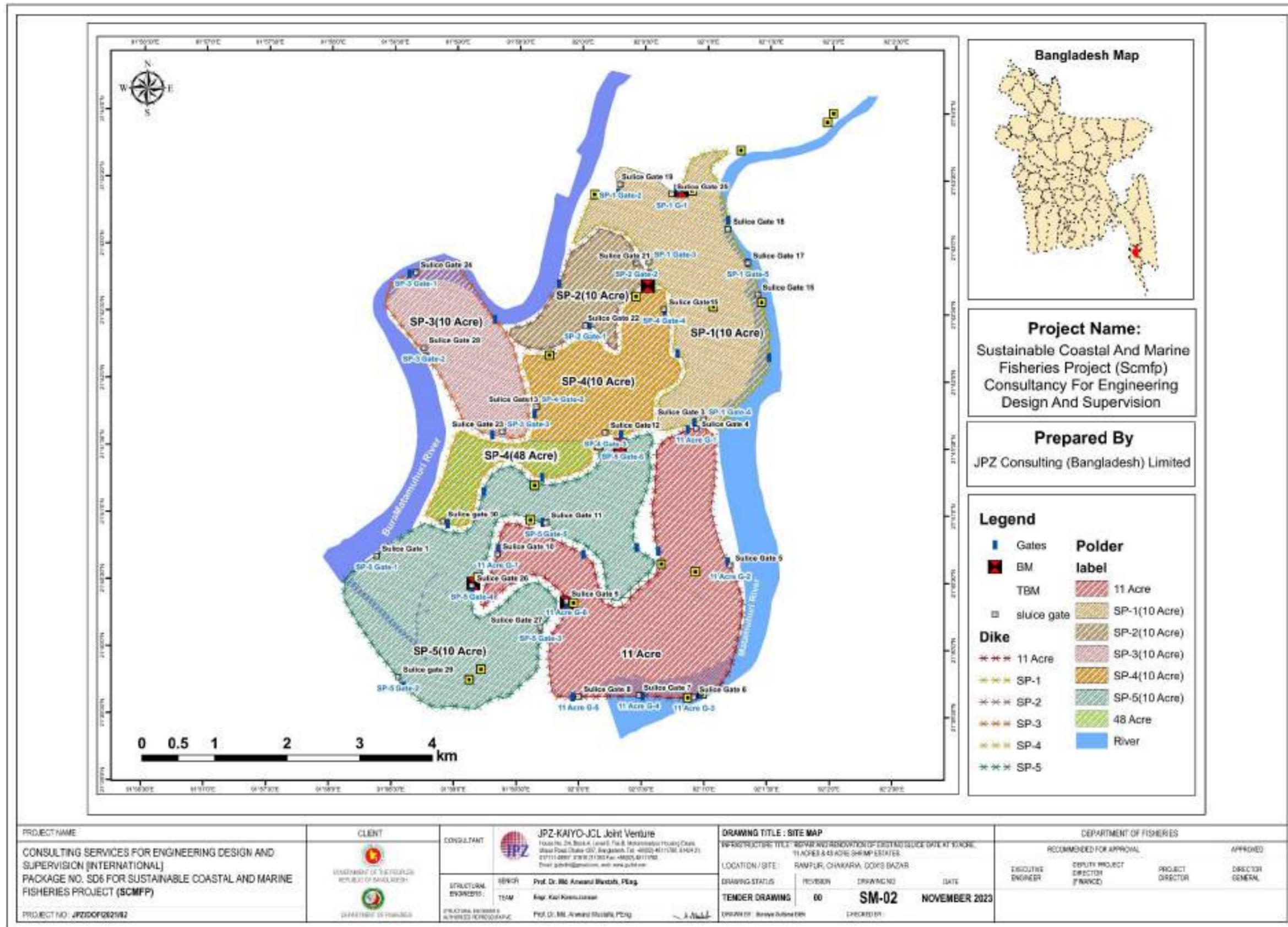
PROJECT NAME
CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)
PROJECT NO. JPZ/DFP/2021/02

CLIENT
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES

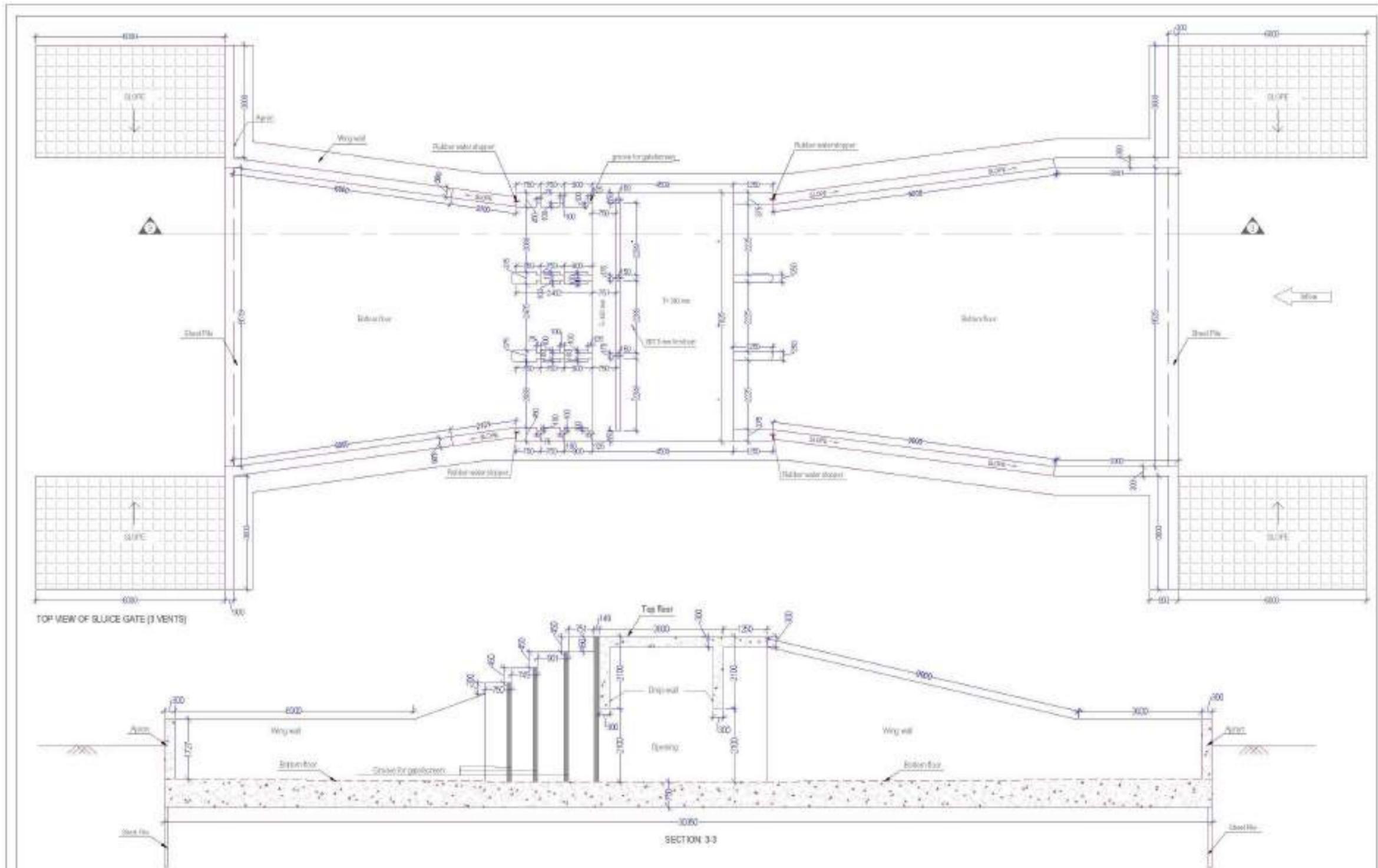
CONSULTANT
JPZ-KAIYO-JCL Joint Venture House No. 29, Block-B, Level-5, Park & Millennium Housing Complex, Mirpur Power Station-137, Bangladesh. Tel: +8802-8811178, 842421, 87111480. Email: jpz@jpz.com, kaiyo@kaiyo.com, jcl@jcl.com
PROJECTAL DIRECTOR
TEAM
PROJ. MGR. / SUPERVISOR

DRAWING TITLE : SITE MAP BM AND TBM
IMPROVEMENT TITLE: REPAIR AND RENOVATION OF EXISTING SLUDGE DRY AT KADRE, 11 ACRES & 48 ACRE SHRIMP ESTATES
LOCATION / SITE: RAMPUR, CHAKARIA, COX'S SAZAR.
DRAWING STATUS
REVISION
DRAWING NO
DATE
TENDER DRAWING
00
SM-01
NOVEMBER 2023
DRAWN BY: Suniya Subeen Bibi
CHECKED BY:

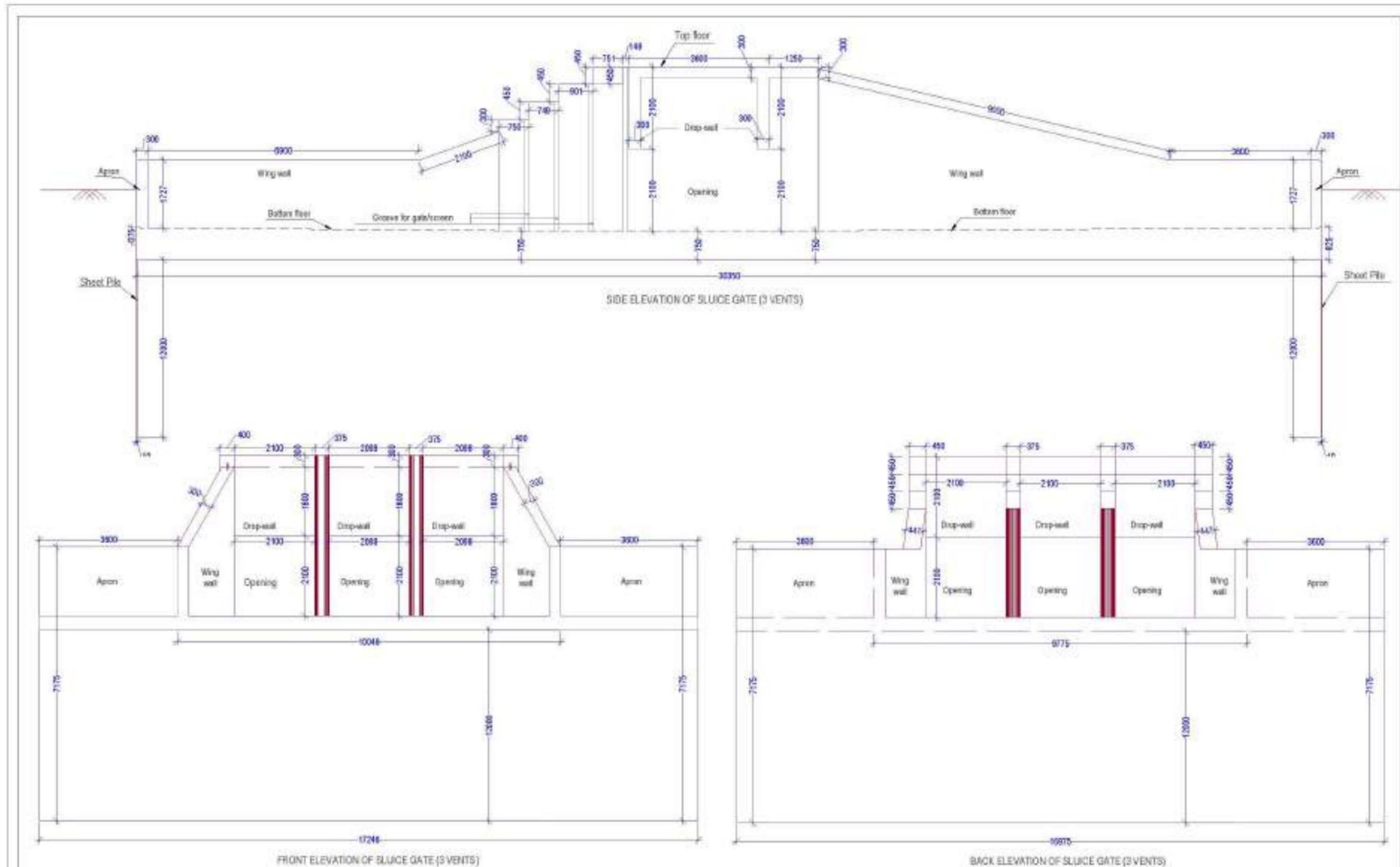
DEPARTMENT OF FISHERIES
RECOMMENDED FOR APPROVAL
APPROVED
EXECUTIVE ENGINEER
DEPUTY PROJECT DIRECTOR (FINANCE)
PROJECT DIRECTOR
DIRECTOR GENERAL



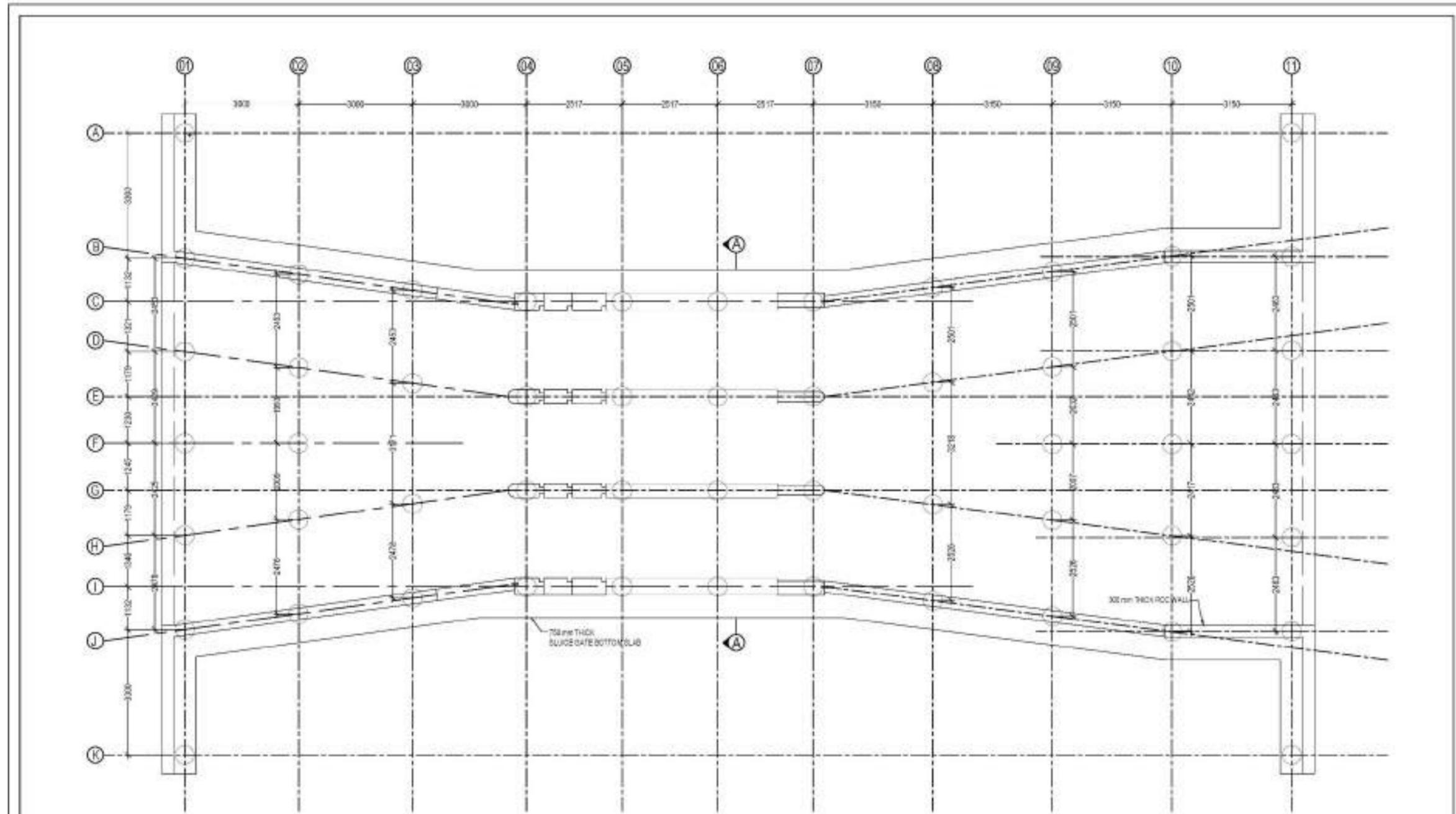
SLUICE GATE (3 VENTS)



PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO - JPZ/DOF/2021/02	CLIENT GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES	CONSULTANT JPZ-KAYO-JCI Joint Venture House: 04, Block: Level: 7th, Miranpur Road, Dhaka Myanmar: Suite 107, Block: 10, 4963, 4911th, 5439 21, 02711 4992, 02711 2180 Fax: +952-413176, Email: jpz@jpz.com.bd www.jpz.com.bd	DRAWING TITLE : TOP VIEW OF SLUICE GATE (3 VENTS) PREPARING OFFICE TITLE: REPORT AND DESIGN OF EXISTING SLUICE GATE AT 10 ACRE (LACSA & RACE SHIMP ESTATE) LOCATION / SITE: RAMPUR, CHAKARIA, COXS BAZAR			DEPARTMENT OF FISHERIES			
			(DRAWN) STATUS: TENDER DRAWING (DESIGN) STATUS: 04 (DATE) STATUS: S-01 (DATE) STATUS: NOVEMBER 2023			RECOMMENDED FOR APPROVAL EXECUTIVE ENGINEER DEPUTY PROJECT DIRECTOR (PROJECT)		APPROVED PROJECT DIRECTOR DIRECTOR GENERAL	
			STRUCTURAL DESIGNER: Prof. Dr. M. Arshad Muzaffar, PEng TEAM: Engr. Karim Hossain PROJECT SUPERVISOR: Prof. Dr. M. Arshad Muzaffar, PEng			DRAWN BY: Sunay Saha (S-01) CHECKED BY:			

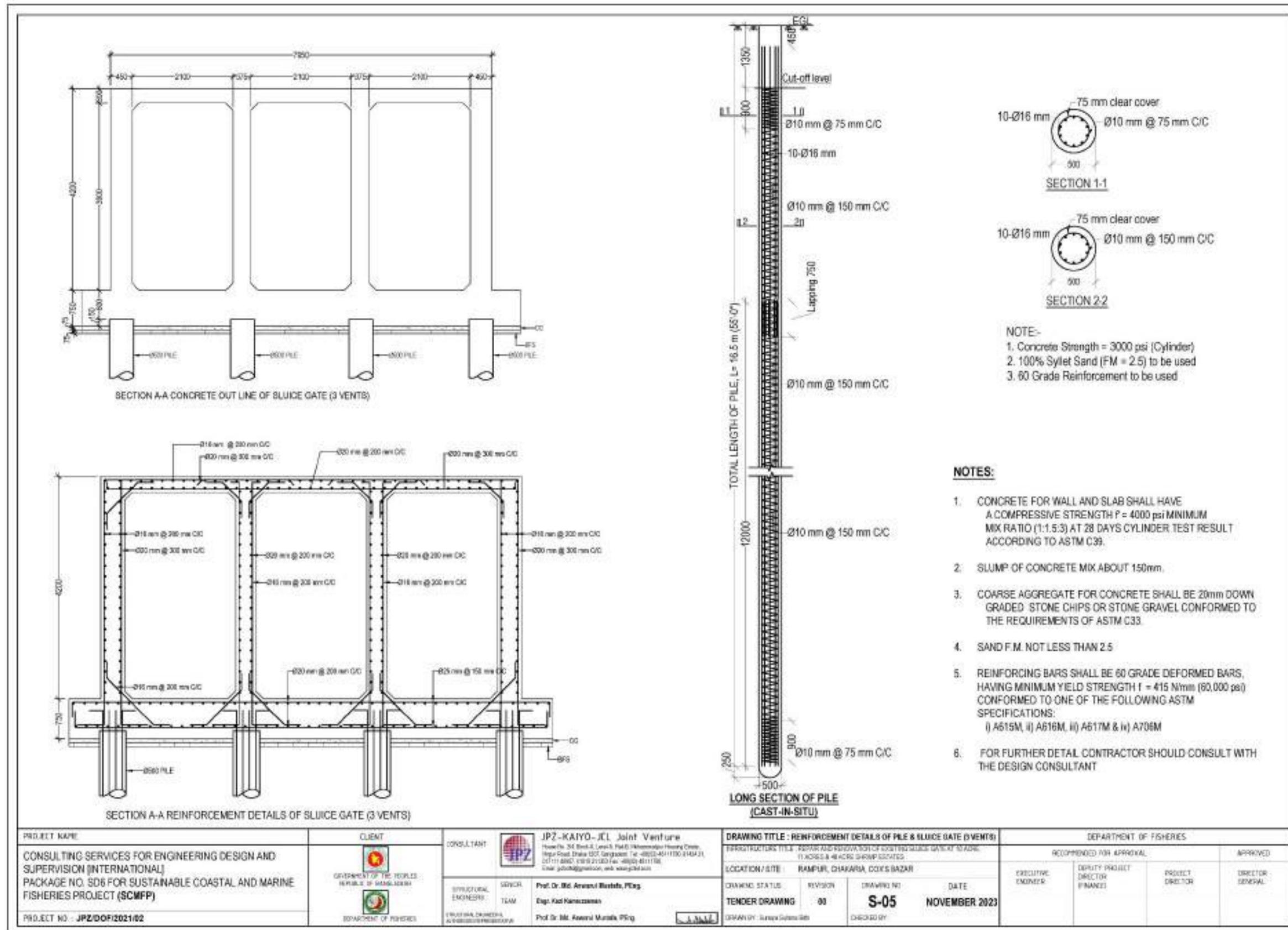


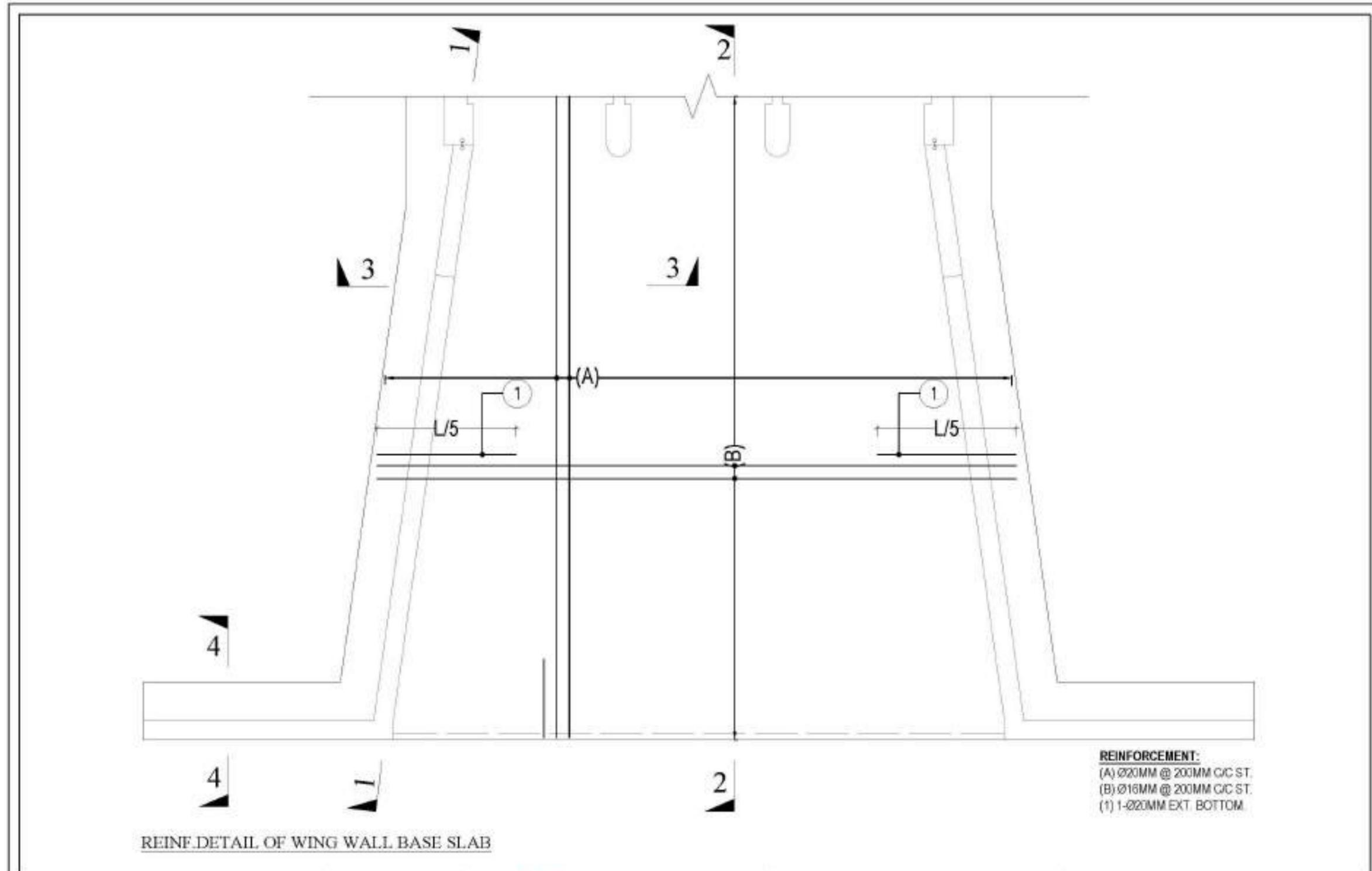
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			INFRASTRUCTURE TYPE: REPAIR AND RENOVATION OF EXISTING SLUICE GATE AT WADE, HAJESLI & BAKRE SHRIMP ESTATES						RECOMMENDED FOR APPROVAL				
			LOCATION/SITE: RAJAPUR, CHAKARIA, COXS BAZAR						LOCAL TIME 12:00 PM	BRUTY PROJECT DIRECTOR (PRAWOC)	PROJECT DIRECTOR	DIRECTOR GENERAL	
			DRAWING STATUS: REVISION			DRAWING NO: S-02							DATE: NOVEMBER 2023
TENDER DRAWING						DRAWN BY: Saikat Kumar Ghosh				CHECKED BY:			



PILE LAYOUT PLAN OF SLUICE GATE (3 VENTS)
TOTAL NO. OF PILES = 53

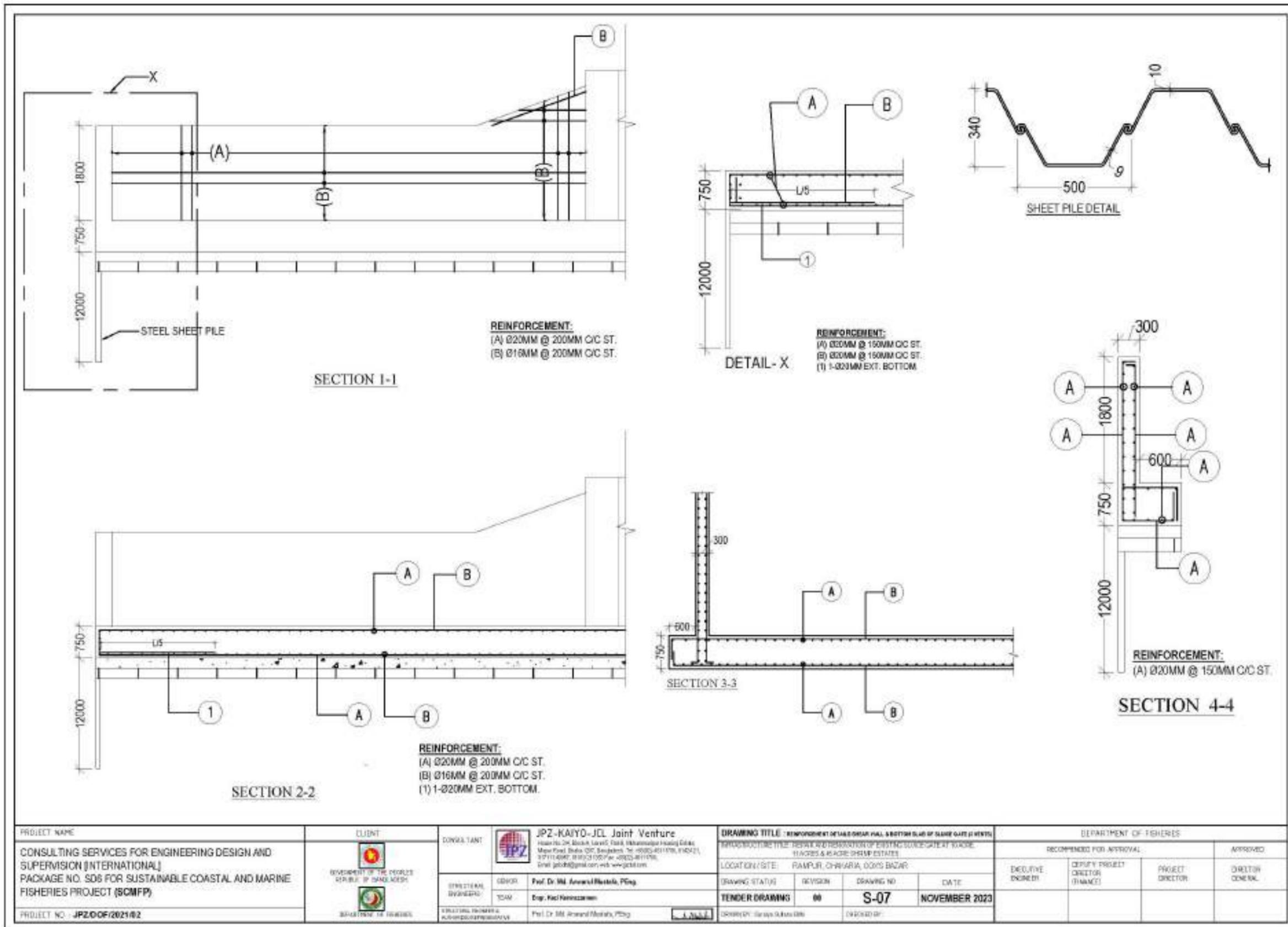
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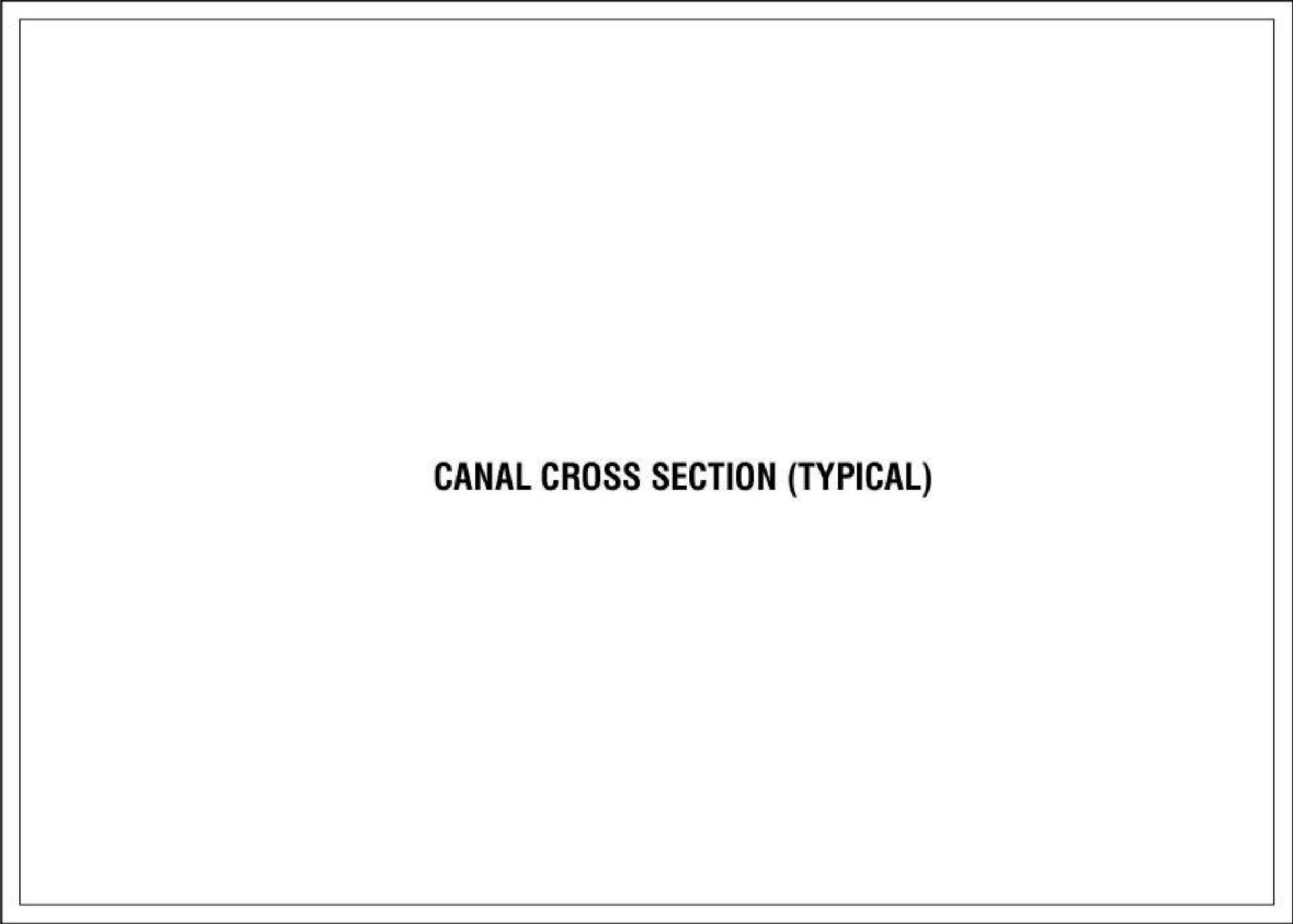
REINFORCEMENT:
 (A) Ø20MM @ 200MM C/C ST.
 (B) Ø16MM @ 200MM C/C ST.
 (1) 1-Ø20MM EXT. BOTTOM.

PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)		CLIENT  GOVERNMENT OF THE PEOPLE REPUBLIC OF BANGLADESH  DEPARTMENT OF FISHERIES		CONSULTANT  JPZ-KAIYO-JCL Joint Venture Head Office: 206, Block 4, Level 4, Park Hotel, Mirpur Cantonment, Dhaka. Main Office: House 107, Barakhala, 10, Mirpur 11, Dhaka 1216. Tel: 88024411119, 88024411198, 88024411199. Email: jpz@jpz.com.bd, jpz@jpz.com		DRAWING TITLE: REINFORCEMENT DETAIL OF WING WALL BASE SLAB REINFORCEMENT DETAIL OF WING WALL BASE SLAB FOR CHAKARIA SHIMP ESTATE				DEPARTMENT OF FISHERIES					
PROJECT NO: JPZ/DOF/2021/02		STRUCTURAL ENGINEER: Prof. Dr. IM. Anwarul Hossain, PEng.		DESIGNER: Engr. Kazi Hossain		DRAWING STATUS: TENDER DRAWING		REVISION: 00		DRAWING NO: S-06		DATE: NOVEMBER 2023		DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL	
		STRUCTURAL ENGINEER & IN-CHARGE: Prof. Dr. IM. Anwarul Hossain, PEng.		DESIGNED BY: Engr. Kazi Hossain		CHECKED BY: Engr. Kazi Hossain		EXECUTIVE ENGINEER:		DEPUTY PROJECT DIRECTOR (FINANCE):		PROJECT DIRECTOR:		APPROVED DIRECTOR GENERAL:	

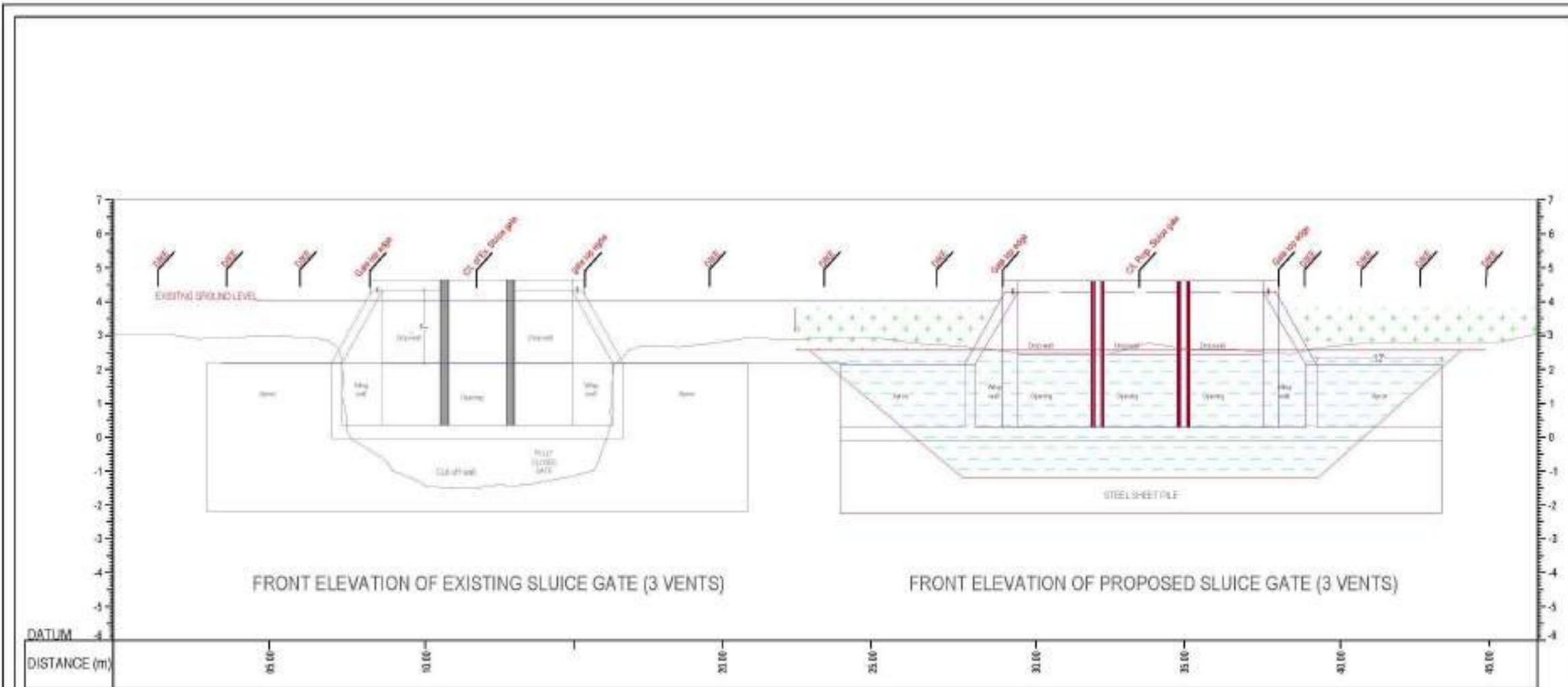


PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. S06 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)	CLIENT GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES	CONSULTANT JPZ-KAIYO-JCL Joint Venture House No. 24, Block 4, Level 5, Park, Mirpur Cantonment Housing Estate, Mirpur Road, Dhaka-1207, Bangladesh. Tel: +8802-4011170, 410421, 371114942, 3710213 (Fax: +8802-4011170). Email: jpz06@gmail.com, web: www.jpz.com	DRAWING TITLE : REINFORCEMENT OF SLAB OVER WALL & BOTTOM SLAB OF SLABE GATE AT WEIRTS PROPOSED DIRECTIONAL BRACK RECONSTRUCTION OF EXISTING SUBCULTURE BRACK, SHAGES & ASHORE SHRIMP ESTATES			DEPARTMENT OF FISHERIES				
			LOCATION/SITE : RAMPUR, CHAKARIA, GOXS BAZAR	DRAWING STATUS : TENDER DRAWING	REVISION : 00	DRAWING NO : S-07	DATE : NOVEMBER 2023	RECOMMENDED FOR APPROVAL	APPROVED	EXECUTIVE ENGINEER

**SLUICE GATE (3 VENTS)
MECHANICAL DRAWINGS**



CANAL CROSS SECTION (TYPICAL)

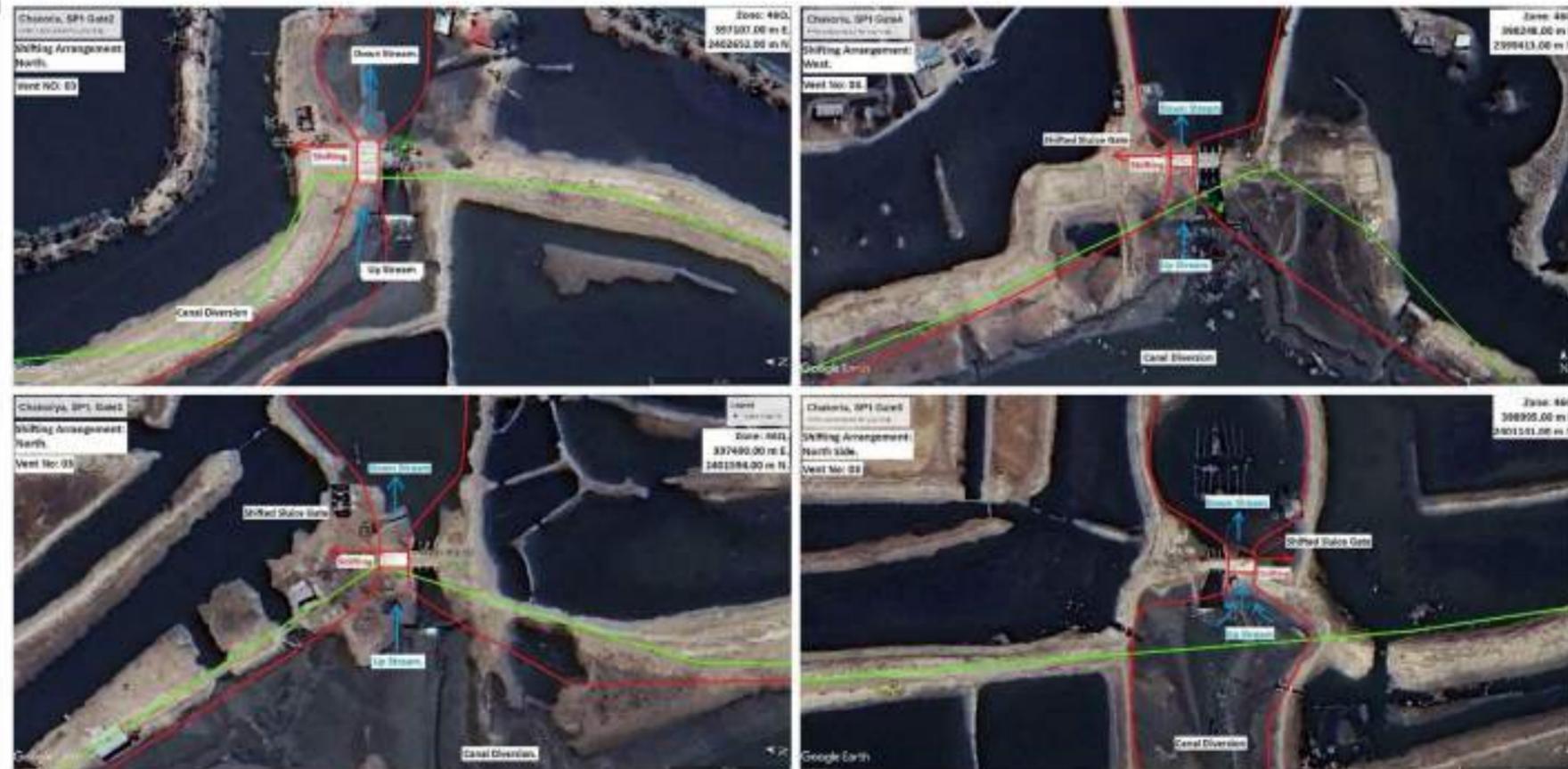


PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. SDB FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO: JP200CF0021902	CLIENT GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH MINISTRY OF FISHERIES	CONSULTANT JPZ-KAIYO-JCL Joint Venture Head Office: 204, Block A, Level: 7, Road 6, Dhaka Cantonment Housing Circle, Dhaka-1000, Dhaka-1000, Bangladesh. Tel: +8802 44111198, 44142421, 4411110000, 8 8 9 2 100 Fax: +8802 44111198, Email: jpz@jpz.com.bd, www.jpz.com.bd	DRAWING TITLE : CANAL DIVERSION CROSS SECTION (TYPICAL) REFERENCE TITLE: IMPROVED RECONSTRUCTION OF EXISTING SLUICE GATE AT STAGE 11 (ACTS & SLICES SUBMITTALS) LOCATION / SITE: RAMPUR, CHAKARIA, COOIS BAZAR DRAWING STATUS: TENDER DRAWING REVISION: 00 DRAWING NO: CS-01 DATE: NOVEMBER 2023 DESIGNED BY: Sanyal, Debasis GEM CHECKED BY:	DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; border: 1px solid black;"> EXECUTIVE ENGINEER </td> <td style="width: 25%; border: 1px solid black;"> DEPUTY PROJECT DIRECTOR (FAWCES) </td> <td style="width: 25%; border: 1px solid black;"> PROJECT DIRECTOR </td> <td style="width: 25%; border: 1px solid black;"> APPROVED DIRECTOR GENERAL </td> </tr> </table>	EXECUTIVE ENGINEER	DEPUTY PROJECT DIRECTOR (FAWCES)	PROJECT DIRECTOR	APPROVED DIRECTOR GENERAL
EXECUTIVE ENGINEER	DEPUTY PROJECT DIRECTOR (FAWCES)	PROJECT DIRECTOR	APPROVED DIRECTOR GENERAL					
STRUCTURAL ENGINEER: Prof. Dr. M. Arshad Mustafa, PEng. TEAM: Engr. Fazel Hossain Khan FUNCTIONAL SUPERVISOR: Prof. Dr. M. Arshad Mustafa, PEng.								

DIVERSION LOCATION MAP (3 VENTS)

List of Sluice Gate

Sl No	Folder No	Sluice Gate No	Size of Plots	Gate System (Vent)
1	SP -1	Gate -2	10 Acre	3
2	SP -1	Gate-3	10 Acre	3
3	SP- 1	Gate-4	10 Acre	3
4	SP- 1	Gate-5	10 Acre	3
5	SP-2	Gate -1	10 Acre	3
6	SP-2	Gate -2	10 Acre	3
7	SP-3	Gate -1	10 Acre	3
8	SP-3	Gate -2	10 Acre	3
9	SP-3	Gate -3	10 Acre	3
10	SP- 4	Gate -1	10 Acre	3
11	SP-4	Gate -2	10 Acre	3
12	SP-4	Gate-3	10 Acre	3
13	SP-4	Gate-4	10 Acre	3
14	SP-5	Gate -1	10 Acre	3
15	SP-5	Gate-2	10 Acre	3
16	SP-5	Gate-3	10 Acre	3
17	SP-5	Gate-4	10 Acre	3
18	SP-5	Gate-5	10 Acre	3
19	SP-5	Gate - 6	10 Acre	3



PROJECT NAME	CLIENT	CONSULTANT	DRAWING TITLE : CANAL DIVERSION LOCATION MAP (SP1 WITH 3 VENTS)	DEPARTMENT OF FISHERIES			
CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SDB FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)	GOVERNMENT OF BANGLADESH DEPARTMENT OF FISHERIES	JPZ-KAYO-JCL Joint Venture House No. 24, Road A, Level 5, Park, Mohammadpur Housing Estate, Mirpur Road, Dhaka-100, Bangladesh. Tel: +8802-8111700, 8143421, 8171120, 8188133 Fax: +8802-8111700 Email: jpz@jpz.com.bd www.jpz.com.bd	INFRASTRUCTURE TITLE: REPAIR AND RECONSTRUCTION OF EXISTING SLUICE GATE AT 18 ACRES IN CHAKARIA SHRIMP ESTATE	RECOMMENDED FOR APPROVAL			
PROJECT NO: JPZIDDF021/02		STRUCTURAL ENGINEER: Prof. Dr. Md. Anwarul Mustafa, PEng	LOCATION / SITE: RAMPUR, CHAKARIA, COX'S BAZAR	EXECUTIVE ENGINEER	DEPUTY PROJECT DIRECTOR (FINANCE)	PROJECT DIRECTOR	DIRECTOR GENERAL
		TEAM: Eng. Karimuzzaman	DRAWING STATUS: TENDER DRAWING	REVISION: 00	DRAWING NO: LM-01	DATE: NOVEMBER 2023	APPROVED
		STRUCTURAL ENGINEER & ARCHITECT REPRESENTATIVE: Prof. Dr. Md. Anwarul Mustafa, PEng	DRAWN BY: Sayee Subira Nily	CHECKED BY:			

List of Sluice Gate

SI No	Polder No	Sluice Gate No	Size of Plots	Gate System (Vent)
1	SP-1	Gate -2	10 Acre	3
2	SP-1	Gate-3	10 Acre	3
3	SP-1	Gate-4	10 Acre	3
4	SP-1	Gate-5	10 Acre	3
5	SP-2	Gate -1	10 Acre	3
6	SP-2	Gate -2	10 Acre	3
7	SP-3	Gate -1	10 Acre	3
8	SP-3	Gate -2	10 Acre	3
9	SP-3	Gate -3	10 Acre	3
10	SP-4	Gate -1	10 Acre	3
11	SP-4	Gate -2	10 Acre	3
12	SP-4	Gate-3	10 Acre	3
13	SP-4	Gate-4	10 Acre	3
14	SP-5	Gate -1	10 Acre	3
15	SP-5	Gate-2	10 Acre	3
16	SP-5	Gate-3	10 Acre	3
17	SP-5	Gate-4	10 Acre	3
18	SP-5	Gate-5	10 Acre	3
19	SP-5	Gate - 6	10 Acre	3



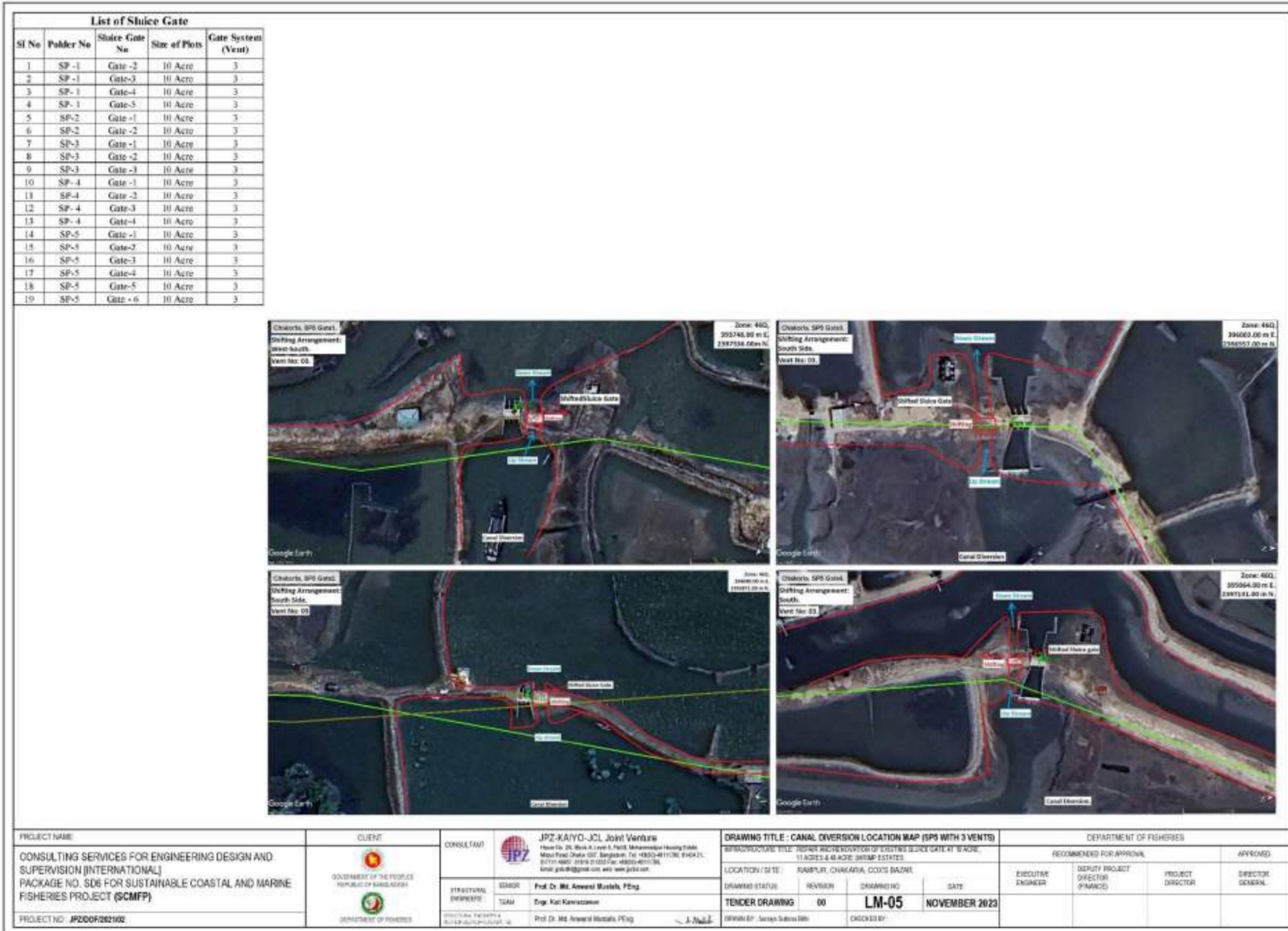
PROJECT NAME	CLIENT	CONSULTANT	DRAWING TITLE : CANAL DIVERSION LOCATION MAP (SP2 WITH 3 VENTS)	DEPARTMENT OF FISHERIES			
CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. S08 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)		 JPZ-KAYO-JCL Joint Venture House No. 28, Block A, Level 9, Plot 6, Mirpur Cantonment, Dhaka, Bangladesh. Tel: 4633-4614/150 (10/24), 16711-4027, 16116-21433 Fax: 4633-4614/1503, Email: jpz@jpz.com.bd, web: www.jpz.com.bd	STRUCTURE TITLE: REPAIR AND RECONSTRUCTION OF EXISTING SLUICE GATE AT BEACON (11 ACRES & 4 ACRES SHM ESTIMATES)	RECOMMENDED FOR APPROVAL			
PROJECT NO: JPDD/DF/2021/02		SENIOR Prof. Dr. Md. Anwarul Hossain, P.Eng.	LOCATION / SITE: RAMPUR, CHAKARIA, COA'S BAZAR	EXECUTIVE ENGINEER	DEPUTY PROJECT DIRECTOR (FINANCE)	PROJECT DIRECTOR	DIRECTOR GENERAL
		SENIOR Eng. Md. Kamruzzaman	DRAWING STATUS: TENDER DRAWING	REVISION: 00	DRAWING NO: LM-02	DATE: NOVEMBER 2023	APPROVED
		PROJECTAL ENGINEER Prof. Dr. Md. Anwarul Hossain, P.Eng.	DRAWN BY: (Signature)	CHECKED BY:			

List of Sluice Gate

Sl No	Plotter No	Sluice Gate No	Size of Plots	Gate System (Vent)
1	SP-1	Gate-2	10 Acre	3
2	SP-1	Gate-3	10 Acre	3
3	SP-1	Gate-4	10 Acre	3
4	SP-1	Gate-5	10 Acre	3
5	SP-2	Gate-1	10 Acre	3
6	SP-2	Gate-2	10 Acre	3
7	SP-3	Gate-1	10 Acre	3
8	SP-3	Gate-2	10 Acre	3
9	SP-3	Gate-3	10 Acre	3
10	SP-4	Gate-1	10 Acre	3
11	SP-4	Gate-2	10 Acre	3
12	SP-4	Gate-3	10 Acre	3
13	SP-4	Gate-4	10 Acre	3
14	SP-5	Gate-1	10 Acre	3
15	SP-5	Gate-2	10 Acre	3
16	SP-5	Gate-3	10 Acre	3
17	SP-5	Gate-4	10 Acre	3
18	SP-5	Gate-5	10 Acre	3
19	SP-5	Gate-6	10 Acre	3



PROJECT NAME	CLIENT	CONSULTANT	DRAWING TITLE : CANAL DIVERSION LOCATION MAP (SP4 WITH 3 VENTS)	DEPARTMENT OF FISHERIES			
CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)	GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES	JPZ-KAIYO-JCL Joint Venture House No. 24, Block-A, Level-5, Plot-8, Miranpur Housing Estate, West Road Dhaka-1217, Bangladesh. Tel: +8802-4811190, 4142421, 01111-8867, 0199-31052 Fax: +8802-4811179. Email: jpzkd@jpzkd.com web: www.jpzkd.com	INFRASTRUCTURE TITLE: DESIGN AND RENOVATION OF EXISTING SLUICE GATE AT 16 ACRES, 11 ACRES & 40 ACRES SHRIMP ESTATES	RECOMMENDED FOR APPROVAL			
PROJECT NO: JPZDOP0202162		STRUCTURAL ENGINEERS: SENIOR: Prof. Dr. Md. Anwarul Hossain, PEng. TEAM: Engr. Ras Khanomaman	LOCATION / SITE: RAMPUR, CHAKARIA, COX'S BAZAR	EXECUTIVE ENGINEER	DEPUTY PROJECT DIRECTOR (FRANCE)	PROJECT DIRECTOR	DIRECTOR GENERAL
		VP&D TOTAL ENGINEER & ARCHITECTURE SUPERVISOR: Prof. Dr. Md. Anwarul Hossain, PEng.	DRAWING STATUS: TENDER DRAWING	REVISION: 00	DRAWING NO: LM-04	DATE: NOVEMBER 2023	APPROVED
			DRAWN BY: Group Subarea 004	CHECKED BY:			



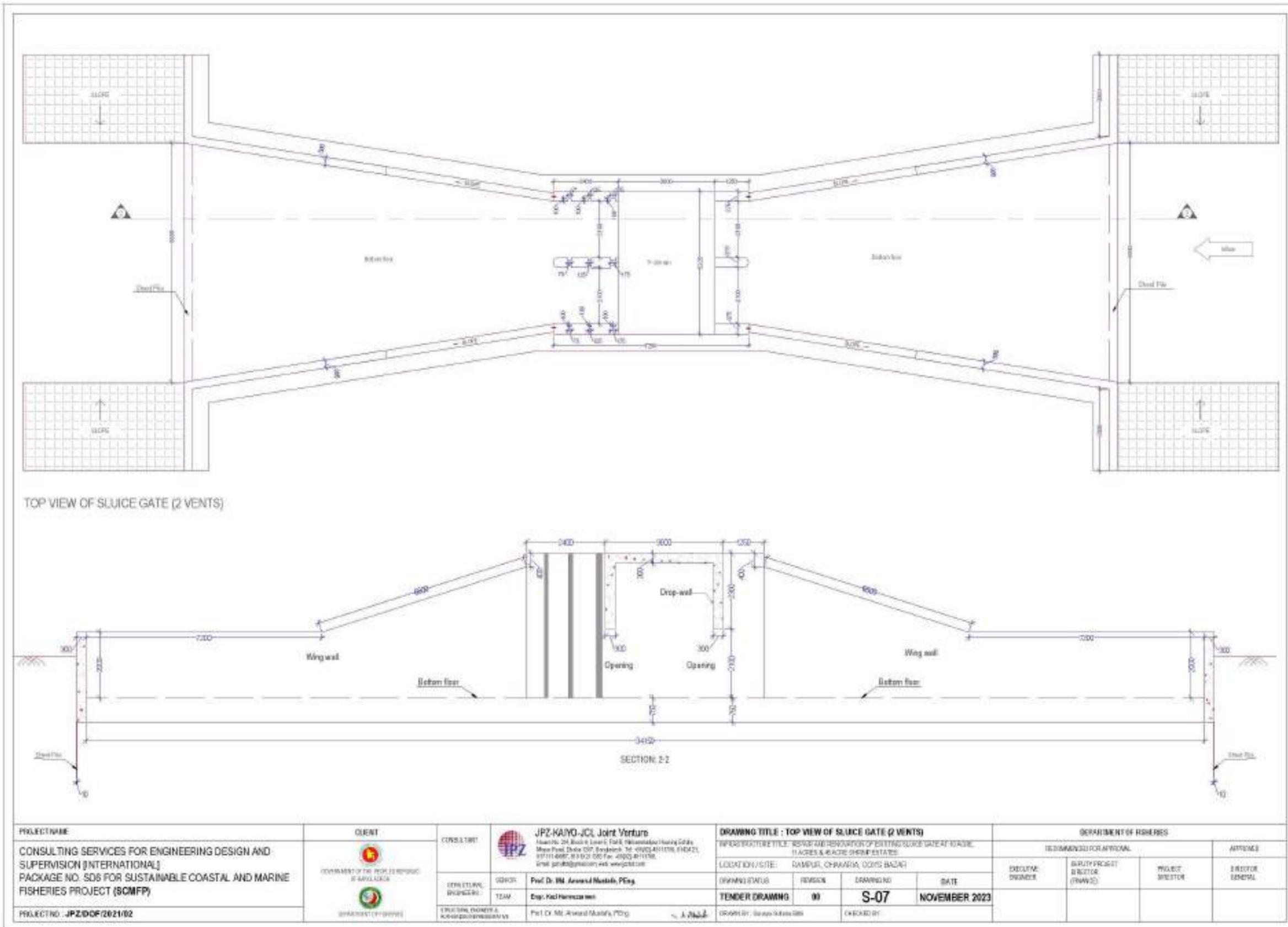
List of Sluice Gate

SI No	Polder No	Sluice Gate No	Size of Plots	Gate System (Vent)
1	SP-1	Gate -2	10 Acre	3
2	SP-1	Gate-3	10 Acre	3
3	SP-1	Gate-4	10 Acre	3
4	SP-1	Gate-5	10 Acre	3
5	SP-2	Gate -1	10 Acre	3
6	SP-2	Gate -2	10 Acre	3
7	SP-3	Gate -1	10 Acre	3
8	SP-3	Gate -2	10 Acre	3
9	SP-3	Gate -3	10 Acre	3
10	SP-4	Gate -1	10 Acre	3
11	SP-4	Gate -2	10 Acre	3
12	SP-4	Gate-3	10 Acre	3
13	SP-4	Gate-4	10 Acre	3
14	SP-5	Gate -1	10 Acre	3
15	SP-5	Gate-2	10 Acre	3
16	SP-5	Gate-3	10 Acre	3
17	SP-5	Gate-4	10 Acre	3
18	SP-5	Gate-5	10 Acre	3
19	SP-5	Gate - 6	10 Acre	3

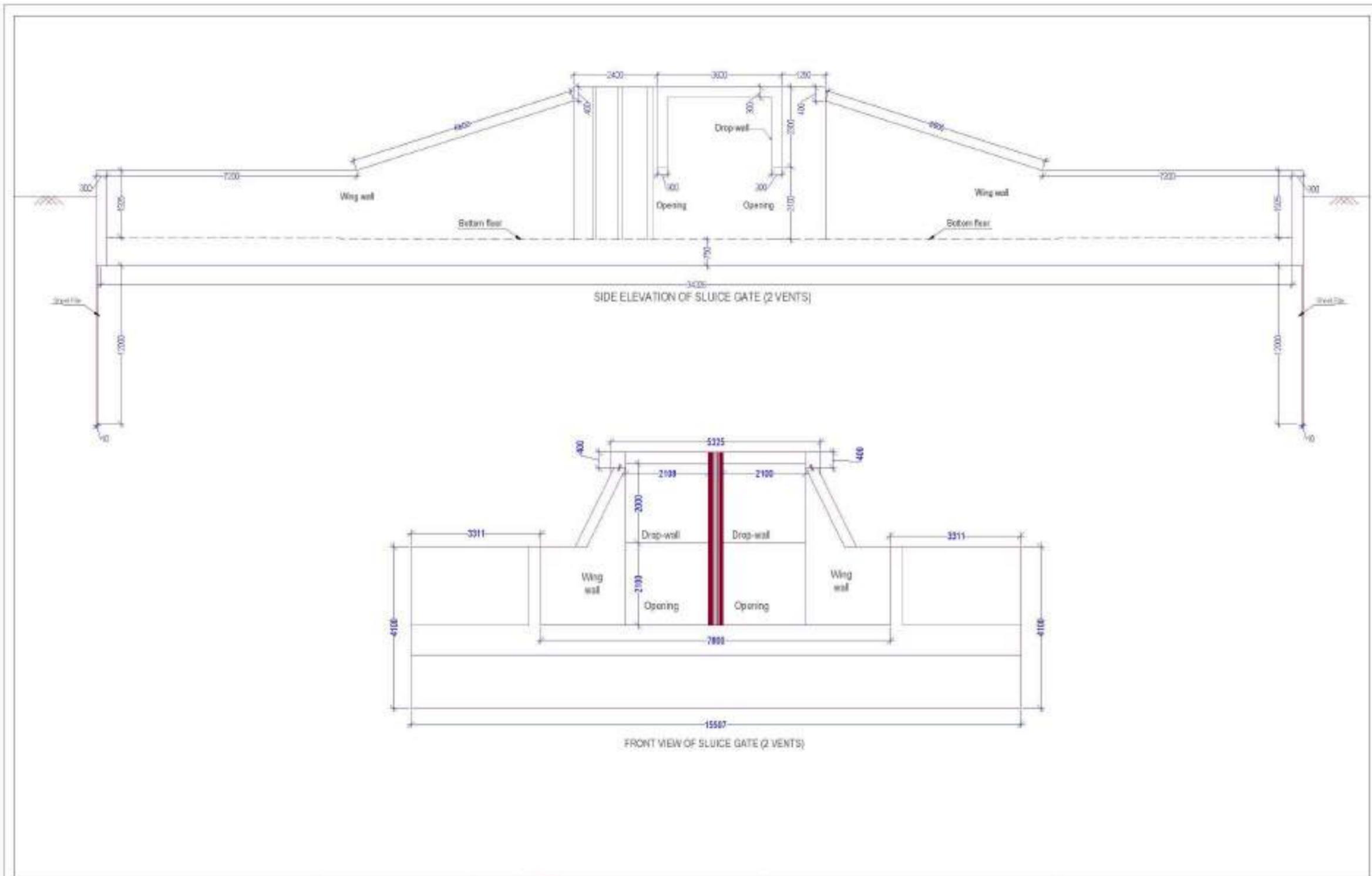


PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO: JP2020F1202162	CLIENT GOVERNMENT OF BANGLADESH DEPARTMENT OF FISHERIES	CONSULTANT JPZ-KAYO-JCL Joint Venture Room No. 04, Deck-4, Level 5, Park Road, Mirpur Cantonment, Dhaka-1217, Bangladesh. Tel: +8802-4611700, 4614241, 4611111, 4607, 4619, 21152 Fax: +8802-4611170, 4607, 4619, 21152 Email: jpz@jpz.com.bd, www.jpz.com.bd	DRAWING TITLE : CANAL DIVERSION LOCATION MAP (SPS WITH 3 VENTS) INFRASTRUCTURE TITLE: REPAIR AND RECONSTRUCTION OF EXISTING SLUICE GATE AT 15 ACRE, 11 ACRES & 8 ACRES SHRIMP ESTATES LOCATION/ SITE: RAMPUR, CHAKARIA, COXS BAZAR			DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL		
			DRAWING STATUS: TENDER DRAWING REVISION: 00 DRAWING NO: LM-06 DATE: NOVEMBER 2023	DRAWING ENGINEER: [Signature] CHECKER: [Signature]	DEPUTY PROJECT DIRECTOR (FINANCE) PROJECT DIRECTOR	APPROVED: [Signature] DIRECTOR GENERAL		

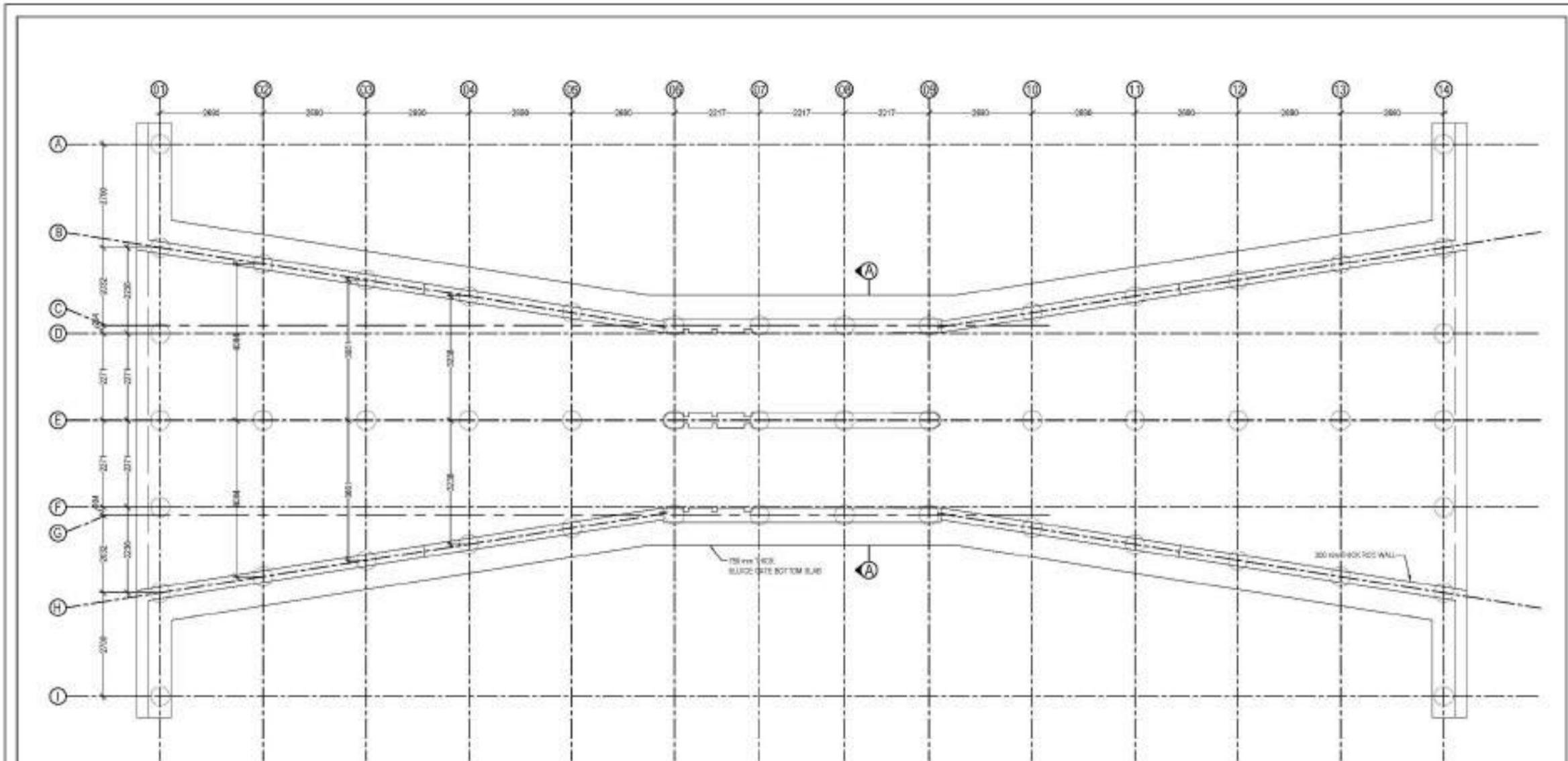
SLUICE GATE (2 VENTS)



PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SDB FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO. JPZ/DOF/2021/02	CLIENT GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES	CONSULTANT JPZ-KAHO-JCI Joint Venture House No. 24, Road 9, Level 5, Plot 8, International Housing Colony, Sector 7, Dhaka 1217, Bangladesh. Tel: +880(0)2111776, 814221, 871114880, 81521020 Fax: +880(0)2111776, Email: jpz@jpz.com.bd, www.jpz.com.bd	DRAWING TITLE : TOP VIEW OF SLUICE GATE (2 VENTS) INFRASTRUCTURE TITLE: REPAIR AND RENOVATION OF EXISTING SLUICE GATE AT 10 ACRES & 6 ACRES SHIMP ESTATE LOCATION / SITE: DAMPUR, CHAKARIA, COX'S BAZAR			DEPARTMENT OF FISHERIES (SECTION FOR APPROVAL)				
			DRAWING STATUS: TENDER DRAWING	REVISION: 00	DRAWING NO: S-07	DATE: NOVEMBER 2023	DECLINE ENGINEER	SENIORITY PROJECT ENGINEER (DRAWN)	PROJECT SUPERVISOR	APPROVED DIRECTOR GENERAL
			DRAWN BY: Saayeb Khan Siddiqui	CHECKED BY:	SIGNED BY: Prof. Dr. Md. Anwarul Hossain, P.Eng.	SIGNED BY: Engr. Kazi Hameeduzzaman	SIGNED BY: Prof. Dr. Md. Anwarul Hossain, P.Eng.	SIGNED BY:	SIGNED BY:	SIGNED BY:
			PROJECT NO: JPZ/DOF/2021/02	CLIENT: GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH, DEPARTMENT OF FISHERIES	CONSULTANT: JPZ-KAHO-JCI Joint Venture	DRAWING TITLE: TOP VIEW OF SLUICE GATE (2 VENTS)	INFRASTRUCTURE TITLE: REPAIR AND RENOVATION OF EXISTING SLUICE GATE AT 10 ACRES & 6 ACRES SHIMP ESTATE	LOCATION / SITE: DAMPUR, CHAKARIA, COX'S BAZAR	DEPARTMENT OF FISHERIES	APPROVAL: DIRECTOR GENERAL

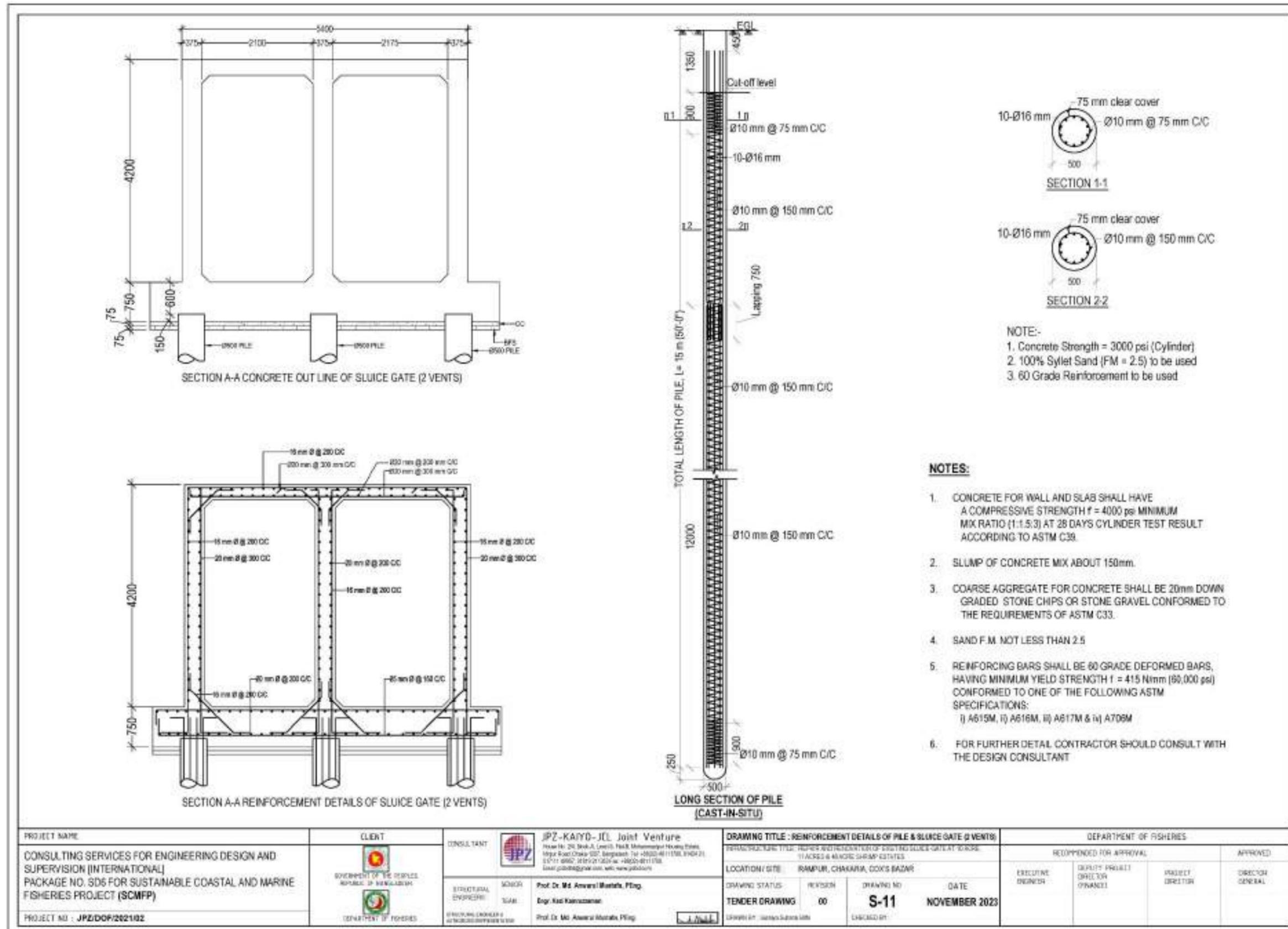


PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO : JPZ/DOF/2021/02	CLIENT GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES	CONSULTANT JPZ-KAYD-JCL Joint Venture House No. 24, Block A, Level 5, F/A-8, Mohammadpur Housing Estate, Mirpur Road, Dhaka-1217, Bangladesh. Tel: +8802-4111170, 414923, 4111180, 4111181, 4111182 Fax: +8802-4011170, 4111171, Email: jpz@jpz.com.bd, www.jpz.com.bd	DRAWING TITLE : SIDE ELEVATION OF SLUICE GATE (2 VENTS) IMPROVISED TITLE: REPAIR AND RENOVATION OF EXISTING SLUICE GATE AT TORQUE, 11 ACRES & 46 ACRES SHRIMP ESTATES LOCATION / SITE: RAMPLI, CHAKARIA, COXS BAZAR				DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL APPROVED			
			DRAWING STYLE: TENDER DRAWING REVISION: 00 DRAWING NO: S-08 DATE: NOVEMBER 2023	DESIGNED BY: [Blank] CHECKED BY: [Blank]	SUPERVISOR: [Blank]	PROJECT DIRECTOR: [Blank]	DIRECTOR GENERAL: [Blank]			
			PROJECT NO: JPZ/DOF/2021/02	PROJECT NO: JPZ/DOF/2021/02	PROJECT NO: JPZ/DOF/2021/02	PROJECT NO: JPZ/DOF/2021/02	PROJECT NO: JPZ/DOF/2021/02			
			PROJECT NO: JPZ/DOF/2021/02	PROJECT NO: JPZ/DOF/2021/02	PROJECT NO: JPZ/DOF/2021/02	PROJECT NO: JPZ/DOF/2021/02	PROJECT NO: JPZ/DOF/2021/02			

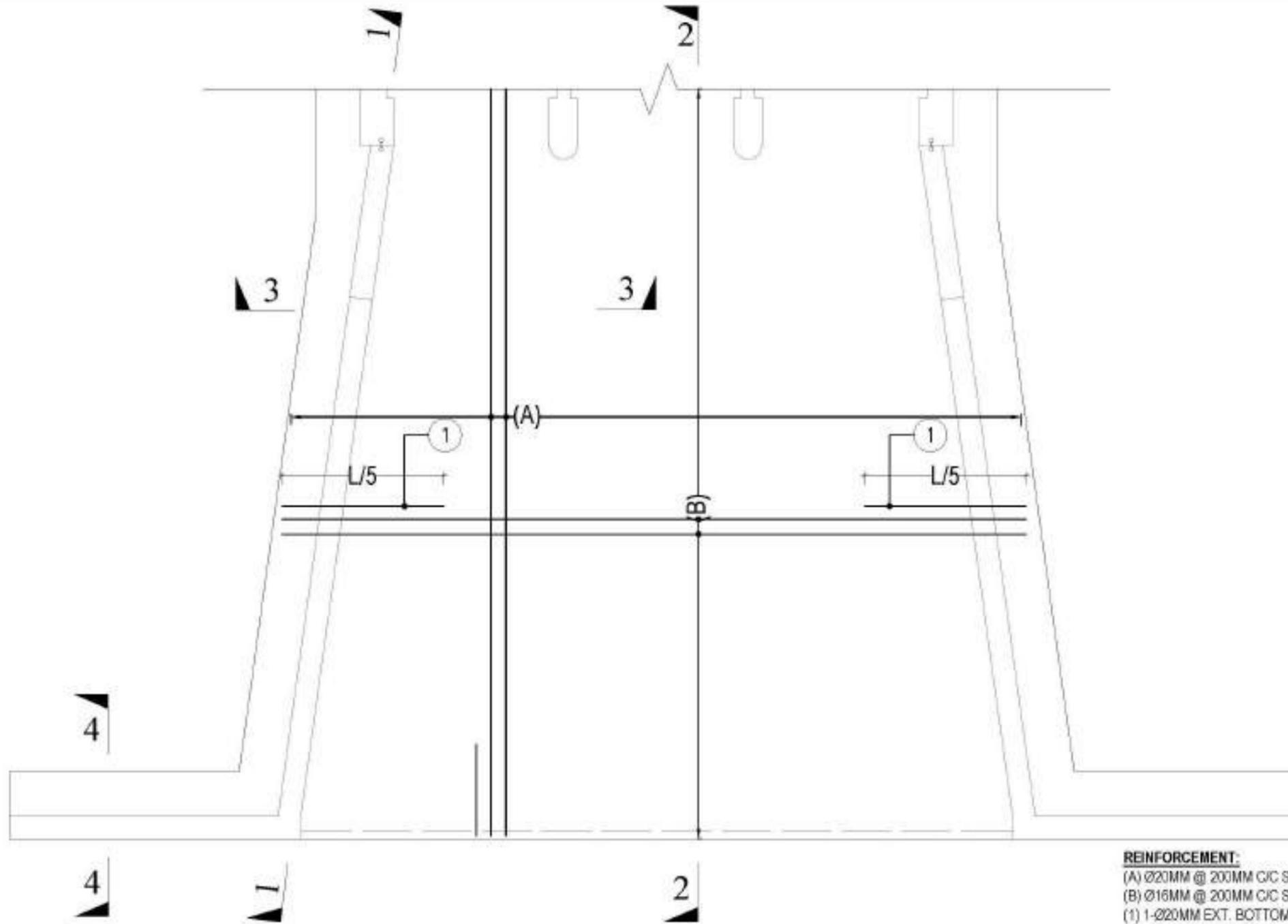


PILE LAYOUT PLAN OF SLUICE GATE (2 VENTS)
TOTAL NO. OF PILES = 50

<p>PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO - JPZ/DOF/2021/02</p>	<p>CLIENT GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES</p>	<p>CONSULTANT JPZ-KAIYO-JCL Joint Venture JPZ-KAIYO-JCL Joint Venture 15th Floor, 24, Sheikh Mujibur Road, Dhaka-1000, Bangladesh. Tel: +88024811178, 83421, 8711, 4997, 019121007 or +88024811178 Email: jpz@jpz.com.bd, info@jpz.com.bd</p> <p>STRUCTURAL ENGINEER TEAM Prof. Dr. Md. Anwarul Hossain, PEng. Engr. Rafiqul Karim Prof. Dr. Md. Anwarul Hossain, PEng.</p>	<p>DRAWING TITLE : PILE LAYOUT OF SLUICE GATE (2 VENTS) DRAWING NO: S-10 DATE: NOVEMBER 2023 DRAWING STATUS: TENDER DRAWING REVISION: 00 DRAWN BY: Sayma Sultana (SM) CHECKED BY:</p>	<p>DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL EXECUTIVE ENGINEER DEPUTY PROJECT DIRECTOR (FINANCE) PROJECT DIRECTOR APPROVED DIRECTOR GENERAL</p>
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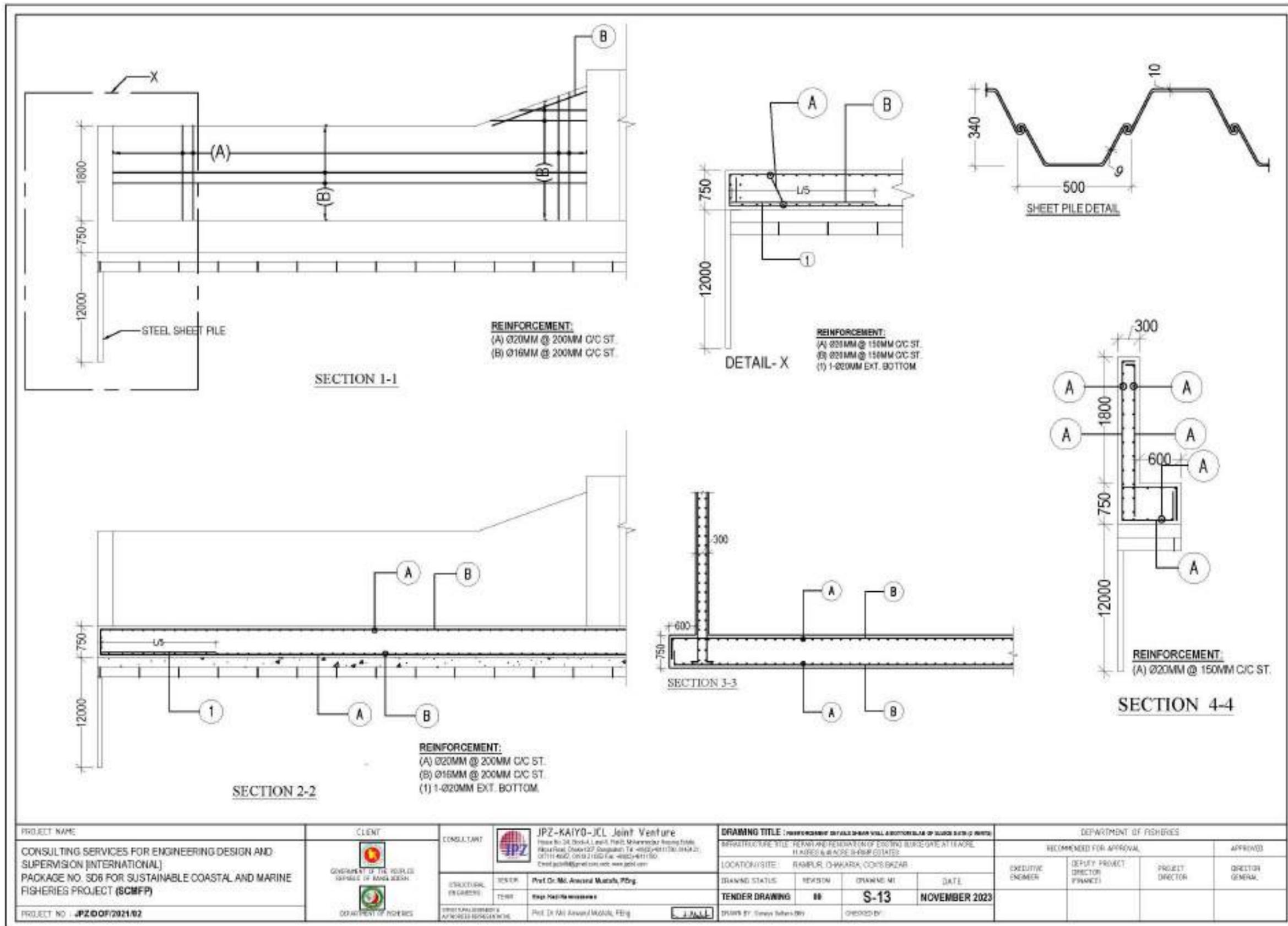
PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO : JPZ/DOP/2021/02	CLIENT GOVERNMENT OF THE REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES	CONSULTANT JPZ-KA/ID-JLL Joint Venture House No. 24, Block-A, Level-10, Park Metropolitan Housing Estate, Mirpur Road, Dhaka-1007, Bangladesh. Tel: +8802-9611158, 960421, 97111 9862, 961221 (24hr) or +8802-9711178. Email: jpz@jpz.com.bd, www.jpzbd.com	DRAWING TITLE : REINFORCEMENT DETAILS OF PILE & SLUICE GATE @ VENTS DRAWING NUMBER: TITLE: REPAIR AND RECONSTRUCTION OF EXISTING SLUICE GATE AT 10 ROSE, 11 ACRES & 40 ACRES SHRIMP ESTATES LOCATION / SITE : RAMPUR, CHAKARIA, COX'S BAZAR DRAWING STATUS : REVISION : DRAWING NO : DATE : TENDER DRAWING : 00 : S-11 : NOVEMBER 2023 DRAWN BY : (Signature) DATE : CHECKED BY :	DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL EXECUTIVE ENGINEER : DEPUTY PROJECT DIRECTOR (FINANCE) : PROJECT DIRECTOR : APPROVED : DIRECTOR GENERAL
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REINFORCEMENT:
 (A) Ø20MM @ 200MM C/C ST.
 (B) Ø16MM @ 200MM C/C ST.
 (1) 1-Ø20MM EXT. BOTTOM.

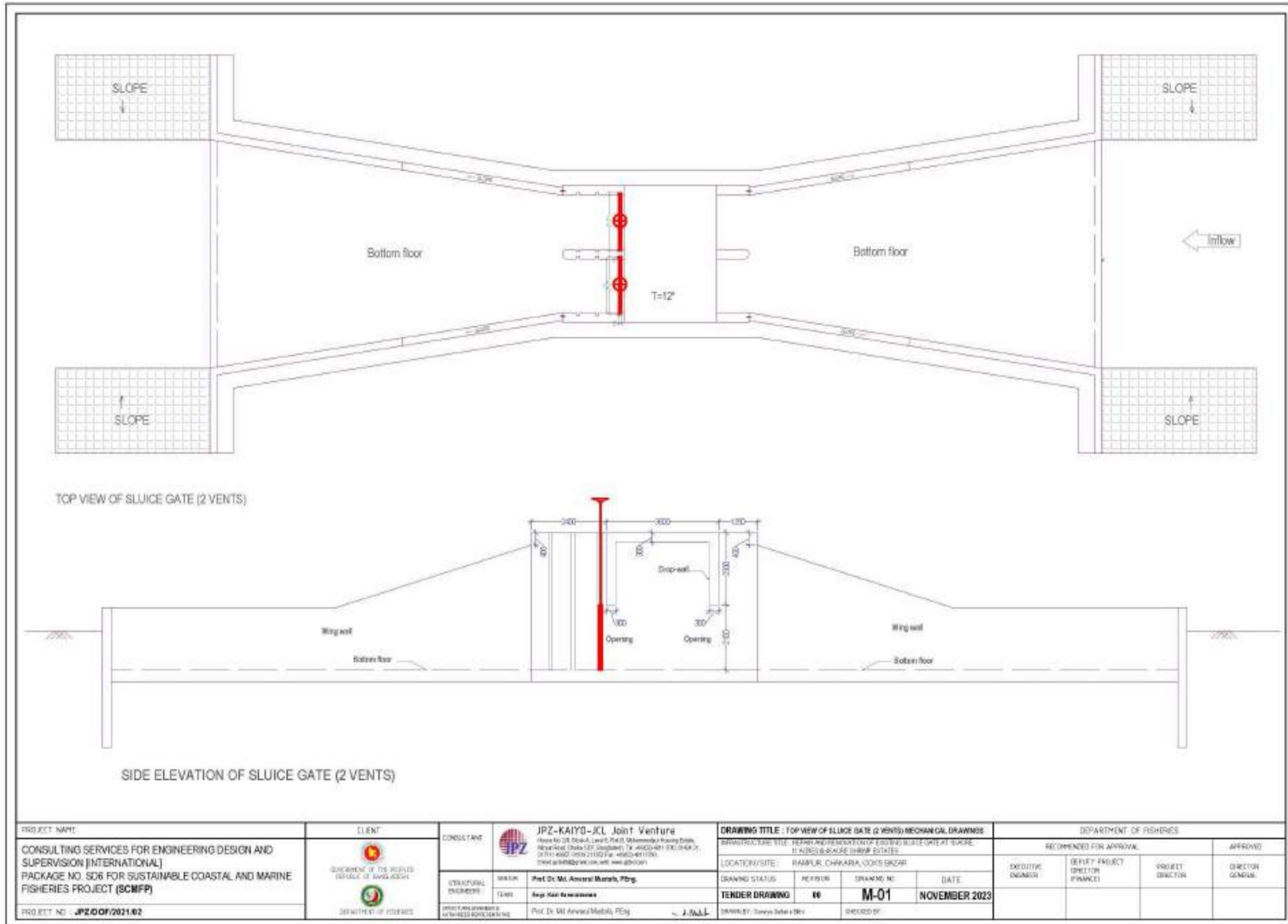
REINF.DETAIL OF WING WALL BASE SLAB

PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)		CLIENT  GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH  DEPARTMENT OF FISHERIES		CONTRACT  JPZ-KAIYO-JEL Joint Venture Head Office: 204, Block 6, Level 6, Park Hotel, Mirpur Cantonment, Dhaka. Main Road, Dhaka 1207, Bangladesh. Tel: +8802-4011478, 4140121, 4111140, 4097, 4193231355 Fax: +8802-8111196. Email: jpz@jpz.com.bd, www.jpzbd.com		DRAWING TITLE : REINFORCEMENT DETAIL OF WING WALL AND BASE SLAB REPRESENTATIVE TITLE: REINFORCEMENT DETAIL OF WING WALL AND BASE SLAB 11 ACRES & 40 ACRES SHRIMP ESTATES LOCAL IDU SITE: RAMPUR, CHAKARIA, COCOS BAZAR.			DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL			
PROJECT NO. : JPZ/DOF/2021/02		PROFESSIONAL RESPONSIBILITY SENIOR: Prof. Dr. Md. Anwarul Hossain, P.Eng. TEAM: Eng. Md. Kamruzzaman		DRAWING STATUS REVISION DRAWING NO. DATE TENDER DRAWING 00 S-12 NOVEMBER 2023			EXECUTIVE PROJECT DIRECTOR (FINANCE)		PROJECT DIRECTOR		APPROVED DIRECTOR GENERAL	
		PROJECTAL NUMBER & APPROVAL NUMBER: P-17/Dr. Md. Anwarul Hossain, P.Eng.		DRAWN BY: Saikat Ghosh (SG) CHECKED BY:								

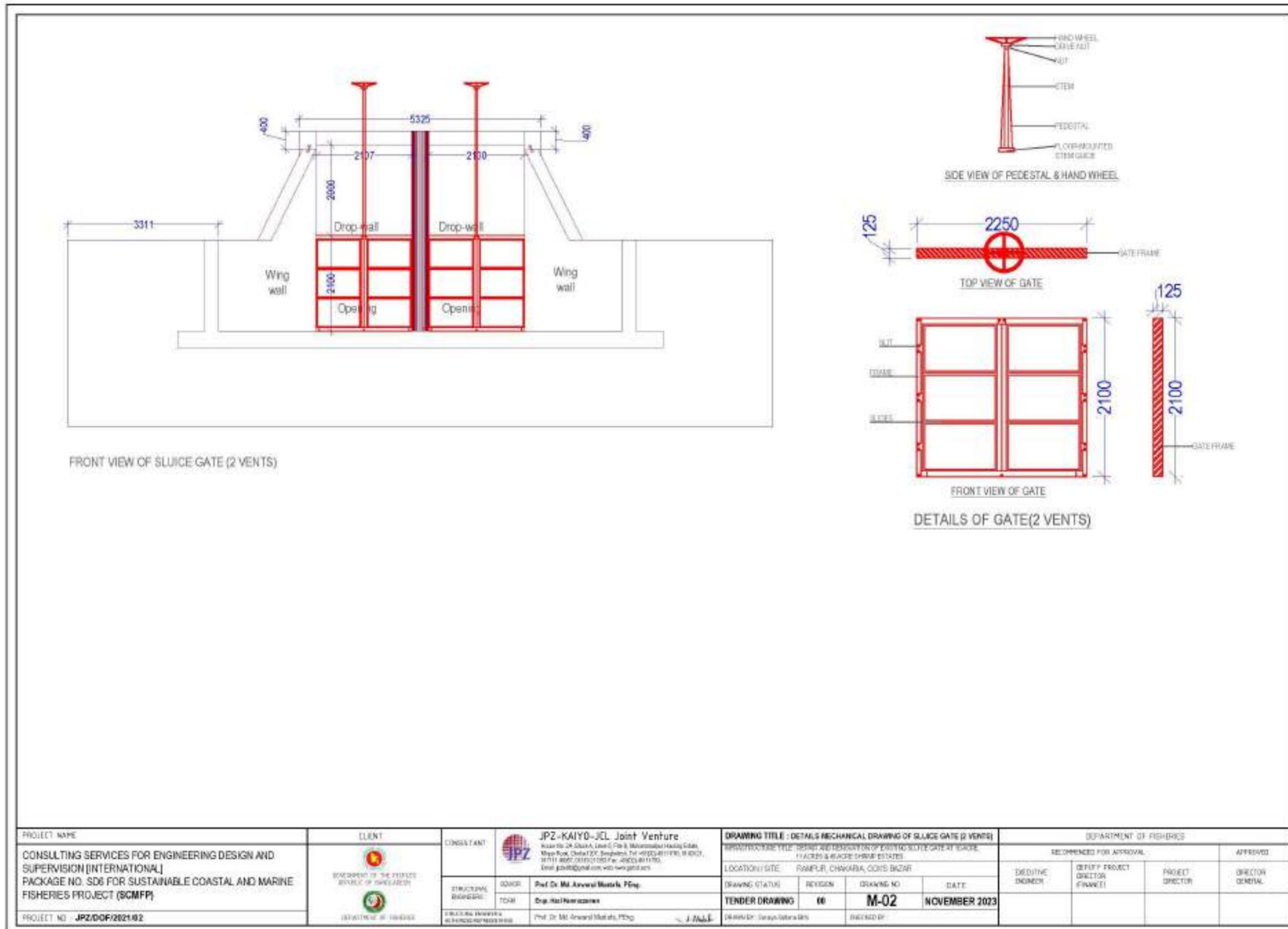


PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO : JPZ/OP/2021/02	CLIENT  GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH  DEPARTMENT OF FISHERIES	CONSULTANT  JPZ-KAIYO-JCL Joint Venture House No. 24, Road-4, Plot-3, Miramandar Avenue, Dhaka Road, Dhaka-1217, Bangladesh. Tel: +880-2-9811761, 9811762, 021114660, 021921100 Fax: +880-2-9811150. Email: jpz@jpz.com.bd, www.jpz.com.bd	DRAWING TITLE : REINFORCEMENT DETAILS OF WALL AND FOUNDATION OF SLURRY WALL PILE INFRASTRUCTURE TITLE : REPAIR AND RENOVATION OF EXISTING BUREAU ATTACHE HOUSE & BANGS B-HMP COLONIES LOCATION/SITE : RAJSHREE, DAKSHINA, COCHIN BAZAR				DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL			
			DESIGNER : Prof. Dr. Md. Anwarul Maksud, PEng. CHECKER : Engr. Md. Masudul Karim APPROVED REPRESENTATIVE : Prof. Dr. Md. Anwarul Maksud, PEng.	DRAWING STATUS : REVISION TENDER DRAWING : ** DRAWING NO : S-13 DATE : NOVEMBER 2023 DRAWN BY : Engr. Md. Masudul Karim CHECKED BY :	EXECUTIVE ENGINEER DEPUTY PROJECT DIRECTOR (FINANCE) PROJECT DIRECTOR DIRECTOR GENERAL	APPROVED				

**SLUICE GATE (2 VENTS)
MECHANICAL DRAWINGS**

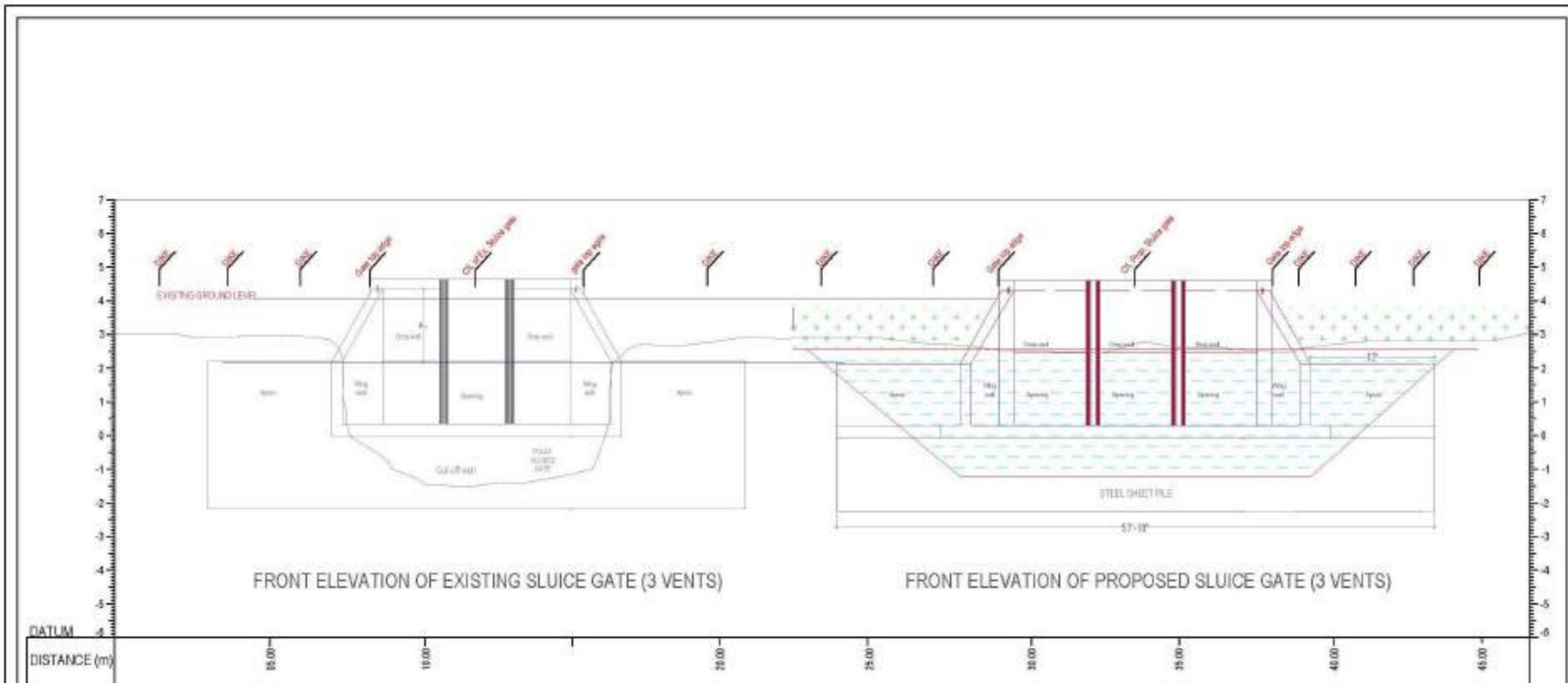


PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO : JPZ/OP/2021/02	CLIENT GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES	CONSULTANT JPZ-KAIYO-JCL Joint Venture House No 28, Block-A, Lane 5, Plot 8, Mohammedpur Poultry Estate, Mirpur Cantt, Dhaka-1215, Bangladesh. Tel: +880-481-870-944-21, 01711-4662-0558/211022 Fax: +880-48111780, 01881-638820/63108, web: www.jpz.com.bd	DRAWING TITLE : TOP VIEW OF SLUICE GATE (2 VENTS) MECHANICAL DRAWING				DEPARTMENT OF FISHERIES					
			ARCHITECTURE TITLE: FEASIBILITY AND PRELIMINARY ENGINEERING SLUICE GATE AT SHADRE II AREA @ CHAKARIA SHRIMP ESTATE				RECOMMENDED FOR APPROVAL					
STRUCTURAL ENGINEER: DESIGNER: Prof. Dr. Md. Anwarul Karim, PEng. CHECKER: Eng. Kazi Nazimuddin PROJECT SUPERVISOR: Prof. Dr. Md. Anwarul Karim, PEng.			LOCATION/SITE: RAMPUR, CHAKARIA, COXS BAZAR		DRAWING STATUS: TENDER DRAWING		REVISION: 00		DRAWING NO: M-01		DATE: NOVEMBER 2023	
PROJECT NO: JPZ/OP/2021/02			DRAWN BY: Sanjiv Datta		CHECKED BY:		EXECUTIVE ENGINEER:		DEPUTY PROJECT DIRECTOR (FINANCE):		PROJECT DIRECTOR:	
APPROVED:			APPROVED:		APPROVED:		APPROVED:		APPROVED:		APPROVED:	



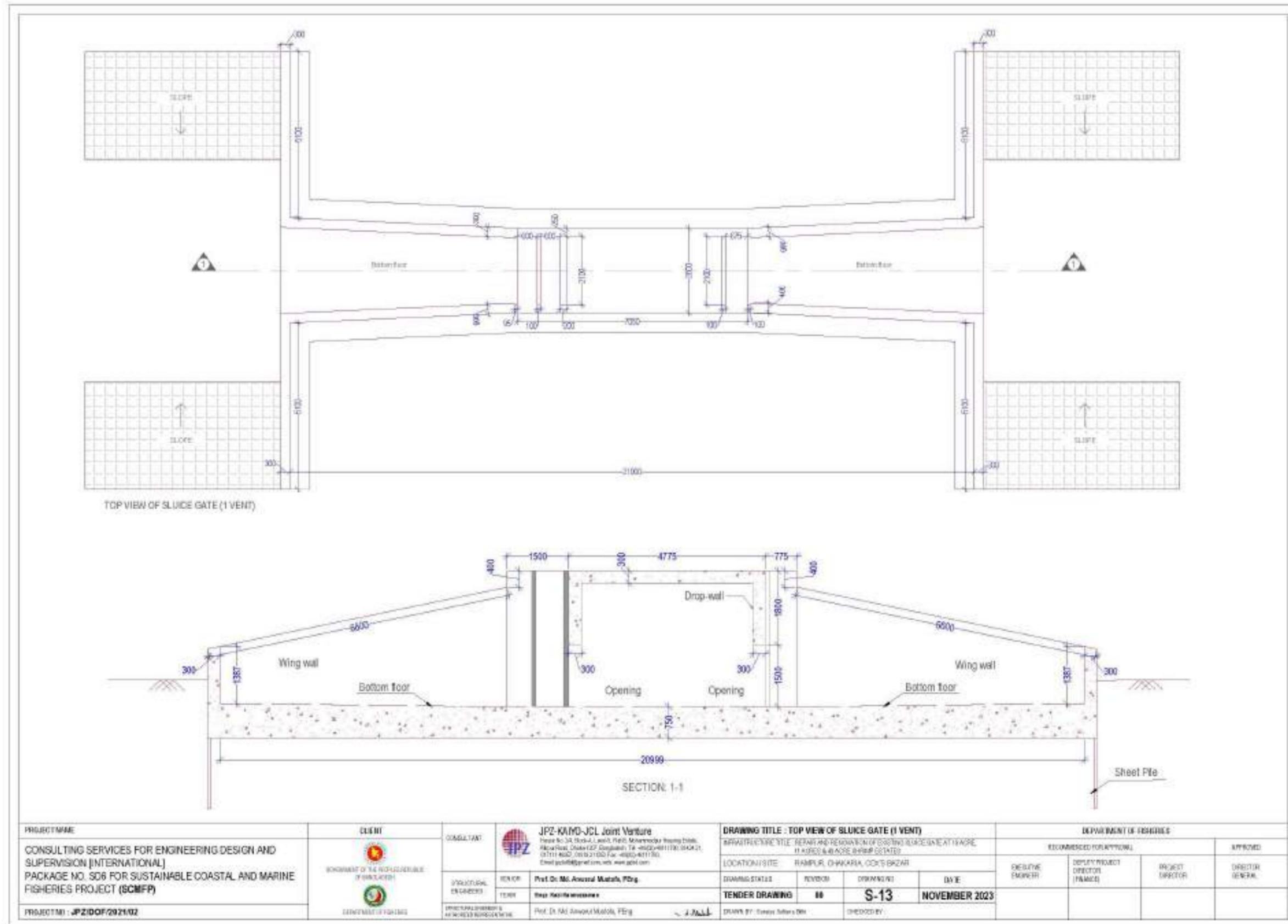
PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)	CLIENT BANGLADESH FISHERIES RESEARCH STATION DEPARTMENT OF FISHERIES	CONSULTANT JPZ-KAIYO-JCL Joint Venture Kuan Ho 24, Shaka, Lane 5, Far 8, Makumbajar Housing Estate, Mirpur Road, Dhaka 1217, Bangladesh. Tel: +880(8) 811178, 811782, 8802, 8815/11 080 Fax: +880(8) 811780, Email: jpzkdj@gmail.com, web: www.jpzkdj.com	DRAWING TITLE : DETAILS MECHANICAL DRAWING OF SLUICE GATE (2 VENTS)				DEPARTMENT OF FISHERIES			
			DRAWING STATUS TENDER DRAWING	REVISION 00	DRAWING NO M-02	DATE NOVEMBER 2023	RECOMMENDED FOR APPROVAL		APPROVED	
PROJECT NO : JPZ/DOF/2021/02		STRUCTURAL ENGINEER Prof. Dr. Md. Anwarul Haque, P.Eng.	LOCATION/SITE RAMPLA, CHAKARIA, COXS BAZAR	DESIGNED BY Sayon Saha/SDS	CHECKED BY	DEDUTIVE ENGINEER	DEPUTY PROJECT DIRECTOR (FINANCE)	PROJECT DIRECTOR	DIRECTOR GENERAL	

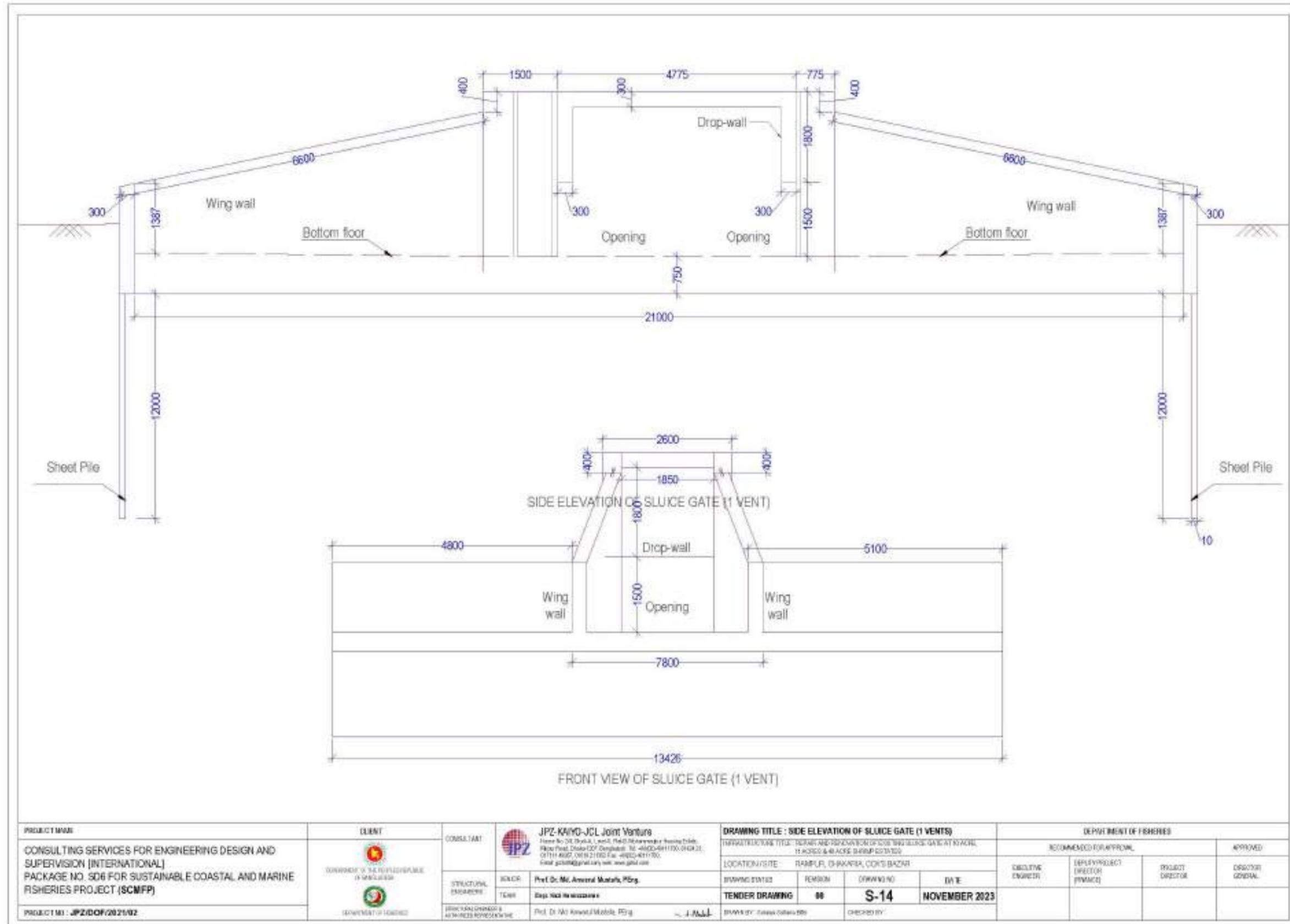
CANAL CROSS SECTION (TYPICAL)



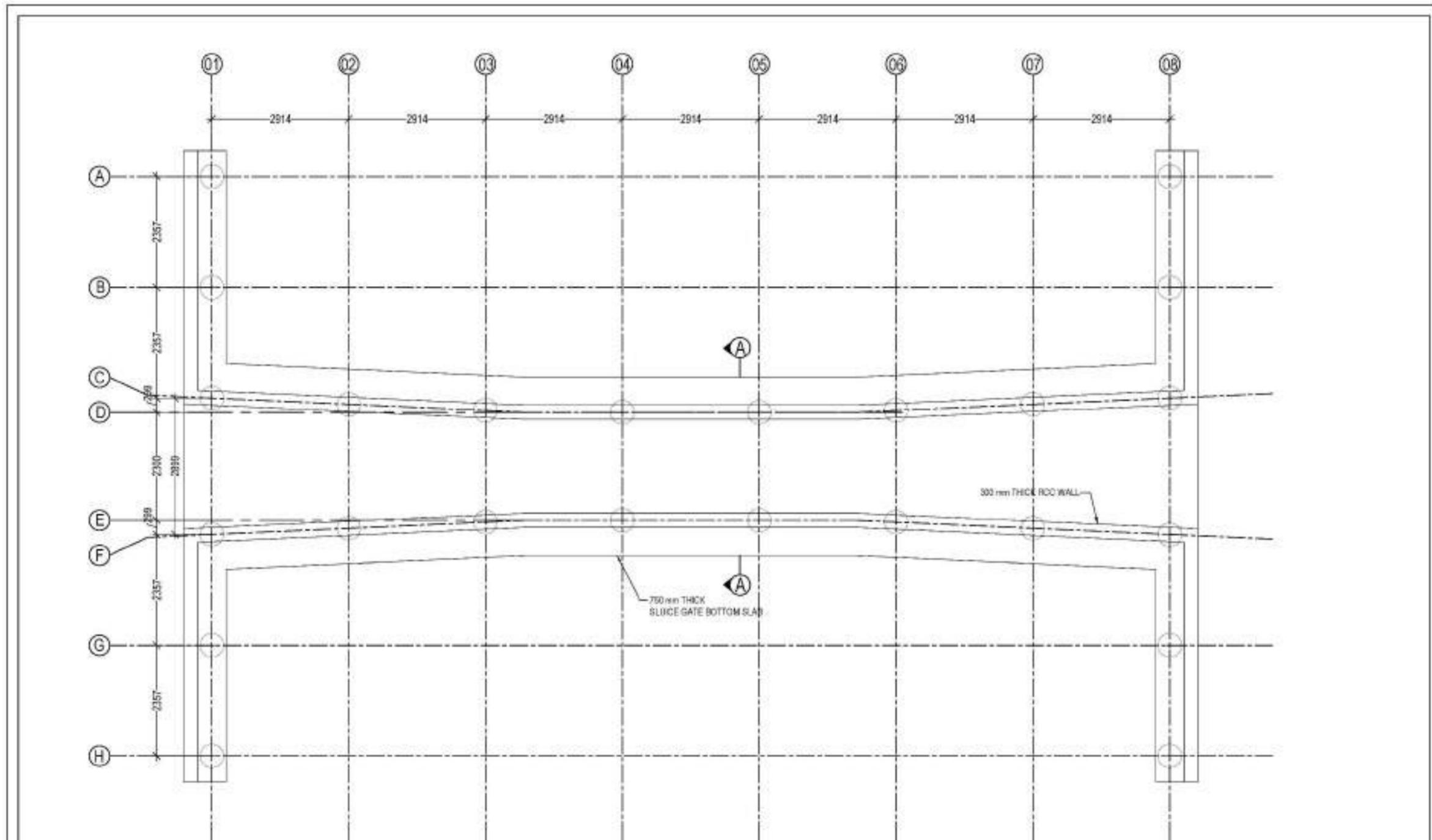
<p>PROJECT NAME</p> <p>CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)</p> <p>PROJECT NO. JP2/DCF/002/02</p>	<p>CLIENT</p> <p>GOVERNMENT OF BANGLADESH REPUBLIC OF BANGLADESH</p> <p>DEPARTMENT OF FISHERIES</p>	<p>CONSULTANT</p> <p>JPZ-KAIYO-JCL Joint Venture <small>JPZ Co., Ltd. 2nd Floor, 100, Nishi-Shinjuku Building, 2-10-1, Nishi-Shinjuku, Tokyo 163-0292, Japan Kaiyo Co., Ltd. 22F, Daijingu Bldg, 4-2-2, Nishi-Shinjuku, Tokyo 163-0292, Japan JCL Co., Ltd. 22F, Daijingu Bldg, 4-2-2, Nishi-Shinjuku, Tokyo 163-0292, Japan</small></p> <p>PROJ. NO. JPZ/002/02</p> <p>DESIGNER Prof. Dr. Md. Anwarul Muzafar, PhD</p> <p>ENGINEER Md. Masudul Alam</p> <p>PROJECT MANAGER & APPROVAL ENGINEER Prof. Dr. Md. Anwarul Muzafar, PhD</p>	<p>DRAWING TITLE : CANAL DIVERSION CROSS SECTION (TYPICAL)</p> <p>REVISIONS: NONE</p> <p>LOCATION/SITE: RAMPUR, CHAKARIA, CO'S BAZAR</p> <p>DRAWING STATUS: TENDER DRAWING</p> <p>REVISION: 00</p> <p>DRAWING NO: CS-01</p> <p>DATE: NOVEMBER 2023</p> <p>DRAWN BY: Sayed Jahan Ara</p> <p>CHECKED BY:</p>	<p style="text-align: center;">DEPARTMENT OF FISHERIES</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="3" style="text-align: center;">RECOMMENDED FOR APPROVAL</th> <th style="text-align: center;">APPROVED</th> </tr> <tr> <td style="width: 33%; text-align: center;">EXECUTIVE ENGINEER</td> <td style="width: 33%; text-align: center;">DEPUTY PROJECT DIRECTOR (T/NA/02)</td> <td style="width: 33%; text-align: center;">PROJECT DIRECTOR</td> <td style="width: 33%; text-align: center;">DIRECTOR GENERAL</td> </tr> <tr> <td style="height: 40px;"></td> <td></td> <td></td> <td></td> </tr> </table>	RECOMMENDED FOR APPROVAL			APPROVED	EXECUTIVE ENGINEER	DEPUTY PROJECT DIRECTOR (T/NA/02)	PROJECT DIRECTOR	DIRECTOR GENERAL				
RECOMMENDED FOR APPROVAL			APPROVED													
EXECUTIVE ENGINEER	DEPUTY PROJECT DIRECTOR (T/NA/02)	PROJECT DIRECTOR	DIRECTOR GENERAL													

SLUICE GATE (1 VENT)



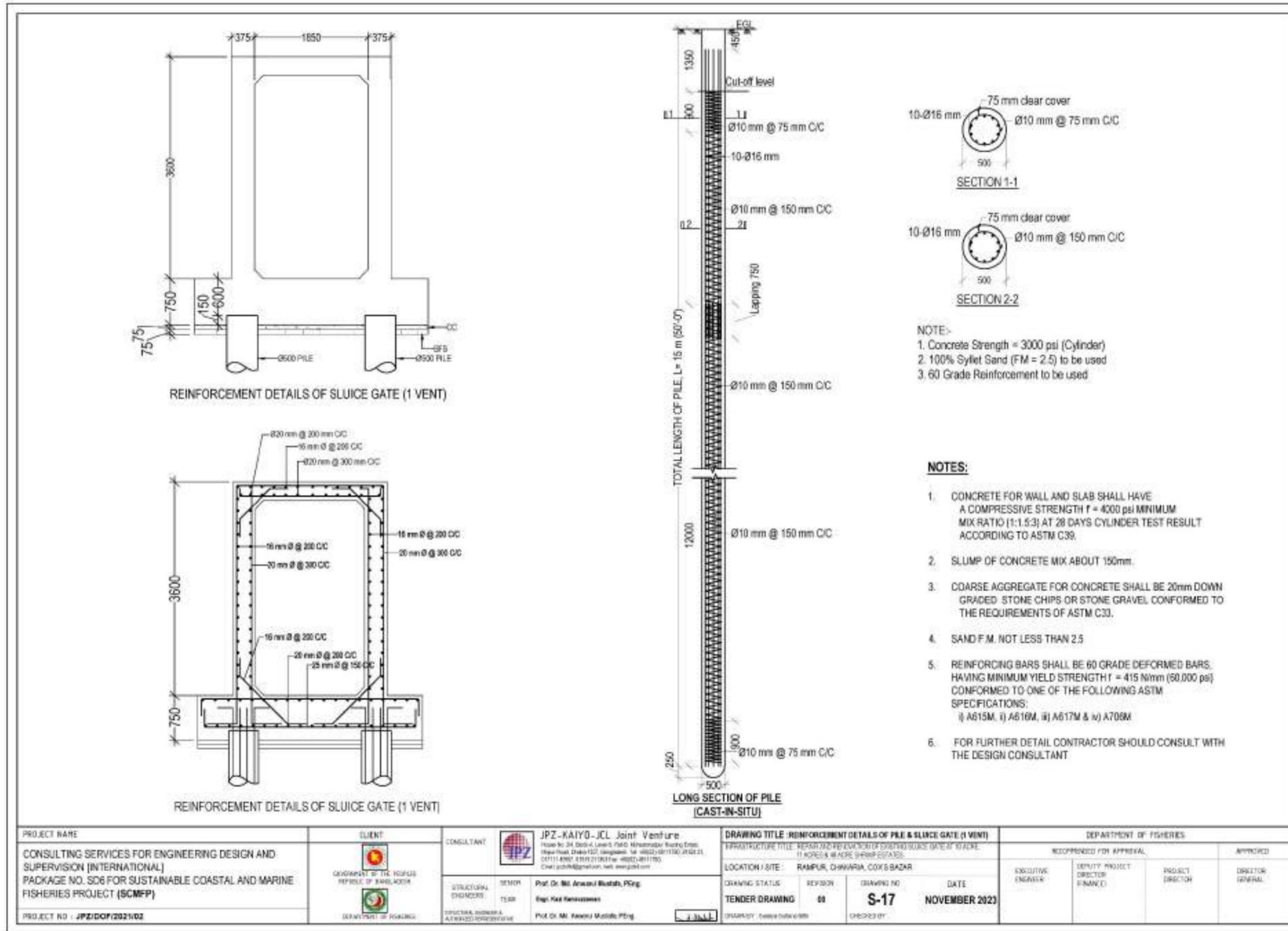


PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. S06 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO : JPZ/DOF/2021/02	CLIENT  GOVERNMENT OF BANGLADESH DEPARTMENT OF FISHERIES	CONSULTANT  JPZ-KAIYO-JCL Joint Venture House No. 04, Dhaka 1, sec-5, Plot 26, Karamnagar Housing Estate, Plot/Floor/Block/DOF/Complex/ Tel: +880-2-9811100/242423, 0111-4667, 0119-21002 Fax: +880-2-9811100, Email: jpzkh@jpzkh.com, www.jpzkh.com	DRAWING TITLE : SIDE ELEVATION OF SLUICE GATE (1 VENTS) (REVISIONS TITLE: REVISIONS FOR DESIGN OF SIDE AND BACKE BARRAGE GATE AT STAGE 11, KORE & BACKE BARRAGE GATE)				DEPARTMENT OF FISHERIES			
			LOCATION/SITE : RAMPLU, CHAKARIA, COX'S BAZAR				RECOMMENDED FOR APPROVAL		APPROVED	
			STRUCTURAL ENGINEERS SOLICIT T. Chak PROJECT MANAGER & ARCHITECT REPRESENTATIVE Prof. Dr. Md. Rowshanul Maksud, P.Eng.	DESIGNER Prof. Dr. Md. Anwarul Maksud, P.Eng.	CHECKER Engr. Md. Rezaul Karim	DRAWING DATE TENDER DRAWING	REVISION 00	DRAWING NO. S-14	DATE NOVEMBER 2023	EXECUTIVE ENGINEER

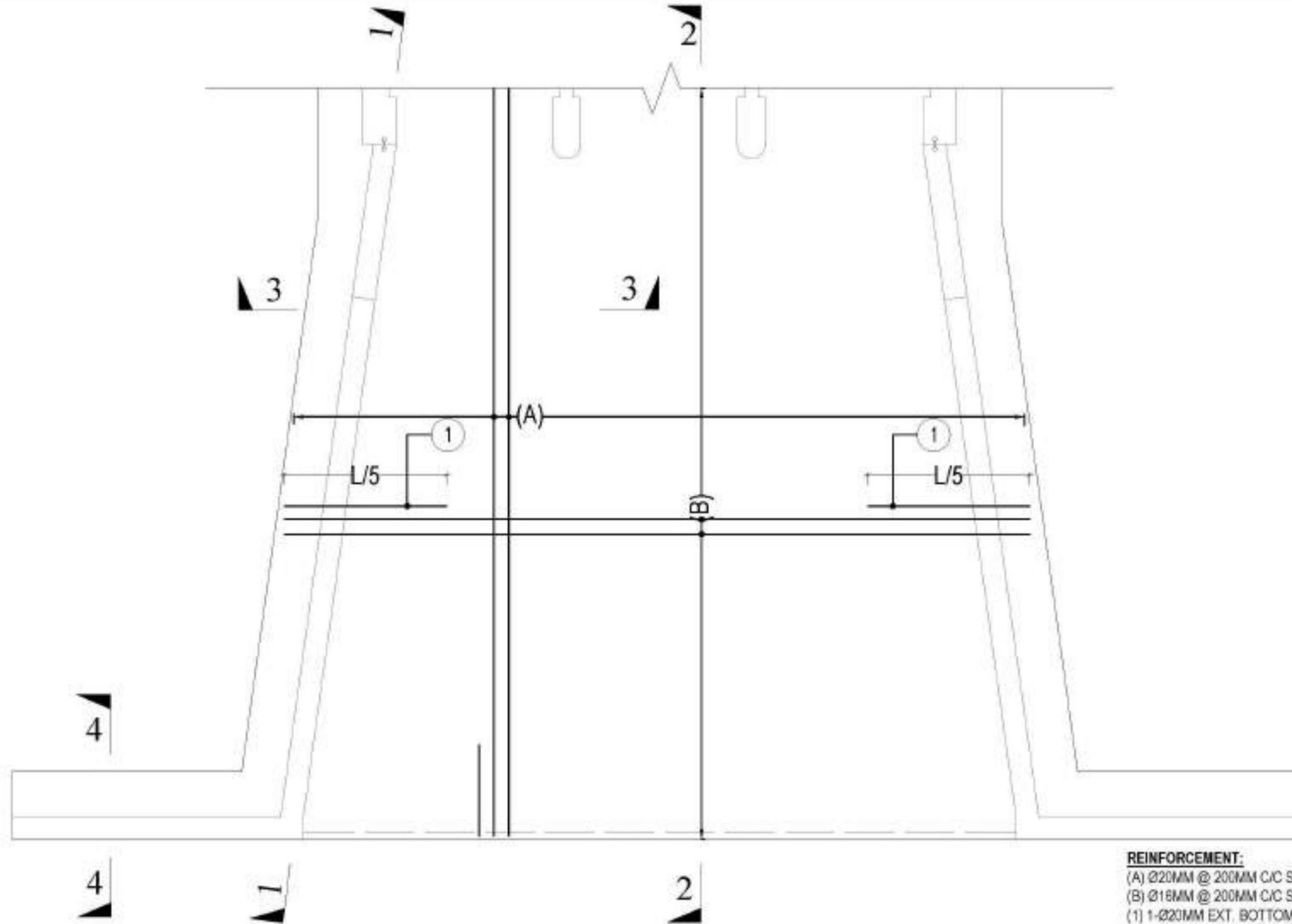


PILE LAYOUT PLAN OF SLUICE GATE (1 VENT)
TOTAL NO. OF PILES = 24

PROJECT NAME	CLIENT	CONSULTANT	DRAWING TITLE : PILE LAYOUT OF SLUICE GATE (1 VENT)	DEPARTMENT OF FISHERIES				
CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)	 GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH  DEPARTMENT OF FISHERIES	 JPZ-KAIYO-JL Joint Venture House No. 24, Dacca Avenue, Park, Miranapur Housing Estate, Miran Road, Dhaka-1207, Bangladesh. Tel: +88024811199, 4142, 41 0111-4267-1319, 21193 Fax: +8802-4811-190 Email: jpz@jpz.com.bd, web: www.jpz.com.bd	APPROVED FOR TITLE: REPAIR AND RECONSTRUCTION OF EXISTING SLUICE GATE AT SITE NO. 11, ACHRA & BACHA SHRIMP ESTATES LOCATION/SITE: RAMPUR, CHAKARIA, COX'S BAZAR DRAWING STATUS: TENDER DRAWING REVISION: 00 DRAWING NO: S-16 DATE: NOVEMBER 2023 DRAWN BY: Sumon Chandra Deb CHECKED BY:	RECOMMENDED FOR APPROVAL	EXECUTIVE ENGINEER	DEPUTY PROJECT DIRECTOR (FINANCE)	PROJECT DIRECTOR	APPROVED DIRECTOR GENERAL
PROJECT NO : JPZ/DOF/2023/02		SENIOR ENGINEERS: Prof. Dr. Md. Anwarul Mostafa, P.Eng. TEAM: Engr. Nazimuzzaman Prof. Dr. Md. Anwarul Mostafa, P.Eng.						

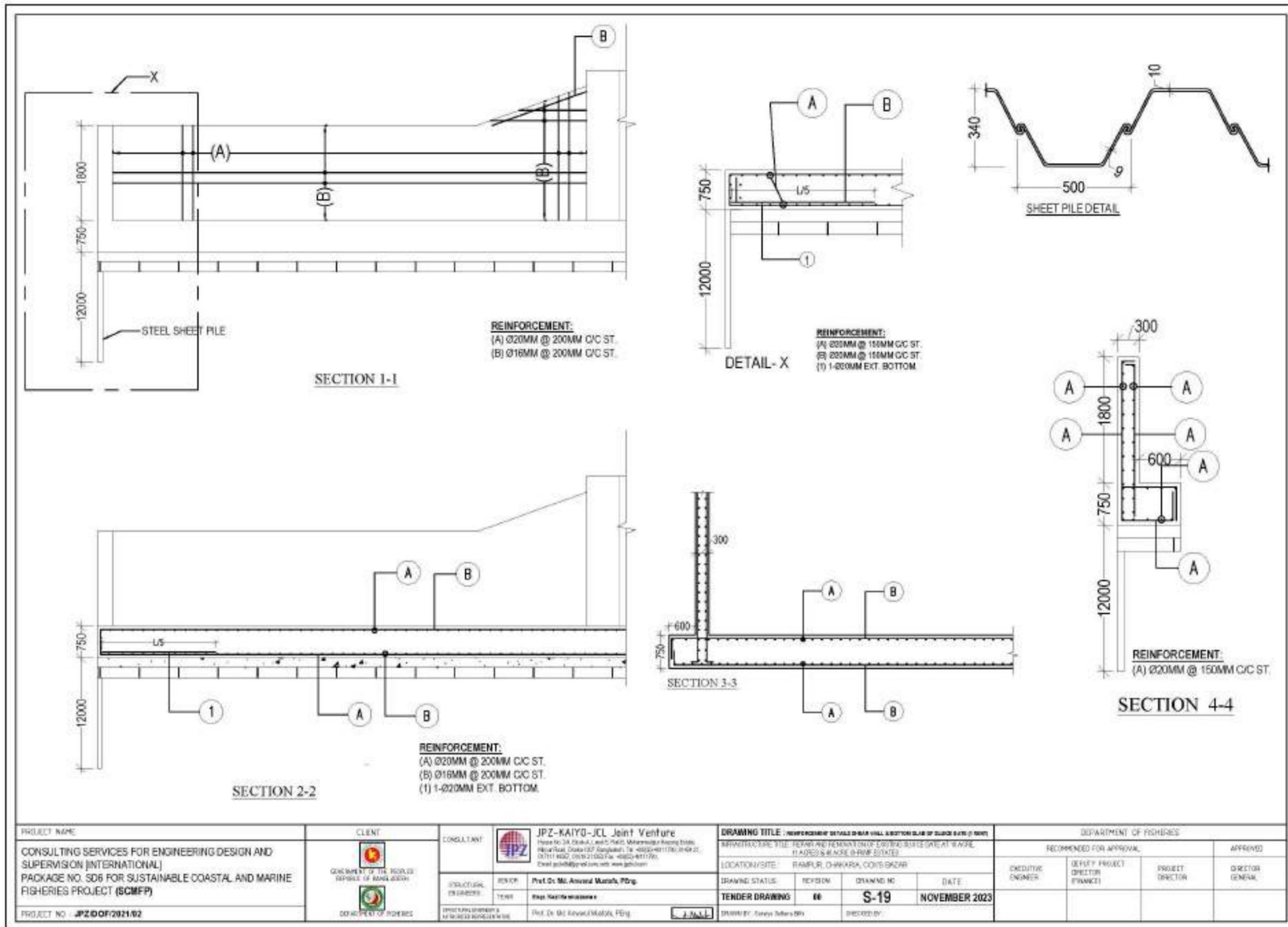


PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)	CLIENT GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES	CONSULTANT JPZ-KAIYO-JCL Joint Venture House No. 34, Dacca-4, Level-5, 7640 Mirpurkhada Building Complex, Dhaka Road, Dhaka-1002, Bangladesh. Tel: +8802-9811190, 9142121, 021111-8262, 2353121363 Fax: +8802-9811190. Email: jpz@jpz.com.bd, web: www.jpz.com.bd	DRAWING TITLE: REINFORCEMENT DETAILS OF PILE & SLUICE GATE (1 VENT) INFRASTRUCTURE TITLE: REPAIR AND RECONSTRUCTION OF DAMAGED SLUICE GATE AT STADIUM II APOREA & II APORE SHRIMP ESTATES	DEPARTMENT OF FISHERIES			
PROJECT NO: JPZ/DOF/2021/02		STRUCTURAL ENGINEER: Prof. Dr. Md. Anwarul Hossain, PEng TECHNICAL SUPERVISOR: Engr. Md. Kamruzzaman STRUCTURAL ENGINEER & AUTHORIZED SIGNATURE: Prof. Dr. Md. Anwarul Hossain, PEng	LOCATION / SITE: RAMPUR, GHAWARIA, COX'S BAZAR	DRAWING STATUS: TENDER DRAWING	REVISION: 01	DRAWING NO: S-17	DATE: NOVEMBER 2023
			EXECUTIVE ENGINEER	DEPUTY PROJECT DIRECTOR (FINANCE)	PROJECT DIRECTOR	APPROVED DIRECTOR GENERAL	



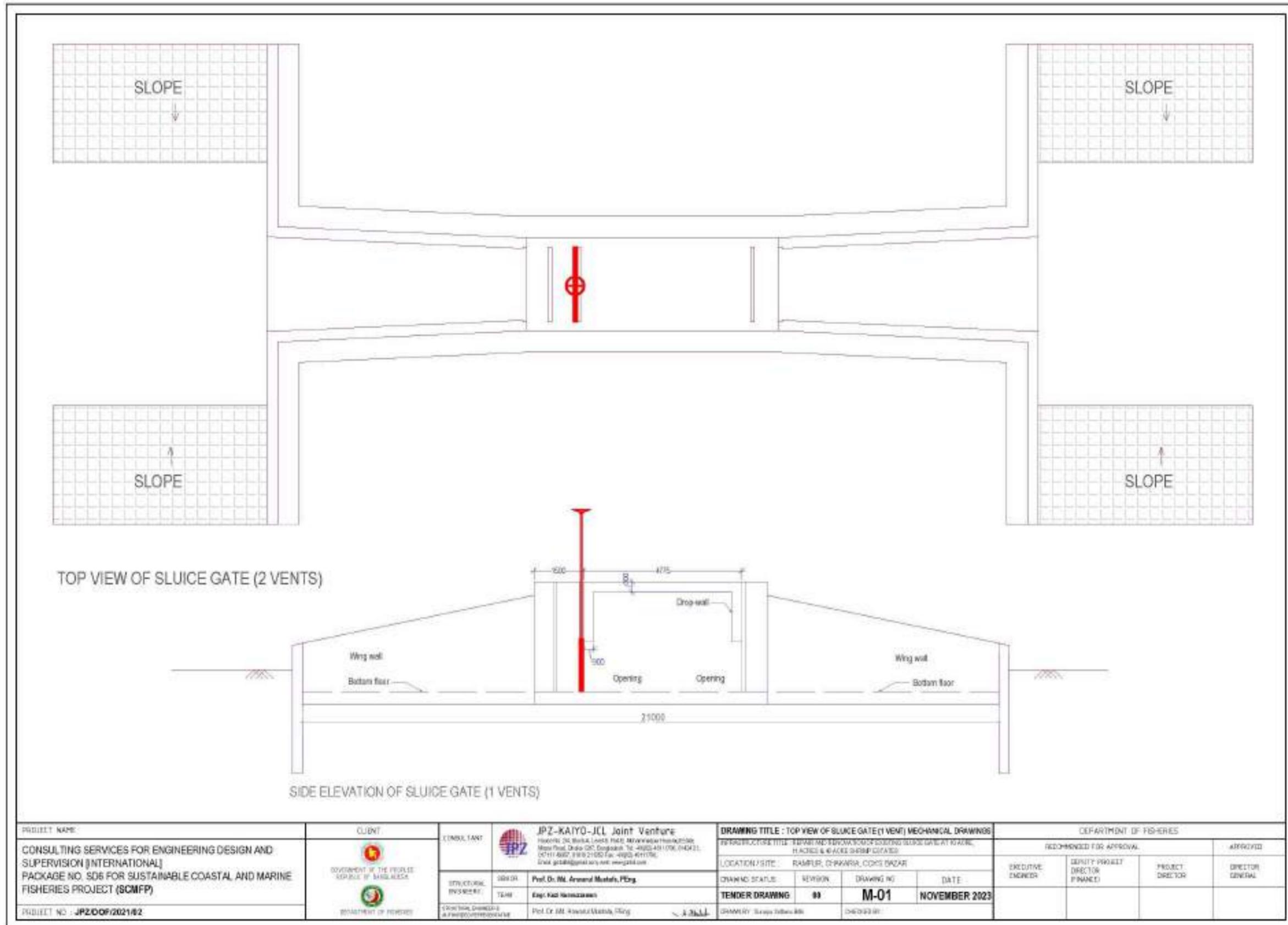
REINF.DETAIL OF WING WALL BASE SLAB

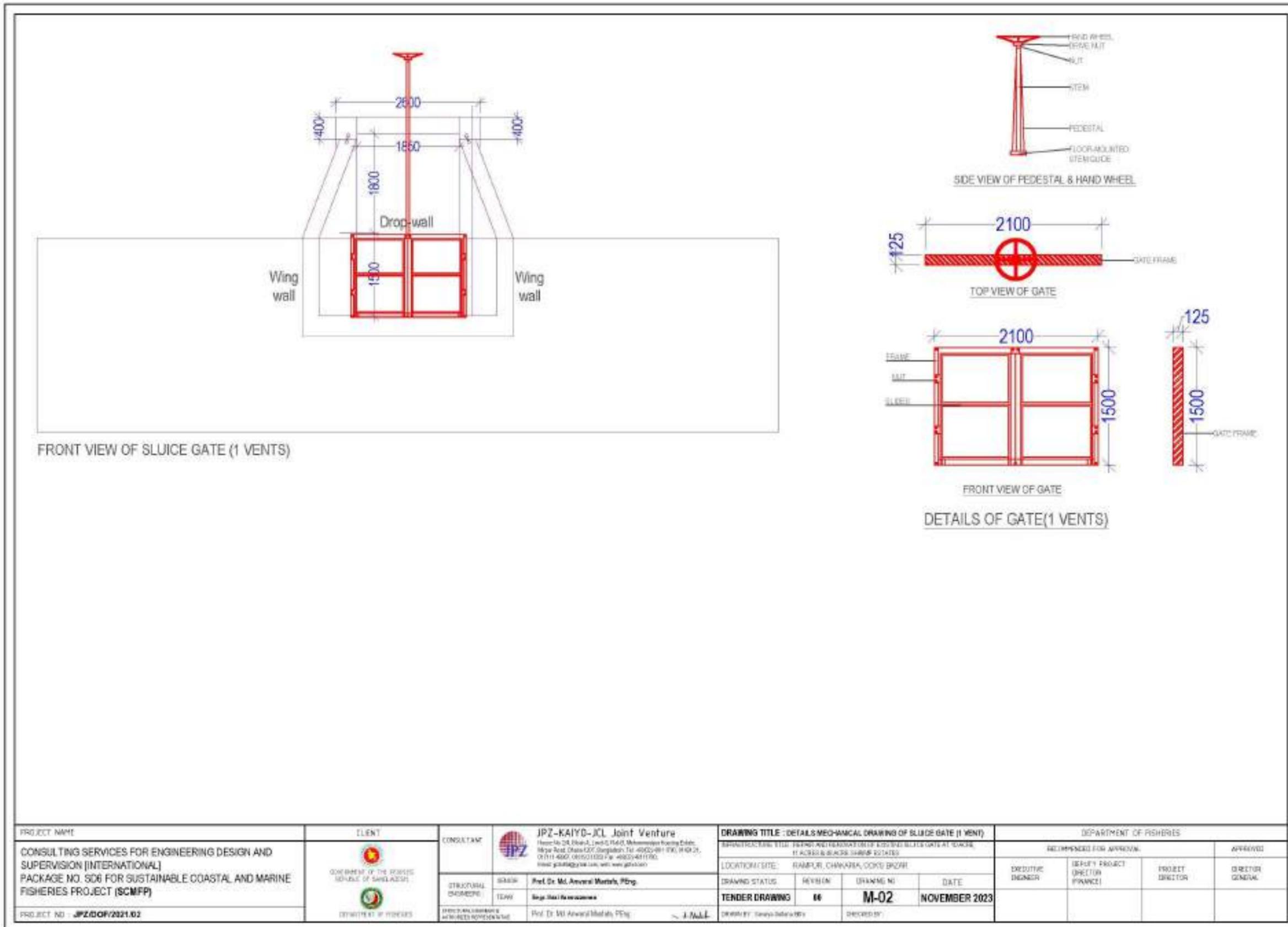
PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. S06 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)		CLIENT  GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH  DEPARTMENT OF FISHERIES		CONSULTANT  JPZ-KAIYO-JCL Joint Venture Floor No. 24, Block 4, Level 5, P.O. Box 100, Dhaka-1000, Bangladesh. Tel: +880-2-46111000 00111-4667, 0019-21122, Fax: +880-2-4611106 Email: jpz@jpz.com.bd, www.jpz.com.bd		DRAWING TITLE - REINFORCEMENT DETAIL OF WING WALL AND BASE SLAB PARAMETER TITLE: REPAIR AND RECONSTRUCTION OF 1000MM WING WALL BASE AT TRACKS II AREAS & BRIDGE BARRIAGES LOCATION / SITE: RAMPLU, CHAKARIA, COXS BAZAR DRAWING STATUS: REVISION: DRAWING NO: DATE:			DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL:					
PROJECT NO : JPZ/00P/2021/02		STRUCTURAL ENGINEER: Prof. Dr. Md. Arsalan Muzahid, PhD TEAM: Engr. Faruk Kamran		DRAWING STATUS: TENDER DRAWING 00 S-18 NOVEMBER 2023 DRAWN BY: Sumon Chakrabarti CHECKED BY:			EXECUTIVE ENGINEER:		DEPUTY PROJECT DIRECTOR (FINANCE):		PROJECT DIRECTOR:		APPROVED: DIRECTOR GENERAL:	



PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)	CLIENT GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES	CONSULTANT JPZ-KAIYO-JCL Joint Venture House No. 24, Dhaka-11 and C Field, Miranpur Road, Dhaka. House No. 24, Dhaka-11 and C Field, Miranpur Road, Dhaka. House No. 24, Dhaka-11 and C Field, Miranpur Road, Dhaka. Tel: +8802-4011700/4014421, 4011180/21052 Fax: +8802-4011700 Email: jpz@jpz.com.bd, jpz.com.bd, www.jpz.com.bd	DRAWING TITLE : REINFORCEMENT DETAILS OF BAR WALL, SECTION SLAB OF SLICE BAYS (1) NORTH				DEPARTMENT OF FISHERIES				
			DRAWING STATUS: TENDER DRAWING NO: S-19 DATE: NOVEMBER 2023				RECOMMENDED FOR APPROVAL				
PROJECT NO : JPZ/DOF/2021/02		PROJECT NO : JPZ/DOF/2021/02		PROJECT NO : JPZ/DOF/2021/02		PROJECT NO : JPZ/DOF/2021/02		PROJECT NO : JPZ/DOF/2021/02		PROJECT NO : JPZ/DOF/2021/02	

**SLUICE GATE (1 VENT)
MECHANICAL DRAWINGS**





PROJECT NAME	CLIENT	CONSULTANT	DRAWING TITLE : DETAILS MECHANICAL DRAWING OF SLIDE GATE (1 VENT)			DEPARTMENT OF FISHERIES			
CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. 506 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)	 GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES	 JPZ-KAIYD-JCL Joint Venture Head Office: Dhaka, Level: 5, RAJ, Mohammedan Road, Dhaka, Bangladesh, Tel: 9900-991100, FAX: 9911-4067, 9915-1133 P. O. Box: 481190, Dhaka. jpz.com.bd, web: www.jpz.com.bd	DRAWING NO: 0001 AND REVISION NO: 0002 SLIDE GATE AT BEARER IT ACRES & BEARER SHIMP ESTATE			RECOMMENDED FOR APPROVAL			APPROVED
			LOCATION/SITE: RAMPLI, CHAKARIA, COXS BAZAR	DRAWING STATUS	REVISION	DRAWING NO	DATE	CREDITIVE ENGINEER	DEPUTY PROJECT DIRECTOR (FINANCE)
PROJECT NO : JPZ/DOF/2021/02		STRUCTURAL DESIGNER: Prof. Dr. Md. Anwarul Maksud, PEng. DRAWN: Saqib Hossain PROJECT MANAGER & ARCHITECT SUPERVISOR: Prof. Dr. Md. Anwarul Maksud, PEng.	TENDER DRAWING	06	M-02	NOVEMBER 2023			
			DRAWN BY: Saqib Hossain	CHECKED BY:					

DIVERSION LOCATION MAP (1 VENT)

List of Sluice Gate

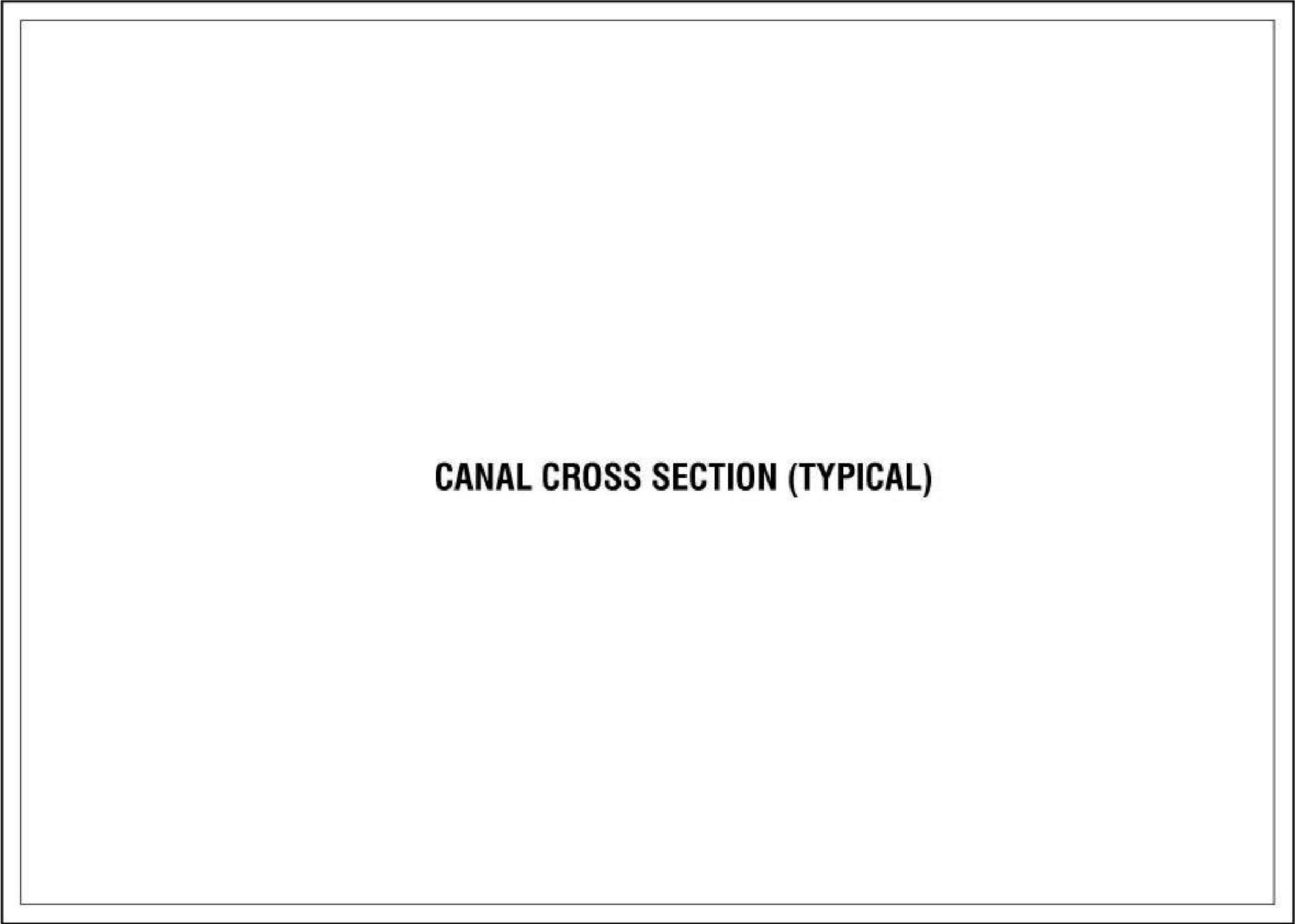
SI No	Polder No	Sluice Gate No	Size of Plots	Gate System (Vent)
1	SP-4	Additional gate (1)	48 Acre	1
2	SP-4	Additional gate (2)	48 Acre	1

List of Sluice Gate

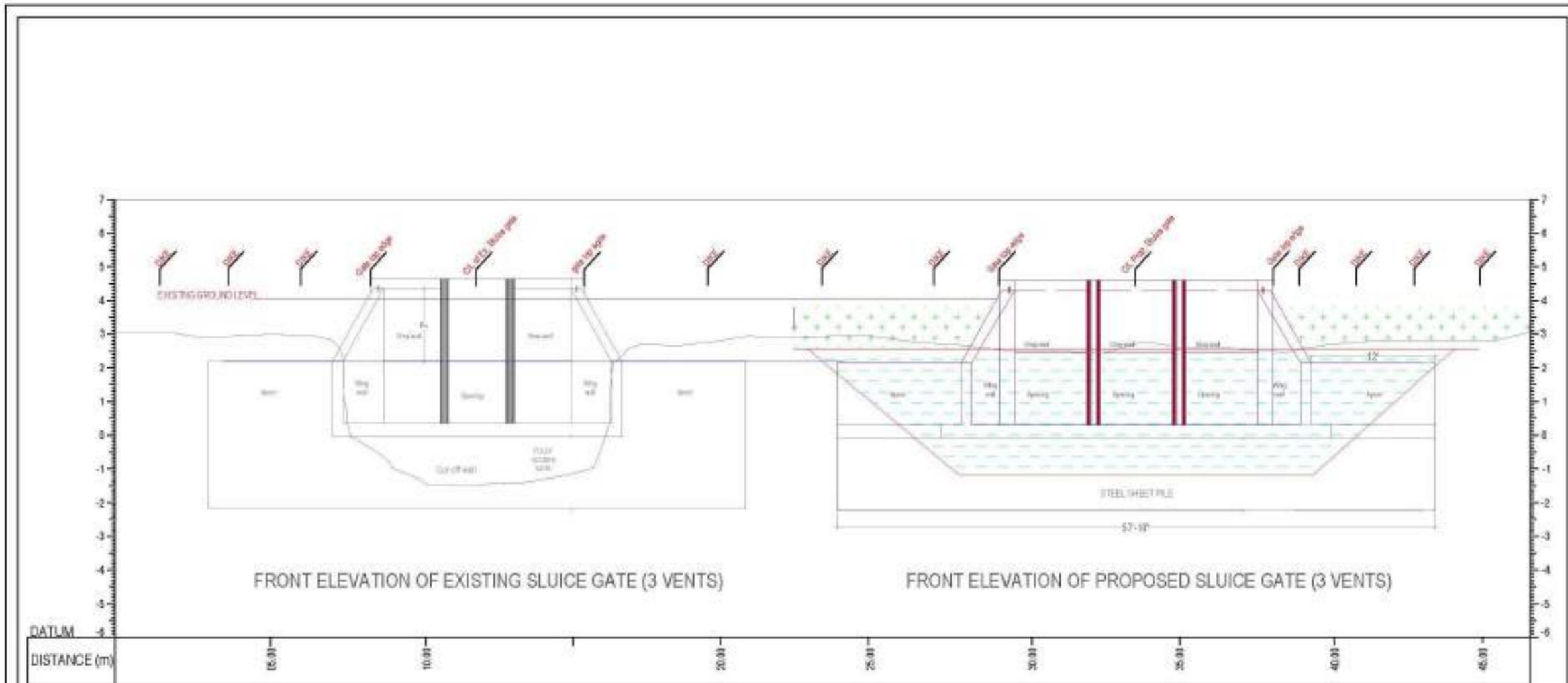
SI No	Polder No	Sluice Gate No	Size of Plots	Gate System (Vent)
1	11 Acre	Gate -1	11 Acre	2
2	11 Acre	Gate -2	11 Acre	2
3	11 Acre	Gate-3	11 Acre	2
4	11 Acre	Gate-4	11 Acre	2
5	11 Acre	Gate-5	11 Acre	2
6	11 Acre	Gate-6	11 Acre	2
7	11 Acre	Gate-7	11 Acre	2



PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)	CLIENT GOVERNMENT OF WEST BENGAL DEPARTMENT OF FISHERIES	CONSULTANT JPZ-KAJO-JCL Joint Venture Prof. Dr. Md. Anwarul Hossain, P.Eng. Eng. Karimuzzaman	DRAWING TITLE : CANAL DIVERSION LOCATION MAP (SP4 WITH 1 VENT) DRAWING NO: 00 LM-01 NOVEMBER 2023	DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL DESIGNING ENGINEER DEPUTY PROJECT DIRECTOR (PRIVATE) PROJECT DIRECTOR APPROVED DIRECTOR GENERAL
PROJECT NO : JPZ/COF/2023/02		STRUCTURAL ENGINEERS Prof. Dr. Md. Anwarul Hossain, P.Eng.	DRAWING STATUS DESIGN DRAWING NO DATE	

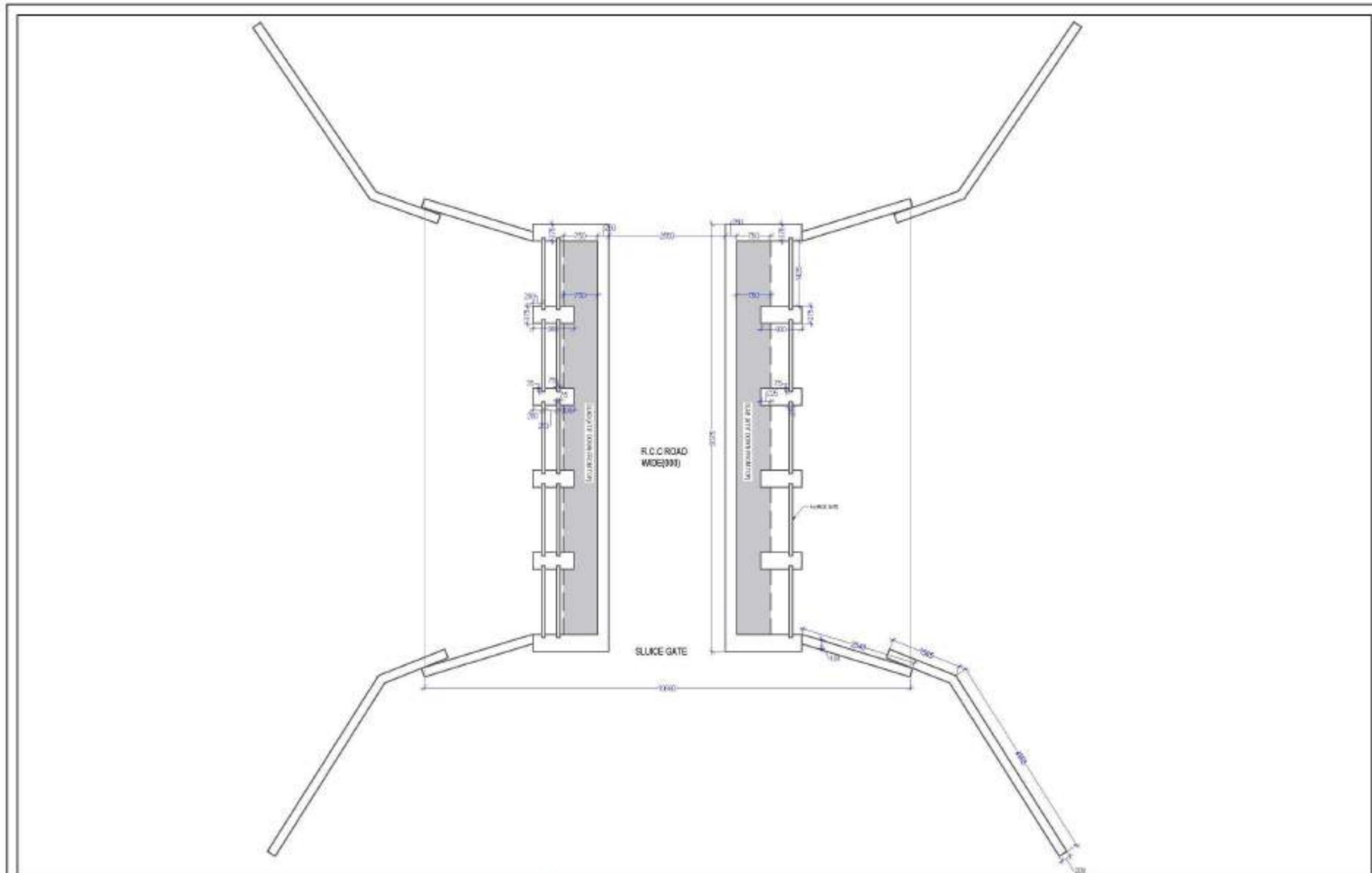


CANAL CROSS SECTION (TYPICAL)

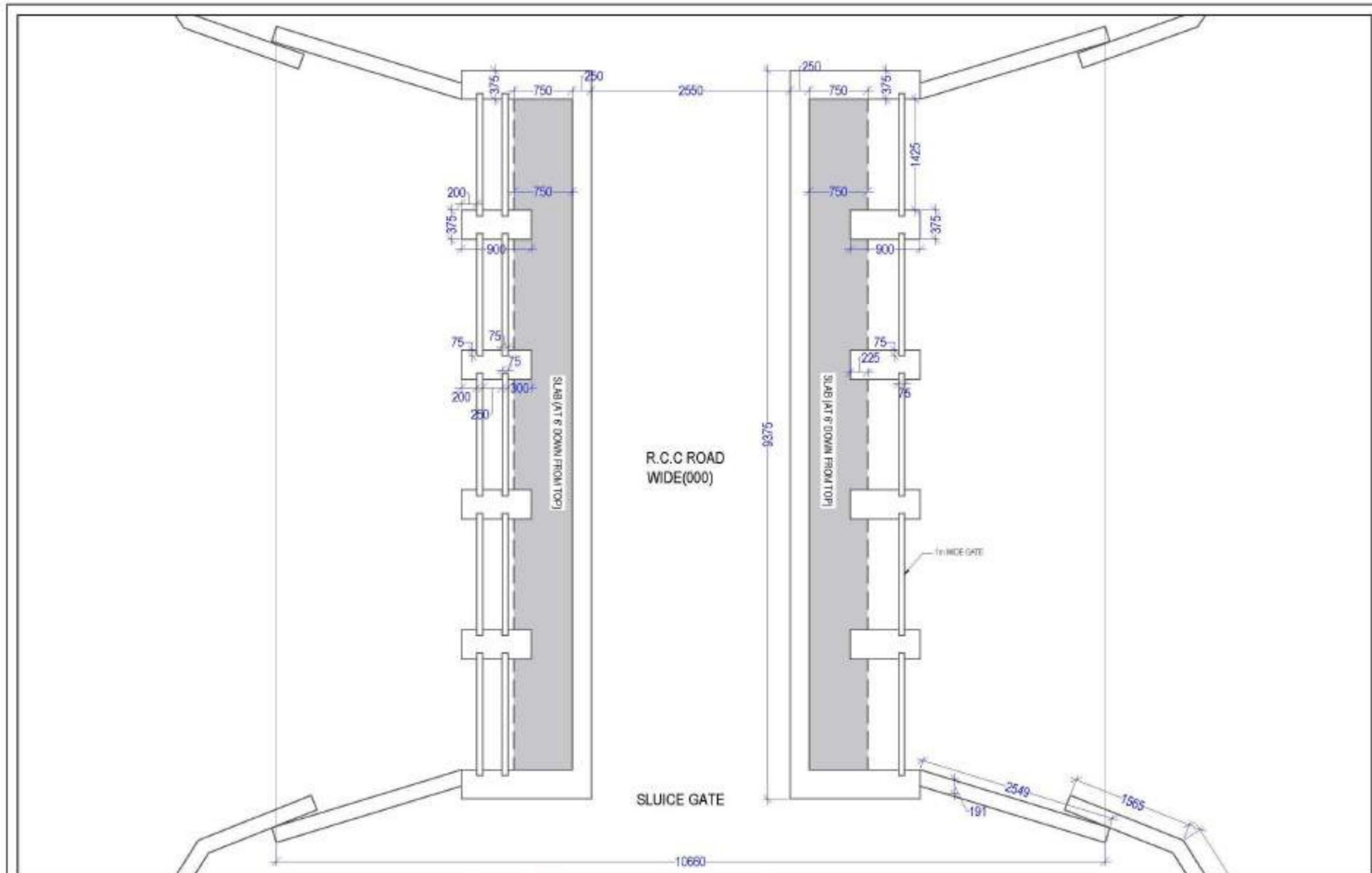


PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. 506 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO: JP20DF0201/02	CLIENT GOVERNMENT OF BANGLADESH DEPARTMENT OF FISHERIES	CONSULTANT JPZ-KAWO-JCL Joint Venture House No. 24, Shukla, 1st Fl., Plot 2, Mohanpur, Ring Road, New Road, Dhaka 1207, Bangladesh. Tel: +880-2-9117000/91421, 01711-452, 0191-21552. Fax: +880-2-4611190. Email: jpz@jpz.com.bd, www.jpz.com.bd	DRAWING TITLE: CANAL DIVERSION CROSS SECTION (TYPICAL) BRADY PILE, STEEL SHEET PILE AND CONCRETE GRADE SLUICE GATE AT TRACK II AREA & BACR 9-FRM (2) DATE LOCATION/SITE: RAMPUR, CHAKARIA, COX'S BAZAR DRAWING STATUS: REVISION (REVISION) NO: DATE: TENDER DRAWING: 00 CS-01 NOVEMBER 2023 DRAWN BY: Tarek Islam/RY CHECKED BY:	DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL <table style="width: 100%; border: none;"> <tr> <td style="border: none;">DECISION ENGINEER</td> <td style="border: none;">DEPUTY PROJECT DIRECTOR (PROJECT) (PW/02)</td> <td style="border: none;">PROJECT DIRECTOR</td> <td style="border: none;">DIRECTOR GENERAL</td> </tr> <tr> <td style="border: none; height: 40px;"></td> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> </table> APPROVED	DECISION ENGINEER	DEPUTY PROJECT DIRECTOR (PROJECT) (PW/02)	PROJECT DIRECTOR	DIRECTOR GENERAL				
DECISION ENGINEER	DEPUTY PROJECT DIRECTOR (PROJECT) (PW/02)	PROJECT DIRECTOR	DIRECTOR GENERAL									

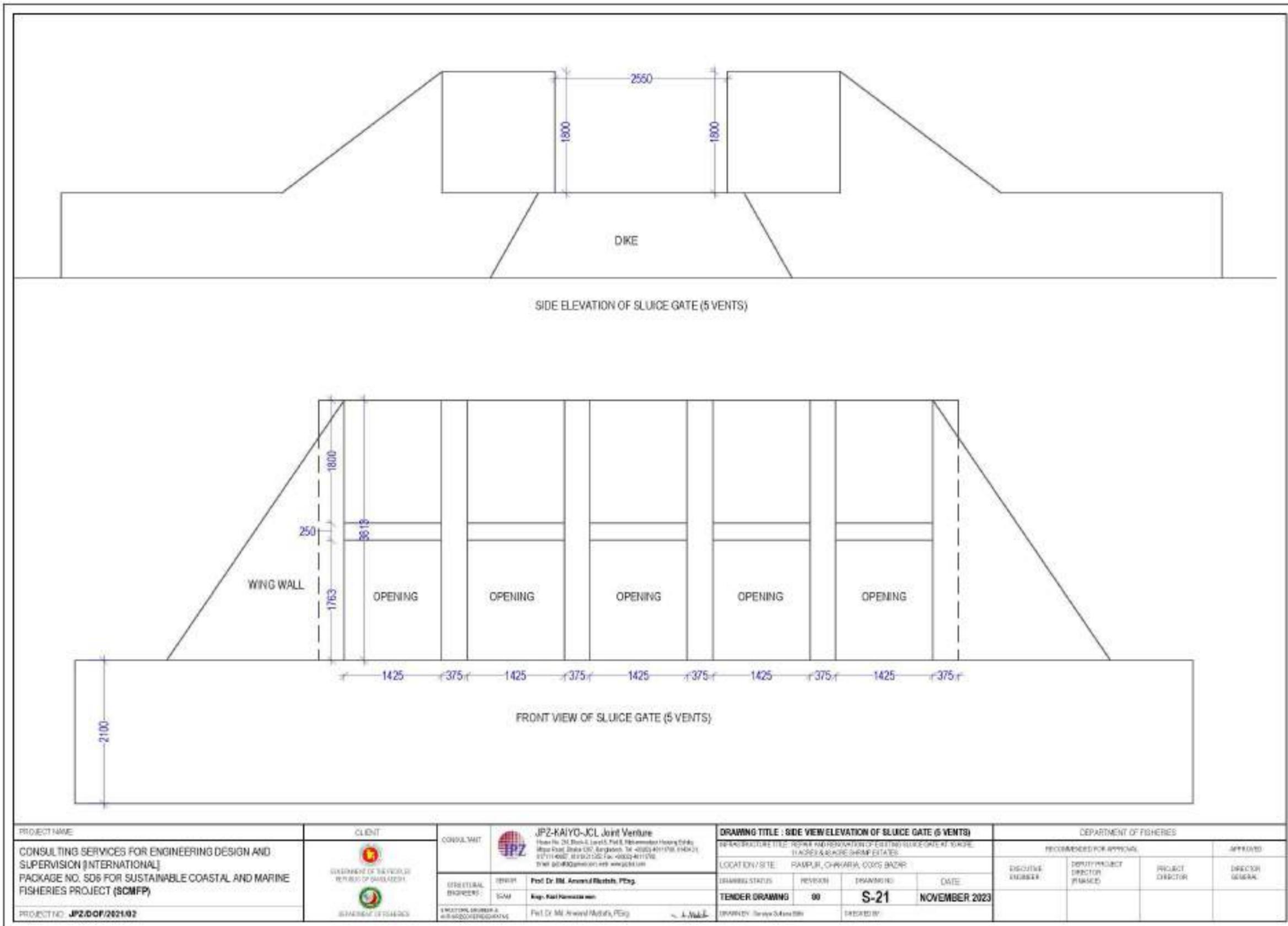
SLUICE GATE (5 VENTS)



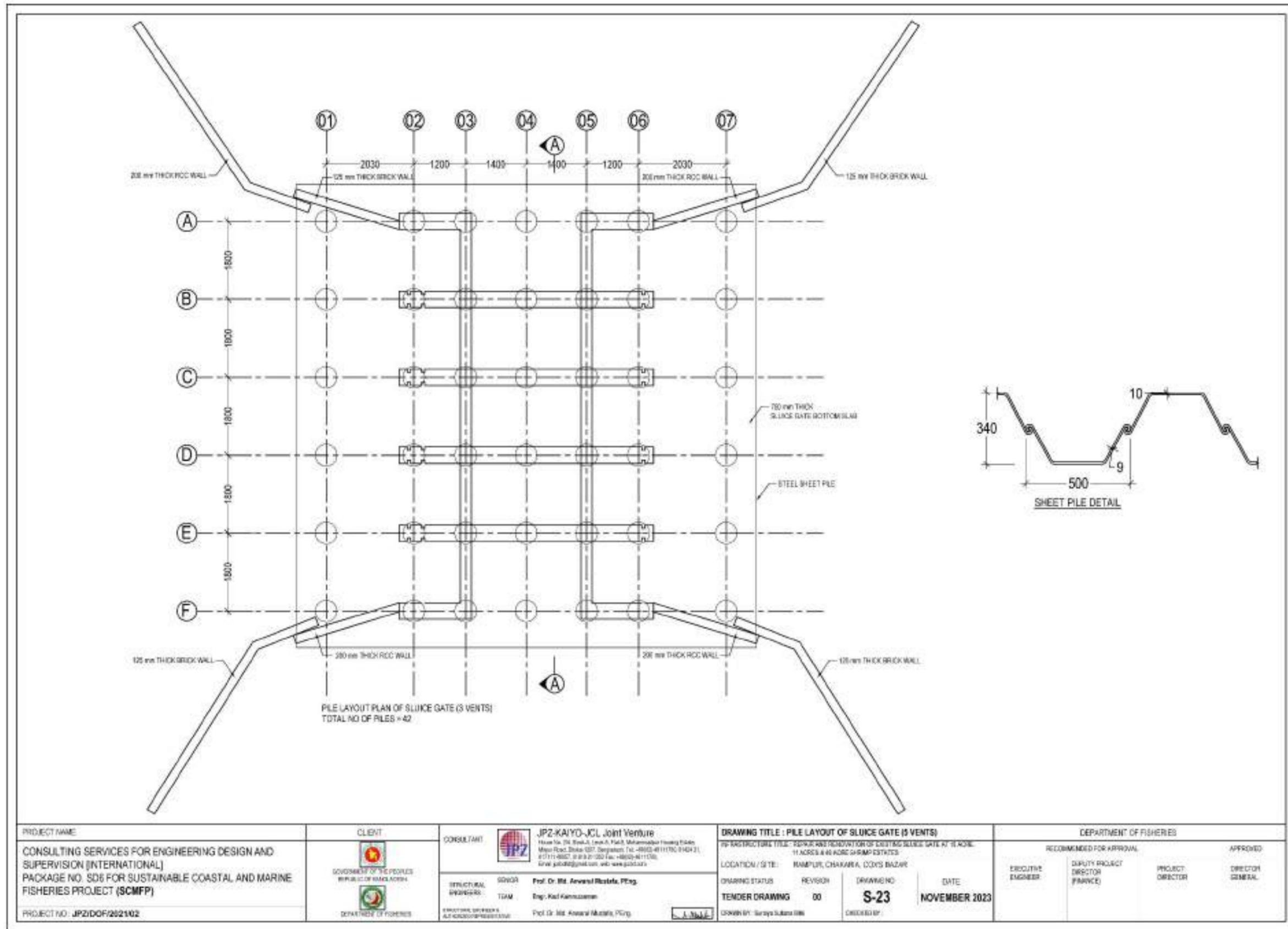
PROJECT NAME	CLIENT	CONSULTANT	DRAWING TITLE : LAYOUT OF SLUICE GATE (3 VENTS)	DEPARTMENT OF FISHERIES			
CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. 506 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)	 GOVERNMENT OF BANGLADESH DEPARTMENT OF FISHERIES	 JPZ-KAIYO-JCL Joint Venture Head Office: 204, Dhaka-1, Level 3, P.O. Box 100, Mirpur Cantonment, Dhaka-1216, Bangladesh. Tel: 8802-9611700, 9611701, 9611702, 9611703, 9611704, 9611705, 9611706, 9611707, 9611708, 9611709, 9611710, 9611711, 9611712, 9611713, 9611714, 9611715, 9611716, 9611717, 9611718, 9611719, 9611720, 9611721, 9611722, 9611723, 9611724, 9611725, 9611726, 9611727, 9611728, 9611729, 9611730, 9611731, 9611732, 9611733, 9611734, 9611735, 9611736, 9611737, 9611738, 9611739, 9611740, 9611741, 9611742, 9611743, 9611744, 9611745, 9611746, 9611747, 9611748, 9611749, 9611750, 9611751, 9611752, 9611753, 9611754, 9611755, 9611756, 9611757, 9611758, 9611759, 9611760, 9611761, 9611762, 9611763, 9611764, 9611765, 9611766, 9611767, 9611768, 9611769, 9611770, 9611771, 9611772, 9611773, 9611774, 9611775, 9611776, 9611777, 9611778, 9611779, 9611780, 9611781, 9611782, 9611783, 9611784, 9611785, 9611786, 9611787, 9611788, 9611789, 9611790, 9611791, 9611792, 9611793, 9611794, 9611795, 9611796, 9611797, 9611798, 9611799, 9611800, 9611801, 9611802, 9611803, 9611804, 9611805, 9611806, 9611807, 9611808, 9611809, 9611810, 9611811, 9611812, 9611813, 9611814, 9611815, 9611816, 9611817, 9611818, 9611819, 9611820, 9611821, 9611822, 9611823, 9611824, 9611825, 9611826, 9611827, 9611828, 9611829, 9611830, 9611831, 9611832, 9611833, 9611834, 9611835, 9611836, 9611837, 9611838, 9611839, 9611840, 9611841, 9611842, 9611843, 9611844, 9611845, 9611846, 9611847, 9611848, 9611849, 9611850, 9611851, 9611852, 9611853, 9611854, 9611855, 9611856, 9611857, 9611858, 9611859, 9611860, 9611861, 9611862, 9611863, 9611864, 9611865, 9611866, 9611867, 9611868, 9611869, 9611870, 9611871, 9611872, 9611873, 9611874, 9611875, 9611876, 9611877, 9611878, 9611879, 9611880, 9611881, 9611882, 9611883, 9611884, 9611885, 9611886, 9611887, 9611888, 9611889, 9611890, 9611891, 9611892, 9611893, 9611894, 9611895, 9611896, 9611897, 9611898, 9611899, 9611900, 9611901, 9611902, 9611903, 9611904, 9611905, 9611906, 9611907, 9611908, 9611909, 9611910, 9611911, 9611912, 9611913, 9611914, 9611915, 9611916, 9611917, 9611918, 9611919, 9611920, 9611921, 9611922, 9611923, 9611924, 9611925, 9611926, 9611927, 9611928, 9611929, 9611930, 9611931, 9611932, 9611933, 9611934, 9611935, 9611936, 9611937, 9611938, 9611939, 9611940, 9611941, 9611942, 9611943, 9611944, 9611945, 9611946, 9611947, 9611948, 9611949, 9611950, 9611951, 9611952, 9611953, 9611954, 9611955, 9611956, 9611957, 9611958, 9611959, 9611960, 9611961, 9611962, 9611963, 9611964, 9611965, 9611966, 9611967, 9611968, 9611969, 9611970, 9611971, 9611972, 9611973, 9611974, 9611975, 9611976, 9611977, 9611978, 9611979, 9611980, 9611981, 9611982, 9611983, 9611984, 9611985, 9611986, 9611987, 9611988, 9611989, 9611990, 9611991, 9611992, 9611993, 9611994, 9611995, 9611996, 9611997, 9611998, 9611999, 9612000	DRAWING NO: S-19 DRAWING DATE: NOVEMBER 2023 DRAWING SCALE: AS SHOWN DRAWING STATUS: FOR TENDER	RECOMMENDED FOR APPROVAL			APPROVED
PROJECT NO: JPZ00F/2021/02		PROJECT MANAGER & ARCHITECT: Prof. Dr. Md. Anwarul Haque, PE ARCHITECT: Prof. Dr. Md. Anwarul Haque, PE	DRAWING NO: S-19 DRAWING DATE: NOVEMBER 2023 DRAWING SCALE: AS SHOWN DRAWING STATUS: FOR TENDER	DESIGNING ENGINEER	DEPUTY PROJECT DIRECTOR (FINANCE)	PROJECT DIRECTOR	DIRECTOR GENERAL

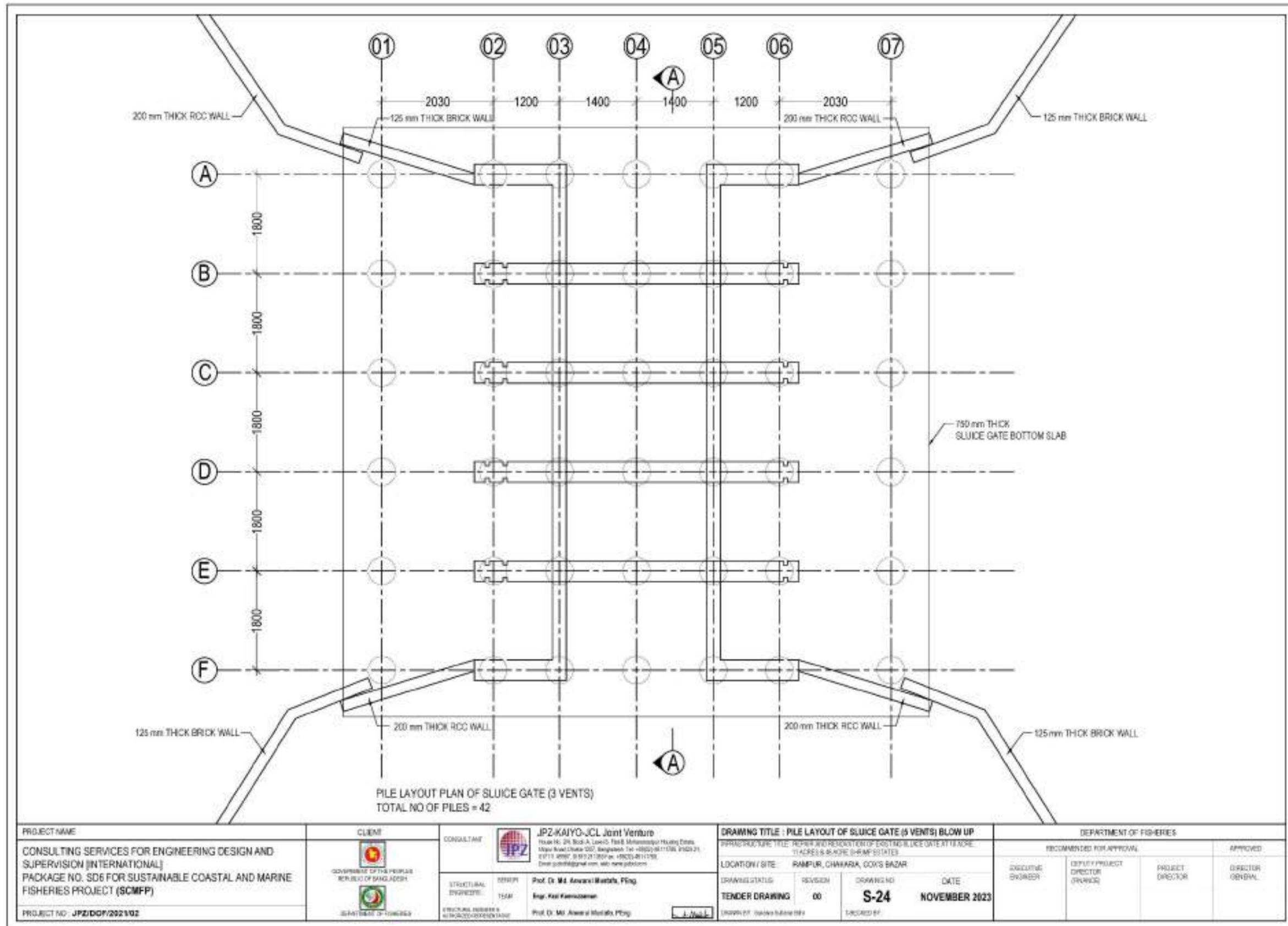


<p>PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. 506 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO - JPZ/DF/2021/02</p>	<p>CLIENT GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES</p>	<p>CONSULTANT JPZ-KAYO-JCL Joint Venture JPZ KAYO JCL PROJECT MANAGER Prof. Dr. Md. Anwarul Haque, PEng. TEAM Sajid Hossain CONSULTING ENGINEER & ARCHITECT RESPONSIBLE Prof. Dr. Md. Anwarul Haque, PEng.</p>	<p>DRAWING TITLE : PILE LAYOUT OF SLUICE GATE (5 VENTS) BLOW UP SPECIAL NOTE: THIS DRAWING IS FOR INFORMATION ONLY AND NOT TO BE USED FOR CONSTRUCTION WITHOUT THE APPROVAL OF THE CONSULTANT. LOCATION/SITE : RAJSHahi, CHAKARIA, COXS BAZAR DRAWING STATUS : TENDER DRAWING NO : S-20 DATE : NOVEMBER 2023 DRAWN BY : Saikat Saha (R/S) CHECKED BY :</p>	<p>DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL ENGINEER IN CHARGE DEPUTY PROJECT DIRECTOR (GENERAL) PROJECT DIRECTOR DIRECTOR GENERAL</p>
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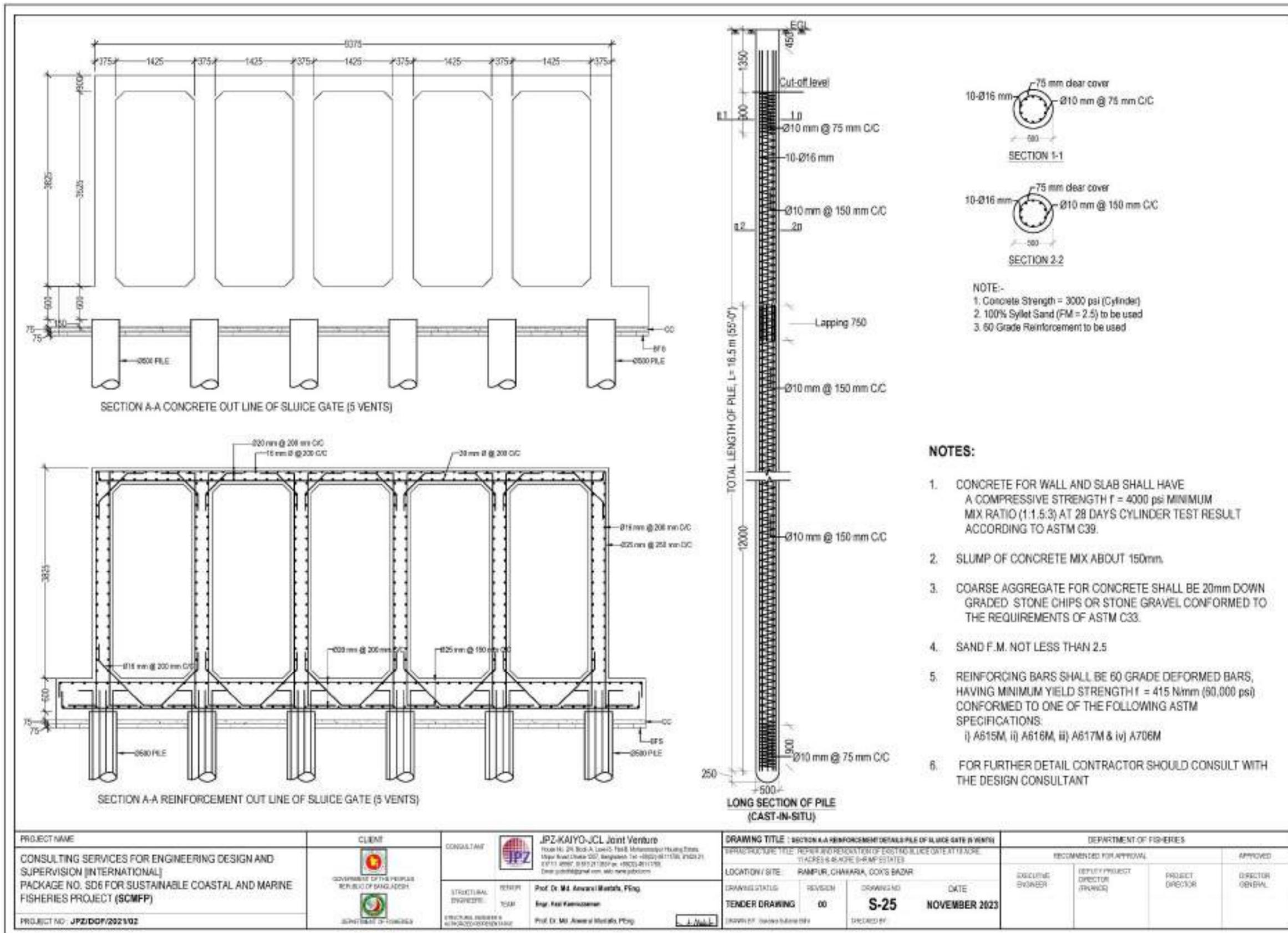


<p>PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO. JPZ.DCF/2021/02</p>	<p>CLIENT DEPARTMENT OF FISHERIES REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES</p>	<p>CONSULTANT JPZ-KAIYO-JCL Joint Venture JPZ Floor No. 24, Block-B, Lane-5, Plot-8, Bhubanmahal Housing Colony, Bangor Road, Dhaka-1007, Bangladesh. Tel: +8802-4011750, 4142421, 417114000, 419321202 Fax: +8802-4111576, 41914002 E-MAIL: jpz@jpz.com.bd, info@jpz.com.bd</p> <p>GENERAL ENGINEER: Prof. Dr. Md. Anwarul Hossain, PEng. SCALE: King. Kazi Hossain DRAWING NUMBER: A/B-02/04/2021/02/001/001 PROJECT DIRECTOR: Prof. Dr. Md. Anwarul Hossain, PEng.</p>	<p>DRAWING TITLE : SIDE VIEW ELEVATION OF SLUICE GATE (5 VENTS) INFRASTRUCTURE TITLE: POWER AND PROTECTION OF EXISTING SLUICE GATE AT TORQUE II ACRES & SHARIF SHRIMP ESTATES LOCATION / SITE: RAMPUR, CHAKARIA, COX'S BAZAR DRAWING STATUS: TENDER DRAWING REVISION: 00 DRAWING NO: S-21 DATE: NOVEMBER 2023 DRAWN BY: Sayed M. Hossain CHECKED BY:</p>	<p>DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL DISCUSSIVE ENGINEER: [] DEPUTY PROJECT DIRECTOR (PAKED): [] PROJECT DIRECTOR: [] DIRECTOR GENERAL: []</p>
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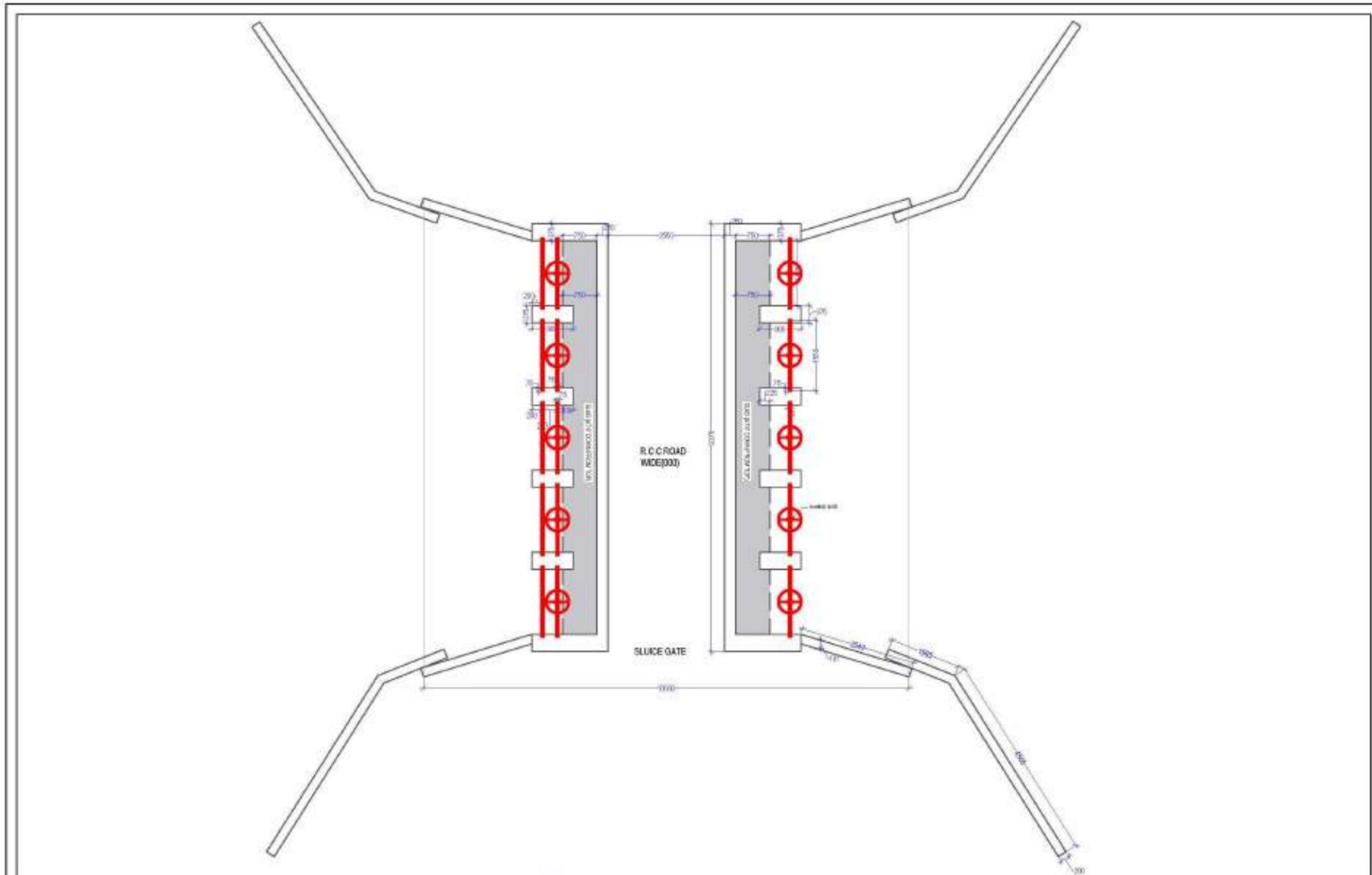


PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO: JPZ/DOP/2021/02	CLIENT GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES	CONSULTANT JPZ-KAIYO-JCL Joint Venture House No. 24, Block-A, Level-5, Plot-8, Miranshagar Housing Estate, Major Road, Dhaka-100, Bangladesh. Tel: +8802-9611156, 9429 21, 9711 4067, 979 21 1854 or +8802-9611178. Email: jpz@jpz.com.bd, www.jpz.com.bd	DRAWING TITLE : PILE LAYOUT OF SLUICE GATE (3 VENTS) BLOW UP INFRASTRUCTURE TITLE: REPAIR AND RESTORATION OF EXISTING SLUICE GATE AT TRAFALGAR SQUARE & BLAQUE, D-HAMP SOCIETIES				DEPARTMENT OF FISHERIES			
			LOCATION / SITE: RAMPUR, CHAKARIA, COX'S BAZAR	DRAWING STATUS: TENDER DRAWING	REVISION: 00	DRAWING NO: S-24	DATE: NOVEMBER 2023	RECOMMENDED FOR APPROVAL	APPROVED	EXECUTIVE ENGINEER

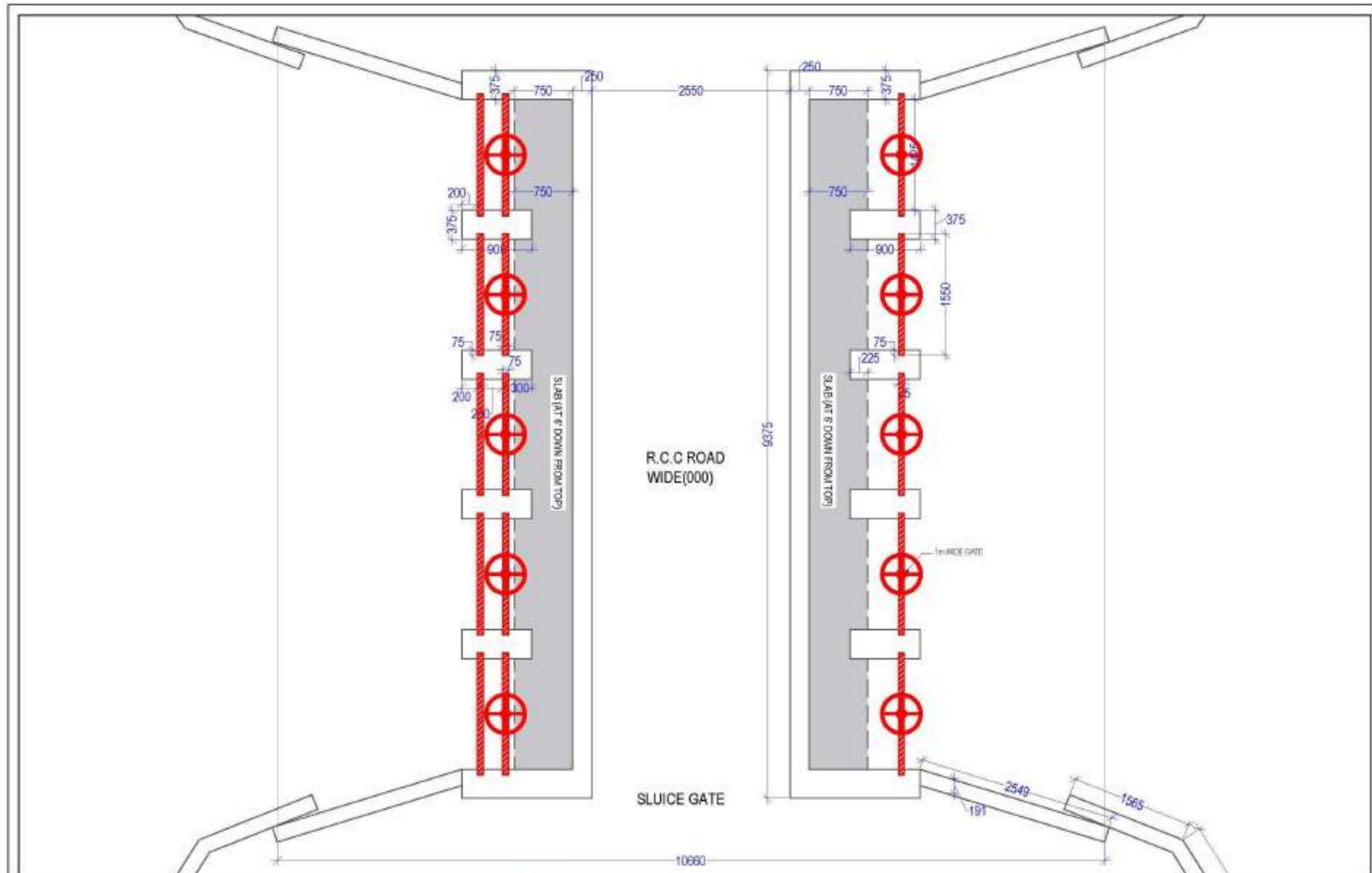


<p>PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO: JPZ/DOF/2021/02</p>	<p>CLIENT GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES</p>	<p>CONSULTANT JPZ-KAIYO-JCL Joint Venture House No. 24, Road A, Level 5, Park B, Mirpur Cantonment Housing Estate, Mirpur Road, Dhaka-1207, Bangladesh. Tel: +8802-9811136, 9829 21, 9811 4899, 9193 21 3847 ext. +8802-9111798. Email: jpz@jpz.com, www.jpz.com</p> <p>STRUCTURAL ENGINEER: Prof. Dr. Md. Anwarul Hossain, Ph.D. TEAM: Engr. Rafiqul Karim STRUCTURAL ENGINEER & APPROVAL/COORDINATION: Prof. Dr. Md. Anwarul Hossain, Ph.D.</p>	<p>DRAWING TITLE: SECTION A-A REINFORCEMENT DETAILS OF PILE OF SLUICE GATE (5 VENTS) STRUCTURE TITLE: REPAIR AND RESTORATION OF EXISTING SLUICE GATE AT TEACRE, TEACRES & BANGRE (RAMP) STATES LOCATION/SITE: RAMPUR, CHAKARIA, COX'S BAZAR DRAWING STATUS: REVISION: 00 TENDER DRAWING: 00 DRAWING NO: S-25 DATE: NOVEMBER 2023</p>	<p>DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL</p> <table border="1"> <tr> <td>EXECUTIVE ENGINEER</td> <td>DEPUTY PROJECT DIRECTOR (TRAVEL)</td> <td>PROJECT DIRECTOR</td> <td>APPROVED DIRECTOR GENERAL</td> </tr> </table>	EXECUTIVE ENGINEER	DEPUTY PROJECT DIRECTOR (TRAVEL)	PROJECT DIRECTOR	APPROVED DIRECTOR GENERAL
EXECUTIVE ENGINEER	DEPUTY PROJECT DIRECTOR (TRAVEL)	PROJECT DIRECTOR	APPROVED DIRECTOR GENERAL					

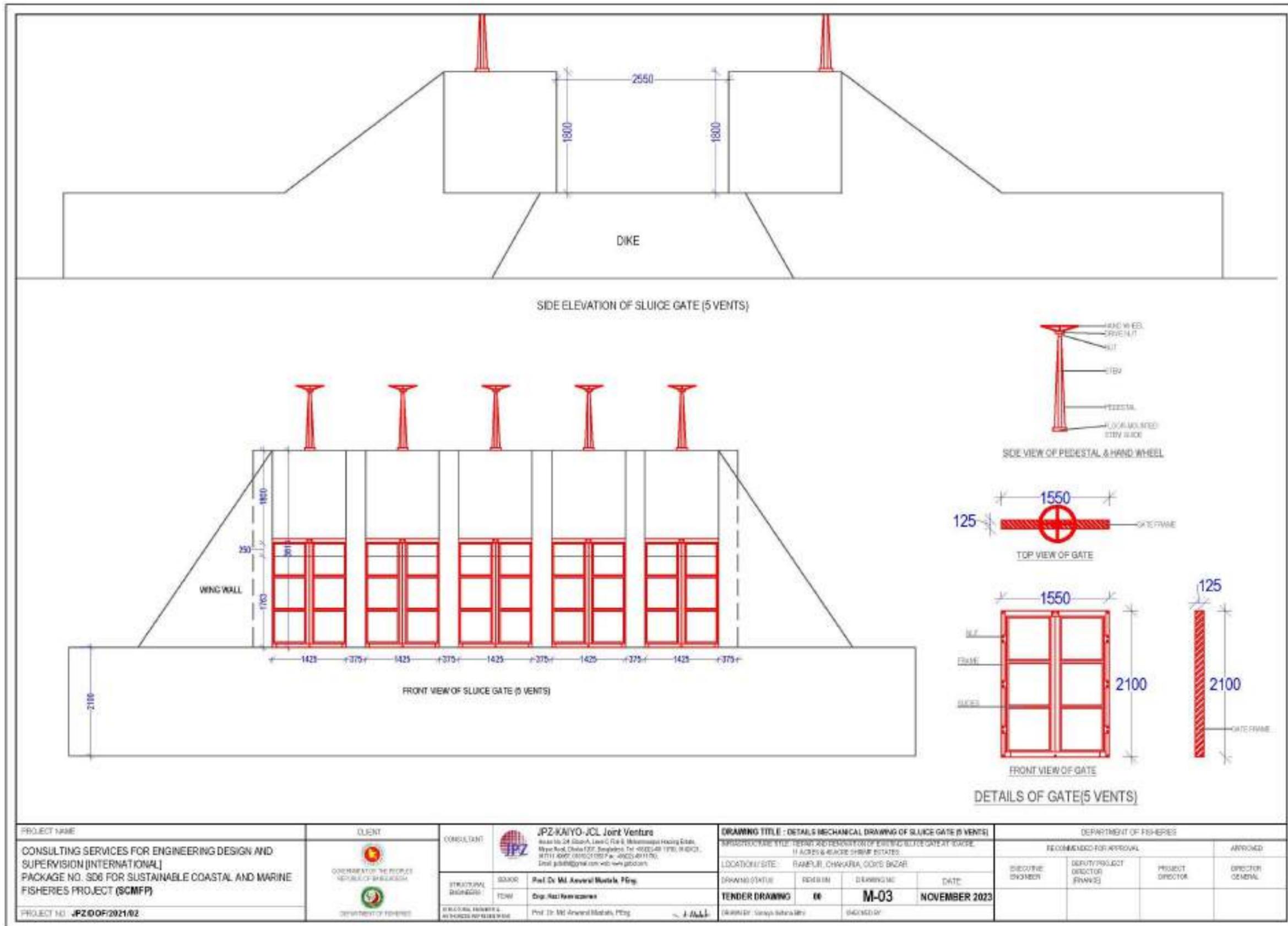
**SLUICE GATE (5 VENTS)
MECHANICAL DRAWINGS**



<p>PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO. JPZ00F/2021/02</p>	<p>CLIENT GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES</p>	<p>CONSULTANT JPZ-KAIYO-JCL Joint Venture House No. 28, Block-AJ, Plot C, Phase I, Mirpur Cantonment, Dhaka. Mirpur Road, Dhaka-1000, Bangladesh. Tel: +8802-4911700, 49149421, 49111494, 49142100 Fax: +8802-4911700. Email: jpz@jpz.com.bd, jpz@kaiyo.com.bd, www.jpz.com.bd</p> <p>STRUCTURAL ENGINEER FOR WORK Prof. Dr. Md. Anwarul Muzahid, PhD TEAMS Engr. Saikat Khatun, BSc</p> <p>PROJECT SUPERVISOR Prof. Dr. Md. Anwarul Muzahid, PhD</p>	<p>DRAWING TITLE : LAYOUT OF SLUICE GATE & VALVES MECHANICAL DRAWINGS INFRASTRUCTURE TITLE: REPAIR AND RENOVATION OF EXISTING SLUICE GATE AT TRAPSE, HAZARSA & BANSE BARRAGE STATION. LOCATION/SITE: BANPLA, CHAKARIA, COX'S BAZAR DRAWING STATUS: PREPARED TENDER DRAWING NO: M-01 DATE: NOVEMBER 2023 DRAWN BY: Saikat Khatun CHECKED BY:</p>	<p>DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL EXECUTIVE ENGINEER DEPUTY PROJECT DIRECTOR (TRAPSE) PROJECT DIRECTOR APPROVED DIRECTOR GENERAL</p>
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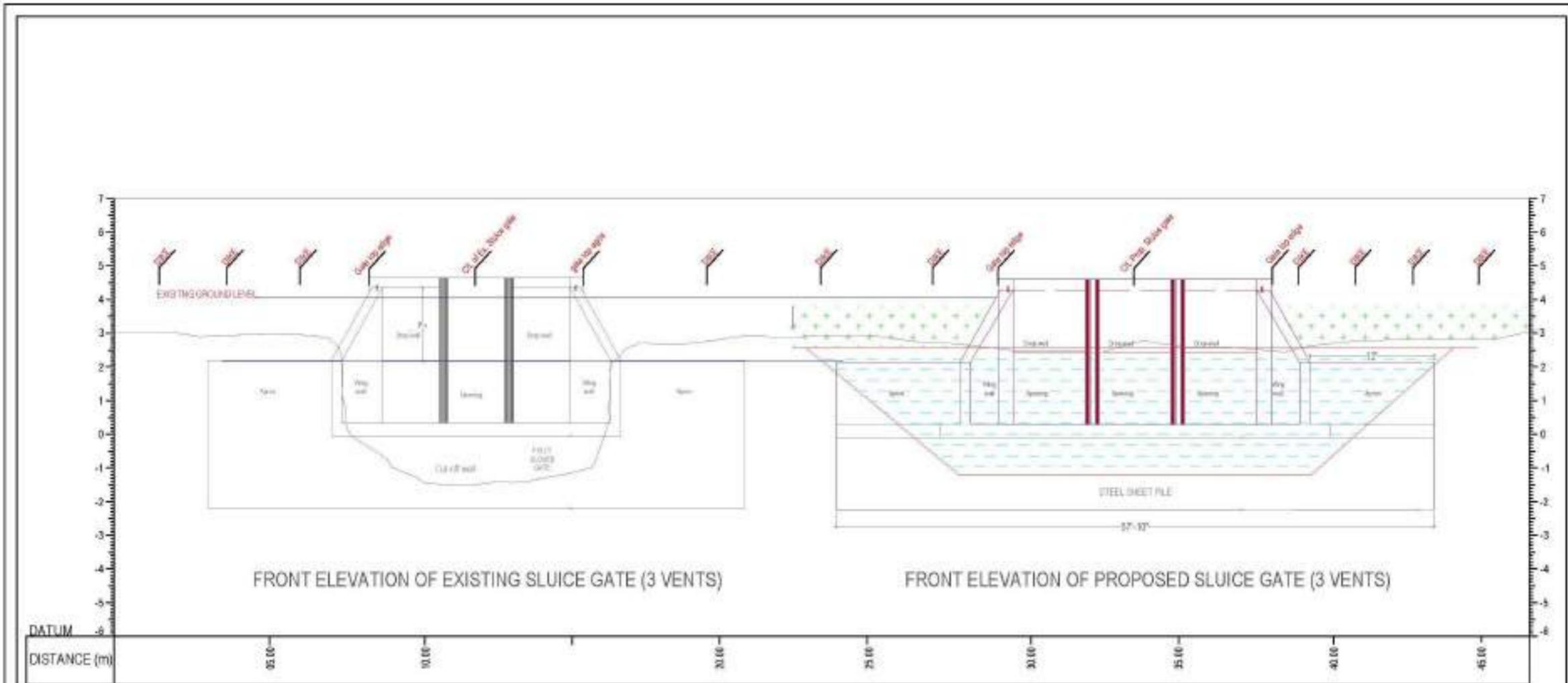


PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)		CLIENT  GOVERNMENT OF BANGLADESH  DEPARTMENT OF FISHERIES		CONSULTANT  JPZ-KAIYO-JCI Joint Venture Room No. 24, 25th Fl., (JPZ) P.O. Box 1000, Dhaka-1000, Bangladesh Phone: +880 2 952 1111, Fax: +880 2 952 1112, Email: jpz@jpz.com.bd, www.jpz.com.bd		DRAWING TITLE : MECHANICAL DRAWINGS OF SLUICE GATE (6 VENTS) BLOW UP BRANDBOX/BLUETOOTH/REPAIR/RECONSTRUCTION OF EXISTING SLUICE GATE AT BEARER, 11 ACRES & SLUICE SHRAW DISTRICT			DEPARTMENT OF FISHERIES RECOMMENDED FOR APPROVAL					
PROJECT NO. : JPZ/DOF/2021/02		STRUCTURAL ENGINEER SD/002 Prof. Dr. Md. Anwarul Hossain, P.Eng. T/001 Big. Md. Anwarul Hossain		LOCATION/SITE : RAJSHALI, CHAKARIA, COXS BAZAR DRAWING STATUS : REVISION DRAWING NO. DATE			EXECUTIVE ENGINEER		DEPUTY PROJECT DIRECTOR (PROGRAM)		PROJECT DIRECTOR		APPROVED DIRECTOR GENERAL	
TENDER DRAWING		NO		M-02			NOVEMBER 2023							



PROJECT NAME	CLIENT	CONSULTANT	DRAWING TITLE : DETAILS MECHANICAL DRAWING OF SLUICE GATE (5 VENTS)	DEPARTMENT OF FISHERIES			
CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SDB FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)	GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES	JPZ-KAIYO-JCL Joint Venture JPZ B-10, 24, 25th Floor, Level C, R/A-8, Mirpur Cantonment Housing Estate, Mirpur Road, Dhaka 1217, Bangladesh. Tel: +880(2)4811780, 4811800, 4811801, 4811802, 4811803, 4811804, 4811805, 4811806, 4811807, 4811808, 4811809, 4811810, 4811811, 4811812, 4811813, 4811814, 4811815, 4811816, 4811817, 4811818, 4811819, 4811820, 4811821, 4811822, 4811823, 4811824, 4811825, 4811826, 4811827, 4811828, 4811829, 4811830, 4811831, 4811832, 4811833, 4811834, 4811835, 4811836, 4811837, 4811838, 4811839, 4811840, 4811841, 4811842, 4811843, 4811844, 4811845, 4811846, 4811847, 4811848, 4811849, 4811850, 4811851, 4811852, 4811853, 4811854, 4811855, 4811856, 4811857, 4811858, 4811859, 4811860, 4811861, 4811862, 4811863, 4811864, 4811865, 4811866, 4811867, 4811868, 4811869, 4811870, 4811871, 4811872, 4811873, 4811874, 4811875, 4811876, 4811877, 4811878, 4811879, 4811880, 4811881, 4811882, 4811883, 4811884, 4811885, 4811886, 4811887, 4811888, 4811889, 4811890, 4811891, 4811892, 4811893, 4811894, 4811895, 4811896, 4811897, 4811898, 4811899, 4811900, 4811901, 4811902, 4811903, 4811904, 4811905, 4811906, 4811907, 4811908, 4811909, 4811910, 4811911, 4811912, 4811913, 4811914, 4811915, 4811916, 4811917, 4811918, 4811919, 4811920, 4811921, 4811922, 4811923, 4811924, 4811925, 4811926, 4811927, 4811928, 4811929, 4811930, 4811931, 4811932, 4811933, 4811934, 4811935, 4811936, 4811937, 4811938, 4811939, 4811940, 4811941, 4811942, 4811943, 4811944, 4811945, 4811946, 4811947, 4811948, 4811949, 4811950, 4811951, 4811952, 4811953, 4811954, 4811955, 4811956, 4811957, 4811958, 4811959, 4811960, 4811961, 4811962, 4811963, 4811964, 4811965, 4811966, 4811967, 4811968, 4811969, 4811970, 4811971, 4811972, 4811973, 4811974, 4811975, 4811976, 4811977, 4811978, 4811979, 4811980, 4811981, 4811982, 4811983, 4811984, 4811985, 4811986, 4811987, 4811988, 4811989, 4811990, 4811991, 4811992, 4811993, 4811994, 4811995, 4811996, 4811997, 4811998, 4811999, 4812000	RECOMMENDED FOR APPROVAL				
PROJECT NO. JPZ/02/2021/02		STRUCTURAL DESIGNER: Prof. Dr. Md. Anwarul Hossain, PEng.	DRAWING STATUS: TENDER DRAWING	DESIGN NO: M-03	DATE: NOVEMBER 2023	SIGNATURE	APPROVED
		TECHNICAL SUPERVISOR & ARCHITECTURAL SUPERVISOR: Prof. Dr. Md. Anwarul Hossain, PEng.	LOCATION/SITE: RAJSHAHI, CHAKARIA, COXS BAZAR	DESIGNED BY: Sayan Saha (MS)	CHECKED BY:	DEPUTY PROJECT DIRECTOR (FRANCE)	DIRECTOR GENERAL

CANAL CROSS SECTION (TYPICAL)



FRONT ELEVATION OF EXISTING SLUICE GATE (3 VENTS) FRONT ELEVATION OF PROPOSED SLUICE GATE (3 VENTS)

PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL] PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP)		CLIENT GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES		CONSULTANT JPZ-KAIYO-JCL Joint Venture House No. 28, Block-A, Level-5, RAJU, Motowadpur Housing Estate, Mirpur Road, Dhaka-1207, Bangladesh. Tel: 4402-491179, 4402-21, 97711-8895, 0088-21003 Fax: 4402-491199. Email: jpzbd@jpz.com, web: www.jpz.com		DRAWING TITLE : CANAL DIVERSION CROSS SECTION (TYPICAL) REPAIR AND RECONSTRUCTION OF EXISTING SLUICE GATE AT 15 ACRE (11 ACRES & 4 ACRES SHRIMP ESTATES)			DEPARTMENT OF FISHERIES					
PROJECT NO: JP2020P/021002		STRUCTURAL DESIGNER: SO/DR: Prof. Dr. Md. Anwarul Haque, PEng. TEAM: Engr. Kazi Anwarul Haque IN CHARGE: Prof. Dr. Md. Anwarul Haque, PEng.		LOCATION/SITE: HAMBUR, CHAKARIA, COCS BAZAR			RECOMMENDED FOR APPROVAL							
				DRAWING STATUS: TENDER DRAWING			EXECUTIVE ENGINEER		DEPUTY PROJECT DIRECTOR (FINANCE)		PROJECT DIRECTOR		APPROVED: DIRECTOR GENERAL	
				DRAWN BY: Sayeeda Islam			CHECKED BY:							

DIVERSION LOCATION MAP (5 VENTS)

List of Sluice Gate

SI No	Polder No	Sluice Gate No	Size of Plots	Gate System (Vent)
1	SP -1	Gate -1	10 Acre	5



PROJECT NAME CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION (INTERNATIONAL) PACKAGE NO: S06 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT (SCMFP) PROJECT NO : JP200F02100	CLIENT GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH DEPARTMENT OF FISHERIES	CONSULTANT JPZ-KAYO-JCL Joint Venture House No. 24, Road 6, Sector 5, Dohali, Mohammadpur Housing Estate, Dhaka Road, Dhaka 107, Bangladesh. Tel: +880-2-811170, 81171, 81172, 81173, 81174, 81175. Fax: +880-2-811176. Email: jpz@jpz.com, web: www.jpz.com	DRAWING TITLE : CANAL DIVERSION LOCATION MAP (SP1 WITH 5 VENTS)				DEPARTMENT OF FISHERIES			
			REPRESENTATIVE TITLE: REPORT AND DRAWINGS OF EXISTING STRUCTURE AT GATE NO. 11 ACROSS 46 ACRES IN SP1, 2023/2024				RECOMMENDED FOR APPROVAL			
			LOCATION / SITE : RAMPUR, CHAKARIA, COY'S BAZAR				EXECUTIVE ENGINEER	DEPUTY PROJECT DIRECTOR (FINANCE)	PROJECT DIRECTOR	DIRECTOR GENERAL
			DRAWING STATUS: KADRON	DRAWING NO: LM-01	DATE: NOVEMBER 2023	TENDER DRAWING	NO	DRAWING BY: Tanvirul Islam BH	CHECKED BY:	APPROVED



GOVERNMENT OF THE PEOPLES REPUBLIC OF BANGLADESH.

DEPARTMENT OF FISHERIES

PACKAGE NO. SD6 FOR SUSTAINABLE COASTAL AND MARINE FISHERIES PROJECT **(SCMFP)**

CONSULTING SERVICES FOR ENGINEERING DESIGN AND SUPERVISION [INTERNATIONAL]

**ARCHITECTURAL, STRUCTURAL, ELECTRICAL, FIRE FIGHTING, PLUMBING & SANITARY DRAWINGS
OF
CONSTRUCTION OF GUARD DHED WITH SANITARY AND ELECTRICAL FACILITIES,
ELECTRRICFICATION, SOLAR PANEL (ON GRID)**

**CONSULTANT:
JPZ-KAIYO-JCL Joint Venture**

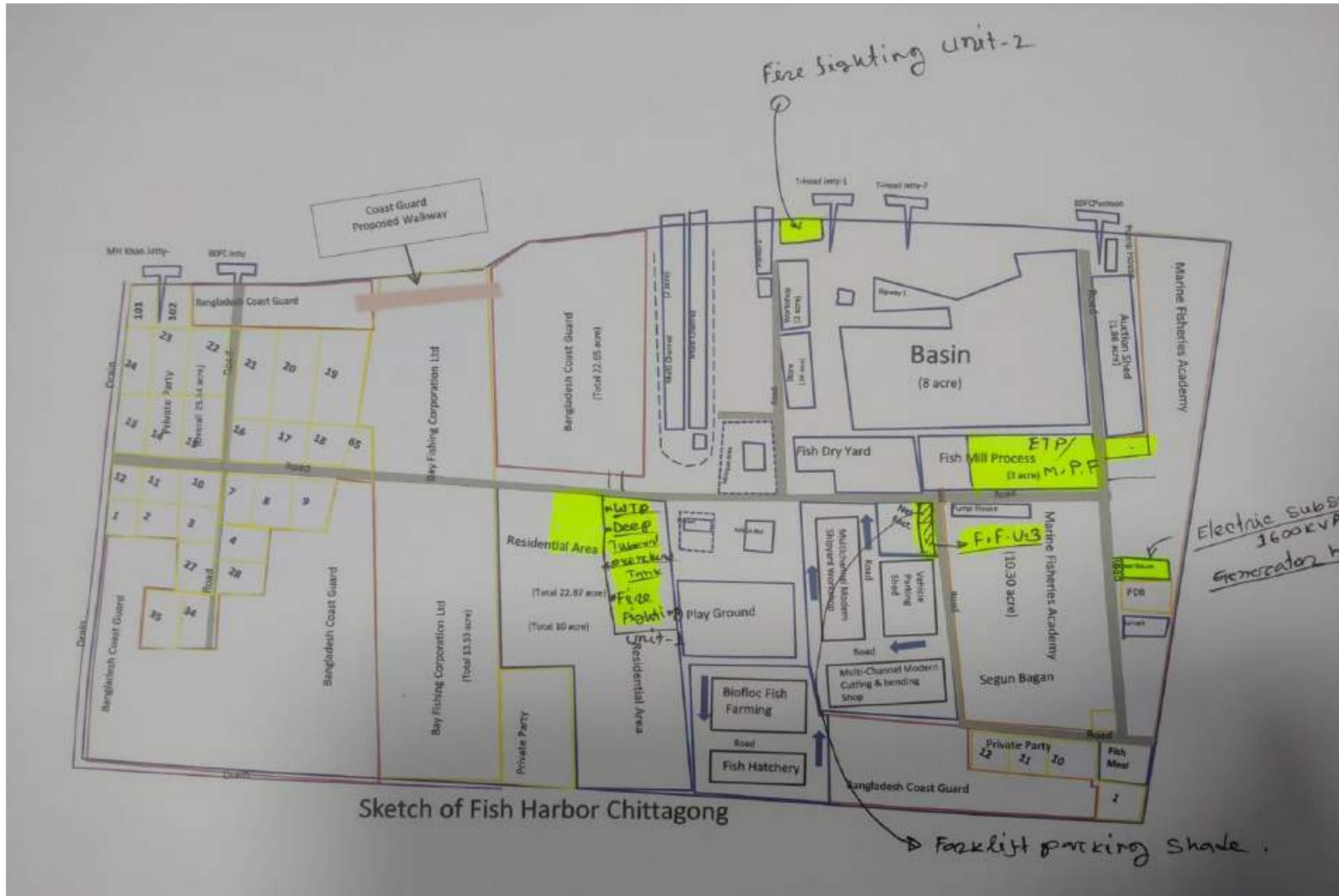
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Design and Layout of the Interventions under BFDC



Annex 15: Manpower Loading and Waste Calculation for the Sub-Project Sites

A. Manpower Loading

Based on the activities, as mentioned in **Section 4.10** of **Volume I: Main Report** no manpower would be recruited for the sub-projects during pre-construction stage. However, at this stage, official task assigning, conceptualizing and planning purposes, officials from DoF for CSE, DFTC, and district-wise (Satkhira, Khulna, and Bagerhat Districts) concerned persons; and officials from BFDC may be assigned. Main work load would be started at the construction stage. In this stage, labor recruitment would be done as well. **Table 4.7** under **Section 4.21** in **Chapter 4** of **Volume I: Main Report** shows tentative numbers of the manpower would be required for the construction stage for the sub-project sites. The detailed descriptions are mentioned in the following sections.

i. Chakaria Shrimp Estate

It has been estimated that around 5 persons including 2 labors for running of excavator, 2 labors for dumping and managing excavated soil on the dyke and 1 supervisor would be involved for the canal rehabilitation works. On the other hand, around 5 labors would be involved for repair and renovation of existing sluice gate; 10 labors would be involved for constructing guard shed with sanitary and electrical facilities; 10 labors would be involved for renovation of fish landing center; and around 20 labors would be involved for the reconstruction of embankment/ peripheral dyke, rehabilitation of water supply and drainage canals, construction of herring bone road on the embankment and barbed wire fencing with RCC pillars. In addition, to manage the whole works at least 3-4 supervisors and 2 site engineers would be involved for supervising and management of the sub-project activities as mentioned in the **Section 4.10.2- Sub- Project 1A: Rehabilitation of 10, and 11- acres of shrimp estate including associate canals**. On the other hand, according to the activities as mentioned for the **Sub- Project 1B: Rehabilitation of 48- acres shrimp demonstration area**, under **Section 4.10.2**, around 50 at peak and 40 in regular basis unskilled, skilled, technicians; about 5 numbers of supervisors; and 2 numbers of site engineers and 1 environmental safety engineer would be required for the mentioned activities.

Therefore, in total, around 100 at peak and about 75-80 in regular basis unskilled, skilled, technicians; about 10 numbers of supervisors and management staff; and 5 numbers of site engineers, and safety engineer would be engaged for conducting the sub-project activities in CSE. It is assumed that around 50 numbers of labors would stay at the construction sites and rest of the labors would be day labors. The supervisors, site engineers and safety engineer would visit the construction sites daily basis and would stay for at least 8 hours/ day. The construction activities would run in full swing for about 12 months' period.

ii. BFDC Harbor at Chattogram

At this stage, around 75 at peak and 50 on regular basis unskilled, skilled, technicians; about 5 numbers of supervisors and management staff; 2 engineers (1 site engineer-civil, and 1 safety engineer) would be required for the sub-project activities as mentioned for the **Sub-Project 3** under **Section 4.10.2**. It is expected that within 12 months' period all the activities would be completed. It is also assumed that 25 labors, 5 supervisors, and 3 engineers would stay at the construction site in this stage.

iii. BMC at DFTC, Teknaf

At this stage, around 75 at peak and 50 on regular basis unskilled, skilled, technicians; about 5 numbers of supervisors and management staff; 2 numbers of site engineers; and 1 safety engineer would be required. It is expected that within five (03) months land preparation works including demolishing the abandon buildings, tree felling and vegetation clearing, land development and preparation activities would be completed. Rest of the works such as establishment of shrimp hatchery would be conducted within 7 months' period. In this stage, less labors would be required. It is assumed that around 30 labors on regular basis would be involved for this activity. It is expected that around 30 labors, 5 supervisors and 3 engineers would stay at the construction site for the whole construction period of 12 months.

iv. Canal Rehabilitation for Cluster Farming at Satkhira, Khulna, and Bagerhat Districts

Like the canal rehabilitation activities through re-excavation under CSE sub-project, around 5 persons including 2 labors for running of excavator, 2 labors for dumping and managing excavated soil on the dyke and 1 supervisor would be required. It is expected that under this sub-project activities all the labors would be day labor and the supervisors and engineers would visit the sites daily for at least 8 hours/day. It is expected that the canal rehabilitation work would be completed within 12 months' period.

During operation stage, the designated employees under Project Management Unit under Deputy Project Directors (DPDs) would be involved under this Project. The number would be given other and associated issues would be mentioned (as and where required-in other sections of this report) once it is finalized by the Proponent.

B. Waste Calculation

During various stages of the proposed Project, a significant quantity of wastes including solid & liquid, hazardous/ Non-hazardous, kitchen waste, sewage waste etc. would be generated. The wastes to be generated at the sub-project sites due to various activities are categorized into two types: Non-hazardous and Hazardous wastes. Again, Non-hazardous wastes have been categorized into Perishable Waste, Kitchen Waste, Non-perishable Waste, Other Solid Waste, and Organic Solid Waste/ Sewage Waste.

All kinds of solid wastes to be generated would be disposed on site maintaining DoE's standard.

Non-Hazardous Wastes

The major solid wastes generated during construction stage would be from tree felling, vegetation clearing, which include shrubs and grasses before land development and site preparation at the BFDC Harbor; and BMC area at DFTC, Teknaf. However, under the sub-project, "canal rehabilitation for cluster farming in Satkhira, Khulna and Bagerhat Districts", existing vegetation like herbs, shrubs and grassy vegetation would be cleared from the dyke before starting the re-excavation works and duping the excavated soil on it.

Besides, kitchen wastes and sewage waste would be generated from the labor shed in CSE; BFDC Harbor at Chattogram; and BMC area at DFTC, Teknaf at this stage.

In addition, solid wastes such as concrete pieces, small cut pieces of MS bars/rods, wood pieces, CI sheets etc. would be generated due to demolishing the existing abandon buildings in 48- acres shrimp demonstration area, and existing broken sluice gates under CSE; BFDC Harbor at Chattogram; and BMC area at DFTC, Teknaf. On the other hand, during rehabilitating sluice gates with new structures; constructing new buildings like fish processing plant, substation etc. construction materials like

concrete pieces, small cut pieces of MS bars/rods, plastic pieces, empty cement bags, empty cartons, waste papers, waste from worker's colony, kitchen wastes, human wastes, etc. would be generated.

The activities of pre-construction stage of each sub-project site are mostly literature review and preparation of documentation of design and layout etc. On the other hand, during operation stage, management of all the sub-projects would be handled by the PMU of the DoF which would eventually be managed from the main head office and existing local office of the sub-project sites. Therefore, waste generation, storage and disposal system for each sub-project has been considered only for construction stage.

Solid wastes are mainly of three types. They are Perishable Waste; Non-Perishable Waste; Other Solid Wastes; and Organic waste/ sewage waste.

a) Perishable Waste

Ref. to **Section 4.22** about 75, 50, and 30 numbers of labors would stay at the construction site during construction stage at CSE, BFDC Harbor; and BMC area respectively. These would be the resident labors. Whereas, 100, 75, and 75 numbers of labors would be present at the construction sites of the sub-project sites respectively during the peak period of the construction activities.

On the other hand, the 10, 5, and 5 numbers supervisors/ monitoring staff; and 5, 3, and 3 numbers of site, and safety engineers are considered to be engaged for surveillance of whole of the construction period under the CSE, BFDC Harbor, and BMC area sub-projects respectively.

Considering this, a number of labor sheds, staff room, sewage system, kitchen waste disposal system etc. would be implemented for them during the early stage of the construction stage.

It is assumed that most of the day labor would carry their food from their home and it is estimated that around 30% of the average number of labors would take their food from the labor shed kitchen. Therefore, for this additional percentage of labor, kitchen waste has been calculated for the construction stage. It is assumed that the labor would work for 10 hours daily for 26 days per month. Hence, sewerage waste has been calculated based on the working hours of the labor.

These officials would work 8 hours daily for 22 days per month. It is assumed that they would carry their food from home but some of them may take food from the kitchen. They would use the toilets also in the construction site. Therefore, waste generation like kitchen waste and sewerage waste has been considered for the officials (engineers) and the supervisors as well.

Kitchen Waste: The labor shed would be constructed by the EPC contractor at the defined and pre-selected location within the sub-Project sites. A kitchen would also be constructed beside the labor shed. **Table A15.1** shows the estimation of kitchen waste to be generated during the construction stage from various sub-project sites:

Table A15.1: Estimation of Kitchen Waste during Land Development

Sl. No.	Economic Classes of Employee	Sub-Project Name	Project Employee /Worker	Rate of Kitchen Waste Generation (kg/ day/capita) *	Total Generated Waste (kg/ day)
1	High-Income Group (Tk. >20,000/month)	Chakaria Shrimp Estate	5	0.56	2.8
2		BFDC Harbor at Chattogram	3		1.68
3		BMC Area at DFTC, Teknaf	3		1.68
4	Middle-Income Group	Chakaria Shrimp Estate	10	0.5	5
5		BFDC Harbor at Chattogram	5		2.5

Sl. No.	Economic Classes of Employee	Sub-Project Name	Project Employee /Worker	Rate of Kitchen Waste Generation (kg/ day/capita) *	Total Generated Waste (kg/ day)
6	(Tk. 10,000- Tk. 20,000/month)	BMC Area at DFTC, Teknaf	5		2.5
7	Low-Income Group (Tk. < 10,000/month)	Chakaria Shrimp Estate	75	0.32	24
8		BFDC Harbor at Chattogram	43		13.6
9		BMC Area at DFTC, Teknaf	47		15
Total			195		68.8

Source: Jodder et. al. Generation and Characteristics of Household Solid Waste in Khulna City, Bangladesh, 2022

It is estimated that around 68.8 kg of kitchen waste would be generated each day from the labor-shed and staff's residence in total from three sub-project sites as mentioned in the **Table A15.1**. It has been considered a number of labors might have food from the labor shed kitchen, and the number of the total labors would be the sum of resident labor and 30% of average number of labors. This is considered for each sub-project site. In addition, the assumed number of supervisors and the engineers to be recruited by the EPC Contractor as mentioned in the **Section 4.21- Manpower Loading**, would also take food from the kitchen during the construction period.

Careless disposal of these wastes would create pollution, odor problem, nuisance, and aesthetic tiring. However, the impact would be for a temporary period, limited within the project site, reversible and may happen only in worst-case scenario (i.e., no management of kitchen waste). Hence, there should be a provision of good housekeeping for managing the kitchen wastes.

These perishable kitchen wastes should be disposed of in covered plastic containers to be kept at designated places, which would require to be collected periodically by local authority for final disposal may be for land filling purposes. In short, generated wastes should be disposed of onsite maintaining DoE's standard.

b) Non-perishable Waste

Non-perishable solid wastes like metal pieces, empty cartons, plastic materials, paper bags etc. should be disposed of in covered Plastic containers of different colors specified for different type of wastes kept at a designated place. Recyclable and plastic wastes will be sold to the re-cycling companies and other interested buyers. Other combustible solid wastes like waste paper, wood etc. will be burnt in local incinerator and the resultant ash will be buried in nearby open space.

c) Other Solid Waste

Vegetation Clearance and Civil Structure Demolition: A one storied (L x W x H: 20m x 11m x 4.5m), and a two storied (L x W x H: 17m x 12m x 4.5m) L- shaped buildings would be demolished which are currently not in use at 48- acres of shrimp demonstration area. It has been estimated that in total around 225 m³ of debris would be generated from these two buildings. On the other hand, around 5 numbers of tree (3 nos. of Akashmoni; a Coconut tree; and a Bullet Wood tree) would be felled and some grassy vegetation with some herbs and shrubs would be cleared. It has been estimated that in total an amount of 3.4 m³ (3 ton) of wooden debris and leaves would be generated from the mentioned vegetation. In addition, within the CSE, a number of sluice gates and guard sheds would be demolished during rehabilitating those structures. According to the design consultant, the volume of concrete waste to be generated due to structure rehabilitation within CSE would be around 7478 m³.

In addition, during field visit, the study team has learnt that five (05) structures would be demolished from BMC area at DFTC, Teknaf. During the inspection of the building of Demonstration Fisheries

Training Center (DFTC), it was observed that the building, as used as training center earlier, is currently not in use due to damage of the structure. It cannot be reformed; hence, the Proponent has taken decision to demolish it. It has been calculated that an amount of around 224 cubic meter debris would be generated from this abandon structure. Likewise, the training center, the dormitories were also found as abandon which was used for the temporary residence for the trainees. Approximately, 258 m³, and 78 m³ concrete material would be generated from the dormitory of the trainees and the trainers respectively. There is another civil structure which was used as the office assistant resident, currently kept unused. It is assumed that around 638 m³ debris would be generated from this structure. In addition, an existing car parking was observed by the study team during field visit which is currently not in use. A tentative amount of 66 m³ debris might be generated from this car parking lot.

The BFDC Harbor sub-Project site is covered with a large amount of vegetation including herbs, shrubs, and hard wood trees of different sizes. It has been decided by the Proponent that most of the activities under this sub-project would be conducted without felling the trees and clearing the vegetation. However, an estimated 192 numbers of tree would be cut down (in which primarily Arjun and Akshmoni has been selected under a wood stand) for constructing the WTP, fish processing Plant, ICE and implementing two new tube wells. It is also estimated that around 90% of the tree species are under adult, and about 10% are sapling. Therefore, before construction, and land development activities vegetation would be cleared from the Project site. Hence, an estimated amount of 200 m³ (about 230 ton) of wooden debris might be generated at this stage. In this case, the average height and Diameter at Breast Height (DBH) of the hard wood trees and canopy coverage have been considered. The wooden debris may create aesthetic tiring, be reason of accidental events like cutting, burning, falling from height (during cutting down trees), income generation, etc. Cut down trees and wooden debris might be kept at a designated place for a short period and sold out to the relevant vendors to carry the debris outside the Project site. In addition, 522 m³ of concrete debris and about 300 kg CI sheet would be generated due to the demolition of abandoned structure.

On the other hand, on the both side dyke of the selected eighteen canals for cluster farming various trees such as: date tree, banana tree, palm tree etc. would be fell down. However, according to the Client, canal rehabilitation through re-excavation activities trees and existing vegetation area would be kept aside as much as possible.

An approximate calculation of the volume and weight of the generated waste in various sub-project areas is given in the following **Table A15.2**. During calculating the wastes, the type of material such as: concrete (including cement, sand, brick etc.) for buildings; iron for CI sheets; wooden debris from hard trees; leaves etc. have been considered as weight varies on the type of material.

Table A15.2: Estimation of Concrete and Wood Waste during Construction Stage

Sl. No.	Sub-Project Site	Source of Waste	Type of Waste	Volume (m ³)	Weight (kg)	Weight (Ton)
1.	Chakaria Shrimp Estate	Hydraulic Structures (Sluice Gates) and Guard Sheds	Concrete waste	7,478	1,79,47,200	19,783
2.		Buildings at 48-acres of Shrimp Demonstration Area	Concrete waste	225	3,06,628	337.5
3.		Trees and other vegetation	Wooden debris and leaves	3.4	-	3
			Sub-Total=	7,706.4		20,123.5
4.		Old Chiller and two-storied building	Concrete waste	224	3,04,814	336
5.			Iron from CI sheets	0.6	300	0.33

Sl. No.	Sub-Project Site	Source of Waste	Type of Waste	Volume (m ³)	Weight (kg)	Weight (Ton)
6.	BFDC Harbor at Chattogram	Trees and other vegetation	Wooden debris and leaves	30.6	-	27
			Sub-Total=	255.2		363.33
7.	BMC Area at	Old Buildings	Concrete waste	704	9,57,987	1056
8.	DFTC, Teknaf	Trees and other vegetation	Wooden debris and leaves	200	-	230
			Sub-Total=	904		1286
			Total=	8865.6		21,772.83

Organic Solid Waste/ Sewage Waste: As the labors, supervisors, and the site engineers would be present at the sub-project sites during the construction period only, hence, organic solid waste/ sewage would be generated during this stage only. According to the information of the manpower loading as mentioned in the **Section 4.21**, although 50, 25, and 30 persons would be resided at the sub-project sites (CSE, BFDC Harbor, and BMC respectively) for 24/7 hrs period during construction stage; rest of the labors would be day labors who would work for 10 hours per day and the numbers of supervisors and site engineers as mentioned in the same section would be worked at the construction sites for 8 hours per day.

Considering these issues, it has been estimated that approximately 8m³, 4.6m³, and 5m³ sewage⁴ would be generated from the labor colony and officers' residence during construction stage from the mentioned sub-project sites respectively. During this stage, human wastes will be managed by constructing temporary sanitary latrines at the labor shed and staff residence. In this regard, a septic tank with the volume of about 4.5m³, 2.5m³, and 3m³ including a soak well may be constructed in the construction sites of the CSE, BFDC Harbor at Chattogram, and BMC Area at DTFC, Teknaf sub-project sites respectively which may be finally demolished and dressed with adjacent land. This waste would be cleaned after a certain time interval based on the requirement.

Hazardous Wastes

Sludge is a hazardous material which might be generated from the Effluent Treatment Plant (ETP), Water Treatment Plant (WTP) and Municipal wastes from the labor sheds, that may pose adverse and profound environmental impacts like harms to human health and the environmental degradation through deuteriation of the quality of soil, air and aquatic systems. Besides, sludge is a complex material with heterogeneous toxic substances that it inherits from a variety of origins/ sources. Hence, it has become a dire necessity to identify the nature of toxic contents in the sludge and judicious measures be taken for their safe disposal.

The disposal and management of sludge should be done as per the Bangladesh Environment Conservation Act, 1995 (Amendment 2010), Bangladesh Standards and Guidelines for Sludge Management (BSGSM) 2015 and National 3R Strategy. The Sludge Management Plan has been given in **Annex A: ESMP Report**.

⁴ Considering 0.29 wt.(kg)/ person/ day for 26 working days for Lower Income Group and 0.6 wt.(kg)/ person/ day for 22 working days for Medium and Higher Income Group.

Annex 16: Topographic Maps

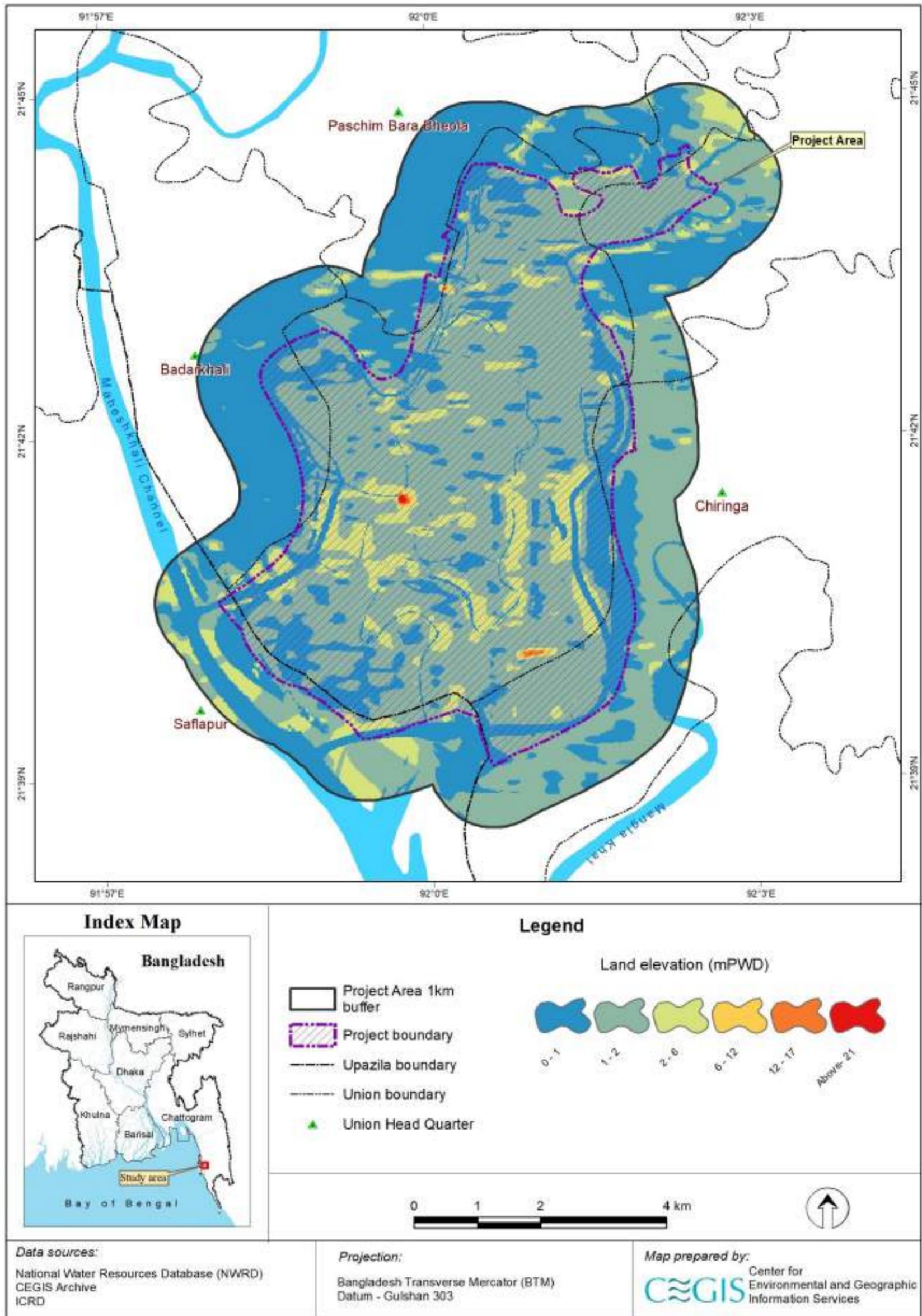


Figure A16.1: Topographic Map of Chakaria Shrimp Estate

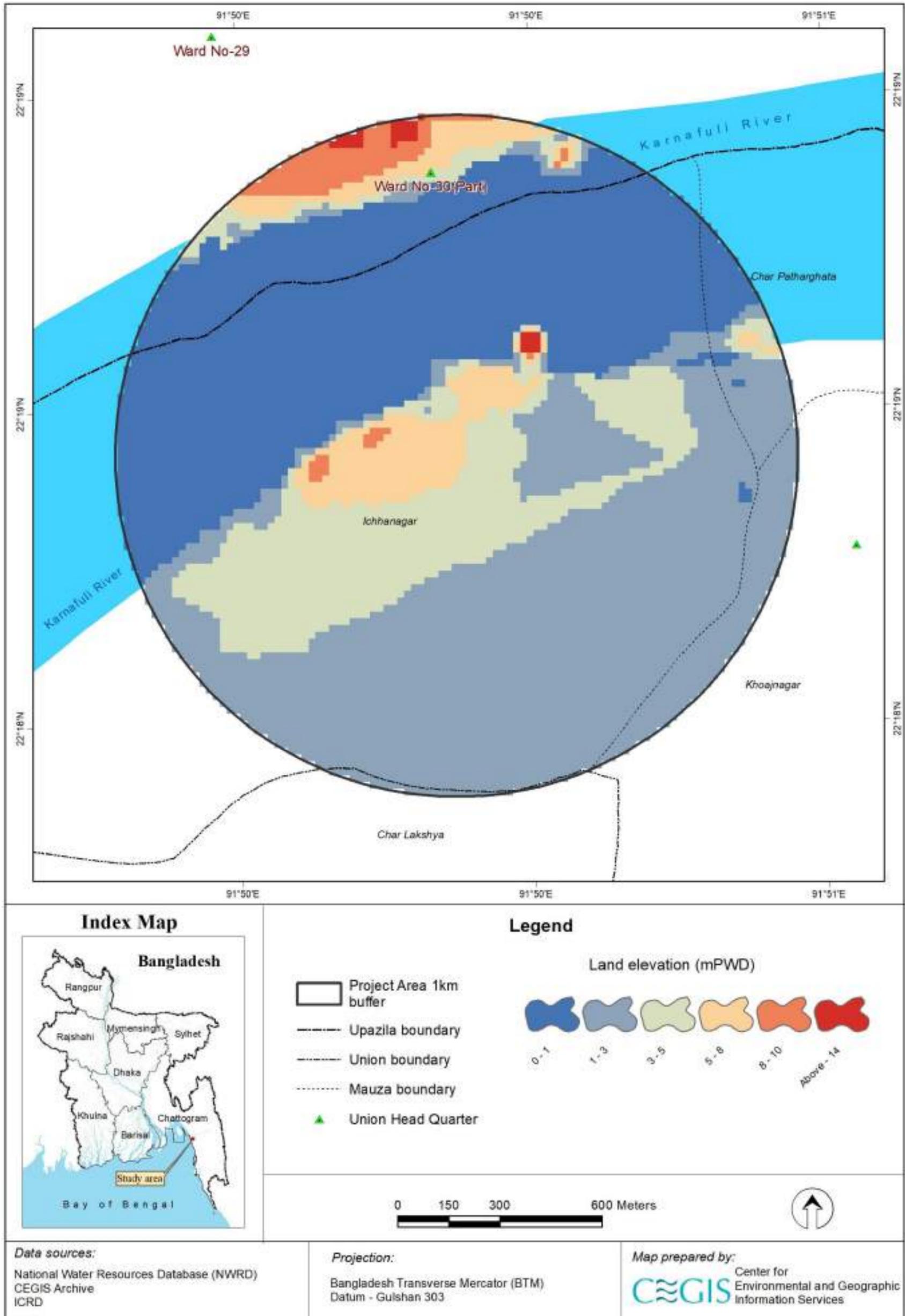


Figure A16.2: Topographic Map of BFDC

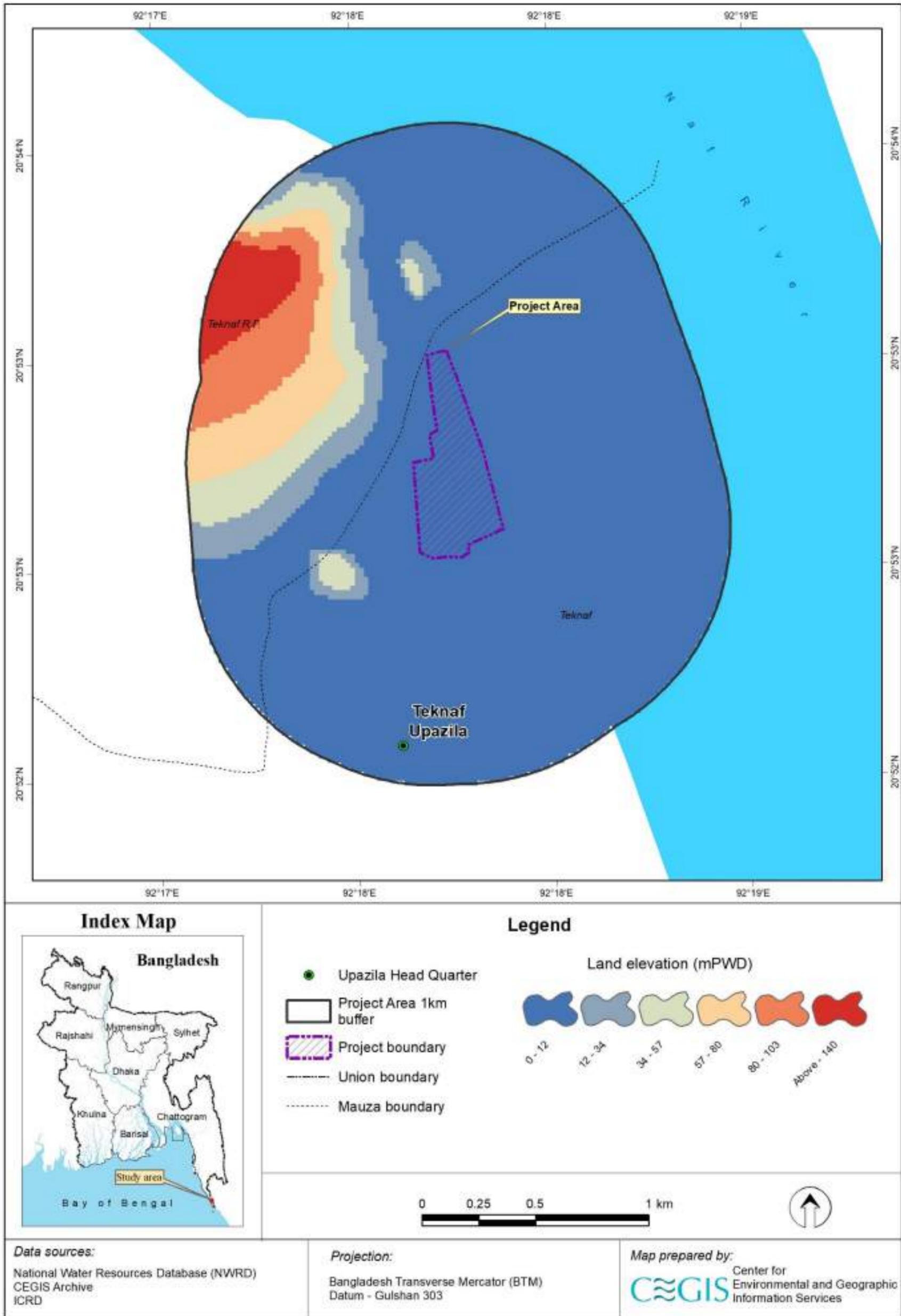


Figure A16.3: Topographic Map of BMC

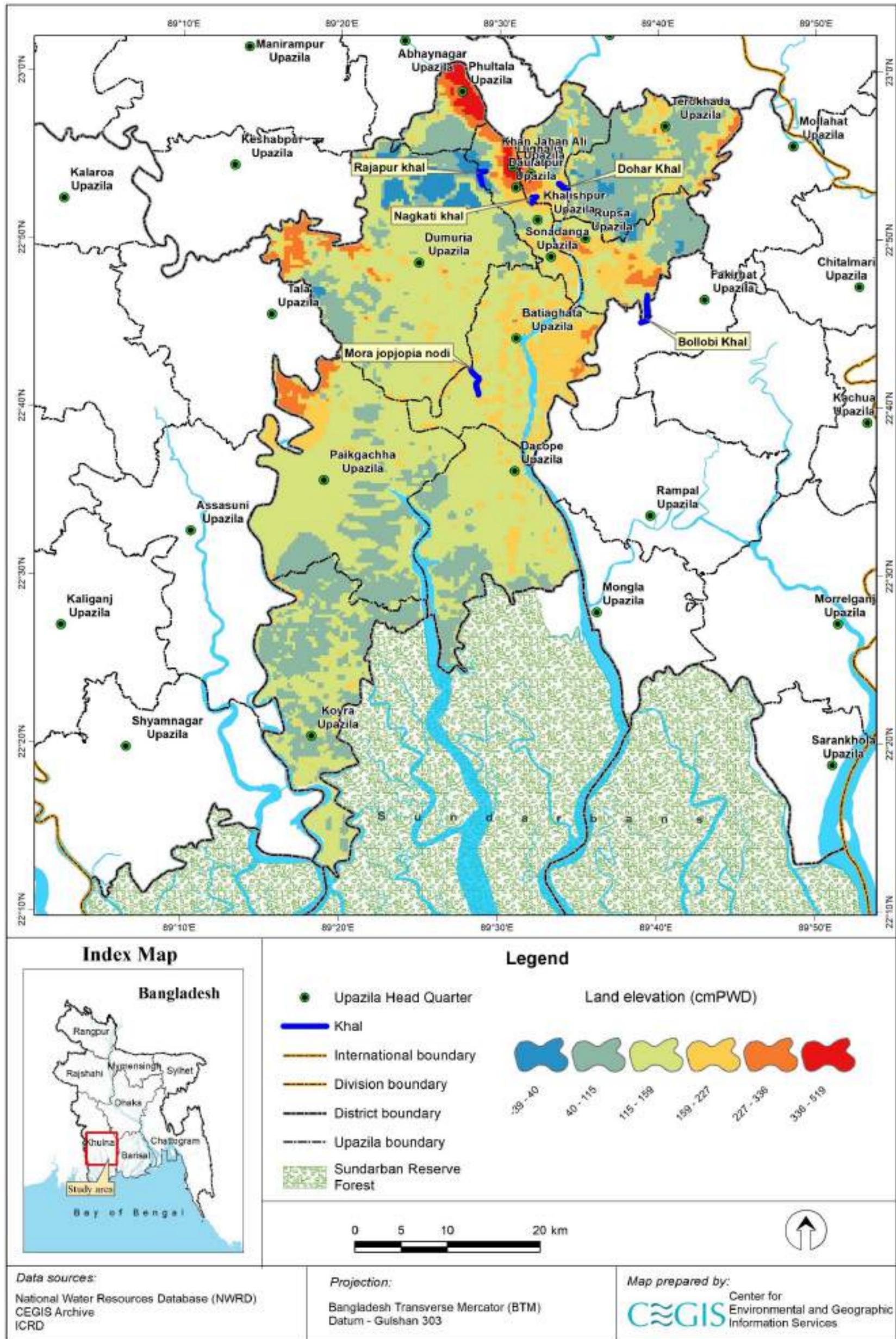


Figure A16.4: Topographic Map of Khulna District

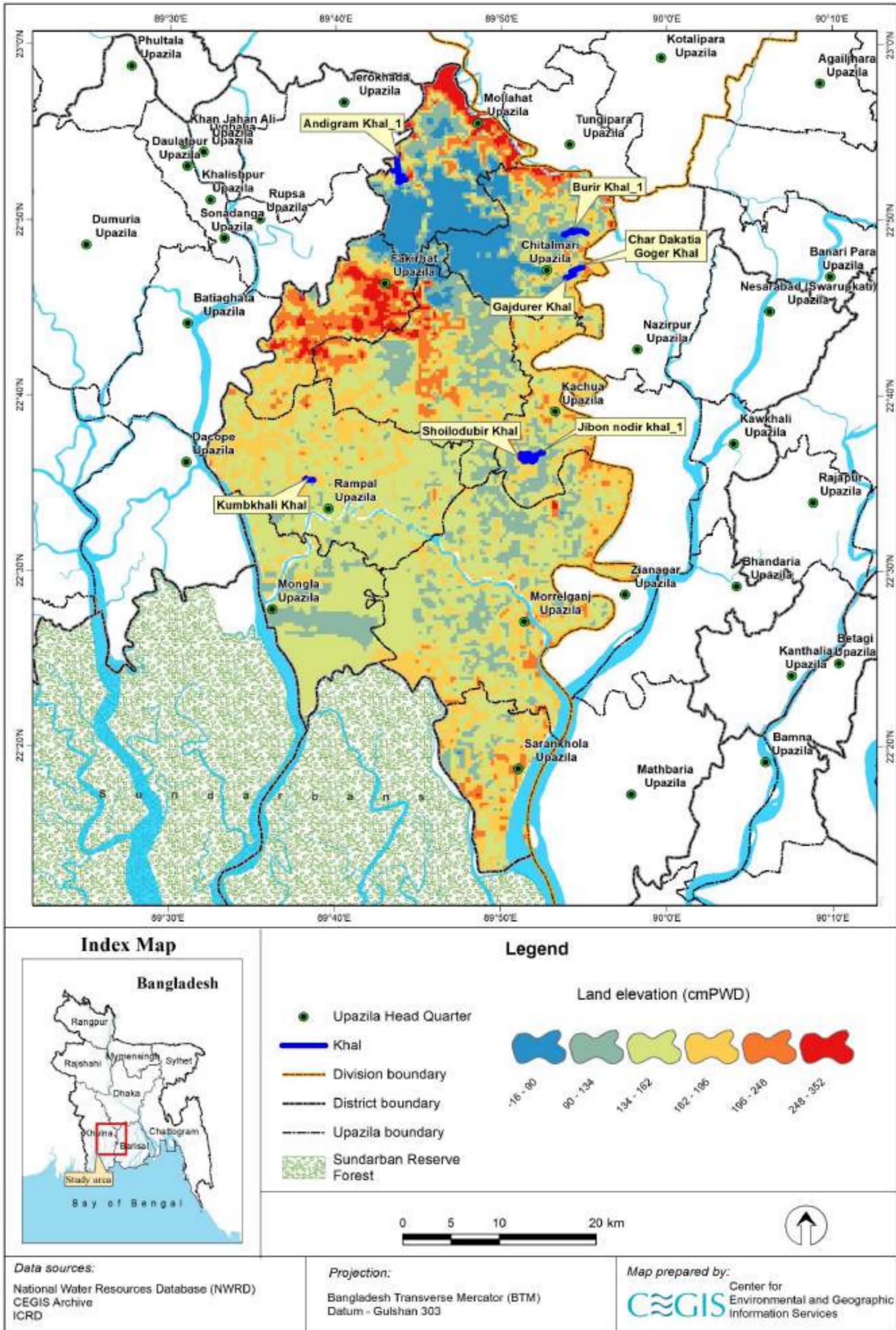


Figure A16.5: Topographic Map of Bagerhat District

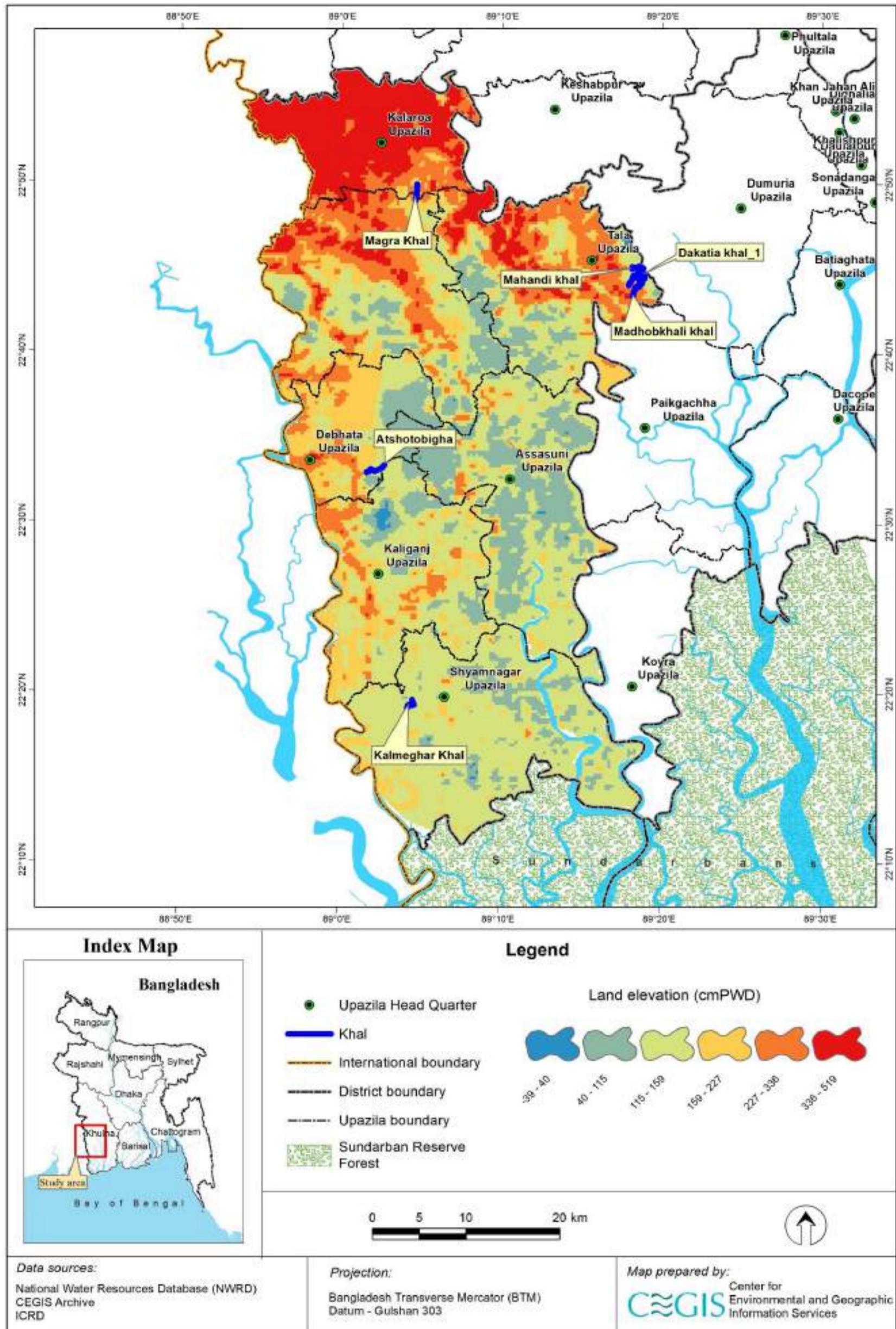
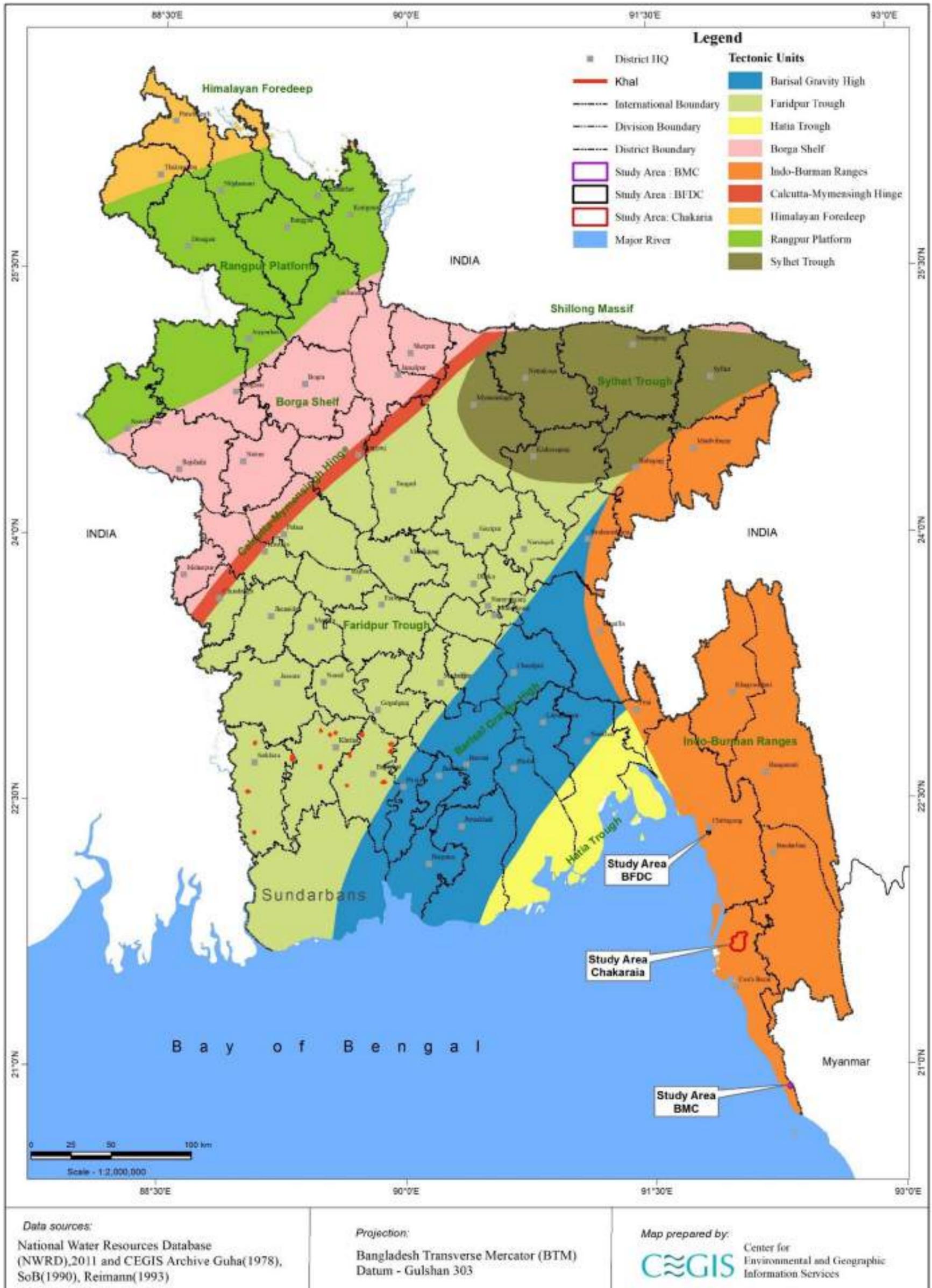


Figure A16.6: Topographic Map of Satkhira District

Annex 17: Tectonic Map of Bangladesh Showing the Study Areas



Annex 18: Physiographic Units Maps

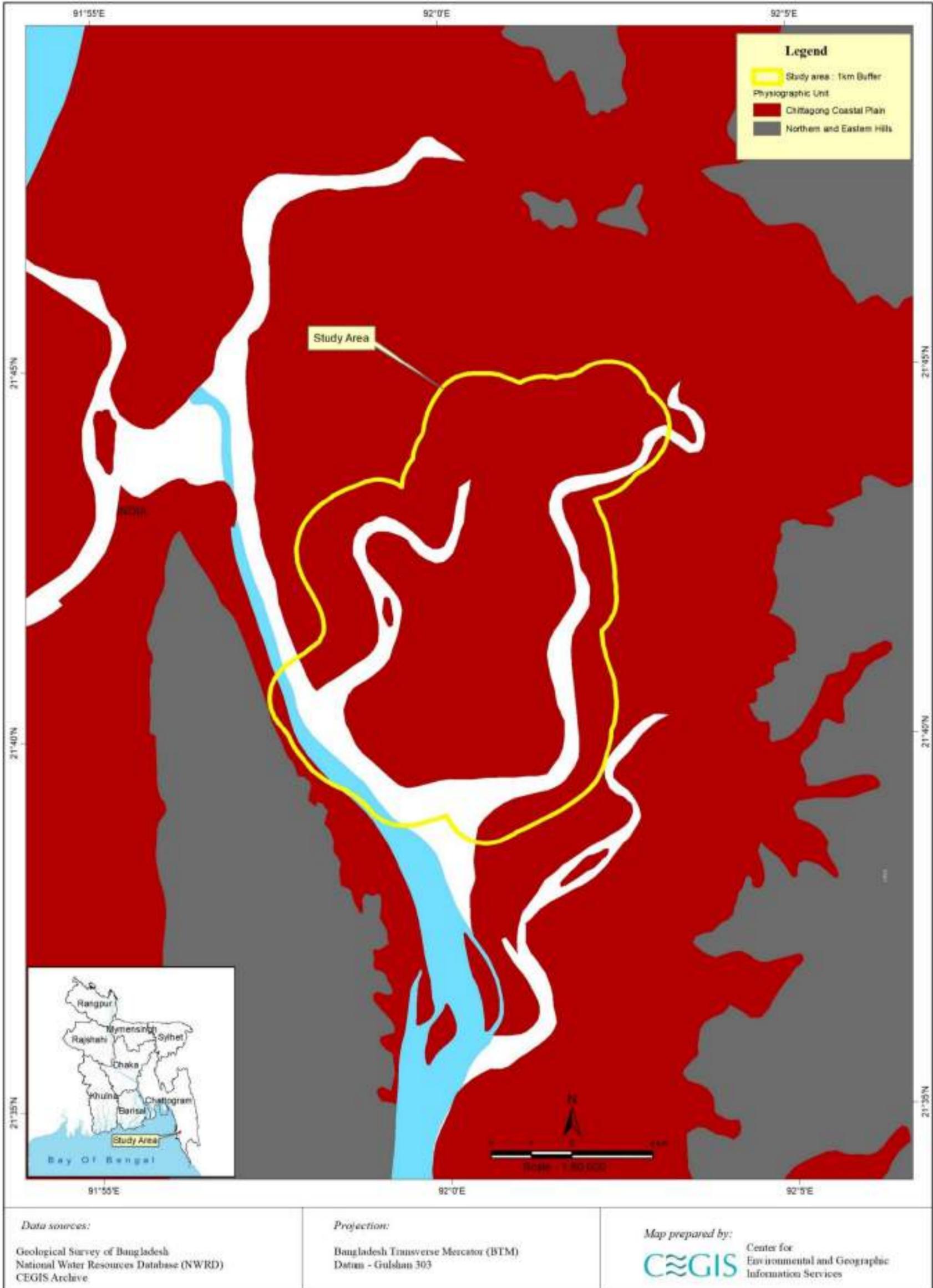


Figure A18.1: Physiographic Units of the Study Area of Chakaria Shrimp Estate

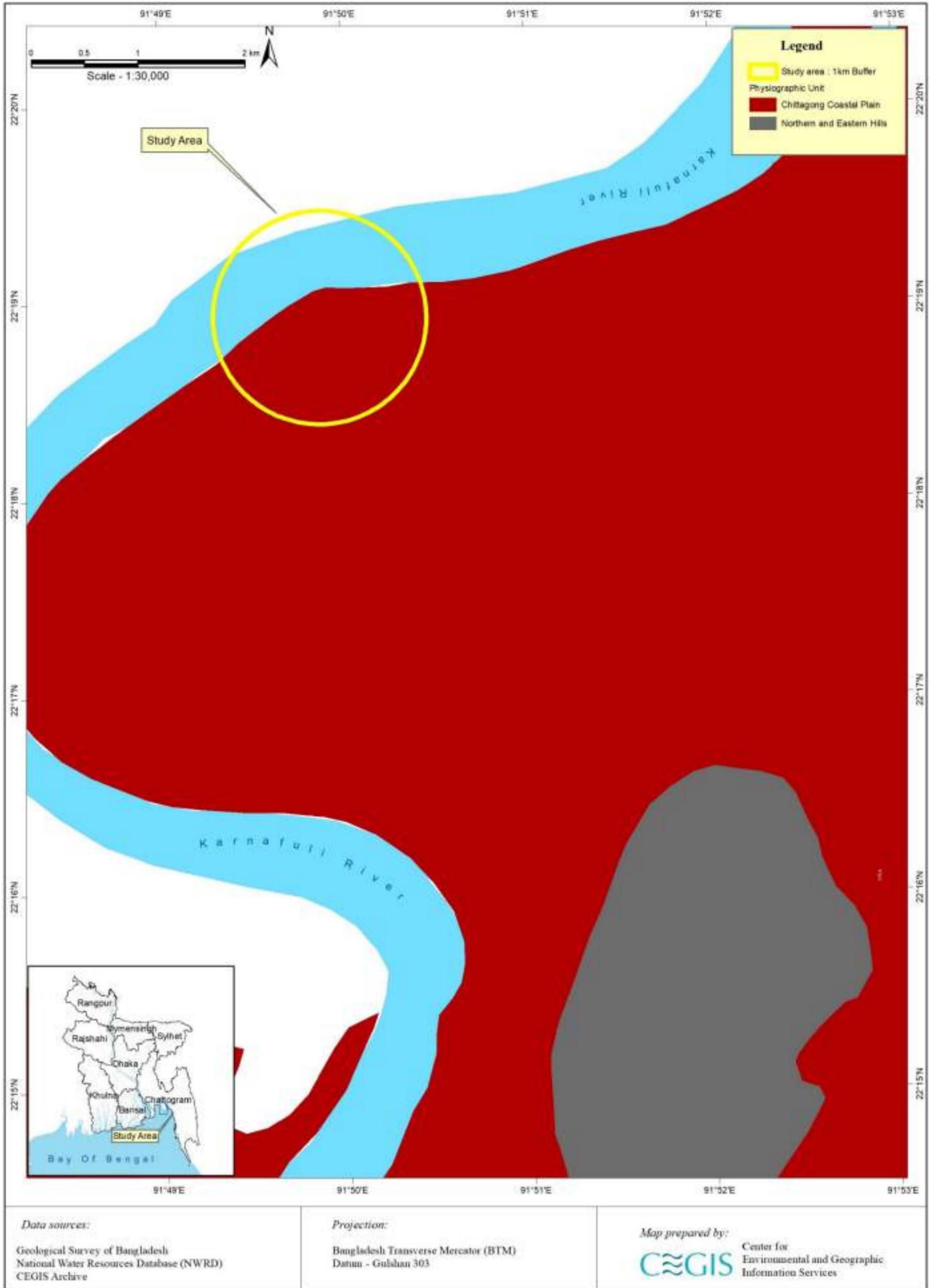


Figure A18.2: Physiographic Units of the Study Area of BFDC Harbor at Chattogram

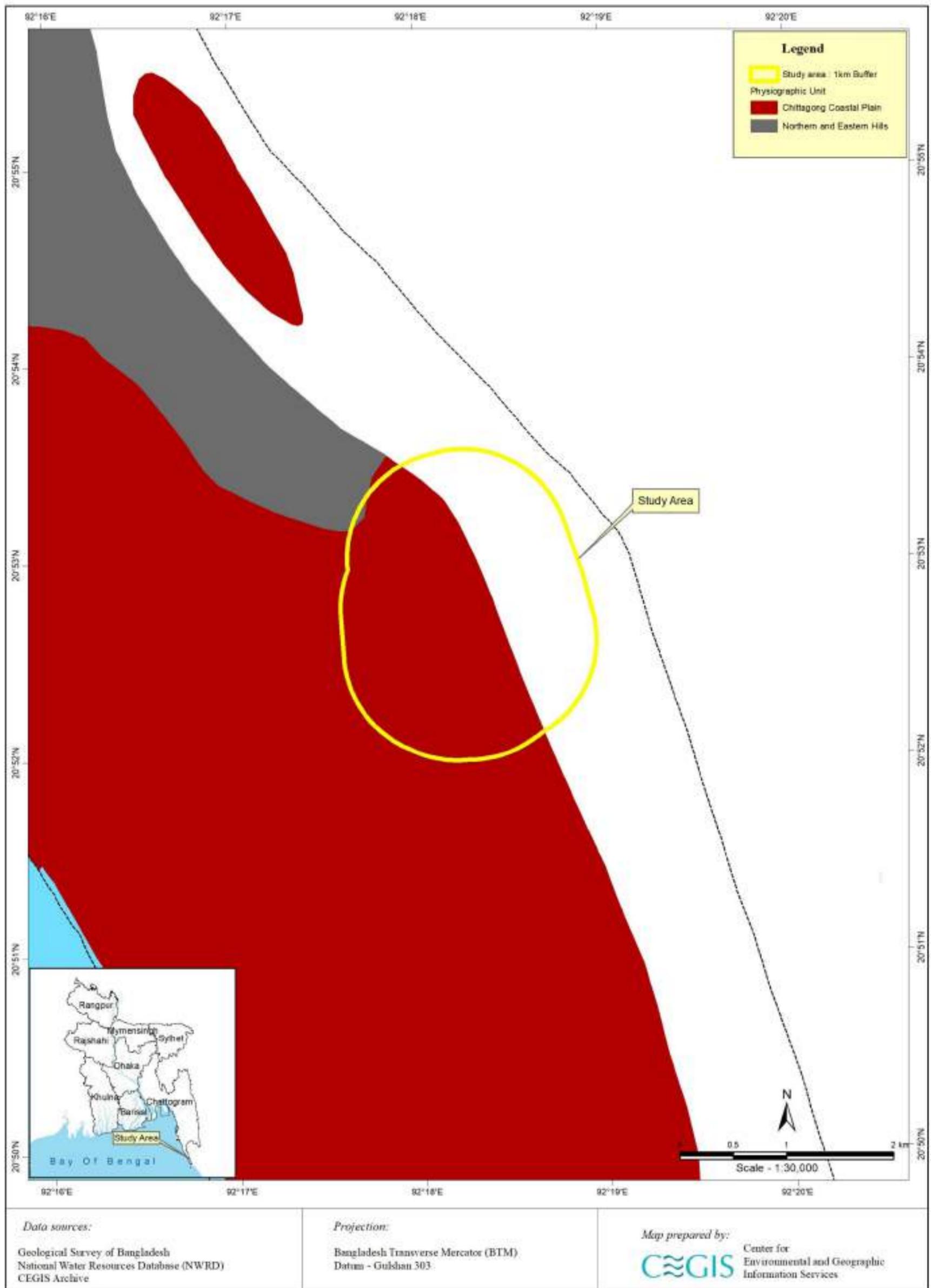


Figure A18.3: Physiographic Units of the Study Area of BMC at DFTC, Teknaf

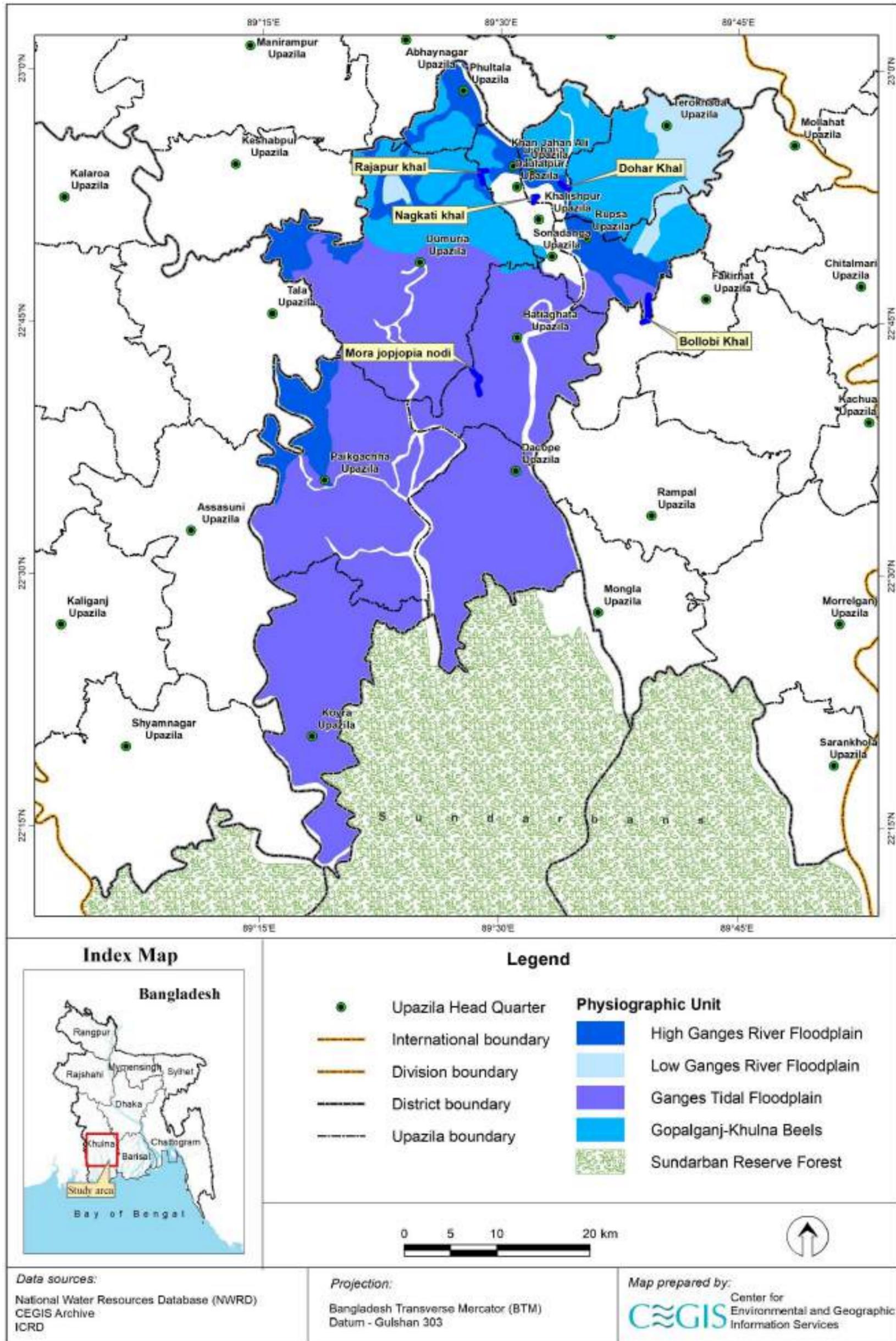


Figure A18.4: Physiographic Units of the Catchment Areas of the Canals under Khulna District

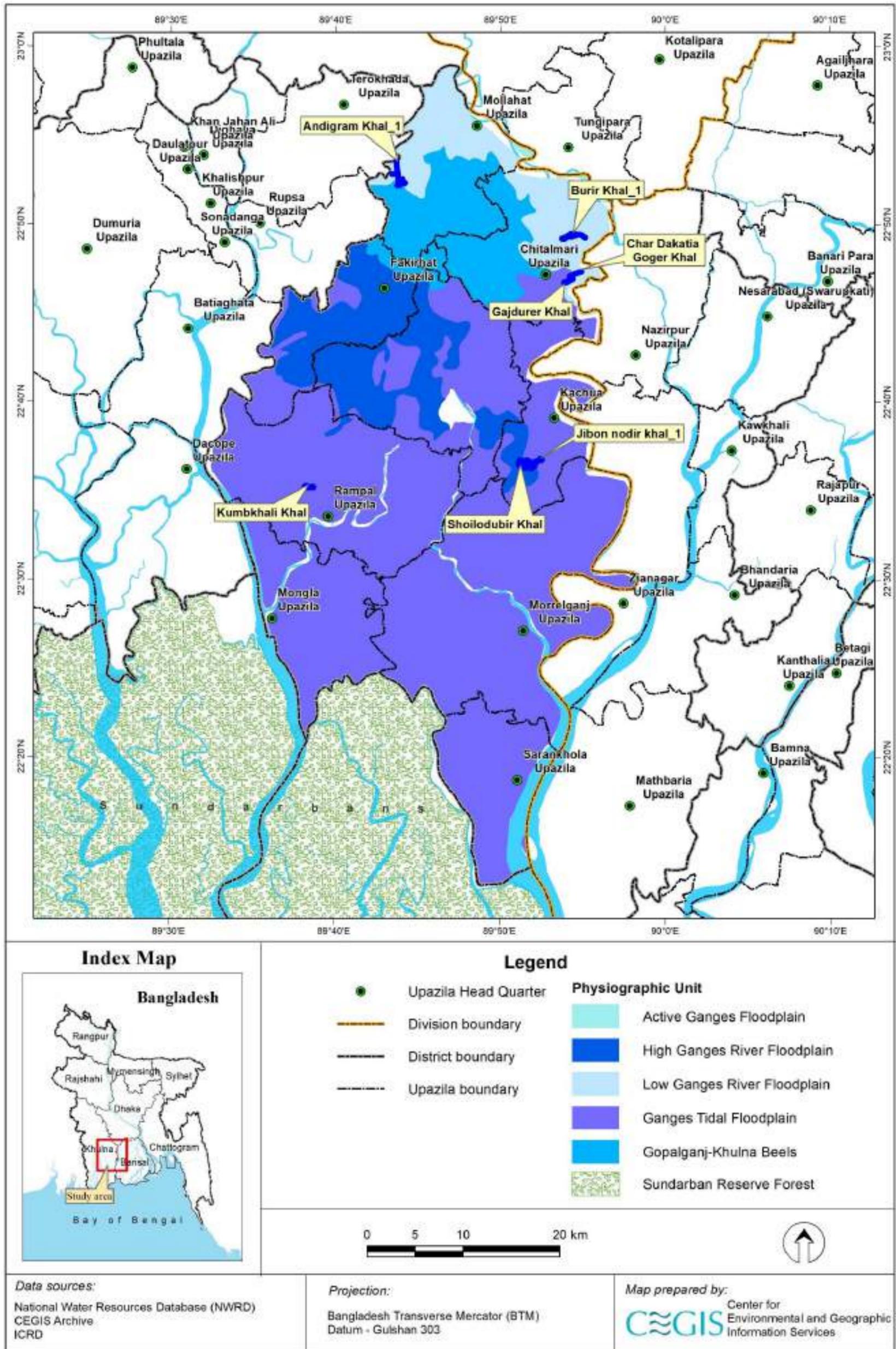


Figure A18.5: Physiographic Units of the Catchment Areas of the Canals under Bagerhat District

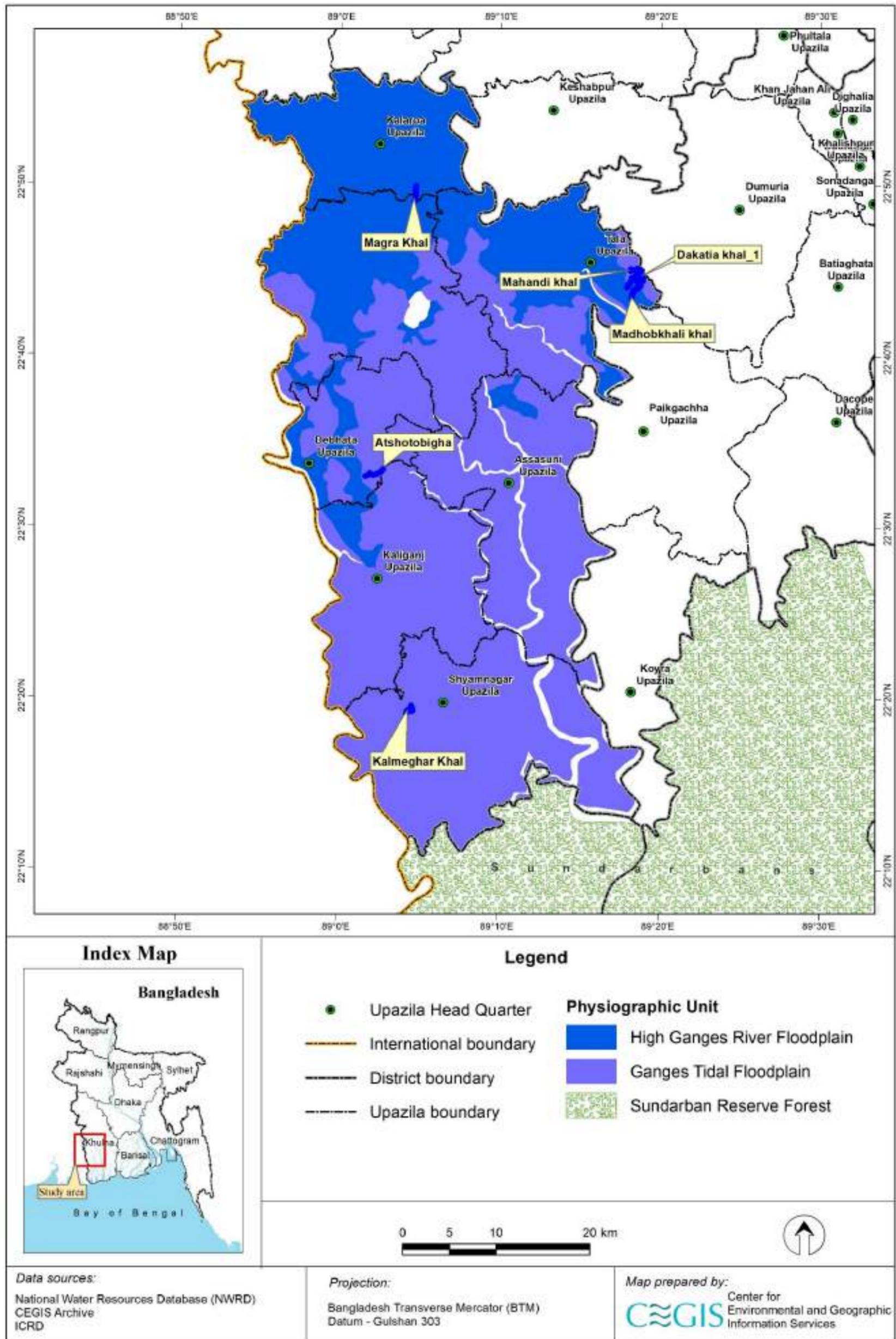
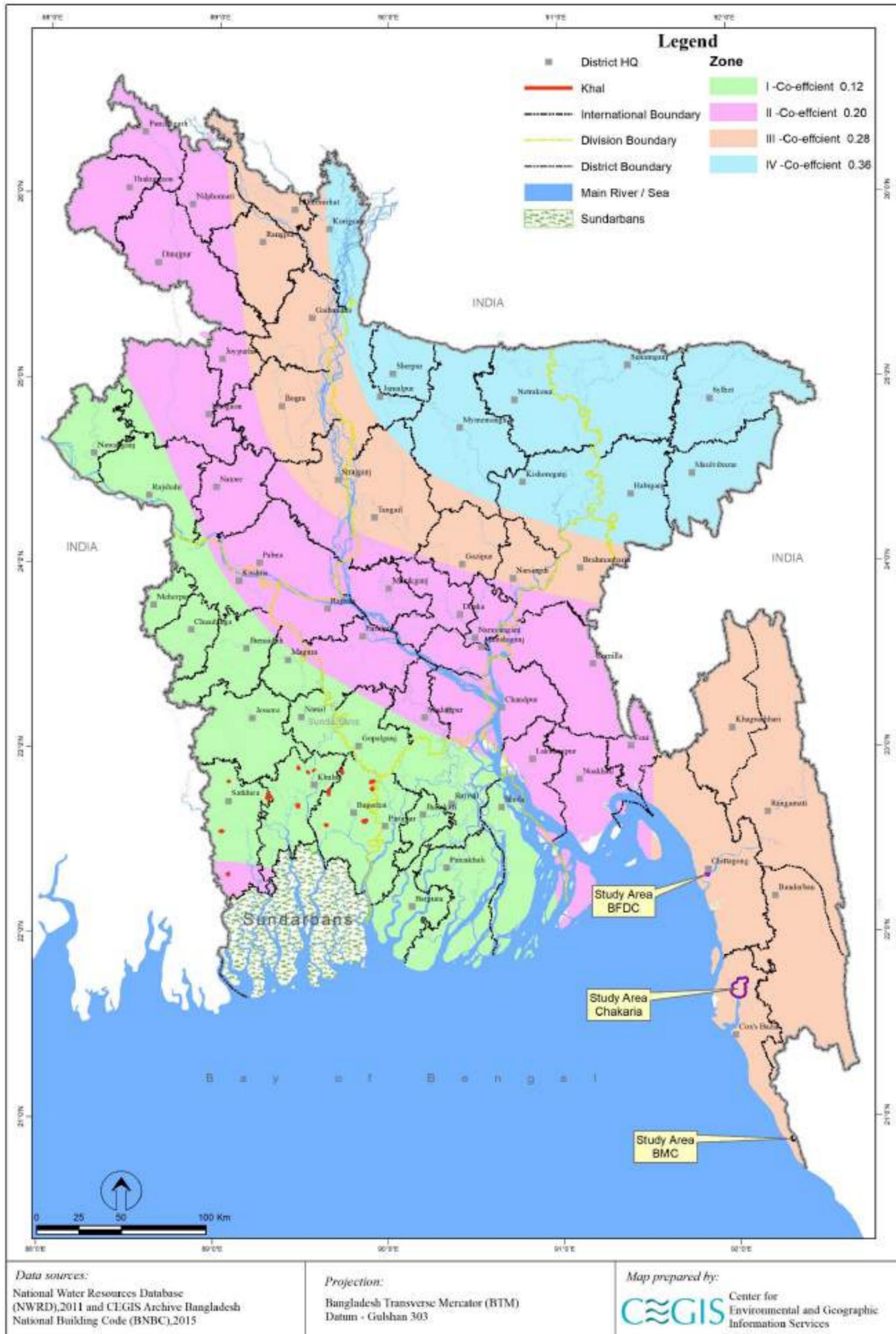


Figure A18.6: Physiographic Units of the Catchment Areas of the Canals under Satkhira District

Annex 19: Seismic Zoning Map of Bangladesh Showing all the Study Areas



Annex 20: AEZ Maps of the Study Areas of the Sub-Project Sites

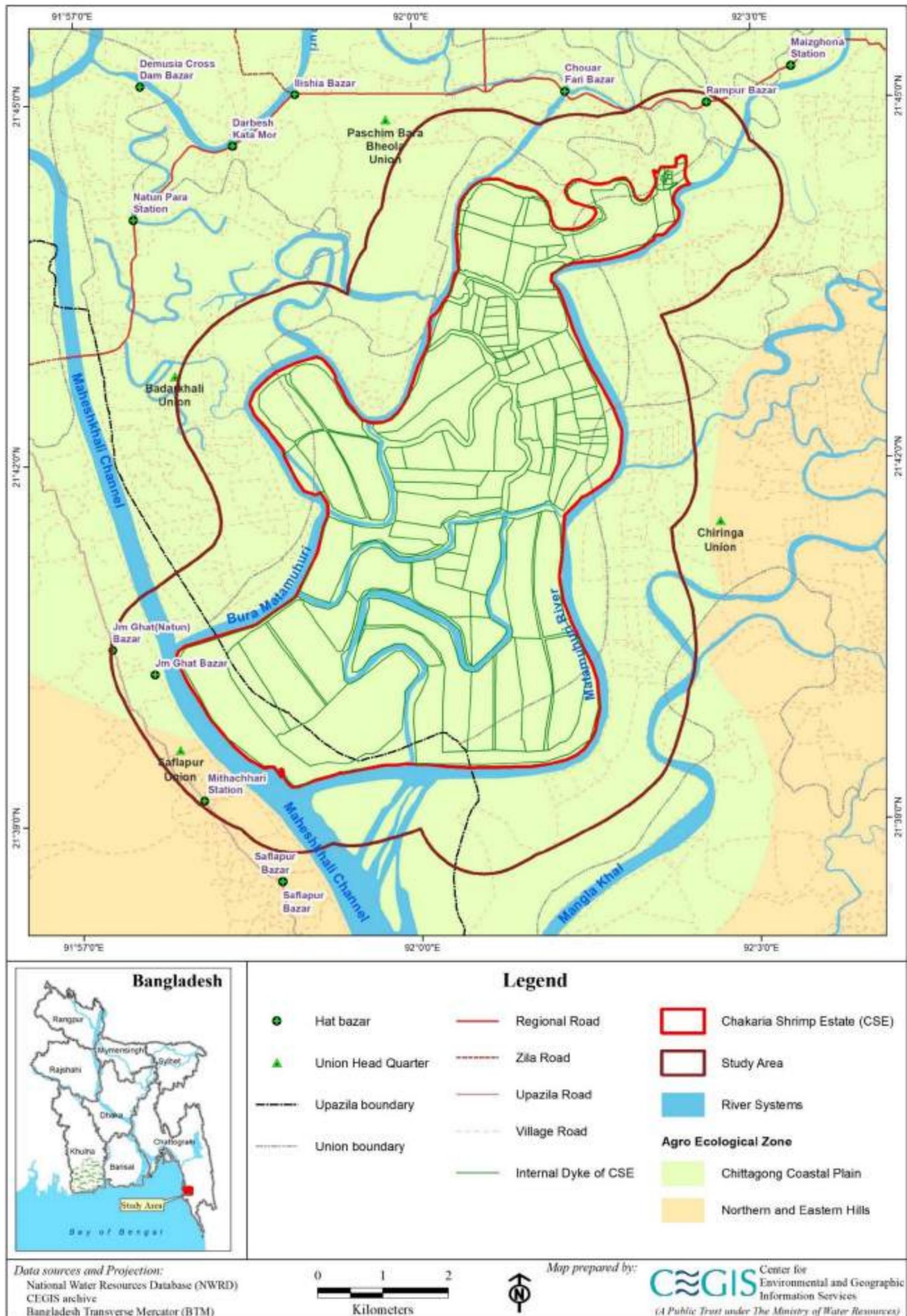


Figure A20.1: AEZ Map of the Study Area under Chakaria Shrimp Estate

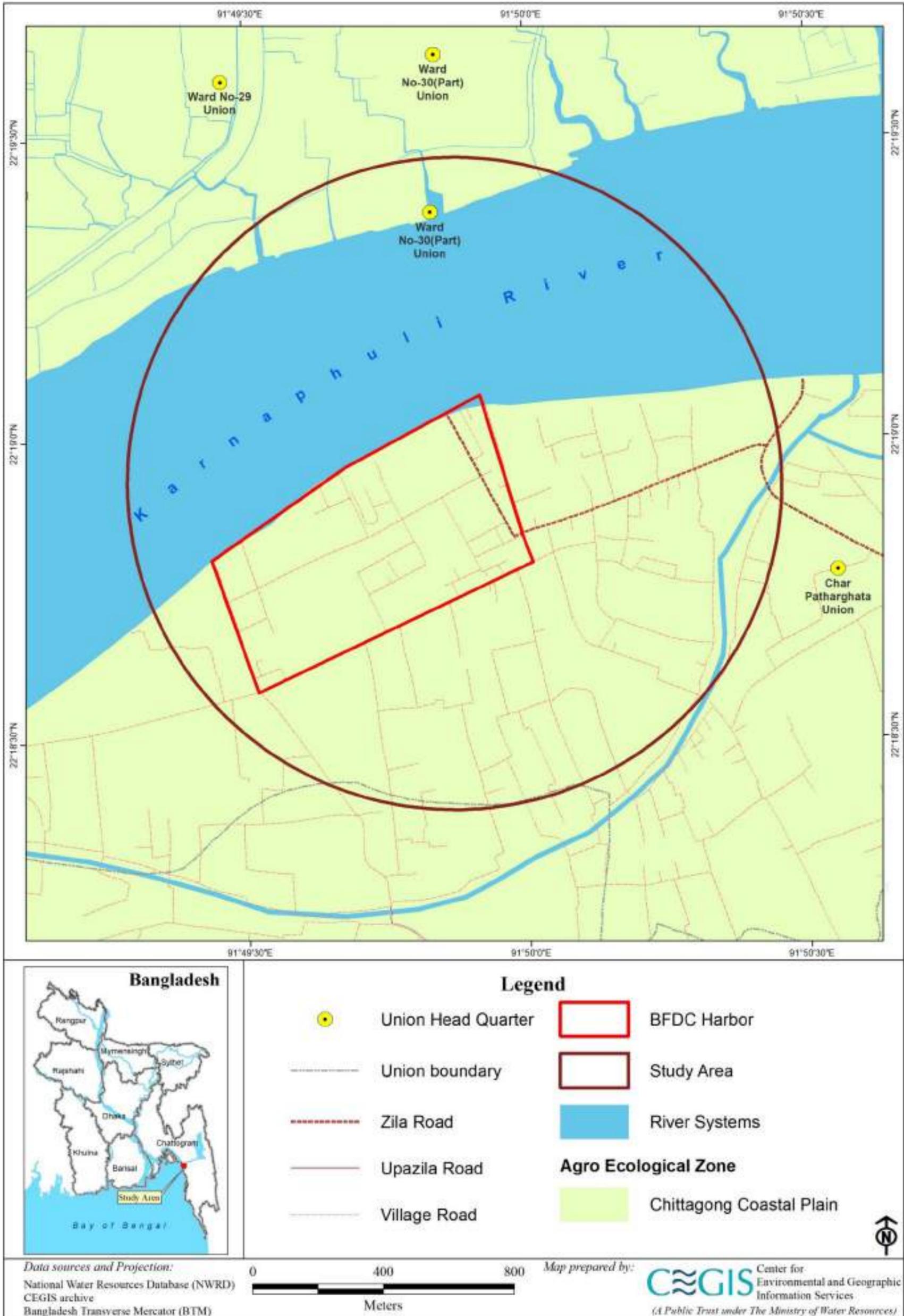


Figure A20.2: AEZ Map of the Study Area of the BFDC Harbor at Chattogram

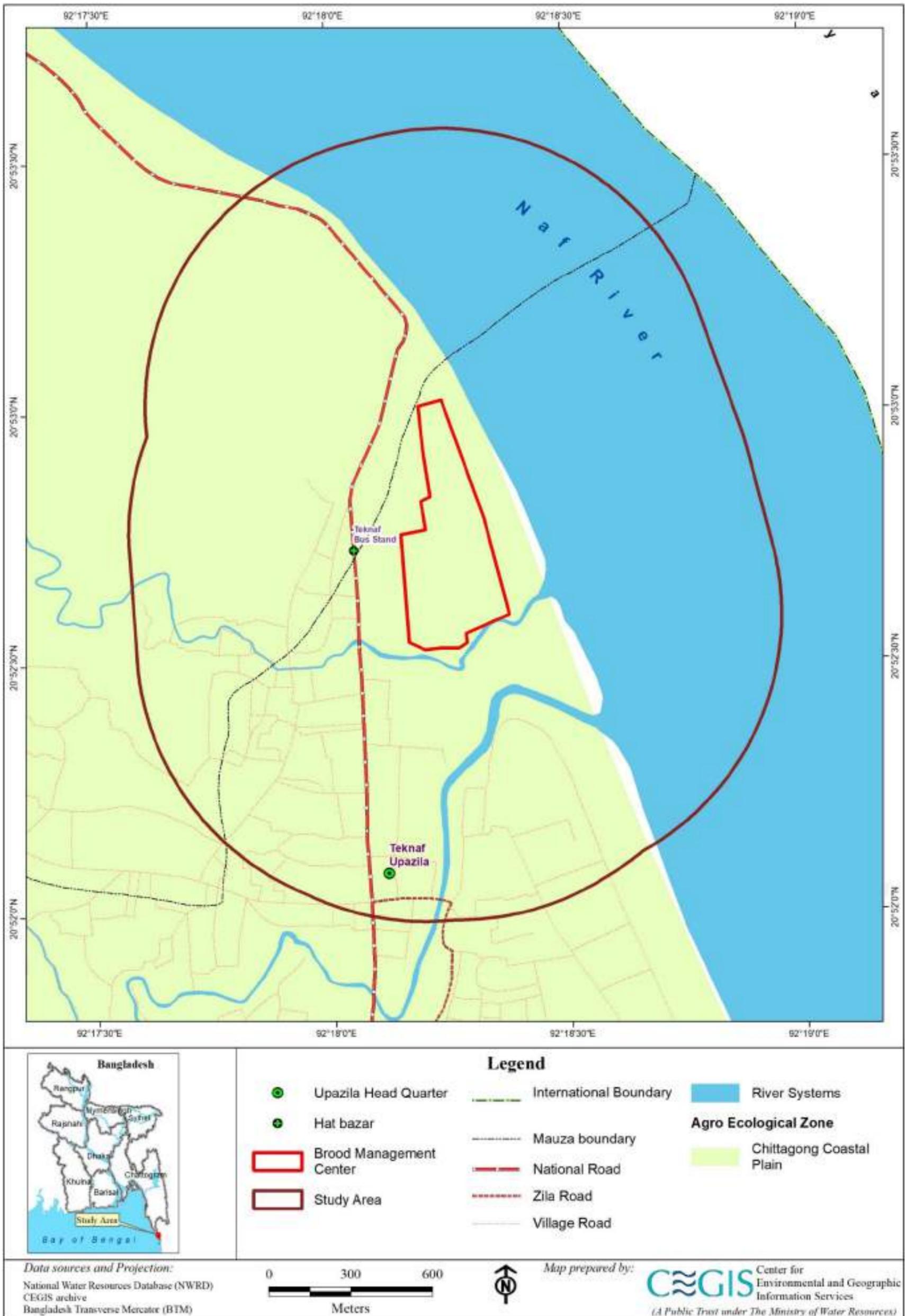


Figure A20.3: AEZ Map of the Study Area of the BMC Area at DFTC, Teknaf

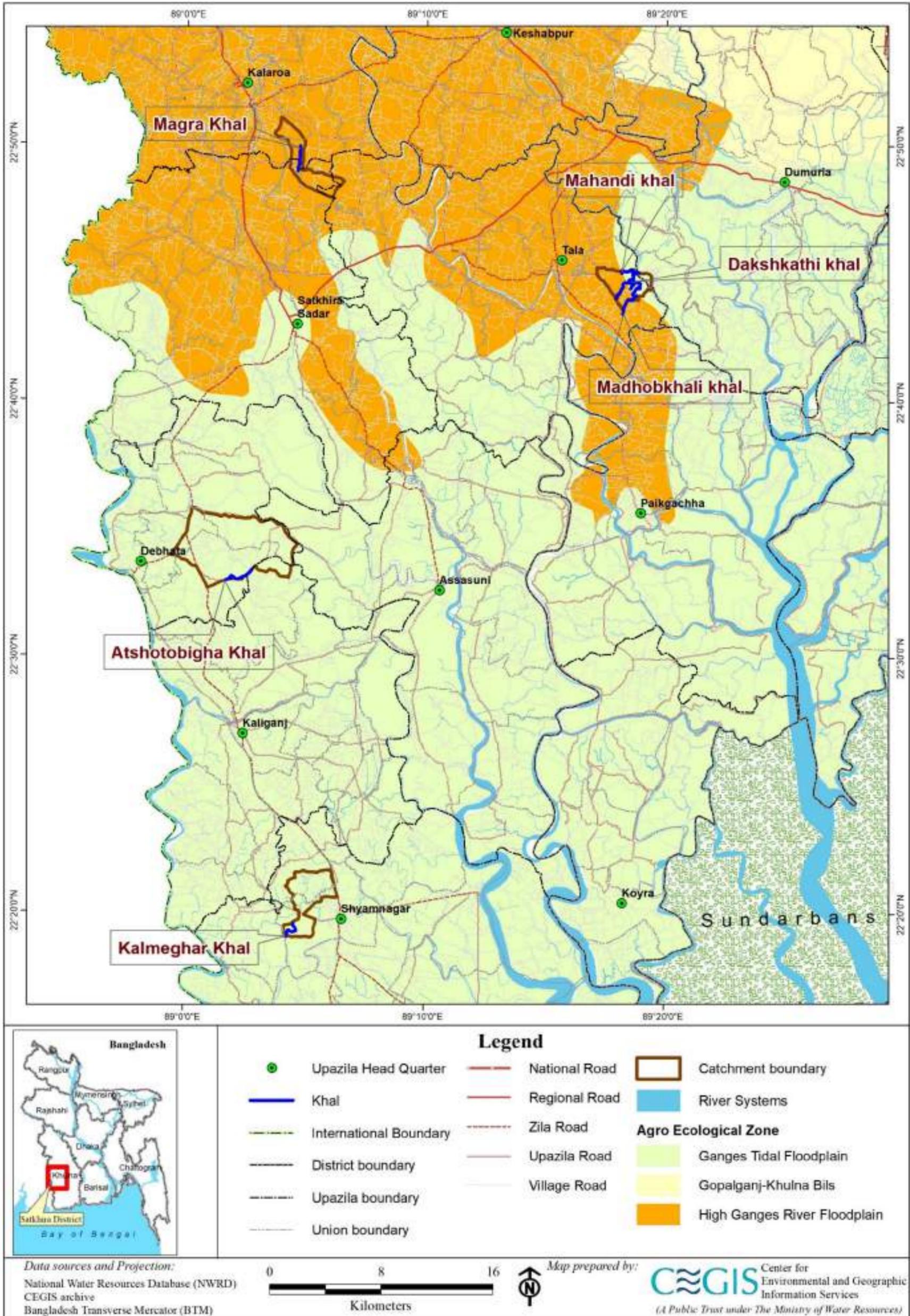


Figure A20.4: AEZ Map of the Catchment Areas of the Canals under Satkhira District

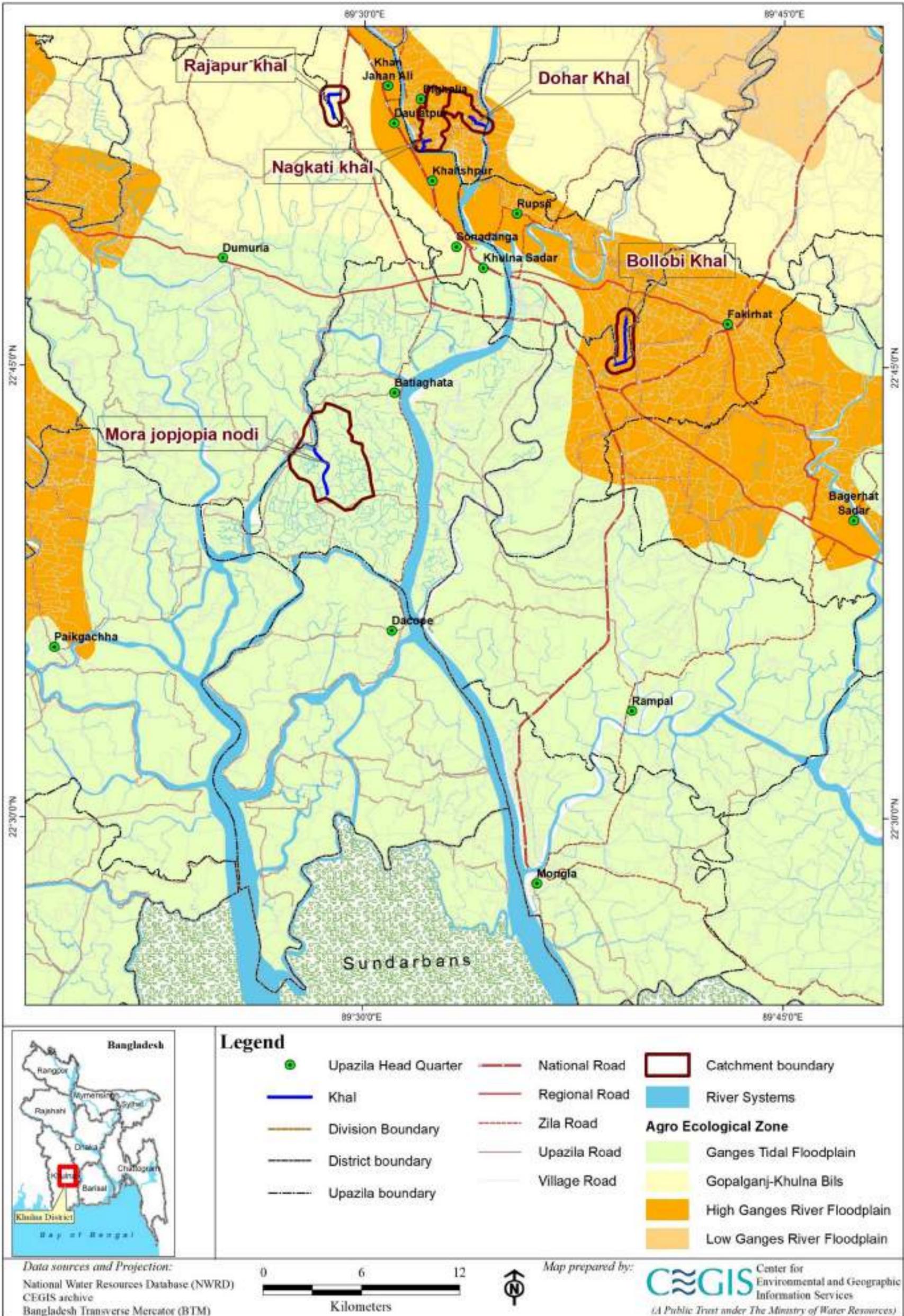


Figure A20.5: AEZ Map of the Catchment Areas of the Canals under Khulna District

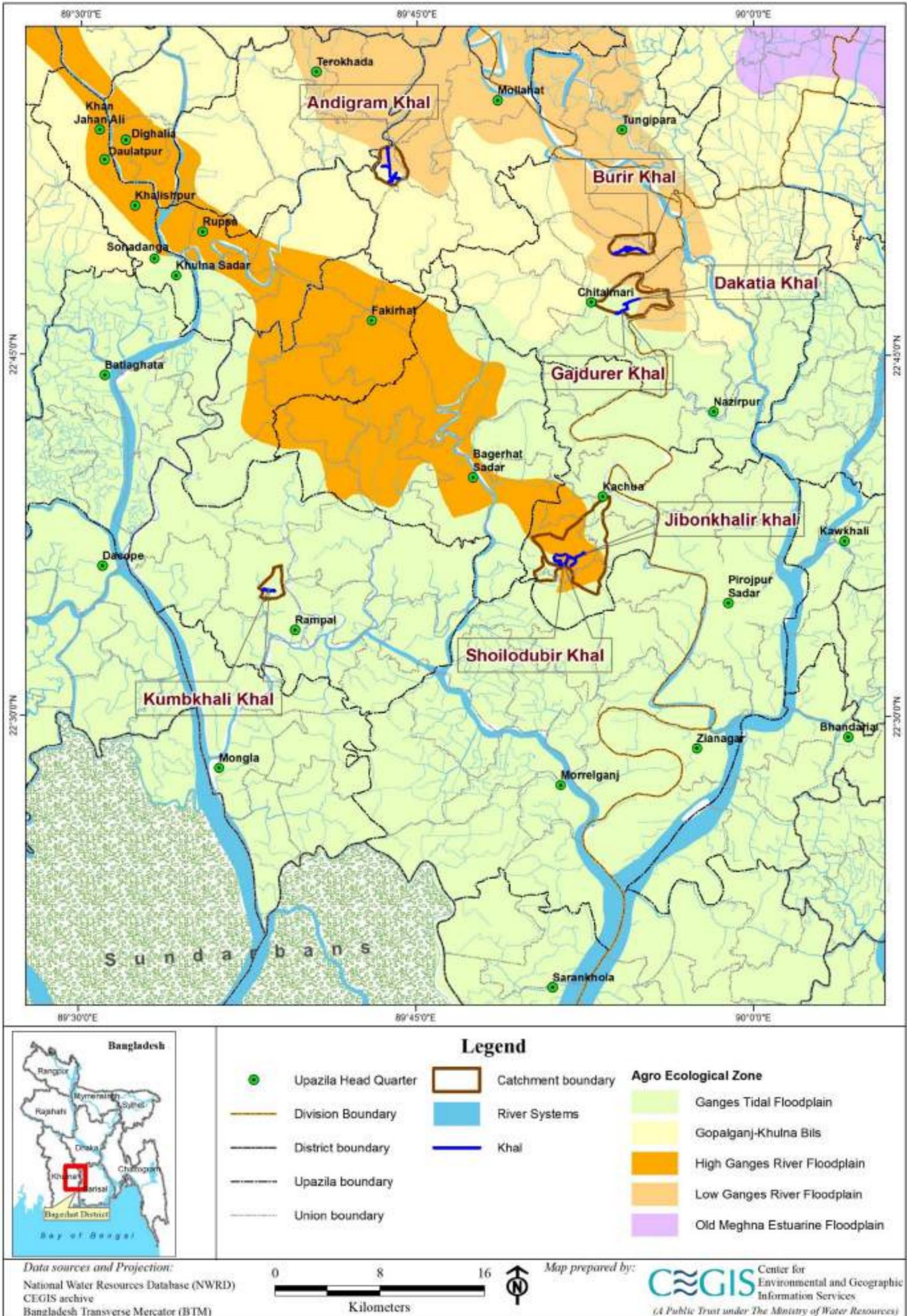


Figure A20.6: AEZ Map of the Catchment Areas of the Canals under Bagerhat District

Annex 21: Land Types Maps of the Study Areas of the Sub-Project Sites

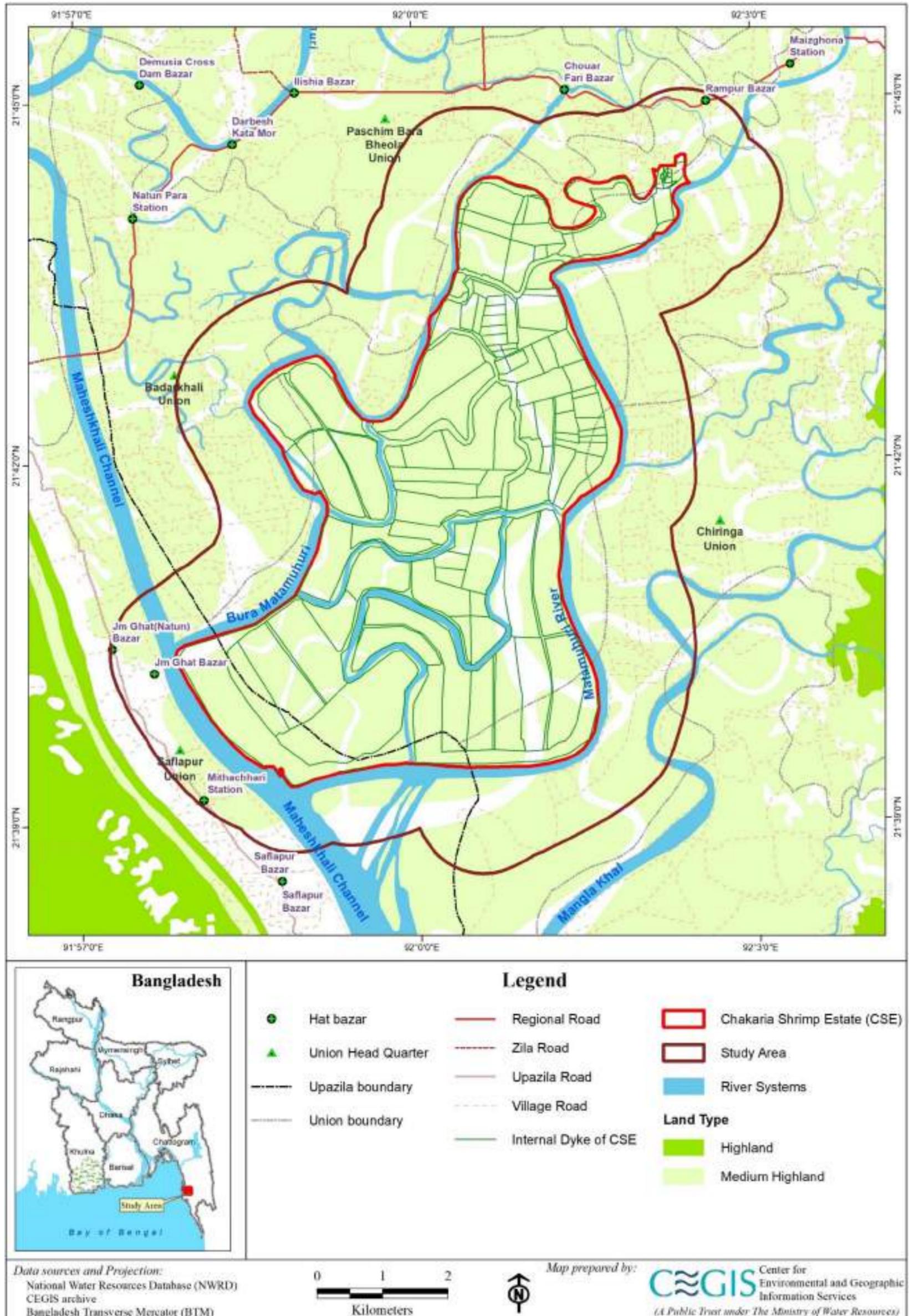


Figure A21.1: Land Types Map of the Study Area under Chakaria Shrimp Estate

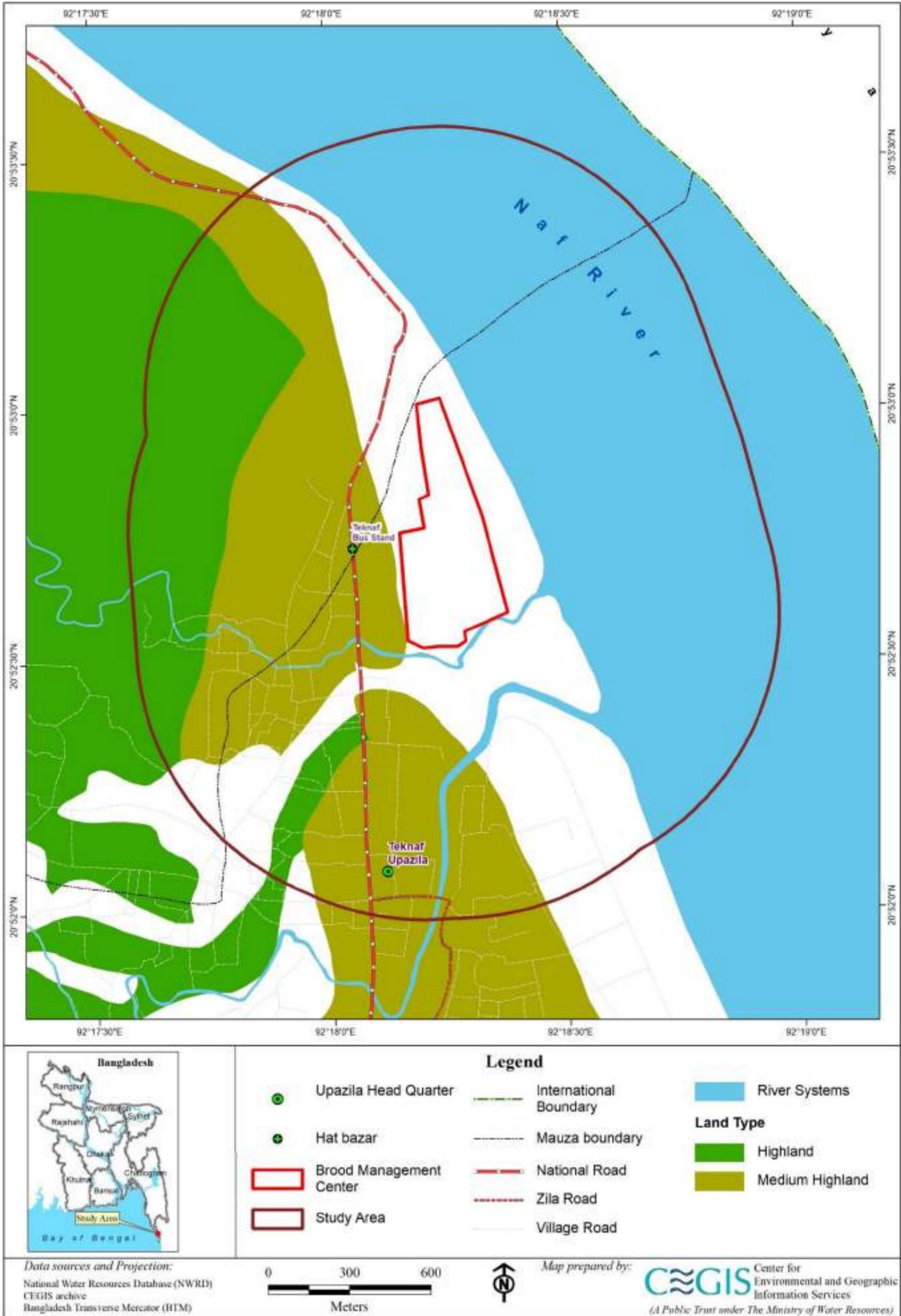


Figure A21.2: Land Types Map of the Study Area of the BMC Area at DFTC, Teknaf

Annex 22: Soil Texture Maps of the Study Areas of the Sub-Project Sites

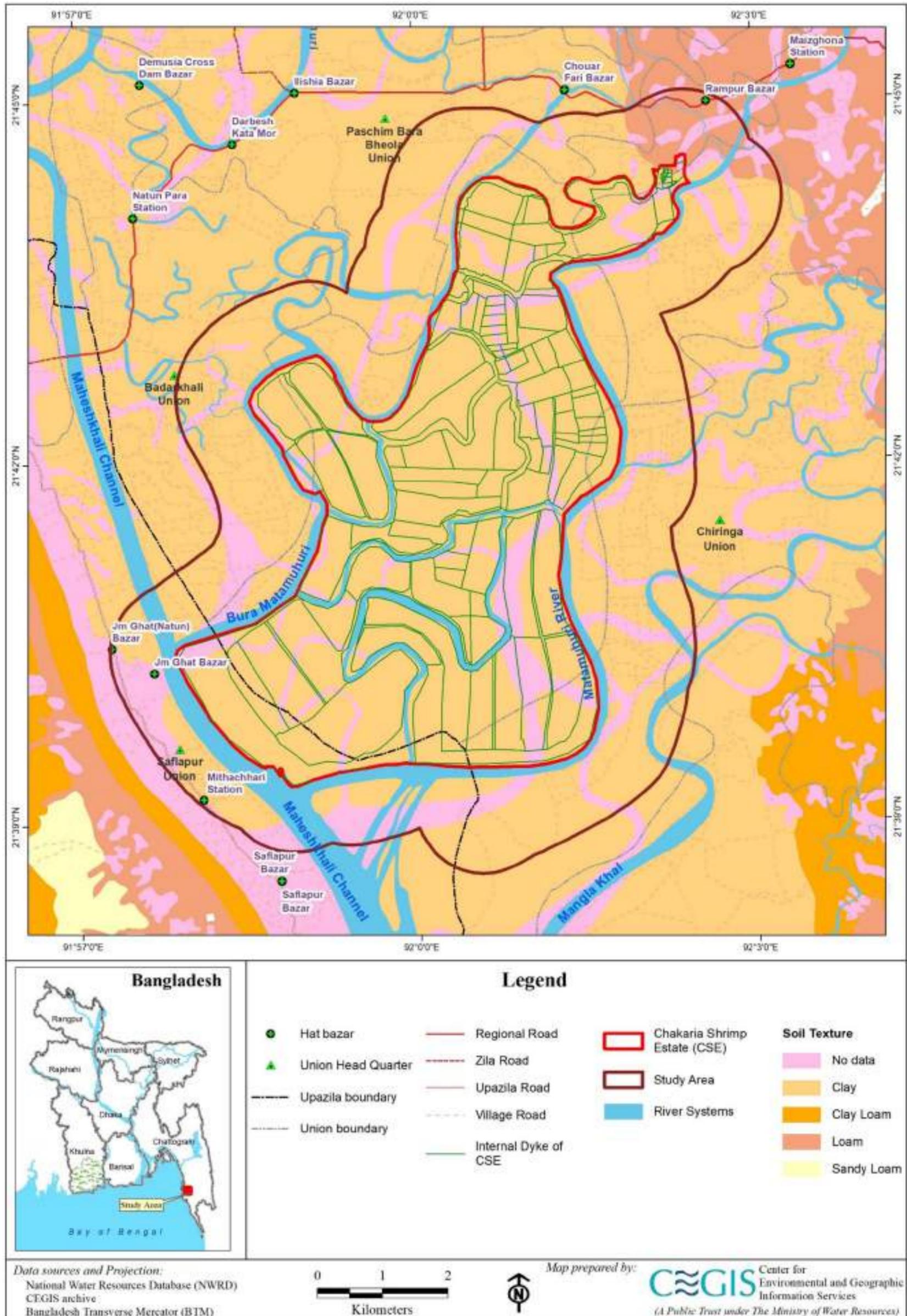


Figure A22.1: Soil Texture Map of the Study Area under Chakaria Shrimp Estate

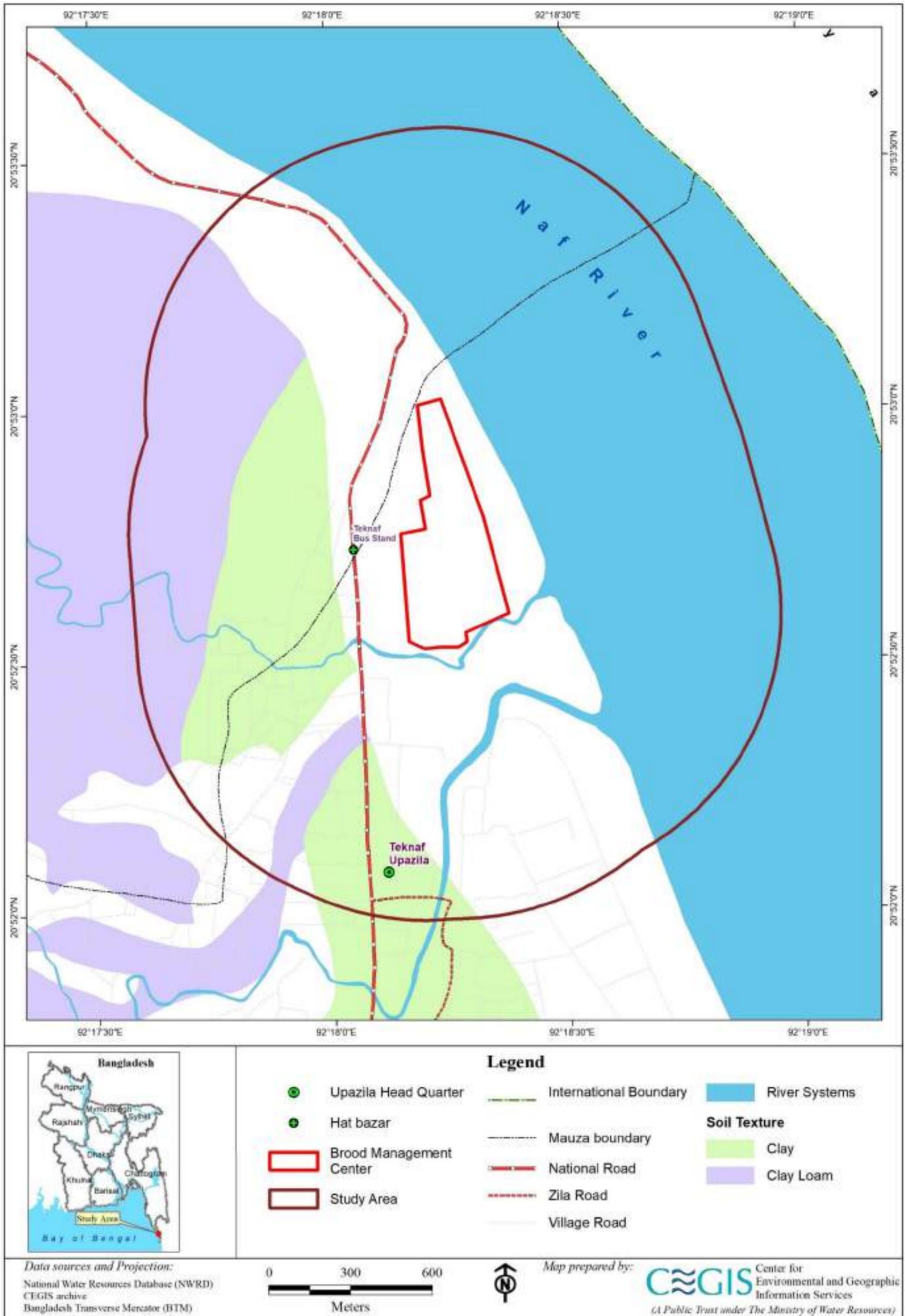


Figure A22.2: Soil Texture Map of the Study Area of BMC Area at DFTC, Teknaf

Annex 23: Land Use and Land Cover Maps of the Study Areas of the Sub-Project Sites

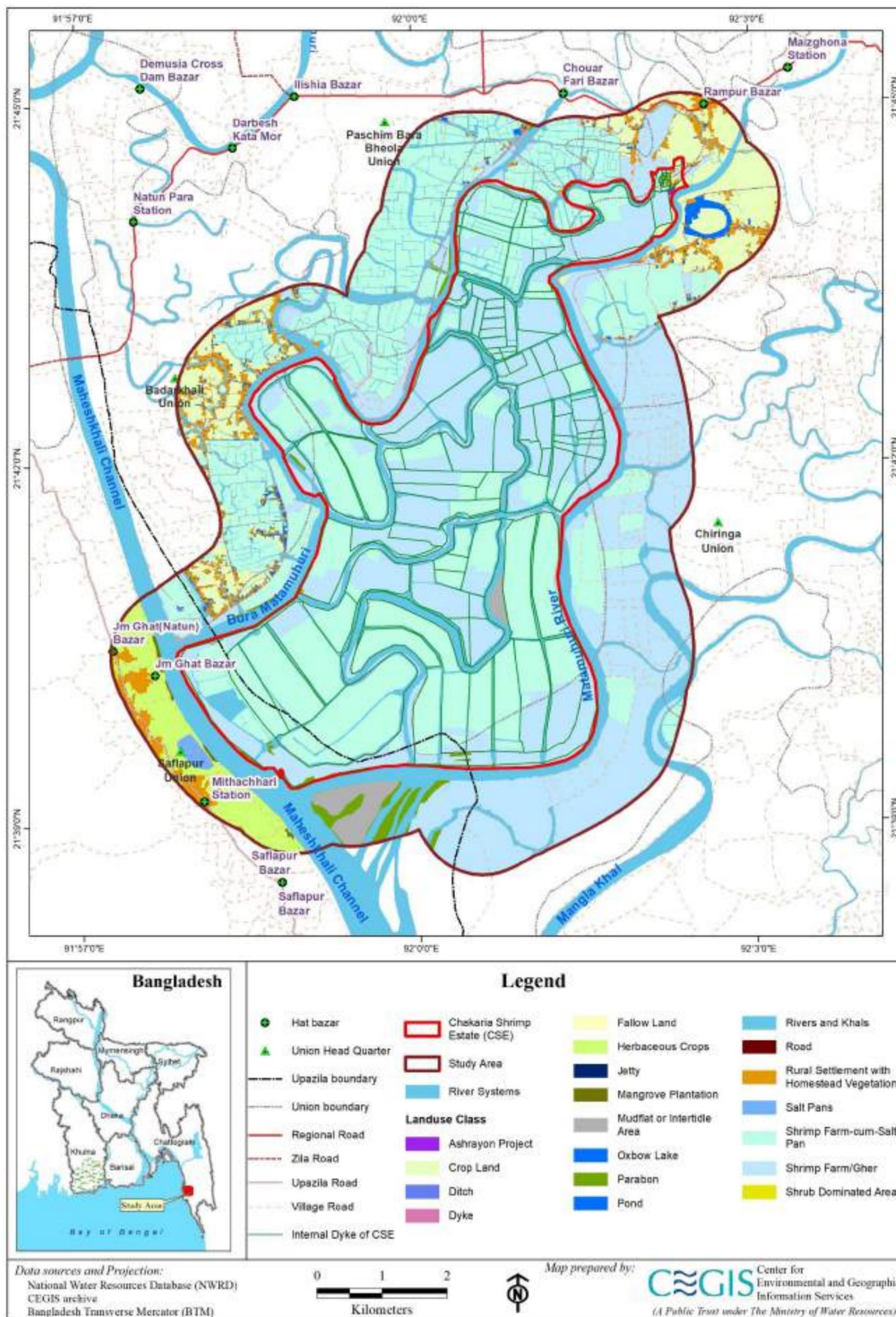


Figure A23.1: Land Use and Land Cover Map of the Study Area of Chakaria Shrimp Estate

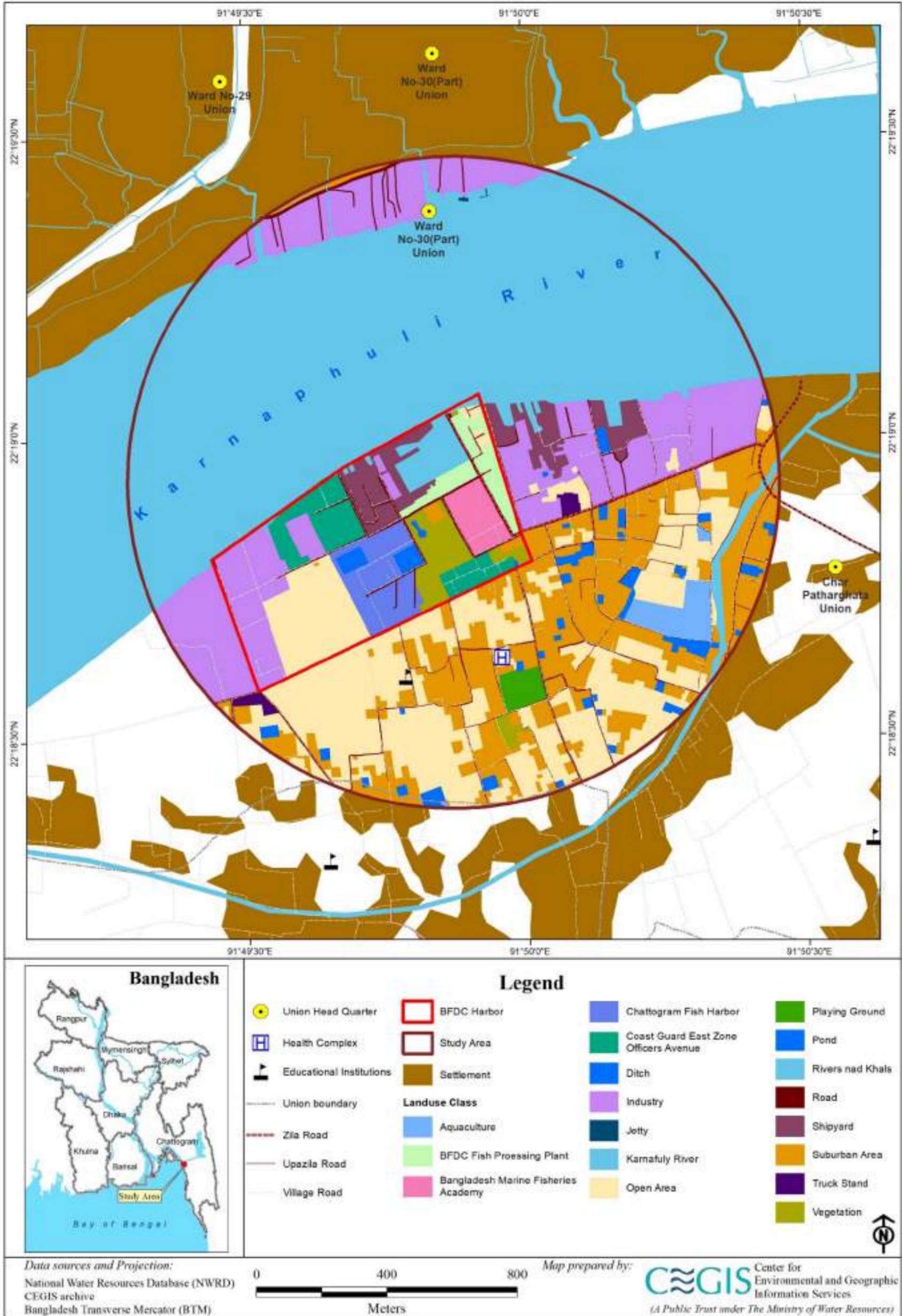


Figure A23.2: Land Use and Land Cover Map of the Study Area of BFDC Harbor at Chattogram

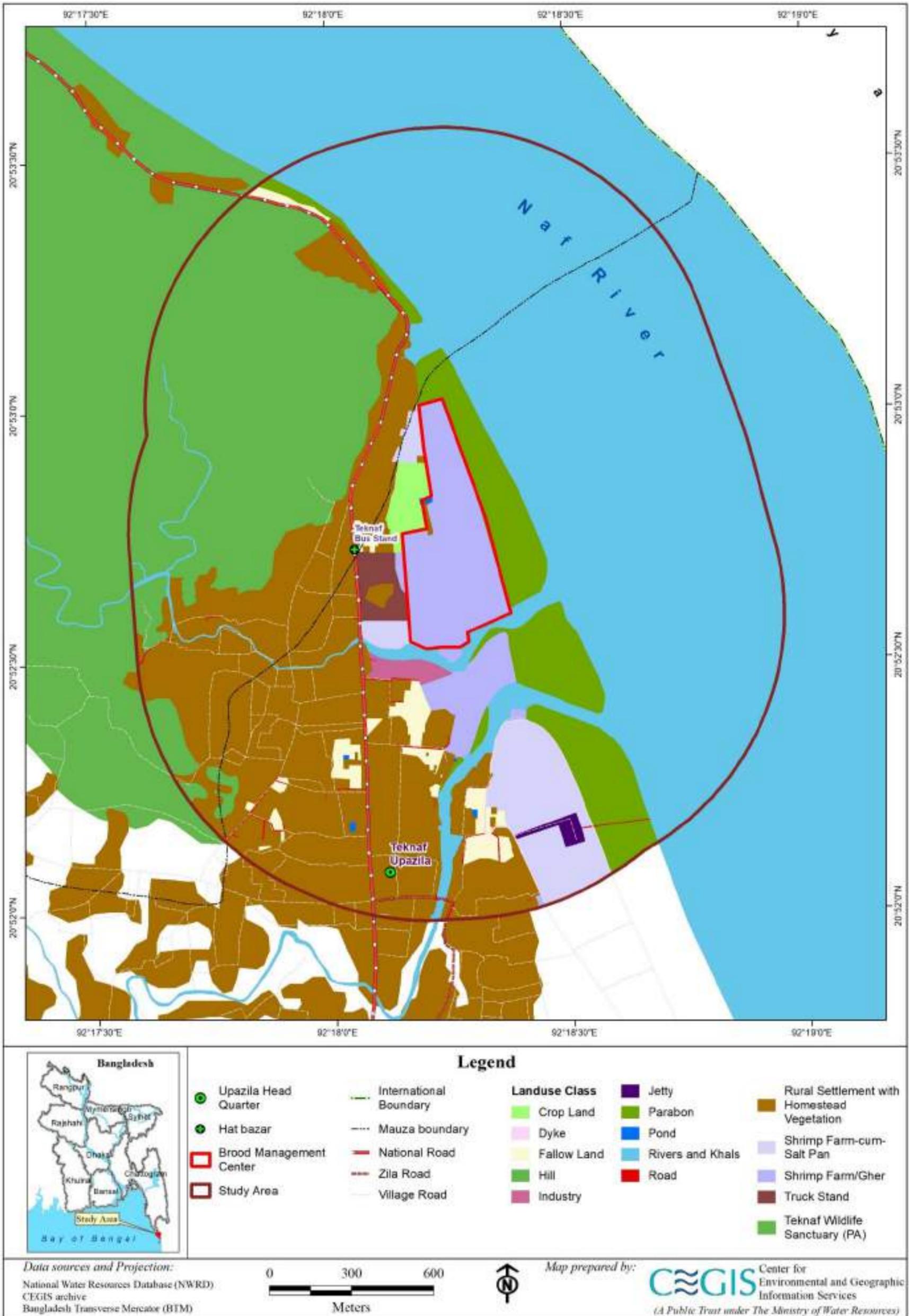


Figure A23.3: Land Use and Land Cover Map of the Study Area of BMC Area at DFTC, Teknaf

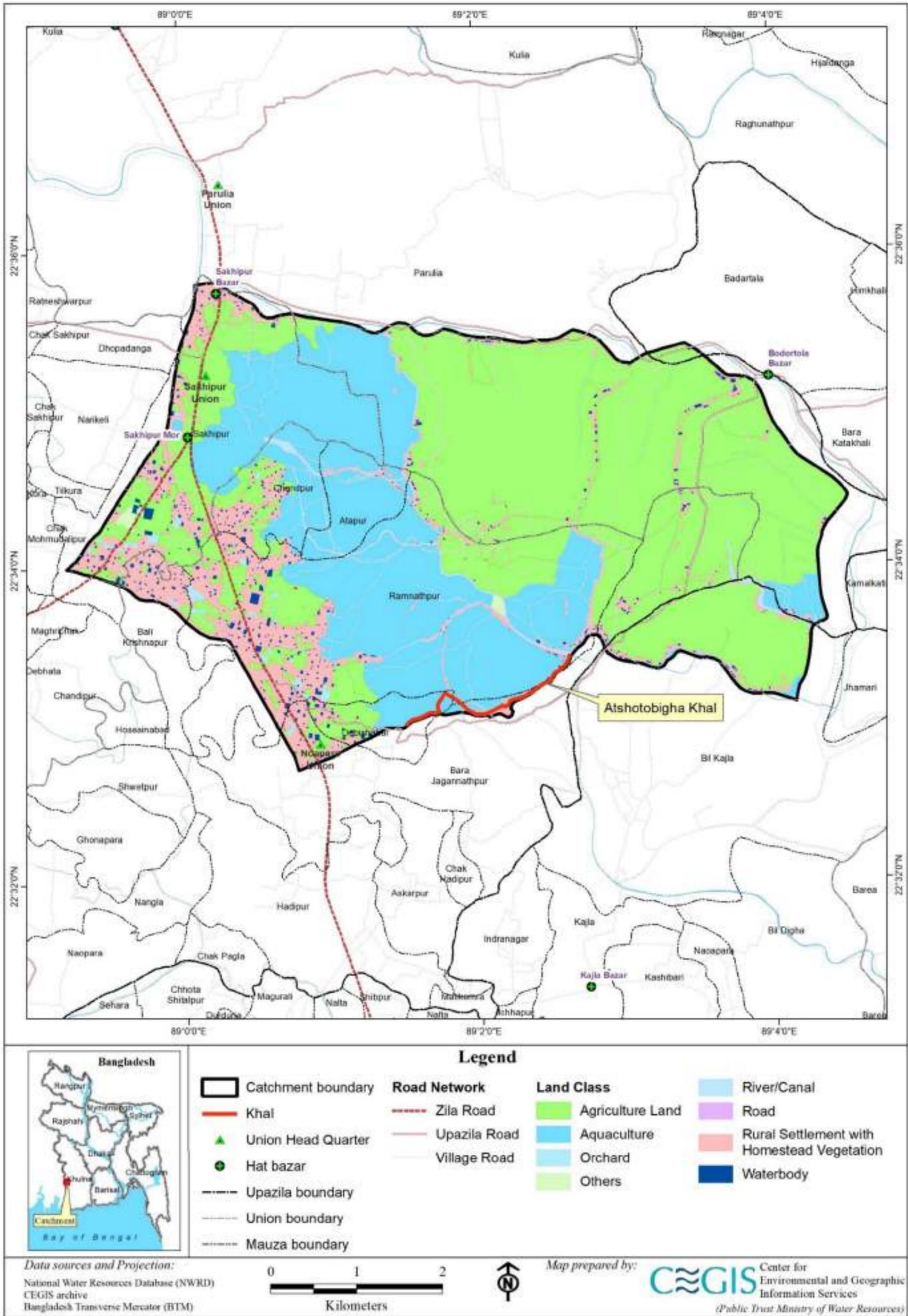


Figure A23.4: Land Use and Land Cover Map of the Catchment Area of Atshotobigha Khal, Satkhira District

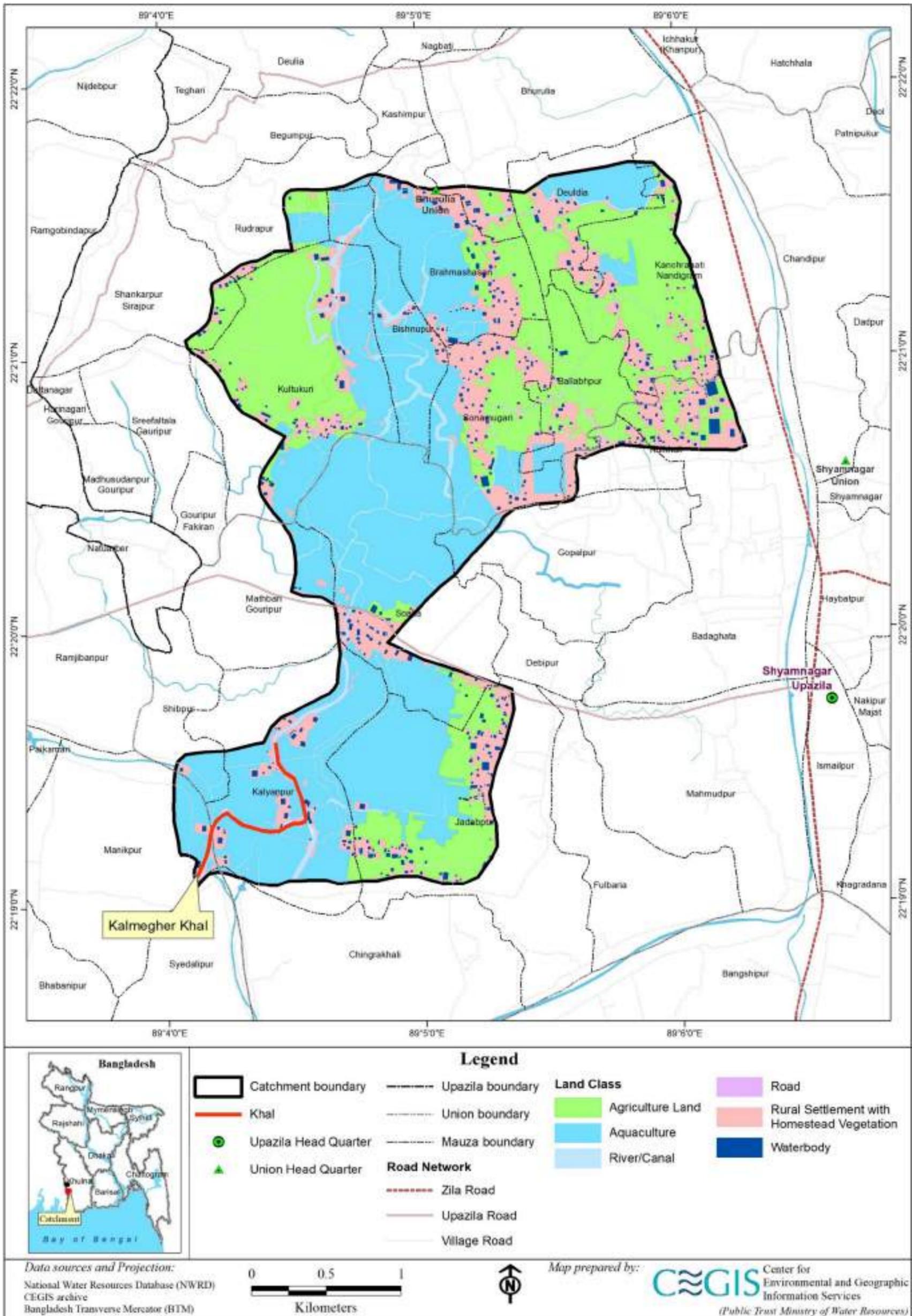


Figure A23.5: Land Use and Land Cover Map of the Catchment Area of Kalmegher Khal, Satkhira District

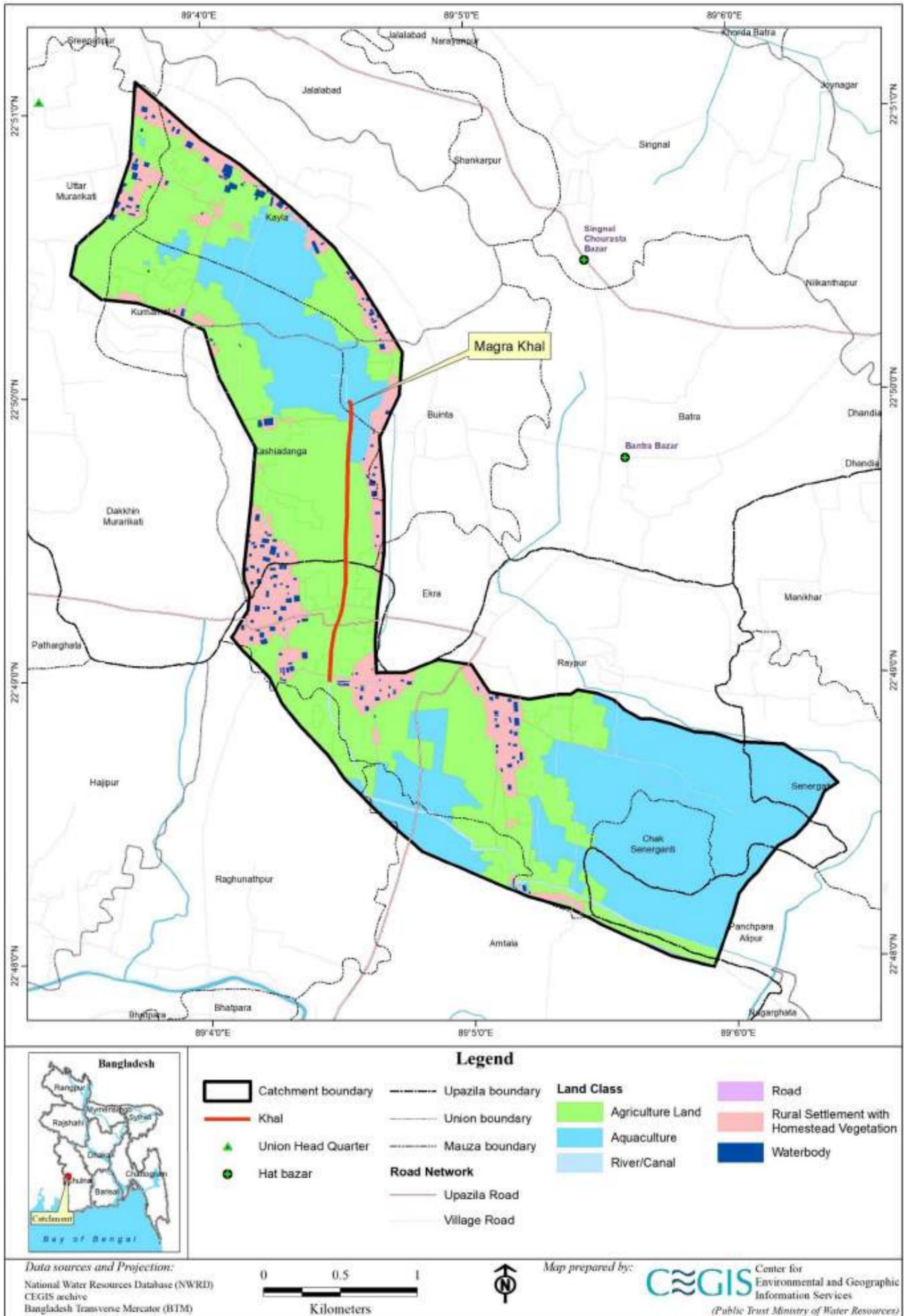


Figure A23.6: Land Use and Land Cover Map of the Catchment Area of Magra Khal, Satkhira District

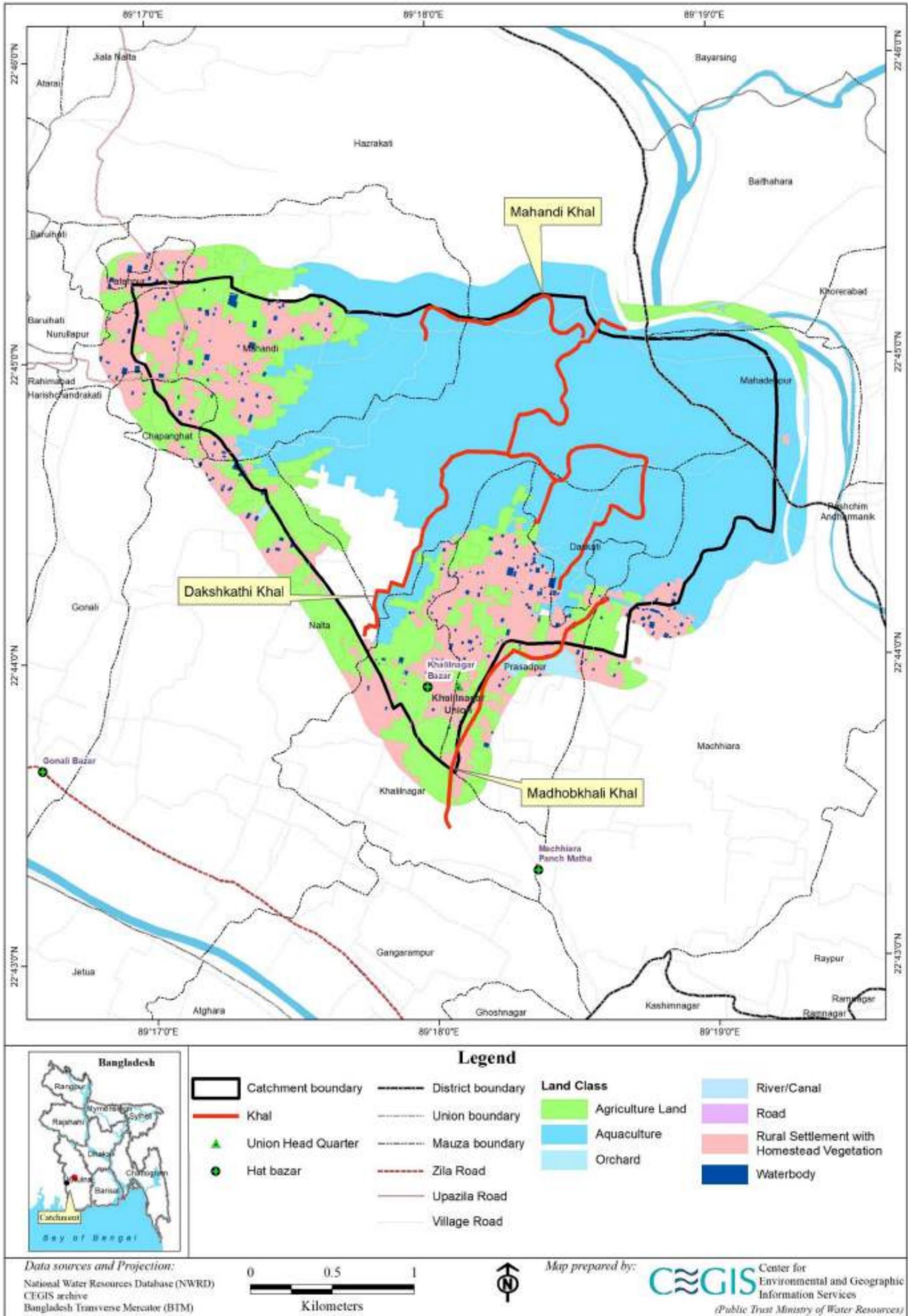


Figure A23.7: Land Use and Land Cover Map of the Catchment Area of Mahandi Khal, Dakshkathi Khal, and Madhabkhali Khal, Satkhira District

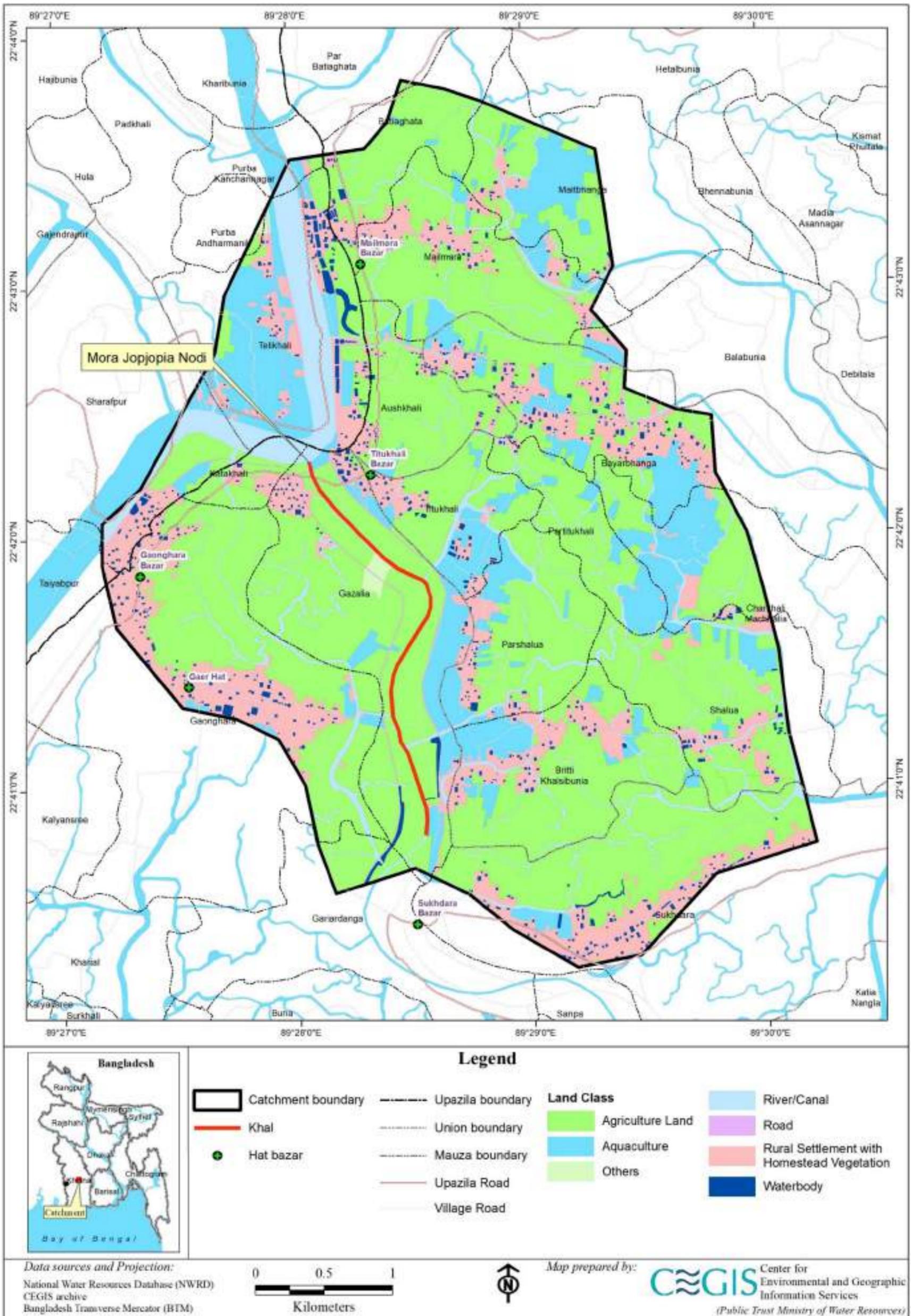


Figure A23.8: Land Use and Land Cover Map of the Catchment Area of Mora Jopjopia Nodi, Khulna District

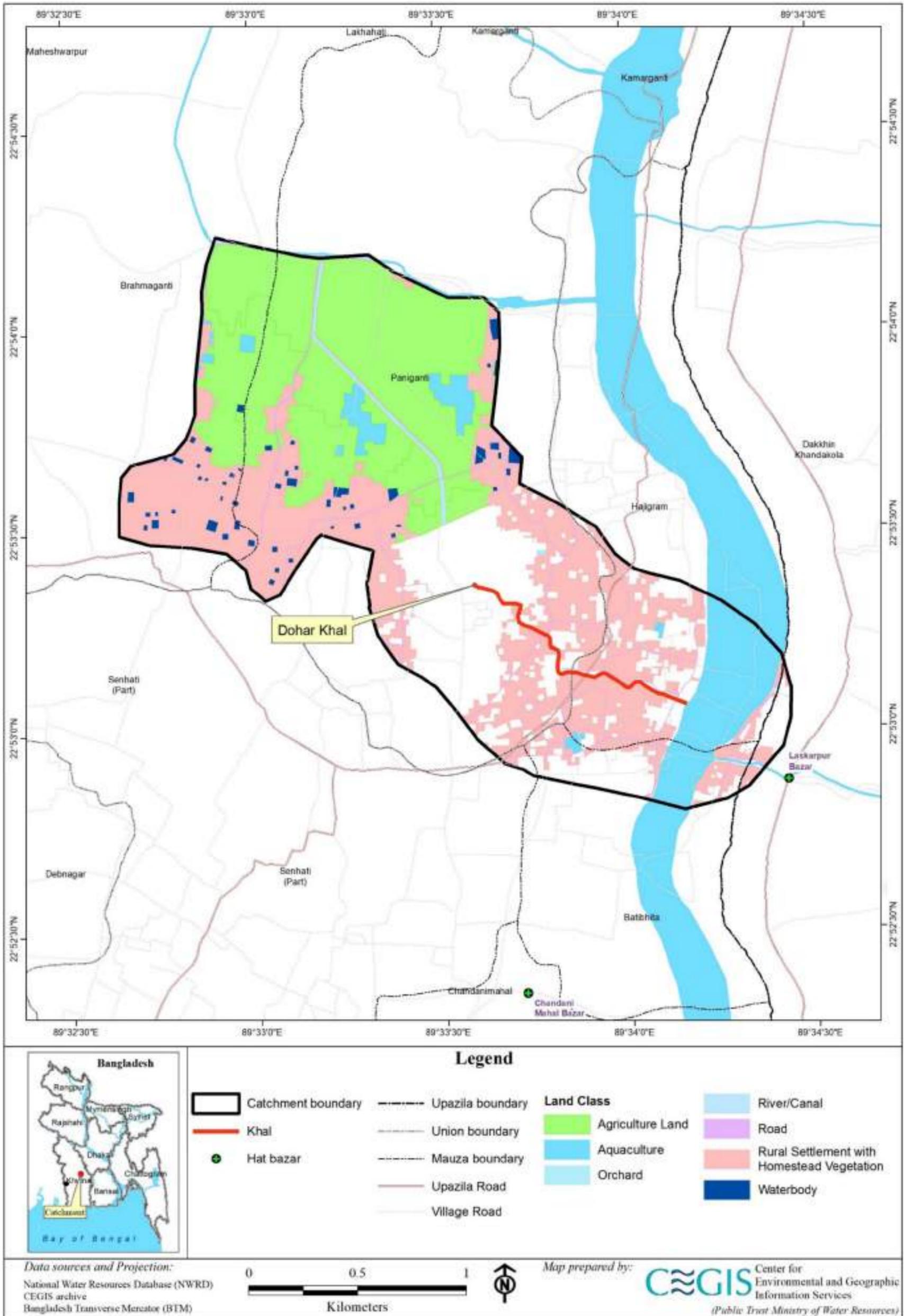


Figure A23.9: Land Use and Land Cover Map of the Catchment Area of Dohar Khal, Khulna District

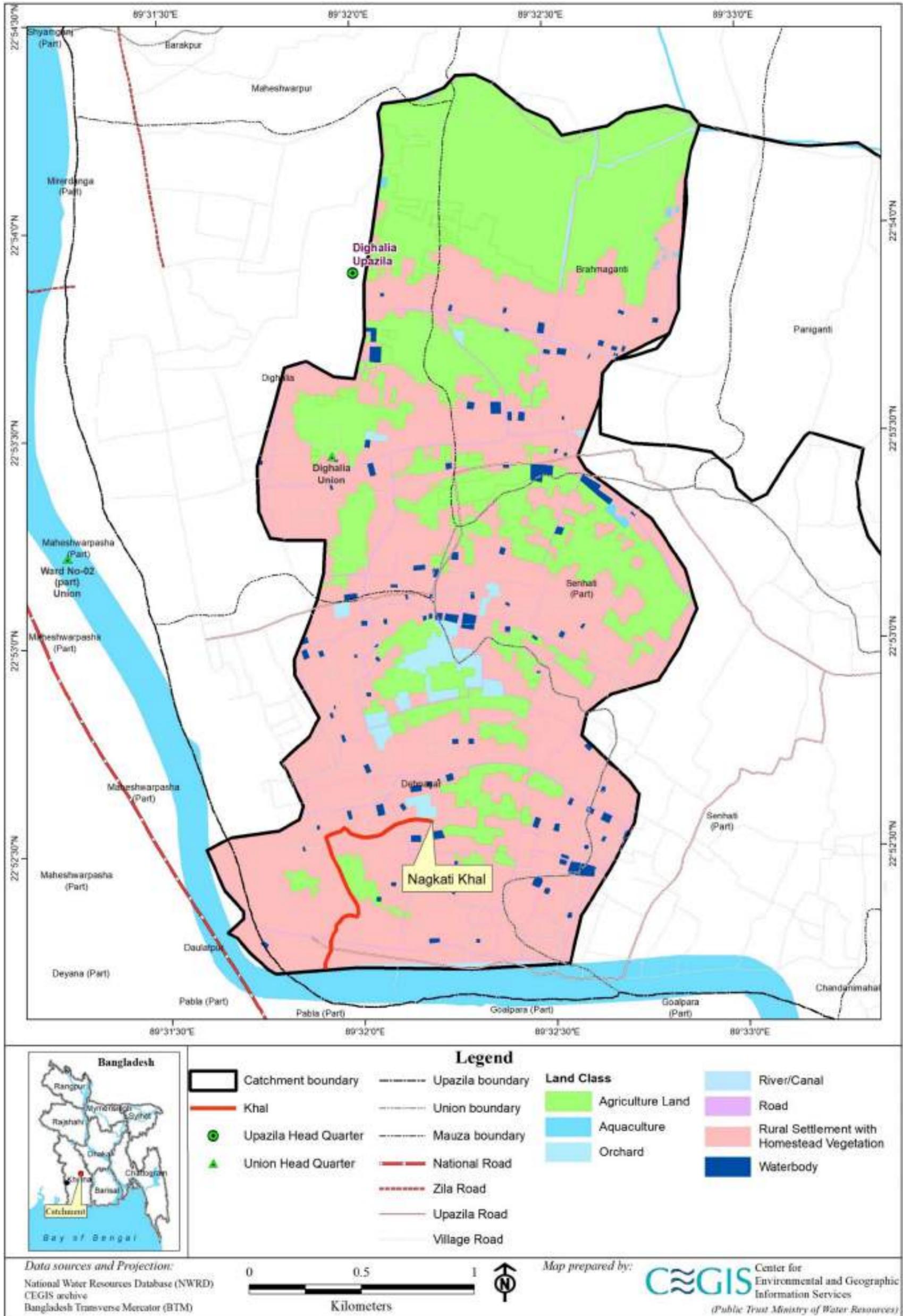


Figure A23.10: Land Use and Land Cover Map of the Catchment Area of Nagkati Khal, Khulna District

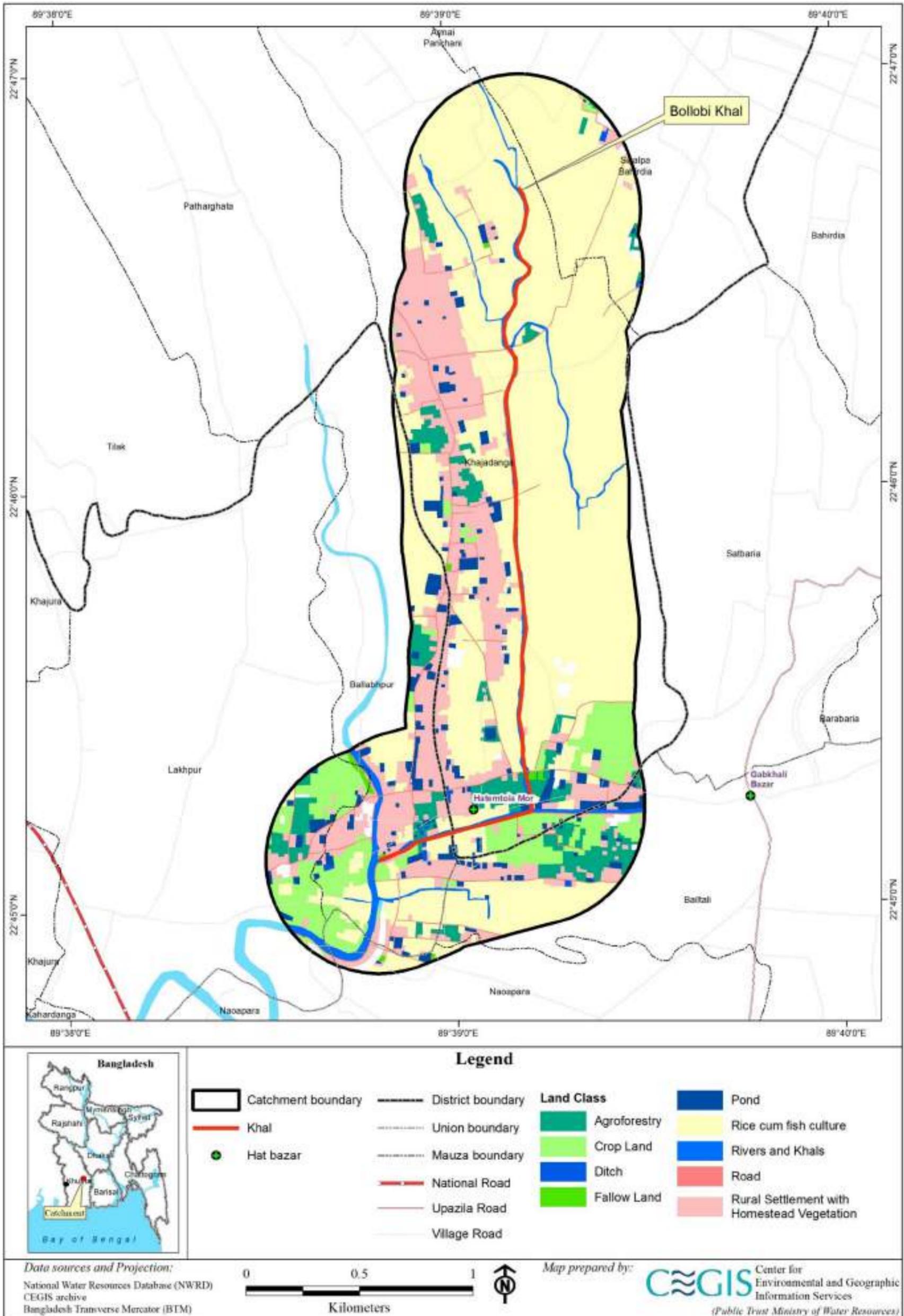


Figure A23.11: Land Use and Land Cover Map of the Catchment Area of Bollobi Khal, Khulna District

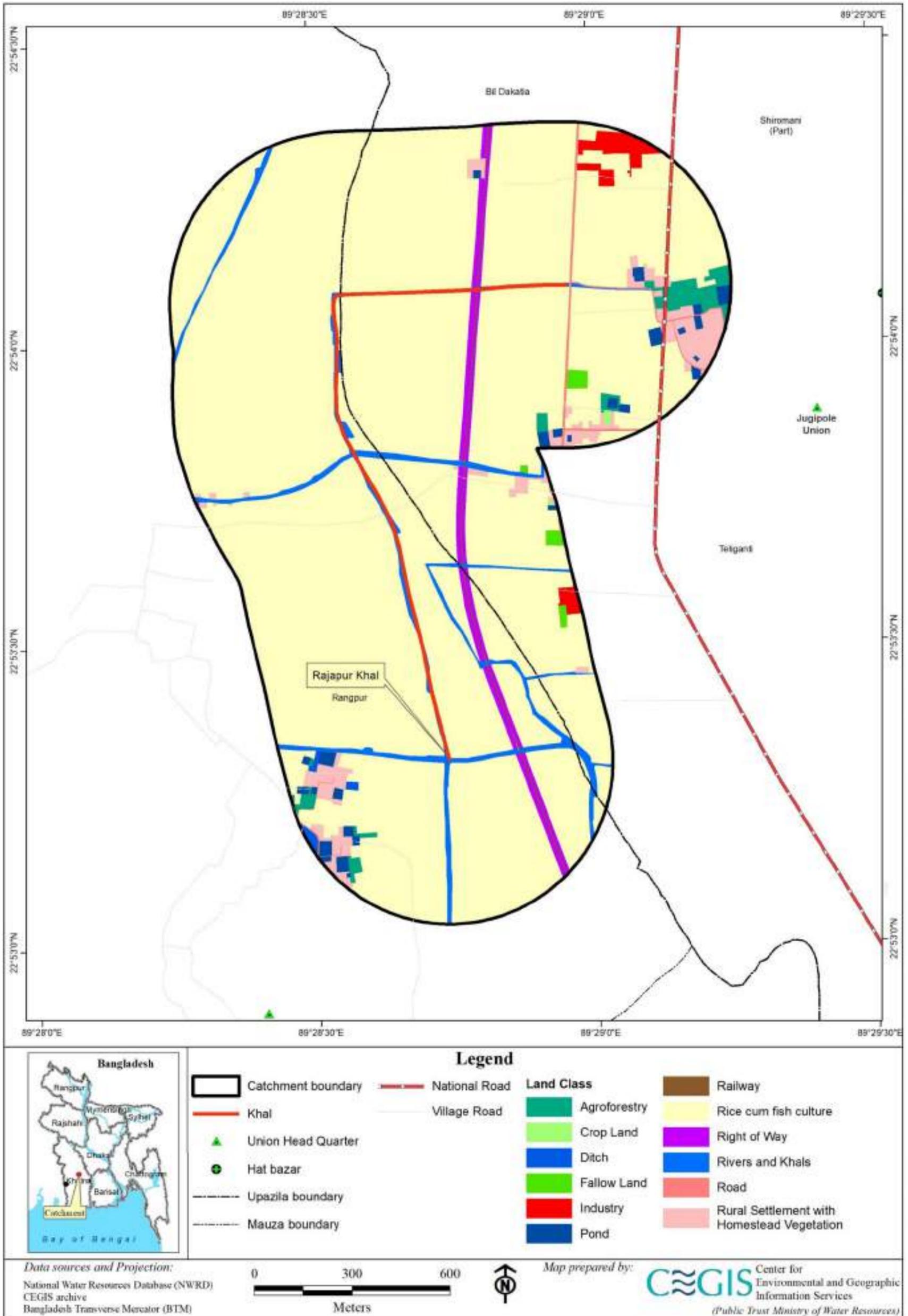


Figure A23.12: Land Use and Land Cover Map of the Catchment Area of Rajapur Khal, Khulna District

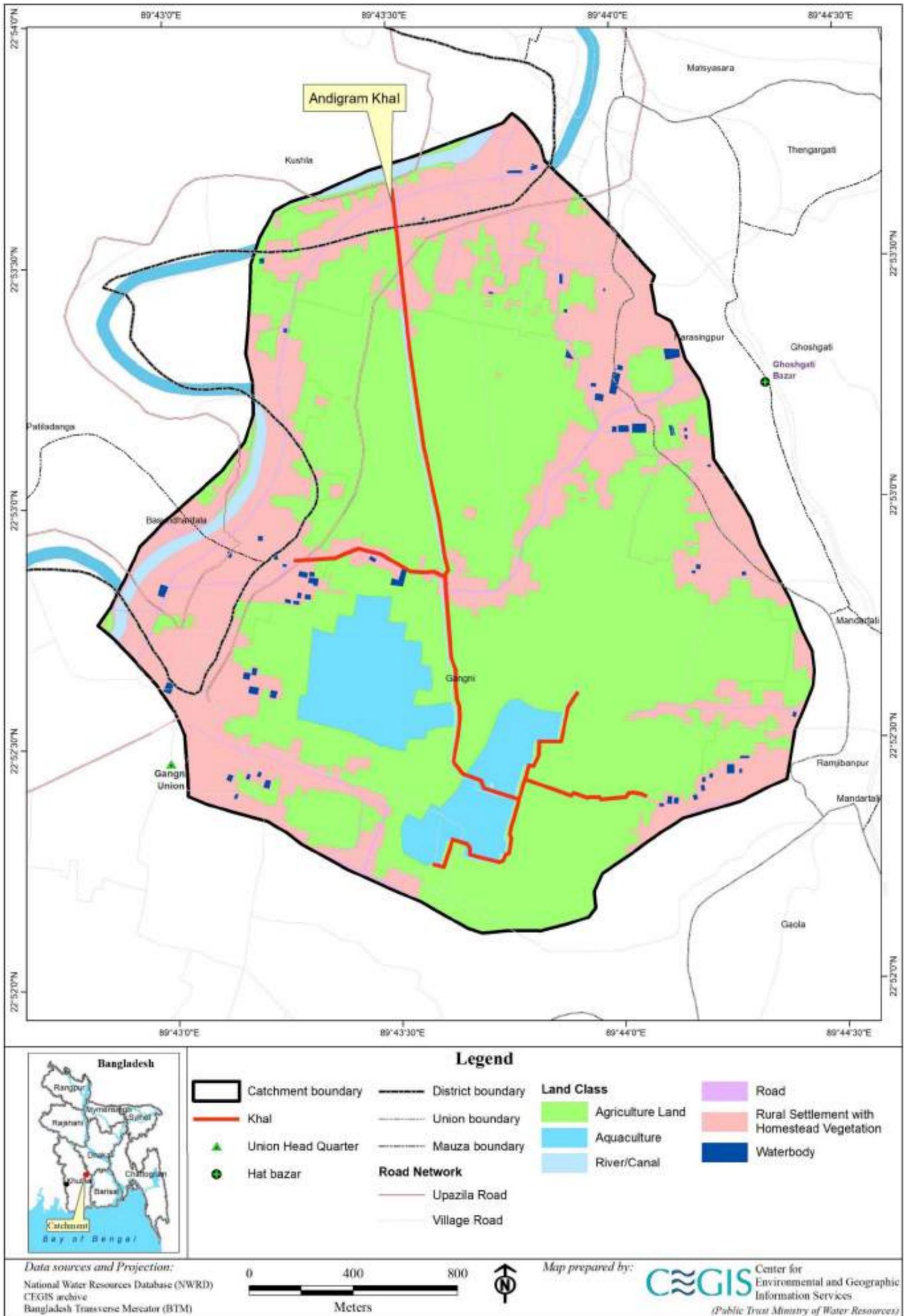


Figure A23.13: Land Use and Land Cover Map of the Catchment Area of Andigram Khal, Bagerhat District

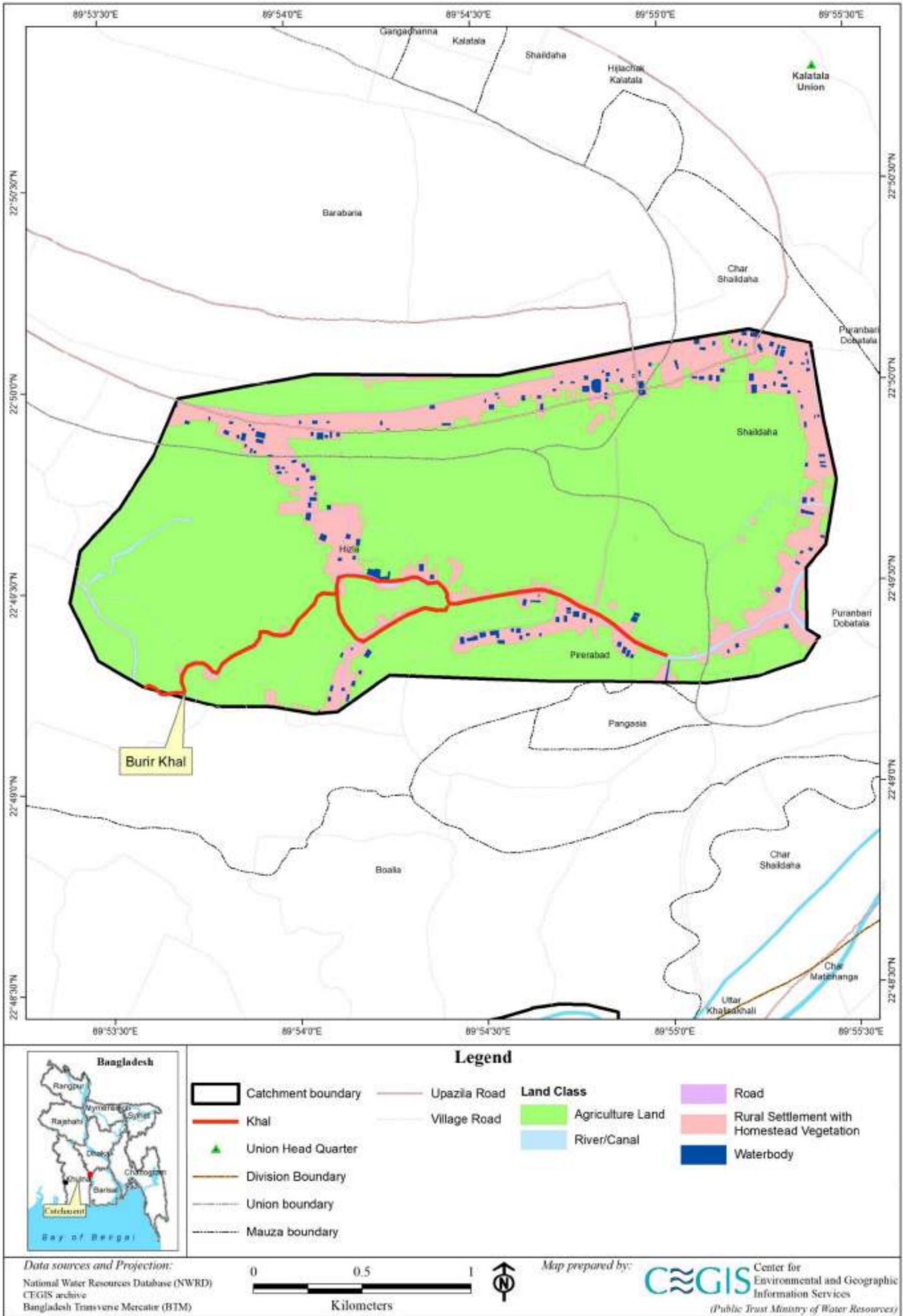


Figure A23.14: Land Use and Land Cover Map of the Catchment Area of Burir Khal, Bagerhat District

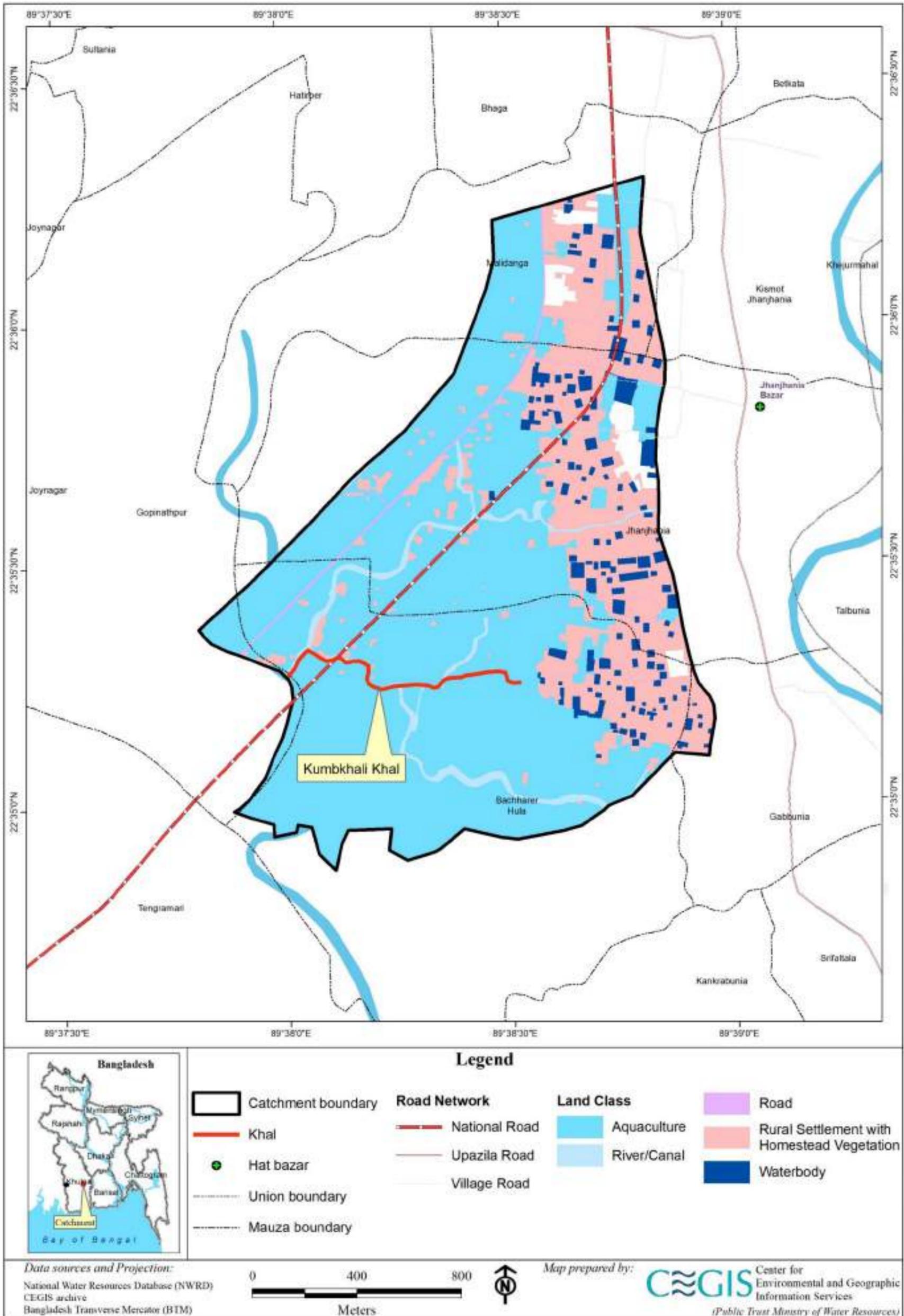


Figure A23.15: Land Use and Land Cover Map of the Catchment Area of Kumbkhalir Khal, Bagerhat District

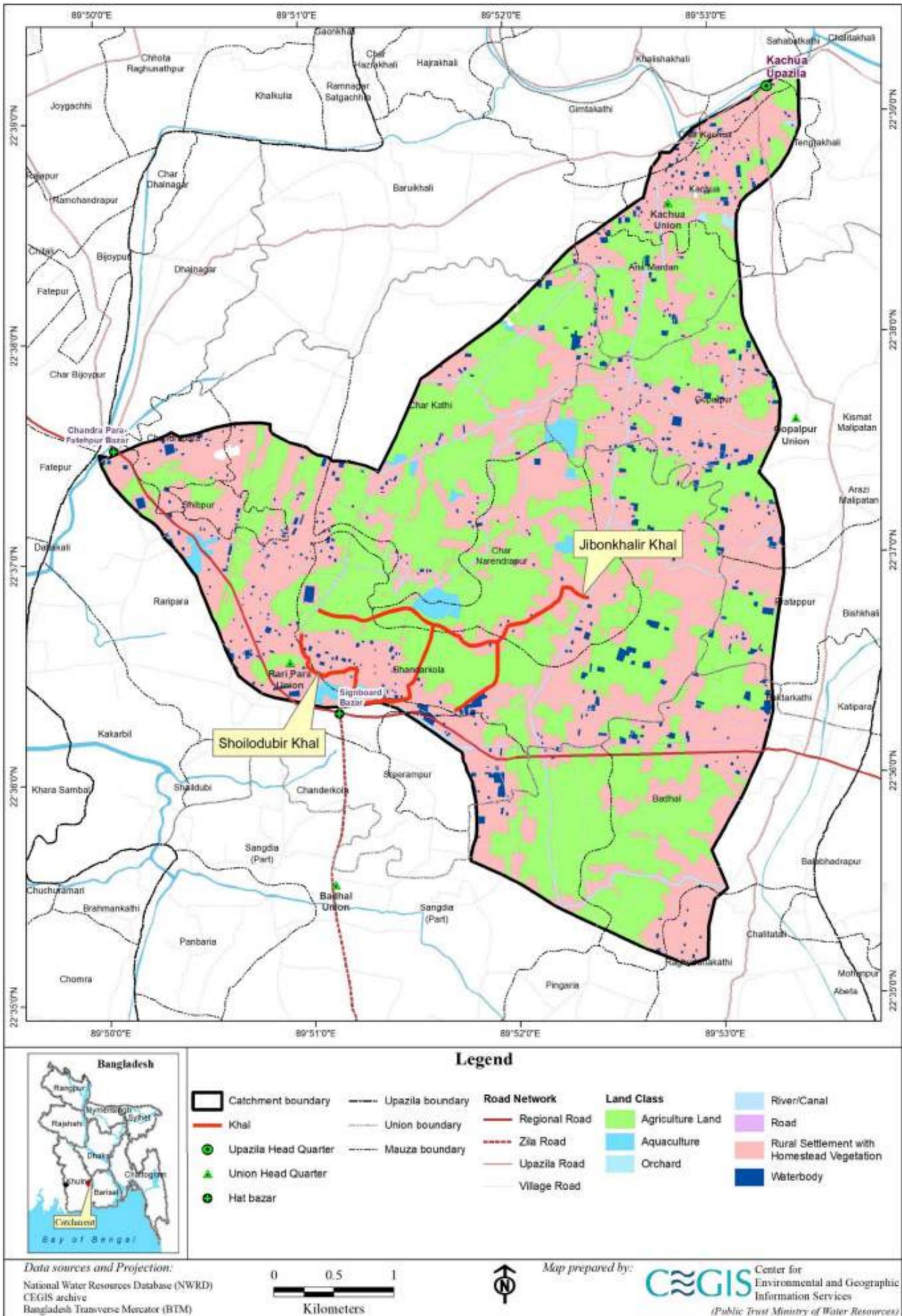


Figure A23.16: Land Use and Land Cover Map of the Catchment Area of Shoilodubir Khal, and Jibonkhalir Khal, Bagerhat District

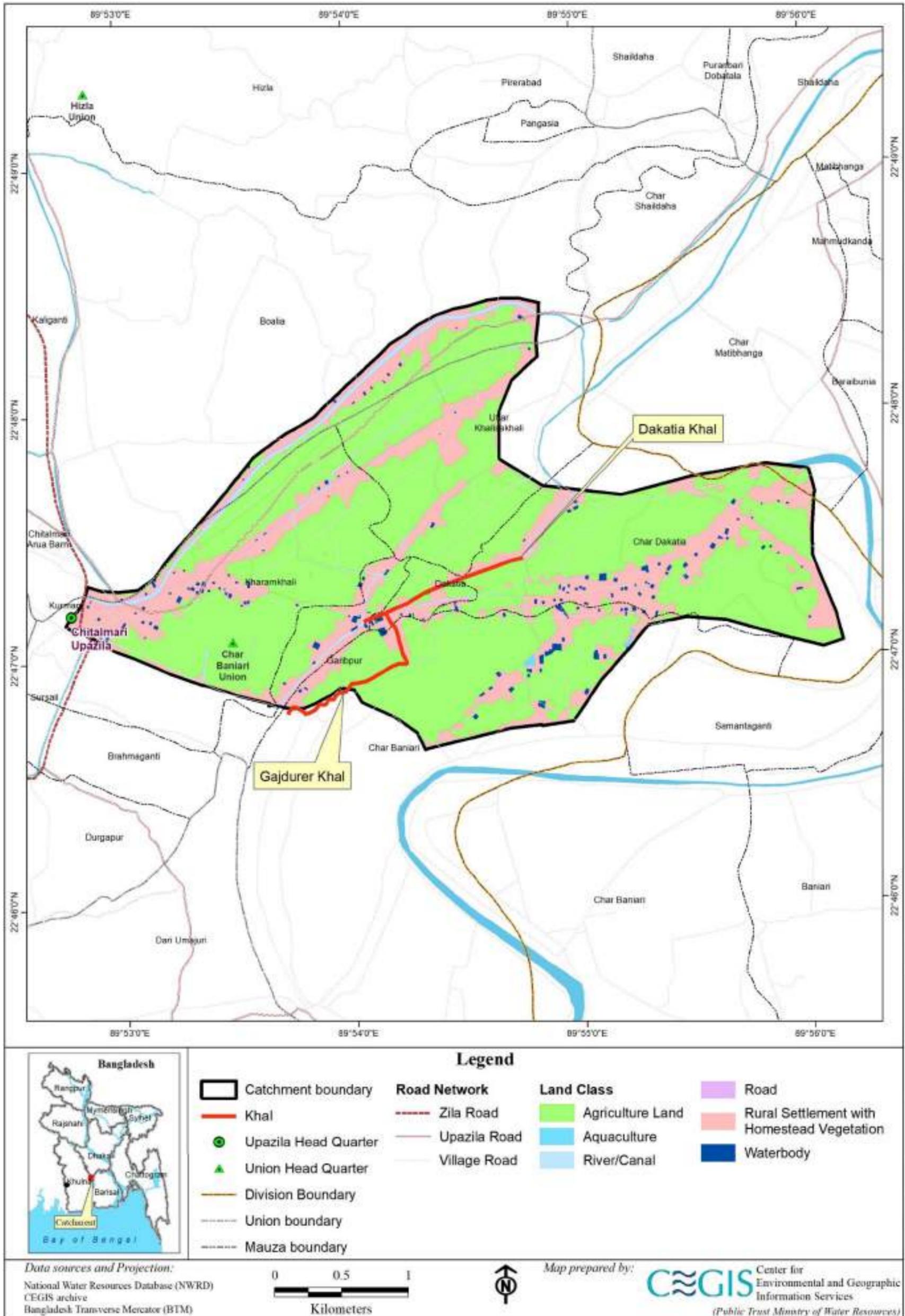


Figure A23.17: Land Use and Land Cover Map of the Catchment Area of Dakatia Khal, and Gajdurer Khal, Bagerhat District

Annex 24: Definition of the Land use Classes

Agroforestry:

Agroforestry as a land use management system refers to the integrated production of agricultural crops or animal pastures and woody perennials (trees and shrubs) in a certain spatial layout or temporal sequence. In Agroforestry system, trees or shrubs are grown around or among crops or pastureland. Separate or adjacent parcel of land, marginal land along with roadside, railway line, embankment and river/canal which have similar characteristics will also be included in this class. Some modern available agroforestry systems in Bangladesh such as Cropland agroforestry, alley cropping and forest farming found in north-west part of Bangladesh, and wind break/shelterbelt and forest farming east-south part of Bangladesh and riparian buffer strip etc.



Crop land:

Crop land refers to areas of land specifically cultivated for agricultural purposes, primarily for growing crops. These lands are dedicated to producing various types of crops, including grains, vegetables, fruits, legumes, and more.



Ditches:

Ditches are usually irregular in shape which contains shallow water. Irregular water bodies are in agricultural land, urban built-up area, rural settlement, road sides and also along with the brickfield are considered as ditch. Whereas small areas in agricultural land, in construction areas containing limited amounts of water in different seasons are excluded in this criterion.



Dyke:

Dyke is a large structure built across rivers and streams to control the flow of water, create reservoirs, and provide various benefits such as hydroelectric power, water supply, flood control, and irrigation. Dams come in different types and sizes, each designed for specific purposes.



Fallow land:

Fallow land is often left fallow for a period of time to allow the soil to recover and regenerate before it is cultivated again. The vegetation may appear as a mix of grasses, shrubs, or small trees, waterlogged with water hyacinth and may be more or less dense depending on the age of the fallow period.



Mudflats:

Mudflats are coastal wetlands that form in intertidal areas where sediments have been deposited by tides or rivers. Mudflats are found in southern coastal region of Bangladesh.



Oxbow lake:

Baor (oxbow lake) is an old river channel which has limited connection to their parent rivers through channel in the monsoon season. It forms when a wide meander from the main stem of a river is cutoff, creating a free-standing body of water. The persistence of staying in water ranges from 11 to 12 months.



Parabon:

An assemblage of a planted mangrove plant species along the estuaries, in salt marshes, and on muddy coasts.

This type of mangrove patch was observed in the Ilisha Khal within the Chakaria Shrimp Estate.



Pond:

A pond is an artificial surface of standing water that is usually smaller than a lake and has a regular shape and prominent edge along with or without some trees. Edge of the pond is inclusive in the class pond.



Rivers and khals:

The rivers are natural water courses which serve as water drainage channels. In general, rivers are linear features and their color is turquoise or cyan in satellite images (WorldView-03; Red: near-infrared, Green: red and Blue). Small temporary char/sandbars are included in the river but permanent char where settlements and agricultural land exists are excluded from the river. Inundated area to the riverbank during monsoon is also considered as part of the river. Only those rivers which are declared by the BWDB, 2011 have been included in river class.



Canals are natural or artificial waterways which are used for irrigation or water transport navigation. Canals are mainly small channels separated from rivers or sometimes man-made linear structures for irrigation. Sometimes canal ways are invisible in the monsoon due to water hyacinth (Kachuripana) or other type of plants.

Road:

Identifying roads within satellite images involves recognizing distinct visual characteristics and patterns associated with road infrastructure. Roads typically manifest as linear features with consistent widths, traversing landscapes in various sizes, from highways to smaller pathways. Their appearance often differs from surrounding areas, with highways appearing smoother and lighter due to pavement while smaller roads might exhibit a darker, rougher texture owing to gravel or unpaved surfaces.



Rural Settlement with Homestead Vegetation:

The rural settlements are geographic areas of clustered or linear rural dwellings which are covered by fruit trees and other plantations, functionally linked with small scale vegetable gardens, open spaces and cattle houses around the dwellings. Rural markets or growth centers within the rural environment is also included in this class and all water bodies are excluded from this class.



Shrimp Farm-cum-Salt Pan:

A Shrimp Farm-cum-Salt Pan is an integrated farming system that combines shrimp farming and salt production. It is a sustainable and profitable farming system that can be used in coastal areas to produce both shrimp and salt.

The geographical location can offer clues, as these facilities are commonly found in coastal areas due to their proximity to seawater. Analyzing the size, arrangement, color variation, saturation levels in the ponds, and using high-resolution, multispectral satellite imagery aids in accurately identifying these distinct features on the ground.



Shrimp Farm/Gher:

The cluster of small ponds or a large water pond used year-round for fish culture mainly dedicated for shrimp is considered as Shrimp Farm/Gher.



Annex 25: Detailed Description of BEZs and The BEZ Maps of the Study Areas of the Sub-Projects

Table 26.1: Description of BEZ of the Study Areas

Study Areas of Sub-Project sites	BEZ Name	Description
Chakaria Shrimp Estate	Chakaria Sundarban	The Chakaria Sundarban was formed like a mosaic island with river channels, tidal creeks, aquaculture ponds, mangrove forests and intertidal mudflats. It is located in the estuarine system of the Matamuhuri River, Bura Matamuhuri River, Maheshkhali Channel. This forest area has been damaged due to clearing the forest for shrimp ponds and aquaculture projects. In addition, natural hazards like cyclonic storms and tidal waves were also responsible for the damage of this area. Although the Chakaria Sundarban was rich in faunal biodiversity; it has become limited to some invertebrate fauna, including such shrimp species such as: <i>Penaeus indicus</i> , <i>P. monodon</i> , <i>Metapenaeus monoceros</i> , <i>M. brevicornis</i> and <i>Palaemon styliferus</i> (GoB-IUCN, 1992).
	Chittagong Hills and the CHTs	This zone is composed of tropical evergreen and semi-evergreen forests, which is situated in the southern hill ranges of the country. While the hills are generally about 600m of height which is not very high at all, they are rugged and often steep. These hill forests are the most important watershed areas of the country. The tropical evergreen and semi-evergreen forests are not very distinct, and are often intermingled and merged into one another in this zone. The majority of the species in the lower canopy are evergreen; on the other hand, the tree species, which form the upper canopy of the forest, is of deciduous type. Some of these deciduous tree species shed their leaves during the winter while others do the same during the monsoon; so that the forests generally appear evergreen in nature (GoB-IUCN, 1992). The tropical evergreen forests are found in the valleys of this zone.
BFDC Harbor at Chattogram	Chittagong Hills and the CHTs	Same as mentioned above.
Brood Management Center	Chittagong Hills and the CHTs	Same as mentioned above.
Canals under Satkhira District ▪ Atshotobigha Khal ▪ Kalmegher Khal	Saline Tidal Floodplain	This zone has a transitional physiography, which is located in the administrative Districts of Satkhira, Khulna, Bagerhat, Jhalakathi and Borguna. It has a low ridge and basin relief, crossed by innumerable tidal river and creeks. Local differences in elevation are less than 1 m. The sediments are mainly composed of non-calcareous clays, although in the riverbanks, they are silty and slightly calcareous. The soils are non-saline throughout the year over substantial number of areas in the north and east, but they become saline to varying degrees in the dry season in the southwest and are saline for much of the year in the Sundarbans. The rivers carry fresh water throughout the year to the east and

Study Areas of Sub-Project sites	BEZ Name	Description
		<p>northeast, but saline water penetrates increasingly further inland towards the west mainly in the dry season, and for most or all of the monsoon season in the southwest. In the Northeast, there is moderately deep flooding during the monsoon season, mainly due to accumulation of rainwater on the land when the Ganges distributaries and the lower Meghna are at high flood levels. Elsewhere, there is mainly shallow flooding at high tide, either throughout the year or only in the monsoon season, except where tidal flooding is prevented by embankments. Within embankments, seasonal flooding only occurs through accumulation of rainwater (Bramuner, 1996).</p> <p>Except for the Sundarban, the floral diversity of this zone is similar to those of the adjoining zones. Innumerable indigenous weeds grow in beel areas. The zone affords a very lucrative place to game bird watcher.</p>
Canals under Satkhira District ▪ Magra Khal	Ganges Floodplain	The soil of Ganges floodplain is calcareous dark gray floodplain soils and calcareous brown floodplain soils. The average rainfall of this area is 1270-1780 mm and the flooding depth of this area is high-medium high, medium high- high, and medium high- low.
Canals under Satkhira District ▪ Mahandi Khal ▪ Dakshkathi Khal ▪ Madhabkhali Khal	Saline Tidal Floodplain	Same as mentioned above.
	Ganges Floodplain	Same as mentioned above.
Canals Under Khulna District ▪ Bollobi Khal ▪ Nagkati Khal	Ganges Floodplain	Same as mentioned above.
Canals Under Khulna District ▪ Mora Jopjopia Nodi	Ganges Floodplain	Same as mentioned above.
	Saline Tidal Floodplain	Same as mentioned above.
Canals Under Khulna District ▪ Dohar Khal	Gopalganj/ Khulna Peat Lands	The occupies a number of low-lying areas between the Ganges River floodplain and the Ganges tidal floodplain in the south of Faridpur region and the adjoining parts of khulna and Jessore Districts. Thick deposits of peat occupy perennially wet basins, but they are covered by clay around the edges and by calcareous silty sediments along the Ganges distributaries crossing the zone. Most of the layers harden irreversibly into coal-like lumps when dry. The soil, in this zone, is potentially strongly acidic and low in essential plant nutrients. The basins are deeply flooded by rainwater during the

Study Areas of Sub-Project sites	BEZ Name	Description
		<p>monsoon season. However, in the basin close to Khulna, the floodwater is somewhat brackish (Brammer, 2000).</p> <p>The floral diversity in this zone is quite limited. Due to lack of diversity in vegetation, the variety in faunal species and their population size are also less here (Latif, 1992).</p>
Canals Under Khulna District ▪ Rajapur Khal	Ganges Floodplain	Same as mentioned above.
	Gopalganj/ Khulna Peat Lands	Same as mentioned above.
Canals Under Bagerhat District ▪ Kumbkhali Khal	Saline Tidal Floodplain	Same as mentioned above.
Canals Under Khulna District ▪ Burir Khal ▪ Dakatia Khal ▪ Gajdurer Khal ▪ Jibonkhalir Khal ▪ Shoilodubir Khal	Ganges Floodplain	Same as mentioned above
Canals Under Khulna District ▪ Andigram Khal	Ganges Floodplain	Same as mentioned above
	Gopalganj/ Khulna Peat Lands	Same as mentioned above.

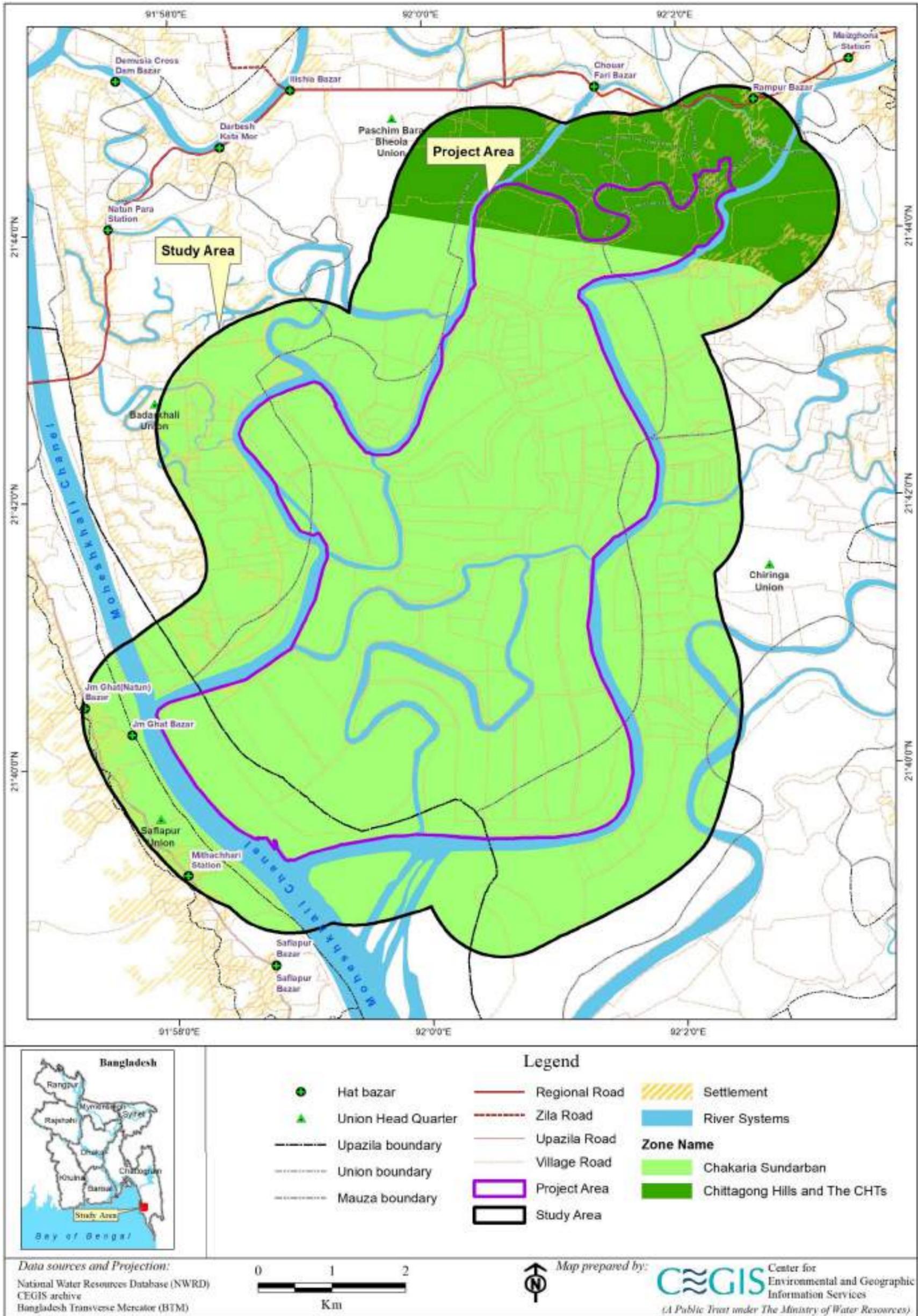


Figure A26.1: BEZ Map of the Study Area of Chakaria Shrimp Estate

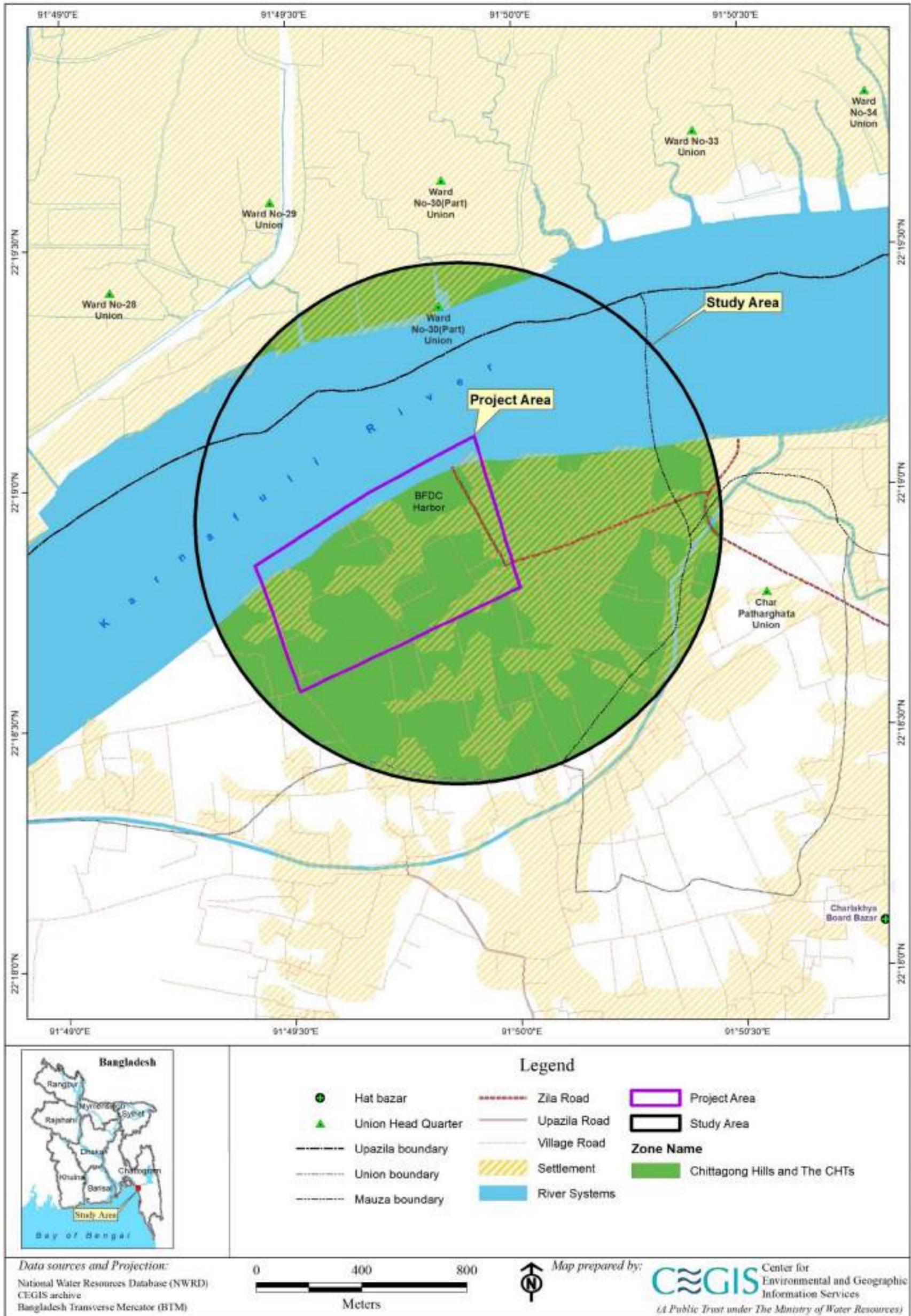


Figure A26.2: BEZ Map of the Study Area of BFDC Harbor at Chattogram

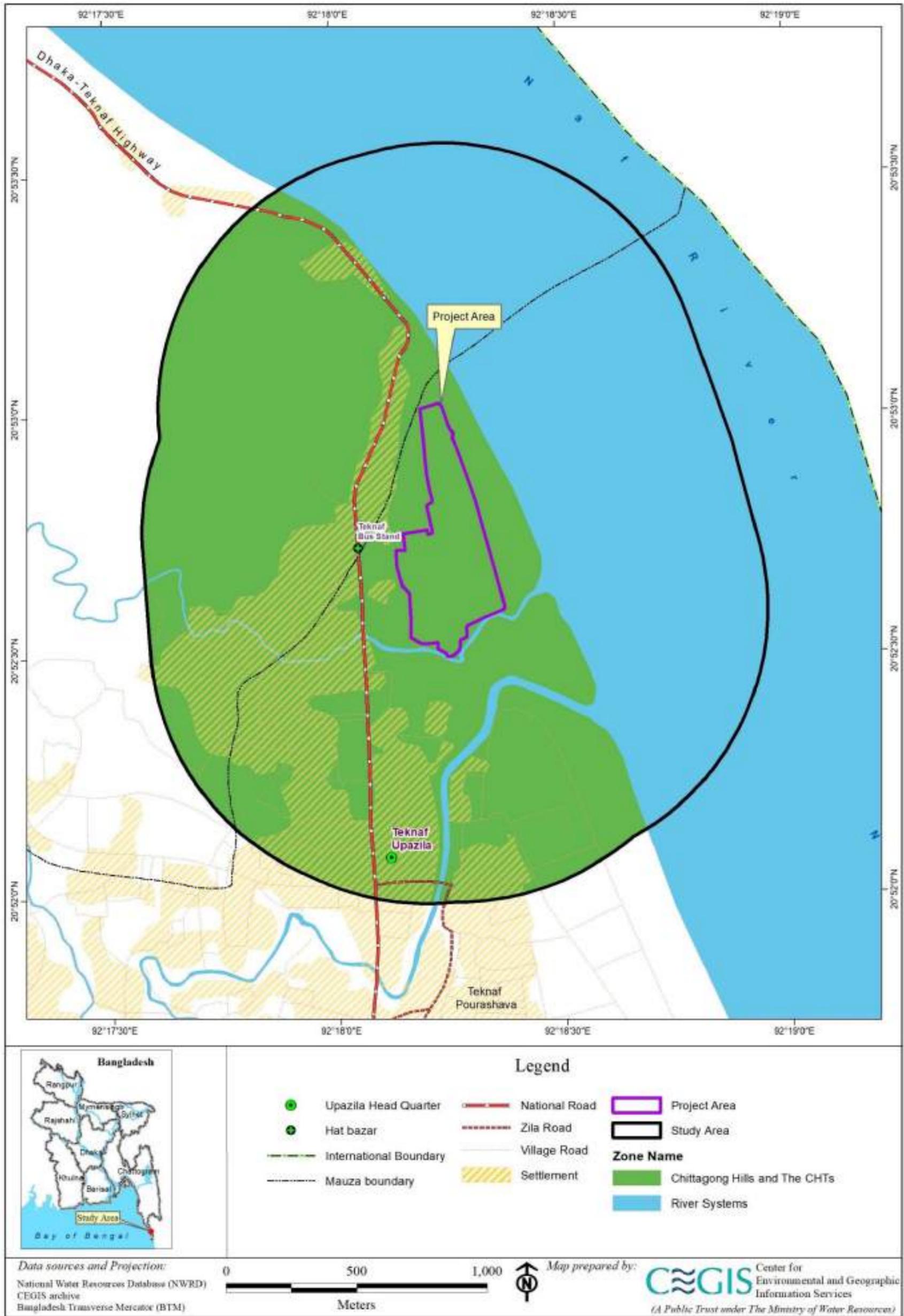


Figure A26.3: BEZ Map of the Study Area of Brood Management Center

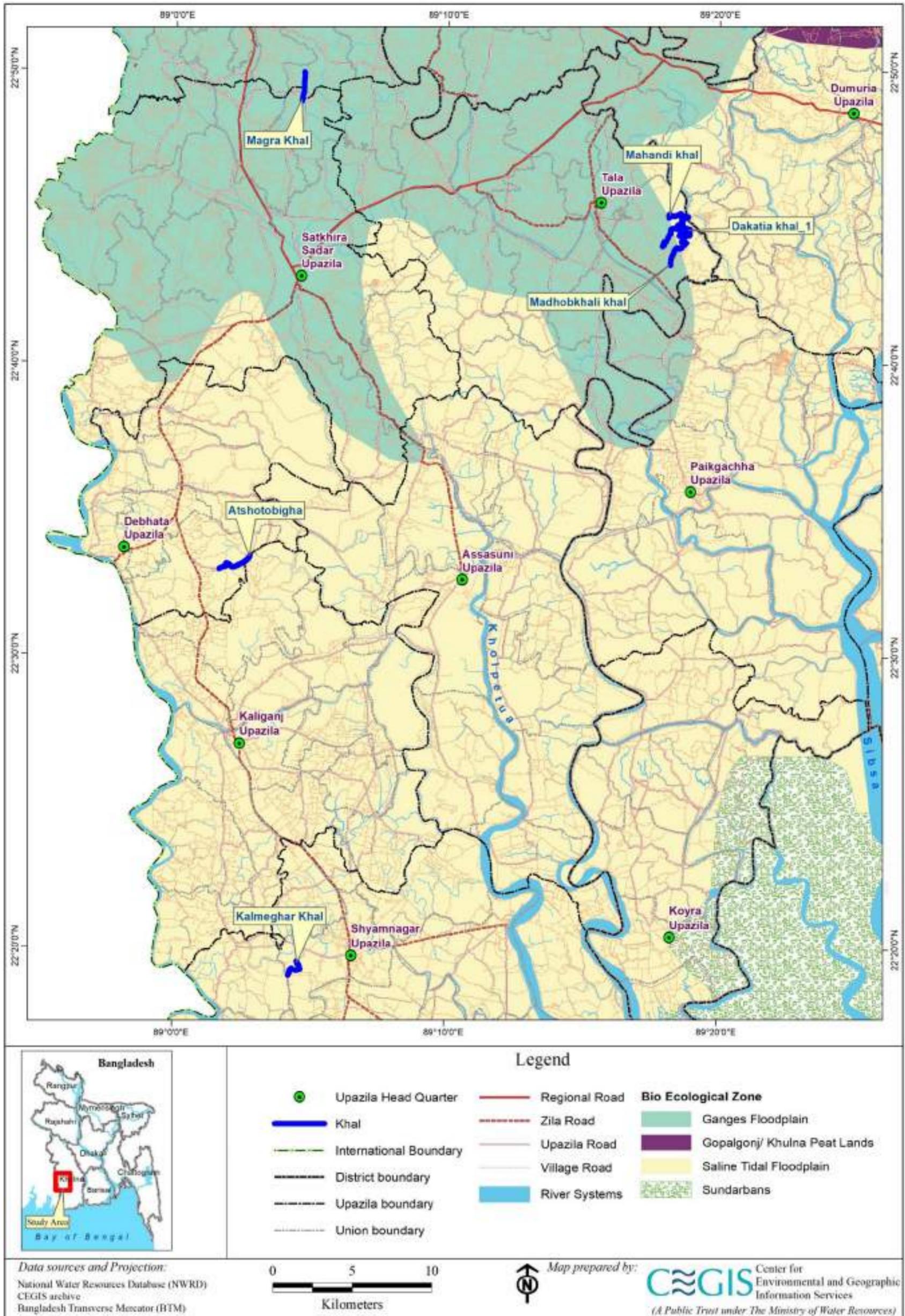


Figure A26.4: BEZ Map of the Study Area of Canals under Satkhira District

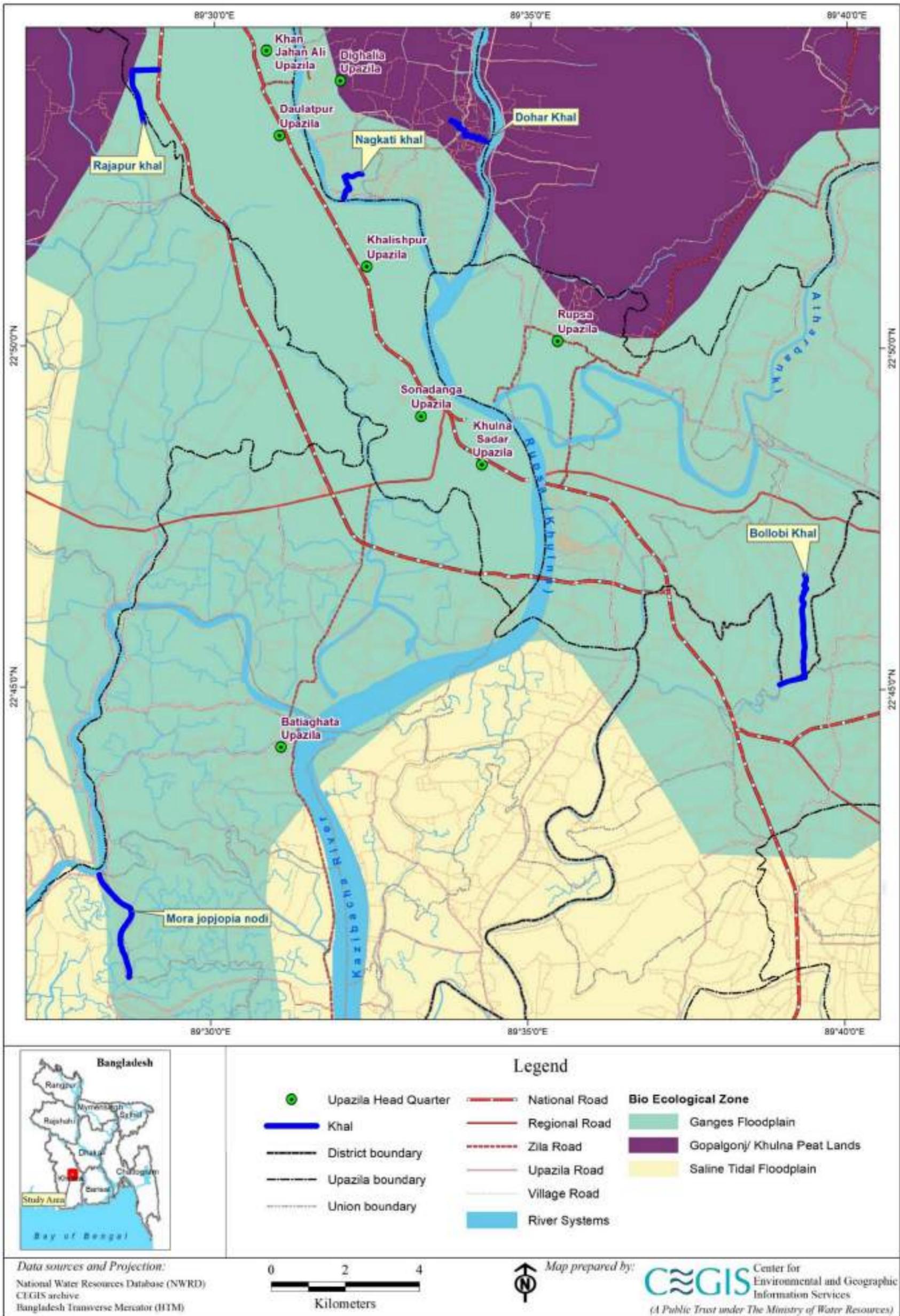


Figure A26.5: BEZ Map of the Study Area of Canals under Khulna District

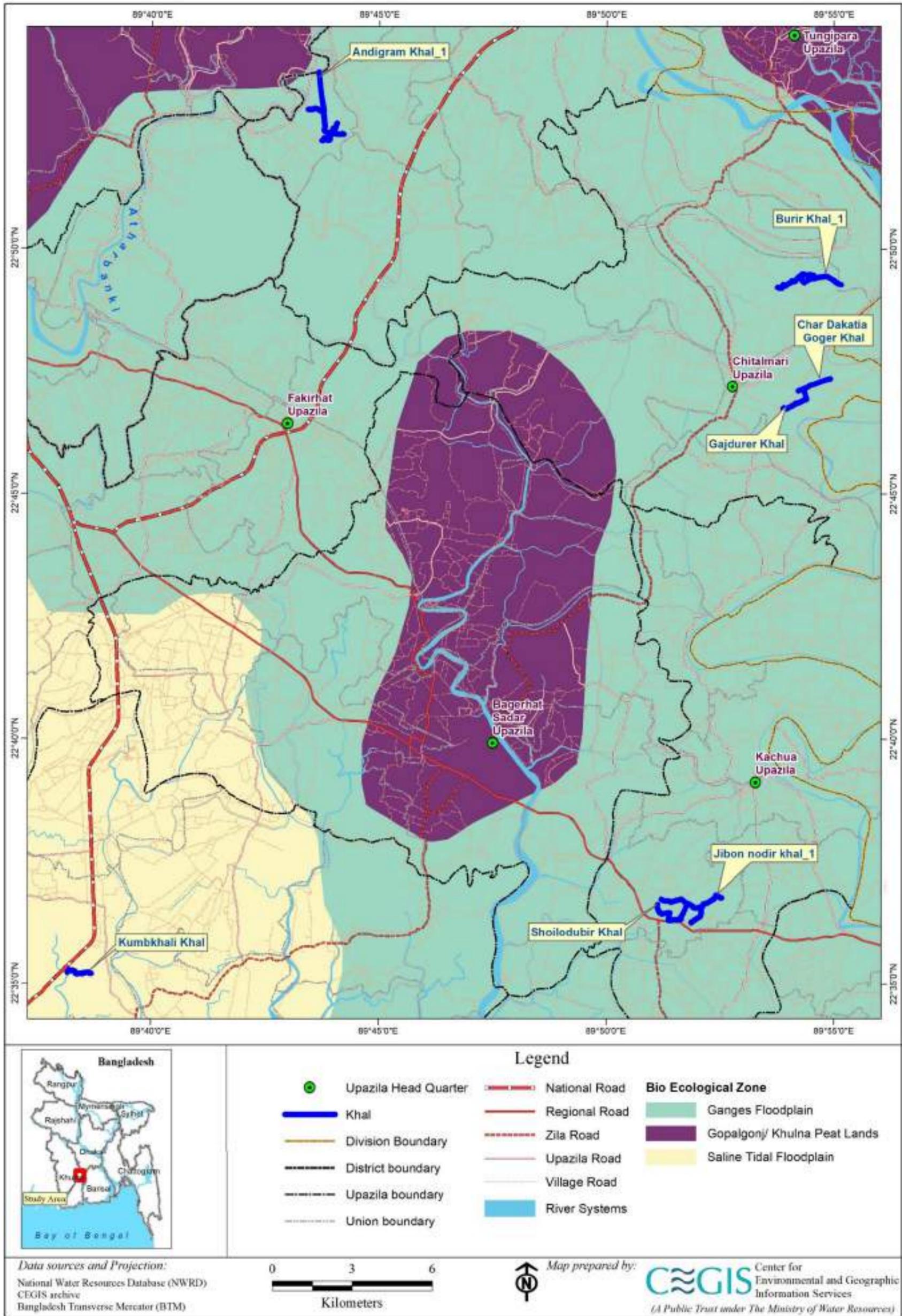


Figure A26.6: BEZ Map of the Study Area of Canals under Bagerhat District

Annex 26: Site Specific Flora and Fauna Within the Project Area

Sl. No.	Name of the Canal	Location	Baseline Ecological Status
1	Mora Jopjopia Nodi	District: Khulna Upazila: Botiaghata Union: Surkhali Data collection (GPS): 22°41'42.14"N 89°28'34.42"E BEZ: Ganges Floodplain	The Mora Jopjopia River is primarily surrounded by agricultural land, where shrimp farming is a common practice along the riverbanks. During field visit and eye observation the project area is predominantly characterized by this agricultural activity and bears sparse vegetation, consisting of plant species such as Babla, Gewa, Korai, Raintree, and Date Palm. Notably, there is an absence of aquatic plant species within the river itself, although the Hargoja Kata shrub stands out in the landscape during on-site visits. The avian fauna has been commonly observed in the project area includes Common Mynas, Oriental Magpie-Robins, House Sparrows, Common Kingfishers, Doves, and Crows, according to local residents. Small mammals like the Common Mongoose and Rat are also found in the project area. Local reports indicate the presence of reptiles such as the Bengal Grey Monitor, Common Garden Skink, Rat Snake, and Banded Krait within the project area. There is no evidence of rare or endangered species, nor any sensitive habitats within the proposed site.
2	Dohar Khal	District: Khulna Upazila: Dighalia Union: Senhati Data collection (GPS): 22°53'51.65"N 89°33'17.93"E BEZ: Gopalganj/Khulna Peat land	This canal provides water to shrimp and fish culture ponds and to the nearest agricultural field. One bank of the canal has dense vegetation, and another bank is used for transportation and has less vegetation. The most dominant plant is Date, and other common plants on the bank are Korai, Raintree, Jujube, Palmyra palm, Mango, Sishu, Neem, Baolakata, Coconut, Betel Nut, Banana, etc. Among the aquatic vegetation, water hyacinth is mostly dominant, Minute duckweed, alligator weed, water spinach, water cress, and taro were also observed in this canal. According to the locals' common avifauna found in the project, there are common mynas, house sparrows, common kingfishers, doves, egrets, and owls. Small mammals like the fox, common mongoose, small Indian civet, and bat are found in the project area, locals said. Reptiles like Bengal Grey Monitor, Common Garden Skink, Rat Snake, Banded Krait, etc. are also found in the project area. There are also no rare or endangered species here. There is no evidence of wildlife of the higher species within the location and no sensitive habitats found within the proposed site.
3	Nagkati Khal	District: Khulna Upazila: Digholia Union: Dighalia Data collection (GPS): 22°52'45.71"N, 89°32'5.05"E	The canal is surrounded by homestead vegetation, roadside vegetation, and agricultural lands. The terrestrial vegetation in the area is diverse, with Mahogany, Raintree, Coconut, Bamboo, Mango, Korai, and Palmyra palm being the more dominant plant species. Mangrove species are notably absent in the vicinity of the canal. The aquatic vegetation commonly found includes water hyacinth, minute duckweed, alligator weed, and water spinach, with minute duckweed being the predominant species. There are also no rare or endangered species here. There is no evidence of wildlife of the higher species

Sl. No.	Name of the Canal	Location	Baseline Ecological Status
		BEZ: Ganges Floodplain	within the location and no sensitive habitats found within the proposed site. According to local residents, the common avifauna observed in the project area consists of common mynas, house sparrows, common kingfishers, doves, egrets, and owls. Small mammals such as foxes, common mongooses, small Indian civets, and bats are reported to inhabit the project area. Additionally, reptiles like the Bengal Grey Monitor, Common Garden Skink, Rat Snake, and Banded Krait are found within the project area.
4	Rajapur Khal	District: Khulna Upazila: Digholia Union: Jugipole BEZ: Ganges Floodplain	The canal traverses through agricultural lands. One bank of the canal serves as a walking path, while the other bank features some vegetation, predominantly consisting of mango and banana plants. A few species of Raintree, Kadam, and Kocha plants were also found along the canal bank. The canal itself harbors a significant presence of aquatic vegetation, with water hyacinth and kudipana being the most dominant species. Other aquatic plants, such as Helancha, Malancha, and Giant Foxtail Millet, were also observed in the project area. During the field visit, avian species like Oriental Magpie-robins, common mynas, egrets, and crows were spotted in the project area. According to local residents, common kingfishers, doves, and owls have been frequently seen in the vicinity. Small mammals, including the common mongoose, fox, and small Indian civet, is present in the project area. Locals also reported the presence of reptiles such as Rat Snakes, and Bengal Grey Monitors within the project area. There are also no rare or endangered species here. There is no evidence of wildlife of the higher species within the location and no sensitive habitats found within the proposed site.
5	Bollobi Khal	District: Khulna Upazila: Rupsha Union: Lakhpur BEZ: Ganges Floodplain	Salinity intrusion occurs only during the dry periods, which is why mangrove species are less common in this canal. Hargoja Kata is the dominating mangrove species present, while Nipa palm and Katashola are rarely found. The canal is surrounded by shrimp culture ponds, agricultural fields, roadside vegetation, and homestead vegetation. There is no evidence of rare or endangered species, nor any sensitive habitats within the proposed site. Along the canal bank, banana plants are the most dominant and are planted by the locals. Other plants found along the canal bank during the field visit include Raintree, Korai, Palmyra palm, Mango, Coconut, and Betel Nut, which are also planted by the locals. No floating plant species were observed in the canal. Due to the presence of vegetation along the canal bank, some avifauna such as house sparrows, common mynas, Oriental magpie-robins, common kingfishers, and doves are commonly sighted at the project site.
6	Atshotobigha Khal	District: Satkhira Upazila: Debhata Union: Noapara Data collection (GPS):	The ecological status of a canal refers to the overall health and condition of the ecosystem within and surrounding the canal. Shrimp estate and crop field vegetation are located on both sites of the canal named Atshotobigha Khal. During the field visit, local people said that this canal supports shrimp cultivation by providing saline water; in addition, it drains excess rainwater from the crop field and

Sl. No.	Name of the Canal	Location	Baseline Ecological Status
		22°33'16.9"N, 89°02'29.3"E BEZ: Sline Tidal Floodplain Length:4738.94 m	prevents waterlogging and salinization. From an ecosystem perspective, this canal serves as a diverse habitat. The ecosystem pattern of the proposed site is cropland, homestead, and roadside vegetation. The major tree species on both sites of the bank are Date Palm, Palmyra Palm, Coconut, White Siris, Gewa, Neem, Babla, Khai Babla, etc. Bhand, Sech, Dubra, etc. herbs and shrubs are naturally grown species that are grown along both sites of the bank, fallow lands, and within crop fields as weeds and roadsides. Local people said that most of the tree species grown naturally on Khas land both sites of the bank. There are also no rare or endangered species here. There is no evidence of wildlife of the higher species within the location, and no sensitive habitats are found within the proposed project site. Water fern, water lettuce, Helencha, Dhol kolmi, etc. are also common aquatic flora found in the canal throughout the year.
7	Magra Khal	District: Satkhira Upazila: Satkhira sadar Union: Kolaroa Data collection (GPS): 22°49'15.7"N, 89°04'30.7"E BEZ: Ganges Floodplain Length:1851.37 m	The canal is surrounded by crop land, shrimp culture and roadside vegetation. No settlement was found within the proposed site. The major vegetation pattern was observed during field visit was crop field and road side vegetation. Canal side bank is exclusively dominated by Palmyra palm, Betel nut palm, Coconut, Banana, Babla, Date palm, Mango, Dramstick, Coconut, Neem etc. A part of the land beside canal remain seasonally fallow during a year. During this time the land is covered by grassy vegetation with some wild herbs. <i>Croton bonplandianum</i> , <i>Echinochloa colonum</i> , <i>Chynodon dactylon</i> , <i>Heliotropium indicum</i> , <i>Amaranthus spinosus</i> , <i>Centipeda orbicularis</i> , <i>Cyperus sp</i> , etc. are the major species (weed) which are growing with the crop in project site. The seasonal fallow lands have important roles in ecosystem functioning as they support grazing for cattle, feeding and breeding habitats of many arthropods, reptiles and avifauna. Some common avifauna local and aquatic species like oriental magpie-robin, Dove, parrot, Red-vened bulbul, Black kite, kingfisher, Cuckoo, Indian Cormorant, Little Cormorant, Grey Heron were also found in the project area. The mammals are scarce throughout the project site. Available species are common mongoose, Indian flying fox, House Rat were found in the project site. Reptiles commonly found within the project site Common Smooth Water-snake, Checkered keelback, Rat snake, Bengal monitor were also noted during field visit. Magra khal are rich of different types of aquatic flora. The dominant aquatic floral types are in the project site: Kochuripana, Panimorich, Jhanji, Aligator weed, Topapana Chechra, Kolmi, Dhol kolmi etc. Innumerable indigenous weeds grow in project site.
8	Dakatia Khal	District: Satkhira Upazila: Tala Union: Khalil nagar Data collection (GPS):	The proposed Dakatia khal is surrounded by shrimp culture and agricultural land. The major vegetation pattern of the project site is mainly crop field vegetation. Crop field ecosystem consist least diversity of floral communities and provide wide area of grazing and feeding habitats for numerous Insects. No vegetation was observed both site of the bank in the project site. Fluctuation of water level due to

Sl. No.	Name of the Canal	Location	Baseline Ecological Status
		22°45'03.7"N, 89°18'34.6"E BEZ: Sline Tidal Floodplain Length:5983.52 m	regular tidal effect. saline tolerant flora as well as a number of crustaceans, fishes, mudskippers and shorebirds were observed of the project site. Different types of aquatic flora like rooted floating, submerged and amphibian vegetations like sedges and meadows were also observed. Fern, Bishkatali, Chaila ghas, Jhangi, Helencha Aligator weed etc were commonly found within project site. The aquatic bird like Little Egret, Common Kingfisher, Little Cormorant, Indian pond heron are frequently found along canal systems. Snail and Oyster were also commonly found in canal bed. There are also no rare or endangered species here.
9	Mahandi khal	District: Satkhira Upazila: Tala Union: Khalil nagar Data collection (GPS): 22°44'41.9"N, 89°17'21.9"E BEZ: Sline Tidal Floodplain Length:3379.17 m	Mahandi khal is surrounded by shrimp culture and agricultural land. The main vegetation pattern both site of the canal is mainly cropland vegetation. Very few plants like Babla, Gewa and Palmyra palm, Date palm etc. were also observed both site of the bank. During field visit we observed that the canal was completely dried up only a small amount of water had accumulated in different places of the canal. Every year two to three month the project site was go under water because the canal is filled with sediment. The project site was not rich with aquatic flora additionally Dhol kolmi, Kochu, Helencha, Kolmi etc were also found in the project site. No critical and endanger species were found in the project site.
10	Madobkhali Khal	District: Satkhira Upazila: Tala Union: Khalil nagar Data collection (GPS): 22°44'12.7"N, 89°18'37.0"E BEZ: Ganges Floodplain Length:564.59 m	This canal goes through the shrimp estate and agricultural field. Approximately 40-50 trees species were also found in a specific site of the project site others site no vegetation were observed. No aquatic vegetation was observed in the project site. Some local and water dependents birds like Indian Cormorant, Little Egret, Brahminy Kite, Black Drongo, Common Kingfisher etc. were also found during field visitr. Small mammals such as Bengal fox, Large Indian civet, common mongoose, Indian flying fox were commonly found in the project area said by local people.
11	Kalmeghar Khal	District: Satkhira Upazila: Shaymnagar Union: Shaymnagar Data collection (GPS): 22°19'34.2"N, 89°04'24.7"E BEZ: Sline Tidal Floodplain Length:2113.45 m	Kalmeghar Khal serves as a crucial water resource, providing irrigation water for shrimp estates and croplands, as well as facilitating drainage. The predominant vegetation pattern along both sides of the canal comprises roadside, homestead, and cropland vegetation. From my observation, households located near the canal are vegetated with local plant species. The dominant tree species along both sides of the canal include Indian Siris, Babla, Khai Babla, Palmyra Palm, Coconut, Sissoo, Neem, Tamarind, and Gewa. In the project area, the canal sides are exclusively dominated by Babla and Indian Siris, which demonstrate good adaptation to saline soil conditions. This vegetation supports local avifauna such as Common Mynas, Doves, Large-billed Crows, Black Kites, Indian Cormorants, Brahminy Kites, Black Drongos, and Common Kingfishers. Small mammals commonly found in the project area

Sl. No.	Name of the Canal	Location	Baseline Ecological Status
			include Bengal Foxes, Large Indian Civets, Common Mongooses, and Indian Flying Foxes. Reptiles commonly observed within the project area are Common Garden Lizards, Checkered Keelbacks, and Bengal Grey Monitors, as reported by locals during field visits. No aquatic flora, such as submerged or free-floating species, were observed within the area. Additionally, patches of Gewa, Choila/Ora, and Hargoza were sporadically observed on the torus and along the canal-side toe of the embankment. The canal bed was rich with different types of snails and shells. There is no evidence of rare or endangered species, nor any sensitive habitats within the proposed site.
12	Andigram Khal	District: Bagherhat Upazila: Mollahat Union: Gangi Data collection (GPS): 22°52'47.57"N 89°43'36.03"E BEZ: Ganges Floodplain Length:2136.88 m	The Andigram Canal primarily traverses through shrimp culture ponds and agricultural lands, although there are some homestead areas along its course. In addition to homestead vegetation, the dominant plant species along the canal is the Palmyra palm, with some specimens having been cut down. Date palms and banana plants are also observed along the canal banks. In the homestead areas, Raintrees, Mahogany, White Siris, and Coconut plants are present. Water hyacinth is the dominant aquatic species in this canal, almost obstructing the normal water flow. According to local residents, the common avifauna found in the project area includes common mynas, house sparrows, common kingfishers, doves, egrets, and owls. Small mammals such as foxes, common mongooses, small Indian civets, and bats are reported to inhabit the project area. Reptiles like the Bengal Grey Monitor, Common Garden Skink, Rat Snake, and Banded Krait are also found within the project area, as stated by locals. There are also no rare or endangered species here. There is no evidence of wildlife of the higher species within the location and no sensitive habitats found within the proposed site.
13	Gajdurer Khal	District: Bagerhat Upazila: Chitalmari Union: Char Baniari Data collection (GPS): 22°46'37.97"N 89°54'15.76"E BEZ: Ganges Floodplain Length:1324.31 m	The canal is surrounded by shrimp culture ponds, agricultural land, roadside vegetation, and homestead vegetation areas. The plant species found along the canal banks vary based on location. Near homestead areas, plants such as raintrees, mahogany, white siris, jackfruit, mango, coconut, betel nut, and bamboo are primarily observed. However, in other areas along the canal bank, only palmyra palms and banana plants are found. Water hyacinth is the dominant aquatic species in this canal, almost obstructing the normal water flow. According to local residents, the common avifauna found in the project area includes common mynas, house sparrows, common kingfishers, doves, egrets, and owls. Small mammals such as foxes, common mongooses, rats, and small Indian civets inhabit the project area, as reported by locals. Reptiles like the Bengal Grey Monitor, Common Garden Skink, Rat Snake, and Banded Krait are also found within the project area. There are also no rare or endangered species here. There is no evidence of wildlife of the higher species within the location and no sensitive habitats found within the proposed site.

Sl. No.	Name of the Canal	Location	Baseline Ecological Status
14	Char Dakatia Gager Khal	District: Bagerhat Upazila: Chitalmari Union: Char Baniari Data collection (GPS): 22°47'24.91"N 89°54'46.36"E BEZ: Ganges Floodplain Length:1977.18 m	<p>A substantial portion of this canal passes through homestead areas while also traversing shrimp culture ponds, agricultural lands, and roadside vegetation zones. A significant amount of roadside vegetation, particularly coconut, palmyra palm, and mahogany plants along the canal banks, has been cut down due to canal excavation activities. Other plant species observed in the project area include raintrees, betel nuts, white siris, kocha, and Indian almonds. Currently, there is no aquatic vegetation present in the canal as a result of the canal excavation work. There are also no rare or endangered species here. There is no evidence of wildlife of the higher species within the location and no sensitive habitats found within the proposed site. According to local residents, the common avifauna found in the project area comprises common mynas, house sparrows, common kingfishers, doves, egrets, and owls. Small mammals such as foxes, common mongooses, rats, and small Indian civets inhabit the project area, as reported by locals. Reptiles like the Bengal Grey Monitor, Common Garden Skink, Rat Snake, and Banded Krait are also found within the project area.</p>
15	Burir Khal	District: Bagerhat Upazila: Chitalmari Union: KalaPalmyra palma Data collection (GPS): 22°49'28.27"N 89°54'42.89"E BEZ: Ganges Floodplain Length:4775.07 m	<p>The canal is surrounded by shrimp culture ponds, agricultural land, roadside vegetation, and homestead vegetation areas. The plant species found along the canal banks vary based on proximity to homestead areas. Near homestead regions, plants such as raintrees, mahogany, korai, guava, mango, and coconut are primarily observed. However, in other areas along the canal, only palmyra palms and banana plants are present. Water hyacinth is the dominant aquatic species in this canal, almost obstructing the normal water flow. There are also no rare or endangered species here. There is no evidence of wildlife of the higher species within the location and no sensitive habitats found within the proposed site. According to local residents, the common avifauna found in the project area includes common mynas, house sparrows, common kingfishers, doves, egrets, and owls. Small mammals such as foxes, common mongooses, rats, and small Indian civets inhabit the project area, as reported by locals. Reptiles like the Bengal Grey Monitor, Common Garden Skink, Rat Snake, and Banded Krait are also found within the project area.</p>
16	Kumbkhali Khal	District: Bagherhat Upazila: Rampal Union: Basarullah Data collection (GPS): 22°35'18.52"N, 89°38'1.57"E BEZ: Sline Tidal Floodplain Length:1640.84 m	<p>The canal is surrounded by shrimp culture ponds, agricultural land, roadside vegetation, and homestead vegetation areas. Due to saline water intrusion occurring in this canal, some mangrove species such as Nipa palm, Keora, Noil, Ora, Bain, and Gewa were observed during the field visit. In addition to these mangrove species, plants like Babla, Korai, Mango, Coconut, Raintree, and Jujube were also present along roadsides and in homestead areas. Among the herb and shrub species, Hargoja kata, Dhol Kolmi, Chargadha Shak, and Bon Gash were mainly observed in the project area. According to local consultations, avifauna such as House Sparrows, Common Mynas, Oriental Magpie-robins, Common Kingfishers, and Doves are commonly sighted at the project site. Small mammals including Common</p>

Sl. No.	Name of the Canal	Location	Baseline Ecological Status
			Mongoose, Indian Flying Foxes, and Rats are commonly found in the area. Local residents reported that Checkered Keelbacks and Rat Snakes are commonly encountered snake species in the region. There are also no rare or endangered species here. There is no evidence of wildlife of the higher species within the location and no sensitive habitats found within the proposed site.
17	Jibon Khalir Khal	District: Bagerhat Upazila: Kachua Union: Raripara Data collection (GPS): 22°36'2.14"N 89°50'43.19"E BEZ: Ganges Floodplain Length:2504.07 m	The canal traverses through roadside vegetation, agricultural lands, and homestead vegetation areas. The coconut plant is the dominant species along the canal bank, particularly in areas where shrimp culture ponds are located. Other plant species observed in the project area include drumstick, white siris, jujube, sapodilla, betel nut, palmyra palm, date palm, mango, banyan, and neem. Aquatic vegetation such as minute duckweed, alligator weed, and water spinach is commonly found. Herbs and shrubs like bananas and taro were also present in the project area. There are also no rare or endangered species here. There is no evidence of wildlife of the higher species within the location and no sensitive habitats found within the proposed site. According to local residents, common avifauna found in the project area include common mynas, house sparrows, common kingfishers, doves, egrets, and owls. Small mammals such as foxes, common mongooses, rats, and small Indian civets inhabit the project area. Reptiles like the Bengal grey monitor, common garden skink, rat snake, and banded krait are also found within the project area.
18	Shoilodubir Khal	District: Bagerhat Upazila: Chitalmari Union: KalaPalmyra palma Data collection (GPS): 22°36'58.60"N 89°51'11.00"E BEZ: Ganges Floodplain Length:5713.29 m	The canal is surrounded by shrimp culture ponds, agricultural land, and roadside vegetation. Due to saline water intrusion occurring in this canal, mangrove species are dominating along the canal banks. Some mangrove species, such as Nipa palm, Keora, Noil, Ora, Bain, and Gewa were observed during the field visit. In addition to these mangrove species, plants like Guava, Sapodilla, White Siris, Raintree, and Palmyra Palm were also present along the canal banks. Among the herb and shrub species, Hargoja kata and banana plants were observed in the project area. According to local consultations, avifauna such as House Sparrows, Common Mynas, Oriental Magpie-robins, Common Kingfishers, and Doves are commonly sighted at the project site. Small mammals including Common Mongooses, Indian Flying Foxes, and Rats are commonly found in the area. Local residents reported that Checkered Keelbacks and Rat Snakes are commonly encountered snake species in the region. There are also no rare or endangered species here. There is no evidence of wildlife of the higher species within the location and no sensitive habitats found within the proposed site.



Mora Jopjopia Nodi



Dohar Khal



Nagkati Khal



Rajapur Khal



Bollobi Khal



Atshotobigha Khal



Magra Khal



Dhaskhathi Khal



Mahandi khal



Madobkhali Khal



Kalmeghar Khal



Andigram Khal



Gajdurer Khal



Char Dakatia Gager Khal



Burir Khal



Kumbkhali Khal



Jibon Khalir Khal



Shoilodubir Khal

Figure A27.1: Vegetation in and around the Project Site

Annex 27: Observed Terrestrial Floral Species within Study and Project Area

Sl	English Name	Scientific Name	Abundance																				Uses	
			Khulna					Satkhira					Bagerhat											
			Study area	Project area				Study area	Project area				Study area	Project area										
				Mora Jopjopia Nodi	Dohar Khal	Nagkati Khal	Rajapur Khal		Bollobi Khal	Atshotobigha Khal	Magra Khal	Dhaskhathi Khal		Mahandi Khal	Madobkhali Khal	Kalmeghar Khal	Andigram Khal	Gajdurer Khal	Char Dakatia Goger Khal	Burir Khal	Kumbkhali Khal	Jibon Khalir Khal		Shoiodubir Khal
1	Mango	<i>Mangifera indica</i>	VC	C	VC	VC	VC	VC	VC	C	C	A	A	A	P	VC	M	VC	C	C	VC	VC	A	Fr, T, Fu
2	Coconut	<i>Cocos nucifera</i>	VC	VC	VC	VC	VC	VC	VC	VC	C	A	A	A	A	VC	VC	VC	VC	C	VC	M	A	Fr, Fu
3	Jackfruit	<i>Artocarpus heterophyllus</i>	C	M	M	C	A	C	C	FC	A	A	A	A	A	M	M	C	M	M	M	M	A	Fr, T, Fu
4	Babla	<i>Acacia nilotica</i>	C	C	A	M	VC	M	VC	C	C	A	P	P	C	C	VC	A	M	A	VC	A	A	Fu
5	Khai Babla	<i>Pithecolobium dulce</i>	C	C	A	M	C	M	VC	C	C	A	C	P	C	C	C	A	M	A	VC	A	A	Fu
6	Date-palm	<i>Phoneix sylvestirs</i>	VC	VC	VC	VC	VC	C	VC	C	VC	A	C	P	A	VC	VC	M	C	M	M	VC	A	Fr, Fu
7	Tamarind Tree	<i>Temarindus indica</i>	M	M	M	M	A	VC	C	M	M	A	A	A	P	M	A	A	M	A	M	A	A	T, Fr, Fu
8	Neem	<i>Azadirachta indica</i>	C	M	M	C	A	M	C	M	A	A	A	A	C	C	A	A	M	A	M	VC	A	M, Fu
9	Palmyra palm	<i>Boassus flabelifer</i>	VC	VC	VC	VC	A	C	VC	M	P	A	C	P	A	VC	VC	VC	C	VC	C	VC	M	T, Fr, Fu
10	Indian siris	<i>Albizia lebbeck</i>	C	C	C	C	VC	M	C	A	A	A	A	A	A	C	M	M	C	M	M	A	M	T, Fu
11	Banana	<i>Musa sp</i>	VC	VC	VC	VC	C	VC	VC	A	C	A	A	A	A	VC	C	C	A	VC	C	VC	C	Fr
12	White Siris	<i>Albizia procera</i>	VC	VC	C	C	A	VC	C	A	A	A	A	P	A	C	M	VC	M	C	M	VC	C	T, Fu
13	Jujube	<i>Ziziphus jujuba</i>	C	C	VC	C	A	C	C	M	A	A	A	A	A	C	M	M	M	A	VC	C	C	Fr, Fu
14	Betel Nut	<i>Areca catechu</i>	VC	C	C	C	A	VC	VC	M	C	A	C	A	C	VC	C	VC	VC	M	M	VC	A	Fr, Fu
15	Bamboo	<i>Bambusa vulgaris</i>	C	VC	M	VC	A	C	VC	A	A	A	A	A	A	C	M	VC	M	A	M	C	A	T, Fu
16	Raintree	<i>Samanea saman</i>	VC	VC	C	C	M	VC	VC	A	A	A	-	A	A	VC	C	VC	C	C	VC	C	A	T, Fu
17	Mahogany	<i>Swietenia mahagoni</i>	C	C	C	VC	A	M	C	C	-	A	A	A	P	M	M	VC	C	C	A	A	A	T, Fu
18	Kadam	<i>Neolamarckia cadamba</i>	M	M	M	M	A	A	M	A	A	A	A	A	A	M	A	A	A	A	M	A	A	T, Fu
19	Kocha	-	VC	VC	C	C	VC	VC	VC	-	-	A	A	A	A	C	C	M	C	M	M	M	M	Fu
20	Gewa	<i>Excoecaria agallocha</i>	M	M	A	A	A	C	M	C	A	A	A	A	C	M	A	A	A	A	C	A	VC	T, Fu
21	Drumstick	<i>Moringa oleifera</i>	C	M	A	C	A	C	C	A	C	A	A	A	C	C	M	M	M	A	M	VC	A	Fo, Fu
22	Sissoo	<i>Dalbergia sissoo</i>	M	M	C	M	A	A	M	A	A	A	A	A	A	M	A	A	M	A	A	A	A	T, Fu
23	Indian Almond	<i>Terminalia catappa</i>	M	M	A	M	A	A	M	A	A	A	A	A	A	M	A	A	M	A	A	M	A	Fr, T
24	Guava	<i>Psidium guajava</i>	VC	C	M	C	A	M	C	M	A	A	A	A	P	C	A	M	C	C	A	C	C	Fr, Fu
25	Sapodilla	<i>Manilkara zapota</i>	C	M	A	M	A	M	M	A	A	A	A	A	A	M	A	A	M	A	A	C	A	Fr, Fu
26	Banyan tree	<i>Ficus benghalensis</i>	M	M	A	A	A	M	M	M	A	A	A	A	P	M	A	A	M	A	A	C	A	Or
27	Hog plum	<i>Spondias pinnata</i>	C	M	A	M	A	VC	M	A	A	A	A	A	A	M	A	A	M	A	A	M	A	Fr
28	Akashmoni	<i>Acacia moniliformis</i>	M	C	M	C	A	M	M	A	A	A	A	A	A	M	A	M	A	M	A	A	A	T, Fu
29	Wood apple	<i>Limonia acidissima</i>	M	M	M	VC	A	C	M	A	A	A	A	A	A	C	M	A	M	A	A	M	A	Fr, Fu

Sl	English Name	Scientific Name	Abundance																				Uses	
			Khulna					Satkhira					Bagerhat											
			Study area	Project area				Study area	Project area				Study area	Project area										
				Mora jopjopia Nodi	Dohar Khal	Nagkati Khal	Rajapur Khal		Bollobi Khal	Atshotobigha Khal	Magra Khal	Dhaskhathi Khal		Mahandi Khal	Madobkhali Khal	Kalmeghar Khal	Andigram Khal	Gajdurer Khal	Char Dakatia Goger Khal	Burir Khal	Kumbkhali Khal	Jibon Khalir Khal		Shoilodubir Khal
30	Nipa Palm	<i>Nypa fruticans</i>	C	A	A	A	A	VC	C	A	A	A	A	A	A	C	A	A	A	-	C	A	VC	Fr, Fu
31	Horgoja /Sea Holly	<i>Acanthus ilicifolius</i>	C	A	A	A	A	C	VC	C	A	A	A	A	C	C	A	A	A	-	C	A	C	Fu
32	Keora	<i>Sonneratia apetala</i>	M	A	A	A	A	C	C	C	A	A	A	A	C	M	A	A	A	-	C	A	M	Fr, Fu
33	Noil	<i>Avicennia officinalis</i>	M	A	A	A	A	C	-	-	A	A	A	A	M	M	A	A	A	-	C	A	M	Fu
34	Ora	<i>Sonneratia caseolaris</i>	M	A	A	A	A	C	-	-	A	A	A	A	-	M	A	A	A	-	C	A	VC	Fu
35	Bain	<i>Avicennia officinalis</i>	M	A	A	A	A	C	-	-	A	A	A	A	-	M	A	A	A	-	C	A	C	T, Fu

Source: CEGIS Field survey February 2024

Note: Common= C, Very Common= VC, Medium=M, Absent =A Usage: T= Timber, Fr= Fruit, Fo = Food, Fu= Fuel wood, M= Medicine, Or= Ornamental and - =Unknown

Annex 28: Observed Aquatic Floral Species within Study and Project Area

SI No	English Name	Scientific Name	Local Status																				Goods/Services/Use		
			Khulna					Satkhira					Bagerhat												
			Study area	Project area				Study area	Project area				Study area	Project area											
				Mora Jopjopia Nodi	Dohar Khal	Nagkati Khal	Rajapur Khal		Bollobi Khal	Atshotobigha Khal	Magra Khal	Dhaskhathi Khal		Mahandi Khal	Madobkhali Khal	Kalmeghar Khal	Andigram Khal	Gajdurer Khal	Char Dakatia Goger Khal	Burir Khal	Kumbkhali Khal	Jibon Khalir Khal		Shoilodubir Khal	
Free floating plant																									
1	Water hyacinth	<i>Eichhornia crassipes</i>	VC	A	C	VC	VC	A	VC	A	VC	A	A	A	A	C	VC	C	A	VC	A	A	A	Compost,vegetable	
3	Khudipana/ Duck weed	<i>Lemna perpusilla</i>	VC	A	C	VC	VC	A	C	A	VC	A	A	A	A	VC	A	C	A	VC	A	M	A		
4	Topapana	<i>Pistia stratiotes</i>	M	A	A	A	A	A	C	A	C	A	A	A	A	C	C	M	A	C	A	C	A		
Submerged Plant																									
5	Jhangi/ water thyme	<i>Hydrilla verticillata</i>	M	C	M	A	M	A	C	C	C	M	A	P	M	M	A	M	A	C	M	A	A	N/A	
6	Ghechu/ Floating lace plant	<i>Aponogeton natans</i>	A	P	A	A	A	A	C	A	M	A	A	A	A	M	A	A	A	A	A	A	A	Vegetable	
Amphibian plant																									
7	Jol kolmi/ Pink morning glor	<i>Ipomoea aquatic</i>	M	C	A	A	A	A	VC	C	VC	A	M	A	A	C	A	M	A	M	C	A	A	Fuel	
8	Kolmi Shak/water spinach	<i>Ipomoea aquatica</i>	C	C	C	C	M	A	C	C	M	A	C	A	A	VC	M	M	A	VC	A	C	A	Vegetable	
9	Alligator weed/Maloncho	<i>Alternanthera philoxiroides</i>	VC	VC	C	M	VC	A	C	A	M	A	C	A	A	VC	VC	C	A	VC	A	VC	A	Vegetable	
10	Helencha	<i>Enhydra fluctuans</i>	VC	VC	M	M	C	A	VC	C	VC	A	VC	A	A	VC	M	M	A	VC	A	VC	A		
11	Kochu	<i>Colocasia spp.</i>	VC	VC	C	A	M	A	VC	C	C	A	C	A	A	VC	VC	C	A	VC	A	C	A	Vegetable	
12	Chaila gash	<i>Hemarthria protensa</i>	M	C	A	A	C	A	C	C	M	M	VC	A	A	C	M	M	A	M	A	A	M	N/A	

Annex 29: List of Fish Species Within the Study Area of Chakaria Shrimp Estate

Table A30.1: Fish Species

Sl. No.	Family	Local name	English name	Scientific name	Global IUCN Status	Availability in the study area
1.	Scatophagidae	Chitra/Bistara	Spotted butterflyfish	<i>Scatophagus argus</i>	LC	C
2.	Sillaginidae	Tular Dandi	Lady fish	<i>Sillago domina</i>	NT	A
3.	Sciaenidae	Lal Poa/Vola	Silver jew	<i>Johnius argentatus</i>	LC	A
4.	Engraulidae	Phasa	Anchovies	<i>Thryssa mystax</i>	LC	C
5.	Haemulidae	Sada Datina	Silver bream	<i>Pomadasys hasta</i>	LC	A
6.	Stromateidae	Rup Chanda	Chinese pomfret	<i>Pampus chinensis</i>	NE	C
7.	Gobiidae	Chewa	Torpedo trevally	<i>Taenoides anguillaris</i>	LC	A
8.	Mugilidae	Bhangan	Mullet	<i>Mugil cephalus</i>	LC	A
9.	Apogonidae	Rekha	Four barred finger fish	<i>Corius quadrifasciatus</i>	LC	F
10.	Synodontidae	Loitta	Bombay duck	<i>Harpadon nehereus</i>	NT	F
11.	Stromateidae	Fili Chanda	Silver pomfret	<i>Pampus argenteus</i>	NE	C
12.	Scombridae	Maitya	Jack and pompanos	<i>Cybium guttatum</i>	DD	F
13.	Polynemidae	Lakhua	Indian salmon	<i>Polynemus indicus</i>	NE	F
14.	Sciaenidae	Sada Poa	Silver jew	<i>Otolithes argentatus</i>	LC	A
15.	Engraulidae	Amadi	Pointed tail anchovy	<i>Stolephorus indicus</i>	LC	F
16.	Cynoglossidae	Kukurjiv	Sole	<i>Cynoglossus macrostomus</i>	VU	A
17.	Oxudercidae	Bele	-	<i>Gobius personatus</i>	DD	A
18.	Ariidae	Ghagra Tengra	Gagora catfish	<i>Arius gagora</i>	NT	A
19.	Tetraodontidae	Potka	-	<i>Chelonodon patoca</i>	LC	F
20.	Sciaenidae	Boro Poa	Long jewfish	<i>Sciaenoides brunneus</i>	DD	A
21.	Leiognathidae	Tak Chanda	Common pony fish	<i>Leiognathus equulus</i>	LC	C
22.	Clupeidae	Ilish	Hilsa shad	<i>Tenualosa ilisha</i>	LC	C
23.	Clupeidae	Chandani Ilish	Toli shad	<i>Tenualosa toli</i>	VU	F
24.	Polynemidae	Ramchos/ Taposhi	Paradise threadfin	<i>Polynemus paradiseus</i>	LC	F
25.	Mugilidae	Khorshula	Corsula	<i>Rhinomugil corsula</i>	LC	A
26.	Latidae	Vhetki/Koral	Seabass	<i>Lates calcarifer</i>	LC	A
27.	Scombridae	Rupsha	Skipjack tuna	<i>Katsuwonus pelamis</i>	LC	F
28.	Engraulidae	Boiragi/Olua	Gold spotted grenadier anchovy	<i>Coilia dussumieri</i>	LC	A
29.	Bagridae	Tengra	Striped dwarf catfish	<i>Mystus sp.</i>	LC	A

List Concern (LC), Near Threatened (NT), Vulnerable (VU) Not Evaluated (NE), Data deficient (DD)

Abundant (A) – a lot of or plenty, Common (C) - frequently available, Few (F) – present but not frequently available (modified after Akter et al., 2019).

Source: CEGIS field visit, 2024

Table A30.2: Prawn/ Shrimp Species

Family	Local Name	English Name	Scientific name
Palaemonidae	Golda chingri	Fresh water prawn	<i>Macrobrachium rosenbergii</i>
	Goda chingri	Hairy river prawn	<i>Macrobrachium rude</i>
Penaeidae	Bagda chingri	Giant tiger shrimp	<i>Penaeus monodon</i>
	Chaka chingri	Indian white shrimp	<i>Penaeus indicus</i>
	Kola chingri	Banana shrimp	<i>Penaeus merguensis</i>
	Horina chingri	Brown shrimp	<i>Penaeus semisulcatus</i>
	Chali chingri	Yellow shrimp	<i>Metapenaeus bravicornis</i>
Solenoceridae	Shora chingri	Coastal mud shrimp	<i>Solencera crassicornis</i>
Alpheidae	Loila chingri	Akaimi shrimp	<i>Acetes japonicas</i>
Hippolytidae	Gora chingri	Roshna prawn	<i>Exopalaemon styliiferus</i>

Source: CEGIS field visit, 2024

Annex 30: Glimpse of Agricultural Practice within the Study Areas of the Sub-Projects



Figure A31.1: Fallow lands of BMC project area



Figure A31.2: View of salt cultivation in BMC study area, Teknaf



Figure A31.3: View of grass cultivation during Rabi Season in Ichanagar, Karnaphuli



Figure A31.4: Fallow lands during Rabi Season in Badarkhali, Chakaria



Figure A31.5: View of pulse crop land during Rabi Season in Ichanagar, Karnafuly



Figure A31.6: View of salt cultivation in Chakaria Shrimp State



Figure A31.7: View of salt cultivation in Badarkhali, Chakaria



Figure A31.8: View of HYV Boro cultivation during Rabi Season in Pukuria, Chakaria



Figure A31.9: View of HYV Boro cultivation during Rabi Season in Badarkhali, Chakaria

Annex 31: List of Consulting Persons

Various Consulting Persons during Field Visits (Informal Consultation)

Name of the respondents	Occupation	Village	Union	Upazila	District	Mobile no.
Ruhul Kader	Fish trader	Rampur	Saharbil	Chakaria	Cox's Bazar	
Jashim	Extension assistant	Rampur	Saharbil	Chakaria	Cox's Bazar	01813734076
Shah Alam	Fisherman	Sadvalia	Badarkhali	Chakaria	Cox's Bazar	
Sultan Ahmad	Day laborer	Sadvalia	Badarkhali	Chakaria	Cox's Bazar	
Abdul Malek	Day laborer	Sadvalia	Badarkhali	Chakaria	Cox's Bazar	
Salimullah	Day laborer	Sadvalia	Badarkhali	Chakaria	Cox's Bazar	01891511647
Md. Borhanuddin	Salt cultivator and fisherman	Sadvalia	Badarkhali	Chakaria	Cox's Bazar	
Md. Kutubuddin	Shopkeeper	Sadvalia	Badarkhali	Chakaria	Cox's Bazar	01829450811
Md. Golam Sheikh	Farmer	Barmogati	Dighalia	Dighalia	Khulna	
Roni Khan	Shrimp farmer	panigati	Dighalia	Dighalia	Khulna	01724981519
Md. Abdullah	Shrimp farmer	panigati	Dighalia	Dighalia	Khulna	
Md. Rakib Sheikh	Farmer	Dakshin Khajadanga	Tilakshalpa Baishdia	Rupsha	Khulna	01919334646
Md. Mohibul Islam	Farmer	Dakshin Khajadanga	Tilakshalpa Baishdia	Rupsha	Khulna	01790852383
Nitish Roy	Farmer	Aushkhali/ Titukhali	Gangarampur	Batiaghata	Khulna	01965528588
Md. Nadir Sheikh	Farmer	Nolta	Khalilnagar	Tala	Satkhira	01745759001
Md. Aslam	Farmer	Nolta	Khalilnagar	Tala	Satkhira	01762092866
Abdul Mazid Gazi	Farmer	Kallyanpur	Shyamnagar	Shyamnagar	Satkhira	01915505901
Ranojit Mistry	Farmer	Kallyanpur	Shyamnagar	Shyamnagar	Satkhira	01909703935
Keramat	Farmer	Kallyanpur	Shyamnagar	Shyamnagar	Satkhira	01957569130
Md. Jahangir	Fisherman	Ekra	Jalalabad	Kolaroa	Satkhira	01739966361
Abdus Sobur	Farmer	Ekra	Jalalabad	Kolaroa	Satkhira	01720587239
Md. Ishak Ali	Fisherman	Ekra	Jalalabad	Kolaroa	Satkhira	01735424957
Abul Kalam Azad	Fisherman	Ekra	Jalalabad	Kolaroa	Satkhira	01727902289
Firoz Morol	Gher business	Bacharhoilo	Jhanjhania	Rampal	Bagerhat	01961611409
Gazi Hafizur Rahman	Mason	Dobaria	Laripara	Kochua	Bagerhat	01792112624
Amit Kumar Gain	Local physician	Dakatia	Charbaniari	Chitalmari	Bagerhat	01921730129

List of Participants in Various FGDs and PCM

A. FGD with Fish and Shrimp Farmers, and Salt Cultivators

14.02.2024

সাসটেইনেবল কোস্টাল এন্ড মেরিন ফিশারিজ প্রকল্পের আওতাধীন, 'কক্সবাজার জেলায় চকরিয়ায় অবস্থিত সরকারি চিংড়ি এস্টেট' উপ-প্রকল্প বাস্তবায়নের ফলে পরিবেশগত প্রভাব নিরূপন এর পরিবেশ ও আর্থ-সামাজিক প্রভাব নিরূপন ও প্রশমনের ব্যবস্থাপনা বিষয়ক মতবিনিময় (এফজিডি) সভা

ক্র. নং	নাম	প্রকৃতি (পদবীসহ) / ঠিকানা	পেশা	মোবাইল নং	স্বাক্ষর
	স্বাক্ষর চাক্ষু, মাদু / চিংড়ি চাক্ষু				
	মুন্সুর উদ্দিন		স্বাক্ষর চাক্ষু ৩৭৬-৩৭২, ৬০ চিংড়ি চাক্ষু চাক্ষু	০১৭৪০৬১৪৬৪	মুন্সুর উদ্দিন
	কাজিম হোসেন		চিংড়ি ৩ নামক চাক্ষু	০১৪২৫৬৫৬২৬	কাজিম
	হাজী নূর হোসেন		"	০১৭৭৬১৭৫১৪০	নূর হাজী
	নাজিম উদ্দিন		চিংড়ি চাক্ষু	০১৪৫৬৭০১২২৩	নাজিম
	কাজিম উদ্দিন		চিংড়ি ৩ নামক চাক্ষু	০১৪১৪৫৬২৩৭	কাজিম
	শ্রী. হোসেন ফার্মার		"	০১৪৬৭৫১০০৭১	শ্রী. হোসেন
	শ্রী. আরিফুল ইকোলজ		"	০১৪১১৩৩০৫৭৬	আরিফুল

ক্র. নং.	নাম	প্রতিষ্ঠান (পদবীসহ) / ঠিকানা	পেশা	মোবাইল নং	স্বাক্ষর
	মুহিবুল হক		ডি.ডি. ৩ লাফা হাউস	০১৪৩৩ ২৪৫৪৩২	মুহিব
	তাহিরুল ইসলাম		-	০১৪১৭৪৫৫৫১০	তাহির
	চান্দুর রহমান		-	০১৪০০ ০১৪৩৩৪৫৭১৩২	APD
	জনক সানসার হাউস		নবদ্বারী	০১৩০১০০৪১৩৬	জনক

B. FGD with Aratdar and Businessmen at Choarfari Bazar

‘সাসটেইনেবল কোস্টাল এন্ড মেরিন ফিশারিজ’ প্রকল্পের আওতাধীন, ‘কক্সবাজার জেলার চকরিয়ায় অবস্থিত সরকারি চিংড়ি এস্টেট’ উপ-প্রকল্প বাস্তবায়নের ফলে পরিবেশগত প্রভাব নিরূপন এর পরিবেশ ও আর্থ-সামাজিক প্রভাব নিরূপন ও প্রশমনের ব্যবস্থাপনা বিষয়ক মতবিনিময় (এফজিডি) সভা

ক্র. নং.	নাম	প্রতিষ্ঠান (পদবীসহ) / ঠিকানা	পেশা	মোবাইল নং	স্বাক্ষর
আরতদার ও ব্যবসায়ী, কোয়ারফারী বাজার					
	শ্রী: মছবুল হোসেন		ব্যবসায়ী	০১৪২৪৫৭৩৫১	শ্রী: মছবুল হোসেন
	শ্রী: জাহেদ		ব্যবসায়ী	০১৭২৪৬১৪৫৬	শ্রী: জাহেদ
	শ্রী: মঞ্জুর হোসেন		ব্যবসায়ী	০১৪১৫৩৩৫৫৩	M.Ham
	শ্রী: হোসেন		ব্যবসায়ী	০১৩১৭২৫০৫৫৫	শ্রী: হোসেন
	শ্রী: মোস্তফিজ হোসেন		ব্যবসায়ী	০১৪৩৭৫৪০৫৫৩	শ্রী: মোস্তফিজ হোসেন
	শ্রী: মঞ্জুর হোসেন		ব্যবসায়ী	০১	শ্রী: মঞ্জুর হোসেন
	শ্রী: মঞ্জুর হোসেন		ব্যবসায়ী	০১৪২৩৪৩৩৫৫৫	শ্রী: মঞ্জুর হোসেন

ক্র. নং.	নাম	প্রতিষ্ঠান (পদবী/স্বাক্ষর) / ঠিকানা	পেশা	যোগাযোগ নং.	স্বাক্ষর
	ডাঃ ইব্রাহিম		কম্পিউটার	০১৬৪৭৬৬০৬৩	ডাঃ ইব্রাহিম
	ইব্রাহিম আলম		কম্পিউটার	০১৬৩১৭৩৭০৬	ইব্রাহিম আলম
	আব্দুল্লাহ আব্দুল আলম		কম্পিউটার	০১৬৩৩৭৭১০৬	আব্দুল আলম
	আব্দুল হামিদ		কম্পিউটার	০১৬৩২০৩২৩০৫	আব্দুল হামিদ

C. FGD with Women Group

সাসটেইনেবল কোস্টাল এন্ড মেরিন ফিশারিজ প্রকল্পের আওতাধীন, 'কল্লাবাজার জেলার চকরিয়ায় অবস্থিত সরকারি চিংড়ি এস্টেট' উপ-প্রকল্প বাস্তবায়নের ফলে পরিবেশগত প্রভাব নিরূপন এর পরিবেশ ও আর্থ-সামাজিক প্রভাব নিরূপণ ও প্রশমনের ব্যবস্থাপনা বিষয়ক মতবিনিময় (এফজিডি) সভা

ক্র. নং.	নাম	প্রতিষ্ঠান (পদবীসহ) / ঠিকানা	পেশা	মোবাইল নং	স্বাক্ষর
কল্লাবাজার গ্রুপ, কল্লাপুত্র, কল্লাখালী					
১.	বর্ষা জাহাঙ্গীর		স্বামী	০১৮২৬১০৫৩ ১২	বর্ষা জাহাঙ্গীর
০২.	সুহাদা		স্বামী	—	সুহাদা
০৩.	তামিজা কল্লাত		স্বামী	—	তামিজা কল্লাত
০৪.	সুহাদা		স্বামী	—	সুহাদা
৫.	ফাহিমাতুল হকিম		স্বামী	০১৮৪৫৪৩ ২৯৩০	ফাহিমাতুল হকিম
৬.	সুহাদা		স্বামী	—	সুহাদা
৭.	ফাহিমাতুল হকিম		স্বামী	—	ফাহিমাতুল হকিম

क्र. नं.	नाम	अधिकार (पदवीसह) / ठिकाण	पेशा	संवाहन नं.	संपर्क
६.	सुधीरा रजवाडार सिद्ध		समाजिक संशोधन	01823860 295	33610 जयपुर सिद्ध
१०.	राजेश्वर जगदल		समाजिक संशोधन	01877 498024	राजेश्वर जगदल ✓
२०.	संतोष (सुधीरा)		समाजिक संशोधन	01885 705157	✓ संतोष (सुधीरा) सुधीरा

D. FGD with Cluster Farmers at Tala, Satkhira District

০২.০৩.২০২৪

‘সাসটেইনেবল কোস্টাল এন্ড মেরিন ফিশারিজ’ প্রকল্পের আওতাধীন, ‘শুষ্ক চিংড়ি খামারের সাথে সংযুক্ত খাল পুনঃখনন’ উপ-প্রকল্প বাস্তবায়নের ফলে পরিবেশগত প্রভাব নিরূপন এর পরিবেশ ও আর্থ-সামাজিক প্রভাব নিরূপন ও প্রশমনের ব্যবস্থাপনা বিষয়ক মতবিনিময় (এফজিডি) সভা

ক্র. নং	নাম	প্রতিষ্ঠান (পদবীসহ) / ঠিকানা	পেশা	মোবাইল নং	স্বাক্ষর
Dakshakathi-Mahandi Khal, Tala, Satkhira					
১.	আনিস	স্বা.স্ব.	স্বা.স্ব.	০১৩০৭৫২৩৫৫	আনিস
২.	শ্রী. আমিন	স্বা.স্ব.	স্বা.স্ব.		আমিন
৩.	শ্রী. কবিউল হোসেন	স্বা.স্ব.	স্বা.স্ব.	০১৭১৫-১২০৭৫	স্বা.স্ব.
৪.	শ্রী. মাসুম	"	স্বা.স্ব.	০১৭১-৭২৭৫৬	স্বা.স্ব.
৫.	শ্রী. আমিন	"	স্বা.স্ব./স্বা.স্ব.	০২৭৩২২৩০৫২৬	স্বা.স্ব.
৬.	শ্রী. আব্দুল হক	"	"	০০৭৬২২৬১৬	স্বা.স্ব.
৭.	আনিস	"	"	০১২৪-৭৪৫২৭	আনিস
৮.	স্বা.স্ব.			০২৭৪৩৬৫২০৪৩	স্বা.স্ব.

ক্র. নং.	নাম	পরিচয় (পদবীসহ) / ঠিকানা	পেশা	মোবাইল নং	স্বাক্ষর
২.	শ্রী. সিদ্দিকুল হক	স্বাক্ষর	৫১ বিজ্ঞানী	০১৭৫৪৭১৬০৪০	স্বাক্ষর

E. FGD with Cluster Farmers at Digholia, Khulna District

'সাসটেইনেবল কোস্টাল এন্ড মেরিন ফিশারিজ' প্রকল্পের আওতাধীন, 'গুচ্ছ চিংড়ি খামারের সাথে সংযুক্ত যাল পুনঃখনন' উপ-প্রকল্প বাস্তবায়নের ফলে পরিবেশগত প্রভাব নিরূপন এর পরিবেশ ও আর্থ-সমাজিক প্রভাব নিরূপণ ও প্রশমনের ব্যবস্থাপনা বিষয়ক মতবিনিময় (এফজিডি)

সভা

05.03.2024

ক্র. নং.	নাম	প্রতিষ্ঠান (পদবীসহ) / ঠিকানা	পেশা	মোবাইল নং	স্বাক্ষর
FGD at Khulna (Nagkati Khal, Digholia)					
১.	শ্রীমতী সুনীতি	কিষ্কিন্দা, সুনীতি	কৃষি	০১৯৩৭১২১৩৫	শ্রীমতী
২.	শ্রীমতী সুনীতি	কিষ্কিন্দা, সুনীতি	"	০১৭৩৩৩৩৩৩	শ্রীমতী
৩.	শ্রীমতী সুনীতি	কিষ্কিন্দা, সুনীতি	"		শ্রীমতী
৪.	শ্রীমতী সুনীতি	কিষ্কিন্দা	"	০২২৭৬০০৪০	শ্রীমতী
৫.	শ্রীমতী সুনীতি	কিষ্কিন্দা	কৃষি	০১৭৩৬৪৩৬	শ্রীমতী
৬.	শ্রীমতী সুনীতি	কিষ্কিন্দা	কৃষি	০১৭৭১৩৩৭২	শ্রীমতী
৭.	শ্রীমতী সুনীতি	কিষ্কিন্দা	"	০১৭৭০৩৪০	শ্রীমতী
৮.	শ্রীমতী সুনীতি	কিষ্কিন্দা	"	০১৭০৫১০৫৭৬	শ্রীমতী

ক্র. নং.	নাম	প্রতিষ্ঠান (পদবীসহ) / ঠিকানা	পেশা	মোবাইল নং	স্বাক্ষর
২.	সাহা সাংস্কৃতিক কেন্দ্র		কৃষিক্ষেত্র	০১৭৩৬৬৭০১১	সাহা সাংস্কৃতিক
২০.	মুহিবুল্লাহ দাউদ	ডাঃ	কৃষিক্ষেত্র	০১৭৬৬৬৬৬ ৯০০	মুহিবুল্লাহ

F. FGD with Cluster Farmers at Chitalmari, Bagerhat District

07.03.2024.

‘সাসটেইনেবল কোস্টাল এন্ড মেরিন ফিশারিজ’ প্রকল্পের আওতাধীন, ‘গুচ্ছ চিংড়ি খামারের সাথে সংযুক্ত খাল পুনঃখনন’ উপ-প্রকল্প বাস্তবায়নের ফলে পরিবেশগত প্রভাব নিরূপন এর পরিবেশ ও আর্থ-সামাজিক প্রভাব নিরূপণ ও প্রশমনের ব্যবস্থাপনা বিষয়ক মতবিনিময় (এফজিডি) সভা

ক্র. নং.	নাম	প্রতিষ্ঠান (পদবীসহ) / ঠিকানা	পেশা	মোবাইল নং	স্বাক্ষর
Dakatia Khal, Chitalmari, Bagerhat					
1.	বিক্রমলালা		স্বের (স্বয়ং) owner		বিক্রমলালা
2.	সদমানন্দ মিস্ত্রী		কৃষক		সদমানন্দ
3.	সিবাম দিওয়াল		কৃষক		সিবাম
4.	আব্দুল করিম		কৃষক	01752914761	আব্দুল
5.	তপনলালা		কৃষক		
6.	চিঞ্জরজাম মালিক		কৃষক	0196603639	চিঞ্জরজাম মালিক
7.	বরেন করই		কৃষক		বরেন

क्र. नं.	नाम	प्रतिष्ठान (पतावली) / ठिकाना	पेशा	मोबाइल नं.	हस्ताक्षर
8.	मुकुन्द लाल		कृषक		मुकुन्द लाल
9.	कृष्ण लाल		कृषक	01985325790	कृष्ण लाल
10.	श्रीला शशि शैल		मध्यम क्षेत्र	01766998098	श्रीला शशि शैल
11.	विश्वेश्वर मधु		कृषक		विश्वेश्वर मधु
12.	चिंतुकरन विद्याल		कृषक	01917949582	चिंतुकरन विद्याल
13.	अशोक चंद्र विद्याल		कृषक	01957599208	अशोक चंद्र विद्याल
14.	राजेश विद्याल		कृषक क्षेत्र	01811787815	राजेश विद्याल

07.03.2024

'সাসটেইনেবল কোস্টাল এন্ড মেরিন ফিশারিজ' প্রকল্পের আওতাধীন, 'গুচ্ছ চিংড়ি খামারের সাথে সংযুক্ত খাল পুনঃখনন' উপ-প্রকল্প বাস্তবায়নের ফলে পরিবেশগত প্রভাব নিরূপন এর পরিবেশ ও আর্থ-সামাজিক প্রভাব নিরূপন ও প্রশমনের ব্যবস্থাপনা বিষয়ক মতবিনিময় (এফজিডি) সভা

ক্র. নং.	নাম	প্রতিষ্ঠান (পদবীসহ) / ঠিকানা	পেশা	মোবাইল নং	স্বাক্ষর
Gajduser Khol, Bagerhat, FGD => Cluster Farmer					
1.	গৌর বসু		কৃষক	-	গৌর বসু
2.	আবিনাশ বরই		Cluster সভাপতি	০১২৪ 01329368133	আবিনাশ বরই
3.	তাপস্বী সন্দিক			-	
4.	ক্রেম্বি বিশ্বাস			01715211795	
5.	নিউন পলাদার			01988147050	
6.	ফারীদুল আলম			01937504274	
7.	নিউন সন্দিক		সদস্য Cluster	01991616405	

ক্র. নং.	নাম	প্রতিষ্ঠান (পদবীসহ) / ঠিকানা	পেশা	মোবাইল নং	স্বাক্ষর
৪.	ব্রজেন্দ্র সেন			০১৬৬১৬১৬৬৬	
২.	এবল এন্ড				এবল

G. PCM Participants' List




স্থানঃ উপজেলা পরিষদ মিলনায়তন, চকরিয়া, কক্সবাজার

তারিখঃ ১২ জুন, ২০২৪ ই।

প্রস্তাবিত "সাসটেনেবল কোস্টাল এন্ড মেরিন ফিশারিজ" প্রকল্পের আওতাধীন কক্সবাজার জেলার চকরিয়ায় অবস্থিত সরকারি ডিফেন্স এংগেট উপ-প্রকল্পের পরিবেশগত ও সাম্প্রদায়িক প্রভাব নিরূপণ বিষয়ে

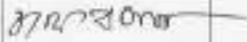
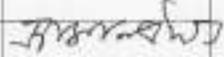
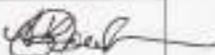
অবহিতকরণ ও মতবিনিময় সভায় অংশগ্রহণকারীদের তালিকা

Sl.No.	Name	Designation	Phone	Email	Signature
	md. Arfan uldin	DC (Land)	01777 79 216		
	md. Farhan Tazim	SCFO	01718927656	farhantazim@gmail.com	
	K.M. Salahuddin	Freedom fighter commander	0186693406		
	Nandan Paul	Upazila Account Officer	01812278861	0174437314	




স্থানাঃ উপজেলা পরিষদ মিলনশ্রবণ, চকরিয়া, ককরাছাড়া
 তারিখঃ ১২ জুন, ২০২৪ ইং

প্রস্তাবিত "সাসটেইনেবল কোস্টাল এন্ড মেরিন ফিশারিজ" প্রকল্পের আওতাধীন ককরাছাড়া জেলার চকরিয়ায় অবস্থিত সরকারি চিংড়ি এস্টেট উপ-প্রকল্পের
 পরিবেশগত ও আর্থ-সামাজিক প্রভাব নিরূপণ বিষয়ক
 অবহিতকরণ ও মতবিনিময় সভায় অংশগ্রহণকারীদের তালিকা

Sl. No	Name	Designation	Phone	Email	Signature
	মুহম্মদ সাফায়ে	জি.এ.এ.সি.সি. ককরাছাড়া	০১৪৭৭৭৭৬১১		
	সাহেব আল	সহকারী	০১৭৫৬২০৪০৩৭		
	সফায়েত আল	সহকারী	০২৬৬৫২৪৫৪৫		
	আব্দুল হকিম	সহকারী	০১৪২৪২৭২৪৭		
	মোঃ সাহেদ মোস্তাফিজ	সহকারী	০৪৪১৫৩২৪৭২		
	আব্দুল জামিল	EA (SCMFP)	০১৪৭৬৬৬০০৪		



স্থান: উপজেলা পরিষদ মিলনায়তন, চকরিয়া, কক্সবাজার

CEGIS

তারিখ: ১২ জুন, ২০২৪ ইং

প্রস্তাবিত "সাসটেইনেবল কোস্টাল এন্ড মেরিন ফিশারিজ" প্রকল্পের আওতাধীন কক্সবাজার জেলার চকরিয়ার অবস্থিত সরকারি চিহ্নি এন্ডেট উপ-প্রকল্পের পরিবেশগত ও অর্থ-সামাজিক প্রভাব নিরূপণ বিষয়ক

অবহিতকরণ ও মতবিনিময় সভায় অংশগ্রহণকারীদের তালিকা

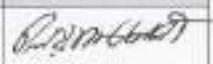
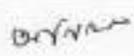
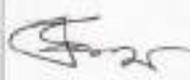
Sl No.	Name	Designation	Phone	Email	Signature
	Mohammad Sofar Tahad	DoF (EA)	০১৬০৪০১১৫৩৪		
	মাহমুদ (মহম্মদ)	DoF (EA)	০১৭৫৫২৩৭৭১১		
	সেফাতুল হক	সহঃ (সি.এম.এ.)	০২৫২২৬৬২৭৫৪		
	ইমরুল হামিদ	সি.এম.এ. মহাপরিচালক কক্সবাজার	০২৬৬৭০০৫৪৩		
	ডাঃ/সি.এম.এ.	মহাপরিচালক	০২৬২২৬৬২৭৫৪		
	সি.এম.এ. কক্সবাজার	সি.এম.এ. কক্সবাজার	০১৪১৩৭২৬৩১		




স্থানঃ উপজেলা পরিষদ মিশনফরম, চকরিয়া, কক্সবাজার
 তারিখঃ ১২ জুন, ২০২৪ ইং

প্রণবিত "সাসটেইনেবল জোস্টাস এন্ড মেবিন ফিশারিজ" প্রকল্পের আওতাধীন কক্সবাজার জেলার চকরিয়ায় অবস্থিত সরকারি চিংড়ি এনসেটি উপ-প্রকল্পের
 পরিবেশগত ও আর্থ-সামাজিক প্রভাব নিরূপণ বিবরণ

অবহিতকরণ ও মতবিনিময় সভার অংশগ্রহণকারীদের তালিকা

Sl. No.	Name	Designation	Phone	Email	Signature
	শ্রীমান মোহাম্মদ হোসেন	সি.এস.ও.	০১৮২৯৬৬০১৭		
	শ্রীমান মোহাম্মদ হোসেন	সি.এস.ও.	০১৮২৯-৮৮১৬৬১		
	শ্রীমান মোহাম্মদ হোসেন	FA, DoF	০১৮১৭৬৬০০৫১		
	শ্রীমান মোহাম্মদ হোসেন		০১৮৫৫৭০৩৮৫৭		
	শ্রীমান মোহাম্মদ হোসেন	সি.এস.ও.	০১৭৭২৬০৮৬৬ ৮০৬৮	-	
	শ্রীমান মোহাম্মদ হোসেন		০১৮১০-৩৬৬৬৬০		



স্বনম উপজেলা পরিষদ মিলনায়তন, চকরিয়া, কক্সবাজার

C&GIS

তারিখঃ ১২ জুন, ২০২৪ ইং

প্রস্তুতকৃত "মাসটাইমসেরাল কোম্পাল এন্ড মেরিন মিশারিজ" প্রকল্পের আওতাধীন কক্সবাজার জেলার চকরিয়ায় অবস্থিত সরকারি চিংড়ি এস্টেট উপ-প্রকল্পের পরিবেশগত ও অর্থ-সামাজিক প্রভাব নিরূপণ বিষয়ক

অবহিতকরণ ও মতবিনিময় সভায় অংশগ্রহণকারীদের তালিকা

Sl. No.	Name	Designation	Phone	Email	Signature
০১	স্বপ্না	OA SUK	০১৭৪১-৩৪৩৪৫৪	udair2028@gmail.com	
	সিদ্দিকুল হাট্ট	সিদ্দিকুল	০১৭৪৩২৪৪৪		
	আমিন	অফিসিয়ালিকার	০১৪৭১৭০০৭৪০		
	মেহেদুল ইসলাম		০১৭৪৪৩৭৩১ ৫৫		
		কক্সবাজার উপজেলা স্বনম পরিষদ	০১৭৬৬০৩৭৭		
	সিদ্দিকুল হাট্ট	মোহা হাট্ট	০১৭৫০১৪৭৫৫৭		



স্থান: উপজেলা পরিষদ মিলনায়তন, চকরিয়া, কর্ণাটক

CEGIS

তারিখ: ১২ জুন, ২০২৪ ইং

প্রস্তুতকৃত "সামটাইনেবল কোম্পানি এন্ড মেরিন ফিশারিজ" প্রকল্পের অর্থায়ন করণকারী জেলার চকরিয়ার অবস্থিত সরকারি চিহ্নিত এসেটা উপ-প্রকল্পের পরিবেশগত ও অর্থ-সামাজিক প্রভাব নিরূপণ বিষয়ক

অবহিতকরণ ও মতবিনিময় সভায় অংশগ্রহণকারীদের তালিকা

Sl. No.	Name	Designation	Phone	Email	Signature
	স্বতন্ত্র জেতার	প্রকল্পসূত্র	০১৪৫৫৫৩০৭২		
	অন্যায় হেপাটাইট	মহান প্রকল্প জেতার	০১৪৫৫৫৩০৭৩০		
	ড. কে. এম. মোহাম্মদুল হক	জিএনসি	০১৭৩৪১৫০৫৩৫		
	এনাঙ্গুল হক	চিহ্নিত এন	০১৪২৩৩৮৪৩৩৩৩		
	আম, ড. এম. আমজাদ	ইউজি জেতার	০১৪৫১-৪২৬৩ ৭১		
	হিজাউল হক	প্রকল্পসূত্র	০১৭৬৫৬৩৩১৫১		




স্থান: উপজেলা পরিষদ ঝিনাইদহ, ঢকুরিয়া, কক্সবাজার
 তারিখ: ১২ জুন, ২০২৪ ইং

প্রস্তাবিত "পাসটাইনেবল কোস্টাল এন্ড মেরিন ডিশারিজ" প্রকল্পের আওতাধীন কক্সবাজার জেলার ঢকুরিয়ায় অবস্থিত সরকারি চিড়ি এন্ডেট উপ-প্রকল্পের
 পরিবেশগত ও আর্থ-সামাজিক প্রভাব নিরূপণ বিষয়ে

অবহিতকরণ ও মতবিনিময় সভায় অংশগ্রহণকারীদের তালিকা

Sl. No.	Name	Designation	Phone	Email	Signature
	হুমায়ূন	সি.সি.ও. (সি.সি.ও.)	০১৭১৫৬৬৩৪৪		হুমায়ূন
	মাহমুদ	সি.সি.ও. (সি.সি.ও.)			মাহমুদ

Annex 32: Photographs



Pictures of Consultations in 10 and 11 Acres Chakaria Shrimp Estate



Pictures of Field works in BFDC





Pictures of Consultations near canals under Khulna, Bagerhat, and Satkhira Districts





Pictures of collecting Field Information and Various Physical and Biological Samples



KII with Executive Engineer BADC



KII with DFO, Cox's Bazar



KII with SUFO, Chakaria



KII with SUFO, Chitalmari



KII with DPD, Cluster Farming Canals



KII with DFO, Khulna

Some KIIs with Various Officials



Banner for Public Consultation Meeting

বন্ধনিষ্ঠ ও নিরপেক্ষতায় অবিচল
chakarianews.com
চকরিয়া নিউজ

ডেস্ক নিউজ

প্রকাশ:
 ২০২৪-০৬-১১ ১২:০৪:৪৭

আপডেট:
 ২০২৪-০৬-১১ ১২:০৪:৪৭

মৎস্য অধিদপ্তর কর্তৃক চকরিয়ায়
 সাসটেইনেবল কোস্টাল এন্ড
 মেরিন ফিশারিজ প্রজেক্টের
 অবহিতকরণ ও মতবিনিময় সভা

 **মৎস্য অধিদপ্তর**

:: পত্রিকায় প্রকাশিত বিজ্ঞাপন, ১১ জুন ::

মৎস্য অধিদপ্তর কর্তৃক সাসটেইনেবল কোস্টাল এন্ড মেরিন ফিশারিজ প্রজেক্ট (১ম সংশোধিত) জুলাই/২০১৮ হতে জুন/২০২৫ মেয়াদে বাস্তবায়নানীল রয়েছে। প্রকল্পটির কার্যক্রম বাস্তবায়নকালে প্রকল্প প্রভাবিত এলাকায় উদ্ভূত সম্ভাব্য পরিবেশগত ও আর্থ-সামাজিক প্রভাব নিরূপণের জন্য পানিসম্পদ মন্ত্রণালয়ধীন সরকারি ট্রাস্ট ও বুদ্ধিবৃত্তিক সেবা প্রদানকারী প্রতিষ্ঠান সেন্টার ফর এনভায়রনমেন্টাল এন্ড জিওগ্রাফিক ইনফরমেশন সার্ভিসেস (সিইজিআইএস) কে পরামর্শক প্রতিষ্ঠান হিসেবে নিয়োজিত করেছে। এই মর্মে সমীক্ষার অংশ হিসেবে সর্বশ্রেষ্ঠ বিভিন্ন সরকারি ও বেসরকারি প্রতিষ্ঠান ও জনগণের সূচিত্রিত মতামত ও পরামর্শ গ্রহণের লক্ষ্যে আগামী ১২ জুন, ২০২৪ ইং, রোজ বুধবার সকাল ১১:০০ ঘটিকায় উপজেলা পরিষদ মিলনায়তন, চকরিয়া, কক্সবাজার জেলায় একটি অবহিতকরণ ও মতবিনিময় সভার আয়োজন করা হয়েছে। উক্ত সভায় উপস্থিত থেকে এ বিষয়ে আপনাদের সূচিত্রিত মতামত প্রদান করার জন্য আমন্ত্রিত অতিথিবৃন্দকে সর্বিনয় অনুরোধ জানানো যাচ্ছে। ধন্যবাদান্তে কর্তৃপক্ষ।

 **CEGIS**

অবহিতকরণ ও মতবিনিময় সভা সংক্রান্ত বিজ্ঞপ্তি

প্রকল্প 'সাসটেইনেবল কোস্টাল এন্ড মেরিন ফিশারিজ প্রজেক্টের ১ম সংশোধিত' বাস্তবায়নকালে প্রকল্প প্রভাবিত এলাকায় উদ্ভূত সম্ভাব্য পরিবেশগত ও আর্থ-সামাজিক প্রভাব নিরূপণের জন্য পানিসম্পদ মন্ত্রণালয়ধীন সরকারি ট্রাস্ট ও বুদ্ধিবৃত্তিক সেবা প্রদানকারী প্রতিষ্ঠান সেন্টার ফর এনভায়রনমেন্টাল এন্ড জিওগ্রাফিক ইনফরমেশন সার্ভিসেস (সিইজিআইএস) কে পরামর্শক প্রতিষ্ঠান হিসেবে নিয়োজিত করেছে। এই মর্মে সমীক্ষার অংশ হিসেবে সর্বশ্রেষ্ঠ বিভিন্ন সরকারি ও বেসরকারি প্রতিষ্ঠান ও জনগণের সূচিত্রিত মতামত ও পরামর্শ গ্রহণের লক্ষ্যে আগামী ১২ জুন, ২০২৪ ইং, রোজ বুধবার সকাল ১১:০০ ঘটিকায় উপজেলা পরিষদ মিলনায়তন, চকরিয়া, কক্সবাজার জেলায় একটি অবহিতকরণ ও মতবিনিময় সভার আয়োজন করা হয়েছে। উক্ত সভায় উপস্থিত থেকে এ বিষয়ে আপনাদের সূচিত্রিত মতামত প্রদান করার জন্য আমন্ত্রিত অতিথিবৃন্দকে সর্বিনয় অনুরোধ জানানো যাচ্ছে। ধন্যবাদান্তে কর্তৃপক্ষ।

সংক্রান্ত সভা অধিবেশন (DuF)
 আয়োজক প্রতিষ্ঠান: সেন্টার ফর এনভায়রনমেন্টাল এন্ড জিওগ্রাফিক ইনফরমেশন সার্ভিসেস (CEGIS)
 (সিইজিআইএস, পলি মনোর অফিস)



Invitation Process for the PCM





Some Photographs of PCM

Annex 33: Selection of Valued Environmental and Social Components

Environmental and social impact assessment is very necessary for any kind of development works. Each of the components has been identified considering the impacts of proposed interventions with associated activities. Finally, the activities or interventions affect the important components of the environment and society.

The scoping process followed to select the Valued Environmental and Social Components (VESC), included professional judgments of the multi-disciplinary team members and local stakeholders as well. In this regard, VESCs were identified based on team experience and through a brainstorming session among team members. Preliminary VESC list was revised in another working-session through consulting with experts and were validated with multi-level stakeholders during a multi-stakeholder meeting.

Finally, VESCs were selected for each sub-Projects with the grounds of their selection under physical, biological, and socio-economic environment; those are pointed out in the following sections.

Environmentally sensitive receptors have been identified through existing literature review, extensive field visits, consultation with local stakeholders, experts/institutes, general public, environmental groups, and the client to pursue different issues of environmental concern. Major environmental issues in terms of VESCs related to this study are discussed below in **Table A33.1** along with their rationales.

Table A33.1: Selection of VESC and its Rationale

VESC	Rationale for selection
Physical Environment	
a) Environmental Quality	
a1. Ambient Air Quality	The land development, rehabilitation of the existing structures like sluice gates, rehabilitation of internal canals through re-excavation, management of internal and peripheral dykes, land development and leveling, demolition of abandon structures, construction of substation and associated underground distribution lines, fish processing plant etc. might cause air pollution. Henceforth, 'air quality' has been considered as a VESC.
a2. Acoustic Noise	Operation of rotatory machinery during various construction activities might alter acoustic noise level at and around the Project site. Therefore, 'Acoustic noise' is considered as a VESC.
a3. Water Quality	Construction material wash water, and operation stage accidental discharge of untreated effluent might cause alteration to 'water quality' of receiving waterbody. Therefore, it has been considered as a VESC.
b) Waste Generation	Generation of solid waste from different sources might cause burden to the construction site management. Hence, waste generation has been considered as a VESC.
c) Drainage congestion	Re-excavation of internal canals under the CSE, and Canal rehabilitation for cluster shrimp farming sub-projects, drainage system may be disrupted for the time being. On the other hand, waste from the construction site and loose soil from the land development activities may affect the internal drainage system at the BFDC harbor and BMC sub-projects. Hence, 'internal drainage' has been considered as a VESC.
d) Accidental Event	

VESC	Rationale for selection
e1. Road Traffic Management	Tree felling and vegetation clearing would be done in the BFDC and BMC areas before implementing the sub-project activities. In addition, some abandon infrastructure would be demolished at the same sites. The generated wastes would be required to be carried from the sub-project sites to other designated places/ to the vendors. In this regard, road traffic might be increased and interference to the regular vehicle movement and passersby may be hampered. Therefore, 'road traffic management' has been considered as a VESC.
e2. Vessel Traffic Management	Transportation of construction materials for implementing rehabilitation of sluice gates in the CSE might cause accidents and vessel congestion. Hence, 'vessel traffic management' has been considered as a VESC.
Biological Environment	
a) Crop Production Loss	Cluster farming for shrimp culture might cause crop production loss in some areas where agricultural activities are currently practiced in the gher areas. Hence, 'crop production loss' has been considered as a VESC.
b) Vegetation	Site preparation cause tree felling and clearance of vegetation. Hence, 'terrestrial vegetation' has been considered as a VESC.
c) Wildlife Habitat	Wildlife Habitat (aquatic and terrestrial) is another important part of the study area. Re- excavate activity might be temporary removal of aquatic habitat of fishes, Mollusca, amphibian and other fauna. It also impacts on existing wetland bird habitat. putting earthen material exercises in proposed locations are destroy existing herbs and fallow land which also habitat of wild fauna. Hence, Wildlife Habitat considering another important VESC.
d) Fish Habitat	The proposed interventions i.e., Canals re-excavation, rehabilitation of existing sluice gates may alter physical characteristics and condition of the intervened habitats. In addition, unauthorized effluent discharge from the ETP at BFDC Harbor may also alter fish habitat at the Karnaphuli River. In this context, fish habitat has been considered as a VESC.
e) Fish Species Composition	The likely alteration to the habitats and restoration of connectivity may cause changes in the composition of fish species. So, 'fish species composition' has been considered as a VESC.
f) Fish Migration	Canal (Khal) re-excavation may create more room for water and cause restoration of the connectivity with the floodplains (Beels), which in-turn may influence migration of migratory fish species. Hence, 'fish migration' has been considered as a VESC.
g) Fish Production	The resultant effect of the proposed interventions may influence both the fisheries (capture) and aquaculture fish productions. Therefore, fish production has been considered as a VESC.
Socio-economic Environment	
a) Shifting of temporary settlements	In the project area, there are some people who are employed as guards and laborers, working at the CSE, who would be required to be shifted to some other places during sub-Project implementation. For this, they may face financial crisis for shifting their structures and belongings to other places; hence, it has taken as an VSC.
b) Land Holding	Most of the cases, land has been given leased to the lease holders of outside of Cox's Bazar District. As a result, local people have grievance on these issues at CSE. On the other hand, unplanned dumping of re-excavation may cause social conflicts in the coastal Districts for the cluster shrimp farming canals. That's why it has taken as an VSC.

VESC	Rationale for selection
c) Occupational Diversity	<p>Occupation in CSE centers around two primary activities: shrimp farming and fishing. Wealthy entrepreneurs lease land for shrimp farming, with locals working as essential labor. Their tasks include overseeing shrimp hatcheries, collecting quality fry, and employing traditional fishing methods to harvest a variety of aquatic species. The harvested shrimp undergo processing for export, adding a crucial economic dimension. Additionally, during dry months, the estate contributes to salt manufacturing. This direct connection between shrimp farming, fishing, and salt cultivation forms the occupational main sector of CSE, providing employment and driving economic activities in the area. Canal rehabilitation project in the South West region of Bangladesh can play a crucial role in promoting occupational diversity in agriculture and fish culture. Rehabilitation of canals can have numerous benefits, including diversifying agricultural and aquacultural opportunities. It can enhance occupational diversity in agriculture and fish culture by improving irrigation and water quality, promoting integrated farming systems, and supporting the sustainable use of water resources. This can ultimately lead to increased productivity and economic opportunities for farmers and fishers in Bangladesh.</p>
d) Income Generation	<p>The additional employment, job opportunity and increased production to be created as a direct or indirect impact of the proposed interventions may act for the income generation of the poor household's group of the study area. Therefore, income generation has been identified as an VSC.</p>
e) Security Issue	<p>Security issues are the major concerns associated with shrimp farming. Fish theft is a recurring problem in the shrimp estate, and this area faces frequent incidents of fish robberies, with local perpetrators demanding monthly payments. Initial investigations reveal the presence of a hundred households residing inside the estate, raising serious concerns about the security and integrity of the shrimp farming community.</p>
f) Occupational Health and Safety	<p>The project involves labor engagement for land preparation and other related activities. Eventually, there will be a labor influx from different areas. The labor influx may have an impact on community health and safety through intermixing. Furthermore, if local labors are not preferred for recruitment, there will be a chance of social conflicts. As labors will be involved in various types of project activities, their occupational health and safety will be a big concern. If a proper arrangement is not taken, labors health and safety will be affected.</p>
g) Gender issue	<p>The Project will include both male and female in its activities. There will be more economic activities in the CSE, Cox's Bazar region. As a result, opportunity will be created for women in different activities both in fisheries and others. Women are currently employed in processing-related jobs in the BFDC area. It will be increased, if the project is implemented. Furthermore, women may engage in earthwork activity as part of canal rehabilitation projects. In fishery project they have the opportunity to be involved. On the contrary, GBV is prevalent in the Cox's Bazar region, and there is a chance to increase of SEA-SH in the project area as well as in the workplace. That's why gender issue has been selected as a VSC.</p>

Annex 34: Detailed Description of Environmental and Social Code of Practices (ESCOPs)

ESCOP 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.	<p>The EPC contractor shall:</p> <ul style="list-style-type: none"> • Develop site specific waste management plan for various specific 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 waste generated during construction in the designated disposal sites approved by the Project. • Minimize the production of waste materials by 3R (Reduce, Recycle and Reuse) approach. • Segregate and reuse or recycle all waste, wherever practical. • Vehicles transporting solid waste shall be covered with tarps or nets to prevent spilling waste along the route. • 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 in a clean, tidy and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes before transportation and final disposal. • Potable water should be supplied in bulk containers to reduce the quantity of plastic waste (plastic bottles). Plastic bag use should be avoided.
Hazardous Waste	Health hazards and environmental impacts due to improper waste management practices	<p>The EPC contractor shall:</p> <ul style="list-style-type: none"> • Collect chemical wastes in 200-liter drums (or similar sealed container), appropriately labeled for safe transport to an approved chemical waste depot. Adopt chain of custody handling • Store, transport and handle all chemicals avoiding potential environmental pollution. • Store all hazardous wastes appropriately in bunded areas (with capacity for storage of 110% contents) away from water courses. • Make available Material Safety Data Sheets (MSDS) for hazardous materials on-site during construction.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> • Collect hydrocarbon wastes, including lube oils, for safe transport off-site for reuse, recycling, treatment or disposal at approved locations (with capacity for storage of 110% contents)). • Construct concrete or other impermeable flooring to prevent seepage in case of spills. • Use covered storage for any hazardous waste

ESCOP 2: Fuels and Hazardous Goods Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Fuels and hazardous goods.	<p>Materials used in construction have a potential to be a source of contamination. Improper storage and handling of fuels, lubricants, chemicals and hazardous goods/materials on-site, and potential spills from these goods may harm the environment or health of construction workers.</p>	<p>The EPC contractor shall:</p> <ul style="list-style-type: none"> • Prepare spill control procedures and submit them for supervision consultant approval. • Train the relevant construction personnel in handling of fuels and spill control procedures. • Store dangerous goods in banded areas (on top of concrete or other impermeable flooring) away from watercourses. • Refueling shall occur only within banded areas. • Store and use fuels in accordance with material safety data sheets (MSDS). Make available MSDS for chemicals and dangerous goods on-site. • Transport waste of dangerous goods, which cannot be recycled, to a designated disposal site. Adopt chain of custody for handling • Provide spill kits where hazardous material are used and stored; and ensure personnel trained in the correct use. • Provide training on using spill kits to the personnel involved in handling of hazardous waste • Provide protective clothing, safety boots, helmets, masks, gloves, goggles, to the construction personnel, appropriate to materials in use. • Make sure all containers, drums, and tanks that are used for storage are in good condition and are labelled 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. • Store all liquid fuels in fully banded storage containers, with appropriate volumes, a roof, a collection point and appropriate filling/decanting point. • Store hazardous materials above flood level considered for construction purposes

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> Put containers and drums in temporary storages in clearly marked areas, where they will not be run over by vehicles or heavy machinery. Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution. Avoid the use of material with greater potential for contamination by substituting them with more environmentally friendly materials.

ESCOP 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	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> Follow the management guidelines proposed in ESCOPs 1 and 2. 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 be contained on site and 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 effect habitat of fish and other aquatic biology.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> Install temporary drainage works (channels and bunds) in areas required for sediment and erosion control and around storage areas for construction materials. Install temporary sediment basins, where appropriate, to capture sediment-laden run-off from 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 solid waste, 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 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. This contaminated water should be drained to the wastewater management facilities in site.
Soil erosion and siltation	Soil erosion and dust from the material stockpiles will increase	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> Stabilize the cleared areas not used for construction activities with vegetation or appropriate surface water

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	the sediment and contaminant loading of surface water bodies.	<p>treatments as soon as practicable following earthwork to minimize erosion.</p> <ul style="list-style-type: none"> • Ensure that roads used by construction vehicles are swept regularly to remove dust and sediment. • In case of dirt roads, any damage made by the construction vehicle should be repaired. • Water the loose 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).
Construction activities in water bodies	Construction works in the water bodies will increase sediment and contaminant loading, and effect habitat of fish and other aquatic biology.	<p>The EPC Contractor Shall:</p> <ul style="list-style-type: none"> • Dewater sites by pumping water to a sediment basin prior to release off site – do not pump directly off site. • 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. The site should be equipped with facilities to store these types of waste and wastewater with management facilities.
Drinking water	Untreated surface water is not suitable for drinking purposes due to presence of suspended solids and ecoli.	<p>The EPC Contractor Shall:</p> <ul style="list-style-type: none"> • Provide the drinking water that meets NEQS 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.

ESCOP 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.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Prepare drainage management procedures and submit them for supervision consultant 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. No discharge to river or any water course.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> 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 facilities. Ensure wastewater quality conforms to NEQS, before it is being discharged into the recipient water bodies. 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	<ul style="list-style-type: none"> 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.

ESCOP 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	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> Strictly manage the wastes management plans proposed in ESCOP1 and storage of materials in ESCOP2. Construct appropriate spill contaminant 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 disposal. 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.
Construction material stock piles	Erosion from construction material stockpiles may contaminate the soils	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds. All construction materials are to be covered

ESCOP 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.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Prepare site specific erosion and sediment control measures and submit them for supervision consultant approval. • This should include a top soil stripping, storage and reuse plan • 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 (ii) destruction of aquatic environment by erosion and/or deposition of sediment damaging the spawning grounds of fish	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • 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.
Soil erosion and siltation	Soil erosion and dust from the material stockpiles will increase the sediment and contaminant loading of surface water bodies.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • 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 paved 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).

ESCOP 7: Top Soil Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Land clearing and earth works	Earthworks will impact the fertile top soils that are enriched with nutrients required for plant growth or agricultural development.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> Strip the topsoil to a depth of 15 cm and store in stock piles of height not exceeding 2m. Remove unwanted materials from top soil like grass, roots of trees and similar others. The stockpiles will be done in slopes of 2:1 to reduce surface runoff and enhance percolation through the mass of stored soil and to ensure stability and safety. Locate topsoil stockpiles in areas outside drainage lines and protect from erosion. Construct diversion channels and silt fences around the topsoil stockpiles to prevent erosion and loss of topsoil. 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. Prior to the re-spreading of topsoil, the ground surface will be ripped to assist the bunding of the soil layers, water penetration and revegetation
Transport	Vehicular movement outside ROW or temporary access roads will affect the soil fertility of the agricultural lands	<ul style="list-style-type: none"> Limit equipment and vehicular movements to within the approved construction zone. Plan construction access to make use, if possible, of the final road alignment.

ESCOP 8: Topography and Landscaping

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Land clearing and earth works	Construction activities especially earthworks will change topography and disturb the natural rainwater/flood water drainage as well as will change the local landscape.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> Prepare landscaping and plantation plan and submit the plan for supervision consultant approval. Ensure the topography of the final surface of all raised lands (construction yards, approach roads and rails, access roads, etc.) are conducive to enhance natural draining of rainwater/flood water. Keep the final or finished surface of all the raised lands free from any kind of depression that causes water logging. Undertake mitigation measures for erosion control/prevention by grass-turfing and tree plantation, where there is a possibility of rain-cut that will change the shape of topography. Cover immediately the uncovered open surface that has no use of construction activities with grass-cover and

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<p>tree plantation to prevent soil erosion and bring improved landscaping.</p> <ul style="list-style-type: none"> Reinstate the natural landscape of the ancillary construction sites after completion of works.

ESCOP 9: Air Quality Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Air quality can be adversely affected by vehicle exhaust emissions and combustion of fuels.	<p>The EPC Contractor shall</p> <ul style="list-style-type: none"> Prepare air quality management plan (under the Pollution Prevention Plan) and submit the plan for supervision consultant approval. Vehicles with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition. Operate the vehicles in a fuel-efficient manner. Cover loads of all haul vehicles carrying dusty materials moving outside the construction site. Impose speed limits (<25 km/h) on all vehicle movement at the worksite to reduce dust emissions. Control the movement of construction traffic. Water construction materials prior to loading and transport. Service all vehicles regularly to minimize emissions. Limit the idling time of vehicles not more than 2 minutes.
Construction machinery	Air quality can be adversely affected by emissions from machinery and combustion of fuels.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> Machinery fitted with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition in accordance with the specifications defined by their manufacturers to maximize combustion efficiency and minimize the contaminant emissions. Proof or maintenance register shall be required by the equipment suppliers and contractors/subcontractors. Machinery causing excess pollution (e.g. visible smoke) will be banned from construction sites. Service all equipment regularly to minimize emissions. Provide filtering systems, duct collectors or humidification or other techniques (as applicable) to the concrete batching and mixing plant to control the particle emissions in all its stages, including unloading, collection, aggregate handling, cement dumping, circulation of trucks and machinery inside the installations.
Construction activities	Dust generation from construction sites, material stockpiles and access roads is a	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> Water the material stockpiles, access roads and bare soils on an as required basis to minimize the potential for environmental nuisance due to dust. Increase the

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	nuisance in the environment and can be a health hazard, and also can affect the local crops;	<p>watering frequency during periods of high risk (e.g. high winds). Stored materials such as gravel and sand shall be covered and confined to avoid their being wind-drifted.</p> <ul style="list-style-type: none"> • Minimize the extent and period of exposure of the bare surfaces. • Restore disturbed areas as soon as practicable by vegetation/grass-turfing. • Store the cement in silos and minimize the emissions from silos by equipping them with filters. • Establish adequate locations for storage, mixing and loading of construction materials, in a way that dust dispersion is prevented because of such operations. • Not to use water as dust suppression on potentially contaminated areas caused a liquid waste stream to be generated. • Crushing of rocky and aggregate materials shall be wet-crushed, or performed with particle emission control systems. • Not permit the burning of solid waste. Install small scale incinerator if needed.

ESCOP 10: Noise and Vibration Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Noise quality will be deteriorated due to vehicular traffic	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Prepare a noise and vibration management plan (under the Pollution Prevention Plan) and submit the plan for supervision consultant approval. • Maintain all vehicles in order to keep it in good working order in accordance with manufactures maintenance procedures. • Make sure all drivers will comply with the traffic codes concerning maximum speed limit, driving hours, etc. • Organize the loading and unloading of trucks, and handling operations for the purpose of minimizing construction noise on the work site.
Construction machinery	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Appropriately site all noise generating activities to avoid noise pollution to local residents. • Use the available plant and equipment that able to meet the Noise Control Rules 2004. • Maintain all equipment in order to keep it in good working order in accordance with manufactures maintenance procedures. Equipment suppliers and contractors shall present proof of maintenance register of their equipment. • Install acoustic enclosures around generators to reduce noise levels.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> • High efficiency mufflers to be fitted to appropriate construction equipment. • Avoid the unnecessary use of alarms, horns and sirens.
Construction activity	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Night work is generally to be minimized. • If it is needed to work at night, notify adjacent landholders prior any typical noise events outside of daylight hours. • Educate the operators of construction equipment on potential noise problems and the techniques to minimize noise emissions. • Employ best available work practices on-site to minimize occupational noise levels following Noise Control Rules 2004. • Install temporary noise control barriers where appropriate. • Notify affected people if major noisy activities will be undertaken, e.g. blasting. • Plan activities on site and deliveries to and from site to minimize impact. • Monitor and analyze noise and vibration results and adjust construction practices as required. • Avoid undertaking the noisiest activities, where possible, when working at night near the residential areas.

ESCOP 11: Protection of Flora

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Vegetation clearance	Local flora are important to provide shelters for the birds, offer fruits and/or timber/fire wood, protect soil erosion and maintain a healthy environment. As such damage to flora has wide range of adverse environmental impacts.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Prepare a plan for protection of flora and submit the plan for supervision consultant 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. • Control noxious weeds by disposing of at designated dump site or burn on site. • 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 a, etc. • Not burn off cleared vegetation – where feasible, chip or mulch and reuse it for the rehabilitation of affected areas, temporary access tracks or landscaping. Mulch provides a seed source, can limit embankment erosion,

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<p>retains soil moisture and nutrients, and encourages re-growth and protection from weeds.</p> <ul style="list-style-type: none"> • Return topsoil and mulched vegetation (in areas of native vegetation) to approximately the same area of the roadside it came from. • 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 • Supply appropriate fuel (bottled gas) in the work camps to prevent fuel wood collection.

ESCOP 12: 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,	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • 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. • Check the site for animals trapped in, or in danger from site works and use a qualified person to relocate the animal.
	Impact on migratory birds, its habitat and its active nests	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Not be permitted to destruct active nests or eggs of migratory birds. • Minimize the tree removal during the bird breeding season (February to April). 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 ledges and roadside embankments, then those areas should be avoided. • Petroleum products should not come in contact with the natural and sensitive ecosystems. Contractor must not release oil, oil wastes or any other substances harmful to migratory birds' habitats, to any waters, wetlands or any areas frequented by migratory birds.
Vegetation clearance	Clearance of vegetation may impact shelter, feeding and/or breeding and/or physical destruction	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • 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

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	and severing of habitat areas	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.
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.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Use lower wattage flat lens fixtures that direct light down and reduce glare, thus reducing light pollution, • Minimize flood lights unless they are absolutely required. • Use motion sensitive lighting to minimize unneeded lighting. • 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	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • 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. • Ensure all workers sign a code of conduct incorporating all ESCOP provisions

ESCOP 13: Protection of Fisheries and Aquatic Ecosystem

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Spillage from water vessels which carry power machinery and ancillaries	Deteriorate aquatic habitat quality of nearby river channel due to disposal of waste like ballast and bilge water	<p>The contractor shall</p> <ul style="list-style-type: none"> • Warn to the vessel sailors to ensure taking all cautionary steps for protecting spillage in river water • Ensure the construction equipment used in the river are well maintained and do not have oil leakage to contaminate river water • 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 if discharged any incautious event.
Accidental discharge of hazardous effluents and hot water	Demolished aquatic microorganisms/ fishes and deteriorate habitat quality	<p>The Contractor shall:</p> <p>Follow mitigation measures proposed ECP 3: Water Resources Management and ECP 4: Drainage Management.</p>
	The main potential impacts to aquatic flora and fauna River are increased suspended solids	<p>The Contractor shall:</p>

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities on the land	from earthworks erosion, sanitary discharge from work camps, and hydrocarbon spills	Follow mitigation measures proposed in ESCOP 3 : Water Resources Management and ESCOP 4: Drainage Management
	Filling of ponds for site preparation will impact the fishes	The Contractor shall: <ul style="list-style-type: none"> Inspect any area of a water body containing fish that is temporarily isolated for the presence of fish, and all fish shall be captured and released unharmed in adjacent fish habitat Install and maintain fish screens etc. on any water intake with drawing water from any water body that contain fish

ESCOP 14: Road Transport and Road Traffic Management

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 EPC Contractor shall: <ul style="list-style-type: none"> Prepare a traffic management plan specifying speed limit 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 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	The EPC Contractor shall: <ul style="list-style-type: none"> Restrict the transport of oversize loads. Mechanism to restrict the oversize transport Operate vehicles, if possible, to non-peak periods to minimize traffic disruptions. Enforce on-site speed limit (max 25km/h).

ESCOP 15: River Transport Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities in River	The presence of construction and dredging barges, pipe lines and other construction activities in the river can cause hindrance and risks to the river traffic.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Not obstruct other normal riverine transport while doing riverine transport and works • Identify the channel to be followed clearly using navigation aids such as buoys, beacons, and lighting • Provide proper buoyage, navigation lights and markings for bridge and dredging works to guide the other normal riverine transport • Keep regular and close contacts with Bangladesh Inland Water Transport Authority (BIWTA) regarding their needs during construction of the project • Plan the river transport and transportation of large loads in coordination with BIWTA to avoid traffic congestions. • Provide signage for river traffic conforming to the BIWTA requirements • Position the dredge and pipeline in such a way that no disruption to the channel traffic will occur
	Accidents	<p>The Contractor shall:</p> <ul style="list-style-type: none"> • Prepare an emergency plan for dealing with accidents causing accidental sinking of the vessels and ships • Ensure sufficient equipment and staffs available to execute the emergency plans • Provide appropriate lighting to barges and construction vessels.

ESCOP 16: Construction Camp Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Siting and Location of construction camps	Campsites 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.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Prepare a construction camp management plan ensuring labor influx management and submit the plan to PIU and supervision consultant for approval. • Locate the construction camps within the designed sites or at areas which are acceptable from environmental, cultural or social point of view. • Consider the location of construction camps away (this distance should be consulted with the local community) 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 site roads,

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<p>fuel storage areas (for use in power supply generators), solid waste management and dumping locations, and drainage facilities, prior to the development of the construction camps.</p> <ul style="list-style-type: none"> 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.	<p>The EPC Contractor shall provide the following facilities in the campsites:</p> <ul style="list-style-type: none"> Adequate housing for all workers. Safe and reliable water supply, which should meet NEQS. 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. The WBG EHS guideline for accommodation must be met. Treatment facilities for sewerage of toilet and domestic wastes. Storm water drainage facilities. Paved internal roads. 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	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> 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 approval waste disposal sites.
Fuel supplies for cooking purposes	Illegal sourcing of fuel wood by construction	<p>The EPC Contractor shall:</p>

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	workers will impact the natural flora and fauna	<ul style="list-style-type: none"> • 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 cooking fuels like LPG or kerosene on ration to the workforce to prevent them using biomass for cooking. • Conduct awareness campaigns to educate workers on preserving the protecting the biodiversity and wildlife of the project area, and relevant government regulations and punishments on wildlife protection. • Provide safety awareness on the use of cooking fuel.
Health and Hygiene	Increased risk of communicable diseases and burden on local health services to be transmitted including malaria, exacerbated by inadequate health and safety practices.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Provide first aid 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 (body temperature, illness, COVID symptom, symptom of any contagious diseases) 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. • Provide adequate drainage facilities throughout the camps to ensure that disease vectors such as stagnant water bodies and puddles do not form. Regular mosquito repellent 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 mandatory by all workers. Place display boards at strategic locations within the camps containing messages on best hygienic practices.
Safety	In adequate safety facilities to the construction camps may create security problems and fire hazards	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Provide appropriate security personnel (police or private security guards) and enclosures to prevent unauthorized entry in to the camp area. These should meet ESS 1 and ESS 4 requirements. • Maintain register to keep a track on a head count of persons present in the camp at any given time. • 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.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> • Provide appropriate type of firefighting equipment suitable for the construction camps • Display emergency contact numbers clearly and prominently at strategic places in camps. • Communicate the roles and responsibilities of laborers in case of emergency in the monthly meetings with contractors.
Social and cultural aspect for Camp setup	Labor Influx in the project area will have risk of social conflict, illicit behavior and crime, burden on and competition for public service provision	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Schedule construction time, particularly near the settlements, to cause least disturbance to the local population, particularly women. • Take due care of the local community and observe sanctity of local customs and traditions by his staff. Contractor will warn the staff strictly not to involve in any unethical activities and to obey the local norms and cultural restrictions. The worker must sign the code of conduct and have training • Carry out the construction activities in such a way that the open defecation timings by the local community should not be affected. The normal defecation timings are early in the morning and at late in the evening. So, the Contractor will have to take care of these timings. • During construction activities, if privacy of the nearby households is affected, the Contractor will inform the house owner to make some arrangements. Similarly, Contractor will take care as much as possible that the construction activities should not affect the privacy. • Ensure that noise and light pollution from the labor camp is kept at minimal levels especially at night.
Site Restoration	Restoration of the construction camps to original condition requires demolition of construction camps.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • 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 stages 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.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> • Handover the construction camps with all built facilities as it is if agreement between both parties (contractor 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.

ESCOP 17: Cultural and Religious Issues

Project Activity/ Impact Source	Environmental Impacts/ risk	Mitigation Measures/ Management Guidelines
Construction activities near religious and cultural sites	Disturbance from construction works to the cultural and religious sites, and contractors lack of knowledge on cultural issues cause social disturbances.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • 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 the access to cultural and religious sites. • Restrict all construction activities within the foot prints of the construction sites. • Plan high noise generating activities considering local prayer time or allow break where applicable. • Take special care and use appropriate equipment when working next to a cultural/religious institution. • 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 given. Employ chance find procedures • Provide 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. • Resolve cultural issues in consultation with local leaders and supervision consultants. • Establish a mechanism that allows local people to raise grievances arising from the construction process as per the project GRM. • 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.
Construction activities in a site where no known cultural heritage is present	Encountering an unknown cultural heritage	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Identify the protected sites in the project areas and ensure that there is no protected monument within 200 feet from a proposed project site. If the proposed site is not located in a notified area, and there are no apparent archaeological values associated with the site, take no further action.

Project Activity/ Impact Source	Environmental Impacts/ risk	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> • If, during the implementation of works, unlisted cultural heritage is encountered in any form, the contractor shall follow the below procedure: <ul style="list-style-type: none"> ○ Stop the construction activities in the area of the chance find ○ Delineate the discovered site or area ○ Secure the site to prevent any damage or loss of removable objects ○ Notify the supervisory engineer who in turn will notify the responsible local authorities (Local UNO and the Regional Office of the Department of Archaeology). ○ Department of Archaeology would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. ○ Decisions on how to handle the finding shall be taken by the Local UNO and Department of Archaeology. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeologically importance), conservation, restoration and salvage. ○ Implementation of the authority decision concerning the management of the finding shall be communicated in writing. ○ Construction work could resume only after permission is given from the responsible local authorities and the relevant Ministry concerning safeguard of the heritage. ○ The PIU shall obtain written record of the assessment of the potential impacts on the site, by the Department of Archaeology- whatever the case might be. ○ All findings must be registered and all the photographs, copies of communication with decision making authorities, conclusions and recommendations/guidance and implementation reports should be documented properly and presents to the authority. • All personnel, especially those working on earth movements and excavations, are to be inducted on the identification of potential heritage items/sites and the relevant actions for them with regards to this procedure during the Project implementation or any other stage during the entire project cycle

ESCOP 18: Community and 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 transmitted diseases etc.), (ii) risk factors resulting from human behavior (e.g. STD, HIV etc.) and (iii) road accidents from construction traffic.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • 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 which should not be less than those laid down on the 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 national standards or statutory regulations, in addition to complying with the National Standards. • 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 protection 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. • Conduct Job Hazard Analysis for all work-related procedure • 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	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • 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	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • 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. • Shall prepare a workplace reporting procedure.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> • 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. • Ensure all the vehicle drivers have license and training. • Provide awareness to the construction drivers to strictly follow the driving rules. • Provide adequate lighting in the construction area and along the roads.
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.	<p>The EPC Contractor shall provide the following facilities in the camp sites to improve health and hygienic conditions as mentioned in ESCOP 16 Construction Camp Management</p> <ul style="list-style-type: none"> • Adequate ventilation facilities • Safe and reliable water supply meeting WBG EHS guideline. • 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 ESCOP 2 • Solid waste collection and disposal system in accordance with ESCOP 1. • Arrangement for trainings • Paved internal roads. • Security fence at least 2.4 m height. • 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.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Provide portable toilets at the construction sites, if about 25 people are working 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. • There should be no direct untreated sewage discharge onsite - all project wastewater to be treated in an approved facility

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> • Provide safe drinking water facilities to the construction workers at all the construction sites.
Other ESCOPs	Potential risks on health and hygiene of construction workers and general public	<p>The EPC Contractor shall follow the following ESCOPs to reduce health risks to the construction workers and nearby community</p> <ul style="list-style-type: none"> • ESCOP 2: Fuels and Hazardous Goods Management • ESCOP 4: Drainage Management • ESCOP 10: Air Quality Management • ESCOP 11: Noise and Vibration Management • ESCOP 15: Road Transport and Road Traffic Management
Trainings	Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria and transmission of sexually transmitted infections (STI) HIV/AIDS and COVID 19 safety procedure. • 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 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 occupations, at the time of recruitment and thereafter pursued throughout the construction stage 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. The worker code of conduct must be signed and followed.

ESCOP 19: Construction and Operation Stage Security

Project Activity/ Impact Source	Impacts /Concerns	Mitigation Measures/ Management Guidelines
Construction Stage	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	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Provide appropriate security personnel (i.e. security guards) to prevent unauthorized entry into the camp area. WBG's guideline must be meet in this case. • 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.

Project Activity/ Impact Source	Impacts /Concerns	Mitigation Measures/ Management Guidelines
	delays in project completion.	<ul style="list-style-type: none"> • 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 above 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. • Ensure no unauthorized access to the site. • No trespassing signs should be posted in conspicuous areas throughout the job site. • List of employees who have after hour access to the property should be available to the DoF 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.	<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • 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: Fencing should be chain-link at least 2.4 m above high and secured with a steel chain and lock • 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 Stage	Vandalism/damage (including use of explosives) and theft of infrastructure (i.e., metals and etc.).	<ul style="list-style-type: none"> • Ensure strategic infrastructure sites 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.

ESCOP 20: Operation of Heavy Equipment Management

Project Activity/ Hazard Source	Hazard Risks	Preventive Measures
Grid station, tower erection	Hazards associated with Heavy equipment movement are: <ul style="list-style-type: none"> • Run over • Pinch in / caught in between 	The EPC Contractor shall <ul style="list-style-type: none"> • All listed hazards shall be prevented through safe working procedures, training of the operators and workers and exclusion of the operation, ensuring visibility and providing signaler etc. where applicable.
Before Operations	<ul style="list-style-type: none"> • Falling of equipment form road edge / into excavations • Falling of loads • Overturning • Driver negligence / poor operations 	<ul style="list-style-type: none"> • All construction equipment shall be maintained, equipped and operated in accordance with manufactures' requirements. • Only authorized and trained personnel shall operate equipment. • Equipment operators and truck drivers shall make a pre-shift safety inspection of their equipment. Any conditions that effect safe operation shall be corrected before use. • All visibility aids like side / back view mirrors will be available with all site vehicles and machinery. • Blocking of side / back wind shields will not be allowed by any means like curtains, posters, wall papers etc. • Use 3-point mounting and dismounting technique onto/from heavy equipment - NEVER JUMP OFF HEAVY EQUIPMENT. • Predefined hand signals or use of two-way radios between the operator and person in charge of the work crew to accomplish any and all movement.
During Operation		<ul style="list-style-type: none"> • Designate the route for earth moving machinery; avoid reversing where possible by providing in – out route. • Separate routes will be established for site vehicles and pedestrians where applicable. • All site staff will be trained for the following: <ul style="list-style-type: none"> ○ Always try to walk on the driver side of equipment as the passenger side has a larger blind spot. Place a flag person for signaling. • Arrange to provide enough space to allow the equipment and workers to perform the planed tasks safely otherwise safe distance will be maintained from all sides of the heavy equipment while they are in use. • Use of high visibility vest for all site personnel. • Prohibition of cell phone use while operating any equipment. • Not permit transporting workers on equipment or vehicles that are not equipped with seats for passengers. • Deployment of flagman when heavy equipment is in motion, especially where machinery and workers are working at close distance to ensure communication

Project Activity/ Hazard Source	Hazard Risks	Preventive Measures
		<p>between the operator and flagman to maintain safe movement.</p> <ul style="list-style-type: none"> • Cordon of swing radius of vehicles in danger zones with warning tape of barriers. • Restriction of work under any suspended or overhead load. • Restrictions in overloading of dumpers and insurance of offloading at level ground with rear wheels stop logs at the edges. • Insurance of reverse alarm with the site vehicles. • Exclusion: exclusion will be done by specifying the work area by barricades / fencing/isolating from pedestrian / worker. • Visibility: best view around machinery directly from the operator position will be ensured by adequate visibility aids (clear front, side and rare screens with side / back view mirrors covering all blind areas). • Signaler: A signaler will be provided in a safe position to direct operation and any pedestrian movements in danger zones.
After Operations		<p>The EPC Contractor shall:</p> <ul style="list-style-type: none"> • Never leave any machinery / vehicle unattended in running position or key inside. • After completion of operation all equipment shall be switched off and doors locked where applicable. • Bucket of excavator, loader shall be grounded. • All power transmission shall be neutral. • All equipment shall be parked in secured ground.

ESCOP 21: Excavation/ Dredging

Project Activity/ Hazard Source	Hazard Risks	Preventive Measures
Sloping and benching	<ul style="list-style-type: none"> • Landslides, cave-ins, excavation collapse • Falling, rolling or dislodging material • Personal Falls, machinery falls into excavated area or trenches • Water accumulation • Confined Space • Being struck or crushed by a workplace vehicle, 	<p>The slopes and configurations of sloping and benching systems will be selected and constructed by EPC contractor and will be in accordance with the approved design following applicable code and designed by a registered professional engineer.</p> <ul style="list-style-type: none"> • Allowable configurations and slopes: Excavations will be sloped at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal), unless the contractor follows other applicable design procedures approved by the engineer. • Sloping and benching systems not utilizing previous options will be approved by a registered professional engineer. Designs shall be in written form and shall include at least the following:

Project Activity/ Hazard Source	Hazard Risks	Preventive Measures
	<ul style="list-style-type: none"> • Machinery Hazards; Loading and dumping hazards, e.g. struck by or pinch in between object, crushed by when reversing, overloading, overturning of the vehicles while unloading. 	<ul style="list-style-type: none"> a) The magnitude of the slopes that were determined to be safe for the particular project; b) The configurations that were determined to be safe for the particular project; c) The identity of the registered professional engineer approving the design; and d) At least one copy of the design shall be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy shall be made available to the PIU upon request.
<p>Design of support systems, shield systems, and other protective systems</p>		<p>Designs of support systems, shield systems, and other protective systems shall be selected and constructed by EPC contractor and shall be in accordance with the approved design specifications following applicable code and designed by a registered professional engineer.</p> <ul style="list-style-type: none"> • Option i: Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data shall be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer. • Option ii: Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer shall only be allowed after the manufacturer issues specific written approval. • Option iii: Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and limitations shall be in written form at the jobsite during construction of the protective system. After that time this data may be stored off the jobsite, but a copy shall be made available to the PIU upon request. • Support systems, shield systems, and other protective systems not utilizing Option i, Option ii or Option iii, above, shall be approved by a registered professional engineer. • Designs shall be in written form and shall include the following: <ul style="list-style-type: none"> a. A plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and b. The identity of the registered professional engineer approving the design. c. At least one copy of the design shall be maintained at the jobsite during construction of the protective system. After that time, the design may be stored off the jobsite, but a copy of the design shall be made available to the PIU upon request.

Project Activity/ Hazard Source	Hazard Risks	Preventive Measures
Selection of Materials and equipment.		<p>Materials and equipment used for protective systems shall be free from damage or defects that might impair their proper function. Manufactured materials and equipment used for protective systems shall be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.</p> <ul style="list-style-type: none"> • When material or equipment that is used for protective systems is damaged, the competent person shall examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment shall be removed from service, and shall be evaluated and approved by a registered professional engineer before being returned to service. • Installation and removal of support - Members of support systems shall be securely connected together to prevent sliding, falling, kickouts, or other predictable failure. • Support systems shall be installed and removed in a manner that protects workers from cave-ins, structural collapses, or from being struck by members of the support system. • Individual members of support systems shall not be subjected to loads exceeding those which those members were designed to withstand. • Before temporary removal of individual members begins, additional precautions shall be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system. • Removal shall begin at, and progress from, the bottom of the excavation. Members shall be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation. • Backfilling shall progress together with the removal of support systems from excavations. • Additional requirements for support systems for trench excavations: <ul style="list-style-type: none"> a. Excavation of material to a level no greater than 2 feet (.61 m) below the bottom of the members of a support system shall be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.

Project Activity/ Hazard Source	Hazard Risks	Preventive Measures
		<p>b. Installation of a support system shall be closely coordinated with the excavation of trenches.</p>
Shield systems		<ul style="list-style-type: none"> • Shield systems shall not be subjected to loads exceeding those which the system was designed to withstand. • Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads. • Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields. • Employees shall not be allowed in shields when shields are being installed, removed, or moved vertically. • Excavations of earth material to a level not greater than 2 feet (.61 m) below the bottom of a shield shall be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

ESCOP 22: Dredging and Disposal

Project Activity	Impacts/Concern	Preventive Measures
Dredging	<ul style="list-style-type: none"> • Turbidity Plumes and Sedimentation • Water Pollution • Disturbance to wildlife 	<ul style="list-style-type: none"> • Design dredging alignment to reduce the need for capital and subsequent maintenance dredging. • Ensuring that dredging and disposal activities are conducted at a time of the year to avoid impacts to sensitive species or critical life-cycle stages (e.g. Breeding of Dolphins). • Detection and avoidance of aquatic mammals (Dolphin) • Selection of dredge equipment specifically to reduce plume extent and the duration of dredging; • Use of specialized equipment (e.g. turtle excluding devices, Pinger); • limiting the speed of the cutter head to reduce the amount of material entering the water column • Changing dredging schedules based on tide, wind, and background/natural turbidity to minimize effects due to increases in turbidity levels • Additional techniques and equipment to minimize adverse impacts on aquatic life from dredging and the resuspension of sediments, include (where practicable) barriers/sheet piles, silt or bubble curtains/screens, and contained sediment transport systems (e.g., pipeline placement) • Inspection and monitoring of dredging activities should be conducted regularly to evaluate the impact

Project Activity	Impacts/Concern	Preventive Measures
		of operations, the effectiveness of mitigation measures, and the need for technical adjustments to avoid and minimize impacts
Disposal	<ul style="list-style-type: none"> • Land Intake • Sedimentation • Destruction of habitat 	<p>Minimization of dredging:</p> <ul style="list-style-type: none"> • The maximization of beneficial re-use options for uncontaminated dredged material, such as for wetland creation or enhancements, habitat restoration, land reclamation, or creation of public access/recreational facilities, among other beneficial uses; • In case of contaminated dredged materials, use of a comparative risk assessment to determine which final disposal option is optimal, including confined land-based disposal (e.g., in a confined disposal facility or landfill), and/or confined aquatic disposal (e.g., confinement in the aquatic environment beneath a cap of clean sediment), and/or use of open sea disposal. • If reuse is not possible, disposal sites should be identified in consultation with local people • Compensation, resettlement should be commenced in case of land acquisition as per ESS5. • Treatment of contaminated dredged materials (e.g., using physical, chemical, and biological methods) should be evaluated as part of each management option to reduce/control impacts to human health and the environment based on the characterization of dredged materials and the comparative risk assessment • Final disposal of contaminated dredged materials, should consider the waste management guidance for non-hazardous and hazardous waste in the General EHS Guidelines of World Bank Group

ESCOP 23: Lifting and Materials Handling

Project Activity/ Hazard Source	Hazard Risks	Preventive Measures
Mechanical Handling	<p>Injuries associated with mechanical handling of loads may result from:</p> <ul style="list-style-type: none"> • Unsafe operating practices • Inappropriate condition of equipment • Improper loading • Carrying too heavy a load • Improper training 	<p>General Requirements:</p> <ul style="list-style-type: none"> • Lifting equipment selection shall be based on a risk assessment and shall be suitable for the task for which it will be used. • Lifting equipment selection should also consider the various operating environments under which the equipment may be used. • All lifting equipment used will comply with the necessary legal requirements. • All lifting equipment must be clearly marked with its safe working load as well as a unique identification number. Where the load capacity is variable, a table of load to conditions must be affixed.

Project Activity/ Hazard Source	Hazard Risks	Preventive Measures
		<ul style="list-style-type: none"> • Testing, including non-destructive testing where relevant, must be carried out by accredited contractors. • No equipment may be used if proof of inspection and test is not available (as recorded in the register). • No purpose made or adapted lifting equipment will be used, unless the special adaptation has been approved (after risk assessment) by the respective responsible engineer and the approval as well as limitations on use or special instructions are held with the register and communicated to the user. • Only employees who have been tested, found competent and authorised will be allowed to operate lifting equipment.
Manual handling	<p>Injuries associated with manual handling of loads may result from:</p> <ul style="list-style-type: none"> • Unsafe working habits • Improper lifting • Carrying too heavy a load • Incorrect gripping • Failure to wear correct personal protective equipment • Improper training 	<ul style="list-style-type: none"> • Training in safe manual handling methods. • Inspect material for the physical size and weight, and sharp or jagged edges, rough or slippery surfaces, splinters or burrs. • Adequate supervision. • Wearing of the correct personal protective equipment. • Pre-employment medical examinations and periodic examinations may reveal a hernia, knee or back injuries. • Consider physical matters such as small worker – heavy load. • Keep fingers away from pinch points, especially when setting down material. • When handling timber, pipes or other long objects, keep the hands away from the ends to prevent them from being pinched. • Wipe off grease, wet, slippery or dirty objects before handling them. • Keep hands free from oil and grease. • When possible, use holders, containers, handles or tongs when manually handling material.

ESCOP 24: Hazardous Waste

Project Activity/ Impact Source	Environmental Impacts	Preventive Measures
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 and hazardous goods/ materials on-site, and potential spills from these goods may harm the environment or health of construction workers	<p>The Contractor shall:</p> <ul style="list-style-type: none"> • Prepare spill control procedures and submit the plan for CSC approval. • Train the relevant construction personnel in handling of fuels and spill control procedures. • Store dangerous goods in bunded areas on a top of a sealed plastic sheet away from watercourses. • Refueling shall occur only within bunded areas. • Make available MSDS for chemicals and dangerous goods, which cannot be recycled, to a designated disposal site approved by DoE. • Provide absorbent and containment material (e.g., absorbent matting) where hazardous material are used and stored and personnel trained in the correct use. • Provide protective clothing, safety boots, helmets, masks, gloves, goggles, to the construction personnel, appropriate to materials in use. • Make sure all containers, drums, and tanks that are used for storage are in good condition and are 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. • Store hazardous materials above flood plain level. • Put 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 slope or drain to a safe collection area in the event of a spill. • Put containers and drums in permanent storage areas on an impermeable floor that slopes to a safe collection area in the event of a spill or leak. • Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution. • Avoid the use of material with greater potential for contamination by substituting them with more environmentally friendly materials. • Return the gas cylinders to the supplier. However, if they are not empty prior to their return, they must be labeled with the name of the material they contained or contain, information on the supplier, cylinder serial number, pressure, their last hydrostatic test date, and any additional identification marking that may be considered necessary.

Annex 35: Options for Layout and Design of Afforestation on the Peripheral Dyke

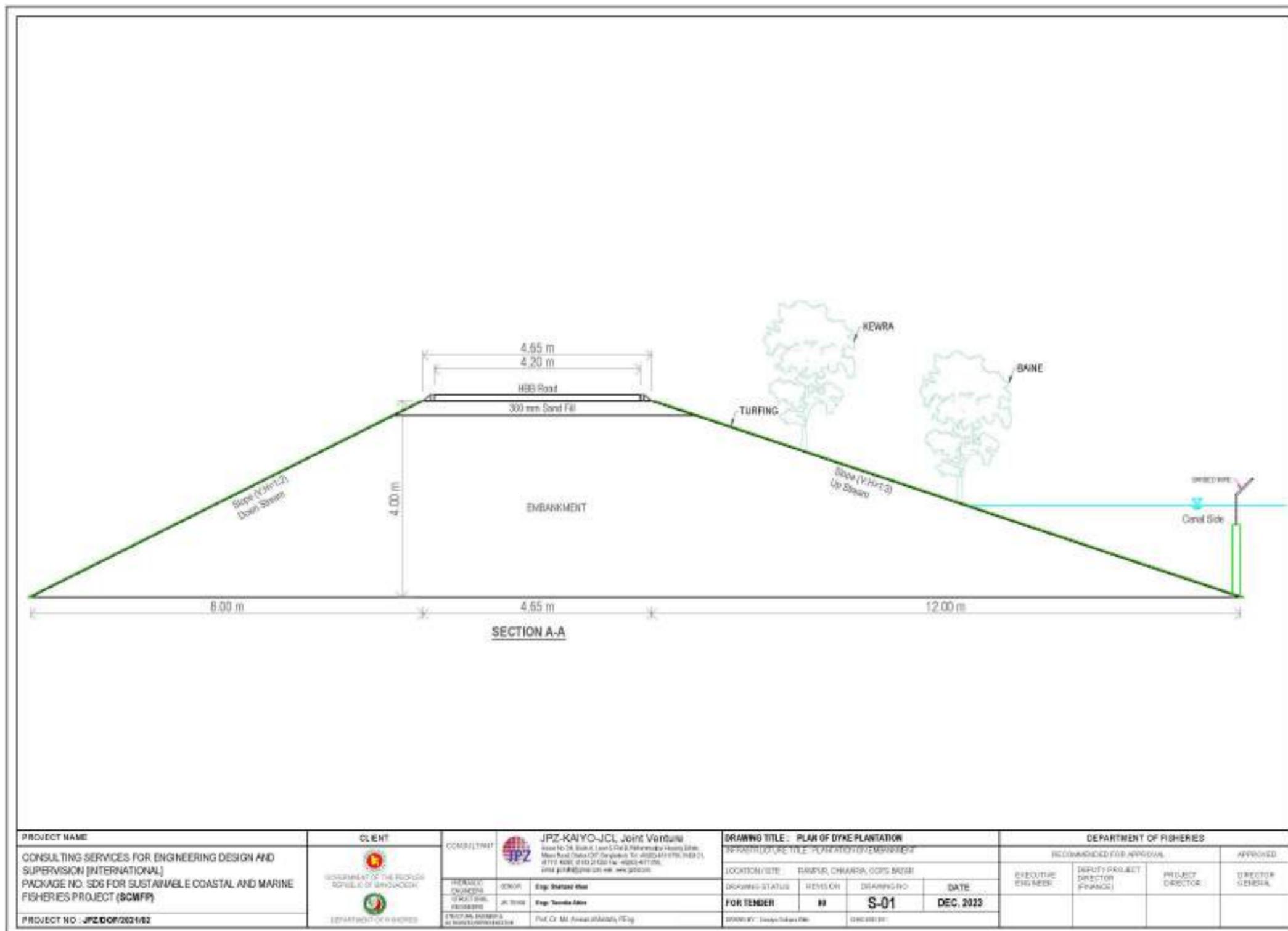


Figure A36.1: Option 1

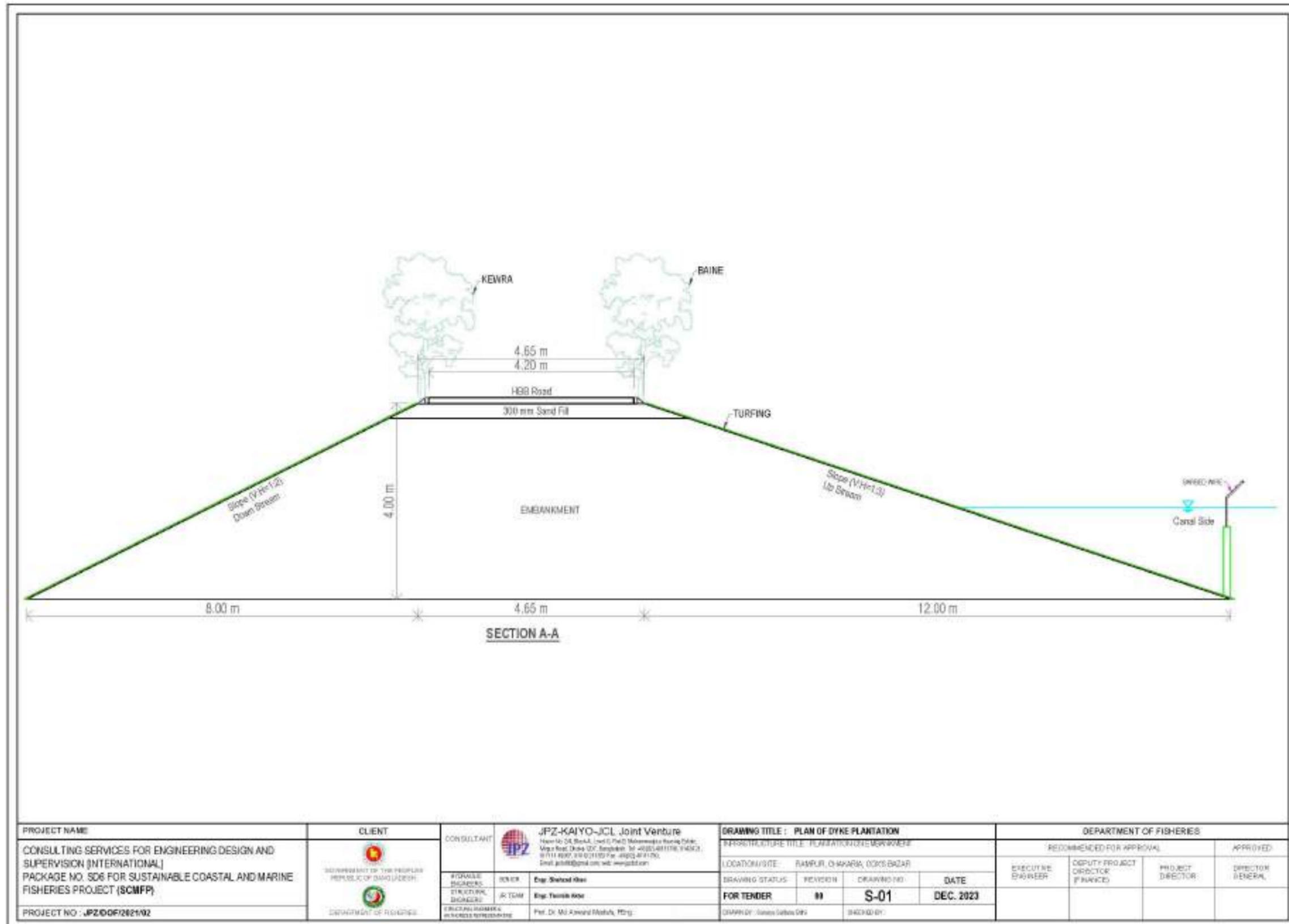


Figure A36.2: Option 2

Annex 37: Terms of Reference of EHS Consultants of Supervision Engineer

A. Objective

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

- ensure that the dismantling, installation and 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 ESIA, this includes Government and the World Bank environmental 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 WBG's EHS Guidelines on occupational health and safety procedure and practice, sanitation condition, implementation of ESMP, and waste management practices and efficiency.
- Supervise contractor in implementing ESMP, environmental monitoring plan, and ensuring environmental social safeguarding during construction activities.
- Ensure that the recommendations of the environmental and social management plan (ESMP), 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 DoF staff; 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.

B. Resources

The consulting services will require the following inputs:

Sl. No.	Expertise	Input (PM)
1	Deputy Manager (Environmental Specialist)	24
2	Asst. Manager (Environment)	24
3	Asst. Manager (Occupational, Health, and Safety)	24
4	Communication Specialist	24
5	Field Surveyor (Diploma Engineer)	24
Total=		120

C. National Consultants

1. Deputy Manager (Environmental Specialist)

The duties of the Deputy Manager shall include, but not limited to:

- Updating the ESMP provided in the ESIA as required based on the concurrent situation
- Based on the checklist conduct monitoring on implementation of ESMP, sanitation condition, and waste management practices and efficiency
- Supervise 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 and social safeguard standards on the basis of the ESIA
- Assist the PMU in arranging conducting environmental and social management seminars for contractors and DoF staff
- Preparation of quarterly environmental monitoring and annual reports of implementing the ESMP as part of project implementation report.

2. Asst. Manager (Environment)

The major duties are:

- Assist Deputy Manager in updating ESMP given in ESIA
- Collect required data and analyse those and outline report
- Assist PMU in arranging conducting environmental and social management seminars for contractors and DoF staff
- Assist in Preparation of quarterly environmental monitoring and annual reports of implementing the ESMP as part of project implementation report

3. Asst. Manager (Occupational Health, and Safety Specialist)

The duties of the Consultant shall include, but not limited to:

- Assist international Deputy Manager in ensuring that 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 ESMP
- Based on the checklist conduct monitoring on occupational safety procedure and practice
- Assist PMU in preparing quarterly environmental monitoring and annual report of implementing this plan as part of project implementation report, and carry out environmental management seminars for contractors and DoF staff
- Assist in plantation and community forest development work
- Ensure worksite health and safety aspects of the contractors' work as per ESMP and ECPs
- Ensure that the contractors do not damage the existing plantations.

4. Communication Specialist

The Communication Specialist will be responsible for the following:

- Reviewing the ESMP including mitigation and monitoring plan, enhancement plan pertaining to social aspects;
- Inspect working and labor condition
- Ensure priorities are giving to the local labor during recruitment of construction labor

- Ensure that gender aspects are adequately covered as per the ESMP
- monitor the implementation of 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
- Monitor grievance redress mechanism
- provide inputs to the quarterly and annual reports

5. Field Surveyor

The Field Surveyor will be responsible for:

- Work under the guidance of the team to collect data and monitor ecological resources, HIV/AIDS program, plantation program in bi-monthly basis as recommended in the ESIA through various defined methodologies such as technical sampling, planting activities, etc.
- Inspect the construction activities to ensure activities are carrying out in line with the EMP under the guidance of the team
- Exclusively engaged in the project site and influence area and responsible for collecting secondary data from the concerned agencies.
- Exclusively engaged to work in close association with the local government institutions, NGOs and maintaining all sorts of liaisons with different institutions and officials.

D. Budget

Sl. No.	Item	Unit	Qty	Unit Cost (USD)	Amount, USD
3	Environmental Specialist	MM	24	2,174	52,174
4	Occupational Health and Safety Specialist	MM	24	1,739	41,739
5	Social Development Specialist	MM	24	1,739	41,739
6	Field Surveyors	MM	24	2,174	52,174
4	International Travel - Airfare	RT	24	870	20,870
	Total				208,696

Annex 38: Scope of Work for Capacity Building and Training Consultant

A. Background

A capacity building program in environmental impact assessment, environmental management and occupational health and safety has been proposed for PMU and DoF staff. The program will (a) prepare training plan in environmental, health and safety, and (b) conduct training programs to improve the capability of 'implementation staff' in monitoring the implementation of environmental management and monitoring plan (EMMP) of the Project including hazardous waste management and occupational health and safety. This will be done through a program of technical assistance and training over a period of two (02) months.

B. Objectives of the Services

The objectives of the services are: (a) to make PMU and EHS Unit staff familiar with environmental issues and impacts related to the project and to improve their skills in management and evaluation of the ESMP; (b) to develop and deliver training on hazardous waste management; (c) to develop and deliver training programs on occupational health and safety; and (d) to develop and deliver training on environmental monitoring, evaluation, and reporting.

C. Scope of Work

Task 1: Preparation of Training Modules on Environmental Management and Monitoring:

The purpose of this task is to develop training modules on (i) environmental issues and impacts related to the project, (ii) hazardous waste management in the project, (iii) occupational health and safety in the project, and (iv) environmental monitoring, evaluation, and reporting.

Training in Module 1 on environmental issues and impacts will broadly include:

- Fundamentals of ESIA and its Process at DoE and at the World Bank
- Typical Environmental Issues in water control structures, electrical sub-station, ETP, WTP, Fish Processing Plant, etc.
- Analyses of Alternatives and Identification of Preferred Option
- Case studies on Scoping of Issues and Assessment of Alternatives for the project components
- Identification and Prioritization of Issues
- Conducting Baseline Environmental and Socio-economic Information
- Case studies on Collection of Baseline Information in ESIA of multi-type Projects
- Prediction and Assessment of Impacts – Tools and Case studies
- Conducting cumulative impacts and climate change assessments
- Building an Environmental and Social Management Plan
- How to Review an ESIA Report?
- Public Consultation and Information Disclosure – The process with case studies

Training in Module 2 on hazardous waste management will broadly include:

- Overview of hazardous waste regulations (USEPA, OSHA, WBG etc.)

- What is hazardous waste?
- What are the hazardous wastes in water control structures, electrical sub-station, ETP, WTP, Fish Processing Plant?
- What to do with hazardous waste? Segregation, transportation and disposal to permanent site.
- Emergency response

Training in Module 3 on occupational health and safety in the project will broadly include:

- Overview of Labor Act, Factory Act, and international Guidelines (e.g., EHS Guidelines of IFC)
- General construction related standards, such as, scaffolding, fall protection, excavations, ladders, head protection, etc.
- Occupational Health and Environmental Control
- Use of Personal Protective Equipment (PPE)
- Access to Medical and First Aid
- HIV/AIDS and other STD management
- Fire Protection Procedure
- Handling and working with sub-station, processing plant, water control structures, etc.
- Machinery and Machine Guarding, especially extremely heated environment
- Use of Hand and Portable Powered Tools and Other Hand-Held Equipment, precautions in Welding, Cutting, and Brazing
- Working with live electrical equipment
- Commercial Diving Operations
- Toxic and Hazardous Substances

Training in Module 4 on monitoring, evaluation, and reporting will broadly include:

- Monitoring techniques and methods for various components of ESMP
- Environmental Monitoring Plan and Institutional Arrangements
- Identify parameters to be monitored
- Collection and analysis of environmental quality data, and Interpretation of monitoring parameters
- Internal and external monitoring needs during construction and operation
- Organizational responsibilities and implementation schedules
- Reporting requirements of monitoring

Task 2: Deliver Training on Environmental Management and Monitoring:

The purpose of this task is to deliver a series of training programs for all the activities proposed in Task 1 to all the implementing agencies of the Project (DoF, PMU, and BFDC).

Based on the above scope of works, the consultant will carry out the following activities:

- Undertake training need assessment for stakeholders including the implementation/construction personnel.

- Devise training programs based on ESIA report and site visits to the Project area
- Prepare a staff training plan and associated materials (modules).
- Evaluate the trainings.
- Modify the training modules as necessary.
- Hand over the final training modules to the DoF/ BFDC for use in future training.
- Prepare training reports.

D. Organization and Staffing

The services are expected to be provided over a 2 months period by a team comprising one environmental specialist/team leader and one occupational health and safety specialist. Details of proposed professionals and their required input are shown below.

Table A36.1: Details of Proposed Consultants

Items	Input (Man Months)
Key Professional Staff	
1. Environmental Specialist/Team Leader	2
2. Occupational health and safety (including HIV/AIDS)	2

E. Supervision

The team will work in association with the PMU, reporting to the project director on a day-to-day basis. Overall supervision will be done by the EHS Unit of PMU.

F. Outputs

The team's outputs will include: (i) an inception report after one week of mobilization, (iii) a draft final report at the end of 7th week, containing a description of achievements, details of the training services provided, including all materials, an assessment of their effectiveness in meeting objectives and recommendations for further training assistance, (iii) and a final report at the end of assignment. All reports will be submitted in English.

In addition, the team will prepare training materials for both training programs. Each training program will consist of about 4 modules including some case studies and worked out examples. The draft training modules should be submitted to the PMU before conducting training programs for evaluation and final training modules will be presented at the end of assignment.

G. Budget

Following Table presents the estimated budget for the capacity building and training program.

Item	Unit	Unit Cost, US\$	Quantity	Total Cost, US\$
A. Remuneration and Per Diems				
<i>i. Key Professional Staff</i>				
Team Leader and Environmental Specialist	m-m	6,000	2	12,000
Natl Occupational health and safety Specialist (including HIV/AIDS)	m-m	5,000	2	10,000
Sub-Total A=				22,000
B. Transport				
<i>i. Transport</i>	LS			7,000

Item	Unit	Unit Cost, US\$	Quantity	Total Cost, US\$
<i>Sub-Total B=</i>				<i>7,000</i>
C. Training Module Preparation and Production	No.	2,500	1	<i>10,000</i>
D. Trainee Allowance	days	50	100	<i>6,000</i>
E. Contingency (10% of subtotal, A+B+C)	LS	1		<i>3,900</i>
Grand Total (A+B+C+D+E)=				48,900

Annex 39: Land Ownership Documents

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GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF AGRICULTURE AND FOREST
SECTION - I (FOREST)

No. 1/For-73/77(1)/ Dated: 17.2.78.

To
The Chief Conservator of Forests,
Bangladesh, Dacca.

Sub :- Shrimp-culture in Sundarban Chakeria (tax's Bazar),
Chittagong.

The undersigned is directed to invite his attention on the above subject and to inform the Govt. decision in the matter as follows

(a) Release 2000 acres of reserved forest land in Chakeria Sundarban in favour of Fisheries Directorate for Shrimp culture for small scale shrimp farming pond for a period of five years.

(b) The question of permanent lease may be considered after five years when the land can be de-reserved.

(c) The details of the Shrimp to along its terms and conditions of the lease would be the responsibility of the Fisheries and Livestock Dept.

2. This decision has been taken on the basis of the recommendation on Shrimp culture in the Reserved forest of Chakeria Sundarban submitted by Lt. Col. (Retd.) Mozamuddin Ahmed, Joint Secretary, Ministry of Fisheries and Livestock.

In view of the facts stated, you are requested to take necessary steps to hand over possession of the land to Fisheries Directorate at an early date.

Sd/- (G. H. Saha)
Section Officer.

No. 1/For-73/77(1)/86/1 Dated: 17.2.1978.

Copy forwarded for information and necessary action to the Secretary, Ministry of Fisheries and Livestock.

Sd/- (G. H. Saha)
Section Officer.

JA/

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
 MINISTRY OF AGRICULTURE AND FOREST
 SECTION - (FOREST)

24
 3720-06

No. 1/For-10/78/ Dated - 26-4-1978.

From :- The Section Officer,
 Ministry of Agriculture & Forest.

To :- The Chief Conservator of Forest,
 Bangladesh, Dacca.

Sub :- Shrimp-culture in Sundarban Chokoria (Cox's Bazar), Chittagong.

In continuation of this Ministry Memo No. 1/For-73, 77(1)/86 dt. 1.2.1978 the undersigned is directed to say that it has been decided after due discussion among the Hon'ble Advisor, Ministry of Agriculture and Forests, Ministry of Fisheries and Livestock and Ministry of Foreign Affairs to transfer further 3000 (Three thousand) acres of Forest land in favour of Director Fisheries for Shrimp-culture under the same terms and conditions as laid down in the above mentioned memo for Sundarban Chokoria (Cox's Bazar).

In view of the facts, mentioned you are requested to take necessary steps to hand over possession of the land to Fisheries Directorate at an early date.

Sd/- (Chinta Kumar Saha)
 Section Officer.

Dated :- 26-4-1978.

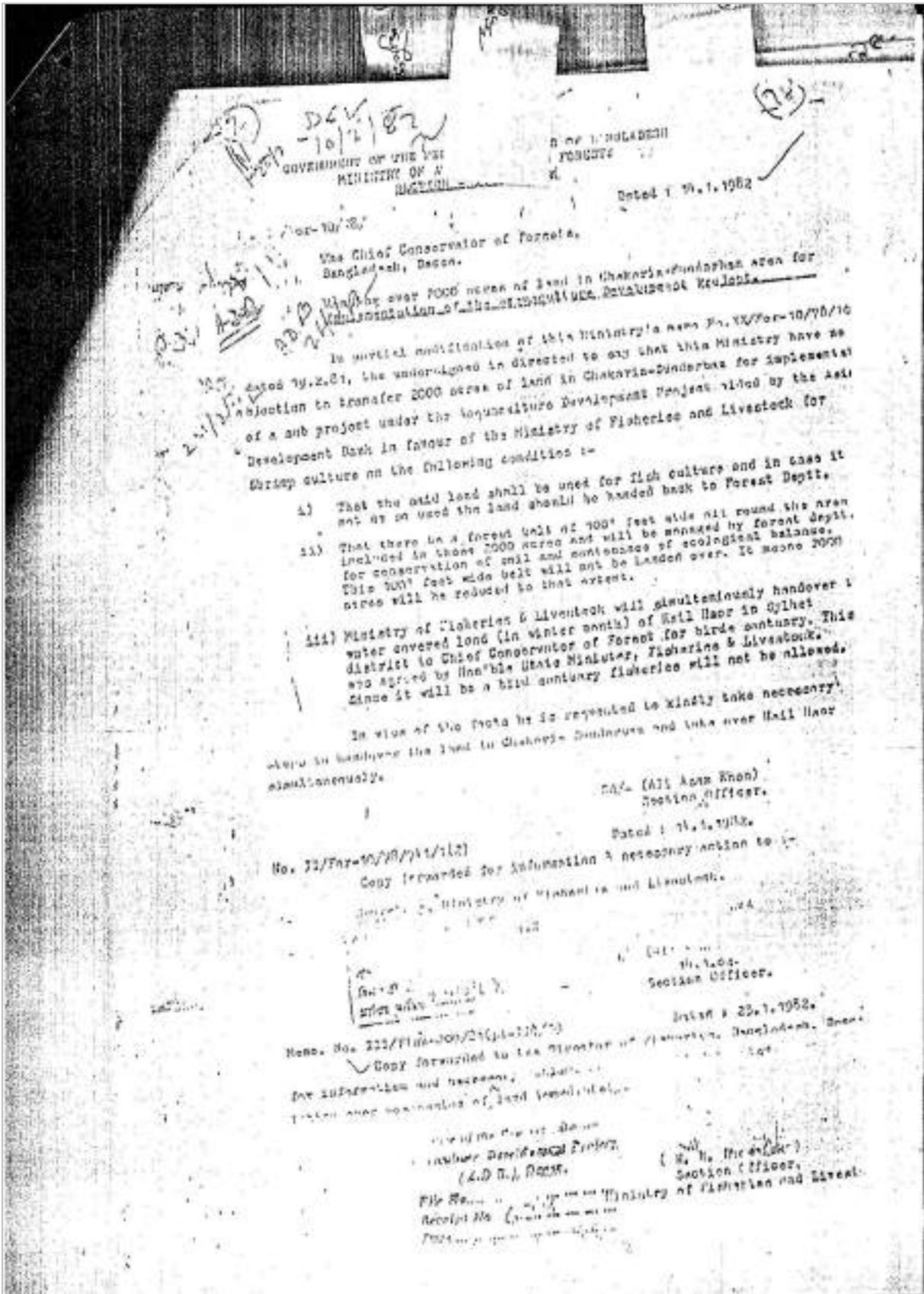
Copy forwarded for information to (1) Ministry of Fisheries and Livestock.

(2) Director, Fisheries. It is requested that he may kindly contact Conservator of Forest, Eastern Circle, Chittagong.

(3) The Conservator of Forest, Eastern Circle, Forest Hill Tracts, Chittagong.

Sd/- (Chinta Kumar Saha)
 Section Officer.

31/



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OFFICE OF THE CHIEF MARTIAL LAW ADMINISTRATOR

MARTIAL LAW ORDER No. 113

Dhaka, the 2nd November, 1985

In pursuance of the Proclamation of the 24th March, 1982, and in exercise of all powers enabling him in that behalf, the Chief Martial Law Administrator is pleased to make the following Martial Law Order :—

1. This Order shall have effect notwithstanding anything to the contrary contained in any other law for the time being in force or in any agreement, contract, document or other legal instrument.
2. Notwithstanding any judgment, decree, decision, direction, writ, order or declaration of any court, including the Supreme Court,—
 - (a) It is hereby declared that the orders, decisions and directions of the Government and also of the Director, Department of Fisheries contained in the said Director's Memo. No. FI-1/4/85/7(80), dated 2nd February, 1985, and in his subsequent letter No. 58, dated 24th February, 1985, as published in the *Dainik Bangla*, dated 27th February, 1985, and in Memo. No. P-1/4/85/38, dated 22nd April, 1985, and No. Chhgo-1/1-85/3, dated 11th June, 1985, as published in the *Dainik Ittefaq*, dated 5th May, 1985, and in the *Dainik Sangram*, dated 17th June, 1985, respectively, and all other letters, memos and notifications issued in reference thereto shall be deemed to be valid and effective and passed with lawful authority and jurisdiction and shall be deemed to have always been valid and effective and passed with lawful authority and jurisdiction and shall not be deemed to be or to have ever been invalid, ineffective, *void ab initio*, illegal, void, or without lawful authority or jurisdiction on any ground whatsoever;
 - (b) all leases, subsisting immediately before the commencement of this Order, in respect of the lands specified in the Schedule below, hereinafter referred to as the scheduled lands, shall, upon such commencement, stand cancelled and the scheduled lands stand reverted to the Government free from all encumbrances;
 - (c) all persons who are in possession of the scheduled lands or any portion thereof, whether under any lease granted at any time before the commencement of this Order or otherwise, shall, within seven days from the date of commencement of this Order, deliver possession of such lands to the Director, Department of Fisheries or his representative.
3. If any person fails or neglects to deliver possession of the scheduled lands or any portion thereof to the Director, Department of Fisheries or his representative as required under paragraph 2(c) within the time specified therein, the Government shall recover possession thereof by evicting such person therefrom without any notice and for the purpose of recovering such possession the Government or any officer subordinate to it may use or cause to be used such force as may be necessary.

or fails or neglects to deliver possession of the scheduled lands or any portion thereof to the Director, Department of Fisheries or his representative as required under paragraph 2(c) within the time specified therein, the Government shall recover possession thereof by evicting such person therefrom without any notice and for the purpose of recovering such possession the Government or any officer subordinate to it may use or cause to be used such force as may be necessary.

direction or a writ or order of any court, including the Supreme Court, notwithstanding any judgment, decree, decision, direction, writ, order or declaration of any court, including the Supreme Court,—

It is hereby declared that the orders, decisions and directions of the Government and also of the Director, Department of Fisheries contained in the said Director's Memo. No. FI-1/4/85/7(80), dated 2nd February, 1985, and in his subsequent letter No. 58, dated 24th February, 1985, as published in the *Dainik Bangla*, dated 27th February, 1985, and in Memo. No. P-1/4/85/38, dated 22nd April, 1985, and No. Chhgo-1/1-85/3, dated 11th June, 1985, as published in the *Dainik Ittefaq*, dated 5th May, 1985, and in the *Dainik Sangram*, dated 17th June, 1985, respectively, and all other letters, memos and notifications issued in reference thereto shall be deemed to be valid and effective and passed with lawful authority and jurisdiction and shall be deemed to have always been valid and effective and passed with lawful authority and jurisdiction and shall not be deemed to be or to have ever been invalid, ineffective, *void ab initio*, illegal, void, or without lawful authority or jurisdiction on any ground whatsoever;

the scheduled lands, shall, upon such commencement, stand cancelled and the scheduled lands stand reverted to the Government free from all encumbrances;

all persons who are in possession of the scheduled lands or any portion thereof, whether under any lease granted at any time before the commencement of this Order or otherwise, shall, within seven days from the date of commencement of this Order, deliver possession of such lands to the Director, Department of Fisheries or his representative.

4. No person shall be entitled to claim any compensation from the Government or from any officer subordinate to it for the cancellation of any lease under paragraph 2(b) or for delivery of possession of the scheduled lands or any portion thereof under paragraph 2(c) and no court, including the Supreme Court, shall entertain any suit, application or other legal proceeding where any prayer for such compensation has been made.
5. Whoever fails or neglects to deliver possession of the scheduled lands or any portion thereof to the Director, Department of Fisheries or his representative as required under paragraph 2(c) within the time specified therein shall be punishable with imprisonment for a term which may extend to two years, or with fine, or with both.
6. All judgments, decrees, decisions, directions, writs, or orders passed, made, given or issued, before the commencement of this Order, by any court, including the Supreme Court, which declared or had the effect of declaring the orders, decisions and directions of the Government or of the Director, Department of Fisheries mentioned in paragraph 2(a) or the memos, letters and notifications mentioned therein to be invalid, or the memos, letters and notifications mentioned therein to be invalid, or ineffective, *nulla fide*, illegal, void or without lawful authority or jurisdiction or for staying the operation thereof shall, on such commencement, stand annulled and shall be of no effect as if such judgments, decrees, decisions, writs, orders, directions or declarations had never been passed, made, given or issued.
7. All suits, appeals, petitions, applications and other legal proceedings, pending, immediately before the commencement of this Order, in any court, including the Supreme Court, where any prayer for declaring the orders, decisions and directions of the Government or of the Director, Department of Fisheries mentioned in paragraph 2(a) or the memos, letters and notifications mentioned therein to be invalid, or the memos, letters and notifications mentioned therein to be invalid, or ineffective, *nulla fide*, illegal, void or without lawful authority or jurisdiction or for staying the operation thereof or for directing the Government or any officer subordinate to it to grant or renew any lease in respect of the scheduled lands shall abate forthwith and shall not be further proceeded with.
8. In this Order, "person" includes a company, whether incorporated or not, firm, corporation and any other body, association or organisation.

Schedule of the Land

Distriet Coe's Bazar, Upazila Chokaria, (Mouza Rimpur R.S. Plot Nos) 1098, 1099, 1084, 1085, 1094, 1095, 1096, 1097, 1098, 1100, 1101, 1102, 1105, 1107, 1108, 1109, 1110, 1111, 1114, 1115, 1116, 1117, and 1118 measuring about 5000 (five thousand) acres of land.

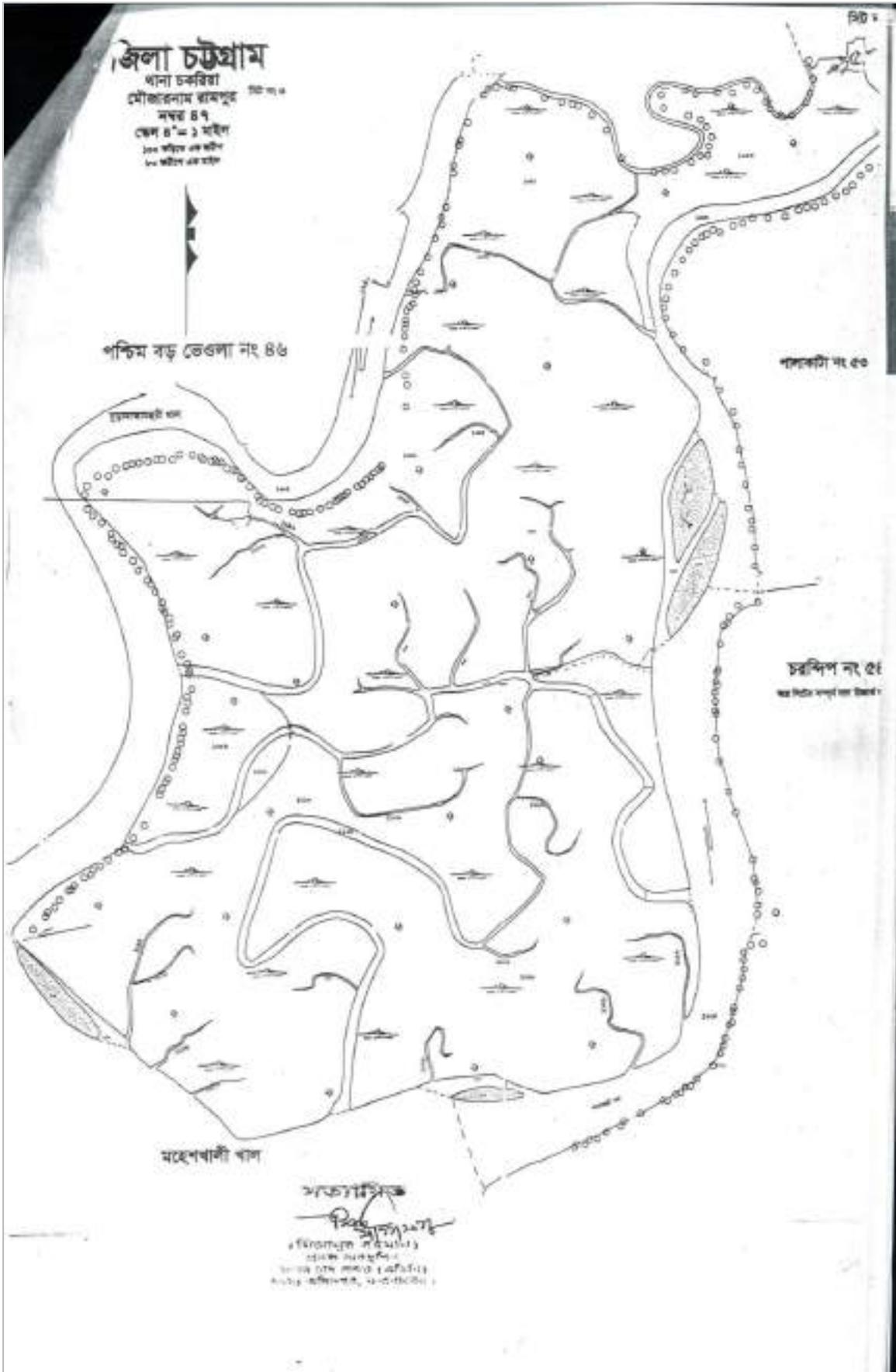
H M ERSHAD, ndc, psc
 LIEUTENANT GENERAL
 Chief Martial Law Administrator
 and
 Commander-in-Chief.

(Vide corrigendum dt. 17-11-56.)

सकामिज कार्यालय, दिल्ली ०, ११०००

2	3	4	5	6	7	8	
					1093(P)	30-12	Small landholding
					1096	5-76	Small landholding
					1097	2-72	Small landholding
						773-0	773-0
					1085(P)	31-03	Small landholding
					1086(P)	354-53	Small landholding
					1093(P)	57-0	Small landholding
					1094	2-56	Small landholding
					1095	1-28	Small landholding
						467-0	467-0
					1083(P)	512-0	Small landholding
					1083(P)	76-0	Small landholding
					1089(P)	78-0	Small landholding
						666-0	666-0
					1083(P)	614-0	Small landholding
					1100	48-32	Small landholding
					1089(P)	13-0	Small landholding
					1099	46-12	Small landholding
					1098	56-18	Small landholding
					1101	14-08	Small landholding
					1102	4-0	Small landholding
					1103	1-92	Small landholding
					1128(P)	30-40	Small landholding
						828-0	828-0
					1083(P)	756-07	Small landholding
					1084	208-48	Small landholding
					1105	4-96	Small landholding
					1106	5-12	Small landholding
					1107	3-32	Small landholding
					1104(P)	33-0	Small landholding
					1135(P)	86-05	Small landholding
						1118-0	1118-0
					1110	903-17	Small landholding
					1111	26-26	Small landholding
					1108	1-44	Small landholding
					1109	8-96	Small landholding
					1112	33-92	Small landholding
					1113	14-64	Small landholding
					1114	7-20	Small landholding
					1115	2-72	Small landholding
					1116	3-04	Small landholding
					1117	1-28	Small landholding
					1118	2-88	Small landholding
					1114(P)	61-28	Small landholding
					1083(P)	78-92	Small landholding
					1104	34-92	Small landholding
						1213-0	1213-0
					1020	1363-08	Small landholding
					1119(P)	61-28	Small landholding
					1121	3-04	Small landholding
					1122	4-32	Small landholding
					1123	4-32	Small landholding
					1124	21-76	Small landholding
					1125	12-80	Small landholding
					1126	7-20	Small landholding
					1127	5-28	Small landholding
					1128(P)	390-0	Small landholding
					1104(P)	47-92	Small landholding
						1831-0	1831-0
						7000-0	

सकामिज
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