Bangladesh University of Engineering and Technology

Department of Urban and Regional Planning

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Project Title: Terms of Reference on "Char Development Project on Selected Chars of Noakhali, Lakshmipur and Chittagong Districts"

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TERMS OF REFERENCE (TOR)

FOR

CHAR DEVELOPMENT PROJECT ON SELECTED CHARS OF NOAKHALI, LAKSHMIPUR AND CHITTAGONG DISTRICTS

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1. BACKGROUND INFORMATION OF THE PROJECT

1.1 Project Background

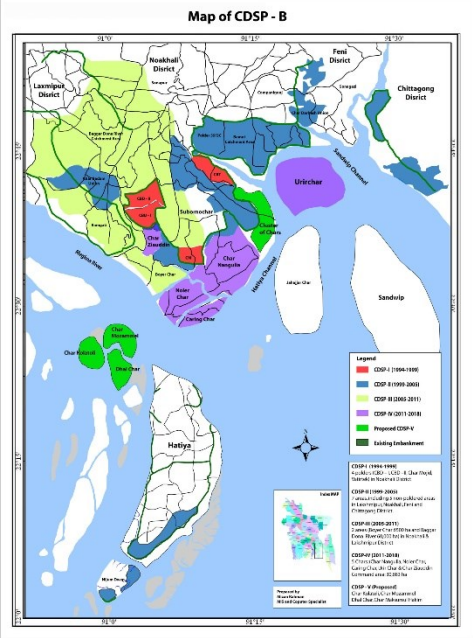
The Ganges-Brahmaputra-Meghna River basin, which forms the core of Bangladesh's coastal zone, is undergoing constant transformation. According to satellite images, every year, roughly 32 km^2 of the shoreline are lost to erosion and 52 km^2 of newly developed land are accreted. This results in a net growth of about 20 km^2 per year. With an estimated density of 800 persons per km^2 and an erosion rate of 32 km^2, over 26,000 people (or about 4,500 households) in Bangladesh lose their estuary land each year. A large number of these formerly landless individuals relocate to the newly developed land, or "chars," as these are known in Bangla (Rahman,2021). The newly accerated land is legally the property of the government and is given to the Forest Department (FD) for a 20-year period. However, a lot of river-eroded families begin living on the new land before it has been formally cleared as suitable for settlement. Since the FD owns the newly formed chars, it is unlawful to occupy the property, which further complicates the already precarious lives of the families that reside there. Due to the remote locations and fragile the law-and-order situation of the char areas, these families have to face a number of challenges. Institutions, basic health and social services are mostly lacking, with the exception of some ‘Samaj’ (local communities) and mosque- and madrassa committees. There is no access to drinking water, especially in winter, lack of communication systems and infrastructures, barely agricultural support and water sanitation and environmental hazards. Overall, a precarious existence endures there. the chars have a level of less than 3m PWD, and are thus subject to regular flooding. This results in high soil salinity levels, making agriculture difficult.

1.2 Rationale

The government has prioritized char development and the related riverbank erosion issues in its long-term climate change management plan as reflected in BDP 2100. A series of projects that have been developing newly accreted land (chars) in the coastal area of Bangladesh for over two decades. As people of coastal areas are vulnerable to a set of risks such as flooding, cyclonic surges, storms, salinity intrusion, these development interventions are necessary to provide a sense of security at different levels and to unleash the development potential that the chars offer (Wilde, 2000). Based on a Hydro-Morphological Study conduced by CDSP-B(AF), a national workshop was organized and recommended 12 coastal ch ars to undertake a feasibility study (CDSP,2023).

Based on the feasibility studies, the three char areas were included in the project for development. The project will align with MDGs, SDGs, and government policies as follows: The Coastal Development Strategy (2006) and Bangladesh Delta Plan 2100.

1.3 Project Location



Geographically the project will cover the prospective project area as shown in the map. The proposed chars are Char Kolatoli, Char Mozammel, Dhal Char which are located in Noakhali, Lakshmipur and Chattogram districts.

Source: CDSP, 2023

2. OBJECTIVE

1. To assess the physical and socio-economic vulnerability of selected coastal chars.
2. To develop climate resilient infrastructure and water-sanitation facilities.
3. To support skill development and capacity building by providing training.

3. SCOPE OF WORK

3.1 Vulnerability Assessment

3.1.1 Physical Vulnerability Assessment

a) *Identifying hazards*: Determination of the potential hazards that may affect the char area considering both current and future hazards based on climate change projections.

b) *Collection of local data*: Collection of relevant data specific to the char area, including historical records, geological and hydrological data, tide gauge records, topographic maps, and climate records to better understand the local context and potential vulnerabilities.

c) *Identification of exposure*: Determination of the degree to which the char area is exposed to the identified hazards consider factors such as distance from the coastline, elevation, presence of protective structures, and natural barriers like sand dunes or vegetation.

d) *Assessing susceptibility and sensitivity*: Evaluation of the susceptibility and sensitivity of the char area to the identified hazards. This may involve analyzing geological and hydrological characteristics, soil type, vegetation cover, land use patterns, and the potential for erosion or sedimentation.

e) *Analyzing infrastructure and human assets*: Examination of the existing infrastructure and human assets present in the char area, such as buildings, roads, ports, and other critical infrastructure as well as evaluation of their vulnerability to the identified hazards and their importance for the community.

3.1.2 Socio-economic Vulnerability Assessment

a) *Livelihood Analysis*: Interviews, focus group discussions, and participatory workshops in 3 coastal districts will be conducted to understand the economic activities, livelihood patterns, and dependence on natural resources in coastal communities. Sectors such as agriculture, fisheries, and tourism that are most vulnerable to climate change impacts will be identified.

b) *Social Vulnerability*: Evaluation of social factors such as poverty levels, access to education, healthcare facilities, and social networks. Marginalized groups, gender-specific vulnerabilities, and social cohesion within communities will also be identified.

3.1.3 Data Analysis and Mapping

a) Combining the collected data from surveys, stakeholder engagement, and physical vulnerability assessments.

b) Using Geographic Information System (GIS) tools to create vulnerability maps, showing the areas most at risk.

c) Analyzing the data to identify the key drivers of vulnerability and prioritize coastal areas requiring immediate attention and adaptation measures.

3.2 Development of Climate Resilient Infrastructure and Water-Sanitation Facilities

The project aims to create a climate resilient sustainable livelihood opportunity for the people of coastal char areas. In order to achieve the second objective, appropriate interventions for infrastructure development such as village-union roads, rural markets, embankments, sluice gates, drainage canals, cyclone shelters etc. will be identified. Furthers steps should be taken to locate suitable places for development of water and sanitation facilities.

3.2.1 Climate Resilient Infrastructure

Conducting an infrastructure inventory survey to assess the existing infrastructure's condition, its capacity to withstand climate risks for any upgrades or redesigns. For developing community perception, identifying and engaging with local communities, government agencies, non-governmental organizations (NGOs) and other stakeholders operating in the area through FGD, KII and participatory tool methods. Questions will include about the existing infrastructure, its vulnerabilities to climate events (e.g., floods, cyclones, erosion), the needs of the community, available resources, and previous experiences with climate-related incidents. Analyzing the collected data to identify key vulnerabilities, needs, and priorities for infrastructure development and mapping these areas of vulnerabilities to understand spatial aspects.

3.2.2 Water and Sanitation Facilities

Field surveys would be conducted to identify the suitable location for deep tube well and hygiene latrine construction. Reconnaissance survey to identify availability and quality of drinking water sources and existing sanitation facilities. FGD, KIIs and household surveys would be conducted to develop knowledge about hygiene behaviours, prevalence of waterborne diseases, access to sanitation facilities (toilets, latrines), waste management practices, and community perceptions. The findings will be used to the identify gaps, challenges, and priority areas for improving water and sanitation facilities.

3.3 Skill Development and Training Programmes for Sustainable Livelihood

Training and capacity-building programs should be provided to local authorities and communities to ensure the sustainability of infrastructure resilience efforts. A programme would be initiated to promote agricultural sustainability through introducing technologies that are adapted to saline conditions and resilient to climate change. This will involve technology identification and farm level testing, demonstrations, training of staff and farmers. With collaboration with NGOs,

programmes would be taken to support social livelihood such as micro-finance services, awareness raising, health and family planning, and disaster management and climate change. Training should also be provided to volunteers for disaster preparedness.

3.4 Survey Equipment

The required topographic, geological, hydrological, physical feature, and other associated surveys can be carried out with enough equipment by the consulting firm (s). If they don't have enough DGPS, GPS, or total station equipment, they will employ. It is appropriate to attach documentation proving the need for the required equipment. Preference will be given to those who own these equipment's. The following equipment have to be used:

1. DGPS with post processing facilities, accuracy level within .5 meter. Preference will be given to Real Time Kinematic Global Positioning System (RTK-GPS).
2. Total station capable to identify point, line and polygon features.
3. Optic Level.

3.5 Format for Conducting Surveys

Format for Topographic Survey:

Topographic survey GPS and Total station will cover the item of location/alignment of all roads, flood embankments, and other drainage divides. Closed boundary/outline of homestead. Waterbodies etc. junction, spot heights or land levels at roughly 10 meter intervals in normal cases, contour at .3 meter interval. Crest levels not exceeding 50 meter along all dykes, road and drainage divide.

The topographic survey report should consist of the following features:

Topographic Survey	• Land levels/spot level for contours at 50-m intervals with denser intervals for undulations. • Alignment and crest levels (not exceeding 500m) of road, embankment, dykes and other drainage divides.

	• Alignment of rivers, lake, canals and drainage channels etc. • Outline of Bazar, waterbodies etc. • Type, width, length and name of the road and name of road above flood level.

Format for Physical Feature Survey:

Physical feature survey will cover location and dimension of existing all structures with height, floor type, and use of structures and others, location of all existing electricity, gas, water, sewerage line, road (Katca, Pacca), Khal etc. Topographic and physical features survey will be incorporated in enlarged RS Mouza boundaries. Mouza map scale will be used In preparation of the bas map to demarcate the study area.

Physical Feature Survey	• Cross section, long section, Type, width, length and name of road, road level above datum, flooding lands, slopes, borrow pit. • Identification of any culvert on the road and their length, width and span of the culvert. • Type, size depth, inlet and outlet location of drain along with flow direction width and depth of the canal, place of encroachment. • Type of sewer system, size, type and location of sewerage line, location of bins, identification of any othr sewarage collection system. • Identification of the locations of the watr supply system. • Identification, location and capacity of electricity, telephone, gas, waste disposal and treatment system.

Format for Land-use survey:

Utilizing the base map, (physical features survey overlay on survey map) the land use map will be prepared indicating the broad categories of land uses as indicated below. And it will be described using a suitable land use code reference. Th characteristics of each land use area will be fully described in the survey report. The land use map will be prepared on the base map.

Land Uses	**Illustrated**
• Residential • Commercial (Markets and shops) • Educational Facilities • Health Facilities • Mixed use • Agricultural • Religious/cemetery • Historic • Vacant • Waste Disposal • Public Gathering	-Average density (high, middle and low) -Established markets -(Primary/Secondary/other schools) -Clinics. Hospitals etc -Mixed areas with dominant land uses (Residential, commercial etc) -All type of agricultural uses. -Mosque, temple, churches and other sites. -Historic structures/ sites -Vacant land with no apparent use. -Primary and secondary disposal sites and facilities -Public meeting and religious gathering

Format for household survey:

Items	**Illustrated**
• Demographic • Education Status • Occupation Pattern • Income level • Ownership Pattern • Land Value	Age, sex, growth rate, household size, migration etc. Primary, secondary, higher and others. Government, private, formal, informal and others, Lower, medium and higher (income range)

• Health facilities • Sanitation facilities • Waste management • Prevalence of waterborne diseases	Land ownership, information, transfer procedures etc. Low land, ditch land, built-up buildable land etc. Type of facilities in hospital, private clinic and dispensary etc. Type of sanitation facilities (pit latrine, flush toilet, septic tank, ventilated improved pit latrine, pour flash to pit latrine etc) Type of waste management practices Type of waterborne diseases and their causes.

4. LIST OF DELIVERABLES AND PAYMENT SCHEDULE

The timeframe is indicative, and the agency must submit a detailed timeline and work plans as part of their technical proposal. Expected contract signing date is October 2023 and the completion period of the contract is 48 months and may have the provision of no cost extension.

A. List of reports to be submitted

Deliverables	**Language**	**Format**	**No. of Copies**	**Period of submission**	**Binding Status**
Inception Report and Indicative Work Plan	English	Softcopy: Hardcopy	1 2	End of 1st Month	Spiral Binding
Technical Report	English	Softcopy: Hardcopy	1 2	End of 2nd month	Spiral Binding
Survey Report Volume1: Topographic and Physical features survey.	English	Softcopy: Hardcopy	2 8	End of 6th month	Spiral Binding

Volume 2: Socio-economic survey. Volume 3: FGD, KII					
Hydro-Morphological Study Report	English	Softcopy: Hardcopy	1 2	End of 8th month	Spiral Binding
Vulnerability Assessment Report	English	Softcopy: Hardcopy	1 2	End of 10th month	Spiral Binding
Preparing of training modules & imparting training on disaster preparedness for Training of Trainers (ToT) & Volunteers	English	Softcopy Hardcopy	1 3	End of 24th month	Spiral Binding
Draft Final Report and Report dissemination through workshops	English	Softcopy Hardcopy	1 2	End of 46TH month	Spiral Binding
Final Report	English	Softcopy Hardcopy	1 4	End of 47TH month	Spiral Binding

Progress Reports: Progress reports shall have to be submitted by consulting firms in every 3(three) months on the basis of the working schedule.

- Medium of the language of the progress report will be English.
- Both Soft copy and Hard copy will be submitted by consulting firm.
- Progress report will be submitted within 1st week of the next quarter.

B. Format for Submission of Maps:

Description	**Scale**	**No. of copies to be submitted**		
		Draft	**Final**	
		Matt Paper 150 gm (color)	**Myler**	**Matt Paper 150 gm (color)**
1.Base Map	1"=330' or 1:3960	2	2	5
2.Field Survey (Original Survey Marking)	1"=165'or 1:1980	1	-	1
3.Physical Feature Survey Map	1"=165'or 1:1980	2	2	5
4.Topographic Survey Map	1"=165'or 1:1980	2	2	5
5.Socio-economic Survey Map	1"=165'or 1:1980	2	2	5
6. Land-Use Survey Map	1"=165'or 1:1980	2	2	5
7. Road Network Map	1"=165'or 1:1980	2	2	5
8. Vulnerability Map	1"=165'or 1:1980	2	2	5

Printing and Submission:

1. **Base Map**
   Sheet Size 30" × 40"
   Scale 1:3960
2. **Survey Map**
   Sheet Size 30" × 40"
   Scale 1:1980
3. **Vulnerability Map**
   Sheet Size 30" × 40"
   Scale 1:1980

Format for Submission of Soft Copy:

1. Reports: DOC and PDF

2. Maps: Shapefile, geodatabase file with accurate attribute information and MXD files of map layouts. All the map sheets should be delivered into PDF format also.
3. Images: JPEG/TIFF
4. Primary and Secondary Data: Excel, DOC, SPSS.
5. Drawing: Shape, DXF, DWG
6. Analysis: Excel, DOC and others (with graph/chart)

C. Fee Schedule and Terms of Payment:

Payments will be made in tranches based on the following percentages and milestones and VAT and TAX will be deducted as per GoB rules during payment:

Payment Installments	Percentage of total payment	Milestone for Payment
1st Installment	15%	Signing the Contract
2nd Installment	20%	Inception Report and Indicative work plan including methodology
3rd Installment	30%	Technical Reports; Survey Reports; Hydro-Morphological Study Report.
4th Installment	25%	Detail Physical and Socio-economic vulnerability assessment reports; Preparing of training modules & imparting training on disaster preparedness for Training of Trainers (ToT) & Volunteers.
5th and Final Installment	10%	Dissemination workshops on draft final report and submission of final report

5. INSTITUTIONAL ARRANGEMENTS AND SHARING OF RESPONSIBILITIES

Institutional bodies are intended to assure the successful and efficient execution of the project. There are many institutional bodies in place for the project of Char Development to ensure the project's seamless execution. The Inter-Ministerial Steering Committee, the Project Management Committee, the implementing agencies, the Technical Assistance team (Consultancy Firm), non-governmental organizations (NGOs), and funding agencies forms the institutional structure for this project.

A. Inter-Ministerial Steering Committee: The Secretary of the Ministry of Water Resources serves as the chair of the Inter-Ministerial Steering Committee, which is the highest level coordinating body at the federal level. The committee bears the responsibility of furnishing the project with comprehensive leadership and direction, guaranteeing its congruence with national development priorities, and addressing any complications that may emerge throughout its execution.

B. Project Management Committee: The Project Coordinating Director of the Bangladesh Water Development Board (BWDB) serves as the chair of the Project Management Committee, which is the primary decision-making and coordinating body at the project level. The committee bears the responsibility of supervising the project's daily execution, guaranteeing its compliance with the project plan, and rendering decisions on any concerns that emerge throughout the implementation phase.

C. Implementing agencies: The Department of Agricultural Extension (DAE), the Department of Public Health Engineering (DPHE), Local Government Engineering Department (LGED), Bangladesh Forest Department are the implementing agencies. Each agency is in charge of carrying out particular project activities pertaining to their area of competence and has its own Project Director and budget.

D. Team for Technical Assistance (Consultancy Firm): This group of professionals supports the integration of project operations. They offers technical supports, advising and monitoring services to the implementing agencies. The group is in charge of keeping an eye on the project's development, provide technical support to the implementing agencies, and making sure that all project activities are coordinated and contribute to the project's goals.

E. NGOs: The Technical Assistance team will contract regional NGOs to carry out certain livelihood and social assistance initiatives in the project area. The NGOs work closely with the implementing agencies to make sure that the project activities are in line with the needs of the local communities. They are in charge of carrying out activities linked to livelihood support, community development, and social mobilization.

F. Donor organizations: The initiative receives funding and oversight assistance from the International Fund for Agricultural Development (IFAD) and the Embassy of the Kingdom of the Netherlands (EKN). The donor organizations are in charge of giving the project funding, keeping an eye on its development, and making sure that its goals are being met by its operations.

6. TEAM COMPOSITION AND REQUIRED QUALIFICATION FOR THE EXPERTS

6.1 Team Composition

The responsibility lies with the consultant to ensure that their team is composed of a suitable blend of key and non-key experts to meet the requirements of the Terms of Reference (TOR). To deliver the required services the team of consultants shall national expertise. Whenever the intending consulting firm feels that necessary skills and expertise are not fully available with them, they are encouraged to make association with other national firms either in the form of joint venture or sub-consultant. The consultant may also propose a comprehensive team composition with task assignments for each key staff along with sufficient support staff to meet the objectives and scope of the services.

A list of key personnel positions for technical evaluation is provided. The table shows the necessary experts and their contributions in terms of person-months.

SI No.	Position/Area of Expertise	No of Expertise	Man Month
A	**Key Personnel-International**		
1.	Team Leader	1	6
B.	**Key Personnel-National**		
1.	Deputy Team Leader	1	18
2.	Project Coordinator	1	36
3.	Senior Climate Change Specialist	1	6

4.	Disaster Risk Management Expert	1	10
5.	Hydrologist and Geologist	1	4
6.	Social and Gender Analyst	1	6
7.	Community Development Specialist	1	6
8.	Survey Expert	2	6
9.	Structural Engineer	1	2
10.	Geo-technical Engineer	1	4
11.	GIS Specialist	1	2
12.	Environment Analyst	1	4
13.	Total		110
C	**Support Stuff**	No. of Stuff	
1.	Office Manager	1	
2.	Local Administrative Officers	1	
3.	Local Facilitator	3	
4.	Computer Operator	1	
5.	Surveyors	6	
6.	Construction Labors	20	
7.	Training Facilitators	3	
9.	DAE Agricultural Stuffs	3	
10.	NGOs	3	

6.2 Required Qualification for the Experts

The Consultancy Team should consist of the following key personnel having the following qualification & experience and shall discharge their respective responsibilities as specified in the table below.

Key personnel	**Educational Qualification**	**Experience requirement**	**Responsibility**
Team Leader	Post graduate degree in urban planning/civil Engineering	1. 15 years involved in planning, design and supervision of urban development projects	1. The Team Leader will be familiar with all aspects of the

		and will have 5 years proven work experience and skill in similar position as Team Leader in similar developed and/or developing countries and countries with similar conditions as Bangladesh. 2. The Team Leader shall have the experience in similar works in at least one country other than his/her own country. 3. He will have demonstrated ability to work in a multidisciplinary team and will possess excellent communication (written and oral) skills in English.	tasks listed in the scope of works. 2. Personnel management, in particular, managing the assignments within the available budget, as well as planning and steering assignments and supporting consultations
Deputy Team Leader	Post graduate degree in urban planning/civil Engineering	15 years involved in planning, design and supervision of any development projects	1. Assist the Team Leader in all respect for the implementation of activities as defined in the scope of works

		and will have 5 years proven work experience and skill as Team Leader / Deputy Team Leader involved in the planning, design and supervision of similar development projects in Bangladesh.	pertaining to this TOR of the project 2. Coordination and quality control of the input and output of the sub-teams of consultants involved in the individual assignments.
Project Coordinator	Postgraduate degree in urban planning /development studies or other relevant field, or equivalent	1. Minimum 10 years of overall professional experience with at least 3 years of experience in project development, planning, management and implementation in the community disaster risk management sector.	1. Coordinate all consulting activities, including engaging with key stakeholders 2. Prepare a detailed project work plan, budget, donor requirements and risk management analysis, all required reports 3. Manage the consulting team members and provide guidance on project implementation. 4. Oversee all project activities, administration and finance, and ensure the project is meeting deadlines, quality standards and reporting requirements.

Senior Climate Change Specialist	Doctoral degree in a field related to climate change	At least 15 years of experience working in climate change adaptation related analysis and will have a current affiliation with an academic institution.	1. Determination of the potential hazards that may affect the char area considering both current and future hazards based on climate change projections. 2. Contribute to incorporating climate change into project design and development of adaptation pathways that enable planning under climate change uncertainty and help decision-makers to sequence measures for flexible implementation with limited desirable and maladaptive consequences. 3. Conduct preliminary scoping and assessment of climate risks and project vulnerabilities and the design of fit-for-purpose climate risk assessments. This includes state-of-the-art reviews of emerging engineering design and decision-making protocols that reflect the impacts of climate change.

Disaster Risk Management Expert	Master's Degree or equivalent in the relevant technical field such as Environmental Engineering/Civil Engineering/ Water Resources Management	15 years' experience in flood risk management, cyclone/tidal surge risk management, climate risk management, flood/cyclone protection infrastructure etc. He/She should have expertise in climate change, environmental issues and / or disaster risk reduction.	1. Contribute to the expanded access to data on climate change and disaster risks 2. Provide technical inputs on urban flood risk management, drainage, mainstreaming of risk reduction in infrastructure investment. 3. Support the development, preparation of training materials and delivery of capacity building and training courses, and the finalization of training reports. 4. Support the executing agency in organizing consultations on the development and dissemination of outputs, arranging trainings, and delivering trainings;
Hydrologist and Geologist	Bachelor in Civil Engineering/Water Resource Engineering	Preferably 05 years' experience as Hydrologist and Morphologist Specialist	1. To carry out all Hydrological and Morphological Surveys. 2. Evaluation of the susceptibility and sensitivity of the char area to the identified

			hazards by analyzing physical features. 3. Facilitate the fixation of alignment and preparation of design addressing the future hazards.
Social and Gender Analyst	Preferably Master's Degree in social sciences, or similar relevant discipline .	He/she should have preferably a minimum of 10 years' experience in the impact assessment as well as in the gender/social monitoring and evaluation of development projects. He/She should have training in stakeholder engagement and facilitation of participatory assessments. Formal training in gender assessment/analysis is also a requirement	1. The Specialist will be responsible for the stakeholder analysis, effective engagement of all groups of stakeholders. 2. Evaluation of social factors of vulnerable communities. 3. Conducting the gender/social impact assessment, and identifying the gender/social monitoring parameters of the proposed project.
Community Development Specialist	Post Graduate Degree in Development Studies	Minimum 5 years of experience of working in community development projects	1.He/She will provide inputs on stakeholder involvement, livelihood improvement and community development etc. 2. Collaborating with NGOs for capacity building (micro-

			finance services, legal right and awareness rising, health and family planning)
Survey Expert	He/she should have a Bachelor/Master degree in surveying or related field	At least 15 years experience in survey activities	He/she will supervise survey activities
Structural Engineer	BSc in Civil Post Graduate in Structural engineering	Preferably 5 years international experience as infrastructure design engineer in planning, design and construction.	Design of all structural components of the project including initial costing. Preparation/review of technical specification for structural design. Apply knowledge of construction methods.
Geo-technical Engineer	Graduate in Civil Engineering with Masters Geotechnical Engineering	Preferably 5 years international experience as Geotechnical engineering.	Ground Investigation procurement, supervision. Preparation/review of technical specification.
GIS Specialist	Bachelor in Civil Engineer or any relevant field	Preferably 05 years' experience as GIS Specialist in infrastructure or development projects. He/She should have experience in geospatial and environmental modelling.	1. Accomplishing survey and data input of all physical features for land use inventory, preparation of relational database, data processing and map producing. 2. Conduct spatial analysis and networking.

Environmentalist	Masters in Environmental Science	Experience in carrying out environmental impact assessment studies for development projects	Conduct Environmental Impact Assessment (EIA) studies

Reference

Rahman, A. (2021). Discourses on char development in Bangladesh. In Springer geography (pp. 415–426). https://doi.org/10.1007/978-3-030-73592-0_25

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